



# FutureGrid

## Hydrogen Transmission in Action

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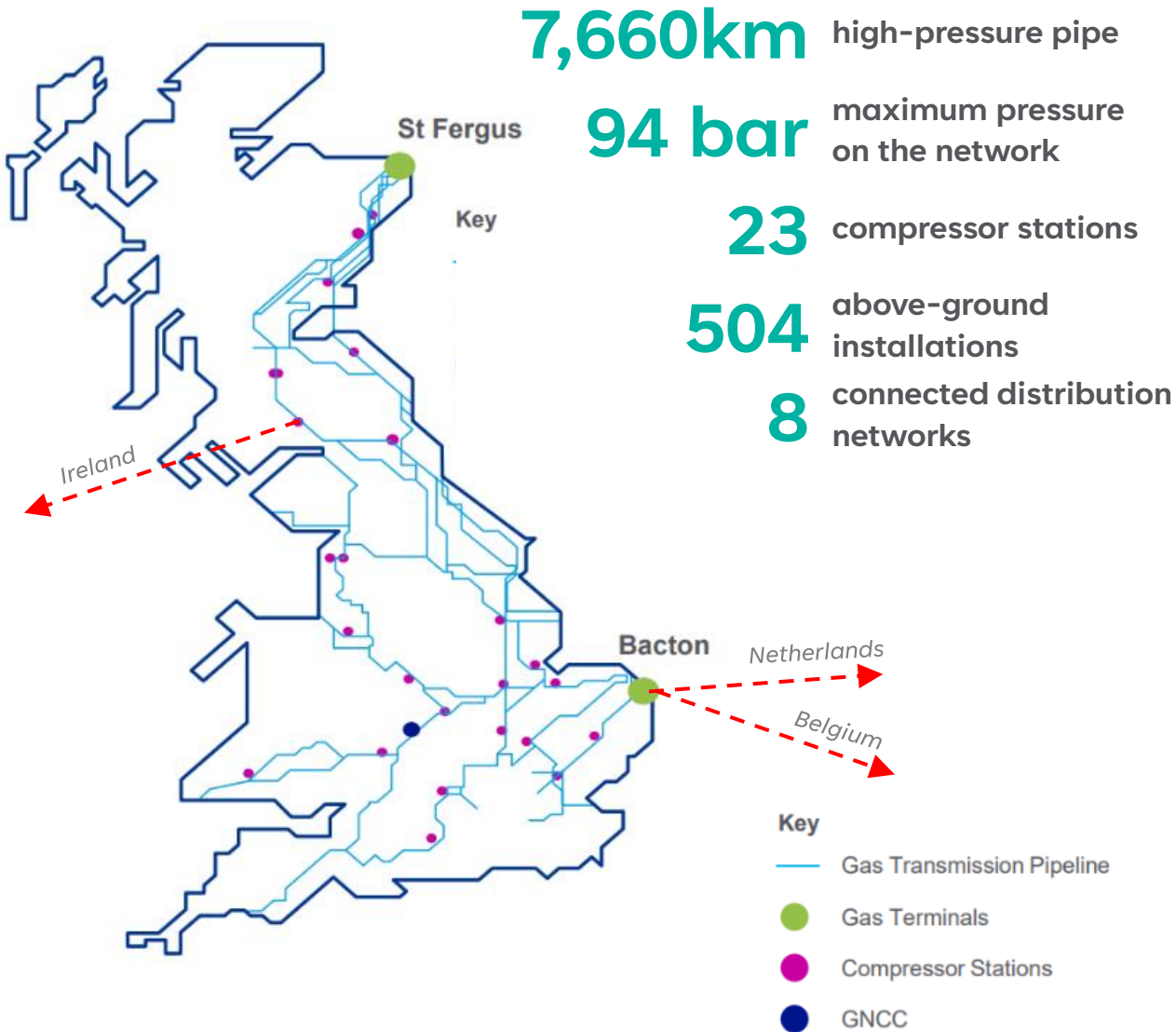


