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
Asset Risk Optimisation		NIA_ENWL005

Project Licensee(s)	Project Start Date	Project Duration
Electricity North West Limited	Jul 2015	2 Years

Nominated Project Contact(s)	Project Budget
R A Wells Asset Management Modelling Manager	£100,000

Problem(s)

DNOs have been developing the Condition Based Risk Management (CBRM) approach to asset management over the past 10 years. This approach allows for a detailed assessment of the relative condition of assets within an asset type and more latterly, a consideration of their relative consequences of failure. CBRM models do not however integrate into an overall risk assessment; neither do they allow the DNOs to plan for optimum investment to manage the asset risk.

With the development of the Common Network Asset Indices Methodology for RIIO-ED1 under SLC51, a standard approach exists for categorizing and quantifying risk across all asset types which opens up the possibility of inter-asset risk prioritisation. In addition, the development of new and innovative techniques for refurbishment and life-extension of assets is widening the range of intervention options available.

In effect, these two developments will allow an almost infinite variety of potential investment portfolios to be assessed against each other in terms of their cost (both initial and lifetime) and monetized impact on asset risk. In principle, investment portfolios can now be optimized to deliver the best value asset risk reduction on the network, however the breadth of these options and the optimization algorithms required goes beyond conventional DNO modelling capability.

In order to enhance our knowledge of the issues around optimizing programmes of work we are proposing to investigate the interaction between;

- Investment in assets near end-of-life compared to earlier in their lifecycle;
- The benefits of refurbishment options versus replacement;
- The benefits of investments to reduce the consequences of failure compared to those aimed at reducing probabilities;
- The relative benefits of different asset types; and
- The effect of including overall constraints to mimic real-world conditions (eg supply chain capacity).

Method(s)

Electricity North West have identified a partner in SEAMS of Sheffield as an organization with recent experience carrying out optimization of asset investment programmes in the utility sector. SEAMS offer a software platform (WiLCO) which can indicate across different asset types the various impacts of investment decision by employing iterative modelling of scenarios.

We will partner with SEAMS to deliver an investment optimization model. This will initially be limited to just four asset groups and hence prove the concept of the use of these techniques.

The SEAMS software is tailored to the specific needs of the client, the modelling parameters are set so that the model produces scenarios around the base requirements. By adjusting the various parameters and constraints and running the model iteratively, it will provide a series of potential outcomes as a result of the parameters which it is asked to optimize. From the results of these iterative models we will gain knowledge of the inter-asset relationships as they relate to asset risk.

Scope

Carry out a trial optimization of the following asset investment programmes for the RIIO-ED1 period;
• Grid Transformers
• Distribution HV Switchgear
• HV Pole (Supports)
• Underground Link boxes.
Using data generated from Electricity North West Limited data sources.

The trial application will be hosted by SEAMS.

Objective(s)

The project has the following objectives:

1. Understand the data requirements to permit the optimization of an existing programme of work
2. Understand the techniques employed and how they may be customized to meet the industry's needs.
3. Vary parameters to understand the relative changes in overall delivery of the regulatory contract
4. Understand the inputs required for a wider roll out of the technology to all asset groups modelled by CBRM.
5. Understand the IT technology implications of the models Consider integration of the model to all corporate systems and the cost benefit
6. Identify potential for optimizing RIIO-ED2 submission so as to maximize benefits for customers whilst optimising investment requirements.

Success Criteria

The project success criteria are:

1. Development and enhancement of knowledge about the inter-dependencies of KPIs and constraints associated with inter-asset modelling and hence permit optimization of programmes of work.
2. That the project permits the asset intervention programme to be varied in a manner which permits delivery of all KPIs in a more efficient manner.
3. That the model can be accessed to allow various criteria to be run and optimized by Electricity North West
4. That the project outputs are scalable and other asset types can be added to the model, based on existing asset data sets

Technology Readiness Level at Start

3

Technology Readiness Level at Completion

6

Project Partners and External Funding

Skipworth Engelhardt Asset Management Strategists Limited (SEAMS)
Ash House
Hallamshire Court
65 Napier Street
Sheffield, S11 8HA
The total cost of the project to Electricity North West is estimated to be £88,500.
It is proposed that Electricity North West will fund up to £88,500 of the development through NIA, and SEAMS will fund £11,500 of the research. SEAMS are funding this part of the project as they wish to develop their ability in the Electricity sector.

Potential for New Learning

The following new learning is anticipated:

- Improved understanding of the relative investment needs of the modelled asset groups, leading to revised totex requirements in RIIO-ED2.
- The ability to optimize the asset investment programme and the potential impact on KPIs for different scenarios of investment
- The potential to improve data collection criteria to better inform the optimization of asset programmes.

The outputs will assist in improving assumptions used in CBAs previously submitted in support of the RIIO-ED1 submission and hence result in improved data submission by confirming these assumptions by detailed modelling.

Scale of Project

The trial will limit the investigation of optimization to the four asset groups detailed in the scope section of this document. Post delivery of the optimization tool an assessment will be undertaken to determine if full implementation to all asset groups modelled by CBRM should be carried out.

