

Electricity Network Innovation Competition

Screening Submission Pro-forma

Notes on completion		
Before completing this form, please refer to the Electricity Network Innovation Competition (NIC) Governance Document, which details all of the information that you are required to provide. Please use Verdana size 10 font in your submission. The text entry areas are suggestions and the size of each text area can be altered if you need to provide more information in one section and less in another. In all cases the full-completed submission should not exceed 11 pages in total. Ofgem will publish all the information contained within the Screening submission.		
Funding Licensee		
Scottish Hydro Electric Transmission (SHE Transmission)		
Network Licence Project Partners		
None		
Funding Licensee area <i>(or where the licensee does not operate in a specific area the geographic location(s) of the Project)</i>		
Scottish Hydro Electric Transmission (SHE Transmission)		
Project title		
New Suite of Transmission Structures (NeSTS)		
Project Summary		
<i>The Licensee must provide an approximate Project start and end date.</i> Whilst existing designs for transmission infrastructure have served the industry well, changing demands on the network and new technological innovations give an opportunity to consider other options which have the potential to benefit customers. SHE Transmission's current NIA Project (NIA_SHET_0010) is developing designs for a new suite of transmission structures to unlock the potential from a number of new technological innovations. The NIA project will identify the designs which demonstrate sufficient potential benefits to merit development to the next stage. SHE Transmission seeks NIC funding to progress the development of these transmission structures beyond the scope of the existing NIA project. Where appropriate the project will also consider further alternatives outwith the scope of NIA which may be appropriate at additional voltage levels. This new NIC project will deliver significant new learning and will potentially include: • Full scale build and testing of proposed structures (including design refinement); • Alternative design for a planned project, utilising new structure designs; and • First installation of the new structure to validate learning. Project Start Date: January 2016; Project End Date: January 2021.		
Estimated Project funding		
<i>The Licensee must provide an approximate figure of the total cost of the project and the NIC funding it is applying for.</i>		
Total cost of Project	£8.5m	NIC funding requested £7.7m
Cross Sector Projects only: requested funding from Gas NIC or NIA?	<i>If yes, please specify</i> n/a	

Problem(s)

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

Significant investment in new and upgraded transmission infrastructure is necessary to cope with the increase in electricity demand and facilitate the connection of new sources of renewable energy. A significant element of these works will involve construction of new transmission lines. Much of the cost of this increased infrastructure will be borne directly by transmission customers.

Transmission structure design in the UK has not changed significantly over the past 60 years; design traditionally consists of a steel-lattice tower with single earth wire and hanging insulators. These current designs have served the industry well; helping to provide a secure and reliable network. However, demands on the network are changing. Increasing volumes of new renewables are being connected, often in remote areas; meanwhile, there is pressure from stakeholders to reduce the visual impact of our work. For SHE Transmission there are further challenges due to the particularly challenging terrain and weather conditions in the north of Scotland.

Several innovations have been introduced to the market recently which could reduce the size, height, cost, foundation size and construction time of structures. These innovations have been proven individually or on a small scale, but have not yet been deployed at scale. At present, GB Licensees do not have sufficient confidence to recommend their use, due to the fact that they have not been deployed at scale on the GB network. In addition, the success of many transmission line construction projects relies on securing appropriate consents and permissions at an early stage. Failure to secure consents in a timely way can lead to delays and increase overall project costs. Many delays are related to the perceived negative visual impact of the towers and civil works.

The NIA project (NIA_SHET_0010) is developing designs for a suite of transmission structures using a number of these new innovations. Since the inception of the NIA project additional technologies have been introduced, which will also be considered in the evaluation of the new designs. This project will deploy and test a combination of these new components using new innovative structures to provide an alternative to traditional techniques and bring benefits to customers.

Method(s)

The Licensee must describe the Method(s) which 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 NIA_SHET_0010 project will recommend several new designs for tower suites which have the potential to deliver financial and carbon footprint benefits. The NIC project will prototype and test these designs on a planned transmission overhead line project. SHE Transmission will then evaluate the value of these designs compared to traditional tower suite designs. The new designs could incorporate innovations such as insulated cross arms and low sag conductors, which are relatively novel and have not been deployed at scale in GB, although many have been the subject of individual IFI or NIA funded investigations and trials.

