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

Jan 2026

Project Reference Number

NGED_NIA_087

Project Registration

Project Title

IMPACT

Project Reference Number

NGED_NIA_087

Project Licensee(s)

National Grid Electricity Distribution

Project Start

January 2026

Project Duration

2 years and 7 months

Nominated Project Contact(s)

Sarah Thorpe

Project Budget

£1,500,000.00

Summary

The Intelligent Management and Post-fault Active Control Techniques (IMPACT) project represents a significant evolution of Active Network Management (ANM) systems for electricity distribution networks. Building on the success of earlier NGED projects such as Running Cool, IMPACT aims to introduce and combine innovative methods to enhance the capacity and flexibility of distribution networks. IMPACT will develop an intelligent system that calculates and safely selects post-fault and dynamic asset ratings for our next generation ANM. This approach has the potential to significantly reduce unnecessary curtailment for generation and demand customers, enabling more efficient utilisation of existing network infrastructure and faster, lower-cost connections.

Problem Being Solved

Active Network Management (ANM) is a sophisticated system that has allowed Distribution Network Operators (DNOs) to connect generation and demand customers to the distribution network more quickly and at reduced cost. ANM systems do this by performing various network simulations and temporarily curtailing (or turning up) generator or demand customers when a network constraint is identified. This process allows existing capacity to be more effectively utilised for new customers without requiring expensive and time-consuming network reinforcement.

ANM systems currently operate using ‘pre-event curtailment’. This means that the system performs iterative analysis to identify potential network constraints for various N-1 scenarios (i.e. an unplanned circuit or transformer outage) and curtails generation/demand accordingly. This avoids the possibility of any overload condition should an actual fault occur on the network. The system compares network loading against the 'pre-fault' or sustained asset ratings to calculate the amount of curtailment. This conservative operational mode is a safe and effective approach to ANM, but customers could be subject to higher curtailment than is strictly necessary.

Method(s)

Innovative methods have the potential to unlock the use of post-fault and short-term post fault ratings based on dynamic line rating technology as trialled in our groundbreaking Running Cool & FASTER projects. These ratings are higher than pre-fault ratings and therefore will reduce curtailment if there is a way to safely and reliably utilise them. Intelligent Management and Post-fault Active Control

Techniques (IMPACT) would be the first time that the methods are combined and deployed on the network to create a fundamental step-change in ANM optimisation. It has the potential for significant benefits for customers and DNOs and warrants innovation funding due to the associated innovation risk.

Scope

IMPACT will aim to develop a software system that consists of several elements or modules that process distribution network status, weather forecast and remote sensor data to produce dynamic and intelligent asset ratings. The system will then select the most appropriate rating to use in the ANM system dependent on a clearly defined and tested set of logical rules. The two main elements of the system are described below:

Enhanced Rating System (ERS) – The ERS will be an innovative software solution that will be responsible for integrating with the NGED source databases to ingest continuous and post-fault asset rating data for OHL, transformers and cables. It will utilise remote sensor data and software thermal models to calculate and store dynamic asset ratings. A sophisticated set of logical rules will then ensure that the most appropriate asset ratings are selected and applied to the ANM models whilst ensuring the safety and reliability of the distribution network.

Weather Processing Module (WPM) – The WPM will be a sophisticated software system that can integrate with various weather forecast datasets that are available from online sources. The WPM will process and validate the datasets for the downstream processes. The input data will be fed into the rating engine, which will calculate asset ratings based on several forecast timescales as well as determining the statistical 'confidence factor' associated with the data. The system will store carry out the analysis and update its database in real-time. It will store and utilise historic data for baselining and weather correction. The WPM will have an integration to the ERS to allow the data outputs to be passed to the ERS so that it can make intelligent updates to the ANM system.

IMPACT has the capability to reduce the curtailment experienced by demand and generation customers connected to the distribution network on curtailable connection agreements. This represents a direct financial benefit to these customers. The DNO must now also compensate the customer at a published set price, known as the "exceeded curtailment price" where curtailment has exceeded the customer curtailment limits. DNOs will benefit financially via reduced curtailment charges if curtailment can be reduced.

