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

Jun 2026

Project Reference Number

NIA3_NESO004

Project Registration

Project Title

Frequency Dependent Equivalent Network (FDNE)

Project Reference Number

NIA3_NESO004

Project Licensee(s)

National Energy System Operator

Project Start

June 2026

Project Duration

1 year and 6 months

Nominated Project Contact(s)

Innovation@neso.energy

Project Budget

£500,000.00

Summary

The increase in inverter-based resources (IBRs) introduces new challenges for electromagnetic transient (EMT) modelling and stability analysis. The traditional short-circuit strength based Thevenin equivalents are no longer sufficient, which fail to capture the frequency-dependent impedance characteristics of the network.

The proposed approach fills this modelling gap by a Frequency-Dependent Network Equivalent (FDNE) for the transmission network. The FDNE is a data-driven model that accurately reproduces the network's voltage-current behaviour across a broad range of frequencies. The aim of this 18-month project will be implemented via five work packages.

The FDNE solution directly supports NESO's objectives of improving system operability and resilience in a high-IBR future. It offers a fast, accurate, and flexible simulation toolset that streamlines compliance processes and empowers users, all while maintaining confidentiality.

Third Party Collaborators

University of Birmingham

Nominated Contact Email Address(es)

Innovation@neso.energy

Problem Being Solved

The transition to a low-carbon electricity system has led to a rapid increase in Inverter-Based Resources (IBRs) such as wind, solar, and battery storage. Accurate modelling of the wider transmission network is essential for ensuring system stability and reliability, reliable compliance testing, and effective event analysis. Traditionally, the network is represented using Thevenin equivalents (a simplified representation of a complex linear electrical circuit which consists of a single voltage source in series with a resistance) based on fault level or Short Circuit Level (SCL). However, these models do not capture the frequency-dependent impedance characteristics of the network, which are increasingly important for modern power systems dominated by power electronics.

The electromagnetic transient (EMT) models offer high accuracy but are often impractical to share due to intellectual property (IP) concerns and computational demands. As a result, there is a gap in the ability to share network models with users and Original Equipment Manufacturers (OEMs) for compliance testing and model validation.

The FDNE project aims to address these challenges by developing and demonstrating frequency-dependent network equivalent (FDNE) models. These models could provide more accurate information about the network that enables flexible, and rapid compliance testing and improves the system security, while allowing secure sharing of network information without IP risks. The project aims to establish methodologies for FDNE model creation, validate their performance, and facilitate their integration into PSCAD, supporting system security and resilience in the evolving electricity network.

The FDNE project aims to develop and demonstrate a new approach for representing the wider electricity network using frequency-dependent impedance models. This innovation replaces traditional Thevenin equivalents, enabling more accurate, flexible, and rapid compliance testing and event analysis. FDNE models can be shared with users without confidentiality concerns, supporting robust inverter design and system stability. The project will establish methodologies for FDNE model creation, validate their performance against original network models, and facilitate their integration into NESO's simulation and analysis platforms. The outcome will improve the customers connection journey, system security, resilience, and operational efficiency, with significant benefits for stakeholders across the electricity sector.

Method(s)

Work Packages Description
According to the technical methodology, 5 work packages are outlined with acceptance criteria.

WP1: Requirements & Specification (4 months)
Description:
WP1 focuses on establishing the technical and methodological foundations for Frequency‑Dependent Network Equivalents (FDNE) suitable for EMT‑based studies in inverter‑dominated power systems. The work package will consolidate existing knowledge, define clear use‑case requirements, and develop representative benchmark networks and scenarios that reflect the characteristics of the GB transmission system. WP1 will also ensure that FDNE models are validated rigorously and supported by appropriate documentation to enable their safe and effective application in compliance testing, event analysis, and user model validation within NESO and by wider stakeholders.
Methods / approach:
A targeted literature review will be undertaken to assess the current state of network equivalencing techniques, with particular emphasis on FDNE methods based on Multi-Input Multi-Output (MIMO) MIMO impedance/admittance matrices rather than conventional positive‑sequence representations. The review will identify practical challenges and gaps related to implementing MIMO‑based FDNE models within EMT simulation environments.
A detailed requirements definition exercise will be carried out to capture FDNE use‑case needs, covering compliance testing, post‑event analysis, and user model validation. This will define the functional, performance, and usability requirements for FDNE models from both NESO and user perspectives.
A representative network library will be developed to emulate key characteristics of the GB transmission system. The library will include networks with a range of integrated IBRs and conventional assets, such as synchronous generators, wind farms, photovoltaic (PV) plants, battery energy storage systems (BESS), and Flexible AC Transmission Systems (FACTS) devices.
A set of benchmark tests and credible operating scenarios will be designed to support FDNE development and validation. These scenarios will reflect realistic and stressed operating conditions to test frequency‑dependent behaviour and dynamic performance.
Outputs:
A literature review report covering progress, challenges, and practical considerations for MIMO‑based FDNE implementation in EMT studies.
A formal FDNE requirements specification documenting use‑case‑driven functional and performance requirements.
A GB‑representative network library including synchronous plant and a range of IBR technologies (wind, PV, BESS, FACTS).
A defined set of benchmark tests and operating scenarios for FDNE assessment and comparison.