Reducing the cost and size of transmission towers required for new infrastructure could improve visual impact, and may ease the planning process. This could decrease time and resources required for construction, and could also facilitate the use of reduced foundations, creating savings in civil and access works and reducing the carbon footprint.

Method(s) continued

The NIC project is currently intended to be developed in stages, and will build on the work being done by the ongoing NIA project as follows:

Phase 1. NIC project commences with prototyping and testing of new suite of structures.

Phase 2. The selected designs are detailed and refined for a proposed overhead line project using the selected innovations. This will be run in parallel with a design utilising traditional methods. At the end of this phase, a decision will be made to proceed with the innovative option or opt for with the traditional design, based on knowledge capture so far.

Phase 3. The new design (if appropriate) is deployed and demonstrated on an overhead line project.

Phase 4. The tower suite is commissioned and put into operation with monitoring and evaluation in place to ensure that equipment performance is as anticipated.

Phase 5. Learning and dissemination activities will be structured throughout the project to ensure knowledge is captured and shared on an incremental basis.

The full project scope, work breakdown and programme will be detailed in our Full Submission Proforma. However, the stages identified above give an indication of our approach to the delivery of the project.

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. OFTOs should indicate potential bid costs expenses.

As identified in the previous section, the project can be divided into a number of discrete phases. Costs are anticipated as follows:

Phase1: Prototyping and testing, approx 20% of costs

Phase2: Parallel refinement phase, approx 15% of costs

Phase3: Execution activity phase, approx 40% of costs

Phase4: Monitoring and Evaluating, approx 10% of costs

Phase5: Learning and Dissemination, approx 15% of costs

The bulk of the costs will be incurred during Phase 3. Further details will be included in the Full Submission Proforma. The cost of the project is subject to confirmation and will be further refined as the project develops prior to full submission.

We will also continue to endeavour to identify further sources of external funding in order to try and reduce the total funding requirement under NIC.

Specific Requirements (please tick which of the specific requirements this project fulfils)

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 transmission and/or distribution equipment (including control and communications systems software)	✓
A specific novel operational practice directly related to the operation of the electricity transmission and/or distribution system	✓
A specific novel commercial arrangement	

Accelerates the development of a low carbon energy sector & has the potential to deliver net financial benefits to existing and/or future Customers

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.

As stated in the Electricity NIC Governance Document, the Network Licensee must provide the following to demonstrate compliance with this criterion:

- i. How the proposed Project will make a contribution to the Carbon Plan. In particular the Network Licensee should outline:*
 - What aspects of the Carbon Plan the Solution facilitates*
 - The contribution of the rollout of the Method across GB can have in facilitating these aspects of the Carbon Plan*
 - How the rollout of the proposed Method across GB will deliver the Solution more quickly than the current most efficient method in GB; and/or*
- ii. How the proposed Project could deliver environmental benefits to Customers; and*
- iii. The expected financial benefits the Project could deliver to Customers.*

(i) By 2020, the Government expects that 15% of the UK's energy needs will be met from renewable sources, with around 30% of electricity generation coming from renewable sources, as indicated in the Carbon Plan. The plan also estimates that electricity demand could increase by between 30% and 60% by 2050 because of the increased electrification of processes and proliferation of renewable energy. To achieve these targets and meet the anticipated rise in demand, extensive work is required across GB's energy networks, including the reinforcement and upgrade of the EHV transmission network.

Overall, deployment of a smaller tower model offering improved visual and environmental impact could lead to quicker planning and construction. This will help to facilitate the connection of large volumes of renewable energy, which will meet the increased demand for electricity.

(ii) Overall, the new suite of tower structures will help deliver environmental benefits to customers. The new transmission structures will be potentially smaller than traditional towers; reduced foundation sizes, decreased volumes of steel and improved visual amenity lead to a smaller carbon footprint and improved environmental impact overall. The new designs may help facilitate the delivery of network reinforcements and therefore enable the connection of downstream demand and renewable generation.

(iii) It is anticipated that the use of a smaller tower design will help to accelerate planning and consent processes; delays in these processes can be costly and therefore any improvement will produce cost savings. Replication across GB will produce savings for customers; the smaller design, reduction in steel use and smaller foundations are expected to deliver cost savings compared to traditional designs for tower suites. Widespread adoption of the design could help lower unit costs, providing additional savings. Lower access and civil costs would further contribute to savings. SHE Transmission anticipates that maintenance of the structures will be easier as the cross-arms may not require painting – this will reduce the requirement for some single circuit outages.

