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RIIO NIC NETWORK INNOVATION COMPETITION

Electricity Network Innovation Competition: 2015 funding decision

Decision

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Overview

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

This was the third year of the Electricity NIC and the first year that the Distribution Network Operators have competed against the other electricity network licensees for funding. There were seven applications. We have selected five projects for funding. This decision is consistent with the recommendations of our independent Expert Panel. We propose to award £44.9 million of the available £81 million to these projects. The network licensees and their partners will invest £19.4 million in funding and in kind contributions in the projects.

The successful projects trial innovative practices and new technologies. We selected them because they will help network licensees understand how to meet customers' changing requirements as different forms of generation connect and customers' use of the network changes.

Context

Our energy networks are facing a number of challenges over the coming years. These include -

- Managing the technical challenges of an increasing level of intermittent generation connecting to the electricity networks.
- Managing the increasing impact of distributed resources and active demand on the networks.
- New sources of generation connecting to the network in areas far from consumption centres.

These challenges will directly affect the way electricity network companies plan and manage their businesses. Network licensees will need to innovate in the way they design, plan, and operate their networks.[1]

The Electricity NIC is designed to help stimulate this innovation. It provides up to £81 million of funding each year to encourage network licensees to undertake trials to address these challenges in the most cost-effective way. Network operators will gain understanding from these trials, which they will then be able to apply to the specific challenges they face. This could bring environmental benefits and cost savings to electricity customers in the future.

In our previous distribution price control we ran the Low Carbon Networks (LCN) Fund which provided innovation funding to Distribution Network Operators (DNOs). The Electricity NIC was introduced from the beginning of our RIIO price controls. For the past two years it has been a competition among electricity transmission network licensees. This is the first year that the distribution licensees have competed in the Electricity NIC.

Associated documents

Electricity NIC Governance Document

RIIO-T1 Strategy Decision

RIIO-ED1 Strategy Decision

[1] A "Network Licensee" is the holder of an Electricity Network Licence, ie a Distribution Network Operator (DNO), the National Electricity Transmission System Operator (NETSO), a Transmission Owner (TO), Independent Electricity Distribution Network Operators (IDNOs) or an Offshore Transmission Owner (OFTO).

Contents

Executive summary

Every year, the Electricity Network Innovation Competition (NIC) encourages network licensees to innovate in the design, development, and operation of their networks.

It funds a small number of large-scale innovation projects. This year, network licensees competed against each other for a share of up to £81 million of funding. 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.

We ran the competition for the third time this year.[2] This document contains our decisions.

The seven submissions we received requested a total of £63.5 million of funding. From these, we have selected five projects for funding. We will approve £44.9 million, of the available £81 million. The project proposals were assessed against criteria in the NIC Governance Document, which we summarise in Appendix 1.[3]

Successful projects

In reaching the decision to fund five projects, we were advised by an independent Expert Panel, which reviews the project submissions and recommends which projects should be provided with funding. We also appointed Frazer-Nash as consultants, to provide additional analysis and views to the Expert Panel and to us.

After careful consideration, we have accepted the Expert Panel's recommendations. We plan to place additional requirements on three of the projects, to ensure they deliver good value to electricity customers. These additional requirements are outlined in Chapter 2.

In December 2015, we will issue a project direction for each successful project explaining the terms that the licensee has to comply with as a condition of funding. The licensee will have to accept this direction before the project can progress.

Successful Projects	**Funding requested**
Celsius Celsius would help manage the operating temperature of distribution substation assets and deliver new solutions to managing thermal pinch points. This would release additional capacity from existing assets, reduce long-term costs for customers and avoid early asset replacement. *Submitted by Electricity North West Ltd (ENWL) (in partnership with Ricardo-AEA, Ash Wireless Electronics, Impact Research, UK Power Networks).*	£4.7m
FITNESS Future Intelligent Transmission Network Substation (FITNESS) would deliver a pilot live multi-vendor digital substation instrumentation system. It would protect, monitor and control the transmission network using digital communication over fibre. This would replace copper hard wiring, reduce cost,	£8.3m

[2] The terms "the Authority", Ofgem", "we" and "us" are used interchangeably in this document. The Authority is the Gas and Electricity Markets Authority. Ofgem is the Office of the Authority.
[3] Our Governance Document and criteria have been formulated in line with our principal objectives and general statutory duties.

risk and environmental impact, and increase flexibility, controllability and availability. *Submitted by Scottish Power Transmission (SPT) (in partnership with Alstom Grid, ABB, University of Manchester and Synaptec).*	
ANGLE-DC ANGLE-DC would demonstrate a novel network reinforcement technique by converting an existing 33kV alternating current (AC) circuit to direct current (DC) operation. This could be used by DNOs as an efficient solution to create additional network capacity and help manage network performance. *Submitted by Scottish Power Manweb (SPMW) (project partners to be confirmed).*	£13.1m
NeSTS The New Suite of Transmission Structures project would create a new breed of overhead line supports that are smaller, better for the environment and could result in financial savings for customers. *Submitted by Scottish Hydro Electric Transmission PLC (SHE Transmission).*	£6.6m
OSEAIT Offgrid Substation Environment for the Acceleration of Innovative Technologies would modify an existing 400kV substation into a field trial facility. The facility would replicate a live substation environment to overcome operational barriers associated with implementing innovative methods and technologies on the network. *Submitted by National Grid Electricity Transmission PLC (NGET).*	£12m

Unsuccessful projects

We received applications from SP Distribution (SPD) and Western Power Distribution (WPD) which we do not intend to fund.

SPD's Evolution was an innovative project which would have trialled one model of the role of a distribution system operator (DSO). Although we strongly support work which is developing thinking and experience in this area, and are encouraged that it has been proposed, we were concerned that this project did not have a robust methodology or appear to have the necessary expertise to be implemented. We did not want to fund a project which, due to its specific weaknesses, might undermine wider progress in understanding the transition to a DSO model. We encourage SPD and other network licensees to work together and with us on this subject.

WPD's project Telecoms Templates for a Low Carbon Future was seeking to define communications solutions to support smarter electricity networks. We recognise that this project sought to tackle an important subject. However, we felt this was an expensive project which lacked a robust methodology and did not demonstrate good value for money.

1. Introduction

Chapter summary

This chapter describes the background and structure of the Electricity Network Innovation Competition (NIC), how we and the Expert Panel have evaluated the projects, and the process we followed during this year's competition.

Purpose

1.1. This document explains our decisions on the applications we received for the third Electricity NIC. We assessed the projects against the evaluation criteria in the Electricity NIC Governance Document, as well as against our principal objective set out in the Electricity Act 1989 and against our general statutory duties.[4] These evaluation criteria are summarised in Appendix 1.

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

- The final submissions for the projects. We evaluated these against the criteria.
- The independent Expert Panel's recommendation report on which projects should receive funding.
- The network licensees' answers to questions raised by us, Frazer-Nash (the consultants who evaluated some of the projects, see section two) and the Expert Panel through our formal Q&A process.

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

The Electricity NIC

1.4. Network licensees need to consider how they can tackle climate change while maintaining security of supply and giving customers value for money. Meanwhile, Great Britain's gas and electricity infrastructure needs significant investment to ensure security of supply.

1.5. The Electricity NIC encourages network licensees to innovate in the way they design, develop and operate their networks. It is an annual competition which provides funding to a small number of large-scale innovation projects. This year, network licensees competed against each other for an allocation of up to £81 million of available funding.

1.6. The Electricity NIC is open to applications from all electricity network licensees. This is the first year that the competition has been opened to applications from the Electricity DNOs and Independent Electricity Distribution Network Operators (IDNOs). This is to coincide with the beginning of RIIO-ED1 from April 2015. Previously the

[4] Electricity Network Innovation Competition Governance Document.

competition was only open to electricity transmission companies. From 2010 to 2014, DNOs competed for innovation funding under the annual Low Carbon Networks Fund.[5]

1.7. Electricity network customers help fund the Electricity NIC projects. Therefore a key part of the NIC is sharing the information and knowledge that the projects create to ensure that customers across the country benefit from each project and gain sufficient return on their funding. This return includes financial benefits and carbon and/or other environmental benefits. Even where the funded projects are deemed unsuccessful at the end of their project life, network licensees will gain valuable knowledge that could result in future savings.

Structure of the Network Innovation Competition

1.8. The Electricity NIC Governance Document prescribes the governance and administration of the Electricity NIC.

1.9. The annual competition starts when network licensees submit project proposals in the Initial Screening Process (ISP). During the ISP, we consider whether these proposals are eligible for funding. Only eligible projects may progress to the full submission stage.

1.10. After the ISP, network licensees are invited to develop the eligible projects into full submissions. An independent panel of experts advises us, but we make the final decision on whether or not to provide funding.[6] The panel consists of individuals with specific expertise in the 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 Electricity NIC Governance Document.

The 2015 competition

1.11. This year's competition began with the ISP in April 2015. We received seven submissions and were satisfied that they all met the ISP eligibility requirements. Network licensees submitted full submissions for the seven projects by the deadline of 31 July 2015. A brief summary of each project is in Chapter 2 and all the ISPs and full submissions are on our website.[7]

1.12. This year, the combined funding requested was £63.5 million.

1.13. The Expert Panel reviewed the network licensees' submissions and consultants' lists of issues with the projects. It also met all the network licensees and their project partners twice. It then evaluated the projects against the criteria in the Electricity NIC Governance Document. Where aspects of the submissions needed clarifying, the network licensees had the opportunity to make the necessary changes and resubmit their proposals. The Expert Panel made its recommendations based on the final submissions. It submitted its recommendation report to us in early November 2015.

[5] https://www.ofgem.gov.uk/electricity/distribution-networks/network-innovation/low-carbon-networks-fund.
[6] The biographies of the Expert Panel can be found here.
[7] Full submissions can be found here.

1.14. We appointed Frazer-Nash as our consultants for this year's competition. The consultants' role changed this year after we received feedback from the Expert Panel about how best they could add value.

1.15. Rather than focus on all the assessment criteria, we asked the consultants to assess a limited number of criteria with a technical focus. The consultants attended the first bilateral meetings with the licensees, but not the second. This year we have used more internal technical resource to support the Expert Panel.

1.16. The consultants produced an Issues List which reported, by exception, against the each of the criteria the consultants was considering. The network licensees were sent a draft for a factual accuracy check.

1.17. In addition, we, the consultant, and the Expert Panel asked questions of the companies throughout the process. All of the questions and answers have been published on our website.[8]

1.18. We assessed the projects, taking into account the Expert Panel's recommendations and assessing the projects against the evaluation criteria, to decide which projects should receive funding. This assessment is included in Appendix 1 of this document.

[8] You can find all the documents here. This includes the full submissions and the questions and answers.

2. Decision

Chapter summary

We have decided to fund five out of the seven submissions we received. We will place additional conditions on three projects. In total we are approving £44.9 million of funding. This chapter provides the reasons for our decision.

Overview of full submissions

2.1. This was the third year of the Electricity NIC and we received proposals from three of the Transmission Owners (TOs) and four of the DNOs.

2.2. Although we were pleased with the project ideas brought forward, there were a number of projects which could have been articulated more clearly, particularly surrounding the relevant project's benefits. We strongly encourage network licensees to undertake prior work before submitting projects, using the Network Innovation Allowance (NIA) where applicable.

2.3. We also strongly encourage network licensees to review the advice for future submissions provided by the Expert Panel in Section 4 of its report.

Our decision

2.4. We have considered the project submissions, the Expert Panel's recommendations, the formal Q&A process, and the consultants' Issues Lists against the competition's framework, our principal objective set out in the Electricity Act 1989, and our relevant statutory duties.

