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

Feb 2025

Project Reference Number

NIA2_NESO106

Project Registration

Project Title

Volta – Qualitative Benchmarking and Impact Analysis for Future Dispatching Tools and Capabilities

Project Reference Number

NIA2_NESO106

Project Licensee(s)

National Energy System Operator

Project Start

March 2025

Project Duration

0 years and 7 months

Nominated Project Contact(s)

innovation@nationalenergyso.com

Project Budget

£600,000.00

Summary

The Volta programme is an innovation digitisation programme focused on using machine learning & AI for control room operations to optimise forecasting and dispatch decisions.

This project is part of the Volta program and is a continuation of two projects; the Advanced Dispatch Optimisation (ADO) NIA2_NGESO0013 project, where a vision for an efficient dispatch process that is fit for purpose for the energy system of the future and the Dispatch Optimiser Transformation (ADO2/DOT) NIA2_NGESO044 project which further developed the ADO recommendations and analysed the gaps between the current and future state.

This project will deliver two specific work packages within the Volta Roadmap:

- A qualitative benchmarking comparison.
- A wider impact assessment for potential market changes

The collaborative approach of this project will involve multiple parties across Europe and potentially worldwide.

Preceding Projects

NIA2_NGESO0013 - Advanced Dispatch Optimisation

NIA2_NGESO044 - Dispatch Optimiser Transformation (DOT)

Third Party Collaborators

AFRY Management Consulting Ltd

Nominated Contact Email Address(es)

Innovation@neso.energy

Problem Being Solved

The Energy market has changed radically and continues to evolve over the coming decades. The portfolio of connected generation resources has changed significantly over the past 20 years to include a large number of small units and battery storage connected at both transmission and distribution levels. There has also been an increase in demand flexibility services being offered into the electricity market. These flexible demand resources, combined with a significant amount of 'invisible' embedded generation, present challenges when forecasting the national demand which used for scheduling, also changes in the generation portfolio mix, have significantly complicated optimisation and balancing processes.

NESO must now consider a much wider range of possible scenarios using advanced optimisation tool when analysing the security of the transmission system and when scheduling units to provide operational reserves and frequency control.

These significant changes on the electricity system are accompanied by reforms to the electricity markets. The outcome of the current REMA process will have an impact on the choice of capabilities, processes, and tools for the system operator.

NESO plays a central role within the energy industry, looking at what the future may bring and how the market needs to adapt to deliver a greener future. We are facilitating the journey to net zero by collaborating with others, sharing insights and analysis, and running world-first innovation projects.

In developing the Volta programme and internal Future Control Strategy (FCS) workstream there has, to date, been limited exploration of academic insight and global best practice, beyond NESO and our direct operational partners.

Method(s)

The qualitative benchmarking project will focus on following Work packages:

Generalised approach to Benchmarking WP-0:

Initial assessment of research available and data required to meet Volta program objectives, including a reviewof ADO, ADO2, and progress on the Volta program 'Grand optimiser design philosophy' and 'Value and feasibility analysis for input data models.

WP-0 will begin with an orientation phase and project approach to WP-0 will be to conduct a thorough review of documentation and conduct conversations with NESO colleagues working in and around the Volta program. Also, conversations with knowledgeable resources external to NESO will be conducted as appropriate. Project will collaborate with NESO to create a comprehensive list of documents and conversational resources. A report will be provided at the end of WP-0 to summarise our findings and our perspective on the Volta program status.

Generalised approach to Benchmarking WP-1:

Qualitative benchmarking comparison of relevant global market practices and standards with identification of learnings, cautions, and best practices.

WP-1 will begin by defining the basis for selection of comparator markets, starting with a definition of the relevant stages and aspects of system operation and the responsibilities in comparator markets. Parties will be selected based on their experience, market design, and the degree to which they face similar challenges to NESO.. In addition to the Transmission System Operator benchmarking exercise, there is the potential to include some providers of the tools and systems in collaborative discussion.

Then project will focus on discovery and documentation of the tools, practices, and processes adopted or being considered by system operators who experience equivalent challenges to NESO or are instructional to NESO in some way. special attention will be given to the critical design features of alternative market designs which influence the tools for system operation.

Generalised approach to Benchmarking WP-2:

Bi-directional assessment of market design on Volta program choices, and of Volta program choices on market design, tailored to the progress of REMA at the point of delivery, and designed to be easily updated as the GB market design decisions are taken.

WP-2 will map and explain dependencies between key design elements and alternative market design decisions. Project will draw our results from WP-1 into WP-2 to provide NESO with a clear illustration of instances where options (in tooling, process or market design) have resulted in learnings, cautions, or best practices that NESO may take forward into the Volta program decision making.

