

NIA Project Registration and PEA Document

Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

Project Registration

Project Title		Project Reference
Tap Changer Monitoring		NIA_ENWL015
Project Licensee(s)	Project Start Date	Project Duration
Electricity North West Limited	Feb 2016	4 Years
Nominated Project Contact(s)		Project Budget
Paul Marshall (paul.marshall@enwl.co.uk)		£1,500,000

Problem(s)

As part of operating an efficient network Distribution Network Operators need to maximise the use of existing assets. This forms a key part of Electricity North West's Innovation strategy for RIIO ED1.

The industry has identified that there is a lack of any accurate online monitoring of tap changer condition to identify when intervention is required for repair, maintenance or replacement.

The development of a leading indicator of asset condition aims to minimise the number of tap changer failures that the industry has seen over recent years by identifying early warning indicators allowing proactive intervention.

Method(s)

The project will develop, bring to pre-production, and ultimately trial, a tap changer condition monitoring system. Other Tap changer monitoring techniques will also be explored.

The project will carry out field trials to identify the optimum point at which Tap changer monitoring is required in the life cycle of a transformer. To ensure a representative sample of the transformer population is analysed, a varying number of tap changer types with different manufacturing periods, designs and operating environments will be selected. Tap changers of the same type/model will have monitoring installed at varying ages of their lifecycle to allow comparison.

There is a need to identify and develop intervention and investigation trigger points through data visualisation which will feed into the future asset management strategies.

Scope

Previous research carried out under an IFI project into Tap Changer monitoring determines that monitoring is required. The technique used had limitations therefore there is a need to develop a more robust technique/system.

We will work closely with Camlin power to develop and productionise a retrofitable tap changer monitoring system to accurately monitor the tap changer performance. In turn determining the intervention/triggers points.

For this project it is proposed to install this system on 10 x 132kV Tap changers and 30 x 33kV Tap Changers and understand the tap changer performance over a 24 month period to allow seasonal changes to be taken into account.

The project will allow Electricity North West to develop its understanding of the effects of tap changer failure modes and maintenance requirements and to identify the optimum window for monitoring in the life cycle of tap changers.

Objective(s)

This project is split into four distinct phases:

Phase 1 is to develop a retrofitable tap changer monitoring system

This phase to be completed by December 2016

Phase 2 is the onsite installation of 40 monitoring systems

This phase to be completed by August 2017

Phase 3 is the continuous data analysis and visualisation of the tap changer condition

This phase to be completed by August 2019.

Phase 4 is the implementation of identified trigger points into company policy and procedures.

This phase to be completed by January 2020

Success Criteria

Production and trial of a condition monitor for Tap Changers

Technology Readiness Level at Start

2

Technology Readiness Level at Completion

8

Project Partners and External Funding

Camlin Power.

Potential for New Learning

Improved knowledge of the tap changer operation to identify when and what intervention is required

Contribute towards the RIIO ED-2 Tap changer Management strategy

More accurate and up to date Probabilities of Failure of the assets

Scale of Project

The project has been designed to allow a robust statistical sample of tap changer sites – any reduction in the sample size would provide too little data for accurate comparison and would be open to a individual set of results having a major impact on the overall outcome.

Running the project over a 4 year period will allow seasonal changes to be taken into account and to show a deviation in tap changer operation over a number of years.

Geographical Area

Electricity North West licence area

Revenue Allowed for in the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

£1,500,000

Project Eligibility Assessment

Specific Requirements 1

1a. A 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 systems and 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

Specific Requirements 2

2a. Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Please answer one of the following:

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

The project will produce all Policies and Procedures relating to the installation and operation of the condition monitoring equipment which will be made available to all DNOs. In addition we will also provide the necessary information to allow DNOs to conduct their own analysis of the data and decide when intervention needs to occur.

ii) Please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the Project.

Maximizing the use of existing assets and optimizing the tap changer intervention window

2b. Is the default IPR position being applied?

Yes

No

If no, please answer i, ii, iii before continuing:

i) Demonstrate how the learning from the Project can be successfully disseminated to Network Licensees and other interested parties

ii) Describe any potential constraints or costs caused or resulting from, the imposed IPR arrangements

iii) Justify why the proposed IPR arrangements provide value for money for customers

2c. Has the Potential to Deliver Net Financial Benefits to Customers

i) Please provide an estimate of the saving if the Problem is solved.

It is estimated that the saving would be £2 million a year by not replacing assets and improved operator safety.

ii) Please provide a calculation of the expected financial benefits of a Development or Demonstration Project (not required for Research Projects). (Base Cost – Method Cost, Against Agreed Baseline).

The savings have been estimated based early tap changer interventions for 871 active tap changers which have the potential to cause a disruptive failure requiring the entire transformer system to be replaced. The savings also reflects the revised inspection and maintenance activities based on tap changer condition, rather than number of operations it has experienced or a predetermined time interval.

iii) Please provide an estimate of how replicable the Method is across GB in terms of the number of sites, the sort of site the Method could be applied to, or the percentage of the Network Licensees system where it could be rolled-out.

The optimum tap changer intervention strategy will differ dependent upon the tap changer type and its operating conditions. This approach will aim to identify early signs of deterioration or fault development for ENW's fleet of 871 active tap changers of which there are 46 different types. As all DNO have a similar age and type profile to ENW therefore it is assumed that this could be rolled out to all network licensees.

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

The cost of rolling this approach out across GB would be the cost of purchase and installation, development/adaption/interfacing of communication and data visualising on all the Licensees tap changers. Therefore it is estimated at £3 million per Licensee and £42 million across GB.

2d. Does Not Lead to Unnecessary Duplication



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

Electricity North West has previously carried out research in IFI which demonstrated that monitoring is required as no other real time tap changer monitoring is being trialled. Therefore we are not duplicating any existing research in this field.

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

n/a