Expected outcome:

WP1 will establish a robust, well-documented foundation for the development and adoption of FDNE. It will provide clarity on how MIMO-based FDNE models can be constructed, validated, and applied reliably in EMT environments, addressing limitations of conventional network equivalents. The outputs will enable consistent benchmarking and validation, improve confidence in FDNE-based studies, and support subsequent work packages focused on automation, integration, and operational deployment.

WP2: FDNE Model Development (5 months)

Description:

WP2 focuses on the extraction of frequency-domain network characteristics and the development of robust methodologies for deriving FDNE models. This work package translates representative network behaviour under multiple operating conditions into scalable, reusable FDNE models.

Methods / approach:

Network impedance data will be obtained for a range of representative scenarios. These scenarios will include AC networks connected to IBRs with varying penetration levels, control settings, and operating points to capture a wide spectrum of system behaviours.

A systematic methodology will be developed to derive FDNE models directly from frequency scan data. This will include data processing, model identification, stability enforcement, and model-order reduction techniques required to generate accurate and numerically robust FDNE representations.

Prototype FDNE models will be developed for selected network areas, using the derived methodology. These prototypes will demonstrate the applicability of FDNE to replace parts of detailed EMT network models while preserving essential frequency-dependent and dynamic characteristics.

The full technical approach, assumptions, limitations, and validation strategy used in the FDNE derivation process will be formally documented to ensure transparency, repeatability, and future extensibility.

Output:

A set of frequency-domain impedance/admittance datasets covering multiple operating scenarios and IBR penetration levels.

A documented methodology for deriving FDNE models from frequency scan data, suitable for EMT applications.

Prototype FDNE models for selected representative network areas.

A technical report detailing the FDNE derivation approach, modelling assumptions, and implementation considerations.

Expected outcome:

WP2 will deliver a validated and repeatable pathway for converting frequency scan data into practical FDNE models. It will demonstrate that FDNE can reliably represent complex AC networks with high IBR penetration across multiple operating conditions. The outcomes will underpin subsequent work packages by providing confidence in the FDNE derivation process and enabling scalable deployment of FDNE models for compliance testing, event analysis, and wider system studies.

WP3: Integration & Simulation Platform (5 months)

Description:

WP3 focuses on the practical implementation of FDNE models within EMT simulation environments, ensuring they can be efficiently deployed within NESO's existing analysis workflows. This work package bridges methodological development and operational use by integrating FDNE models into PSCAD, developing robust data interfaces, and confirming compatibility with NESO's established modelling and simulation platforms.

Methods / approach:

FDNE models developed in previous work packages will be implemented and integrated into PSCAD EMT simulation tools. This will include configuring FDNE representations to function as substitutes for selected parts of detailed network models while maintaining numerical stability and simulation robustness.

A dedicated interface will be developed to support the import and export of FDNE data.

Compatibility assessment will be carried out to ensure that FDNE implementations and interfaces align with NESO's existing modelling platforms, data formats, and simulation practices. Any limitations, dependencies, or configuration requirements will be identified and documented.

Output:

A PSCAD-integrated FDNE implementation suitable for EMT-based studies.

A functional interface for importing and exporting FDNE data between modelling tools and PSCAD.

A compatibility report documenting alignment with NESO's existing platforms, workflows, and technical constraints

Expected outcome:

WP3 will enable FDNE models to be applied seamlessly within NESO's EMT simulation environment, supporting practical use in compliance testing, event analysis, and system studies. By delivering robust integration and clear compatibility evidence, the work package will reduce barriers to FDNE adoption, support efficient workflows, and provide confidence that FDNE-based studies can be carried out consistently within NESO's operational toolchain.