2.5. This year's projects are summarised in Table 2.1.

Table 2.1: Projects selected for funding as submitted

Project	Funding requested
Celsius Celsius would help manage the operating temperature of distribution substation assets and deliver new solutions to managing thermal pinch points. This would release additional capacity from existing assets, reduce long-term costs for customers and avoid early asset replacement. *Submitted by Electricity North West Ltd (ENWL) (in partnership with Ricardo AEA, Ash Wireless Electronics, Impact Research, UK Power Networks).*	£4.7m
FITNESS Future Intelligent Transmission Network Substation (FITNESS) would deliver GB's first live multi-vendor digital substation instrumentation system to protect, monitor and control the transmission network using digital communication over fibre. This would replace copper hard wiring, reduce cost, risk and environmental impact, and increase flexibility, controllability and availability. *Submitted by Scottish Power Transmission (SPt) (in partnership with Alstom Grid, ABB, University of Manchester and Synaptec).*	£8.3m

ANGLE-DC ANGLE-DC would demonstrate a novel network reinforcement technique by converting an existing 33kV AC circuit to DC operation. This could be used by DNOs as an efficient solution to create additional network capacity and help manage network performance. *Submitted by Scottish Power Manweb (SPMW) (project partners to be confirmed).*	£13.1m
NeSTS The New Suite of Transmission Structures project would create a new breed of overhead line supports that are smaller, better for the environment and could result in financial savings for customers. *Submitted by Scottish Hydro Electric Transmission PLC (SHE Transmission).*	£6.6m
OSEAIT Offgrid Substation Environment for the Acceleration of Innovative Technologies would modify an existing 400kV substation into a field trial facility. The facility would replicate a live substation environment to overcome operational barriers associated with implementing innovative methods and technologies on the network. *Submitted by National Grid Electricity Transmission PLC (NGET).*	£12.0m
Evolution Evolution would have trialled the UK's first concept of the Distribution System Operator role. It would have demonstrated how operating a "localised balancing market" could reduce customer bills through efficient provision of services and optimised network performance. *Submitted by Scottish Power Distribution (SPD) (in partnership with Smart Grid Consultancy, Global Energy Advisory, CGI).*	£6.1m
Telecoms Template for a Low Carbon Future Telecoms Template would have defined communications solutions to support smarter electricity networks. It would have built on knowledge from global experience to test technology performance against smart grid criteria. It also would have delivered a suite of design templates and a software tool to facilitate informed strategy decisions. *Submitted by Western Power Distribution (WPD).*	£12.6m

2.6. For our decision this year we have -

- Selected two projects that can be funded as submitted (Table 2.2).
- Identified three projects which will require additional conditions to be agreed by the network licensee before funding can be provided (Table 2.3). This is to ensure that customers' money is being spent efficiently and that customers will receive good value for money from these projects. We explain the additional conditions for these projects below in "Reasons for our decision".
- Decided that two projects will not be funded (Table 2.4).

Table 2.2: Projects selected for funding as submitted

Project	Funding Licensee	Funding requested
Celsius	ENWL	£4.7m
FITNESS	SPT	£8.3m

Table 2.3: Projects selected for funding with additional conditions

Project	Funding Licensee	Funding requested
ANGLE-DC	SPMW	£13.1m
NeSTS	SHE Transmission	£6.6m
OSEAIT	NGET	£12.0m

Table 2.4: Project not selected for funding

Project	Funding Licensee	Funding requested
Evolution	SPD	£6.1m
Telecoms Templates	WPD	£12.6m

Reasons for our decisions

2.7. We reviewed each submission against the evaluation criteria in the NIC Governance Document. These assessments are in Appendix 1 of this document. Below we summarise the reasons for our decisions.

Project selected for funding as submitted

Celsius – ENWL

Overview

2.8. This project would seek to understand better the relationship between load and the temperature of electrical assets in distribution transformers and substations. It would develop a tool to determine an asset's internal operating temperature and then test a range of retrofit cooling techniques for these assets and assess whether or not these are acceptable to customers. If successful this project would allow DNOs to release increased capacity from existing assets without degrading their health and reliability.

Summary of assessment

2.9. We and the Expert Panel concluded that this was a well presented and clearly articulated submission. The submission has the potential to deliver real benefits to GB consumers. Celsius performed well against all of the evaluation criteria set out in the Governance Document and provided us and the Expert Panel with confidence throughout the evaluation process. Where concerns were raised, ENWL responded with suitable adjustments to the submission to mitigate these.

2.10. Both we and the Expert Panel agree that this project is innovative and will deliver benefits for electricity customers. It would use learning gained in a First Tier LCN Fund project which identified that thermal constraints are a barrier to low carbon technology uptake. Celsius would provide practical solutions to tackle a network issue which is likely to increase as the demand for low carbon technologies increases. It would release thermal capacity significantly faster than traditional network reinforcement techniques.

2.11. We believe that this project represents good value for money. The learning generated could result in considerable savings. If successful, the learning from Celsius could be deployed across GB by other DNOs.

2.12. Initially the Expert Panel had concerns that DNOs would not be comfortable in exceeding traditional asset ratings limits. ENWL allayed concerns by increasing the robustness of its dissemination programme. This now includes one-to-one sessions with industry stakeholders and an additional project output would be drafting changes to Engineering Recommendations.

2.13. We consider that this project has a robust methodology. ENWL engaged four project partners and secured contributions to the overall project cost. These partners would support the project where external expertise is needed.

Future Intelligent Transmission Network Substation (FITNESS) - SPT

Overview

2.14. FITNESS would trial GB's first live digital substation. It would equip two bays of a 275kV substation with new fully integrated digital controls and communications equipment. These would run in parallel with conventional technologies fitted to the remaining substation bays for a trial period and then be operated as business as usual. It would also trial new sensor technologies for voltage and current measurements. The digital communications would use fibre optic cables instead of copper. The new substation design would increase controllability, reduce environmental impact, improve substation safety and allow faster deployment.

Summary of assessment

2.15. We agree with the Expert Panel's view that this project would provide excellent learning for the likely future deployment of digital substations across GB. If successful, SPT claimed that the project would help to accelerate the roll out of digital substations by eight years. Overall we thought the project performed well against the evaluation criteria set out in the Electricity NIC Governance Document.

2.16. The project is innovative because it would use multi-vendor interoperability that has not been proven in a live substation. We agreed with the Expert Panel that this would be necessary in proving standardisation and progressing to business as usual for the other network licensees.

2.17. We and the panel were impressed by the project and the chosen methodology following the bilateral meetings with SPT. SPT resubmitted its project with reduced costs to improve the value for the project. We were pleased that the two major suppliers partnering on the project are offering contributions.

2.18. We are satisfied that this project would bring significant benefits to other network licensees and to consumers. It would reduce outage time when carrying out substation replacement and modernisation. It would give SPT more control and visibility of its operating conditions, allowing greater use of the network and potentially allowing more access to the network to distributed generators. The new design would also result in considerable carbon savings.

Project selected for funding with additional conditions

ANGLE-DC – SP Manweb

Overview

2.19. This project would convert existing alternating current (AC) assets to direct current (DC) operation at medium voltage (MVDC) as an innovative way of reusing existing assets. The link would provide a fully controllable connection between the mainland and Anglesey, where there is a significant amount of renewable generation connected to the network, with more scheduled to be connected. It would provide additional export capacity from Anglesey.

Summary of assessment

2.20. We were satisfied that this project would bring carbon and financial benefits to consumers. The method could release capacity through the increased control of the power in the network and it could reduce losses on the network. These benefits could result in significant carbon and financial savings.

2.21. The project is innovative. There has not been a MVDC line on an AC circuit trialled in GB before. We are convinced that there are commercial and technical risks associated with the project which prevents the project being implemented as business as usual. SPMW identified 25 other sites across GB where this method could be implemented; this project could reduce the costs of rolling out of this method across these other sites.

2.22. The Expert Panel initially raised concerns about the relatively short period allotted for testing the DC link in the project plan. However, SPMW provided assurance that it would continue to provide the other network licensees with data once the project has closed down. SPMW also extended the project's deadline to allow more flexibility during the project closedown process.

2.23. We were pleased with the dissemination plan within the submission and are satisfied that this project would produce valuable learning which may be relevant to a number of stakeholders.

2.24. While the project does not have any project partners confirmed, we were pleased by the prior engagement SPMW has undertaken in preparation of its bid. It has engaged with the two main suppliers of MVDC technology and consultants have verified aspects of the submission.

2.25. SPMW claimed that there will not be any direct benefits from the project. However, the method would involve installing an additional 33kV AC circuit alongside the DC link to provide security of supply during the project. Whilst we are supportive of this precaution we were concerned how this extra asset relates to SPMW's load-related allowances in its RIIO-ED1 settlement. Furthermore, the project may offer SPMW an additional benefit in terms of extra capacity, potentially allowing it to outperform under the RIIO-ED1 efficiency incentives and load indices. Therefore as a condition of funding this project, we would review, once the project has ended, whether or not the value of these additional assets, and any other attributable price control benefits to SPMW, should be returned to customers.

2.26. We agree with the Expert Panel that this is an expensive project but we consider it to be good value for money considering the benefits the project may accrue. Overall, this project performed well against the evaluation criteria.

New Suite of Transmission Structures – SHE Transmission

Overview

2.27. This project would seek to develop a full suite of new overhead line support structures. Network licensees can face opposition to new projects due to the visual and environmental impact of overhead lines. With the exception of the introduction of NGET's T Pylon there has been no change in design to the standard steel lattice towers used throughout GB since the 1920s. SHE Transmission has indicated that the T Pylon does not lend itself to deployment in challenging environments. However, there is increasing renewable generation requiring connection to the network in challenging environments, such as those within SHE Transmission's area.

2.28. NeSTS would deliver a suite of new towers and then demonstrate a chosen design. It would aim to be publicly acceptable and reduce the costs of new overhead line projects. It would be available to all TOs and be particularly relevant for challenging terrain.

Summary of assessment

2.29. The project would build on a NIA project to deliver new structures which would have a reduced environmental and visual impact and be adept at connecting remote generation. It could potentially be lower cost than the current tower design, primarily due to reduced foundation costs. We agree with the Expert Panel's view that this project is good value for customers and could generate relevant learning and benefits.

2.30. SHE Transmission has identified two key stages to the project: Design Development and Testing, and Implementation. At the stage gate between stages 1 and 2, SHE Transmission would evaluate whether or not the project would deliver the projected benefits. We agree with the Expert Panel that we should review SHE Transmission's proposal before deciding whether or not the project should proceed to Stage 2. This would ensure customers' funds for Stage 2 are returned if the project proves to not be viable or the projected benefits of the project, based on the cost savings from the new structures, do not materialise. Our review of this stage gate would be a condition of funding the project.

2.31. We agree that the project is innovative and that NIC funding should be used to support the project. The stage gate would ensure that should the review of the design's business case indicate that the new design would not be viable to be rolled out, the project would be halted.

2.32. The project involves three suppliers, including an SME for the design of the new towers. Initially the panel was concerned about the reliance on the SME as the other TOs will need sufficient confidence to roll out the new design. However, this concern was alleviated by SHE Transmission providing assurance that other suppliers and contractors would be engaged early in the project. They would contribute to the design and SHE Transmission would procure a construction contractor for the building phase.

2.33. We, and the Expert Panel, were initially concerned at the lack of stakeholder engagement within the project's method given the importance of potential improved visual amenity of the tower. Following resubmission the project included a stakeholder engagement strategy that reduced this concern. Nevertheless, we would expect SHE Transmission to assess the need for a Customer Engagement Plan and/or data protection strategy, given the planned engagement with the public. We will include a Successful Delivery Reward Criterion (SDRC) to this effect in the Project Direction as a condition of funding the project.[9]

Offgrid Substation Environment for the Acceleration of Innovative Technologies (OSEAIT) – NGET

Overview

2.34. This project would convert an existing 400kV substation that is due to be decommissioned into a field trial facility. It would be equipped with monitoring and testing equipment to replicate a live network environment for a series of 14 field trials.

2.35. The trials being tested would provide learning to all network licensees and provide benefits which we would expect to see reflected in RIIO-T2 business plans. The trials would research and develop unconventional technologies and practices, extend the operational life of ageing assets, and accelerate the implementation of innovation.

Summary of assessment

2.36. NGET claims that this facility would be unique in GB and possibly globally. We agree with the Expert Panel that this project is innovative. The results of the trials are uncertain with sufficient risk that we do not think this project would take place without NIC funding. The final programme of trials has not yet been confirmed. We, and the Expert Panel, were reassured that the project's Technical Advisory Board would have a role in prioritising the programme of trials.

2.37. NGET would invite a wide group of stakeholders to sit on the Technical Advisory Board. It would invite Ofgem, representatives of GB Network licensees, academic representatives and a health and safety representative.

2.38. We agreed with the panel that the total cost of this project, £26 million, is high. We have therefore decided to include a condition of providing the funding that we will approve the final estimates of the costs of the substation conversion, prior to the work starting.

2.39. As the trial programme is not yet confirmed we would include a further condition to ensure the project remains value for money. This would stipulate that if the trials (or trials achieving similar benefits to the GB transmission system) are not achieved in the NIC timescale, NGET should continue to maintain the facility at its own cost until the trials are complete, or return an appropriate proportion of the conversion cost.

2.40. We also shared the panel's concerns about the future operation of the project post the NIC period. We are keen to see a legacy from the upfront investment made in the facility. Therefore we will include as a condition of providing funding, that NGET must

[9] Successful Delivery Reward Criteria are defined in the Governance Document.

engage with us at least one year prior to the project's end to examine the options for how the facility would be managed and paid for beyond the NIC period.