If the trial is successful in its evaluation, we will integrate the optimization system into our asset condition assessment systems for all appropriate assets and create business systems and processes to ensure programme optimization is a business as usual activity for long term planning associated with regulatory reviews as well as retrospective application to our RIIO-ED1 programme.

Geographical Area

Electricity North West licence area

Revenue Allowed for in the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

The indicative expenditure will be £88,500.

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.

~~Currently the use of Condition Based Risk Management (CBRM) modelling results in an approach based on interventions across all asset types regardless of the inter asset risk. The use of this software as adapted to industry needs will provide a method by which asset programmes can be optimized against each other so as to deliver overall asset risk reduction at least overall cost for the customer.

Due to the development of the Common Network Asset Indices Methodology under the requirements of SLC51, all DNOs will be using the same overall framework for asset risk and all will be required to produce data in the same form as that specified for optimization model input under the requirements of the RIIO-ED1 Regulatory Instructions and Guidance (RIGs). Hence the system will be directly is scalable to all DNOs in GB.

We will seek partners within the GB Electricity industry to develop the output of the trial (if it is proven to meet the success criteria) into a full production model for use within the RIIO-ED1 delivery phase and RIIO-ED2 planning phase. Additionally, we will publish a report of the trial's findings and present a paper on the topic at an appropriate conference or seminar.

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

We are seeking to deliver more targeted investment decisions across the asset base hence optimising the overall investment funding requirements whilst ensuring stewardship of the asset base and meeting all Primary and Secondary KPIs and other appropriate commitments made in the RIIO ED1 contract. This project addresses the 'Asset Management' initiative described in our latest innovation strategy (March 2015).

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.

We anticipate that in the RIIO-ED1 period, the successful implementation of the proving trial funded under NIA through this proposal will deliver a gross saving of between £2 and 5 million on our RIIO-ED1 investment requirements. These savings will be shared with customers through the efficiency incentive applicable in RIIO-ED1. We estimate this saving will be between £0.84 and £2.1million.

In the creation of the bid for the RIIO-ED2 period we anticipate the application of this methodology will enable further savings to be made against the methodology we employed for the RIIO-ED1 period. We anticipate savings of the magnitude identified in RIIO-ED1 as a minimum.

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 objective of the project is to create a model that will permit inter asset optimization and hence maximize asset risk reduction against a fixed allowance. As this is a project to promote learning and potential integration it is difficult to provide firm financial benefits but the following example illustrates the objectives of the project.

Example:

Without Optimisation

A company needs to develop a programme of work to manage the risk presented by the condition of the asset base and determines intervention programmes on all their asset classes based on condition. As they are unable to optimize the programme, they use historic data to reduce the risks associated with all asset classes. This results in a mixed programme of interventions all equally weighted in importance.

With Optimisation

As with the previous example a programme of work is required to manage the risks presented by the condition of the assets. By applying the optimization tool, the company is able to understand the relative advantages and disadvantages of intervening on different asset classes which are unequally weighted. As a result of this optimization the company still decides that some intervention is required on each asset class but they decide that the best value risk reduction can be achieved by targeting a smaller number of asset classes with an enhanced higher volume of interventions.

This targeted strategy could have a number of impacts for the customer including:
• Increased improvement of risk deltas for lower cost;
• Improved network availability for lower cost; and
• Reduced customer interruptions with minimal additional investment etc.
The outcome of optimization modelling is that the company can either achieve more for the same cost as a un optimized programme or the same for less.

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.

All Electricity Distribution Network Operators have a form of the CBRM modelling tool. The outputs of the CBRM model will be used to form the basis of the input data to the optimization tool, therefore there is no reason why this could not be adopted as an industry standard, should the other DNO's wish to adopt it. It should be noted we are already in discussion with another DNO as to the benefits of adopting this solution in their business models.

We will seek partners within the GB Electricity industry to develop the output of the trial (if it is proven to meet the success criteria) into a full production model for use within the RIIO-ED1 delivery phase and RIIO-ED2 planning phase. Additionally, we will publish a report of the trial's findings and present a paper on the topic at an appropriate conference or seminar.

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

We anticipate that the cost of a full implementation of asset risk optimization to the ENWL asset management system will require:

1. Roll out of the techniques to all assets covered by the CBRM modelling system
2. Integration of the Optimisation system into the corporate IT estate.
3. Changes to the Asset data repositories and creation of bespoke searches.

Based on our experience of previous similar projects we believe this may result in a further expenditure of £300,000.

If this figure is extrapolated to the GB DNOs we anticipate full implementation would cost approximately £1.8m.

2d. Does Not Lead to Unnecessary Duplication

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

Through the contacts we have with other DNO's we have attempted to determine if any of these companies either have this capability currently, or are looking to carry out similar developments. We have not identified any extant capability in this regard but have identified a potential DNO partner for the development of the implementation phase. We will hold talks with that DNO to ensure that post completion of the trial any learning can be applied to their desire to develop as similar optimization tool to ourselves.

Discussions with suppliers of these types of model also indicate that there is only one other DNO currently exploring this form of modelling at the moment and they are aware of our proposal to lead a trial development.

We therefore believe this is a unique project in the DNO community.

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

Not applicable.