Electricity/Gas Network Innovation Competition Screening Submission Pro forma

Notes on completion		
Before completing this form, please refer to the relevant Network Innovation Competition (NIC) Governance Document(s).[1] Please use the default font (Verdana size 10) in your submission. We will only accept the text visible in the text entry areas. The text entry areas are predetermined and should **not** be changed. The full-completed submission should not exceed 10 pages in total. Ofgem will publish all the information contained within this Screening Submission.		
Is the application for the Gas or Electricity NIC?	Gas NIC ☐	Electricity NIC ☒
Cross Industry Project	YES ☐ *If yes, please fill out Cross Industry Projects section*	NO ☒
Funding Licensee(s)		
Scottish Hydro Electric Power Distribution (SHEPD) & Northern Powergrid (NE)		
Network Licensee Project Partners		
Costain, E.ON Solutions GmbH & E.ON Connecting Energies Ltd		
Funding Licensee area(s)		
Scottish Hydro Electric Power Distribution & Northern Powergrid (NE)		
Project Title		
Resilience as a Service - RaaS		
Project Summary		
The Resilience as a Service (RaaS) project will reduce or defer costly future network reinforcements and the use of existing carbon intensive standby generation required to maintain a reliable service as we move ever closer to a low carbon economy. We will do this by developing a market-based solution for RaaS along with the procurement framework and implementation methodology to provide the customer with a low carbon, cost effective and secure electricity supply. This project aims to maintain and improve reliability for customers, especially in remote and isolated areas, while accelerating the low carbon economy by successfully proving that RaaS can be deployed at scale in the UK. RaaS will develop and test an economically viable, scalable and replicable technical solution, bringing together a wealth of expertise through a strong partnership between: large scale project delivery experts Costain; European energy giant E.ON and two DNOs: Scottish and Southern Electricity Networks (SSEN) and Northern Powergrid (NPg). This represents a consortium with the depth, strength and expertise required to deliver a strategic, commercially viable solution to ensure no stakeholder groups are left behind during the transition to a Low Carbon Economy.		
Estimated Start Date	**Estimated End Date**	
2nd January 2020	31st December 2023	

[1] https://www.ofgem.gov.uk/publications-and-updates/version-30-network-innovation-competition-governance-documents All capitalised terms used in this document have the meaning given to them in the respective NIC Governance Document.

Estimated Project funding			
The Licensee must provide an approximate figure of the total cost of the project and the amount of NIC funding for which it is applying.			
Total Cost of Project **(If Cross Industry Project provide cost split in Cross Industry section)**	£16.5	**NIC funding requested**	£15.0
Is the Technology Readiness Level (TRL) of the Project at start date between 4 and 8?	YES ☒	NO ☐	

What is the Problem?

The Licensee must provide a narrative that explains the Problem(s) that the Project is seeking to address.

In remote areas, maintaining an acceptable level of resilience can be costly, in comparison with other more highly populated sections of the network. These areas are often geographically isolated, and it can be financially and technically challenging to provide a consistent and reliable electricity supply, and disruption caused by outages has a significant impact on stakeholders. For instance, isolated parts of the GB network can require expensive network reinforcements to maintain security or they may even rely on expensive carbon-intensive standby generation to secure a reliable service in very remote areas. The bulk of such costs are borne by network customers.

The challenge of maintaining acceptable resilience will increase, as we move to meet future carbon targets with the ongoing electrification of both
transport and heat, as well as a continued growth in the connection of distributed renewables. The connection of large volumes of Low Carbon Technologies such as electric vehicles, heat pumps, PV panels and potentially significant volumes of storage will radically alter long established and consistent demand patterns. This will increase peak network loading which in turn drives investment, the cost of which will fall to network customers. In addition, increased electrification of heat and transport will also result in a greater stakeholder dependence on electricity for day-to-day life. Therefore, maintaining a robust, reliable and affordable network is a key component of realising the country's ambition of a low-carbon economy.

Traditional resilience options such traditional network reinforcement or diesel-powered generators are not only costly to own and operate but also have a significant environmental impact. However, new technology options are emerging, which offer the opportunity to develop fresh business models for delivering resilience which may present better value for consumers. The integration of these solutions has not yet been technically proven at scale in GB, the small-scale deployments to date have all been bespoke customised solutions, delivered at a price point which is too expensive for wide spread adoption. Moreover, there is no proven business model in GB for DNOs to access these services or a clear needs case for service providers to create the solutions.

