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.

NIA Project Registration and PEA Document

Date of Submission

Mar 2017

Project Reference Number

NIA_NGGD0095

Project Registration

Project Title

Migration Corrosion Inhibitors

Project Reference Number

NIA_NGGD0095

Project Licensee(s)

Cadent

Project Start

March 2017

Project Duration

0 years and 11 months

Nominated Project Contact(s)

Tatiana Prieto-Lopez

Project Budget

£28,593.00

Summary

The initial scope of the project will involve:

- Selection of suitable MCI products
- Short-term lab-based testing to determine efficacy of technology (validation of manufacturer's claims and measurement against NGGD's needs and quality criteria).

There is also potential to complete some long-term testing which will remain out-of-scope during this phase.

The scope of Corrosion Inhibiting technologies far exceeds this project per se and there are many other products which could also be beneficial when applied in Gas Distribution. For now, these products will also remain out-of-scope.

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

As part of National Grid Gas Distribution (NGGDs) replacement programme, innovations that mitigate the access, social and financial issues associated with Multi-Occupancy Buildings (MOBs) need to be considered.

Riser pipe assets are susceptible to corrosion and there are inherent risks associated with the safe operation of the network. The current approach is to either repair or replace those pipes that fall into the highest risk category with potentially high costs and significant customer disruption. The replacement process can also prove to be difficult in certain circumstances due to the access restrictions, in particular around the balcony areas, where sections of concrete need to be removed in order to access the corroded pipe.

The focus of this project is to investigate a potential technique: Migrating Corrosion Inhibitors (MCI's) which could be used to mitigate

high-risk pipes where the pipe is routed through a concrete floor slab e.g. (a balcony). There is potential for excess water to pool at the concrete-pipe interface and continue into the annular space between the pipe wall and the aperture in the slab.

These types of installations are high-risk and could lead to severe corrosions.

Method(s)

NGGD were initially approached by Lake Corrosion Engineering who in turn recommended MCI products which have the ability to migrate through concrete and attach to a metallic surface (adsorption) which stops the chemical reaction causing the pipe to corrode.

The project will comprise of a technology search to find the products which are best suited to the needs of NGGD. Once completed, the 'top four' products will be selected based on NGGD's quality criteria and a series of laboratory tests will be completed to determine the efficacy of the MCI's.

Although this technology is used across many industries e.g. (Maritime), it is unproven in Gas Distribution. As such, the Technology Readiness Level (TRL) has been assessed as lower (starting position is TRL 3).

It is likely, that NGGD will proceed to field trials after the successful conclusion of the project and a further phase will be required to demonstrate the practical application of the technology.

Scope

The initial scope of the project will involve:

- Selection of suitable MCI products
- Short-term lab-based testing to determine efficacy of technology (validation of manufacturer's claims and measurement against NGGD's needs and quality criteria).

There is also potential to complete some long-term testing which will remain out-of-scope during this phase.

The scope of Corrosion Inhibiting technologies far exceeds this project per se and there are many other products which could also be beneficial when applied in Gas Distribution. For now, these products will also remain out-of-scope.

Objective(s)

To determine the efficacy of selected MCI products and assess their practicality based on prescribed quality criteria.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Each product will be assessed against NGGD's quality criteria which in short, is based upon:

- Proven efficacy
  - Ability to inhibit corrosion
  - Penetration depth through concrete
  - Life expectancy of product
- Safety
- Ease of application
- Cost.

The project will be deemed a success by proving that these products could be used to mitigate corrosion and could also be applied as part of a repair programme to ensure the maximum asset life expectancy is realised.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The scale of the project is small and will involve only a technology search and short-term test at this stage.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

At present this is not applicable as the short-term trials are lab-based only.

With the proviso that this stage of the project is a success, field trials will be undertaken at NGGD approved locations.

Revenue Allowed for the RIIO Settlement

Not applicable

Indicative Total NIA Project Expenditure

External costs: PRA World Ltd	£19,500
Contingency @ 10%	£1,950
Internal costs @ 33.3%	£7,143
Total (£)	**£28,593**

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)

The project is in its infancy at present and it is assumed that MCIs will contribute to cost savings for customers as they are low-cost and easy to apply. Successful application will offset replacement and extend the asset life, thus reducing the cost of replacement.

In 15/16 Financial Year (FY) NGGD spent £15.3M on riser replacement. A conservative estimate for using this technology could save around £150k per annum (1%). A Cost-Benefit Analysis (CBA) has been completed as part of the project governance.

There is a greater potential for further benefit by pro-actively using this type of technology on new assets as a means of protection in areas of high risk e.g. maritime/saline environment).

Please provide a calculation of the expected benefits the Solution

Cost-benefit has been estimated and extrapolated. If successful, the next phase of the project would refine these estimated figures once a better understanding of the technology and its limited are understood.

For now, NGGD would typically replace a riser system if it was found that a severe corrosion had occurred on the section of the pipe passing through a concrete floor slab. For a medium-rise building (MRB), replacement costs can be estimated at circa £1300 per property, so if we are to assume an MRB with 20 meter points, this equates to £26,000 for full replacement.

If the efficacy of MCI's is determined as positive, the benefit would come from more riser systems across the network reaching the full potential of their assest life which would offset annual replacement costs. As such, the year-on-year replacement costs would reduce overall as a consequence. At present, a current estimate would be 1% of cost-savings for replacement which would equate to at least £150,000 (but likely to be higher).

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

Off-the-shelf product; easily procured and deployed. Each Distribution Network (DN) would be privy to the technical to the outputs of the project but may choose to conduct their own suite of testing, based on their needs.

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

If proven, the roll-out of this technology would be fairly straightforward. MCIs are relevatively cheap to procure and training would be straightforward. Initially, this technology would be used to protect 'at-risk' areas where riser pipes pass through the concrete slab. It is

envisaged that this could be done as part of an inspection/site survey programme.

A conservative estimate for NGGD for implementation/roll-out would be <£5k for training purposes but the volume of MCI material required per annum would need to be calculated. Again, a conservative estimate would be around £20-25k for materials per annum. National roll-out if there was uptake from other networks would be estimated between £100 - £150k.

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

A Technical report will be shared with all Network Licensees at the end of the project. If the technology is proven to be viable, it will be straightforward to procure and roll-out.

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

NA

☑ 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