

NIA Project Registration and PEA Document

Date of Submission

Mar 2023

Project Reference Number

NIA2_NGESO029

Project Registration

Project Title

DER Visibility

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NIA2_NGESO029

Project Licensee(s)

National Grid Electricity System Operator

Project Start

March 2023

Project Duration

0 years and 3 months

Nominated Project Contact(s)

Deepak Lala

Project Budget

£100,000.00

Summary

The energy industry is rapidly transforming from a one-way centralised grid to a highly distributed two-way electricity network. Currently there is limited visibility and data pertaining to Distributed Energy Resources (DERs) (e.g., power outputs, utilisation, locations) or forecasts for when new DERs will be connected. This is hampering the efficient transition to a low-cost, high-renewable electricity network. The ESO is utilising DNO data, however some information remains siloed and is in a range of formats, making it difficult to integrate into ESO processes. Therefore, it is necessary to understand what data sources are available and how they can be aggregated to better plan and provide increased flexibility.

Nominated Contact Email Address(es)

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Problem Being Solved

The energy industry is rapidly transforming from a one-way centralised grid to a highly distributed two-way electricity network. The Distributed Energy Resources (DER) model will play an increasingly pivotal role in the UK power mix as part of a broader effort to decarbonise the sector. There is a need to utilise DER data effectively to improve system planning and stability. Other countries have made significant advancements by utilising DERs in terms of flexibility, alleviating constraints and reducing costs across the network.

Currently there is limited visibility and data pertaining to DERs (e.g., power outputs, locations, availability) or forecasts for when new DERs will be connected. This is hampering the efficient transition to a low-cost, high-renewable electricity network. Currently, the ESO is utilising DNO data, however some information remains siloed and is in a range of formats making it difficult to integrate into ESO processes. Therefore, it is necessary to understand what data sources are available and how they can be compiled to better plan and provide increased flexibility.

Method(s)

This project brings together an experienced team of subject matter experts from the Hartree Centre, with significant experience in data analysis and software development.

Phase 1 of the project will comprise of 4 main work packages:

WP1: Understanding the sources and formats of currently available data

- This will consist of a data mapping exercise to understand the current sources of DER data. This will involve engaging a range of stakeholders across the industry to ensure that all possible data sources are identified and mapped.

WP2: Understanding the volume, velocity and variability of the data needed to achieve the core user-stories, and related data access methods and standards

- This WP will continue engagement with key stakeholders to further understand the sources of available data including, access, methods and security standards that will need to be implemented in any future projects.

WP3: Understanding the relevant technology mappings and the likely system architecture needed to implement the core user stories

- WP3 will utilise the information gained from WP1 and 2 to begin mapping out the most efficient solutions for aggregating the data and presenting it in a useful format that can be accessed by the ESO and wider network licensees.

WP4: Establishing a clear understanding of the Phase 2 feasibility and requirements

- WP4 will focus on defining what could be achieved in Phase 2 regarding developing a software tool. At this stage all the data compiled earlier in the project will be reviewed and a decision will be made on whether to progress with Phase 2 of the project.

The main tasks for Phase 1 are listed below:

- Research and literature review.
- Client and stakeholder interviews and discussions.
- Understanding the sources of data currently available
- Determine the core project stakeholders, user personas and special end-user pre-requisites for the phase-2 project.
- Establish the core user-stories for Phase 2
- Understand the volume, velocity, variability (VVV) of the data needed to achieve the core user-stories, and related data access methods and standards.
- Determine the current 'As-Is' scenario and the ideal 'To-Be' scenario for a longer-term project.
- Understand the relevant technology mappings and the likely system architecture needed to implement the core user-stories.
- Determine the data-security requirements and GDPR obligations.
- Estimate the required effort profiles needed to implement the main project.
- Agree a feasible 'Cup-cake' roadmap from small, medium to full-MVP build.
- Document the main risks and mitigations.

In line with the ENA's ENIP document, the risk rating is scored Low.

- TRL Steps = 1 (1 TRL step)
- Cost = 1 (£100k)
- Suppliers = 1 (1 supplier)
- Data Assumptions = 2
- Total = 5 (Low)

Scope

There is an Increasing volume of service providers connected to distribution networks which are seen as key enablers in unlocking flexibility on the network. Whereas previously they have had a relatively small impact, we are now seeing this growing rapidly. Although there is some data on DERs, a lot of the information is siloed or in formats that are not easily implemented into existing processes. One of the key challenges is increased DER operational visibility being made available to industry stakeholders.

The proposed project will be split into two phases; the first phase will consist of engaging industry stakeholders internally and externally to understand what sources of DER data are currently available, where the data is stored, data security requirements and how easily accessible it is. It will also look at potential use cases for the data and how different industry organisations could use it. If then deemed that there is sufficiently accessible data, the second phase of the project will look at potential ways to aggregate the data and develop

a tool that could be used across the industry to increase the visibility of DER data such as utilisation, locations, power outputs etc. It also looks to develop a forecasting tool to highlight when and where new DERs could be used for flexibility on the network.

Objective(s)

- Analyse the various data sources, their granularity, accessibility and security requirements.

If deemed that the appropriate data sources are accessible, Phase 2 will:

- Develop a tool to map the DER's by both geographical and grid location, forecast the likelihood of more appearing in various locations, and approximating when they will be connected to the grid, power outputs, utilisation, and accessibility.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

The ESO does not have a direct connection to consumers, and therefore is unable to differentiate the impact on consumers and those in vulnerable situations. Benefits to all consumers are detailed below.

Success Criteria

The following will be considered when assessing whether the project is successful:

- A set of core documents as defined by the deliverables including initial Phase 2 project plan with use-stories, use-cases, roadmap, risk assessment, proposed solution architecture and WP breakdown.
- A good understanding of the Phase 2 requirements and feasibility is reached.
- Agreement to proceed with Phase 2 of the project.

