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**
Combined On-line Transformer Monitoring	NIA_ENWL004

Project Licensee(s)	**Project Start Date**	**Project Duration**
Electricity North West Limited	Sep 2014	3 Years

Nominated Project Contact(s)	**Project Budget**
Paul Marshall (paul.marshall@enwl.co.uk)	£200,000

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 our Innovation strategy for RIIO ED1.

Electricity North West has proposed that approximately 50% of the 132kV and 33kV transformers that traditionally would have been due for renewal in the RIIO-ED1 period will now be refurbished and the oil regenerated to improve the Health Indices.

These targeted transformers will be operating beyond their original design life and under a first Tier funded project Electricity North West installed online Dissolved Gas Analysis and Partial Discharge condition monitoring on six transformers to monitor their condition and assess their actual condition compared to academic research.

This approach also aims to extend the life span of the transformers at or near their original design life thus deferring their replacement and/or also avoiding de-rating based on age.

There is now a need for data visualisation of the results as well as further research into validating and calibrating the data from the installed on-line condition monitoring research into exploring the optimum life of a transformer.

Method(s)

The project will use the online DGA and PD monitoring equipment already installed under First Tier funding to further monitor the condition of the six 132kV transformers. This data will allow further academic research to develop an understanding of the effects of life extension on failure modes and maintenance requirements of assets. The actual data will calibrate the theoretical research data to prove that oil regeneration life extension is a safe, reliable and cost effective asset management technique.

The combination of these techniques would represent a holistic interpretation of transformer condition in near real-time and investigate the optimum life of a transformer which would be able to be utilised in future asset management strategies.

Scope

Previous research carried out under an IFI project defined an oil regeneration window for transformers at the end or near the end of their design life to extend it by approximately 10 years. The First Tier project deployed online monitoring equipment at six sites where the oil regeneration technique will be used.

This NIA version of the First Tier project will validate the data from the monitoring equipment and calibrate the previous IFI research.

These results will be fed into data visualisation software that will be developed to allow consistent comparison.

Electricity North West will work closely with an academic resource to validate the data and calibrate the life extension results.

Objective(s)

This project is split into two distinct phases:
Phase 1 is the development of a dashboard/ decision tool to be used by Electricity North West
This phase to be completed by April 2016.

Phase 2 is the Data validation of existing research into life extension by oil regeneration
This phase to be completed by Sept 2017

Success Criteria

Completion of dashboard and decision tool utilising the online results

Validate and calibrate the actual end of life oil regeneration results against research

Technology Readiness Level at Start	Technology Readiness Level at Completion
4	8

Project Partners and External Funding

Camlin Power and the University of Manchester

Potential for New Learning

This project will lead to improved detection of early deterioration in assets that are approaching or have exceeded their design life as well as refurbished and oil regenerated units.

More accurate and up to date Health Indices of the assets

Contribute towards the RII0 Transformer Management strategy

Scale of Project

The project has been designed to allow a robust statistical sample of transformers sites.

As changes in oil chemistry can be slow the 3 year duration of the project is considered significant to allow modelling of the effects of oil regeneration over time as changes in oil chemistry can be slow.

Also running the project over a 3 year period will allow seasonal changes to be taken into account and to compare measured oil results to theoretical results over a number of years.

Geographical Area

Electricity North West

Revenue Allowed for in the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

£200,000

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 Licenses.

The project will produce all Policies and Procedures relating to the installation and operation of the condition monitoring equipment which will be made publically available to all DNOs. In addition will we 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 by extending their life

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 with be £8.5 million by refurbishing and extending the life of 132kV and 33kV transformers at the end of

their design life by a further 10 years.

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 financial benefits of the project are based on the capital replacement deferment cost saving in the RII0 1 period of seventeen 132kV and one hundred and nine 33kV transformers by 10 years. The cost of the any transformer refurbishment work, condition monitoring installation and monitoring cost have been deducted from the potential savings on a NPV basis.

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.

Oil regeneration monitoring and life extension will be applicable to all the other DNOs with similar transformers which are within the oil regeneration window. Therefore it could be rolled out across all DNOs

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

Unknown

2d. Does Not Lead to Unnecessary Duplication   ⊠

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

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