WP4: Validation & Testing (3 months)
Description:
WP4 focuses on the comprehensive validation of FDNE models and their application to realistic power system studies. This work package will demonstrate the accuracy, robustness, and computational benefits of FDNE by benchmarking against full EMT network models and conventional Thevenin equivalents. It will also showcase FDNE's practical value through representative case studies and establish an automated, end-to-end workflow suitable for repeatable use within NESO.
Methods / approach:
FDNE models will be systematically validated against full EMT network models and conventional Thevenin equivalents. Validation tests will include flat-run conditions, small-signal disturbances, fault studies, and other relevant dynamic tests to assess frequency-dependent and time-domain behaviour.
A set of detailed case studies will be completed to demonstrate FDNE application in key use cases, including compliance testing, post-event analysis, and extreme or stressed operating scenarios. These studies will reflect realistic system conditions relevant to NESO operations.
The full FDNE workflow will be automated, covering network data collection, FDNE model establishment, PSCAD interface generation, and model validation. This automation will support repeatability, efficiency, and scalability of FDNE deployment.
Output:
Validation results comparing FDNE models with full EMT network models and Thevenin equivalents across a range of dynamic tests.
Completed case studies demonstrating FDNE application to compliance testing, event analysis, and extreme scenario simulations.
An automated, end-to-end FDNE workflow covering data extraction, model generation, PSCAD integration, and validation.
A consolidated results summary reporting accuracy, computational performance, and reliability metrics for FDNE models.
Expected outcome: WP4 will provide clear, quantitative evidence that FDNE models can accurately and reliably replace parts of detailed EMT networks while delivering significant computational efficiency gains. It will demonstrate FDNE's suitability for core NESO use cases and reduce barriers to routine operational adoption through automation. The outcomes will establish confidence in FDNE as a scalable and repeatable tool for compliance testing, event analysis, and future system studies in inverter-dominated networks.

WP5: Knowledge Transfer & Implementation (1 months)
Description:
WP5 focuses on knowledge transfer, stakeholder engagement, and the long-term adoption of the FDNE methodology and tools. This work package ensures that the technical outputs developed in earlier work packages are converted into clear guidance, training materials, and accessible documentation. It also supports effective dissemination to internal and external stakeholders and establishes a pathway for ongoing support and potential wider rollout of FDNE within NESO and the broader industry.

Methods / approach:
Comprehensive user guidance and training materials will be developed to support the practical application of FDNE.
A final project report will be completed, consolidating the overall FDNE methodology, validation results, case study findings, and key technical and operational recommendations. The report will provide a complete and auditable record of the project.
Stakeholder engagement will be undertaken through the organisation of workshops and/or webinars.
Ongoing support arrangements will be defined to provide updates, respond to user queries, and enable potential wider rollout of FDNE tools and methodologies beyond the project lifecycle, subject to NESO priorities.
Output:
FDNE user guide and training materials suitable for engineers, analysts, and other stakeholders.
A final project report covering methodology, results, lessons learned, and recommendations.
Delivered stakeholder workshops and/or webinars, including presentation and demonstration materials.
Defined approach for ongoing support, updates, and potential wider deployment of FDNE.
Expected outcome:
WP5 will ensure that FDNE capability is effectively embedded beyond the project delivery phase. It will enable NESO engineers and stakeholders to confidently apply FDNE methods in practice, support consistent and informed use of the tools, and maximise the value of the project investment. The work package will also promote knowledge sharing and lay the foundation for wider adoption of FDNE across the wider electricity industry.

Measurement Quality Statement

The FDNE project outcomes will be measured using a combination of modelling, simulation, automated testing, and quantitative analysis. Measurement will primarily be based on EMT-domain simulations, where FDNE models are compared against reference models to assess accuracy, robustness, and computational performance.

The primary measurement method will be comparative EMT simulation. FDNE models derived from frequency-domain impedance data will be implemented in PSCAD and exercised under a range of predefined test conditions. Results will be benchmarked against (i) full EMT network models and (ii) conventional Thevenin equivalents to quantify the added value of FDNE. Accuracy will be assessed using time-domain and frequency-domain response comparisons. Validation will be carried out through structured case studies aligned with key use cases, including compliance testing, post-event analysis, and extreme scenario simulation. Several limitations and uncertainties are recognised in the measurement approach. FDNE models are derived from frequency scan data and therefore inherently depend on the quality, frequency range, and operating conditions used during data extraction. While multiple scenarios will be included to improve representativeness, FDNE accuracy outside the validated operating envelope may be reduced. These limitations will be explicitly documented, and the validated scope of application will be clearly defined to ensure appropriate and safe use of FDNE models.
Overall, the combination of comparative EMT simulation, benchmarked case studies, and quantitative performance metrics provides a robust and proportionate approach to measuring FDNE project outcomes, while maintaining transparency around assumptions, uncertainties, and applicability limits.