# The National Transmission System (NTS)

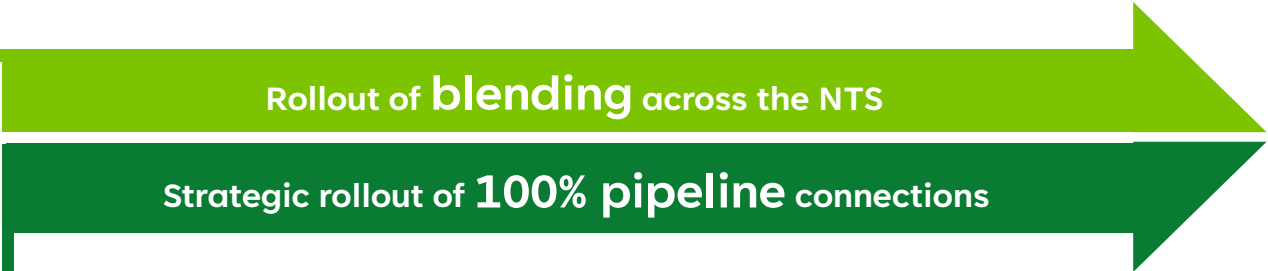
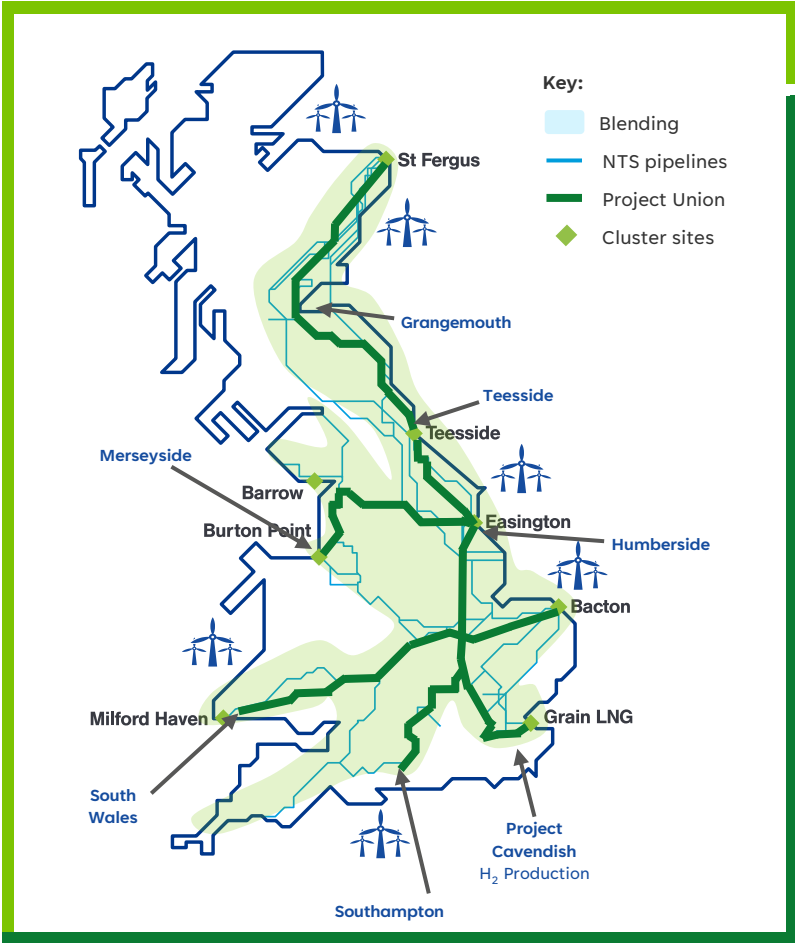
## The role of gas:



## UK gas demand:




# Dual Pathway to a hydrogen NTS: hydrogen blending and rollout of 100% hydrogen pipelines





## Delivering a **Dual Pathway** to transitioning the NTS to hydrogen:

- ➡ In 2024/5 low level hydrogen blending on will be facilitated on the transmission network
- ➡ From 2025 onwards blending could extend and increase up to 20% - more if deblanding technology can be proven.
- ➡ In 2028/9 Project Union will deliver the first phases of 100% hydrogen transmission pipeline between the northern clusters
- ➡ By 2033 Project Union will have delivered a circa 2000km hydrogen backbone joining key production and use clusters
- ➡ Asset conversion continues to 2045 to deliver a complete 100% hydrogen network.

**Net Zero**  
**2050**

  
Levelling up, Job Creation

  
Global Leader in Green Innovation

  
Providing flexibility and optionality

# ProjectUnion

Project Union will connect, enable net zero and empower a UK hydrogen economy, repurposing existing transmission pipelines to create a hydrogen ‘backbone’ for the UK by the early 2030s.