Therefore, RaaS will develop and demonstrate the technical, organisational and commercial arrangements necessary to prove the business model to allow for resilience services to be delivered in a socially acceptable way. In addition the project will help develop learning which will inform the development of future security of supply standards in GB.

What Method(s) will be used?

The Licensee must describe the Method(s) that are being demonstrated or developed. It must also outline how the Method(s) could solve the Problem. The type of Method should be identified where possible eg technical, commercial etc.

The RaaS project will reduce or defer costly future network reinforcements and the use of existing carbon intensive standby generation required to maintain a reliable service as we move ever closer to a low carbon economy. In many locations across GB, the Smart Grid Architectures being developed and tested in other industry demonstrator projects may offer an effective market based solution, yet this may not be suitable for more remote locations due to network topology and customer density. Thus, we require a commercially viable alternative to ensure no stakeholder groups are left behind during the move to meet future carbon targets.

The project builds on existing technology demonstration projects including the E.ON microgrid at Simris, (part of the EU Horizon 2020 Project INTERFLEX in Sweden) and the NPg NIA-funded Microresilience Project, which are yet to be proven scalable and commercially viable. This integration of existing beneficial innovations facilitates economic development of deliverable resilience services in a replicable, socially acceptable and commercially viable fashion, to maintain a reliable electricity network for rural customers in a low carbon economy.

This approach accelerates the adoption of these innovations by ensuring roll-out across GB will be kick-started through the BAU adoption by the two DNO partners.

The RaaS project is proposed to run in four phases:

- Phase 1: Define - Requirements definition and trial site identification

Development of the functional specifications and dynamic service requirements, that act as design parameters and commercial constraints for the solution. This will be supported by extensive stakeholder engagement to ensure that a wide range of emerging technologies are considered in the design of the solution. This phase will include identification and selection of two or more test geographies that exhibit high criticality or have networks which are predicted to be challenging and costly to maintain acceptably resilience as we move to meet future carbon targets.

- Phase 2: Design - Detailed design and procurement

Design of scalable, modular technology solutions to meet the functional service requirements using the technical experience of the consortium members. Development of market transparency and commercial requirements to inform a TOTEX assessment model and the identification of any enabling works. Through this phase the functional service requirements shall be used as the basis of a future RaaS procurement and be combined with the solution design to ensure competitive procurement for any build works outwith the consortium skillsets.
Stage Gate
To review solution design and business case ahead of Installation and Commissioning.

- Phase 3: Deployment - Installation and commissioning

Installation of the technical solution in the defined SSEN and NPg trial areas to facilitate the trial execution and evaluation phase. This stage will include development of new business functions and processes required to operate the technical solution at scale within the trial environment. Schedule Performance Index (SPI) and Key Performance Indicators (KPIs) are to be set and the solution commissioned against these to ensure robust, replicable trial delivery.

- Phase 4: Operate – Trial execution and evaluation

Rollout of the end to end beta-solution to defined areas and user groups to demonstrate real-world operation, record customer experience, and identify any unforeseen risks or unintended consequences. The NPg and SSEN trials will be complementary and delivered in stages so to enable results from both to inform upcoming iterations. Results shall be processed and evaluated with respect to commercial viability and informing future regulatory mechanisms.

The four phases of the project will be delivered through several discreet Work Packages which are briefly described below, with the proposed lead organisation presented for each:
WP1: Project Management – Costain
WP2: Network Engineering – Northern Powergrid
WP3: Resilience Technology – E.ON
WP4: Stakeholder Engagement – Northern Powergrid

Method(s) continued

WP5: Trial Design – Scottish and Southern Electricity Networks
WP6: Economic Assessment – E.ON
WP7: Design Authority – Scottish and Southern Electricity Networks
WP8: Demonstration – Costain
WP9: Commercial and Compliance – Scottish and Southern Electricity Networks
WP10: Dissemination – Costain
Learning and dissemination activities will be structured throughout the project with a robust stakeholder engagement plan which is, where relevant, aligned to the engagements of the Open Networks project or other similar industry initiatives , and includes resources for various stakeholder types.

