

<b>Project Name</b>	<b>HyNTS FutureGrid Phase 1</b>		
<b>Question number</b>	<b>#2</b>	<b>Pro forma section</b>	<b>5</b>
<b>Question date</b>	<b>10/09/2020</b>	<b>Answer date</b>	<b>14/09/2020</b>
<b>Question summary</b>	<b>Can you set out the similarities and differences between HyNTS and other international research on transmission assets and hydrogen? Who are your contacts for these projects? (eg GasUnie and SNAM)</b>		

**Answer (please retain document formatting and do not exceed 2 pages unless otherwise agreed with Ofgem)**

The HyNTS programme covers all National Grid Gas Transmission (NGGT) hydrogen related research and demonstrations. Our initial project by HSL (now HSE Science Division) was desk based and involved research into work to date both in the UK and internationally and a comparison between different asset types and our own unique gas network setup. Some specific comparisons and contrasts for networks in Europe can be defined as:

- **Germany** – has many parallel pipelines and current plans are to convert one of the parallel feeders to hydrogen whilst maintaining the supply of natural gas in the other.
- **Netherlands** – have separate high- and low-quality gas transmission networks. It's proposed that one of these networks which will be converted to hydrogen.
- **Belgium & Italy** – have similar networks and conversion plans to the UK.

The HyNTS programme is now moving to physical trials and demonstrations (in an offline scenario) of how hydrogen affects the NTS, ahead of introducing hydrogen into the live network. Similarly, other European countries have started their own net zero transitions through desktop research and detailed risk assessments and in two cases have progressed to trials. In the Netherlands, after an extensive risk assessment and reconstruction of valve stations a single length of feeder has been converted to hydrogen service. This supply to an industrial facility runs at 40 bar with a 70% hydrogen blend and has been operational for 18 months. In Italy, they have conducted a small-scale trial over a number of weeks studying the impact of hydrogen at 10% concentration between 24 bar(g) and 5 bar(g). Whilst the Netherlands and Italy have demonstrated hydrogen on their live network in both cases it is at lower pressures and concentrations and they therefore still have the same challenge as ourselves to introduce concentrations of hydrogen up to 100% at transmission pressures up to 80-95 bar(g). For this reason, the proposals for FutureGrid are unique and of interest to our counterparts in Europe and why it's important we collaborate to maximise available learning. As with other parts of Europe, the gas transmission network has been operational for over 40 years and in this time has undergone many changes and is comprised of many different material types and grades. For this reason maximising our datasets to allow robust analysis is one of the key reasons why working with Fluxys in Belgium on FutureGrid is so important. Their Fast Screening Methodology will allow a comparison of materials within assets to occur so that whilst an asset might be different between our two countries, the materials that make it up could be similar and the impact of hydrogen on the material structures can be shared and compared. This methodology will allow this comparison to happen and is part of the benefit in kind Fluxys are offering as being a part of FutureGrid Phase 1. Beyond the FutureGrid project hydrogen research is already being shared in many cross-European groups that NGGT is a part of these include: GERG – The European Gas Research Group, H2GAR – Hydrogen Gas Asset Readiness Group and MarcoGaz (Hydrogen TaskForce). More specifically recent examples of data sharing include regular bi-lateral meetings with colleagues from GasUnie to discuss their feeder conversion details and recent findings about embrittlement and the performance of soft parts in valves. Bi-lateral meetings with SNAM to understand the results of their hydrogen trial and OpenGrid Europe who also presented at NGGT's hydrogen hub on their research and shared thoughts on hydrogen embrittlement mitigations. More recently we have met with colleagues at Fluxys in Belgium specifically on material characterisation. Contacts at our European counterparts include:

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