Repurpose ~2,000 km of the NTS through a phased approach in line with Government’s cluster prioritisation and green hydrogen development



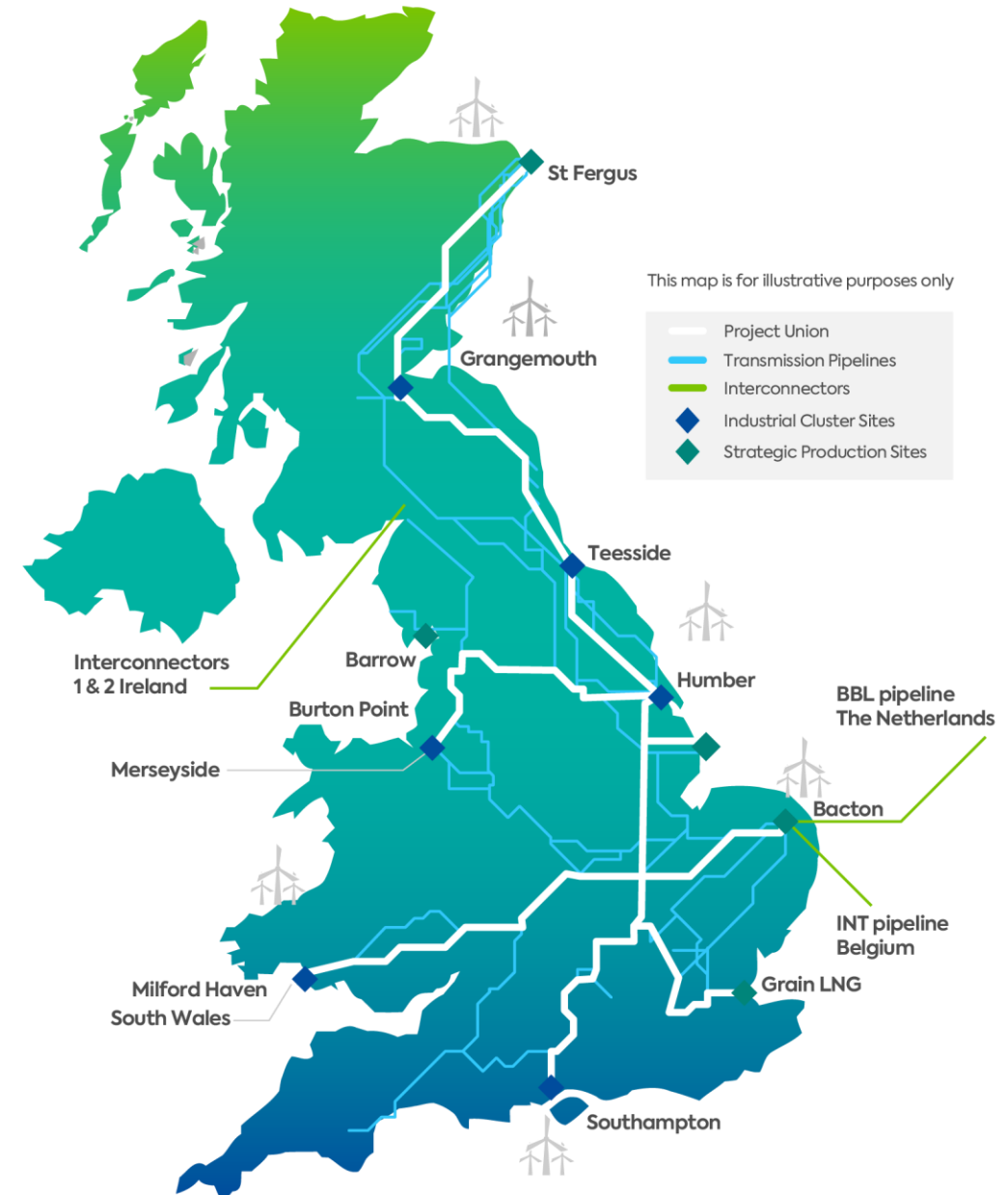
Connect cross GB supply, demand and strategic storage sites, enabling growth of a UK hydrogen economy



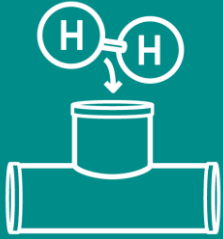
Use existing infrastructure to deliver a low carbon future, reducing environmental impact of new construction