Data Quality Statement: The FDNE project uses simulation-based data generated from validated EMT network models rather than live operational measurements. The primary data consist of frequency-domain impedance and admittance matrices obtained through systematic impedance scanning of PSCAD EMT models representing AC transmission networks with integrated IBRs. These models are NESO-developed or based on recognised industry benchmarks adapted to reflect GB transmission system characteristics. Data are generated using documented and repeatable impedance scan procedures, ensuring consistency and reliability within the defined study scope. Multiple operating scenarios and IBR penetration levels are included to improve representativeness; however, the data remain scenario-dependent and do not cover all possible system configurations. Key limitations include dependence on EMT model quality, selected frequency ranges, and numerical approximations.

In line with the ENA's ENIP document, the risk rating is scored Low.
TRL Steps = 1 (2 TRL Steps)
Cost = 1 (£500,000)
Suppliers = 1 (1 supplier)
Data Assumptions = 2 (Medium)
Total = 5 (Low)

Scope

This project will develop and validate a Frequency-Dependent Network Equivalent (FDNE) capability for NESO, using a MIMO-based approach to represent frequency-aware network behaviour for EMT studies in high-IBR systems. The scope includes methodology development, tool implementation, validation against full EMT and Thevenin equivalents, integration with PSCAD, and delivery of user guidance and training materials.

The project covers application of FDNE for compliance testing, event analysis, and representative extreme scenarios, using simulated network data.

The project explicitly excludes real-time operational deployment, live system measurements, and replacement of NESO's core operational planning or control systems.

Objective(s)

The objectives of this project are:

1. To deliver an assessment of requirements and hence provide specification for FDNE model.
2. to develop the FDNE methodology and model.
3. to carry out system integration & simulation platform for FDNE development in PSCAD.
4. to provide the validation & testing of the proposed FDNE model in PSCAD.
5. to organise Knowledge Transfer events and finalise the project report for FNDE.

Consumer Vulnerability Impact Assessment

N/A

Success Criteria

Key outputs and success criteria:

> Representative PSCAD benchmark model developed
Success criterion: A complex PSCAD EMT benchmark model is completed, incorporating synchronous generators, wind and PV plants, BESS, and FACTS devices, and is demonstrably stable under steady-state and dynamic operating conditions representative of the GB transmission system.

> FDNE methodology successfully developed

Success criterion: A documented FDNE methodology is produced that defines data requirements, modelling steps, assumptions, and limitations, and can be applied consistently to derive FDNE models from frequency scan data.

> FDNE accuracy confirmed in the frequency domain
Success criterion: Magnitude and phase comparison plots show close agreement between FDNE responses and PSCAD frequency scan results across the validated frequency range, within predefined engineering tolerance margins.

> FDNE implementation operational in PSCAD
Success criterion: The FDNE module compiles without error and runs reliably within PSCAD, integrating successfully with existing EMT simulation workflows.

> Time-domain behaviour validated
Success criterion: FDNE-based simulations produce time-domain responses that are consistent with full EMT network models for flat-run, disturbance, and fault scenarios, with no spurious instability or numerical artefacts.

> Overall equivalence demonstrated against full EMT models
Success criterion: Frequency-domain results from FDNE and full EMT network models match within acceptable engineering application tolerances, demonstrating FDNE’s suitability as a replacement for conventional Thevenin equivalents in relevant studies.

Project Partners and External Funding

Project partner is University of Birmingham
No external funding

Potential for New Learning

The project will produce validated methods and insights into frequency-dependent modelling of IBR-rich systems.

> Knowledge will be shared via formal reports and industry platforms such as the ENA portal, supporting adoption across other GB networks.
> The learning will be also captured as appropriate into conference/journal papers for wider awareness and knowledge sharing.
> The main findings will help influence key internal stakeholders from NESO as well as external stakeholders (e.g. GB TOs, Developers, and OEMs)
> Verbal/written communications for purpose of project progress reporting;
> This project’s own knowledge dissemination events for wider internal/external stakeholders; > Knowledge sharing in global/regional industrial forums e.g. G-PST, CIGRE.

Scale of Project

The project spans 18 months with 1 project partner. The project consists of desk-based research, stakeholder engagement with various network licensees and international TO’s. At the end of each work package internal dissemination events will be held to ensure that the results align with the wider business.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The ideas being developed by this project are not bound to any particular geographical area, and should be applicable anywhere in

NESO’s operational area (i.e. Great Britain).

