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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 2022

Project Reference Number

NIA2_NGET0002

Project Progress

Project Title

Role and value of electrolysers in low-carbon GB energy system

Project Reference Number

NIA2_NGET0002

Funding Licensee(s)

National Grid - Gas Transmission (GB wide)

Project Start Date

February 2022

Project Duration

1 year and 3 months

Nominated Project Contact(s)

Atia Adrees (box.NG.ETInnovation@nationalgrid.com)

Scope

Task 1 [M1, M10 and M12]: Review of long-term scenarios for the UK

Subtask 1.1 [M1]: This activity will involve selecting a set of credible future development scenarios used in the analysis considering a range of scenarios from the CCC (including CCC sixth Carbon budget, the climate change risk assessment), BEIS (the climate change report just published), and National Grid FES to achieve net-zero 2050 targets.

Deliverable 1 [M1]: Report on set of decarbonisation scenarios for simulation studies.

Task 2 [M2-M4]: Update of the topology and parameters of the integrated model for electricity transmission planning

The objective of this task is to update the current model's topology and parameters against the selected set of scenarios.

Deliverable 2 [M4]: Report on integrated whole-system model for optimisation studies

Task 3 [M3-M11]: Optimal portfolio and system implications of Power-to-Gas under different scenarios

This task aims to study the system benefits of electrolysers from the whole system perspective with the primary focus on electricity transmission network and system balancing, while also identifying the infrastructure needed to support the transport of hydrogen and the requirement for hydrogen storage.

Subtask 3.1 [M4-M9]: System implications of electrolysers with focus on its impact on electricity transmission operation and development

The benefits and system impact of electrolysers across the whole-energy system will be quantified by comparing the modelling results for a system with and without electrolysers. The analysis will also include assessment of the optimal capacity, technology, and locations of electrolysers under different scenarios developed in Task 1 and using electrolysers for network congestion management to reduce network constraints and associated costs and need for network investment.

Subtask 3.2 [M7-M10]: Role and value of electrolysers in the context of ancillary services

The analysis will be conducted by enhancing the Imperial advanced frequency-secured Stochastic Unit Commitment (SUC) model, considering renewable generation uncertainty while ensuring supply security and frequency stability, taking into account the largest infeed loss and reduction in system inertia. The synergies and conflict between management of transmission network constraints and providing balancing services by electrolysers will be investigated.

Subtask 3.3 [M8-M11]: Transport of hydrogen and need for hydrogen storage

This task will investigate the feasibility of hydrogen transmission infrastructure and existing gas networks at various pressure tiers (i.e. high, medium and low pressure) to transport hydrogen to end user.

Deliverable 3 [M13]: Report on the benefits of optimal portfolio and system implications of electrolysers under different scenarios.

Task 4 [M9-M15]: Sensitivity studies

A range of sensitivity studies will be performed to analyse conditions that can affect the deployment of the electrolysers and, consequently, their system implications.

Deliverable 4 [M14]: Report on the drivers for the deployment of electrolysers and their whole system implications

Deliverable 5 [M15]: Integrated Electricity planning tool and user guide documents and demonstration.

Objectives

The main objective of this work is to identify the optimal locations for large-scale electrolysers to reduce system reinforcement and operational costs and quantify the benefits of multi-vector approach to reduce future network costs.

Success Criteria

The project will be considered successful if the developed model identifies a few optimal locations of large scale electrolysers in each selected decarbonization pathway.

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

NGET (“NG”) has endeavoured to prepare the published report (“Report”) in respect NIA2_NGET0002 Role and value of electrolysers in low-carbon GB energy system (“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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Required Modifications to the Planned Approach During the Course of the Project

There have been no changes to the scope or costs for this project. The project kick-off was delayed by 3 months due to delays in contract negotiations phase. Therefore, the completion date is moved three months ahead.

Lessons Learnt for Future Projects

Due to the delay in the project kick off, no outcomes are available to report.

Lessons learnt will be reported in next year's progress report.

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

Due to the delay in the project kick off, no outcomes are available to report.

First outcome of the project will be delivered in July in the form of report on the set of decarbonization scenarios for simulations.

Data Access

Details on how network or consumption data arising in the course of a NIC or NIA funded project 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 relating to NIC/NIA projects" at www.nationalgrid.com/electricityinnovation.

National Grid already publishes much of the data arising from our NIC/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

Foreground IPR will be created in relation to the test results of the methodology on the NGET network. The supplier will contribute the background IPR in the area of whole system model, whilst NGET will contribute background IPR with regards to the relevant electricity transmission domain knowledge used in the project.