The number of curtailable connections will increase as the volumes of Low Carbon Technologies (LCTs) also increase on the distribution network. It is anticipated that customer curtailment may become a focus of the RIIO Ofgem regulatory mechanism. It is therefore critical that DNOs investigate novel ANM methods to reduce customer curtailment, and to be adequately prepared for future regulatory directives. IMPACT has the potential to generate learning that can be disseminated to the wider industry and therefore lead to financial benefits in future price controls from the ability of DNOs to defer or avoid network reinforcement.

Objective(s)

The project will undertake the following objectives:

- Investigate the existing ANM technologies and develop use cases
- Develop high-level and functional specifications for the ERS and WPM.
- Complete desktop simulations to validate system operation and associated potential benefits.
- Develop, test and install the ERS.
- Develop, test and install the WPM.
- Demonstrate the IMPACT system on a trial network and monitor its performance.
- Disseminate learning to internal stakeholders and the wider industry.

Consumer Vulnerability Impact Assessment

Whilst the methods developed in this project may not have a direct impact on consumer vulnerability, there will be positive indirect benefits. The solution has the capability to reduce the curtailment of customers on flexible connections. This will increase network efficiency and benefit all customers through reduced socialised costs. In addition, the solution could facilitate the connection of additional LCTs by releasing network capacity, which will benefit all network customers.

Success Criteria

Success is the specification, design, development, testing and deployment strategy of the ERS that works in conjunction with an upgraded ANM system. The solution should be able to output and select an enhanced, post-fault or static rating dependent on network conditions and carry out its ANM operation in line with the ERS logic.

In addition, the solution will have a policy document that describes the operation and control of the new system(s).

Project Partners and External Funding

The following project partners will be engaged on this project:

- ZIV Automation – ZIV Automation are a technology company with over 30 years of experience in advanced digital solutions for power grids. They will be responsible for design, development and integration of the ERS.
- Digital Engineering – Digital Engineering was formed in 2010 and developed a leading position as a weather analytics business. In 2016 the business began to work with energy network companies in the UK, using its core competence of weather modelling. Digital Engineering will be responsible for the design, development and integration of the WPM.

No external funding will be used to support the project.

Potential for New Learning

IMPACT will generate significant learning related to the calculation of dynamic and enhanced asset ratings that can be integrated into ANM systems for customer and DNO benefit. The project will investigate transformer, OHL and cable assets to maximise the learning from the project. A key element will be understanding how the solution can harness weather data to drive capacity increases on the network. IMPACT will also learn how to create the necessary logic to implement dynamic and enhanced ratings without diminishing the safety and reliability of the network.

The majority of UK DNOs have successfully implemented ANM systems to manage network constraints in real-time. ANM systems are designed under similar principles because the associated distribution networks are constructed from the same electrical equipment (i.e. OHLs, cables and transformers). It is therefore anticipated that the learning from IMPACT will be applicable to all UK DNOs that operate ANM systems on their network.

A reporting and dissemination work package has been built into the project plan. This will facilitate the efficient dissemination of learning to relevant stakeholders and the wider industry. As part of this work package the project will produce a system performance report that will describe the performance of IMPACT and compare this to system simulations. Following this a full project closedown report will be produced and the project will seek to share learning through industry conferences and webinars as required.

Scale of Project

IMPACT will specify, design, build and trial an innovative new ANM system, Enhanced Rating System (ERS) and Weather Processing Module (WPM) to reduce both generation and demand curtailment, and unlock significant benefits to both the customer and the DNO.

The project will explore the use of the application of intelligent post-fault ratings for OHL, cables and transformer assets. IMPACT will investigate enhanced/dynamic post-fault ratings that are calculated based on real-time weather and network data. The ambition is to validate the new system across a real-world trial network, most likely utilising an existing ANM zone to avoid unnecessary duplication of effort. The outcome of IMPACT will be replicable and scalable across GB as all DNOs currently operate ANM systems.