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

Project spend broken down by work package:

• WP1 - Requirements & Specification - £110,000
• WP2 – FDNE Model Development - £135,000
• WP3 - Integration & Simulation Platform - £135,000
• WP4 - Validation & Testing - £85,000
• WP5 - Knowledge Transfer, Training & Project Closure - £35,000

Total estimated project cost £500,000

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 FDNE project will develop and demonstrate a new approach for representing the wider electricity network using frequency-dependent impedance models. This innovation replaces traditional Thevenin equivalents, enabling more accurate, flexible, and rapid compliance testing and event analysis. FDNE models can be shared with users without confidentiality concerns, supporting robust inverter design and system stability. By enhancing modelling accuracy, supporting faster compliance testing, equipping NESO to manage future grid challenge, accelerating renewable energy connections, and hence facilitating GB's energy system transition.

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

n/a

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

The proposed project delivers substantial benefits to NESO and the wider electricity sector:

> Enhanced EMT Study Capability: NESO will gain the ability to conduct more efficient and scalable EMT simulations, enabling faster assessment of dynamic behaviours such as control interactions, oscillations, and rare transients. This supports proactive stability management in a high-IBR grid.
> Accelerated Compliance and Connections: FDNE models can replace bulky EMT grids for specific points, greatly speeding up generator compliance tests and model validations. This streamlines the customer connection process and reduces time-to-decision for operability assessments.

> Accuracy Without Complexity: Unlike simplified Thevenin equivalents, FDNEs preserve frequency-dependent impedance features, ensuring studies remain physically representative. This improves stakeholder confidence and reduces risk of undetected instabilities.
> Secure Model Sharing: FDNEs allow NESO to share FDNE as black-box equivalents with OEMs or developers without revealing internal system data. This facilitates collaboration on tuning and validation while safeguarding intellectual property and respecting confidentiality constraints.
> Capability Development: NESO teams will build lasting modelling expertise through tool adoption and training. Knowledge will be shared with other licensees via the ENA portal and industry events, supporting replication and broader innovation uptake.
> Future System Readiness: As IBR and converter penetration rises, FDNEs offer a modular way to simulate "rest-of-system" behaviour under novel or edge-case scenarios. This equips NESO to manage future challenges such as 100% inverter-based grids and system black start planning.

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

The methodology and tools developed through this project should be further refined and validated in alignment with practical business cases within the GB market.

The following activities are recommended for potential implementation

> Dissemination of key findings from the project to inform and influence internal stakeholders, co-shaping suitable business models and relevant industry codes within the nascent market.
> Engagement in consultations with external stakeholders in the GB to raise awareness and gather feedback on NESO's FDNE applications.

The subsequent internal stakeholders will be engaged when looking at implementing the project findings into BAU:
> Network Operability – Policy
> Networks Operability – Operability Product
> External stakeholders including but not limited to GBTOs, Developers/manufacturers, Academia, industrial forums e.g., G-PST, CIGRE and ENTSO-E.

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

Costs and Level of efforts for Implementation
> Wider knowledge dissemination, engagement/comms events (Low, ~£2k);
> Contribution to further round(s) of the NESO's Stability Pathfinder Programme and other related programme;
> Contribution to further updates of Technical Code/Commercial Codes (Medium).

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 in the format of project progress/final reports in appropriate version will be circulated to relevant Network Licenses (RNL) for purpose of awareness and guidance via ENA portal.

The RNLs will be also invited for knowledge dissemination events at different stages of this project for knowledge sharing purpose.

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. 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.

No similar innovation projects have been identified, which are related to the scope of this project. There is seen to be no duplication or overlapping with any previous projects.

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

The FDNE project will develop a new approach for representing the wider electricity network using frequency-dependent impedance models. This innovation replaces traditional Thevenin equivalents, enabling more accurate, flexible, and rapid compliance testing and event analysis. FDNE models can be shared with users without confidentiality concerns, supporting robust inverter design and system stability. The project will establish methodologies for FDNE model creation, validate their performance against original network models, and facilitate their integration into NESO's simulation and analysis platforms. The outcome will improve the customers connection journey, system security, resilience, and operational efficiency, with significant benefits for stakeholders across the electricity sector.

Notably, no similar developments have been undertaken before.

Relevant Foreground IPR

As the outcome of this project, new methodology and tools/models for FDNE will be generated.

Data Access Details

Data for this project and all other projects funded under the Network Innovation Allowance (NIA), or 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 Energy System Operator 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.neso.energy/about/innovation
3. Via our managed mailbox innovation@neso.energy

Details on the terms on which such data will be made available by National Energy System Operator can be found on our website: [Data Sharing Approach | National Energy System Operator.](#)

Please identify why the Network Licensees will not fund the project as a part 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