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

May 2025

Project Reference Number

NIA2_NESO099

Project Registration

Project Title

AI First design discovery and prototyping

Project Reference Number

NIA2_NESO099

Project Licensee(s)

National Energy System Operator

Project Start

April 2025

Project Duration

0 years and 3 months

Nominated Project Contact(s)

innovation@nationalenergyso.com

Project Budget

£400,000.00

Summary

This project is a design-first exploration of how AI can transform strategic energy planning and control room operations. It takes a novel approach, thinking through how AI can power digital experiences in ways not previously explored in these critical domains.
The initiative will prototype two strategic use cases:

- Vanguard – AI-driven strategic energy planning, leveraging AI to plan future energy system.
- Volta – AI in the control room, augmenting control room operations and decision support.

Using a design thinking-led approach, this work will envision and prototype an end-to-end AI-powered experience, demonstrating its potential impact. By integrating AI into these areas in a truly innovative way, the project pushes boundaries and redefines how digital intelligence supports energy systems.

Nominated Contact Email Address(es)

box.so.innovation@nationalgrid.com

Problem Being Solved

The project aims to tackle the following issues:

- **Envisioning AI's Transformative Potential:** NESO needs to explore and envision how AI can fundamentally transform the way it builds digital products, delivers services, and operates core functions. This project will focus on identifying and demonstrating potential use cases through prototyping and end-to-end visioning.
- **Uncharted Territory in AI Application:** This project addresses the novelty and untested nature of applying AI in strategic energy planning and control room operations, aiming to mitigate risks and ensure success for implementation by testing AI application through prototyping.
- **Risk Mitigation for Future Investments:** Without a clear understanding of AI's potential and the necessary preparations, future AI initiatives may face significant risks. This project aims to de-risk future investments by providing valuable insights and prototypes that illustrate AI's transformative potential, rather than developing actual AI solutions.

Method(s)

The methodology for the project:
The project will follow an iterative prototyping approach to develop key strategic AI programs. Using Figma prototypes, the team will integrate feedback from interviews and workshops to refine and validate use cases, ensuring AI-driven solutions enhance NESO's strategic energy planning and control room operations.
To achieve this, the project will conduct two parallel design thinking sprints, each following a structured, iterative approach:
Multiple ideation sessions to generate and refine innovative AI use cases.
Wireframing and validation, incorporating stakeholder feedback loops to ensure alignment and feasibility.
Prototype development, translating validated ideas into functional models.
Review and iteration, refining the prototypes based on testing insights.
The final prototypes will demonstrate AI's transformative potential, offering tangible, future-ready solutions for strategic energy planning and control room optimization.

In line with the ENA's ENIP document, the risk rating is scored Low.
Technology Readiness Level (TRL) change = [1]
Cost = [1]
Suppliers = [1]
Data assumptions = [1]
Total = 5 (low)

Scope

This project will focus on identifying and demonstrating potential AI use cases through prototyping and end-to-end visioning, so NESO can potentially leverage AI to enhance its operations, build digital products, and deliver services

Objective(s)

- To explore and envision AI's transformative potential across two key strategic AI initiatives.
- Develop a prototype for Vanguard – AI-driven strategic energy planning, leveraging AI to plan future energy system.
- Develop a prototype for Volta – AI in the control room, augmenting control room operations and decision support.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

This project has been assessed as having a neutral impact on customers in vulnerable situations because it is a transmission project.

Success Criteria

- **Actionable AI Insights for how AI will drive innovation and change** that helps NESO ensure that its AI transformation efforts are focused, cohesive, and aligned with its new role and AI ambitions, ultimately driving innovation in how NESO uses AI.
- **Demonstration of AI Possibilities:** Effective demonstration of AI capabilities through workshops and prototypes, showcasing how AI can transform NESO's operations, digital products, and service delivery.

Project Partners and External Funding

Project Partner: EY . No external funding.

Potential for New Learning

The development of prototypes will provide a vision for how AI can shape future services in Strategic Energy Planning and to augment control room operations to envision the control room of the future.
All outputs developed will be published and shared externally through the Smarter Networks Portal.

Scale of Project

The project spans 10 weeks with one project partner

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

Project has a geographical scope of Great Britain.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£400,000

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:

Through the development of prototypes and iterative testing, the project will seek to demonstrate the practical application of AI to real world solutions, accelerating its adoption within NESO. This hands-on approach will provide valuable insights into the implementation challenges and opportunities, ensuring that AI technologies are effectively integrated into NESO's operations and core services.

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

Given the stage of this project, it is not possible to quantify the expected cost benefits that can be delivered directly by accelerating our adoption of AI. This project may deliver the insights that can then be used to model a full business case and cost benefit analysis which can be presented as learning from this project and can help the industry learn how to model the cost benefit of AI.

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

All network licensees will benefit from the learnings of this work in their own efforts at taking a transformative AI first approach to the challenges being faced in the sector.

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

The project will develop prototypes for Vota and Vanguard which will inform the potential approach for delivering the final products. Therefore, it isn't possible to calculate costs at this stage but the outputs of the project may facilitate a high level calculation of this cost.

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 learning generated will be highly valuable for relevant Network Licenses, as it will provide insights into how AI can be effectively applied to transform the delivery of products, services, and operations in the energy sector.
The AI Transformation Discovery Project includes the development of specific prototypes for strategic energy planning and control room operations. These prototypes will serve as practical demonstrations of how AI can be applied to real world scenarios. By learning from these prototypes, relevant Network Licenses can gain valuable insights into how AI can transform strategic energy planning and control room operations.

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.

We will continue to carry out due diligence through the market discovery work as part of this project to ensure there is not duplication. We do not believe there to be any duplicate project out there as we start this project but will take into account the learnings from any projects which are found during the project.

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

As part of this Discovery project, we will prototype across strategic areas where we believe AI can be truly transformative. These prototypes will demonstrate, rather than simply theorise, how AI can enhance NESO's delivery of services and system operations functions in new ways at a 2030 pace.

Relevant Foreground IPR

AI first design vision showcased through two prototypes for strategic energy planning and system operations

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

Technological Maturity: The capabilities of AI and ML are still evolving, and their application to complex energy systems is relatively new. This poses a risk as the technology may not yet be fully reliable or optimized for all scenarios.
Integration Complexity: Integrating AI into existing energy infrastructure requires significant changes in processes, technology, and governance and so it is important to develop and prototype these transformative applications of AI before committing to their development as part of business as usual.

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

The project represents a high-risk innovation initiative rather than an incremental improvement to existing processes.
This project is exploring unproven applications of AI in strategic energy planning and control room operations—areas where AI has not yet been fully leveraged. While the potential for transformation is significant, there is also a real possibility that AI may not deliver the expected impact on digital experiences and services in these domains.
Given this uncertainty and risk, the project is being treated as an innovation-led exploration rather than a BAU investment. It requires an experimental, design-driven approach, allowing for rapid prototyping, iteration, and learning before determining whether AI can truly drive meaningful change in these core areas.

This project has been approved by a senior member of staff

☑ Yes