Scope

WP-0 Overview and point-in-time assessment report including:

- Post-completion assessment of ADO (NIA2_NGESO0013) and ADO2 (NIA2_NGESO044)
- Point in time assessment on the Volta program 'Grand optimiser design philosophy' (NIA2_NESO107) and 'Value and feasibility analysis for input data models' (NIA2_NESO108) to understand how to future proof the work being undertaken by the Volta program
- Conversations and interviews with NESO team members and stakeholders

WP-1 Comparators report including:

- Benchmarking approach and list of comparator System Operators (SOs), input sources, and contacts
- Summary of learnings, cautions, and best practices for input data models and optimisers
- Comparative analysis of capabilities, processes, and tools used by comparator SOs
- Perspective on how challenges relevant to NESO have been faced by other SOs.
- Interpretation of findings and recommendations to take forward into the Volta program

WP-2: Scenario and impact analysis report including:

- Description of market change scenarios and the status of REMA
- Analysis of REMA and potential market changes on the Volta program
- Analysis of the potential impact of Volta program technology choices on market design
- A clear discussion of the relationship between the Volta program choices and market changes under each relevant market design scenario
- Interpretation of opportunities and cautions and recommendations to take forward into the Volta program and potentially the REMA process

Develop a comprehensive joint roadmap, integrating insights from Volta's main internal stakeholders, including the Balancing Programme and the Future Control Room Design Team. This deliverable will involve reviewing and aligning their respective roadmaps, incorporating lessons learned from other System Operators (SOs), and prioritizing collaboration across teams. As a precursor, additional support may be required to articulate a detailed and actionable roadmap for the Future Control Team. The finalised joint roadmap will outline key milestones and strategic objectives spanning the 2025–2030 timeline.

Objective(s)

- Delivery of a Point-in-time assessment report including assessment of ADO and ADO2
- Documented benchmarking approach and list of System Operators (SOs), input sources and contacts, as well as a summary of learning, cautions and best practices used by other Sos
- Impact analysis looking into market change scenarios and how this will impact the wider Volta program as it moves towards maturity, as well as comparisons of capabilities, processes, and tools used by comparator System Operators (SOs).

Consumer Vulnerability Impact Assessment

This project has been assessed as having a neutral impact on customers in vulnerable situations because the outputs of this project are focused on providing improvements to the real time operation of the GB electricity network.

Success Criteria

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

- The project delivers against objectives, timescales and budgets as defined in the proposal.
- Review and validate the foundational assumptions of the Volta Program to confirm that it can meet its goals for optimised electricity dispatch and system reliability in line with NESO and REMA objectives.
- Identified insights, risks, and standards that can improve the program's adaptability and technical design, especially for

interoperability.

- The project will assess the interaction between REMA's market design choices and the Volta Program's technical decisions to reveal key opportunities and constraints that can guide program alignment with Great Britain's evolving electricity market.
- Offer insights into potential standards that the Volta Program can adopt.

Project Partners and External Funding

The project partner is AFRY. No external funding

Potential for New Learning

The project will help in developing standardised processes and technologies that are interoperable across different regions. This will promote greater efficiency and consistency in energy dispatch and optimisation, supporting future collaborations

Dissemination of Learning:

Reports and Updates: The project will deliver detailed reports following the conclusion of each work package, including an overview and point-in-time assessment report, comparators report, and scenario and impact analysis report to be published externally.

Stakeholder Engagement: Regular updates and detailed final reports will be provided to NESO and other stakeholders, supporting agile decision-making and keeping stakeholders informed on progress, risks, and emerging opportunities.

Public Accessibility: All deliverables will be made accessible to Ofgem and the public, ensuring transparency and public accountability via ENA Smarter Network Portal.

Scale of Project

A desk-based research project will be conducted over a 20 weeks period by the AFRY in close collaboration with the NESO's SMEs, business analysts and other SOs across the world.

Technology Readiness at Start

TRL1 Basic Principles

Technology Readiness at End

TRL2 Invention and Research

Geographical Area

Will be based upon the GB NESO area of operations

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

£600,000

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 project aims at providing standards and insights into the work of the Volta programme, which aims at modernising and improving the current dispatch operations and processes. The benchmarking against what has been done by other network operators, and understanding market changes, will inform the strategic direction of the Volta programme to meet the objective of modernising balancing operations.

Better balancing tools will allow for better system management, reducing costs, enhancing optimisation through more accurate forecasting and situational awareness, and enabling further proliferation of renewables as a result.

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

This is a research project and will not have a cost benefit as a result.

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

This will be applicable across networks and operators, as the benchmarking exercise will allow for better understanding of current processes and methods.

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

This is a research project and as such, there will be no costs of rolling out the method across GB

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

This benchmarking exercise will inform best practice across network licensees and allow them to compare their own practices with that identified in the benchmarking exercise.

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.

This project is unique to NESO, as it will inform development of balancing technologies and will provide a roadmap that will allow for a forward-looking approach to be taken, minimising the risk of duplication through effective planning.

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

This is a project aimed at analysing and reporting the operational solutions and strategic direction of relevant System Operator (SO) counterparts across the globe, which operate in a variety of markets facing comparable challenges to NESO.

NESO is Great Britain's (GB's) primary electricity SO and needs to develop an understanding of how other SOs operate and how this can translate to the GB system. This activity has not been done before, and there is no guarantee that there are useful lessons learned, therefore, innovation funding is being used in this instance.

Relevant Foreground IPR

Foreground IPR that will be generated throughout the project include the reports included in the scope of the project, such as the benchmarking and impact analysis 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 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@nationalenergyso.com

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

The outcomes of this project are not guarantees, and there are unknown unknowns that this project hopes to determine. The risk associated with this makes the project suited to innovation funding more than BAU 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

The project hopes to inform the development of low-TRL activities and methods, therefore innovation funding is more suitable for undertaking the research that will inform the direction of further work.

This project has been approved by a senior member of staff

☑ Yes