

























Energy Networks Association

Network Hydrogen Project Updates

Hydrogen Programme Managers' Group
16 March 2020

	<p>NTS Hydrogen Injection</p>	<p>To identify the requirements to enable a physical trial of Hydrogen injection into the NTS, identifying the gaps in the safety case and indicating the most suitable NTS location for a live small-scale trial.</p>	<p>£ 200k [NIA]  Sep 2019 until Aug 2020</p>		<p>Tx only H₂ upto 100%</p> <p>Lead: Dave Hardman Lloyd Mitchell</p>	 <p>DNVGL have identified several areas of the NTS and interested customers. H2 Hub requested additional criteria to be included ready for business decision. Also linking with H21 for potential offline test rig at Spadeadam.</p>
	<p>Hydrogen Deblending</p>	<p>To assess a variety of hydrogen recovery technologies and develop concept designs for selected options including a techno-economic review and identify the requirements for a demonstration project.</p>	<p>£ 31k [NIA]  Dec 2019 until May 2020</p>	 <p>Cadent, NGN, SGN & WWU</p>	<p>Tx and Dx Blend of H₂</p> <p>Lead: Lloyd Mitchell</p>	 <p>Costain have identified a number of suitable technologies to enable the de-blending of hydrogen and natural gas on the NTS/LTS. These technologies have been applied to a number of agreed case studies to give an indication of the feasibility of this technological solution</p>
	<p>Hydrogen Flow Loop</p>	<p>Off line test loop to evaluate metallurgy changes on existing NTS steel pipe and new MASIP pipe when exposed to 30% hydrogen, identifying next steps to assess the NTS' suitability to transport hydrogen.</p>	<p>£ 125k [NIA]  Apr 2019 until Mar 2020</p>		<p>Tx only Blend of H₂</p> <p>Lead: Ed Timerick</p>	 <p>The project is continuing to add pressure cycles to the X52 pipework in an H2 rich environment. Interim metallurgy analysis revealed no discernible changes. Applying for additional funding to increase pressure range and time for fatigue.</p>
	<p>Project Cavendish</p>	<p>A review of the potential of the Isle of Grain region to use existing infrastructure to supply hydrogen to London & the South East including generation, storage, transport and CCS.</p>	<p>£ 178k [NIA]  Feb 2019 until Feb 2020</p>	 <p>Cadent & SGN</p>	<p>Tx and Dx Blend of H₂</p> <p>Lead: Suki Ferris</p>	 <p>Nearing completion, outlining the technical feasibility of producing hydrogen at scale to decarbonise London and South East England by 2040. Includes cost analysis and potential policy and regulatory mechanisms that would support taking this programme to the next phase</p>
	<p>Zero 2050 South Wales</p>	<p>To bring together utilities, industry, academia, SME, Government, regional experts to adopt a whole system view to design a pathway to meet South Wales net-zero target which delivers the best value to consumers.</p>	<p>£ 62k [NIA]  Nov 2019 until Aug 2020</p>	 <p>NGET Lead, WWU & WPD</p>	<p>Tx & Dx G & E H₂ Vision</p> <p>Lead: Suki Ferris</p>	 <p>In the initial phases of gathering data, including the locations of bulk hydrogen demand, infrastructure required to transport hydrogen, and evaluation of hydrogen storage needs. This data will be fed into the overall Pathfinder model to determine the optimal pathway to decarbonise South Wales.</p>
	<p>Spatial GB Clean Heat Modelling</p>	<p>Provide a coherent modelling framework for regional energy demand and supply mapping that captures competition between low carbon technologies and the impact on the national heat decarbonisation strategy.</p>	<p>£ 356k [NIA]  Sep 2019 until Dec 2020</p>	 <p>All GDNs supporting</p>	<p>Tx and Dx Blend of H₂</p> <p>Lead: Usman Bagchu</p>	 <p>Project is progressing well with regular input from all parties, data gathering has gone well and is all but completed, Model development has started.</p>



Feasibility of H₂ in the NTS

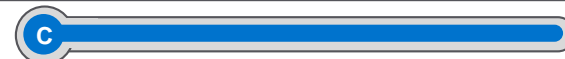
A feasibility study with the aim of determining the capability of the NTS to transport hydrogen. Includes a review of relevant assets, pipeline case study and draft scope for offline trials.

£ 205k [NIA]
 Nov 2018
until
 Apr 2019



Tx only
 Blend of H₂

Lead:
 Lloyd Mitchell



Confirmed transporting hydrogen in the NTS is technically feasible, a summary of the challenges which would need to be addressed was presented including hydrogen embrittlement, increased hazard zones and changes to operational practices.