A smaller project scale would not be able to develop the solution to the required TRL.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The real-world trial area will be selected by a formal site selection process. It is anticipated that the trial will be carried out on an area of network that is already part of an ANM zone to reduce the work involved in setting up the solution on the trial network.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

Total project budget is £1.50m

Project Eligibility Assessment Part 1

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

The use of dynamic and enhanced post-fault ratings will allow generator customers subject to alternative connections to export additional energy to the distribution network above the base case scenario. A large proportion of generator customers are now renewable (i.e. solar PV and onshore wind) and this volume is forecast to increase as the UK moves towards Net Zero in 2050. Therefore, IMPACT has the capability to reduce the curtailment of renewable energy and contribute to the UK's carbon emissions savings.

Additionally, the project has the capability to better utilise network capacity and therefore may avoid the replacement of network infrastructure, such as OHL, cables and transformers that can have a direct impact on the environment. Having better management of existing network capacity can also allow more LCTs to connect the distribution network.

How the Project has potential to benefit consumer in vulnerable situations:

Not required.

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

N/A - RIIO2 project

Please provide a calculation and/or description of the expected benefits of the solution

The expected benefits were calculated by investigating the potential curtailment reduction of customers connected to the distribution network on curtailable connections and subject to ANM. The methodology to calculate the benefits involved the following steps:

1. Obtain historic curtailment data from existing NGED ANM zones
2. Extract data from generator customers subject to curtailment in the past year
3. Locate the Point of Connection (PoC) of each customer to the distribution network
4. Calculate the increase in capacity release after applying the post fault rating at the PoC
5. Calculate average generator financial and load factors using publicly available data
6. Calculate financial benefit due to reduced curtailment

It was observed that the high-level curtailment benefit translates to approximately £129k per average generating customer per year. This benefit is attributable to increased revenue from electricity exports that would not have been the apparent in the base case.

IMPACT will build on the learning of our Running Cool NIA and Forecasting Ampacities for Short-Term Enhancements to Ratings (FASTER) projects. Running Cool found that there were potential capacity release and financial benefits from the use of Short-Term Post Fault Ratings (STPFRs) when integrated within ANM systems. The results from the project indicated that 132kV OHL circuits could provide a yearly uplift of approximately 6,842 MWh on average when compared to the static post-fault rating. FASTER aimed to assess the feasibility of using weather forecasts to enhance the performance of NGED distribution OHL by providing retrospective ampacity forecasts based on historic weather data. The project has demonstrated that significant enhancements can be made to OHL line ratings by using weather forecasts. With a forecast timeframe of 24 to 48 hours, the enhancements could contribute to significant savings in flexibility service procurement

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

As described in Section 2.8, the majority of UK DNOs have successfully implemented ANM systems to manage network constraints in real-time. ANM systems are designed under similar principles because the associated distribution networks are constructed from the same electrical equipment (i.e. OHLs, cables and transformers). It is therefore anticipated that the learning from IMPACT will be applicable to all UK DNOs that operate ANM systems on their network. The solution is therefore highly replicable.

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

At this stage a quantitative assessment of the costs is unable to be calculated due to the existing TRL. However, the cost of rolling out the Method post-trial will be a function of the cost of procuring/licensing of the IMPACT system followed by an initial design and setup phase to configure and install the system in the host environment. The costs will be comparable to those of existing ANM software products that are used by most DNOs. Each DNO will have similar but unique ANM systems in terms of available technology, data, process and people. However, the learning from this project will help to inform the other DNOs in terms of advancing their ANM schemes.

Requirement 3 / 1

Involve Research, Development or Demonstration

Projects 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

Involve Research, Development or Demonstration - Please select all that apply

☐ 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 learning generated on ANM optimisation and enhanced/dynamic asset ratings is directly applicable to other network licenses. This is because most network licenses operate ANM systems with curtailable connections. The learning will allow other DNOs to implement the post-trial methods on their network and realise the financial and technical benefits associated with the solution.

Not required - RIIO2 project

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. Networks must explicitly mention similar projects that they have considered and

how these differ.

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

A thorough review of projects registered on the Smarter Networks Portal was conducted during the scoping stage to understand if there were any closed or live projects that have addressed the technical methods proposed in IMPACT. The review found that there was no duplication. In addition, there were no objections to the proposed scope when presented to other DNOs via the ENA.

