NIA Project Registration and PEA Document

Date of Submission

Feb 2018

Project Reference Number

NIA_NPG_024

Project Registration

Project Title

Autodesign: LV Connections Self-Service Tool

Project Reference Number

NIA_NPG_024

Project Licensee(s)

Northern Powergrid

Project Start

February 2018

Project Duration

2 years and 7 months

Nominated Project Contact(s)

Dan Filor

Project Budget

£1,100.00

Summary

The connections design departments in DNOs are facing unprecedented pressure as customers seek to connect novel new loads, and other low carbon technologies, at low voltage. Examples include electric vehicle (EV) charging and renewable generation. This situation is unlikely to improve; the transport sector in the UK is expecting to see significant growth in electric vehicle sales and use in the near future. For distribution network companies this will create the need to serve significant additional vehicle charging infrastructure.

This demand stretches the capacity of Northern Powergrid and means that a large proportion of the available engineering resource is devoted to relatively routine design work. This, in turn, means that design resource is not necessarily available to serve those customers that have more complex or complicated requirements. Overall this means that customers' quotations are delivered on longer timescales than we, or they, would like.

Third Party Collaborators

EA Technology

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

The connections design departments in DNOs are facing unprecedented pressure as customers seek to connect novel new loads, and other low carbon technologies, at low voltage. Examples include electric vehicle (EV) charging and renewable generation. This situation is unlikely to improve; the transport sector in the UK is expecting to see significant growth in electric vehicle sales and use in the near future. For distribution network companies this will create the need to serve significant additional vehicle charging infrastructure.

This demand stretches the capacity of Northern Powergrid and means that a large proportion of the available engineering resource is devoted to relatively routine design work. This, in turn, means that design resource is not necessarily available to serve those customers that have more complex or complicated requirements. Overall this means that customers' quotations are delivered on longer timescales than we, or they, would like.

Method(s)

Northern Powergrid has recently implemented an Enterprise Asset Management (EAM) system built on an Oracle database architecture. This dataset contains a rich source of data on the location and capability of the electrical assets in the ground. We have an opportunity to leverage this information and the substantial investment that it represents to facilitate a faster and more efficient, economic and consistent connections process that delivers a better customer experience.

Building on this new asset we will develop an innovative, low voltage connection tool, in order to facilitate more rapid connection of electrical equipment onto the distribution network, initially to be used by connections assessors, building ultimately to be used by end-customers.

The end result is that the tool will enable customers to make informed choices on the location and type of equipment they wish to connect on a (substantially) self-service basis, speeding up the process and reducing abortive connections applications.

Scope

The project scope will initially attempt to encompass all LV connection design requests. As the project develops it is expected that this will be refined to a subset of typical LV design request which are particularly suited to the automated/self-service approach.

The project target is to develop a system that is capable of dealing with 50% of design requests with either no or very limited intervention by scarce engineering design resource

Objective(s)

The project will be delivered in four separate phases, each acting as stage-gates for progress to subsequent stages.

Stage 1 :assessment of data quality issues, identification of key design rules and assessment of feasibility of approach and production of a fully designed plan for

subsequent stages.

Stage 2 : Identification and assessment of appropriate and efficient algorithms to perform network assessments at LV, including modules to convert "raw" network

data to CIM and from CIM to a DEBUT-style assessment tool where deemed necessary.

Stage 3 : Phased pilot introduction and implementation of tool, based on stage 2 outcomes, to internal users.To include rollout testing, user feedback, modification

and post development.

Stage 4 : Development of customer-friendly online connections tool.

Building on the beta testing phase of the internal connections tool produced in stage 3, we will scope out and deliver a tool with an appropriate feature set for customer self-service use.This will be web enabled/on-line where at all possible.