Initial studies and early engagement with equipment suppliers and stakeholders have indicated that significant savings may be achievable if this new approach is implemented.

Delivers value for money for electricity Customers

The Licensee must demonstrate that the Method(s) being trialled can derive benefits and resulting learning that can be attributed to or are applicable to the electricity transmission system/ to the electricity Distribution System.

As stated in the Electricity NIC Governance Document, the Network Licensee must provide the following to demonstrate compliance with this criterion:

- i. What is the potential Direct Impact of the Project on a Network Licensee's electricity network or on the operations of the GB System Operator;*
- ii. Justification that the scale/ cost of the Project is appropriate in relation to the learning that is expected to be captured;*
- iii. The processes that will be employed to ensure that the Project is delivered at a competitive cost; and*
- iv. The expected proportion of the benefits which will accrue to the electricity Transmission System/to the electricity Distribution System as opposed to other parts of the energy supply chain.*

Sub-criterion v (the internal systems, procedures and processes used by the Network Licensee to identify Project Participants and Project ideas) should be covered in the 'Project Partners and external resourcing/funding' section below.

(i) SHE Transmission's Business plan (2011) and associated Innovation Strategy (January 2012) identifies several high-level innovation objectives which will be positively impacted by this NIC project. These include objectives to:

1. Accelerate network development and connections including the integration of increasing amounts of renewable generation.
2. Minimise the cost of providing network capacity.
3. Maximise the use of existing assets to deliver capacity and speed connection.
4. Maintain and improve safety and environmental performance.
5. Maintain and improve network performance.

The concept for this project arose as a result of ongoing work to achieve these objectives, and will have a direct impact against them.

(ii) The learning from the work carried out by this project will provide significant knowledge and learning for all TOs (and DNOs in England and Wales), and will contribute directly to reducing both the costs and the risks associated with these projects. This will be beneficial to both current and future customers.

Tower construction projects typically incur high capital costs, the majority of which is borne by transmission customers. If the new tower suite proves to be a viable solution in creating additional network capacity, it has the potential to reduce the cost of transmission reinforcement projects through reduced materials and construction costs, and fewer consent-related delays. These reinforcement costs are passed directly to transmission customers. Stakeholders will be consulted on the new designs and where appropriate their input will be incorporated into the final specification. In order to give TOs the necessary confidence to adopt the new method on a widespread basis, this NIC project will demonstrate the solution on an overhead line project to represent the full range of conditions which may be experienced.

(iii) The project will be delivered in accordance with SHE Transmission's procurement obligations and Large Capital Projects process, to ensure that this NIC project delivers best value.

(iv) These projects typically incur high capital costs, with the vast majority of these costs being borne by transmission customers. Therefore, transmission customers will benefit directly from any savings derived from the project. If this approach is found to be successful then it may be of benefit to TOs, DNOs in England and Wales and potentially renewable developers.

Demonstrates the Project generates knowledge that can be shared amongst all Network Licensees

The Licensee must explain the learning which it expects the Method(s) it is trialling to deliver. The Licensee must demonstrate that it has a robust methodology in place to capture the learning from the Trial(s).

As stated in the Electricity NIC Governance Document, the Network Licensee must provide the following to demonstrate compliance with this criterion:

- i. What new knowledge is intended to be generated from completing the Project;*
- ii. What methodology will be used to capture results from the Project and how the Project's results will be disseminated to other Network Licensees; and*
- iii. Whether the Network Licensee wishes to conform to the default IPR arrangements as set out in Section B: Chapter 9. If the Network Licensee wishes to deviate from the default IPR arrangements it must outline the proposed arrangements, justify why the arrangements are more suitable than the default arrangements and justify how the new arrangements will deliver value for money for Customers.*

This project will demonstrate and prove new technology, which will be directly replicable by the other Network Licensees. The new tower structure designs and the associated knowledge and learning gained from this project will allow this technique to be applied in other situations across the transmission network, and areas of the distribution network in England and Wales.