Project not selected for funding

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

Evolution – SPD

Overview

2.42. The role of the DSO is becoming increasingly relevant and is one focus of our work on flexibility within the electricity networks.[10] We expect the role of DSO to bring carbon and financial benefits to electricity customers owing to more comprehensive control of the local network.

2.43. Evolution would have been a commercial project trialling one model of the role of the DSO. It would have transformed three Grid Supply Points (GSPs) into a single source of dispatchable capacity and tested the DSO role by operating a local market for grid capacity and system services. The market would have allowed the GSPs to become dispatchable "Virtual Balancing Mechanism Units" (BMU) and/or enrol in ancillary services for the (national) System Operator. As SPD would have had oversight on the network constraints on the local network it could have ensured it remained within operational limits.

2.44. While we very much support the idea behind this project, and are encouraged that it has been proposed, we agree with the Expert Panel's view that this particular submission should not be funded. We were not convinced that this project had a robust methodology or the necessary expertise to be implemented. We were concerned that these shortcomings might have undermined progress in understanding what the transition to a DSO model might mean in practice.

Summary of assessment

2.45. Both we and the Expert Panel had several concerns about this project's ability to meet some of the evaluation criteria. We did not consider that the concerns raised during the evaluation process were adequately addressed in the resubmission. We do not consider that our concerns would be mitigated by the imposition of additional conditions on the project.

2.46. We agreed with the Expert Panel that the project would be innovative in trialling a form of DSO for three GSPs. The learning developed as a result of this project could have had wide applicability both among other Network licensees and for policy development of the DSO transition more broadly. We also felt the project would be relevant and timely.

[10] https://www.ofgem.gov.uk/ofgem-publications/96959/flexibilitypositionpaperfinal-pdf.

2.47. We were not satisfied that SPD had understood the complexities of the market. The submission lacked sufficient detail around the commercial arrangements which would need to be implemented and the likely impacts of these. For example, we wanted to understand who the market's winners and losers would be, and how these players would be engaged and incentivised to be involved. SPD did not demonstrate that it had fully-understood the complexities of the market.

2.48. The Expert Panel emphasised that it would have been far more comfortable if SPD had proposed a feasibility study as the first stage of such a project. Such a study could determine whether the costs to all parties associated with establishing and managing a DSO market would really create sufficient benefit, or whether a more technocratic approach to achieving the same goals would be less expensive and less disruptive.

2.49. We also shared the Expert Panel's concerns surrounding the lack of expertise brought to the project. Following these concerns being raised at the first bilateral, SPD brought some market specialists to the second bilateral. While we are supportive of companies adjusting their approach to address concerns, we felt that this expertise should have been fully involved in the project's initial stages and throughout the process. We remained unconvinced that the project was designed with sufficient input from market experts. We would also have expected to see significantly more engagement with NGET as the System Operator.

2.50. We had serious concerns about the performance of this project against a number of the evaluation criteria set out in the Governance Document. Most notably we were concerned with its performance against the following criteria: "involvement of other project partners" and "demonstrates a robust methodology". We will therefore not fund the project this year.

2.51. While the project was not sufficiently well-developed to be funded this year, we consider that the DSO transition that the project was seeking to explore is relevant and timely. We agreed with the Expert Panel's emphasis on the importance of exploring the role of the DSO. We feel that this concept, sufficiently developed, could be brought by a DNO to a future NIC competition. We would encourage all DNOs to explore collaboratively the use of the NIA for further development of such a project.

Telecoms Templates for a Low Carbon Future (Telecoms Templates) – WPD

Overview

2.52. Telecoms infrastructure will play a vital role in facilitating the networks' transition to a smarter grid. This project would have investigated how the approach to the communications requirements of previous innovation projects may have affected the extent to which they fully-realised forecast benefits.

2.53. The project would have undertaken a global appraisal of what the communications requirements for a smart grid are. It would have created baseline templates of communications systems and developed a test laboratory to trial telecoms technologies. It would have calibrated the results into a tool for DNOs to understand and apply the most suitable telecoms approach for a given smart grid application.

2.54. We agreed with the Expert Panel that telecommunications is an important area which needs to be considered by the network companies. The project was innovative and may have been able to provide relevant knowledge and learning. However, we had

concerns which were not addressed about the suitability of expertise and the proposed methodology. We were not convinced that the project's potential outputs justified its high cost.

Summary of assessment

2.55. 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. We do not consider that our concerns would be mitigated by additional conditions.

2.56. The Expert Panel and the consultants highlighted concerns on this project's chosen methodology. Both suggested that a systems engineering approach would have been more appropriate in addressing the challenges identified in the proposal. A systems engineering approach would have focused more on characterising and quantifying the future requirements of a smart grid as a whole system. The project could then have demonstrated how technologies could fulfil these potential requirements.

2.57. We were not convinced that templates were the correct method for providing an enduring solution for Network licensees, especially considering the evolving nature of smart grids. WPD was unable to persuade us that the outputs of the project would have an enduring application.

2.58. While we were pleased that an external party, Siemens, helped prepare the project proposal, we were not convinced that this project had sufficient external expertise. We did, however, positively note that Newcastle University would have provided laboratory testing facilities and assisted with the trials. WPD's preference was to wait until a confirmation of funding before confirming project partners. However, this meant that the project's budget was not clear and the specific roles remained undefined.

2.59. We agreed with the Expert Panel that there was a lack of clarity surrounding how the money would be spent following the completion of the first stage. The project funding request was relatively high and we were not persuaded that the project's methodology was sufficiently robust to justify this cost.

2.60. We had serious concerns about the performance of this project against some of the evaluation criteria set out in the Governance Document. Most notably we were concerned with its performance against the following criteria: "value for money" and "demonstrates a robust methodology". We will therefore not fund it this year.

2.61. While the project was not sufficiently well-developed or defined to be funded this year, we consider that the telecoms issue that the project was seeking to explore is pertinent to smart grids development. We would encourage any licensee seeking to develop such a project in future to reflect on our evaluation and that in the Expert Panel's report.

Customer issues in running the projects

2.62. Celsius would involve changing the visual or aural impact of assets which may be in close proximity to domestic or commercial customers. The project would produce a Customer Engagement Plan and data protection strategy detailing exactly how it would

engage with customers. ENWL has confirmed that if customers note a discernible negative difference from a trial and a solution cannot be found, that particular trial would be halted.

2.63. NeSTS would engage with a wide range of stakeholders to consider the visual impact of potential tower designs. As mentioned in paragraph 2.33 we will require SHE Transmission to assess the need for a Customer Engagement Plan and/or data protection strategy at an early stage in the project.

2.64. Some of the projects may result in supply interruptions but all of these would be planned in accordance with the licensees' usual business practises.

2.65. All successful submissions have confirmed that, where relevant, they have included, and justified, any protection required from reliability and availability incentives.

3. Next Steps

Chapter Summary

The successful projects will each receive a project direction in December 2015 and will receive funding from 1 April 2016. We will publish the dates for next year's competition in early 2016.

Funding selected projects

3.1. Before funding a project, we issue a project direction explaining the terms that the funding licensee has to comply with as a condition of receiving funding.[11] We are currently preparing project directions for the successful submissions and we will issue draft versions of these to funding licensees shortly. The project directions for NeSTS, ANGLE-DC and OSEAIT will include the additional conditions outlined in Chapter 2.

3.2. Once each of the funding licensees has decided whether or not to accept its project direction, we will issue a funding direction to each funding licensee. This will specify the amount of money the National Electricity Transmission System Operator (NETSO) will be allowed to recover from its customers over the next regulatory year to fund the successful NIC projects. The funding direction will require those funds to be transferred to the relevant Network licensees in order to fund the selected projects. We will issue the funding direction in time for the NETSO to prepare its indicative use of system tariffs at the end of December 2015.

3.3. Although funding will not be raised until the next regulatory year (starting on 1 April 2016) we expect the funding licensees to start their projects as quickly as possible, according to the terms in their respective project directions and in accordance with the requirements of the NIC Governance Document.

3.4. We will monitor projects to ensure they are implemented in line with the full submissions. Each funding licensee will have to provide a detailed report, at least every six months, to allow us to evaluate the project's progress. We will publish these on our website to make project learning available to all interested parties. Funding licensees should also share their project's learning according to the plan set out in their respective project submissions. In addition, funding licensees, including those from previous years, must hold an annual conference, open to all, where they present what they've learned from their respective projects. Finally, the Energy Networks Association has developed a portal which holds learning from innovation projects, including from the LCN Fund and the Gas NIC and the Electricity NIC, and we expect learning from this year's projects to be made available through the portal.[12]

3.5. Network licensees are incentivised to deliver the projects to a high standard. They will be eligible to apply for a reward if they comply with the delivery criteria in the project direction. This is designed to reward those projects which are well managed and completed to at least the standard that could be expected from the full submission.

[11] The terms 'project direction' and 'funding licensee' are defined in the Governance Document.
[12] Please see Smarter Networks portal here.

Future competitions

3.6. As explained in Chapter 2 of this document, we had some concerns about certain areas of this year's submissions. We expect licensees to consider these and the recommendations provided by the Expert Panel when developing submissions for future competitions.

3.7. We plan to consult shortly on the NIC governance arrangements. The outcomes of this consultation alongside any specific lessons from this year's process may lead to changes to the Governance Document.

3.8. The Electricity NIC Governance Document (v3) would then govern the fourth year of the Electricity NIC. This will be in place before the ISP deadline in 2016.

3.9. We will confirm the ISP and full submission deadlines in early 2016. We expect they will be similar to the deadlines in 2015.

Appendix 1 – project evaluations

This appendix contains our detailed evaluation of each project against the Electricity NIC criteria. The Governance Document explains the criteria and our evaluation process in full, but here is a summary.

Degree to which the solution being trialled:	**Degree to which the project:**
• 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 transmission customers. • Generates knowledge that can be shared amongst all Network licensees.	• Is innovative (ie not business as usual) and has an unproven business case 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.

Celsius (ENWL)

Project overview

As the take up of low-carbon technologies (LCTs) increases, the use of low voltage networks is expected to change significantly. In particular, heat pumps and electric vehicles will increase demand. This results in an increase in the electrical current flowing in the low voltage network assets, which in turn causes their operating temperature to rise. Any clustering of these new loads will exacerbate this. As the capacity of network assets is limited by their operating temperature, this can cause thermal pinch points at distribution substations. By reducing these pinch points this project would release additional capacity from existing assets to facilitate the uptake of LCTs, instead of using traditional reinforcement.

Celsius would seek to better understand the relationship between increasing load and temperature rise of electrical assets in distribution substations. The project would develop a tool to determine an asset's internal operating temperature. Celsius would then test a range of retrofit cooling techniques for these assets, and whether or not these techniques are acceptable to customers. If successful this project would allow DNOs to release increased capacity from existing assets without degrading their health and reliability.

(a) 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

ENWL claimed that Celsius would accelerate the development of the low carbon energy sector by facilitating connections of LCTs using network capacity released from existing assets. This would defer or avoid the need for traditional reinforcement and bring financial benefits to customers. If successful, the project could be deployed throughout GB, bringing substantial benefits.

Low Carbon and/or environmental benefits

Celsius has the potential to facilitate the uptake of low carbon technologies, in accordance with DECC's Carbon Plan, by releasing network capacity from existing assets. The project could be rolled out across GB to tackle thermally constrained areas more rapidly than traditional reinforcement. This would allow an increase in the number of LCTs being connected to the network.

ENWL claimed that the Celsius project could release, on the LV network, up to 30MW of asset capacity through thermal monitoring and 11MW from installing retrofit cooling technologies. Under DECC's scenario 1[13] for LCT growth, the thermal constraints would increase on ENWL's low voltage assets. These comprise 1,937 pole-mounted transformers, 3,884 ground mounted transformers and 1,506 cable circuits. If successful, the potential capacity released across ENWL's network could be over 1GW from the application of thermal monitoring and the use of cooling technologies. Extrapolating these figures across the GB network, ENWL suggested potential benefits of over 13GW of additional network thermal capacity.

[13] The Department of Energy and Climate Change (DECC) regularly updates projections of energy demand, supply and greenhouse gas (GHG) emissions. The last full set of projections was published in October 2012. This report updates those projections: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239937/uep_2013.pdf.

It is recognised that Celsius would result in a higher current flow in low voltage networks which would therefore increase losses. ENWL recognised uncertainty associated with the net carbon impacts of the project which depend on future uptake of LCTs.