Part of the earlier project phases is to define the stage 4 tool's scope in more detail, however, we would expect, although cannot commit to, the main output of the tool to:

Assist the user in accurately specifying the capacity required by guiding them through connections options and main technology options.This will lean on the

work done to date on online connections but also include new technologies such as EV charging, home energy storage, PV etc;

Using the capacity requirement details, display the desired location and show existing network assets with a guide to their ability to service the new requirement;

Provide estimates of connection cost to the user, as a guide, and within some defined level of error.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

A successful project will provide positive or negative assessment of the objectives laid in in the previous section : can the identified EAM system be used with a set of definable algorithms to automate and thereby improve the effectiveness, efficiency and level of customer service provided to potential connections. If this can be achieved the project seeks to produce a system based on these technologies and introduce them in a controlled and incremental fashion.

Project Partners and External Funding

n/a

Potential for New Learning

The project will provide new learning in the feasibility, design, development and deployment of automated, self-service design tools for improved low voltage connections customer service. Learning will be provided on leveraging the significant investment that has been made by all DNOs in asset specification, network connection and geographic information systems.

It is also anticipated that the project will provide general insight into building automated design systems. This may allow the application of similar approaches to other routine design tasks at other voltages or for other asset based approaches.

Scale of Project

The project is desktop/laboratory scale and does not involve the large scale deployment of network equipment.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project is desktop in development. Implementation will impact the whole of the Northern Powergrid network at low voltage. Cost of the project or implementation does not scale with geographic applicability.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£1100k

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

Solving this problem and implementing the solution across the whole of the GB network would provide a financial benefit of £10-12m. This assumes that the solution is applicable to all GB LV networks although this is no expectation that this coul;d not be achieved.

Please provide a calculation of the expected benefits the Solution

Not required. Project currently at TRL 3 – " Active research and development is initiated. This includes analytical and laboratory studies to physically validate analytical predictions or models of separate elements of the technology. Examples include components that are not yet integrated or representative but operate in a standalone basis. (ie Low System Readiness Level, SRL)".

We are targeting a 70% take up by customers, which seems reasonable given the tool will give an instant answer as opposed to a seven to ten day turnaround using the present process. Assuming that the project is fully successful and there is this take up by customers, the benefit over 16 years from commencement of the project and in accordance with the Ofgem CBA tool, is £1140k with an NPV of £710k.

This is not a risk adjusted figure and assumes that the solution is applicable to that 70% of connections design enquiries received.

However considering a significantly lower take up of 50%, the benefit over 16 years, is £540k with an NPV of £290k, rising to an NPV of 260k over 45 years. In fact, any degree of applicability above 37% provides a positive NPV over 16 years.

Please provide an estimate of how replicable the Method is across GB

The nature of the proposed method is that it is entirely replicable across the whole of the GB energy network at LV and wherever customers are likely to request routine connections.

Please provide an outline of the costs of rolling out the Method across GB.

Roll-out costs will depend on the IT requirements need to support the final form of implementation which is currently unknown. It is anticipated that this will not be particularly expensive and will require little by way of capital. It is expected that implementation costs would be less than £200k per DNO..

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☐ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☑ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☑ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

RIIO-2 Projects

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☐ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

All Network Licensees will be able to use the learning generated as the outcomes will be relevant to each individual Network Licensee;

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

The Northern Powergrid innovation strategy specifically details the requirement to improve the ease of working with the organisation. This project is designed to both reduce the cost to the customer of doing this and the frustration that comes with the inevitable long lead times associated with dealing with routine customer enquiries. Furthermore the project outcome also allows the innovation strategy requirement to reduce general operational costs.

☑ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

No similar projects have been identified as having been conducted on the GB network. As far as can be ascertained no similar LV auto-design systems have been developed or implemented in any other part of the world.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

The project is high risk, reflected in the low initial TRL. Only recent improvements in EAM systems and the step change in the quality of the embedded data have allowed such approaches to be contemplated and explored.

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

The project is high risk with uncertain outcomes and we have elected tom use regulatory money specifically assigned to such projects.

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

The project is low TRL reflecting the high degree of technical risk of failure in the project. Similar applications are not available and this development is to a great extent a first-off. Alternative funding with sufficient certainty of availablity and appropraitely short lead times is not available.

This project has been approved by a senior member of staff

☑ Yes