Project Partners and External Funding

The Hartree Centre will be carrying out the work, no external funding required.

Potential for New Learning

This project will help the ESO and wider energy industry by:

- Assessing the feasibility of DER visibility based on existing data and by doing so, unlocking new power system opportunities.
- Increasing volume of service providers connected to distribution networks. Previously they have had a small impact, but this is growing rapidly.
- Further developing industry knowledge, the data has not been used in this way previously.
- There are currently no tools available that can aggregate all the available data and forecast the likelihood of new DER's appearing to support flexibility planning.

Scale of Project

The project spans three months with one project partner. The project consists of desk-based research, stakeholder engagement with partner organisations, data analysis and dissemination.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

The project will be conducted in the UK.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£100,000

Project Eligibility Assessment Part 1

There are slightly differing requirements for RII0-1 and RII0-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RII0-2 / RII0-1).

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 RII0-2 projects only)

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

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

The ESO's remit is to provide a safe, reliable, affordable electricity supply. As a central player in the GB electricity system, it is the ESO's role to drive the transition to Net Zero. We are seeking to facilitate a smooth transition through shared insights and analysis to help industry stakeholders determine the direction of travel and make informed decisions. The rapid expansion of DERs offers new ways to improve system reliability, reduce energy costs for consumers and support the energy system transition.

To facilitate this, we need to understand the following:

1. Data which the DNOs hold is siloed and in various formats making it difficult to integrate into ESO processes. How can the large amount of DER data be used more effectively?
2. Other countries have made significant advancements by using DERs. What can we learn from their processes?
3. The DER model will play an increasingly pivotal role in the UK power mix as part of a wider effort to decarbonise the sector. How can we integrate DERs more effectively?

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 (RII0-1 projects only)

N/A

Please provide a calculation of the expected benefits the Solution

Not required as research project.

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

- There is an Increasing volume of service providers connected to distribution networks.
- Previously they have had a small impact, but this is now growing rapidly. This project will help improve the visibility of DERs across the industry.
- As part of the research other network companies will be engaged to help shape the outcomes so that the outputs of the project can be used more broadly.
- The project outputs will also be shared more broadly across industry as there is an opportunity to utilise DER data in various projects and BAU work

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

As Phase 1 of this project is a feasibility study, it is difficult to quantify the costs of rolling out the method across GB. However, based on the findings of Phase 1, a cost-benefit analysis will then be conducted before progressing into Phase 2 of the 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

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

The project's outcomes aim to improve the availability of DER data. This will have more comprehensive benefits for other network licensees by ensuring a similar format and greater visibility of DER data, thus improving accessibility and supporting a more cost-effective system through increased flexibility, planning and better utilisation.

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

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.

- Regional Development Programmes – The RDP programmes are looking at the electricity network across Great Britain to identify areas of development between transmission and distribution networks in areas with large amount of DERs. RDPs are designed to unlock additional network capacity, efficiently manage constraints, and open new revenue streams for market participants. They aim to introduce new ways of working that significantly enhance transmission and distribution systems coordination and control, and they provide new tools and resources to manage system constraints – ultimately reducing costs for consumers. This project will build on the RDP work by testing out assumptions in a live scenario.
- COMMANDER – An NIA project which will identify and define alternative ESO/DSO coordination schemes for accessing and managing DERs with respect to their qualification, procurement, dispatch, and settlement and develop a roadmap for future ESO/DSO roles and responsibilities.

- ENVISION – A UKPN NIA project which is looking to develop a single system with LV network data on customer energy consumption, energy generation and DER information (volumes and types). This project seeks to aggregate all the DER data across all the network licensees.

The proposed project will start with a literature review to understand the latest research and advancements in archetype development and will ensure previous work feeds into, and is built upon, rather than duplicated.

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

- There isn't an established collection of DER data across the industry and flexibility is reasonably new topic area that needs to be explored further.
- Growing volumes of DER – work has been done to better forecast behaviours (e.g., wind and solar) however this has typically investigated other behavioural characteristics which aren't weather associated.
- The project intends to improve current processes and data silos enabling greater visibility.
- The data can be used for multiple purposes and across multiple projects that are at the cutting edge of development for the energy transition.
- This project will introduce new skills and techniques into the DER mapping process and potentially introduce requirements for network licensees.

Relevant Foreground IPR

The following foreground IPR is expected to be generated in the course of the project:

- A data map to identify and map the current sources of DER data.
- Core user-stories, and related data access methods and standards information.
- The most efficient solutions for aggregating the data (presenting it in a useful format that can be accessed by the ESO and wider network licensees).

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 a number of ways:

1. 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 ESO already publishes much of the data arising from our innovation projects here so you may wish to check this website before making an application.
2. Via our Innovation website at <https://www.nationalgrideso.com/future-energy/innovation>
3. Via our managed mailbox innovation@nationalgrideso.com

Details on the terms on which such data will be made available by National Grid ESO can be found in our publicly available "Data sharing policy relating to NIC/NIA projects" at <https://www.nationalgrideso.com/document/168191/download>.

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

Due to the nature of the project and that it is researching potential future impacts to the grid based largely on assumptions, this does not fall into current BAU.

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 increased risks associated with the availability of required data and a high level of assumptions, which makes this project better suited to NIA.
- The TRL of the overall framework is relatively low. Therefore, innovation funding is more suitable for exploring the project's potential and increasing the TRL before transferring into BAU activities.
- Conducting this project with NIA funding will ensure that the project findings can be shared more widely with other interested network licensees.

This project has been approved by a senior member of staff

☒ Yes