At the end of each phase, the project will produce a report, which will be shared with other TOs. Following completion of the project, the outcomes and learning will be compiled into a close down report with sufficient information to enable TOs to use the New Tower Suite as a design option. These reports will be published on the ENA's Smarter Networks Learning Portal. The new designs for a suite of transmission structures will be shared among all relevant GB Network Licensees. A comprehensive description of planning to capture learning will be included in the Full Submission Proforma.

(i) Learning will be identified in many areas, including:

1. Design specifications for smaller structures and associated works;
2. Operational effectiveness of innovations;
3. Safety, health and environmental impacts related to the new design;
4. Visual impact of new designs;
5. Overall footprint requirements including civil and access requirements;
6. Stakeholder considerations – planners, environmental regulators, and community experts;
7. Construction issues;
8. Operation and maintenance issues; and
9. Cost implications

(ii) SHE Transmission will use a standard framework to capture results from the project. Knowledge will be disseminated through the following activities, although this is not an exhaustive list. A full description of our knowledge and dissemination programme will be included in the Full Submission Proforma.

- SHE Transmission-hosted events for other licensees and relevant organisations;
- ENA Learning Portal to upload presentations and lectures;
- Regular press releases published as appropriate;
- The development of case studies with manufacturers to show best working practice.

(iii) SHE Transmission wishes to use the default IPR arrangements; however, this is subject to final confirmation depending upon the outcome of ongoing discussions with suppliers. Further details will be provided in the Full Submission Proforma if the default IPR arrangements cannot be used.

Please tick if the project conforms to the default IPR arrangements set out in the NIC Governance Document?	
<i>If the Licensee wishes to deviate from the default requirement for IPR then it must demonstrate how the learning will be disseminated to other 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 arrangements.</i>	
It is intended that the work undertaken using NIC funding will adhere to the NIC default IPR arrangements. However, this will be subject to confirmation depending upon the final outcome of commercial negotiations with equipment suppliers, our project partners etc. . Further details will be provided in the Full Submission Proforma if the default IPR arrangements cannot be used	
How is the project innovative and with an unproven business case where the innovation risk warrants a limited Development or Demonstration Project to demonstrate its effectiveness?	
<i>Demonstrate why the Licensee has not previously used this Solution (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 trial as part of its normal course of business and why the Solution is not Research.</i> <i>As stated in the Electricity NIC Governance Document, the Network Licensee must provide the following to demonstrate compliance with this criterion:</i> <i>i. Why the Project is innovative and has not been tried before;</i> <i>ii. Why the Network Licensee will not fund such a Project as part of their business as usual activities;</i> <i>iii. Why the Project can only be undertaken with the support of the NIC, including reference to the specific risks (e.g. commercial, technical, operational or regulatory) associated with the Project.</i>	
(i) This project has been developed to trial improved technology and equipment introduced by various equipment manufacturers and suppliers. Some individual components such as Insulated Cross Arms have been trialled in earlier NIA or IFI projects; other equipment has been implemented in other parts of the world. However, this will be the first project which trials and tests a combination of these new innovations at scale on the GB Network. In order to allow GB Licensees to fully exploit the benefits of this alternative technology, there exists a need to develop new design and operational practices. This, in addition to the uncertainty associated with using equipment for the first time, has prevented this technology from being adopted previously. The project will, where relevant, use learning from work done by other Transmission Licensees to develop new tower designs i.e. National Grid's T – Pylon. However, this project will look at designs which are applicable to lower voltage levels and have to potential to be deployed in more challenging terrain and in more demanding weather conditions	

How is the project innovative and with an unproven business case where the innovation risk warrants a limited Development or Demonstration Project to demonstrate its effectiveness? (Continued)

(ii) As development and connection of renewable energy increases, there has been a growing need to create additional overhead line capacity. Transmission lines are costly and there is little incentive for a single project to carry the additional cost and uncertainty of developing new designs which incorporate innovations not yet tested at scale.

(iii) The NIC project will be used to fund the additional costs of developing and demonstrating the new designs on an integrated basis, addressing any changes to existing operational practices required to implement the new designs. We are also proposing that the NIC project includes funds for additional activities required for the first time deployment this could potentially include stakeholder engagement, assessment and testing of prototypes and onsite monitoring to allow the continued assessment of the new equipment once it is in service. No individual project can justify the incremental cost or risk for these activities, therefore NIC is the most appropriate means of funding these activities. The proposed NIC project will also include the development of any new tools, training and operational techniques necessary to support the introduction of the new techniques. Without NIC funding there would not be sufficient confidence to implement as 'business as usual'.

