

NIA Project Annual Progress Report Document

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Jul 2023

Project Reference Number

NIA2_NGESO038

Project Progress

Project Title

Whole Energy System Network Planning Review

Project Reference Number

NIA2_NGESO038

Project Start Date

March 2023

Project Duration

0 years and 5 months

Nominated Project Contact(s)

Robert Gibson

Scope

The purpose of this project is to understand what the different options are for undertaking whole energy system planning across multiple energy vectors, as well as to establish the principles of whole energy network planning.

Activities will include:

Research and analysis: Undertaking desk-based research seeking international evidence in regulation, project innovation, and academia as the basis for research into the best practice on whole energy system analysis and design – informing draft use cases and an initial set of principles for whole energy system planning.

Stakeholder Workshops: Engagement with a range of sector representatives to test and enhance use cases. Exploring the synergies that can be obtained in the cross-sector management and delivery of energy projects, to enable the energy transition efficiently and economically.

Analysis and Reporting: Updated use cases and identification of trade-offs in the decision-making process and a refined principles for the analysis. Also, to include gap analysis in current evidence base for optimisation across vectors and technologies, and recommendations for ESO to close gaps going forward and position the FSO role for maximum impact and efficiency. Delivery in the form of report.

Objectives

The primary objective of this project is to gain an understanding on the options available for undertaking whole energy analysis. This is supported by:

1. Delivery of results from desktop research into what is already done
2. Stakeholder engagement effectively undertaken throughout the project
3. Delivery of findings through a cohesive, publicly shareable, report

Success Criteria

This project will be successful if there is an established understanding of what options there are for undertaking network analysis across multiple energy vectors. This understanding should be built on a foundation of research and engaging relevant stakeholders.

This will take the form of feasibility study report that contains an overview of best practice on whole energy system analysis and design with:

- Use cases for typical whole systems optimisation problems;
- Proposed principles for whole energy system coordination/optimisation by the FSO;
- Defined gaps in evidence for the full spectrum of technologies/solutions to be considered;
- Recommendations regarding future projects to expand the evidence base for whole energy system coordination.

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

National Grid Electricity System Operator ("NGESO") has endeavoured to prepare the published report ("Report") in respect of Whole Energy System Network Planning Review, NIA2_NGESO038 ("Project") in a manner which is, as far as possible, objective, using information collected and compiled by NG 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 NG and the Project partners).

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Project Overview

The purpose of this project is to understand what the different options are for undertaking whole energy system planning across multiple energy vectors, as well as to establish the principles of whole energy network planning.

This project seeks to build this understanding through research and analysis of existing best practices, tested through stakeholder engagement, to deliver an actionable set of use cases and principles for the ESO to evolve into the FSO.

Project Plan

The project is being delivered through a multiphase approach:

Phase 1: Desk-based study focusing on whole energy system analysis. The outcomes from this phase are expected to be draft use cases of typical whole energy system optimisation problems that the FSO will need to consider. An initial view of the principles of whole energy system coordination, to be tested with stakeholders, that would maximise synergies across vectors and deliver the most efficient and economic outcome for UK plc.

Phase 2: Stakeholder engagement in order for the project to receive feedback on the draft use cases and principles, as well as to collect cross-industry perspectives of the opportunities and challenges associated with whole energy system analysis. This phase also included an academic review of the use cases and the principles by Birmingham University.

Phase 3: Finalisation of the use cases and principles, according to stakeholders' feedback. In addition, phase 3 will define gaps in evidence for the full spectrum of technologies/solutions to be considered; Recommendations regarding future projects to expand the evidence base for whole energy system coordination

Project Activities

The project is planned to be completed by July 2023. The completion of each phase reflects one milestone for the project.

- Phase 1 milestone: Completion of draft use cases and principles
- Phase 2 milestone: ENA workshop
- Phase 3 milestone: Final Report

Phase 1 has been completed, draft use cases and principles have been developed following a series of workshops between the ESO and DNV. During these workshops the draft use cases were analysed. The ESO team provided feedback on the context of the use cases and recommended improvements to the narrative of the use cases. In addition, the draft approach to the principles was analysed.