Net financial benefits

ENWL claim that the Celsius project could bring £2m of benefits for assets fitted with retrofit thermal monitoring and £0.7m for retrofit cooling technologies as an alternative to traditional reinforcement. This is inclusive of an estimate of the increase in losses on the network caused by Celsius. When extrapolated across the ENWL network these net financial benefits would rise to £42.4m, with estimated equivalent figures of £582m across GB.

(b) Provides value for money to electricity network customers

We are satisfied that the project would have a direct impact on the ENWL network by releasing capacity more quickly than using traditional reinforcement techniques. The project includes a range of low to high cost techniques which would release a range of low to high amounts of capacity.

The cooling trials would be undertaken on 100 substations or transformers fitted with temperature monitoring sensors. The submission provides justification for the cost and scale of the techniques being trialled. We and the Panel were initially concerned about how this could provide meaningful results, but ENWL reassured us that multiple data points would be recorded at each trial site to ensure statistically robust results.

We are confident that the project is being delivered at a competitive cost. The project partners were identified following an advertisement via the Energy Networks Association's Smarter Networks Portal. Project partners were chosen for expertise and value. All project partners have provided a discount on their standard day rates for the project. ENWL confirmed that other costs have been derived from existing business framework agreements and competitive processes would be used for remaining requirements.

ENWL confirmed that it would explore all possible alternatives to planned supply interruptions during the project. The installation of the equipment is not expected to lead to supply shutdowns. The project has budgeted for planned interruption penalties using expected durations advised by ENWL engineers.

With a NIC funding request of £4.7m, this is a relatively low cost project given the potential learning and impact on DNO networks across GB.

(c) Generates knowledge that can be shared amongst all relevant Network licensees

This project would build on previous learning from projects funded under the LCN Fund. Learning would be generated both by the early stages of the project (such as site selection and technology installations) and the closedown stages (such as processes for transitioning to business as usual). The generated knowledge would be shared with, and be relevant to, all DNOs, industry groups, academic institutions and customers.

ENWL secured input from UKPN to help determine the site selection methodology. This is intended to ensure that the geographical and loading circumstances of most assets on GB distribution networks would be reflected in the trial sites. This would increase the relevance and potential for read-across to their own networks for other DNOs.

The learning would primarily be of interest to the DNOs, specifically how Celsius could help defer or avoid network reinforcement investment and reduce costs, while maintaining quality of supply and network reliability. Industry groups would be interested to learn of potential impacts on network design and operation. Academic institutions would be interested in the raw data generated by Celsius to support wider research in the area of electricity distribution networks and the thermal ratings of cables and transformers.

The submission explained that there would be a range of approaches used for knowledge dissemination, including a Celsius website, seminars, conferences, workshops, social media, press releases and internal communication. The knowledge dissemination would be aligned to the project deliverables. The project plan would include a separate work stream for learning and dissemination which would ensure the dissemination activities are promoted with appropriate audiences and communication methods.

The project and project partners would conform to the NIC default Intellectual Property Rights (IPR) arrangements.[14]

(d) Is innovative (ie not business as usual) and has an unproven business case where the innovation risk warrants a limited Development or Demonstration project to demonstrate its effectiveness

Both we and the panel agree that the project would be innovative, with thermal constraints at distribution substations a recognised area of concern that has not yet been thoroughly investigated. Specifically, this project would develop external temperature sensors for distribution substation assets with more intelligence (ie to assess internal temperatures), which is novel. The use of forced cooling is common for higher voltage assets, as is the use of dynamic thermal ratings. But neither is routinely considered for distribution substation assets. There is not widespread use of retrofit cooling techniques on the electricity distribution network.

Many of the techniques and results which would be used in the project are not clearly understood or quantified. We accept that there are elements of this project which are uncertain and therefore would not be expected to be funded from within existing allowances.

ENWL stated that using the NIC funding would enable the development of installation processes and procedures to deploy the project and improve understanding of the benefits.

[14] As defined in the Governance Document.

(e) Involvement of other project partners and External Funding

ENWL identified a number of project partners for Celsius -

- **ASH Wireless** would provide the retrofit monitoring solution and ongoing support with its installation, commissioning and operation, project governance and knowledge dissemination.
- **Ricardo-AEA** would analyse the trial data and develop a methodology to understand the relationship between asset temperature, load characteristics and surrounding environment. It would determine the impact of the cooling technologies on demonstration sites and develop a thermal ratings tool for use with external temperature sensors. It would provide recommendations for business as usual rollout and assist with knowledge dissemination.
- **UK Power Networks (UKPN)** would work with Ricardo-AEA and ENWL to develop the site selection methodology, installation plan and guide for the monitoring solution. It would participate in evaluation and selection of retrofit cooling techniques and assist with knowledge dissemination.
- **Impact Research** would lead the customer survey engagement and provide support with learning and dissemination.

In addition, the **University of Southampton** would be a project supplier and provide a peer review of the analysis methodology used to determine the temperature of the assets. It would also provide an investigative study on the impact of Celsius on asset lifetime health.

The Panel and we were initially concerned that there was not sufficient specialist knowledge and expertise within the project, specifically in relation to the thermal behaviour of transformers. However, these concerns were allayed when ENWL provided reassurance of the engagement of a specialist with direct experience of transformer thermal monitoring.

ENWL's Future Networks Steering Group selected the project partners after internally developing the idea for Celsius. ENWL identified partners in early 2015 through an expression of interest and Calls for Innovation. ENWL confirmed that the partners were chosen dependent on experience, skills, cost and ability to commit resources. ENWL also confirmed that each has agreed terms and conditions. ENWL has agreed work schedules with the partners and suppliers, with defined roles and responsibilities, and cost and timing schedules.

Each project partner has committed funding for the project, totalling £217k of project partner contributions.

(f) Relevance and timing

We consider that Celsius is both relevant and timely. The project is tackling a problem that is expected to be widespread as demand for connections of LCTs to the distribution network continues to grow.

ENWL conducted a First Tier LCN Fund project, Low Voltage Network Solutions, which identified that thermal constraints are a barrier to low carbon technology uptake. ENWL researched other projects (eg under the Innovation Funding Incentive and the First Tier LCN Fund) which illustrate the effectiveness of managing temperature. This project

would be the first large scale application of temperature monitoring and retrofit cooling techniques on distribution substation assets.

The results of Celsius would help establish a business case for using the technologies trialled, which would be timely in feeding in to the business plans for RIIO-ED2, as well bringing benefits during RIIO-ED1.

(g) Demonstration of a robust methodology and that the project is ready to implement

We are satisfied that this project has a robust methodology and that the project is ready to implement. The submission contained a detailed project plan demonstrating the work streams for ENWL and the project partners.

We are confident that ENWL has the necessary resources in place to deliver this project. ENWL provided details of the internal team who would be responsible for delivering the project. It added that project partners have agreed terms and conditions as well as work schedules for both cost and time.

This project could have impacts on customers. Some assets involved in the project may be in close proximity to domestic and/or commercial customers. Some techniques used in the project could change the visual and/or audible impact of these assets. Therefore the project would engage with customers to undertake surveys to establish customer perception and acceptability. Project partner Impact Research would be drafting and issuing the required Customer Engagement Plan and data protection strategy.

The project would conduct surveys with 600 customers. After the project there would be another survey which would interview 150 of the customers previously surveyed plus another 450 new customers. ENWL would provide education on the project to some customers with Impact Research determining the communication materials required.

ENWL stated that there could be potential supply interruptions associated with the installation of the technologies. It stated that it will take all practicable steps to avoid this. If avoidance is not possible we are confident that ENWL will do this in line with usual practices; it will attempt to reduce the impact of interruptions and it will do so with consideration of vulnerable customers. If customers report a notable effect attributed to the techniques being used, the team would explore possible solutions. ENWL stated that it would consider halting the technique in question if a solution is not found.

There are a number of options available to customers should they wish to contact ENWL regarding the Celsius project.

The project costs presented were compiled by a management accountant with inputs internally, and from project partners and suppliers. The management accountant would be part of the project team and be responsible for managing all the costs and reporting requirements. The submission stated the cost information has an accuracy of 5-7 per cent with 8 per cent contingency included in the overall costs.

We are confident that the project's proposed methodology is robust. The project went through ENWL's internal audit process which found no material errors or issues. The submission was signed off by the Head of Engineering, the Networks Strategy and Technical Support Director, and the Chief Executive Officer. There is evidence of a good

support structure in place for the delivery of the project. The technical methodology for analysing the temperature sensor would be peer-reviewed by the University of Southampton.

The Successful Delivery Reward Criteria (SDRCs) for the project relate to key development stages of the project. In the resubmission, ENWL strengthened the SDRCs by adding more robust evidence for transitioning to business as usual and improving knowledge dissemination.

The project would use ENWL's standard methodology for considering risks and issues. The submission provided a comprehensive set of risks and there is evidence of a risk management strategy in place.

The project steering group would identify any circumstances which could result in the project being suspended or to halt the project.

Future Intelligent Transmission Network Substation (FITNESS) (SPT)

Project overview

There is increasing pressure on networks to cope with continuing changes in the generation mix and in load profiles, alongside ageing assets. As a result, there is a growing requirement for new substations to be lower cost and more flexible in design while retaining system reliability. There is recognition within the industry that a change is needed in design, practices and methods of network control and protection.

This project would pilot GB's first live digital substation. Currently TOs' SCADA control systems use analogue communications. Substation primary equipment (circuit breakers, transformers etc) currently interacts with monitoring and protection independent electronic devices (IEDs), through various means of connecting, including copper wiring networks. The aims of this trial are to replace the copper wiring carrying analogue electrical information from measurement devices to the IEDs with fibre optic cable, and to digitise the communications systems to maximise the potential of the IEC 61850 standards.[15] FITNESS would design a new substation fitted with both analogue communications and the new digital technology, and conduct laboratory testing to prove interoperability. It would trial live system testing through on site installation. It would demonstrate interoperability between vendors for the technology and identify any gaps in standards. If successful, the project would result in key learning to enable the roll out of digital substations across GB.

(a) 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

SPT claimed that FITNESS would bring benefits by introducing a new substation design. It would result in faster substation deployment with improved network availability and lower network constraints, thus reducing network constraint payments. The new substation would have reduced footprint leading to lower environmental impact than current designs and result in savings from reduced civil works. Additionally, a switch from copper wiring to fibre optic communication could result in further footprint and cost savings by boosting technologies such as non-conventional instrument transformers (NCITs), replacing conventional current and voltage transformers.

Low Carbon and/or environmental benefits

SPT stated that the project would support the Carbon Plan by demonstrating a system that would enable more low carbon generators to have access to the network, through improved visibility of the substation's performance and modernisation as well as reduced outages. The new system would allow easier integration of equipment for monitoring and control functions, providing improved accuracy and dynamic response needed to support low carbon generators on the network. For example it would use phasor measurement units.[16] In the future FITNESS could also support the effective roll of other innovative low carbon infrastructure technologies, such as those associated with National Grid's Enhanced Frequency Control Capability (EFCC) project.[17]

[15] IEC 61850 is an international standard for communication networks for substations. It was introduced in 2004 and updated in 2011.
[16] A phasor measurement unit (PMU) is a device which measures the electrical waves using the same timing for synchronisation. The synchronisation allows real-time measurements of multiple remote measurement points on the grid.
[17] Information on the EFCC project is available here.

The improved system would release capacity and reduce the need for constraining generators; SPT estimate the project could relieve 70–200MW per year in capacity constraints from 2021 to 2050. This capacity release would also enable the uptake of low carbon generation.

FITNESS's system and design would reduce replacement and modernisation timescales for substation bays, reducing the length of planned outages and, in turn, outage-related constraint payments.

FITNESS would reduce the environmental footprint of new substations design by 10per cent through space savings. There would be an 80per cent reduction in the use of copper owing to the switch from copper wires to fibre optic cables. This could save approximately 25,000 tonnes of CO_2e over 2021 to 2050. There would also be a significant reduction in civil works needed for new substation builds with reduced foundations, mountings and trenching.

Net financial benefits

Between 2020 and 2050 SPT claimed FITNESS could result in significant financial savings for electricity customers, by providing proof of performance and especially of interoperability, enabling faster deployment cross GB networks -

- The improved performance of the digital substation could lead to potential savings of £260-592m in constraint costs.
- The improved flexibility and controllability could result in £45-67m savings in operation and maintenance costs.
- The reduced cabling and environmental footprint of the substations could result in £572-858m savings.

(b) Provides value for money to electricity transmission customers

SPT claimed that FITNESS provides value for money due to the potential benefits of the project, the competitive costs included in the submission and because it would facilitate rollout of other GB projects.

