

## NIA Project Registration and PEA Document

### Date of Submission

Jun 2014

### Project Reference

## Project Registration

### Project Title

Power Transformer Real Time Thermal Rating

### Project Reference

### Project Licensee(s)

UK Power Networks

### Project Start

June 2014

### Project Duration

2 years and 7 months

### Nominated Project Contact(s)

UKPN Innovation Team

### Project Budget

£1,046,005.00

## Summary

The Power Transformer Real Time Thermal Rating project intends to demonstrate how additional capacity can be made available from existing assets and defer reinforcement by three years or more. It is estimated that transformers can be loaded up to 20% above static seasonal rating.

Changes in environmental conditions have a dramatic effect on transformer loading and in urban areas due to rise in air conditioning installations, current summer or winter firm ratings may not be fully representative of the situation at particular sites. This seasonal increase in loading is leading to premature network reinforcement decisions.

This demonstration will be achieved by retrofitting Transformer Management System (TMS) onto existing assets to provide real-time monitoring of the transformer's health, and continuously calculate the transformer thermal capacity, thereby safely loading the transformer close to the maximum top oil temperature less 2 Deg Celsius allowed by design nameplate.

An increase in capacity will be achieved by carrying out the following:

- Installation of an active TMS, monitoring ambient & top / bottom oil temperatures;
- Installation of additional fans, modification to cooling set-points and enabling pre-cooling;
- Initiate pre-cooling in the event of a loss of one transformer (N-1 scenario);
- Create an "out of firm" condition by altering network normal operational configuration; and

- Use the TMS to ensure design limits are not exceeded and calculate impact on degradation.

A greater understanding, visibility in asset performance is expected to lead to a reduction in assets replacement, facilitating the connection of additional loads and low carbon technologies.

### **Nominated Contact Email Address(es)**

innovation@ukpowernetworks.co.uk

### **Problem Being Solved**

#### **Method(s)**

#### **Scope**

#### **Objective(s)**

The main objectives are to:

- Conduct extended heat run tests on representative transformers in order to clarify the variance between top oil and measured winding hot spot (WHS) temperature (where fibres are fitted) and make comparison with calculations;
- Install TMS equipment to gain access to key parameters;
- Conduct tests to establish summer/winter rating with/without evaporative cooling; and
- Develop an approved policy for implementing Power Transformer Real Time Thermal Rating.

### **Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)**

n/a

### **Success Criteria**

n/a

### **Project Partners and External Funding**

n/a

### **Potential for New Learning**

n/a

### **Scale of Project**

n/a

### **Geographical Area**

### **Revenue Allowed for the RIIO Settlement**

### **Indicative Total NIA Project Expenditure**

## 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)

n/a

#### Please provide a calculation of the expected benefits the Solution

n/a

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

n/a

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

n/a

### 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**

n/a

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

n/a

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

**Is the default IPR position being applied?**

- Yes

**Please demonstrate how the learning from the project can be successfully disseminated to Network Licensees and other interested parties.**

**Please describe how many potential constraints or costs caused, or resulting from the imposed IPR arrangements.<**

**Please justify why the proposed IPR arrangements provide value for money for customers.**

## 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.**

n/a

**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**

n/a

**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**

n/a

**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**

n/a

**This project has been approved by a senior member of staff**

Yes