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 2025

Project Reference Number

NIA2_NESO118

Project Registration

Project Title

Open-Source Market Model

Project Reference Number

NIA2_NESO118

Project Licensee(s)

National Energy System Operator

Project Start

June 2025

Project Duration

1 year and 1 month

Nominated Project Contact(s)

innovation@neso.energy

Project Budget

£550,000.00

Summary

This innovative project aims to develop an open-source market model that empowers external stakeholders to conduct their own sensitivity analyses. By exclusively using data and code from the public domain, the model will complement NESO reports without replacing proprietary models and data. The project will begin with a comprehensive review of existing open-source models over three months, followed by the development of an initial prototype in six months. The final release will provide a robust and scalable model. The primary challenge lies in producing reliable results without access to commercially sensitive data, but this also presents an opportunity to showcase the potential of open-source solutions in data-driven decision-making.

Nominated Contact Email Address(es)

box.so.innovation@nationalgrid.com

Problem Being Solved

Current power dispatch and market models and data used by NESO are either commercially sensitive or provided by commercial suppliers. Even if model files from commercial tool such as BID3 or Plexos are made available for download, accessing and running them requires expensive licenses. The results are underpinned by commercially sensitive data which cannot be released. This does not allow us to share the data and models with stakeholders interested in testing their own sensitivities.

Method(s)

The Open Source Market Model project employs a structured method divided into five key work packages (WPs) to achieve its goals.

Each work package focuses on a specific aspect of the project, ensuring that tasks are completed efficiently and on schedule.
WP1 involves managing the project by creating a detailed plan with timelines and milestones, and coordinating communication among all stakeholders.
WP2 assesses open-source models by evaluating their technical abilities and community engagement to select the most suitable ones for further development.
WP3 focuses on developing an open-source model that replicates existing commercial tools while using publicly available data to make it accessible to more stakeholders.
WP4 addresses security risks by gathering information and mapping potential threats to keep sensitive data secure.
Finally, WP5 involves sharing the project's findings through workshops and detailed documentation, engaging stakeholders in understanding the model's development and security measures
In line with the ENA's ENIP document, the risk rating is scored Low.
Technology Readiness Level (TRL) change = [1]
Cost = £550k [1]
Suppliers = [1]
Data assumptions = [2]
Total = 5 (Low)

Scope

The scope of the Open Source Market Model project includes several key activities:

- The project involves assessing open-source models to ensure they meet standards for rigour, modelling capabilities, coding best practices, and documentation.
- Additionally, the project aims to develop and validate an open-source model whose results align with those from commercial tools used by NESO.

The project also involves assessing security risks related to the open-source release of NESO's models and data.
However, the scope does not cover the provision of cloud computing resources and interfaces needed to run the model in the cloud, nor does it include the numerical algorithms used by optimisers to solve mathematical optimisation problems.

Objective(s)

The project objectives are:

- Deliver a validated repository of open-source models and datasets that stakeholders can use to run their own sensitivities.
- Improve transparency and accessibility in energy planning, allowing more stakeholders to participate and contribute to the process.
- Assess and mitigate security risks associated with releasing NESO models publicly, ensuring that sensitive data remains secure while enabling broader stakeholder engagement.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

No specific impact on vulnerable consumers.

Success Criteria

The project's success will be evaluated through various key performance indicators (KPIs). These include;

- ensuring that the open-source models are accurate and reliable, matching NESO's commercial tools in cost and capacity forecasts
- effectively identifying and addressing security risks, as shown by a completed security risk assessment and mitigation report
- The project's success will be assessed by the degree of stakeholder involvement and the feedback gathered during workshops and progress meetings.

Project Partners and External Funding

Open Energy Transition will lead development of the proof-of-concept, no external funding required

Potential for New Learning

The Open-Source Market Model project aims to develop new knowledge and innovations in several key areas. Firstly, it will seek to create a validated open-source model that replicates the capabilities of NESO's commercial tools, using only public domain data and code. This project will address the issues with current models being commercially sensitive or requiring expensive licenses, making

energy planning more accessible and transparent. Additionally, the project will assess and mitigate security risks associated with releasing NESO models publicly, ensuring that sensitive data remains secure while enabling broader stakeholder engagement. The findings from the project will be shared with the industry through various channels:

- Workshops will be organised to present the validated open-source model and discuss the security risk assessment findings with stakeholders.
- Comprehensive documentation and reports detailing the model development, validation process, and security risk assessment will be provided. Any relevant information will be available on ENA Smarter Network Portal.

Scale of Project

The project spans 12 months with one project partner. The scale of the project is already the minimum viable scope to develop a proof-of-concept solution, without which such model development would not be feasible (and the learning would not take place).