SPT has requested £8.3m with a total project cost of £10.8m. We and the panel were satisfied that the project reflects value for money considering the benefits the project could generate. FITNESS could produce significant learning for other Network licensees when deploying digital substations with a direct impact on consumer bills through reductions to both the transmission network costs and balancing services costs, alongside environmental benefits.

SPT identified some relevant project partners in time for the submission; three of these would make in-kind contributions to the project costs. SPT reviewed project partner costs to ensure costs were discounted. The panel did have concerns about the costs associated with the University of Manchester's work; however SPT reviewed these costs and reduced these costs following the second bilateral. The project would follow SPT's procurement and legal policies to ensure project partners are contracted with agreed milestones and work schedules.

(c) Generates knowledge that can be shared amongst all relevant Network licensees

SPT claimed that FITNESS would generate a significant amount of learning for other TOs and DNOs to deploy digital substations as part of business as usual practice. The project would provide the first live trial of a digital substation in parallel with trialling the operations and practices of a more efficient substation. Learning would cover all aspects of this trial from installation of the technology to the ongoing operations of the digital substation. SPT proposed a robust methodology to capture the results of this learning and SPT provided early indications of who would find this learning relevant.

We and the Panel are satisfied that FITNESS has adequate methods in place to disseminate the learning of the project, including through visual materials, attending stakeholder events and producing reports. The project would be of interest to a number of stakeholders, including TOs, DNOs, International Standards Working Groups and academia. SPT and the project partners are engaged with relevant standards committees and would directly relay the learning from this project to those committees.

FITNESS would conform to the default IPR arrangements.

(d) Is innovative (ie not business as usual) and has an unproven business case where the innovation risk warrants a limited Development or Demonstration project to demonstrate its effectiveness

We and the Panel consider that this project is innovative. There is not a live digital substation within GB. SPT claimed that the benefits of digitising substations are well recognised among the TOs and SO and that digital substations are expected to be business as usual in the future. FITNESS would trial various elements of an integrated system which have not previously been incorporated into a live trial in GB.

There is significant risk associated with trialling the first GB live digital substation. Much of the technology is novel, and a key innovation of this project would be trialling multi-vendor interoperability. We would not expect the project to proceed as business as usual.

(e) Involvement of other project partners and External Funding

SPT identified the concept of FITNESS following its internal Innovation Strategy review in 2014. The idea was discussed internally then shared with NGET and SHE Transmission. Major suppliers showed interest at the early stages of the project. SPT undertook stakeholder engagement at the PAC World Conference to determine further interest.[18] SPT then undertook a detailed partner selection process and chose partners based on quality of technical solutions, previous experience and cost for delivery. The following project partners would be involved -

- **ALSTOM Grid** would provide elements of the integrated system to be installed within the digital substation.
- **ABB** would also deliver elements of the integrated system for the substation.
- **University of Manchester** would host the laboratory for testing the equipment and assist with the project's learning dissemination.

[18] PAC World produces a magazine and online forum for protection, automation and control professionals on an international scale.

- **Synaptec** (SME) would provide technical support such as developing the sensors within the substation and support for developing this for replication by other Network licensees.

SPT provided reassurance to the Panel of the interoperability of the technologies provided by the project partners. Three of the project partners have offered in-kind contributions to the funding, notably ALSTOM Grid (£1m) and ABB (£395k).

Technical experts from the other TOs (NGET and SHE Transmission) would join the project's Advisory Board.

(f) Relevance and timing

We and the Panel consider this project to be relevant and timely. There have been significant commercial developments in creating a digital substation with learning being utilised from similar projects internationally. The learning from this project would contribute to solutions to tackling problems facing networks such as those from the connection of low carbon generation.

SPT claimed that the TOs and SO recognise the need for a step change in substation design. FITNESS has the potential to provide learning for digital substations for the TOs as planning for RIIO-T2 gets underway.

(g) Demonstration of a robust methodology and that the project is ready to implement

SPT provided a robust project plan for FITNESS containing detailed work streams throughout the project's duration. We are confident that the team has both the internal and external resources necessary to deliver the project and begin as planned in April 2016.

It is not expected that FITNESS would have any direct impact on customers.

SPT provided evidence for the FITNESS cost-benefit estimates within the submission, which was put together alongside partners and independent consultants. SPT claimed to have robust processes in place to verify the submission for accuracy. The submission was reviewed internally with approval given by the SPEN Board of Directors.

The submission included a comprehensive risk register with identified processes in place to ensure that risks are contained by mitigation actions.

We are confident that FITNESS has a robust methodology for carrying out this project. The methodology reflects the initial research and analysis that has been undertaken to prepare the project for implementation. Our appointed independent consultants and the panel were both satisfied with the robustness of the methodology.

The Successful Delivery Reward Criteria (SDRCs) were comprehensive, relating to key development stages. In its resubmission, SPT updated some of the dates to ensure regular milestones would be recorded more accurately.

ANGLE-DC (SPMW)

Project overview

The island of Anglesey has significant renewable generation already connected to the network with more scheduled to be connected. Consequently there are increasing voltage and thermal issues in the surrounding network which need to be addressed. The island is currently connected to the mainland by both the transmission network (400kV) and the distribution network (33kV).

The method used in ANGLE-DC would convert an existing 33kV alternating current (AC) circuit to medium voltage direct current (MVDC) operation as a supplement to planned reinforcement. This project would use the MVDC link to Anglesey from the mainland. It would re-use existing 33kV cable and overhead line assets to become a fully controllable MVDC power link. This would give the DNO full control of this link to the mainland, independent of the power flow on the transmission system. It would therefore provide additional export capacity from Anglesey.

(a) 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

ANGLE-DC would provide an innovative approach to facilitating further connections of low carbon technologies by releasing capacity and giving the network operator more control of the power flows. The method would reduce losses on the network and could deliver significant financial savings. There is potential for the project to be replicated at 25 sites across GB.

Low Carbon and/or environmental benefits

ANGLE-DC would facilitate the Carbon Plan by enabling further connection of low carbon technologies to the network. The project could unlock 30.5MW of capacity on the existing corridor between Llanfair and Bangor. This is because MVDC enhances the power flow controllability and allows parallel operation with the transmission system.

The increased control of the circuit would allow the network operator to control the size and direction of the power flows. SPMW stated that, in certain situations, some circuits in an AC network have to be taken out of service to avoid uncontrolled power flows, which would otherwise cause thermal limits to be exceeded. By being able to directly control the power flow in such circuits, they can be put into service so that an efficient use of these potentially stranded assets can be achieved. In the ANGLE-DC project, the MVDC circuit could result in 30.5MW capacity being released because of this more efficient use of the assets.

The Panel was initially unclear on how widespread the method could be deployed. SPMW claimed that there are 25 circuits around the UK that would be suitable for the ANGLE-DC solution. SPMW assumed that, if deployed across the 25 circuits, then the ANGLE-DC method could release 762.5MW of capacity over a 20-year period. The conventional alternative to this technology would be to install new circuits.

The method being trialled in ANGLE-DC could reduce losses in Anglesey and North Wales by around 13GWh annually. This is because the MVDC link would provide better voltage

control on both sides of the link. This support would manage voltages across a wide area which would minimise current (and therefore network losses) through the circuits.

Net financial benefits

SPMW claimed that if the ANGLE-DC method reduces losses by the stated amount this would equate to lifecycle cost savings of £15.77m. If this figure is extrapolated to the potential 25 sites in GB then the solution could provide £252.4m savings by 2050.

SPMW estimated that the total savings the ANGLE-DC trial could bring from avoided network reinforcement and reduction in network losses could total £18.67m by 2050. If the method is rolled out across GB to the 25 sites then the savings could be £396m by 2050.

(b) Provides value for money to electricity network customers

The project would have a direct impact on the distribution network. It would -

- release capacity more quickly than standard reinforcement methods;
- facilitate the connection of renewable generation;
- reduce system losses; and
- provide extra control of the network for the operator.

SPMW estimated that there would be increasing thermal and voltage issues on the 33kV network in Anglesey and North Wales. SPMW expect the Bangor-Llanfair circuit will exceed its thermal limits due to uncontrolled power flows. The ANGLE-DC project would enhance the performance of the current network and alleviate the existing network issues. The method would generate significant learning on how converting existing AC assets to DC operation at medium voltage could be an alternative solution to reinforcement.

We and the Panel questioned SPMW on the extent to which it could receive direct benefits from the scheme, as it had acknowledged none in its submission. Our concern related to capacity benefit gained if the MVDC link is successful and continues to operate at the end of the project. It also related to the construction of the additional 33kV circuit to provide security of supply during the trial. We questioned how these factors related to SPMW's load-related allowances in its RIIO-ED1 settlement. SPMW maintained that it would accrue no direct benefits from the trial. As a condition of funding this project we will review, post-trial, whether or not the value of these additional assets, and any other attributable price control benefits, should be returned to customers given SPMW's RIIO-ED1 settlement.

We and the Panel agree that this is an expensive project. However, we are confident that the project would be delivered competitively. SPMW has undertaken previous work, such as consulting with suppliers, to improve the accuracy of the estimates provided.

No project partners have been confirmed as SPMW would undertake a competitive process to ensure best value.

(c) Generates knowledge that can be shared amongst all relevant Network licensees

The project would generate a significant amount of learning across the six work packages outlined in the submission. This would include the detailed design of the MVDC link; the methodology for implementation of both the MVDC and AC links; monitoring the circuit; and the data analysis.

SPMW claimed the new learning would be relevant for network operators: primarily for DNOs to understand the operation of a MVDC link as part of an AC network. The SO and TOs may also be interested in the impact of power flow and voltage control. The project could also generate interest with offshore developers, developers of standards and network codes, as well as the general public. The project has generated interest from other stakeholders such as the Welsh government and Anglesey County Council. SPMW identified a variety of methods for knowledge dissemination. SPMW would use the regular progress reports, workshops, webinars, conferences and its website.

We are satisfied that the project has a robust methodology in place to capture the learning. There would be a designated 'knowledge coordinator' who would document and categorise the information and communicate it with a delivery team, which would be responsible for dissemination.

We and the Panel were concerned that the length of the testing period was limited to six months. If the project ran into delays during the initial stages then this could result in a shortening of the monitoring and evaluation stage. However, SPMW has committed to providing monitoring and evaluation data to other DNOs following the end of the project when, if successful, the DC link would be in regular use.

The Panel was initially concerned about cross-over with WPD's Equilibrium LCN Fund project.[19] However, following questioning, SPMW reassured the Panel that ANGLE-DC would generate additional learning, particularly use of convertors at opposite ends of a distribution circuit and the re-use of an existing AC line and cable. SPMW also stated it would review learning generated from Equilibrium and other relevant projects to feed into ANGLE-DC.

The project would conform to the default IPR arrangements.

(d) Is innovative (ie not business as usual) and has an unproven business case where the innovation risk warrants a limited Development or Demonstration project to demonstrate its effectiveness

We and the Panel consider that this project is innovative. The conversion of an existing AC circuit to MVDC operation has not been trialled at the distribution level in GB before. There are significant commercial and technical risks associated with this project as there is no previous directly relevant experience to draw upon.

Specifically, there would be a new methodology created for the implementation phase. SPMW claimed that the conversion of AC assets to DC operation to release capacity has not yet been achieved. To reduce the risk of damage to the assets involved SPMW would engage specialist companies in working to develop and install systems which could give

[19] https://www.ofgem.gov.uk/publications-and-updates/lcn-fund-year-five-screening-submission-equilibrium.

advanced warning of developing damage to the assets. We support the Panel's view that this project warrants NIC funding.

(e) Involvement of other project partners and External Funding

The project does not have any project partners confirmed. However, we were pleased with the significant amount of previous engagement that SPMW has undertaken in relation to this project. SPMW has engaged with two main suppliers of MVDC technology and suppliers of potential engineering and consultancy support. Consultants have verified; the proposed design concept, the technical assumptions, the project risks, the project delivery programme, and the costs used in the submission's cost benefit analysis. Project partners, including academic partners, would be sourced through competitive tendering processes.

The project has no external funding.

(f) Relevance and timing

The Panel considered there to be a lack of clarity as to when SPMW require the new export link to be built. However, we and the Panel agree that there is increasing renewable generation seeking connection on Anglesey, which could lead to problems on the network and require an enhanced export link. The benefits associated with this method would make the project timely. It is also relevant to facilitating the carbon plan in the context of releasing capacity and connecting more renewable generation.

SPMW claimed that this project would encourage DC technology suppliers to develop their products to become commercially optimised solutions for network operators. As a consequence, this project could reduce costs for future roll-out of this method across the 25 identified potential sites.