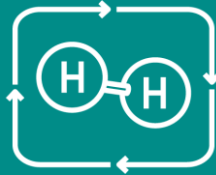
Enable early and affordable market growth of a low carbon hydrogen economy to achieve net zero





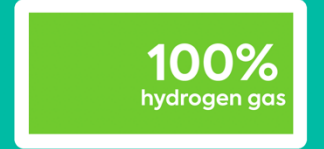


**Standalone hydrogen Tests**  
Standalone hydrogen test modules are operating alongside the main test facility, to provide key data required to feed into the main facility.

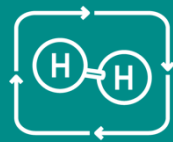


**Offline hydrogen test facility**  
A representative range of NTS assets of different types, sizes, and material grades have been supplied from decommissioned assets to build the test facility.

Four key hydrogen concentrations are being tested:







## Offline hydrogen test facility

A representative range of NTS assets of different types, sizes, and material grades have been supplied from decommissioned assets to build the test facility.



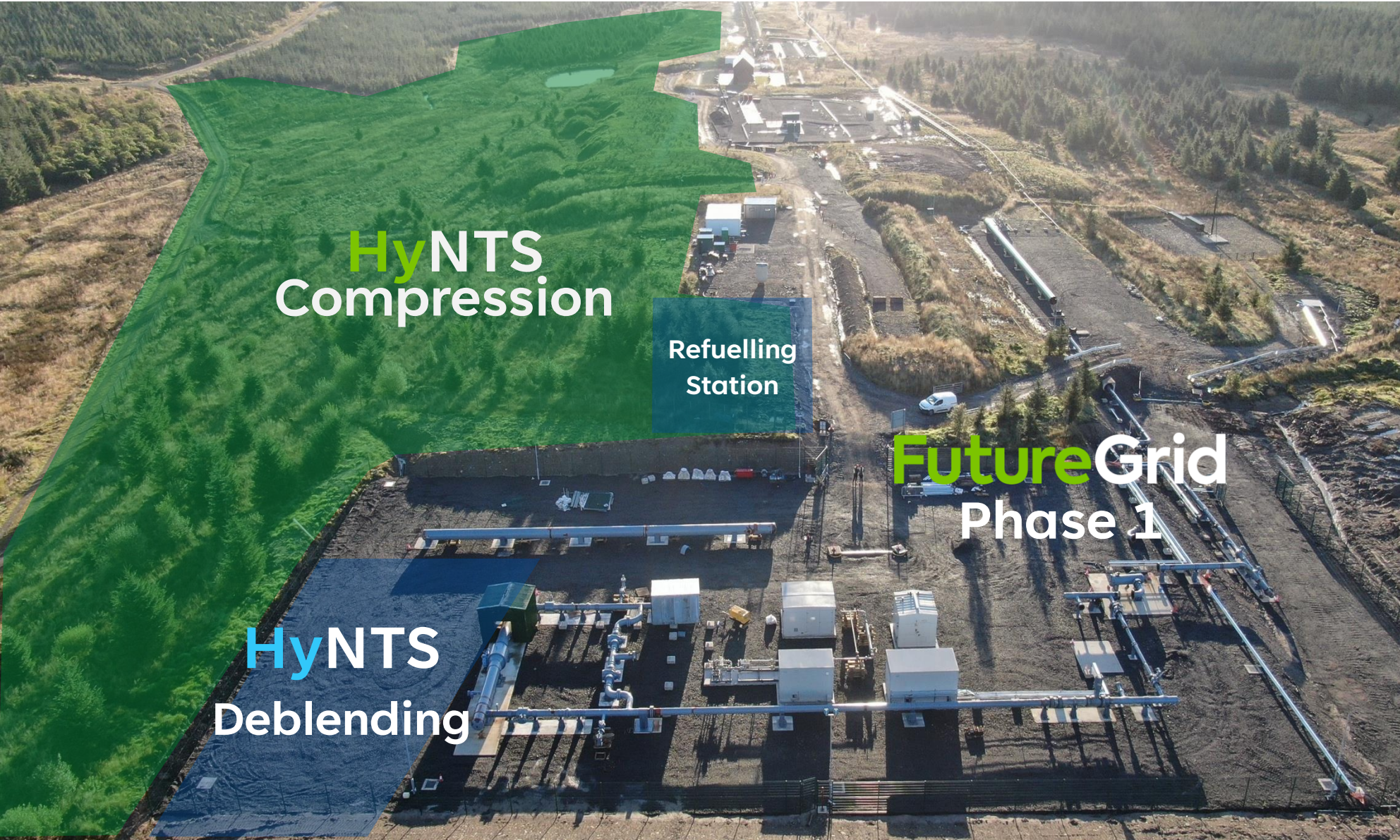
- 1 High pressure storage
- 2 Ball valve arrangement
- 3 Filter
- 4 Ultrasonic meter
- 5 Flow control valve
- 6 Non-return valve
- 7 Filter skid
- 8 Orifice plate meter
- 9 Boiler house & heat exchanger
- 10 Regulator skid
- 11 Pipeline isolation valve
- 12 Flow control valve
- 13 Low pressure storage
- 14 Recompression unit
- 15 Data centre
- 16 Control room