Funding Commentary

The Licensee must provide a commentary on the accuracy of its funding estimate. If the Project has phases, the Licensee must identify the approximate cost of each phase. Non RIIO-Network Licensees should indicate potential bid costs expenses

The Resilience as a Service project will run for four years with a total cost of up to £16.5 million. These costs are based on an initial set of assumptions to ensure that the project outcomes are successfully delivered. The project can be divided into a number of discrete phases, which are broadly set out below

- Phase 1 – Define, approx. 10% of costs;
- Phase 2 – Design, approx. 20% of costs;
- Phase 3 – Deployment, 50% of costs; and
- Phase 4 – Operate, approx. 20% of costs.

The bulk of the costs will be incurred from Phase 3 onwards, therefore, it is proposed to have a Stage Gate at the end of Phase 2. This will allow the project costs to be better understood following completion of the initial phases of the project allowing a robust review of the project business case to ensure that it still has the potential to deliver benefits for customers.

The project partners plan to make a contribution of at least 10% of the project value. The contribution will include in-kind provision of time, resources and data, ensuring that the project can proceed at a lower cost than if it was delivered commercially and allowing the project to utilise existing expertise and previous learning held by the partners. Full details of partner contributions will be provided at Full Submission Proforma.

Further details on the project costs and funding will be included in the Full Submission Proforma. We will also continue to endeavour to identify efficiencies and further sources of external funding in order to try and reduce the total funding requirement under NIC.

Which specific requirements does the Project fulfil?(Please tick which of the specific requirements this Project fulfils)

	Electricity	**Gas**
A specific piece of new (ie unproven in GB) equipment (including control and/or communications systems and/or software)	☐	☐
A specific novel arrangement or application of existing electricity/gas transmission and/or distribution equipment (including control and communications systems software)	☒	☐
A specific novel operational practice directly related to the operation of the electricity/gas transmission and/or distribution systems	☒	☐
A specific novel commercial arrangement	☒	☐

How does the Project accelerate the development of a low carbon energy sector and have the potential to deliver net financial benefits to existing and/or future customers in the relevant sector?
The Licensee must demonstrate that the Solution has the potential to accelerate the development of the low carbon energy sector in GB and/or deliver wider environmental benefits to GB customers. The Licensee must demonstrate the potential to deliver net financial benefits to existing and/or future customers.
The electrification of heat and transport required for the country to meet its environmental targets will see an overall increase in demand for electricity and a growing societal dependence on secure, reliable and dependable network. The absence of a secure and reliable supply of electricity could undermine public confidence, which would slow the adoption on lower carbon technologies such as heat pumps and EVs. Therefore, maintaining and improving on current levels of reliability will be essential to ensure that this transition tales place. There are areas of the country where maintaining resilience is already technically challenging and expensive, providing enhanced capacity or reliability using traditional means is likely to be prohibitively expensive. However, new technologies are emerging which provide viable alternatives to conventional options, these include the use of microgrids or islanding as a means of maintaining network reliability. Typically, this will involve the combined use of energy storage, distributed generation and enhanced network protection and control schemes. This project seeks to investigate the potential for these types of solutions to be used in GB, and to develop a business model for "Resilience-as-a-Service" (RaaS). Whilst, each component part necessary to provide low carbon RaaS has already been well demonstrated they have not been integrated at scale and there is not a clear path to market for this approach. For network operators, the price point for low carbon resilience options is too high to provide value for money as unit costs of some components (such as energy storage) remain largely non-standardised and the systems integration skill set is only held by a limited number of vendors. From the perspective of the delivery partner, there have not been enough referenceable cases and the resources needed are too highly skilled to create cost competitive efficient delivery methodology around. For the asset owners, there is not enough understanding of potential revenue streams to justify development of new products and services for this unproven market. This project aims to address each actors position in the future value network by clearly defining a business model and standard methodology for each. By setting out a clear commercial structure for each provider, it will invite healthy competition and improved value to the customer. Establishing a standard delivery model for microgrids reduces the risk for the supply chain, driving cost optimisation through competition which will in turn invite the right skills and commercial entities to the market, improving the supply chain's ability to deliver smart grid solutions while appropriately apportioning the arising risks. By reducing the cost and de-risking the implementation process this will allow network operators to purchase these solutions instead of the high carbon, traditional alternatives. An unreliable or constrained electricity network provides a significant risk for smaller more isolated communities as it potentially stifles local business growth and undermines the long-term sustainability of these communities. With a growing reliance on the electricity network at , this is becoming a higher criticality issue with customers. In this project, we aim to improve the service some of the most remote customers in the UK network, enabling these small communities to remain relevant in a period of high urbanisation. Additionally, the increasing criticality of resilience has the potential to cause reliance on high levels of carbon rich generation sources such as diesel generators for standby supplies. These generation sources are significant sources of particulate matter and carbon as well as potential for oil leaks etc. This project addresses this by creating the business case and framework for procurement of low carbon resilience services. Modern resilience technologies such as batteries carry a much smaller environmental burden when compared to traditional alternatives like diesel generators.