(g) Demonstration of a robust methodology and that the project is ready to implement

The submission contained a detailed project plan. The Panel raised concerns regarding the relatively short period of time allotted for testing the DC link in relation to the likelihood of project delays. However, this was alleviated following SPMW's assurance that it would continue to provide other Network licensees with data following project close down. The project plan outlines six work packages with roles and responsibilities defined.

In response to feedback, SPMW extended the deadline of the project by two months to allow more flexibility during the project closedown writing and review. This period is important for effective learning dissemination. SMPW also added an SDRC for the factory acceptance of MVDC convertors to ensure that the project has at least one SDRC per year. Each SDRC was SMART; specific, measurable, achievable, relevant and time bound.

SPMW claimed that the project would be sufficiently resourced with internal resource identified and confidence of confirming external resource. The project would be ready to begin in January 2016.

SPMW claimed that the operation of the network, for customers, would not be affected by the project. One of the learning outputs of the project would be to understand the

long term effect of DC stress on AC assets. Therefore SPMW would install monitoring devices at each end of the circuit to track this. Customer impact would be minimised by the installation of a new 33kV AC circuit alongside the DC circuit. Any planned supply interruptions would follow SP Energy Network's standard procedure for scheduling outages.

SPMW stated the project would have a live risk register which would be continually updated with risks and mitigation plans. The submission contained risks which had been identified already along with the appropriate mitigation actions required to deal with them.

The project's methodology would identify key performance indicators within each work package and would be used to evaluate project performance for budget, time and quality. Any issues would be reported to the project board's steering committee. The committee would issue a formal report to Ofgem and identify whether or not halting the project is the most appropriate action to take.

We agree with the Panel that this project had a robust methodology and we are confident that the project would be managed well. The submission has received external input and has been verified externally.

NeSTS (SHE Transmission)

Project overview

The recent increase in connections of renewable generation on the electricity network has led to a need for increased reinforcement including the replacement and new build of overhead lines (OHL). Renewable generation, from wind in particular, is often located in remote areas leading to complications with planning, and with the operation and maintenance of replacement and new infrastructure projects. One aspect of this is the opposition to new projects due to the visual impact of OHL on the environment. Standard steel lattice towers are based on a design from the 1920s. They were not designed for the challenging environments now being built on to reach remote renewable generation.

To address the issue of planning and stakeholder acceptance the T Pylon was developed following a NGET and DECC design competition. However, SHE Transmission claimed that NGET has indicated that the T Pylon does not lend itself to deployment in areas with challenging landscapes, including features such as high volumes of shallow bedrock and/or high altitudes. This is the type of environment typical for high levels of onshore wind generation, such as that within SHE Transmission's area.

This project would seek to address the problems associated with the standard lattice tower by developing a suite of new towers. Then, if there remains a positive business case to continue, the project would demonstrate a chosen design. The aims of NeSTS are to produce a full suite of tower designs which is publicly acceptable, and to reduce the costs of new OHL projects by up to 10per cent over a whole asset life basis. The new tower would initially be applicable to 275kV and 132kV OHL although SHE Transmission would also look at the potential to extend to 400kV lines. The design would be available to all the TOs and be particularly relevant for challenging terrain.

(a) 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

NeSTS would facilitate the connection of low carbon generation and general reinforcement by designing a suite of new tower structures which can be built on challenging terrain and connect remote generation. The design is expected to have a reduced environmental and visual impact. The cost would be potentially lower than the current tower design and therefore, if deployed, could deliver financial benefits to electricity customers.

Low Carbon and/or environmental benefits

NeSTS would help to facilitate the Carbon Plan by providing additional support options for the reinforcement required to connect low carbon generation. The new structures would be designed to be able to cope with adverse terrain so would be suitable for connecting remote renewable generation.

The new structure may have a reduced direct environmental impact due to potential reductions in foundations required, and/or in the need for land clearance.

SHE Transmission expects the new structure to be smaller and less visually intrusive than the current tower design, thus reducing the visual impact on the environment for stakeholders.

Net financial benefits

SHE Transmission estimated that currently one kilometre of 275kV OHL costs, on average, £1.47m. SHE Transmission claimed that if 15per cent of new infrastructure uses the structures designed by NeSTS, which may deliver savings of 10per cent, the overall savings equate to £174m by 2050. SHE Transmission expected the bulk of these savings to come from reduced foundation costs. These savings would flow to customers via the Transmission Use of System charges.

(b) Provides value for money to electricity network customers

NeSTS could have a direct impact on the transmission infrastructure. SHE Transmission claimed the project would instil confidence in the structures for other TOs for deployment for new or replacement OHL projects. The project would cost £6.6m and we agree with the Panel that this project should generate good learning and potential benefits for this cost.

SHE Transmission proposed a stage gate review at the end of the first stage. At that point, it would evaluate whether the project would deliver the projected benefits and decide whether to proceed to full demonstration on a live network or suspend the project. This stage would also give SHE Transmission an opportunity to assess the future requirement for OHLs in light of recent UK Government policy development regarding renewable generation. SHE Transmission expected that around £1.6m of the amount funded through NIC would be spent before the reaching the stage gate.

The project would follow SHE Transmission's Large Capital Projects governance processes and would use an appropriate competitive procurement procedure for required equipment.

SHE Transmission selected some project suppliers based on relevant experience, eg working on the precursor NIA project to NeSTS. Others were selected based on being on SHE Transmission's framework contractor and with a previous track record, or via the ENA Collaboration Portal. The contractor for the construction phase would be procured using SHE Transmission's standard procurement processes.

(c) Generates knowledge that can be shared amongst all relevant Network licensees

SHE Transmission has set six learning objectives to be achieved through NeSTS. These would reflect the learning gained by the project's different phases, including creating a working group for OHL supports. The learning from NeSTS would be relevant to TOs considering new and/or replacement infrastructure projects.

The proposal had a dissemination plan with a number of methods identified to disseminate learning, including e-learning modules, a visualisation tool, a decision tool, progress reports, events, webinars and conferences. SHE Transmission claimed the project would be relevant for several groups of stakeholders such as other Network licensees; the supply chain for the structures; local authorities and planners; and Government and regulators.

We are satisfied that SHE Transmission and the project suppliers have a robust method in place to capture the results of the learning gained from the project.

The project would conform to the default IPR arrangements.

(d) Is innovative (ie not business as usual) and has an unproven business case where the innovation risk warrants a limited Development or Demonstration project to demonstrate its effectiveness

SHE Transmission highlighted the lack of new design for towers (save the recent introduction of T Pylon) and the potential need to develop a new pylon for challenging terrain. The designs being developed through the NIA project have innovative elements of design such as a combination of new insulator arrangements, new mechanical/structural layout, use of novel materials, and use of new foundation and construction techniques and materials.

We agree with the Panel that there are risks associated with this project and that it would not be carried out through business as usual. NIC funding would be used to ensure the project delivers sufficient confidence to other TOs in a rigorous testing stage. Should the detailed preparatory work conclude that the design does not offer sufficient environmental or cost advantages, or technical tests identify any flaws that cannot be overcome, then the project would need to be halted at the stage gate.

(e) Involvement of other project partners and External Funding

NeSTS would not have project partners. However, the project would involve suppliers and the other two TOs provided letters of support. Both other TOs would also participate in quarterly working group meetings. Subject to the final agreement of commercial arrangements the three project suppliers are likely to be -

- **Energyline**, which would continue its current technical supplier role in the NIA project for the application design and assume responsibility for design assurance and technical approval.

- **Social Market Research**, which would assist in the customer engagement involved in the project such as developing and managing customer survey, interviews and events. It would support the analysis of data for reports which would inform and assess the NeSTS design.

- **TNEI**, which would provide independent validation of the financial and environmental benefits of the NeSTS approach.

SHE Transmission explained that the concept of NeSTS was originally put together in November 2013 and has been developed through the NIA project. Both Energyline and Social Market Research are SHE Transmission's Framework Contractors. SHE Transmission asserted that previous procurement activities ascertained that they could provide best value. TNEI has previously been involved in a NIC project with SHE Transmission.

The Panel was initially concerned by the reliance placed on Energyline, especially as it will be important for other TOs to have sufficient confidence in the new tower for them to deploy it. However, we are reassured that materials suppliers and construction

contractors would be engaged early to allow them to contribute to the design. A construction contractor would be procured for the build phase and would be responsible for the relevant construction warranties and guarantees.

(f) Relevance and timing

We consider this project to be timely. SHE Transmission has highlighted the increased requirements to reinforce the network, particularly due to the large number of renewable generators being connected or seeking a connection. Although recent government policy decisions have reduced the funding available for onshore renewable generation, there is still a requirement for increased reinforcement. SHE Transmission provided a number of potential upcoming routes for new reinforcement which could benefit from the results of the NeSTS project. Part of the initial stage of the project would be to ascertain a route which would use the NeSTS tower.

The new tower would be designed to accommodate a range of voltage lines. Therefore it would be applicable to a number of future projects planned by the other TOs.

(g) Demonstration of a robust methodology and that the project is ready to implement

SHE Transmission provided a detailed project plan which outlined the appropriate milestones and work streams. The project would build on the learning and knowledge being formulated in the NIA project. We are confident that SHE Transmission would have the resources required to deliver the project and be ready to begin in January 2016, as per the project plan.

SHE Transmission has identified two key stages to the project: Design Development and Testing, and Implementation. At the stage gate between stages 1 and 2, SHE Transmission would evaluate whether or not the project would deliver the projected benefits. We agree with the Panel that we should review SHE Transmission's proposal before deciding whether or not the project should proceed to Stage 2; our review of this decision would be a condition of funding the project. This would ensure customers' funds for Stage 2 are returned if the project proves not to be viable.

In general the project had a robust methodology to ensure the design of the towers would be tested rigorously. We shared the panel's initial concerns that the project had weak stakeholder engagement given the potential benefit of reduced visual impact. SHE Transmission addressed this concern in the bilateral meetings, and its resubmission included a Stakeholder Engagement Strategy. Nevertheless, we would expect to see SHE Transmission assess the need for a Customer Engagement Plan and/or data protection strategy, given the planned engagement with the public. We will include a SDRC to this effect in the Project Direction.

The submission contains a risk register and contingency plan with appropriate risks and mitigation actions identified.

The project may result in outages but these will be carried out in accordance with SHE Transmission usual procedures.

The submission contains adequate SDRCs which reflect the project's five phases.

SHE Transmission claimed that the benefits proposed within the submission are conservative. The information provided has been verified by SHE Transmission's internal management.

OSEAIT (NGET)

Project overview

Electricity network operators manage assets to maximise value over their life and, where required, expand their networks to accommodate changes in supply and demand. Historically, this management has been based on interval-based maintenance interventions. Our transmission and distribution networks are now experiencing operating conditions that are significantly different from those for which they were originally designed and constructed. Reasons for these changes include the growth and penetration of renewable and embedded generation, as well as changes in consumer behaviour, introducing new challenges.

There are notable differences between test laboratory conditions and the reality of the national electricity grid. Factors such as environmental conditions, time under test/load, and the management of engineering activities in surrounding equipment are difficult to recreate in laboratory conditions. This leads to difficulties in transferring outputs of research and development to deployment on the grid. Licensees are therefore reluctant to put the quality and security of supply they provide to their customers at risk in order to demonstrate the viability of new ideas with unproven track records. This can mean that certain laboratory-tested projects are less likely to be implemented on the live system.

To address this issue, NGET would take advantage of a rare opportunity to secure a fully operational test substation. It would modify an existing 400kV substation that is due to be decommissioned into a reconfigurable, field trial facility. This offgrid facility would replicate a live substation environment, to overcome the operational barriers to implementing innovative methods and technologies on the electricity network. The project would involve conversion of the facility, with a programme of 14 field trials proposed during the project.[20] This programme would be finalised by the Technical Advisory Board, governing the project. The existing substation would be equipped with monitoring and testing equipment as well as GIS bays to cater for different technologies. The result of the project would be an enduring facility that will help facilitate the transition to low carbon electricity networks, by recreating a live network environment for the initial trials of new technologies and approaches.

(a) 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

NGET claimed that OSEAIT would support the development of the low carbon energy sector, citing three areas: researching and developing unconventional technologies and practices; extending the operational life of ageing assets; and accelerating the implementation of innovation. It forecast savings from the project of £360m by 2050.

Low Carbon and/or environmental benefits

OSEAIT would facilitate the Carbon Plan by allowing work to be carried out to determine the most efficient solution for managing the network changes arising from LCTs, including the impact of abnormal loading on the rate of asset deterioration. In particular,

[20] For the purposes of this document "during the project" refers to the period covering 4 January 2016 – 31 October 2020.