To see a 3D flythrough of the facility including the flow rates, scan the QR code



# FutureGrid Compression & Deblending



Our goal is to deliver a **World-Class** Hydrogen Test & Demonstration facility for Compression systems providing the key evidence to transition the UK network in **2026**



# FutureGrid Compression Team



Owner and operator of National Transmission System, end user of the project outcomes and evidence



OEM for turbine and compressor systems on the NTS and worldwide, demonstrating future capability



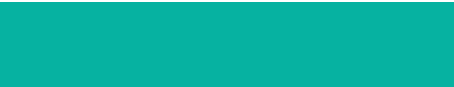
DNV Spadeadam site owners and expert consultants across the gas industry and delivering the test facility



Compressor cab design and engineering specialists delivering the ancillary equipment to site



Gas distribution network owner and operator, developing LTS futures at DNV Spadeadam and sharing data across FutureGrid and LTS programmes



Gas distribution network owner and operator, H21 facility demonstrating the distribution network alongside FutureGrid at DNV Spadeadam



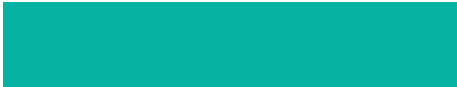
Digital modelling and simulation experts, whom will produce the detailed site design and associated data



Academic institute to peer review activities with a focus on the rotating machinery and digital aspects of the project




HSE Science & Research Centre to independently peer review safety data relating to compressors on the project.






