

NIA Project Registration and PEA Document

Date of Submission

Mar 2026

Project Reference Number

NPG_NIA_061

Project Registration

Project Title

Loop Detect

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NPG_NIA_061

Project Licensee(s)

Northern Powergrid

Project Start

April 2026

Project Duration

0 years and 11 months

Nominated Project Contact(s)

Emma.Burton@northernpowergrid.com

Project Budget

£875,000.00

Summary

The Loop Detect project seeks to improve visibility of looped services using AI trained on trusted GIS-confirmed loop data in combination with additional data sources. By consolidating these datasets, the project aims to create a larger, reliable training dataset that supports a topology-aware AI model capable of predicting looped services where records are currently incomplete. The central hypothesis is that multi-source evidence will enable sufficiently accurate and early identification to support operational decision-making.

Third Party Collaborators

Capgemini

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

Current data on looped services is fragmented and inconsistent. As a result, looped services are frequently discovered late during customer applications, causing delays and extra site visits. The Loop Detect project seeks to improve visibility of looped services using AI trained on trusted GIS-confirmed loop data

Method(s)

This project will be delivered in clearly defined stages with measurable success criteria and decision gates. The methodology is designed to prove the end-to-end approach that NPg would look to roll out at scale, while retaining tight scope control and governance. The purpose of the method is to prove an end-to-end approach for identifying looped services, using a combination of digitised records, smart meter data and AI models, in a way that NPg can scale into business-as-usual (BAU) if successful.

Scope

Stage 1 - Discovery: Understand the problem in detail, confirm what data exists, set measurable success criteria and agree the scope and governance before build activities begin.

Stage 2 – Create a Confirmed Dataset of Looped Services: creation of the “groundtruth” dataset that the model will learn from

Stage 3 – Train and Apply the AI Model: training of a topologyaware model on the confirmed dataset and generate probabilitybased indicators of likely looped services in areas with incomplete or missing data.

Objective(s)

- 1. Discovery Stage. Define and validate a product vision for an NPG Agentic Solution (e.g. Customer or Digital Product), including a roadmap for future phases.
- 2. Create a Confirmed Dataset of Looped Services
- 3. Development of Network Topology Model. Assess model accuracy, calibration and reliability

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

Positive impact from the impact assessment tool, no negative customer impact

Score 10/10

Success Criteria

Stage 1: Discovery Report delivered. Go/no go decision to stage 2

Stage 2: Creation of a confirmed dataset of looped services from historic records + validated smartmeter indicators. Go/no go decision to stage 3

Stage 3: Development of Network Topology Model. Model accuracy, calibration and reliability meet agreed thresholds.

Project Partners and External Funding

Capgemini

Potential for New Learning

It is anticipated that the project will prove its hypothesis of being able to significantly improve its visibility of looped services through consolidation of varied data sources, through which we aim to create a much larger, more representative, and more reliable set of confirmed looped services. This enhanced dataset will be used to train a topologyaware AI model that can infer the likelihood of looped services in locations where no reliable records exist today. The core hypothesis is that a combination of multiple evidence sources—rather than reliance on any single dataset—will provide the confidence needed for AI-driven identification to be operationally useful, even in areas with historically poor records.

Scale of Project

The scale of the project will include the entire Northern Powergrid licence area.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The project will utilise data from across the two Northern Powergrid licence areas, although it is anticipated that the output will be scalable across other GB networks.

Revenue Allowed for the RIIO Settlement

none

Indicative Total NIA Project Expenditure

£875,000

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:

The project aims to deliver both strategic and operational benefits by supporting Northern Powergrid's role in enabling the transition to Net Zero while improving the efficiency and reliability of the customer connections process.

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

A Cost Benefit Analysis (CBA) has been developed to calculate benefits that can be directly and conservatively attributed to earlier identification of looped services.

Benefit 1: Reduction in avoidable site visits

Benefit 2: Improved customer connection timescales

NPV £1.2m at 10 years

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

It is anticipated the methodology will be replicable across GB networks.

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

Costs to roll out the solution would likely be lower than the initial investment in this project, which aims to validate the hypothesis. Wider adoption costs would depend on the nature/volume data held by the network and will be considered in the outputs of this project.

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

RIO-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

The introduction of an AI-driven approach to identify and electrically characterise looped service assets across the electricity distribution network will, if proven successful, enable networks to automate data digitisation and looped service detection, significantly reducing reliance on manual processes and reactive field investigations. Learning may enable more targeted investment, risk-based prioritisation, and proactive network interventions, accelerating the transition to Net Zero, in ensuring the network can accommodate future demand arising from the uptake of low-carbon technologies.

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

N/A

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.

A review of the ENA Smarter Networks Portal has been conducted to identify potential duplication. Searches returned no projects that replicate the full scope of this proposal, which combines OCR-based digitisation, predictive modelling and customer engagement for looped service identification.

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

Three relevant projects undertaken by other networks were noted:

ENWL Service Unlooping Programme (ED2)

This programme focuses primarily on physical interventions to remove looped services as part of ED2 delivery. It does not incorporate advanced AI techniques for predictive analytics or automated data extraction. Therefore, while thematically related, it does not duplicate the innovation proposed here.

SSEN's LCT Connections Readiness Indicator (NIA_SSEN_0077)

This project aims to help households and businesses understand their readiness for low-carbon technology (LCT) connections such as

EV chargers or heat pumps. It uses a decision-tree and machine learning tool to flag issues like looped services or fuse ratings, enabling proactive upgrades.

Relevance: SSEN's approach demonstrates the value of predictive modelling for LCT readiness and includes some overlap in identifying looped services. However, its scope is customer-facing readiness assessment rather than creating a GIS-ready dataset or prioritisation framework for network investment.

Conclusion: While SSEN's project uses ML for gap-filling and prediction, it does not address the comprehensive data digitisation, confidence scoring, and prioritisation methodology proposed here. Further review will ensure lessons learned are incorporated without duplication.

National Grid – Spatially Enabled Asset Management (SEAM)

The SEAM project focuses on improving asset management decisions through enhanced spatial data integration and analytics, enabling better exploitation of existing asset and network data. SEAM demonstrates the value of spatial context and GIS-led insights in asset decision-making but assumes the availability of structured, high-quality asset data as an input.

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

The project is innovative as the application of AI for automated loop detection and predictive analytics has not been tried before to the best of our knowledge.

Relevant Foreground IPR

Not anticipated that new IPR will be generated

Data Access Details

Data sharing will be in line with Northern Powergrid's data sharing policy.

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

The economic and technical risk associated with the development and deployment of new data models within the business, and the associated uncertainty of the outcome

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

The nature of the research and uncertainty around technical outcome, mean it is suited to be delivered through innovation funding.

This project has been approved by a senior member of staff

☒ Yes