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL6 Large Scale

Geographical Area

Applicable across GB (full National Transmission System)

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£550,000

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:

By developing open-source models, the project encourages collaboration and consensus among stakeholders, as these models are accessible and transparent. This openness helps build trust and ensures that all parties are aligned in their efforts to innovate and improve the energy system.
Furthermore, the project accelerates innovation by providing stakeholders with a validated model that can be used to explore new ideas and strategies for energy management. This validated model ensures that stakeholders have a reliable tool for simulating different scenarios, which can lead to more efficient and effective energy solutions. By supporting open collaboration and providing robust tools, the project helps drive the energy transition towards more sustainable and resilient systems.

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

Greatly reduce barrier to entry for stakeholders who do not have access to specialised software licenses.
One of the most immediate and impactful benefits of this initiative is the reduction of barriers to entry for stakeholders. Currently, the need to procure specific software licenses the restricted access to commercially sensitive data limit the ability of many stakeholders, particularly smaller industry players and academic institutions, to engage with and analyse our recommendations. By providing an open-source supplement, we could enable a broader range of stakeholders to participate in our Whole Energy analysis. This inclusivity aims to foster a richer, more diverse dialogue and drive innovation across the sector.
Enhanced industry participation in our Whole Energy analysis helping to co-create a future that minimises total system cost and consumer bills.
Enhanced industry participation is crucial to co-creating a future that minimises total system cost and consumer bills. By allowing stakeholders to run sensitivity analyses and explore different scenarios using our models, we facilitate a collaborative approach to network planning and infrastructure development. This collective effort could help identify the most cost-effective and efficient pathways to achieving our net-zero targets, ultimately benefiting consumers through reduced energy bills.

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

Solution applicable across the full GB Transmission system.

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

N/A

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 Open Source Market Model project seeks to introduce a novel approach by leveraging open-source tools to foster faster development and innovation within the energy sector. This project aims to demonstrate how open-source models can be effectively used to simulate complex energy systems, providing insights that were previously difficult to achieve with proprietary tools and data. By making these tools accessible, the project could enable a wider range of stakeholders to participate in the development process, thus facilitating consensus and collaboration across the industry.
If successful, the knowledge gained from this project can be applied industry-wide by showcasing the benefits of open-source methodologies in enhancing transparency and adaptability. Stakeholders can use the models to test and implement new energy strategies, leading to improved system performance and sustainability. By promoting collaborative innovation, the project aims to set a precedent for how open-source tools can drive transformative changes in energy management and planning.

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.

The Open-Source Market Model project is a first-of-its-kind initiative in Great Britain. It highlights that this project represents the first time an open-source model will be released alongside flagship network planning documents. This marks a significant departure from traditional, closed-source methods

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

If successful the outputs of this project would represent the first time in Great Britain that an open-source model will be released alongside flagship network planning documents. It would mark a significant departure from traditional, closed-source methods. The use of open-source simulation models in this context is an innovative application of technology. It leverages existing open-source communities and tools to ensure the models are robust and well-supported. The project aims to replace proprietary and commercially sensitive datasets with open alternatives, ensuring that the quality of results is not compromised while enhancing transparency and accessibility

Relevant Foreground IPR

Open Source Market Model
Final innovation project report outlining methods and findings from developing the model

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:
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.
Via our Innovation website at https://www.nationalgrideso.com/future-energy/innovation
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

High Initial Uncertainty: The initial costs associated with developing, releasing, and maintaining open-source models, along with the uncertainty of their success, make it impractical to fund through regular business activities.
Need for Rigorous Quality Assurance: The extensive quality assurance, calibration, and functionality assessments required to ensure the models' accuracy and reliability involve significant resources and expertise that go beyond typical business activities.

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

Commercial Risk:
The initial costs associated with developing, releasing, and maintaining open-source models, along with the uncertainty of their success, make it impractical to fund through regular business activities.
Technological Risks:
Model Accuracy and Reliability: Ensuring that the open-source models are as accurate and reliable as their proprietary counterparts requires extensive calibration and ongoing updates.
Data Integration: Sourcing and integrating appropriate new data to replace proprietary and commercially sensitive datasets can be complex and resource-intensive.
Operational Risks:
User Training and Misinterpretation: Developing comprehensive documentation and conducting training workshops/webinars to prevent the wrong usage or misinterpretation of the models is essential to their successful adoption.
Unproven Approach: There is a chance that this novel approach may encounter unforeseen challenges, making it less effective or more complex than anticipated.
User Acceptance: Stakeholders may be hesitant to adopt open-source models due to concerns over accuracy, reliability, and support compared to traditional, proprietary models.

This project has been approved by a senior member of staff

☑ Yes