Project Partners and external resourcing/funding

The Funding Licensee should provide a description of the internal systems, procedures and processes used by the Funding Licensee to identify Project Participants and Project Ideas.

The Licensee should provide details of any Project Partners, External Funders or Non-Network Licensees 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.

We consult regularly with our stakeholders both in formal engagement sessions and more informal dialogues, to identify new innovative ideas and approaches. In addition we have a number of specific mechanisms that allow us to capture potential partners and ideas. These include:

1. Energy Innovation Centre
2. ENA Facilitated Transmission Licensee Forum.
3. ENA Collaboration Portal;
4. Bilateral engagement with the supply chain including academics;
5. Participation in a range of conferences and other networking events;
6. Stakeholder engagement more broadly across our customer base;
7. Internal innovation generating workshops and initiatives; and
8. Our previous IFI and ongoing NIA programme partners and ideas.

Through these mechanisms we record potential innovative ideas and associated partners for either participation or delivery. These are then used in our assessment of which projects to proceed for NIC submission. The main focus when selecting projects is to ensure that they are closely aligned with the SHE Transmission Business aims and deliver benefits for customers. In the process of selecting projects a number of factors are considered including:

- Business needs and gap analysis;
- Avoidance of duplication with previous projects;
- Need for innovation funding and compliance with governance arrangements;
- Timeliness of the solution in relation to the challenges the industry and our stakeholders face;
- Replicability and relevance of the solution to other license holders;
- Technical readiness; and
- Value assessment.

We utilise the output of these workshops to present a short list to our Innovations Steering Board (ISB); this decides which of our strongest bids should be put forward for submission to the NIC.

For reasons of commercial sensitivity we are unable to identify potential partners at this stage but will provide further details in the Full Submission Proforma.

Derogations or exemptions

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

No derogations or exemptions are anticipated at this stage. However, as we further develop the design of the project and begin to investigate these new solutions in detail, there is potential that we may identify areas which may require us to consider derogations or exemptions. If necessary we will outline these in the Full Submission Proforma.

Customer impact

The Licensee should outline any planned interaction with Customers or Customers' premises as part of the Project, and any other impacts (such as amended contractual or charging arrangements, or supply interruptions).

No interaction is planned or expected with customers or customers' premises as part of this project.

In order to ensure that we deliver the anticipated overhead line project within the programme we will continue to develop the traditional solution in parallel with the innovative design. This will allow us to make a fully informed decision prior to committing to implementation.

Subsequently, any customer or developer who participates in the project will be recruited on a voluntary basis with an appropriate set of commercial arrangements in place to protect both parties. We do envisage any direct customer impacts via the project at this stage; however, as we develop the detail of the NeSTS project and identify the demonstration site we may need to reconsider this position. Further information will be provided in the Full Submission Proforma to identify any customer impacts.

Details of cross sector aspects

The Licensee should complete this box only if this Project forms part of a larger cross sector Project that is seeking funding from multiple competitions (Electricity NIC and Gas NIC). The Licensee must explain about the Project it will be collaborating with, how it all fits together, and must also add a justification for the funding split.

Not Applicable

Any further detail the Licensee feels may support its submission
The NeSTS project has the potential to deliver significant benefits for customers and the environment by reducing the cost and time required to construct overhead line projects. This will be achieved by combining a number of innovative components in an innovative suite of new structure designs. The NIC project will demonstrate these new designs on a planned overhead line project. This project offers the opportunity to demonstrate these for the first time. Therefore, we will enter into an appropriate set of commercial arrangements with the supply chain to minimise risk and protect customers' money. The project has been previously submitted for the Network Innovation Competition at the ISP stage but has not been progressed to Full Submission. The progress in the associated NIA which has identified alternative structures now means that the project is ready to proceed to the next stage. Other initiatives to develop new transmission towers such as National Grids 'T' Pylon are currently being developed. These are focused on specific voltage ranges or have been developed in response to specific stakeholder requirements. The NeSTS project will complement this work, but its primary focus is on lower voltages and to address the more challenging weather conditions and terrain in the north of Scotland. The new designs will be developed for a 'practical' perspective to ensure that they can be readily constructed and maintained to ensure they deliver long term value for customers.
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