How will the Project deliver value for money for electricity and/or gas customers?

The Licensee must demonstrate that the Method(s) being used can derive benefits. It must also be able to demonstrate that the resulting learning can be attributed or are applicable to the electricity/gas transmission and/or distribution systems.

All DNOs have a clear responsibility to continually improve network reliability and increase levels of resilience for our customers. The challenge of maintaining security will become ever more important as demand grows due to the electrification of heat and transport. The RaaS project will develop and demonstrate at scale, an innovative business model combining the necessary technical and commercial learning to show how local resources can be used to maintain security of supply. This project will provide significant knowledge and learning for all DNOs and will provide additional options for improving security of supply in specific areas which may be vulnerable to disruptions both now and in future. The project has been designed to ensure the solution is proven to be safe, replicable, and acceptable to other network licensees through robust demonstration of the methods.

The development and demonstration of the Methods will show how network resilience on the distribution network can be maintained by utilising new techniques using local assets that are already connected. The project will demonstrate an innovative new business model where DNOs can procure "Resilience as a Service" which will allow network reinforcement expenditure to be deferred, avoided, or substantially reduced, whilst still maintaining the long-term reliability of the network. Initially, the project will focus on remote and rural areas, where maintaining a secure supply is already challenging. However, the learning will be applicable to wider areas of the network where network reinforcement may be required,

The project will build on earlier NIA projects in this area by both NPg and SSEN and with knowledge gained from EONs Horizon 2020 funded project in Sweden along with Costain's extensive experience in delivering major infrastructure projects. The will give a firm foundation for the development of the RaaS project, and the combined experience of the project team will ensure that this challenging project is delivered within the project budget to ensure that customer benefits are realised.

How will the Project generate knowledge that can be shared amongst all relevant Network Licensees?

The Licensee must explain the learning that it expects the Method(s) to deliver, and how it will be shared. The Licensee must demonstrate that it has a robust methodology in place to capture the learning and how the learning will be disseminated.

While NPG's Microresilience and the E.ON Simris have demonstrated the technical potential for delivering resilience, commercially driven resilient microgrid installations have not yet been undertaken on the GB network. Consequently, there are a large number of questions about the application of this type of approach.

There is no clear and comprehensive blueprint for the balance of technical, commercial, logistic and social activities that needed to deliver this solution, particularly in the context of the GB network and regulatory regime. This project aims to deliver such a blueprint, containing a full set of standard approaches for microgrids, directly relevant to all other DNOs. The project learning will also support several other activities that are currently underway and will actively engage with those. There are three broad areas where learning can be categorised;

- The project will facilitate the increased uptake of low carbon technology, the Industrial Strategy and other societal needs of interest to government, regulatory and associated commercial stakeholders, such as energy resource developers;
- Open Networks, ENA working groups on low carbon technologies and Security of Supply are tasked with the development of future network architectures. This project is certain to have important implications in these areas; and
- The project is also likely to be of interest to groups that will benefit directly from the use-cases which will be demonstrated and tested. Organisations representing community groups, farming and other rural interests will be actively engaged, consulted and informed as part of the project.

A comprehensive strategic and tactical workstream to disseminate new learning and to engage in a two-way dialogue with each of these three key strands will be delivered as part of this project.

Does the Project conform to the default Intellectual Property Rights (IPR) arrangements set out in the NIC Governance Document?	YES ☒	NO ☐

By selecting NO, the Licensee is indicating that it wishes to deviate from the default requirements for IPR. If this is the case, it must demonstrate how the learning will be disseminated to other relevant Licensees and how value for money will be ensured. The Licensee must also outline the proposed alternative arrangements and justify why the arrangements are more suitable than the default IPR arrangements.

