

## NIA Project Registration and PEA Document

### Date of Submission

Jul 2016

### Project Reference Number

NIA\_SPT\_1606

## Project Registration

### Project Title

Reuse of Existing Concrete Assets

### Project Reference Number

NIA\_SPT\_1606

### Project Licensee(s)

SP Energy Networks Transmission

### Project Start

July 2016

### Project Duration

2 years and 1 month

### Nominated Project Contact(s)

James Yu (Future Networks Manager)

### Project Budget

£343,000.00

## Summary

ScottishPower will work with a supplier(s) to develop a strategy to assess and repair structures as detailed below:

### Stage 1: Development of a Methodology

ScottishPower will identify and engage with a suitable experienced consultant who will assist ScottishPower developing a methodology and technical assessment process for the reuse of concrete structures. This will be applied across a number of identified sites to determine suitability.

### Stage 2: Design Assessment

ScottishPower will identify various sites that will benefit from this new approach. The design consultant will carry out a desktop assessment of the assets to determine if and what level of repair/strengthening/reuse is required.

### Stage 3: Visual and Condition Assessment

A visual and condition assessment of the structure will be undertaken. Testing of the concrete will be required and this shall be undertaken by an approved concrete repair contractor.

### Stage 4: Report

A report, considering the findings of the assessment and testing stages, will be compiled to allow ScottishPower to make an informed judgment as to the value of extending the service life of the assets. This report will be of sufficient detail to allow an approved concrete repair contractor to undertake any repair / strengthening / reuse works as required.

### Nominated Contact Email Address(es)

SPInnovation@spenergynetworks.com

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## Problem Being Solved

There is a very large asset base of concrete structures within ScottishPower that are approaching or have potentially reached the end of their service life. Current practice within ScottishPower is to demolish these concrete structures and replace them with new steel structures.

It has been identified that alternative methods are available that can possibly extend the lifespan of the existing structures. Where it is identified within the concept design that certain existing structures can be reused then ScottishPower want to investigate the viability of this.

To realise the potential benefit of this, ScottishPower wants to review current practice and identify a methodology that is more sustainable, requires less outage time to construct and is more economical.

## Method(s)

The aim of this project is to create an assessment process and specification to determine whether these existing concrete assets are suitable for reuse.

This project will develop a methodology to determine the assessment criteria, reuse, strengthening and repair process.

The methodology will then be used to implement the recommendations from the design assessment which will be collated through the design reporting stage. This will allow recommendations to be implemented within each asset replacement programme to allow existing concrete assets to be re-furnished as appropriate.

It is anticipated that this approach will allow ScottishPower and the wider industry to achieve cost and time savings on major construction projects which in turn will help reduce system charges and provide increased network resilience by reducing outage requirements. The reuse of these structures will also support ScottishPower's sustainable development policy.

It is anticipated that identified projects will be used to develop the assessment process and specification. This learning will then be implemented as business as usual

## Scope

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## Objective(s)

It is anticipated that the following objectives will be met:

### Stage 1: Development of a Methodology

It is proposed that this is developed along with the consultant who will then carry out the design assessment. The proposed methodology will aim to produce a document that can be used to assess all future assets. The details of the methodology are as follows:

- Identify the various types and groups of structures that are part of the ScottishPower network;
- Identify assessment methods;
- Produce a summary of asset attributes and ratings to be assessed;
- Determine scoring system which will produce a condition rating to determine if the asset can be reused;
- Set out Health and Safety assessments that will be used along with the condition assessments.
- Highlight acceptable risks.

## Stage 2: Design Assessment

The outline scope will be as detailed below:

- Desktop assessment of the as-built records to determine the original design loadings;
- Consider dynamic loadings and understand design loadings from old and new electrical infrastructure;
- Determine where the weak points in the structures are and what proposed strengthening works could be undertaken to the existing structures;
- Determine a condition assessment/testing strategy that is required to complete the assessment.

## Stage 3: Visual and Condition Assessment

It is proposed that a visual and condition assessment will be carried out, with any specialist testing being undertaken by an approved contractor.

It is expected that a combination of Non Destructive and Intrusive testing will be required and that test samples will be sent to a UKAS accredited laboratory for evaluation.

## Stage 4: Report

The final report will collate the data gained from project Stages 2 & 3 providing recommendations such as:

- Identify repair/reuse/strengthening works that need to undertake to increase the service life of the asset(s);
- Repair specification for a contractor to provide an accurate cost and in turn carry out the necessary repair / improvement works;
- Detail of the risk that ScottishPower will need to accept in order to continue using these existing assets, such as reduced factors of safety etc;
- Cost benefit analysis of repair / reuse / strengthening works including ongoing inspection and maintenance requirements against the cost of replacement.

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

n/a

## Success Criteria

It is expected that this project will be successful if the following outcomes can be returned:

- Increases the lifespan of existing structures by 20+ years;
- Demonstrates notable savings in-line with the service life;
- Reduced on-site working times and number of outages required.

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

This project will initially be developed across ScottishPower license areas and will be implemented on asset replacement projects.

## Technology Readiness at Start

TRL5 Pilot Scale

## Technology Readiness at End

TRL8 Active Commissioning

## Geographical Area

Various existing substations as appropriate.

### **Revenue Allowed for the RII Settlement**

No applicable to current RII settlement

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

£343,000

## Project Eligibility Assessment Part 1

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

This project has the potential to deliver financial benefits to customers if it is found that re-using concrete structures is a viable solution. In this circumstance it would look to deliver benefits by enabling network licensees to reduce capital investment costs.

We estimate savings of £300,000 per bay can be achieved with this methodology.

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

##### Base Cost

Cost to demolish and replace existing concrete structures with an equivalent steel structures in a typical bay: **£360k**

##### Method Cost

Assessment and Survey of a typical bay: £10k

Undertake repairs to concrete structures in a typical bay: £50k

##### Financial Benefits

Base Cost - Method Cost = £300k

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

All network licensees maintain concrete structures and the methodology is applicable to all licensees.

It is estimated that 40-60% of existing concrete structures can be reused and either repaired or reused to increase service life.

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

The main driver is the need for a more sustainable approach, rather than a demolition and new build strategy. This project will provide

more information after Stage 3 has been carried out, which identifies if a structure is in a good enough condition to have its service life extended. At this point ScottishPower will be better placed to determine the outline costs associated with rolling the strategy out.

### 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**

Generally current practice across the industry is to demolish and re-build everything; this is an unsustainable and expensive approach.

Once this project has been completed it is expected that a specification will be available to the other DNOs. This will then allow them assess whether a repair and reuse strategy is applicable to their business.

**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

## 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