NGET claimed that the facility would enable the effects of intermittency on assets and systems to be understood and management solutions explored. Furthermore, the facility would help accelerate innovations that are better able to cope with the more dynamic fluctuations of electricity demand and generation that will characterise the low carbon energy sector.

The facility would enable the development of novel insulating and conducting materials with a reduced carbon footprint. Other carbon benefits would arise in the form of allowing evaluation of the carbon footprint of interventions to extend the operational life of ageing assets.

The carbon savings are necessarily somewhat speculative as they are contingent on the particular trials that take place at the facility. NGET estimated savings of 0.6MtCO_2e to 2030 for the programme identified in the bid. It estimated a doubling of these carbon benefits if rolled out to other GB licensees (assuming 50 per cent effectiveness of the innovations on the existing GB asset base).

Net financial benefits

As with the carbon benefits, the financial benefits of this project depend on the precise programme of trials. A large proportion of the estimated £360m benefits by 2050 are accounted for by five of the proposed projects. These are benefits that NGET claimed would either not accrue in their entirety or would be severely delayed without the facility. NGET added that, based on a conservative estimate, the project would bring benefits equal to the NIC funding by 2021. Its assumptions included benefits reducing by 10per cent every five years owing to the reduction in remaining scope for efficiencies following savings achieved from earlier projects.

(b) Provides value for money to electricity network customers

The £26m total cost of the project is high. NGET requested £12m of customer funding and would contribute £14m itself.

NGET identified the cost of converting the substation into a test facility at around £12m. This compares favourably with NGET's estimate of £84m for developing a test facility from scratch. The conversion costs in the original bid were higher and were reduced by around £4m by NGET following questioning from us and the Panel. While we welcome this reduction, we agree with the Panel that the final conversion costs warrant further justification. Therefore, as a condition of funding this project, we will approve the final funding of the conversion costs prior to work starting.

NGET stated that, when the facility was not being used for its own NIC project, other GB Network licensees would be able to access it on equal terms, through the development of the terms of reference for the governing Technical Advisory Board. NGET would invite Network licensees, Ofgem, a Health and Safety Representative and academic representatives to sit on this board.

The board would determine prioritisation of the final programme of trials. As these trials have yet to be finalised, the costs surrounding this element of the project are necessarily estimates.

NGET would manage contracts through its internal Estimating Hub, procurement and finance departments which, it stated, would ensure the project would be delivered at a

competitive cost. NGET prepared all internal labour costs under International Financial Reporting Standards and included only costs directly attributable to employing the individual.

Despite these reassurances, the Panel is keen that the uncertainty around the value for money is controlled through an additional condition. If the trials (or trials achieving similar benefits to the GB transmission system) are not achieved in the NIC timescale, NGET should continue to maintain the facility at its own cost until the trials are complete or return an appropriate proportion of the conversion costs.

NGET proposed that, during the project, any revenues earned through the facility (after costs) would be returned to customers.

NGET engaged internally and externally to establish interest in the potential facility and to inform its design.

(c) Generates knowledge that can be shared amongst all relevant Network licensees

New learning would be generated through the trials that would be run within the facility. NGET provided examples of the relevant learning from 6 of the proposed 14 trials. This included, for example (as an output of the asset thermal model for remote operation), a generic, validated mathematical model than can combine load, measurements and forecast temperatures for various scenarios or the testing of super hydrophobic insulators.

The Technical Advisory Board would monitor progress of the learning outputs. The learning would be relevant to other GB licensees and more widely. The learning could feed into the development of standards (both new and existing) and NGET would take advantage of its existing presence on relevant industry forums.[21]

NGET acknowledged the need to package knowledge appropriately for different audiences. It devised a comprehensive dissemination plan, covering six categories: national engagement and roadshows; specialised training courses and videos; international engagement; new policies and standards; digital media activity; and final results.

The project would comply with the default IPR arrangements for parts of the project that have been fully funded by the NIC. But, as a test facility with potential utility outside of the NIC project, NGET proposed and described some commercial arrangements for financing further trials, depending on circumstances. Where NIC and NIA financing funds part of a trial, the default IPR arrangements would apply.

Additionally, NGET has proposed an adaptation of the IPR mechanism used to return a proportion of royalties to consumers as an appropriate mechanism through which it would return any revenues (after costs) earned through the facility during the project.

[21] Such as CIGRE (International Council of Large Electric Systems), IEEE (Institute of Electrical and Electronics Engineers), IEC (International Electrotechnical Commission) and EPRI (Electric Power Research Institute).

(d) Is innovative (ie not business as usual) and has an unproven business case where the innovation risk warrants a limited Development or Demonstration project to demonstrate its effectiveness

NGET claimed that testing a combination of elements within one facility would be unique in GB and possibly globally. Conversion of the test facility is necessary to allow off-grid testing to be undertaken in conditions comparable to the live network. It would be particularly valuable for assessing the feasibility of asset life extension. It would provide the ability to carry out trials in a way that would not be possible on the live network, due to the potential disruption to supply from asset failure.

As the final programme of trials has yet to be confirmed, it is not possible to assess the innovative nature of each individual trial proposed to be carried out during the project. However, the details provided of the trials to be undertaken demonstrate innovation. We, and the Panel, were reassured of the role that the Technical Advisory Board would have in prioritising the programme of trials. We recognise this as a pragmatic and sensible approach given the possibility of some of the planned trials losing currency with network developments in the meantime. NGET invited us to sit on the Technical Advisory Board.

We and the Panel are satisfied that the project is innovative. The outcome of many of these trials is uncertain and there is a risk that they will fail to deliver a positive result. We are concerned that this conversion and the trials would not go ahead without NIC funding. We consider that there is commercial risk in converting the facility, because its future income stream after the NIC project period is uncertain. We and the Panel consider that the learning from the innovative trials could usefully inform the RIIO-T2 process, with potential savings to customers in the next price control.

(e) Involvement of other project partners and External Funding

NGET elected not to seek financially-contributing Project Partners for OSEAIT. It stated that this would ensure the facility's neutrality would never be questioned, and the intellectual property respected and controlled. It committed to seek to understand whether secondments or sponsorship and donations of assets from organisations can be used to potentially mitigate running costs or extend capabilities. It would only do this were no commercial advantage sought or offered by third parties.

NGET would invite a wide group of stakeholders to sit on the Technical Advisory Board. It would invite representatives of GB Network licensees, Ofgem and academic representatives. Following prompting from the Panel, NGET stated it would also invite a Health and Safety Representative to the Technical Advisory Board.

Based on the 14 trials expected to be delivered during the project, NGET estimate that it would provide 53per cent of the costs of the project, providing £2.8m as a compulsory contribution, plus a further £11.1m extra contribution.

(f) Relevance and timing

NGET stated that OSEAIT represents a rare opportunity, with the planned decommissioning of the Deeside substation. The trials identified would be relevant to the future challenges facing network operators in GB. The membership of the Technical Advisory Board would help ensure that the final programme of trials is relevant and timely for the issues facing the networks. With the project due to end by 2020, the

learning should be particularly timely in informing business planning for the next transmission price control, RIIO-T2. We would expect to see significant savings for customers in the next price control as a result of the sharing of learning from these trials.

We and the Panel had some concerns about the future operation of the trial beyond the NIC period. While the benefits of the project based on the planned programme of trials appear to justify the NIC funding, we are keen to see a legacy from the upfront investment made in this facility. As a condition of funding this project, NGET must engage with us at least one year from the end of the project period to examine the options for how the facility would be managed and paid for beyond the NIC period.

(g) Demonstration of a robust methodology and that the project is ready to implement

NGET produced a high-level project plan in its submission. The plan is broken up into three construction phases and an operational stage. NGET stated that trials would begin during the construction phases.

NGET provided a detailed breakdown of the different resources required to deliver the project. The Technical Advisory Board would be responsible for ensuring that adequate resources are committed to deliver the NIC programme of trials.

NGET described its efforts to reasonably estimate costs, including making use of its specialised Construction Estimating Hub Team. It identified contingency funding for each element of the project. NGET stated that it is ready to start the work once funding is awarded. Work commencing would be subject to our approval of the final estimates of the conversion costs.

NGET stated that there would be no impact on security of supply and that generation customers would not be commercially affected.

In its resubmission, NGET split the SDRCs into two groups: those that relate to the facility itself, and those that relate to the 14 individual trials. The former are relatively comprehensive, with associated timelines. The SDRCs related to the trials are necessarily less certain. NGET would need to seek approval from us for any changes to the wording of the SDRCs, which would be necessary to make them SMART.

NGET claimed that all of the information within the proposal had been subject to both internal and external screening and review, including by NGET's senior management team. Based on the extensive re-write for the resubmission, the review of the original submission was perhaps not as thorough as it ought to have been.

NGET identified the main risks of the project including mitigating actions. The Technical Advisory Board would be responsible for deciding whether or not to terminate a trial.

Evolution (SPD)

Project overview

There is expected to be increasing value to be gained from DNOs managing their networks more flexibly for a cost-effective low carbon transition.[22] Part of this flexibility is the emerging role of the Distribution System Operator (DSO). We are actively engaging in this complex transition through our work on flexibility, chairing Workstream Six of the Smart Grid Forum and by actively participating in ongoing European discussions.

Evolution would have been a commercial project trialling one model of the role of the DSO. It would have transformed three Grid Supply Points (GSPs) into a single source of dispatchable capacity. It would have performed the DSO role by operating a 'local market for grid capacity and system services'. This would have been designed to optimise network performance involving local generation, demand side response (DSR) and energy storage services. SPD claimed the market would be created to allow the GSPs to become dispatchable Virtual Balancing Mechanism Units (BMU) or enrol in ancillary services for the SO. Participants of the BMU would have been recruited for services which SPD could have dispatched to deliver the response required by the SO. As SPD would have had oversight of the technical network constraints on the local network, it could have ensured it remained within operational limits.

SPD claimed that this project would identify the elements of the current system structure which would need to be altered to establish the transition from DNO to DSO. We and the Panel agreed that the idea behind this project is one of great interest and strongly encourage further development in this area. However, this project was not fully-formed enough to be considered for funding under this year's NIC.

(a) 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

We support SPD's claims that enabling the role of the DSO would benefit low carbon generators and therefore facilitate the low carbon energy sector. This is because of the visibility a DNO has of its network, the loads and generators connected to it and the network constraints. The DSO could potentially operate its network more efficiently than if the SO was dispatching the distributed resources directly. If the network is operated more efficiently this should deliver financial benefits to consumers.

Low Carbon and/or environmental benefits

Evolution would have facilitated the Carbon Plan by allowing further connections of renewable generation combined with fewer constraints of generators through increased network control. With increased network visibility and better management of the network it could have offered increased access to the system for low carbon generators. It would have created a market incorporating energy storage and DSR services.

SPD stated that it was difficult to quantify the carbon or environmental benefits directly associated with the project. While we appreciate this difficulty, it was symptomatic of the relatively immature state of the project presented.

[22] https://www.ofgem.gov.uk/sites/default/files/docs/2015/09/flexibility_position_paper_final_0.pdf.

Net financial benefits

SPD claim that this method would have reduced connection costs where there are network constraints. Evolution's method would have made savings in constraint payments to distributed generators and through curtailment mitigation actions, such as active outage management. While we appreciate that the potential financial benefits are likely to outweigh the costs, the case put forward by SPD was difficult to follow and included assumptions without adequate explanations. We were surprised to see that the benefits case in the narrative was not updated for the three GSPs in the resubmission compared with one GSP in the original submission.

(b) Provides value for money to electricity network customers

SPD explained in its submission the potential benefits of DNOs taking on the DSO role. SPD claimed that it could have alleviated some of the expensive contingency measures currently undertaken by the SO. This would be achieved through improved visibility of the local conditions, providing enhanced forecasting, as currently the SO has limited data for dispatchable resources to the distribution network.

SPD stated that innovative technologies being trialled on the network are designed to operate most efficiently under a more DSO-type operating environment. It added that the technologies being trialled through innovation projects are operating under the current DNO operating environment and therefore not reaching their potential. SPD argued that a local market with long term forecasting could be used to address locational demand and supply conflicts. This could be supported with incentivising arrangements that support appropriately located generators, storage and demand.

SPD claimed that the market created under Evolution would be inclusive and accessible to all participants. Evolution would take control of BEGA and BELLA customers and hold a separate balancing and settlements obligation with the SO.[23] It would ensure this would be optimised to benefit all market participants. SPD argued Evolution's main objective would have been to get the greatest value from renewable generation and developing a market, to ensure that market participants are fairly compensated for their services. However, we were concerned that there was not a sufficient incentive to engage customers which would have been vital for the market to work.