Aberdeen Vision

A feasibility study for the generation of hydrogen at St Fergus using the NTS (up to 2%) to supply the city of Aberdeen. Includes generation, injection, separation and transport.

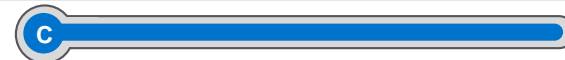
£ 116k [NIA]
 Dec 2018
until
 Sep 2019










SGN

















Tx and Dx
 Blend of H₂

Lead:
 Lloyd Mitchell



Suggested a 200MW modular design would offer an optimised potential build and allow for cost savings through manufacture of multiple units. The analysis of the Tx and Dx networks in the area did not identify any major concerns around the injection of hydrogen.

 <p>HyDeploy 1&2</p>	<p>Hy Deploy 1 is exploring the viability of blending upto 20% on a private gas network. Hy Deploy 2 is then exploring the path to deployment by trialing on the public gas network.</p>	<p>£ 22.5m^[NIA]</p> <p>Apr 2017 until Mar 2023</p>	  Cadent and NGN	<p>Dx H₂ blend upto 20%</p> <p>Lead: Andy Lewis</p>	 <p>H₂ Blending commenced into the Keele network on 31 Oct 19. Maximum blend rate has now been reached. The trial is likely to be extended until Sept 2020. All network related findings are inline with the HSE exemption submitted. Work has begun on the HyDeploy2 trial with trial begin brought forward to sept 2020 inline with BEIS request</p>
	<p>The project combines Industrial fuel switching, CCUS and blending to offer decarbonisation to the Liverpool and Manchester areas.</p>	<p>£ 1.7M^[NIA]</p> <p>May 2017 until 2026</p>	 Cadent	<p>H₂ Tx and Dx H₂ and blend</p> <p>Lead: Andy Lewis</p>	 <p>New work packages have commenced on Fuel Switching and Hydrogen Supply as a result of being successful awarded BEIS innovation funding. BEIS CCUS innovation project is now coming to close (April 2020). Work is being done on H₂ pipeline pre-feed ahead of potential DC bid being submitted.</p>

 <p>H21 NIC Phase 1</p>	<p>H21 NIC Phase 1 will provide critical safety evidence on leakage and consequences of leakages within a 100% hydrogen.</p>	<p>£ 10.3m^[NIC]  Jan 2018 <small>until</small> Aug 2020</p>	 <p>NGN, Cadent, SGN & WWU</p>	<p>Dx 100% H₂</p> <p>Lead: Mark Danter</p>	 <p>Leakage and consequence testing is due to be completed at the end of March 2020. All of the results are being QA checked by experts from HSE and DNV GL. Results will continue to be fed into the 100% H₂ Quantitative Risk Assessment. Final report detailing all results is due to be released in August 2020.</p>
 <p>H21 NIC Phase 2</p>	<p>The project continues the work to build the safety evidence started in Phase 1. In this phase testing on Network Operations and an Unoccupied Trials site will be undertaken to ensure that the network can be maintained safely.</p>	<p>£ 7.5M^[NIC]  Jan 2020 <small>until</small> Dec 2021</p>	 <p>NGN, Cadent, SGN, WWU & NGGT</p>	<p>Dx 100% H₂</p> <p>Lead: Mark Danter</p>	 <p>Collaboration Agreement has been signed with all the GDNs and NGGT, invoices have also been issued for the network contributions to the project. Draft contracts have been drawn up with the project partners, HSE and DNV GL.</p>
 <p>H21 Strategic Modelling</p>	<p>The project seeks to extend the principle of hydrogen conversion as established in the H21 Leeds City Gate report, across key UK urban centres.</p>	<p>£ 444k^[NIA]  Apr 2017 <small>until</small> Mar 2020</p>	 <p>NGN, Cadent, SGN & WWU</p>	<p>Dx 100% H₂</p> <p>Lead: Mark Danter</p>	 <p>Modellers from each of the GDNs have produced H₂ models for 2 key urban centres within their networks. A close down meeting has been held with representatives of each of the networks to ascertain how the final report will look. The final report is due to be released at the end of March 2020.</p>
 <p>H21 Field Trials</p>	<p>The Field Trials project is acting as an enabler to the H21 NIC Phase 2 project. During this project a detailed design of the Phase 2a test rig and Mater Test Plan will be produced and a location for Unoccupied Trials will be secured.</p>	<p>£ 585k^[NIA]  June 2018 <small>until</small> July 2020</p>	 <p>NGN</p>	<p>Dx 100% H₂</p> <p>Lead: Mark Danter</p>	 <p>First draft Master Testing Plan issued by HSE, final version expected before the end of March 2020 – this consists of a set of questions to be answered via Phase 2 testing. Detailed design of micro grid is underway, expected to be finalised April 2020. Unoccupied Trial site located at Redcar, liaising with the Local Authority to secure the site.</p>