The main outputs of these workshops were:

- Draft use cases that reflect the key whole energy system co-optimisation problems that the ESO is already considering
- Draft approach of the principles that should be further tested with ESO stakeholders

Phase 2 is in progress and is expected to be completed by 15 June 2023. Two stakeholder engagement sessions have taken place: the first session with the Office of Gas and Electricity Markets, supporting the Gas and Electricity Markets Authority (Ofgem) and the Department for Energy Security and Net Zero (DESNZ) and the second session with National Gas Transmission (NGT). Feedback and comments from these sessions have been incorporated into the updated use cases and principles.

A final engagement will take place to complete Phase 2 and this will include a workshop with ENA members on 12th of June 2023.

Phase 3 is yet to commence; it will begin once Phase 2 is completed on 15 June 2023. The final report will be delivered by 15 July 2023.

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

No modifications to the planned approach during the course of the project took place between March 2023 and June 2023.

Lessons Learnt for Future Projects

1. **Literature review evidence:** although this project has not been completed yet, there have been several lessons identified for future projects. The literature review on whole energy system optimisation problems is limited, especially with regard to network planning. This learning will be further analysed in the final report outcomes (i.e., Defined gaps in evidence for the full spectrum of technologies/solutions to be considered; Recommendations regarding future projects to expand the evidence base for whole energy system coordination.)
2. **Effectiveness of stakeholder engagement:** input from ESO teams and ESO stakeholders (Ofgem, DESNZ, NGT) has been particularly useful to validate the approach on the use cases and the role of the FSO with regard to whole energy system optimization problems. After every workshop, the delivery team collected the feedback from stakeholders and made updates to the use cases. Stakeholder feedback has been particularly useful so that use cases reflect cross-vector challenges and synergies.

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

Interim project outcomes

Phase 1 was completed with the development of the draft use cases. Some initial outcomes of this phase are:

- FSO role expands to new directions (e.g., whole system planning, advisory role to Ofgem /DESNZ) that require co-ordination and collaboration with multiple energy vectors.
- GB energy industry will face new challenges related to whole energy system network planning and infrastructure. The conundrum for the FSO and GB energy industry will be to juggle energy vectors to find the balance between Net Zero targets, costs, efficiency, speed of delivery, and potential environmental impact of the solution.

Phase 2 is ongoing. The main outcomes of this phase so far are:

- Project Archetype use cases have been confirmed to reasonably cover the spectrum of whole energy system co-optimisation problems and are not missing anything significant.
- There is a common understanding and consensus across stakeholders on use cases.
- Stakeholders realise the need for coordination and collaboration when it comes to whole energy system planning.

Next steps

Next steps include the ENA workshop and the completion of Phase 3. The project will provide recommendations regarding future projects to expand the evidence base for whole energy system coordination and will perform a gap analysis in evidence for the full spectrum of technologies/solutions to be considered.

This project will be considered to be successful if there is an established understanding of the options available for undertaking network analysis across multiple energy vectors. This understanding should be built on a strong foundation of research and relevant stakeholder engagement.

Based on the stakeholder feedback to date, this first criterion has been achieved. The engagement sessions with Ofgem, DESNZ and NGT have been very insightful and have confirmed that key stakeholders are aligned when considering the whole energy system optimisation problems.

Further outcomes will be delivered in Phase 3, in line with the project plan and method.

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 National Grid can be found in our publicly available “Data sharing policy related to NIC/NIA projects” and www.nationalgrideso.com/innovation.

National Grid Electricity System Operator already publishes much of the data arising from our NIC/NIA/SIF projects on the Smarter Networks Portal (www.smarternetworks.org) and National Grid ESO Data Portal (data.nationalgrideso.com). You may wish to check these websites before making an application under this policy, in case the data which you are seeking has already been published.

Foreground IPR

A feasibility study report that contains an overview of best practice on whole energy system analysis and design with:

- Use cases for typical whole systems optimisation problems;
- Proposed principles for whole energy system coordination/optimisation by the FSO;
- Defined gaps in evidence for the full spectrum of technologies/solutions to be considered;
- Recommendations regarding future projects to expand the evidence base for whole energy system coordination.

All relevant reports will be published on the Smarter Networks Portal when available.