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

The following are projects that have (or are in the process of) investigating solutions in the ANM space. The key differences between their scope and IMPACT have been highlighted in the table to demonstrate that IMPACT does not cause any unnecessarily duplication.

ANM - Balancing Coordination Demonstration (ABCD)

- Network Lead: National Grid ESO/NGED
- Differences to IMPACT: NGED and the ESO investigated new communications methods to better coordinate ANM and Balancing Services to reduce potential impacts.

Connectrolyser

- Network Lead: UKPN
- Differences to IMPACT: The Connectrolyser investigates the ability to use hydrogen hubs as flexibility for network management.

Constellation

Network Lead: UKPN
Differences to IMPACT: The Constellation project is demonstrating a novel approach to protection and control by installation intelligence into distribution substations.

Cross Vector Energy Hub

Network Lead: Northern Powergrid
Differences to IMPACT: This project is seeking to design and implement a multi-vector (gas & electricity) energy hub to coordinate renewables, BESS and gas assets with a holistic approach.

Fractal Flow

Network Lead: Northern Powergrid
Differences to IMPACT: Fractal Flow is developing a machine learning tool that provides a data coordination function between the DNO and ESO to allow intelligent control of DERs.

HeatNet

Network Lead: UKPN
Differences to IMPACT: HeatNet investigated how advanced algorithms could be used to coordinate heat pump operations to mitigate their impact on distribution network constraints.

LV Interconnected Pairs

Network Lead: UKPN
Differences to IMPACT: This project investigated the use of automation on the LV network to reduce the effects of loss of supply caused by HV faults.

NIMBUS

Network Lead: SSEN-T
Differences to IMPACT: NIMBUS looked at using meteorological data to model and predict the impact of weather and climate change on network assets over their life span.

UN:LOCK

Network Lead: SSEN-T
Differences to IMPACT: This project explored the use over novel market-based solutions to allow the additional connection of generation in constrained areas of the network.

Additional Governance And Document Upload

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

IMPACT is further developing and integrating innovative methods to facilitate the use of post-fault, dynamic and enhanced ratings in ANM systems for the first time. This will create a step-change in the ability of these systems to reduce curtailment for customers on alternative connections and therefore lead to significant benefits. There is a significant innovation risk associated with the novelty of combining the various technical elements and trialling the solution on a real-world network. This risk warrants the associated funding through the NIA budget.

Relevant Foreground IPR

The following IPR is expected to be generated during the delivery of this project:

- ERS/WPM system functional design specifications
- ERS/WPM technical architecture and interface specifications
- Methodology to define and carry out the simulations, system testing and validation
- The development of ANM modifications to facilitate the IMPACT system
- Data and learning reports

Data Access Details

Data for this project and all other projects funded under the Network Innovation Allowance (NIA), Network Innovation Competition (NIC) or the new Strategic Innovation Fund (SIF) can be found or requested in several ways:

- A request for information via the Smarter Networks Portal at https://smarter.energynetworks.org, to contact select a project and click 'Contact Lead Network'. National Grid Electricity Distribution already publishes much of the data arising from our innovation projects here so you may wish to check this website before making an application.
- Via our Innovation website at https://www.nationalgrid.co.uk/innovation/ Via our managed mailbox nged.innovation@nationalgrid.co.uk

The data associated with the IMPACT system performance will be analysed by the project team and insights shared with the wider industry. It is not anticipated that there will be any restrictions to sharing source data with interested parties, however, this will be subject to appropriate review following any request.

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

It is anticipated that the methods investigated and developed in IMPACT will have significant benefits to customers on curtailable connections and also DNOs. The solution has not been developed before and hence requires innovation funding to increase the TRL so that it can be trialled to validate the prospective benefits. This innovation risk therefore warrants innovation funding through the NIA budget.

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

There are certain technical risks that will be addressed by IMPACT. The use of post-fault and dynamic post-fault ratings has not been applied to ANM before and therefore a focused innovation project to investigate and develop the solution so that it can be assessed for potential benefits. The use of the NIA funding mechanism allows a small scale and limited trial to be developed to facilitate the required learning outcomes.

This project has been approved by a senior member of staff

☑ Yes