H100

Feasibility & FEED study to assess a suitable site location for a hydrogen production and distribution network

Key Project Dependencies

- NIC bid to construct the hydrogen production and distribution network
- Hy4Heat developing hydrogen appliances in time for H100 demonstration

KIWA, ERM, HSL, NPL,
Arup, Wood, Costain,
Providence Policy,
University of Edinburgh,
DNV GL

100% Hydrogen
Injection

Lead:
Mark Wheelton

£ 3.6m
NIA

⌚ 2017
until
2021

Overall Status



H100 NIA coming to completion & progressing with H100 Fife – NIC bid for construction of the hydrogen production facility, demonstration facilities and network

Milestone	Due	Status
Feasibility & FEED Studies	30/03/20	Complete
Review & approve H100 NIA technical evidentiary reports	30/06/20	In progress
ISP Submission	06/04/20	In progress

#	Top 3 Risks
1	Lack of funding to progress with Pre-Construction & construction activities
2	Long lead items delaying the operational phase of the project
3	License exemptions & derogations not granted by Ofgem

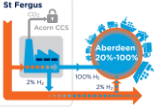

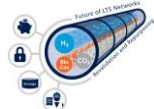







Progress & Next Steps

Progress this month:

- Feasibility & FEED Studies complete and site selection
- Draft ISP for Network Innovation Competition

Next Steps

- Submit ISP to Ofgem for 2021 NIC funding
- Develop site specific QRA
- Progress with H100 Safety Case
- Draft H100 NIA Final Report

 <p>Aberdeen Vision</p>	<p>To assess the feasibility of blending and injecting 2% hydrogen into the National Transmission System at St Fergus entry point</p>	<p>£ 135k NIA</p> <p>Nov2018 until Feb 2020</p>	<p>SGN & National Grid</p>	<p>H2 2% BLEND</p> <p>Lead: Phil Bradwell</p>	 <p>The initial draft of the final report shows there are no critical obstacles that would prevent the injection of 2% hydrogen into the NTS at St Fergus and its distribution through the system into the gas distribution network.</p>
 <p>The Future of LTS</p>	<p>To assess the feasibility and safety of the Local Transmission System (LTS) for storage and transport of pure and blended hydrogen and CO2.</p>	<p>£ 205k NIA</p> <p>Jan 2019 until Feb 2020</p>	<p>SGN & HSE</p>	<p>NETWORK & H2 BLEND</p> <p>Lead: Nancy Thomson</p>	 <p>The first phase of this project assesses the scientific and regulatory feasibility of repurposing the LTS. This has included a feasibility study to establish if an existing decommissioned 30km LTS pipeline from Granton, in Edinburgh, to Grangemouth could be revalidated in the context of a decarbonised gas grid.</p>
 <p>Real Time Networks</p>	<p>Develop the world's first real-time gas demand model capable of energy modelling, will enable the modelling of a wider variety of gases in the network</p>	<p>£7,998k NIA</p> <p>April 2016 until April 2020</p>	<p>SGN & DNV GL</p>	<p>NETWORK & H2 BLEND</p> <p>Lead: Alexander Webb-Brown</p>	 <p>All sensor sites and weather stations have been installed and commissioned. Our customer data collection period has recently completed which was used to train the demand model. Full training of the demand model will be completed by Summer 2020 with results and findings disseminated soon afterwards</p>
 <p>Hydrogen Excess Flow Valves</p>	<p>Develop an excess flow valve and new specification suitable for low pressure hydrogen networks</p>	<p>£ 130k NIA</p> <p>Sept 2019 until Aug 2020</p>	<p>SGN, HSE, IGEM, AV-UK</p>	<p>100% Hydrogen</p> <p>Lead: Mark Wheeldon</p>	 <p>A review of the current Gas Industry Standard has been completed and a gap analysis has been done. The project partners will now draft a new specification based on the review and gap analysis</p>
 <p>Hydrogen Gas Detection</p>	<p>Develop a gas detection instrument that can be used to detect hydrogen gas in levels ranging from ppm to 100% gas in air</p>	<p>£ 158k NIA</p> <p>Oct 2019 until Dec 2020</p>	<p>SGN & WWU</p>	<p>100% Hydrogen</p> <p>Lead: Mark Wheeldon</p>	 <p>Sensor technologies for detecting hydrogen in ranges from ppm to 100% gas in air have been identified. Testing of the sensors has begun</p>
		<p>£</p> <p></p>			