How does the project demonstrate it is innovative (ie not business as usual) and has an unproven business case, that the innovation risk warrants a limited Development or Demonstration Project to demonstrate its effectiveness?

Demonstrate why the Licensee has not previously used this Method (including where the Solution involves commercial arrangements) and why NIC funding is required to undertake it. This must include why the Licensee would not run the Project as part of its business as usual and why the Solution is not Research.

This project is the first large scale deployment of Resilience as a Service, whilst there have been some earlier NIA previous projects such as NPg's Microresilience project and some previous technical demonstrations such as EONs project at Simris in Sweden this approach to network resilience has never been previously implemented on the GB network. There is currently no proven business case for the use of "Resilience as a Service", specific challenges and uncertainties include:

- Requirements Definition - a validated set of Requirements for RaaS is needed to enable DNOS to procure this type of service;
- Technical Standards – technical standards need to be developed for this mode of network operation, in particular in key areas such as earthing and protection;
- Market Readiness - there are currently no market information available to potential service providers to allow them to consider this potential service when developing their projects.

At present any projects in this field have been highly bespoke and customised. Therefore, not suitable for at-scale delivery across the industry. Without the additional learning delivered from the RaaS project it is unlikely that this solution would be able to be delivered via the BaU mechanisms. Therefore, the project requires additional NIC support if it is delivering benefits to customers.

How were project Partners, external resourcing/funding identified, and what are their respective roles in the Project?

The Licensee must provide evidence of how Project Partners were identified and selected, including details of the process that has been followed, and the rationale for selecting partners and ideas for the Project.

The Licensee should provide details of any Project Partners who will be actively involved in the Project and are prepared to devote time, resources and/or funding to the Project. If the Licensee has not identified any specific Project Partners, it should provide details of the type of Project Partners it wishes to attract to the Project.

The genesis of this project was the competitive open call for Network Innovation Competition ideas undertaken via the ENA Innovation Managers working group in the Autumn of 2018. In response to this call, Costain and E.ON jointly presented their idea for a microgrid installation on the GB network. Following further discussions and scoping workshops involving the potential delivery partners and DNOs this current project proposal was developed. This builds on both previous works undertaken by the proposing partners and by the DNOs – such as SSEN's NINES project and NPg's Microresilience and DS3 NIA projects.

Costain will lead the project on behalf of the consortium using a long track record in large-scale complex energy infrastructure projects including delivery of the London Power Tunnels. As project manager, Costain will be accountable for logistics, assure the timeline, control project cost and guide the consortium to deliver the desired benefits.

E.ON have extensive experience of operating electricity distribution systems in continental Europe. Additionally, and most importantly, they designed and installed a microgrid solution at Simris in Sweden as a part of the Horizon 2020 project INTERFLEX. This project saw the successful integration of a 442kW solar farm, a 500kW wind turbine, an 800 kW / 330 kWh battery, 22/11kV Primary substation and 150 active participants. The technical and operational experience gained from Simris is a key foundation for this proposal.

The DNOs bring knowledge of the network and the location of issues, will provide ESQCR oversight and, most importantly, a clear understanding of the customer benefits of resilient microgrids. Further partners may be identified as the project design proceeds.

Will the Project require any derogations or exemptions?

The Licensee should outline if it considers that the Project will require any derogations, exemptions, or changes to the regulatory arrangements.

At this stage it is not anticipated that any exemptions or derogations will be required.

How will the Project activities impact customers?
The Licensee should outline any planned interaction with customers or customers' premises as part of the Project, and any other direct customer impact (such as amended contractual or charging arrangements, or supply interruptions).
At the moment we do not anticipate any direct interaction with customers. However, this is an area which will continue to review, and we will provide further details in the Full Submission as appropriate.
What funding is being requested from each NIC? (Cross Industry Projects only)
The Licensee must outline funding that is being requested from the Electricity and the Gas NICs and include a justification for the funding split.
Click or tap here to enter text. Not applicable

Are there any further details the Licensee considers would support its submission?	
Further to the ENA Joint NIC Call both SPEN, WPD and UKPN have expressed an interest in supporting and collaborating further on the project. During the development of the Full Submission we will continue discussions with all three parties to further develop their interest and involvement in the RaaS project.	
Contact Information (*Cross Industry Projects can provide details for up to two contacts)*	
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