We are not convinced that this project is justified in its scale and cost. The submission is not sufficiently developed. The Panel probed the project team on the commercial arrangements of the project, for example, who would be the winners and losers in the market, and did not receive satisfactory responses. SPD attempted to address these points in its resubmission, but we feel that such considerations should have been central to the project submission, rather than an apparent add-on.

SPD would have run a competitive tender process for the supplier of relevant equipment required for the project. SPD claimed it would work closely with previous project partners for other innovation projects and, where relevant, run a competitive tender process if it needed further expertise.

[23] Bilateral embedded licence exemptible large power station agreement (BELLA); bilateral embedded generation agreement (BEGA). BELLA and BEGA customers are large generators already connected to the distribution network under a contract with the SO.

(c) Generates knowledge that can be shared amongst all relevant Network licensees

SPD claimed that Evolution would have provided learning in the advancement of regulatory mechanisms which could be required to facilitate the DSO model. The project would have developed process maps to build on existing and new commercial mechanisms. This would have: developed the decision making process for top down investment in network enablers and new technology; identified triggers of DSO investment required to enable DSO activities; and identified information exchanges and methodologies to enable participation in local balancing and settlements arrangements and the information exchange.

While we agree that this learning would provide a useful contribution to the development of the role of the DSO, we and the Panel were not convinced that the project was sufficiently developed enough to trial a working market. We were not satisfied that SPD had identified the market players, particularly the potential 'winners and losers', and the complexities involved in the market's operation such as the cash flows between market players. Without understanding this market and the associated complexities we agree with the Panel and are unconvinced that this project would be able to produce valuable learning.

The project would have disseminated knowledge via events and forums, newsletters and conferences. There would have been internal dissemination via project champions and an annual internal technology conference. The project would have involved SP Energy graduates in the delivery to maximise their exposure to different activities and to bring a fresh perspective to the project. The knowledge would have been captured via an individual within the Evolution team.

The project would have conformed to the default IPR arrangements.

(d) Is innovative (ie not business as usual) and has an unproven business case where the innovation risk warrants a limited Development or Demonstration project to demonstrate its effectiveness

This project would have been innovative as it would have been trialling the role of the DSO which is significantly different to the role of the DNO. The project would have sought to restructure the current market system. Working to define the role of the DSO is an innovative idea and we are keen to see the DNOs working together to develop this.

(e) Involvement of other project partners and External Funding

SPD confirmed it had partnered with Smart Grid Consultancy (SGC) to provide expertise on the project's scope and architecture. It had partnered with Global Energy Advisory who would support engagement with wider industry and financial institutions. It had partnered with CGI to provide support on software development and to coordinate with Elexon on determining the financial flows. National Grid and Elexon were confirmed as project supporters.

We shared the Panel's concern that the project had not been properly scoped with defined work streams for the project partners. There was very limited clarity on the costs associated with the project partners; there was limited detail on their role within the project and a lack of any detail on the contractual arrangements with the partners. We also noted that some of this expertise was introduced to the project in response to the

Panel's concerns of lack of expertise in the first bilateral. Whilst we are supportive of companies adjusting to address concerns, we felt that this expertise should have been fully involved in the project's initial stages and throughout the process, not brought in late during the process.

The project would have not used external funding.

(f) Relevance and timing

As our energy generation mix continues to evolve and further renewable generation is connected to the system, the SO's role continues to become more complex. SPD stated that the SO spends £850 million per year to balance the system, with the majority going towards generators to ramp up or curtail supply. There has been growing interest in the DSO role, both within GB and more widely. We and the Panel therefore see this project as very relevant and timely.

(g) Demonstration of a robust methodology and that the project is ready to implement

We were not convinced that this project had a robust methodology or that it had the correct expertise to deliver this project.

The Panel were not satisfied that SPD had understood the complexities of the market. We and the Panel agreed that it would have been more appropriate to have undertaken a feasibility study to understand the pros and cons of this project. We would have expected a project of this ambition to have done more pre-work to understand the cash flows and which parties could benefit from the project. We would also have expected preliminary work to contain engagement with relevant parties to understand required incentives to encourage parties to be involved.

Following concerns raised by the Panel, SPD brought market specialists to the second bilateral meeting. However, the Panel remained unconvinced that SPD would have been able to begin the project in a timely manner with a firm budget. Considering the important role that National Grid (as SO) would have in the DSO development, we were disappointed that it was not a project partner. It was not clear what role National Grid would have played.

In response to challenge during the evaluation process, SPD's resubmission included a re-working of the project structure. Its resubmission included the following as the first three work packages: (1) Market and Technical Design; (2) Stakeholder Interface and (3) Ofgem Consultation Report 'Funding Gate'.

While we welcomed this recognition of the importance of these preliminary stages and the potential role for Ofgem within them, we continued to share the Panel's concerns. Most notably, we and the Panel feel that a detailed feasibility study would be an appropriate first stage, to determine whether the costs to all parties associated with establishing and managing a DSO market would really create sufficient benefit, or whether a more technocratic approach to achieving the same goals would be less expensive and less disruptive.

SPD updated the SDRCs to reflect the new work packages. However, the SDRCs remained non-compliant with the requirements of the NIC Governance Document, including a gap of nearly three years between two deliverables.

SPD raised a number of potential regulatory issues it would have needed Ofgem's support on. This would have involved seeking letters of comfort from Ofgem to be able to support NGET diverging from SO Standard Condition B3 (disposal of relevant assets and restrictions on charges over receivable) and SO Standard Condition B7 (availability of resources). We could not envisage problems with this but would have needed further information before assessing whether or not the project could affect system reliability. We did have concerns that SPD would have needed to contract with BEGA and BELLA customers; although we would not be involved with this process, we were concerned that there appeared to be no incentives in place to do this.

Overall we were concerned that this project did not have sufficient resources in place for timely delivery, nor a robust methodology. We are pleased that SPD raised the subject of the DSO and strongly encourage the DNOs to work together and with us in developing this idea further.

Telecoms Templates for a Low Carbon Future (WPD)

Project overview

Network licensees are aiming to transition to a smarter grid to facilitate the connection of more low carbon generators and to provide network capacity to respond to changing demand needs. Telecoms infrastructure is set to play a vital role in facilitating this. Past and current network innovation projects have incorporated elements of this infrastructure, for example in the deployment of active network management systems. WPD's project would have attempted to understand how the approach to the communications requirements of previous innovation projects may have impacted their degree of success. It would have undertaken a global appraisal to determine what the communication requirements are for a smart grid, using learning from previous innovation projects, worldwide. The output of the project would be to create baseline templates of communications systems, addressing security, quality, performance, scalability and cost. The project would have developed a test laboratory to trial the telecoms technologies. The results would have been calibrated into a tool for DNOs to understand and apply the most suitable telecoms approach required for a given smart grid application.

(a) 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

WPD argued that the rate of the transition to a low carbon energy sector depends on the rate at which enabling technologies are put in place across the network and that telecoms infrastructure is one of the most important enabling technologies. It claimed that experience gained on a range of previous projects suggests that communications aspects are often not fully considered during project design and specification. This project would have enabled appropriate communication solutions to be identified and adopted at the beginning of the projects.

Low Carbon and/or environmental benefits

This project would not have directly released any capacity into the network. However it would enable the transition to a low carbon economy as per the Carbon Plan by increasing the deployment rate and success of projects aiming to achieve a smarter grid. It calculated 157 Mt CO_2 reductions were at risk from existing LCNF projects should the telecoms infrastructure used be inadequate.

Net financial benefits

WPD claimed the project would accelerate the transition to a smart grid by preventing the delay of smart grid projects caused by telecommunication issues, by a year or more. The impact of the project would have been greater if its outputs were applied across GB. Assuming this project could prevent the delay to smart grid projects by two years then WPD has calculated benefits of £1.6bn. Such estimates were necessarily somewhat speculative.

(b) Provides value for money to electricity network customers

WPD argue that this project would have a direct impact on the network. It would enable DNOs to apply communications more efficiently as part of business-as-usual activities or for smart grid projects.

However, we and the Panel were not convinced that the potential outputs of this project would justify the cost. There would have been three work streams. The first would have been a desktop activity to develop the baseline templates, costing £1.3m. We and the panel were concerned by this cost based on the work involved. The second work stream was to establish what telecoms infrastructure may be required in the future and to conduct trials, costing £10.5m. We were not convinced by the justification provided for this cost and remained unclear as to what the funding would be used for. The third work stream would have carried out analysis of the previous work streams and disseminated findings, costing £1.3m. WPD also identified project management costs of £1.0m to cover the whole project.

We were unclear on the costs associated with the project partners, collaborators and supporters. An organogram was provided, but we and the Panel felt there was too much uncertainty associated with the identified roles. We were pleased that WPD planned to undertake a competitive process to ensure good value.

(c) Generates knowledge that can be shared amongst all relevant Network licensees

WPD claimed that many previous innovation projects which have been seeking to enable a smarter grid have come across problems associated with communications. This project could have presented useful knowledge and learning associated with the design and installation of telecommunications, which might have resulted in reduced delays in future projects.

We were satisfied that Telecoms Templates had an adequate knowledge dissemination plan and a robust methodology in place to capture the learning being generated. WPD made provision for eight different workshops on the learning from the project reflecting different project milestones. The learning generated would have covered the whole project: from mobilisation, through the design, build and trial phases, and the consolidation of learning. WPD identified a range of stakeholders who would have been interested in the learning from this project such as other DNOs, industry groups, telecoms vendors, academia, internal stakeholders and customers.

The project would have conformed to the default IPR arrangements.

(d) Is innovative (ie not business as usual) and has an unproven business case where the innovation risk warrants a limited Development or Demonstration project to demonstrate its effectiveness

We were satisfied that this project would have been innovative. WPD claimed that communication aspects of projects are often overlooked and result in delays. This project would have sought to develop an approach that DNOs could use to more intelligently plan communications into a project and choose the best fit of installations.

WPD argued that funding is required to determine the effective tools and processes which are needed to address the overarching problem of an ageing telecoms infrastructure which requires developing. The project would have developed an all-encompassing learning package on telecoms infrastructures which would have sought to address security, quality, reliability, deployment and cost.

(e) Involvement of other project partners and External Funding

WPD developed the project with its in-house contractor for telecoms, Surf Telecoms, as well as with support from Siemens and Newcastle University. The project did not have project partners confirmed as WPD would have run a competitive process to identify them. The project did have a number of project collaborators and supporters.

The Panel raised concerns regarding lack of expertise in the project. Newcastle University would have worked alongside Surf Telecoms to provide technical expertise for the work involving the test laboratory. In the second bilateral WPD expanded on the expertise of those to be involved in the project. However, we and the Panel remained concerned whether the requisite expertise would be in place to support the project in the key roles.

We and the Panel understand the preference for waiting for confirmed project partners before developing bid packages for selecting suppliers. However, considering the technical and commercial expertise required to undertake this project, we felt that the submission would have benefited from a telecoms partner being in place and offering external funding towards the project.

(f) Relevance and timing

We and the Panel are convinced that this project would address a relevant issue. Network licensees are managing a transition to a smarter grid and we recognise that communications play a vital role in this. As a fast-paced area of development, we support this area of smart grids being considered, especially if communications issues have to some extent prevented or delayed the full realisation of benefits from existing innovation projects.

In light of the issues raised in the submission we encourage Network licensees to consider communications in more depth during planning for business as usual activities as well as future innovation projects. However, we remain unconvinced that the use of templates for the network licensees is the correct approach for this to happen. Given the evolving nature of smart grids we are concerned that templates would not have enduring currency for future network applications.

(g) Demonstration of a robust methodology and that the project is ready to implement

We, the Panel and the consultants were concerned about the project's methodology. We were concerned that it did not present an appropriate and defined approach to identifying telecom needs. We agreed with the consultants and the Panel that a systems engineering approach would have been more suitable bearing in mind the nature of the challenge. This approach could focus more on characterising and quantifying the future requirements of a smart grid as a whole system and demonstrate how technologies could fulfil these potential requirements. We did not see sufficient evidence throughout

the submission to support the proposed method, such as learning gained in other sectors which may have been applicable.

As mentioned under criterion (e) we had concerns about the expertise available to undertake this project. We are therefore not convinced that this project has the resources in place to be successfully delivered.

The submission contained adequate SDRCs.

WPD verified the information provided in the submission and that it had been reviewed and endorsed by WPD's Operations Director. The evidence of both the quality of the drafting of the initial submission, and that some required information was missing, brings into doubt the thoroughness of this review. The project would have followed a three-step process to ensure that it would have been halted if this was found to be the appropriate course of action.

WPD provided evidence of a risk management strategy which would have proactively identified risks in a timely manner and then implemented appropriate mitigation actions.