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.
Network Licensees must publish the required Project Progress information on the Smarter Networks Portal by 31st July 2014 and each year thereafter. The Network Licensee(s) must publish Project Progress information for each NIA Project that has developed new learning in the preceding relevant year.

NIA Project Annual Progress Report Document

Date of Submission

Jul 2025

Project Reference Number

NIA2_NESO108

Project Progress

Project Title

Volta – Value and Feasibility Analysis for Input Data Models

Project Reference Number

NIA2_NESO108

Funding Licensee(s)

NESO - National Energy System Operator

Project Start Date

March 2025

Project Duration

0 years and 5 months

Nominated Project Contact(s)

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Scope

The analysis will cover the following tasks:

1. Data Model Assessment – evaluate proposed adaptive input data while identifying critical data gaps.

2. Feasibility Analysis – assess how the models could be implemented in the control room.

3. Value Analysis – analyse the potential benefits to operational efficiency, system optimization, cost savings, and compare against current practices and alternative solutions.

4. Recommendations and Roadmap – provide actionable recommendations and a detailed implementation plan.

Objectives

The project will:

· Evaluate the proposed adaptive input data model to determine its technical soundness and alignment with our operational requirements.

· Assess the feasibility of implementing the input data model in our operational environment.

· Determine the potential value and benefits of the adaptive input data model.

· Provide actionable recommendations and develop a roadmap for implementation.

Success Criteria

If the objectives are met, the project can be deemed successful if:

· Provides a summary of operational needs and delivers plan for the project

· Types of models are identified, input data defined, granularity of models, potential routes to integration are identified and defined. Justification of coding language included. Findings for each of the proposed activities are presented at workshop with key project stakeholders.

· An understanding of where the input data is adequate to overcome challenges and gaps in current tools and processes within NESO

· An understanding of the feasibility of using adaptive models including considerations of: retraining frequency (computational cost and trade-offs between compute equipment cost and speed), frequency of output update, model granularity (temporal and spatial). Report will discuss the potential value of the use of adaptive models including accuracy of model using co-defined metrics, model robustness to data inputs, and how the AI will be made explainable. Report will include exec summary of <2 pages.

· Actionable recommendations on the feasibility of implementing adaptive models in NESO's operations

Performance Compared to the Original Project Aims, Objectives and Success Criteria

National Energy System Operator ("NESO") has endeavoured to prepare the published report ("Report") in respect of VOLTA – Value and Feasibility Analysis for Input Data Models , NIA2_NESO108 ("Project") in a manner which is, as far as possible, objective, using information collected and compiled by NESO and its Project partners ("Publishers"). Any intellectual property rights developed in the course of the Project and used in the Report shall be owned by the Publishers (as agreed between NESO and the Project partners).

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Required Modifications to the Planned Approach During the Course of the Project

Background information

The Volta VFA (Value Feasibility Analysis) project is part of the Volta Programme, which aims at delivering AI solutions for the NESO Control Room to enable the energy transition by optimising the usage of the available generation (including renewables, batteries and small generators) in a secure and economic manner. Currently, the Forecasting Team at NESO prepare 30 minute resolution forecasts of National Demand, which are shared with the control room and manually updated throughout the day. This project is assessing the feasibility and value of developing adaptive models, which can employ machine learning methods to update forecasts based on real time data. The definition of an adaptive model is discussed below.

Problem statement

The Volta Programme is developing a cutting-edge optimisation strategy for balancing supply and demand in real time. The optimiser requires compatible inputs relating to forecasts, network status, and system requirements. Currently, the system operates using single point forecasts, with significant human input and intervention. In a clean power world, with an increase in intermittent renewables and the number of distributed assets, we will need adaptive, probabilistic forecasts to feed the optimiser. This project assesses the feasibility and value of such models.

Progress against stated project plan

The project is underway and remains aligned with the original aims, objectives, and success criteria. The activities related to the

current state & delivery plan, solution design, and input data assessment have all been completed.

Deliverable 1: Current state & delivery plan
“Adaptive models” were defined, based on Volta’s requirements. Ways of working defined, NESO’s requirements and current ways of working were described and included in the following deliverables.

Deliverable 2: Solution Design
Two layers for the adpative models are defined: forecasting layer and the enrichment layer. In the forecasting layer sits models for demand, generation, and interconnectors. In the enrichment layer, the transmission model and the system requirements sit. Coherence across models is discussed (i.e. local vs global models), alongside model granularity. Models are categorised into two types: weather-driven and market-driven. The existing NESO capability is documented. An overview of the vision for each model type is shared for demand, generation, interconnectors, transmission, and system requirements. The design of the PoCs is outlined.

Deliverable 3: Input Data Model Assessment
The Data Model Assessment has been delivered and considers which data is needed for the adaptive models, their suitability, as well as the priority and availability of these datasets. Data challenges are highlighted, and opportunities offered by new data sets are proposed.

Deliverable 4: PoCs (ongoing)
The project will deliver Proof of Concept (PoC) models to showcase feasibility of real-time forecasting models. The PoC, models being built focus on forecasting inputs: generation, demand, and interconnectors.

The PoC build is underway, which aims to assess the most appropriate mechanism by which to build the model to ensure cohesiveness across multiple forecasting regimes.

Deliverable 5: Feasibility and Value Analysis report
This is due to be delivered this week.

Deliverable 6: Recommendations and roadmap report.
An actionable roadmap for implementation is forthcoming this month.

Lessons Learnt for Future Projects

The lessons learnt at this stage are:

- Data requests for projects of this length can be challenging if the relevant data is not publicly available. Mitigation strategies such as early data access requests, utilising data already in DAP, minimising data requests to that necessary for the case study / minimal viable product

Note: The following sections are only required for those projects which have been completed since 1st April 2013, or since the previous Project Progress information was reported.

The Outcomes of the Project

The project is ongoing. The outcomes to date include:

- The differentiation between adaptive inputs into two categories: the forecasting layer and the enrichment layer. The forecasting layer includes adaptive models, which utilise machine learning to forecast inputs required for decision making, such as generation, demand and interconnector flow. The enrichment layer includes the system requirements and the model of the transmission system, which it is suggested could be rule-based models.
- The data input assessment model identifies the necessity for adaptive input models. It highlights data streams which, if enhanced, could benefit future adaptive input models.

Data Access

Details on how network or consumption data arising in the course of NIA funded projects can be requested by interested parties, and the terms on which such data will be made available by NESO can be found in our publicly available “Data sharing policy related to NIA projects (and formerly NIC)” and Innovation | National Energy System Operator.

National Energy System Operator already publishes much of the data arising from our NIA projects at www.smarternetworks.org. You may wish to check this website before making an application under this policy, in case the data which you are seeking has already been published.

Foreground IPR

The following outcomes are expected to be delivered by this project:

- Proof of concept models to demonstrate feasibility of adaptive real-time forecast models for generation, demand, and interconnectors (in progress)
- Report on data input quality (delivered)
- Report on adaptive input model value creation (in progress)
- Roadmap detailing next steps on integrating adaptive input models into the control room through Votla (in progress)