# Layout for FutureGrid Compression facility


- 1




1km High pressure 36" pipeline
- 2




A20 Gas Turbine  
Upgraded combustion can to utilise H2 <100%
- 3




Gas Compressor  
Repurposed from NTS and replaced for 100% H2
- 4




Aftercooler to prevent test loop overheating
- 5




H2 & CH4 Storage  
48" 450m x2
- 6



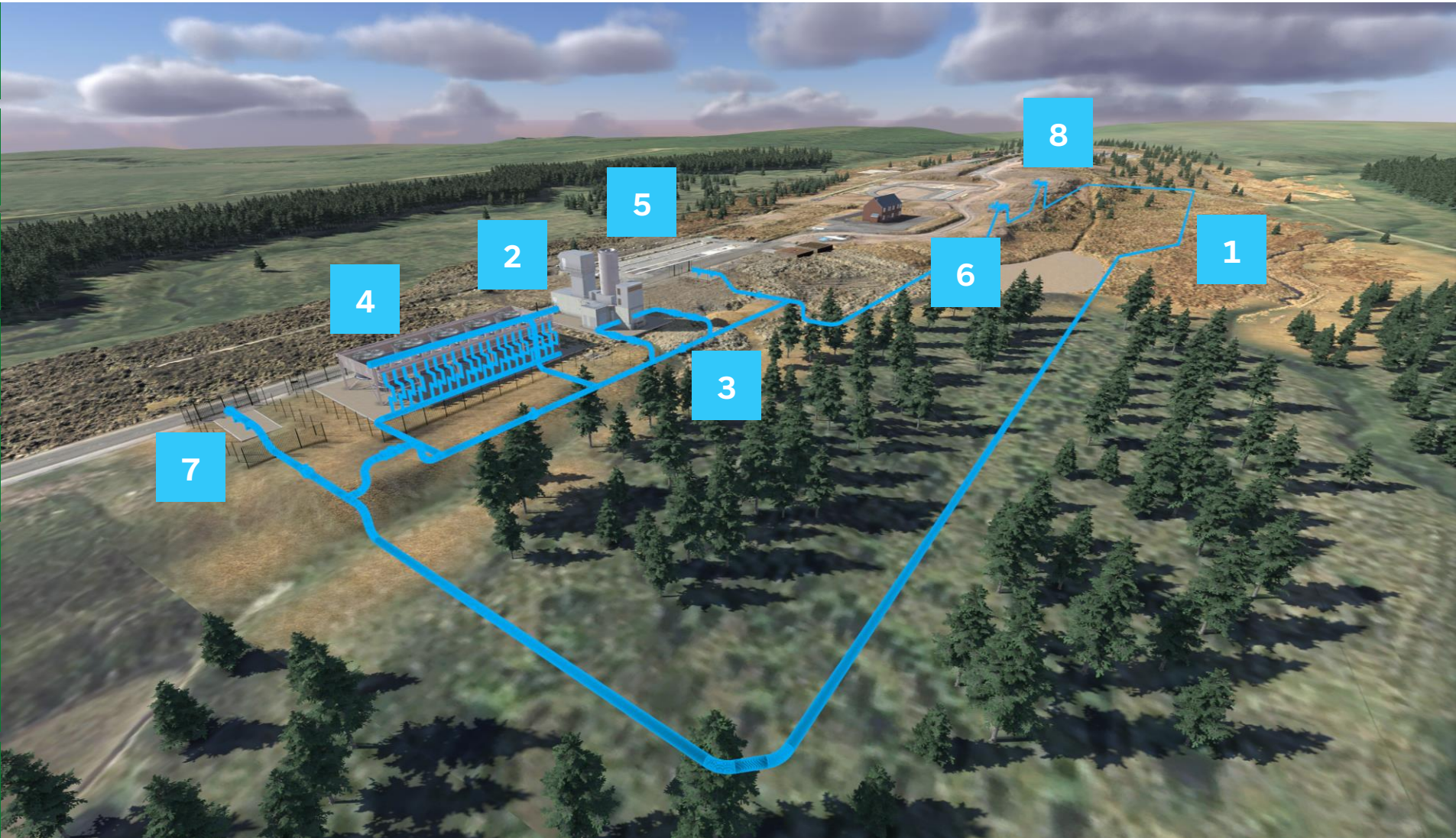
Buried Pipework to enable operational maintenance testing
- 7



PIG Traps to enable access to the test loop & for future testing
- 8



FutureGrid & HyNTS control room



# What are the benefits?

24

compression stations

74

compression units

~£60m

cost to replace each unit


Approx. £29m

cost to repurpose each unit to 100% H<sub>2</sub>


Approx. £10m

cost to repurpose each unit to 25% H<sub>2</sub>  
(~£17m to 50% H<sub>2</sub>)


OPTION		Total forecast expenditure	Saving vs. Baseline
No Change	Cost of not transitioning to hydrogen	(£6.5b)	(£2b)
Baseline	Replacement of all units	(£4.5b)	
Option 1	Repurposing to 100% Hydrogen	(£3.1b)	£1.4b
Option 2a	Repurposing to 25% and then repurposing 100% Hydrogen	(£3.3b)	£1.2b
Option 2b	Repurposing to 25% and then replacement	(£4.7b)	(£0.2b)
Option 3a	Repurposing to 50% and then repurposing 100% Hydrogen	(£3.4b)	£1.1b
Option 3b	Repurposing to 50% and then replacement	(£4.8b)	(£0.3b)



**End Consumer**  
Minimisation of new build disruption & cost  
Minimise cost for the transition through reuse of assets and maintained lifetime  
Access to Net Zero gases instead of costly domestic heat upgrades



**Energy Supply Resilience & Government Priorities**  
NTS provides resilience vs localised/transient supply & access to remote production sources  
Storage and flexibility through linepack supporting access to green & blue hydrogen  
Enabling Hydrogen for Industry, Transport, Power and Domestic Heating



**Environment**  
Minimisation of new build impact, utilisation of existing sites to prevent green field requirement  
Reduction in reliance on natural gas  
Reduced compressor CO<sub>2</sub> emissions



End Slide



# national gas transmission

Thanks for listening  
Opportunity for questions