Hydrogen Cost Reduction (HyCoRe) Impact on the UK Electricity and Gas Networks

John Nwobu, Irfan Yousuf, Offshore Renewable Energy Catapult, United Kingdom

Introduction

The HyCoRe project investigated key options and considerations for exporting offshore wind power in the UK, with a particular focus on the role of existing gas and electricity networks in transporting green hydrogen through wind powered electrolysis.

The activities within the alpha phase of the project covered the following work packages:

- WP2 – Investigating the options for exporting offshore wind power
- WP3 – Investigation on Energy carrier Medium
- WP4 – Integrated analysis/cost drivers
- WP5 – Impact on gas and electricity systems

This poster provides a summary of the outcomes from the investigations in work package 5 around the impact of gas and electricity networks

Aims and objectives

The activities in work package 5 set out to identify a possible future location for onshore electrolysis (power to gas) that is in proximity to the UK gas network infrastructure. This set out to address the following areas/user needs:

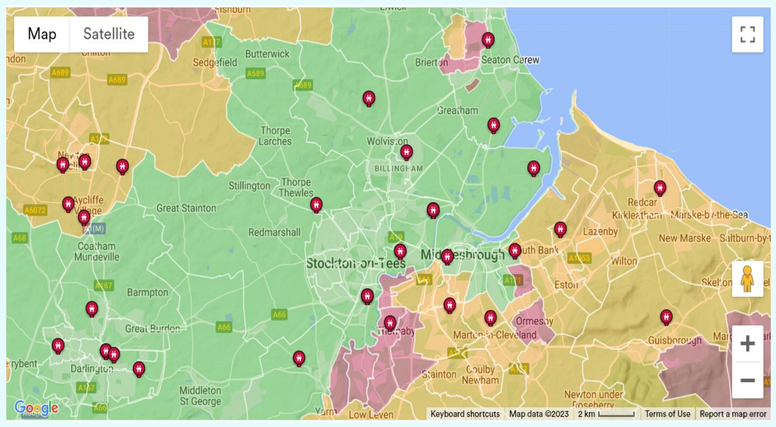
1. Is there an opportunity to reduce energy network investments through strategic deployment of electrolysers and what are possible locations?
2. What are the best ways of using electrolysis and energy storage at scale to reduce network infrastructure upgrade costs?
3. What is the best way to incorporate a large-scale increase in renewable generation in the coming years?
4. What are the existing or new test scenarios required and how could these technologies be tested and validated?

Conclusions

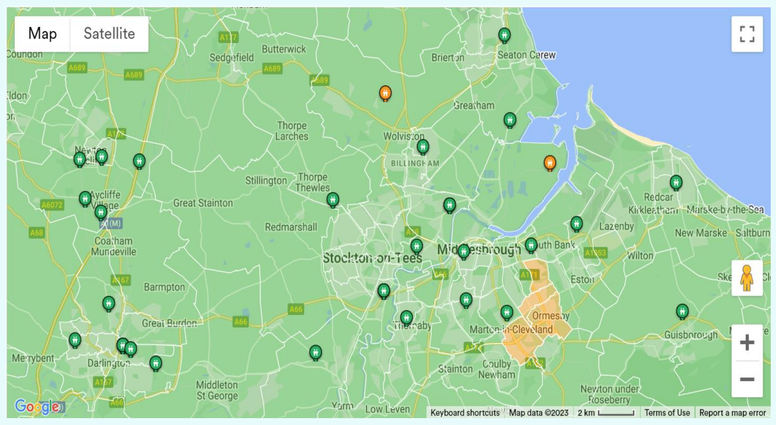
- The Teesside area in the Northeast England has been identified as a possible potential location of co-locating electrolysers and energy storage technologies
- The outputs from the discovery phase has shown that technologies like electrolyser and energy storage systems can add further benefits by bringing much needed flexibility into the electricity and gas networks.

Results

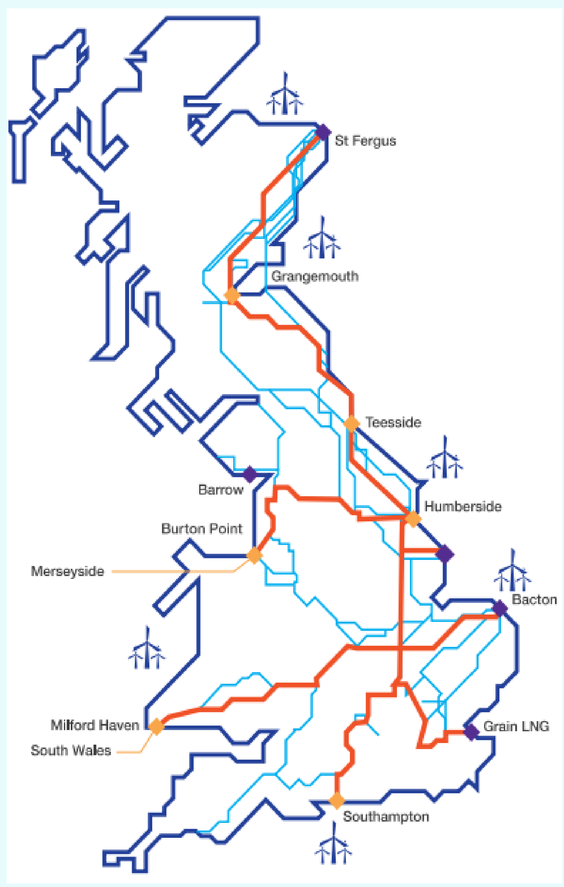
Generation



Demand



Heatmap of 11kV substations within 20 km from Teesside



Project Union _ Overview 27.8 (nationalgas.com)

- Our analysis suggested the selection of the UK Teesside area for our study is driven by the significant impact and potential brought forth by Project Union and the East Coast Hydrogen project and its proximity to large industrial sites, large scale gas storage, offshore wind power and forecasted North Sea Cross Border Hydrogen pipeline 1 and 2 project.

Discussions

- From our initial analysis, there is an opportunity for electrolyser-based congestion relief due to restrictions around additional generation but also available demand within the network (see above figure).
- Improving the energy market design, gas and electricity market structures was highlighted to be crucial to include a market for hydrogen with a better understanding of market players and support mechanisms
- Repurposing existing infrastructure was important, and within the Teesside area, there is sufficient existing offshore gas pipeline infrastructure with plans for new hydrogen infrastructure (North Sea Cross Border Hydrogen Pipeline 1 & 2).
- Finding cost savings needs further assessment as it relates to different factors such as cost benefits of creating flexibility vs network upgrades, energy policy and markets mechanism to drive down price of wholesale and retail energy. This is to be explored in future phases of the project.
- Hydrogen system OEMs and operators will need to become aware of the grid code and ensure compliance with the grid code in order to scale up the integration of hydrogen into the network.
- We also identified there is a need to understand if there is enough water resource requirements for electrolysis within this network

Northern Gas Networks

Kinewell Energy

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