

**Gas Transmission
and Metering**

24th June 2022

Transition of the UK Gas National Transmission System for use with Hydrogen

Why hydrogen transmission?

Situation



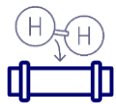
Urgency, pace and scale is required to realise the UK's decarbonisation challenge and deliver net zero



Low carbon hydrogen is required **all future UK net zero scenarios**



Today natural gas delivered by the NTS represents **~3 times the annual energy demand of electricity**



Hydrogen can replace methane, transporting energy as a gas or liquid is much more efficient than transporting electricity



10GW of hydrogen production capacity is targeted by 2030, equivalent to amount of gas consumed by over **6 million households in the UK each year**

The Infrastructure challenge

- The transition to hydrogen will require **significant investment** in new and repurposed infrastructure to **link future supply and demand**
- Repurposing** existing pipeline infrastructure represents the most **cost effective solution**

7,600km

94 bar

maximum pressure on the network

24

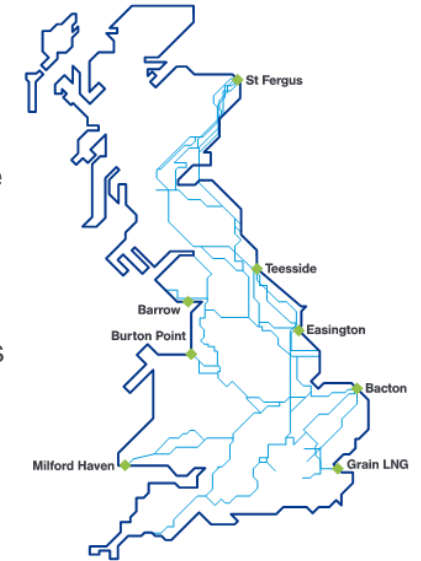
compressor stations

504

above-ground installations

8

connected distribution networks

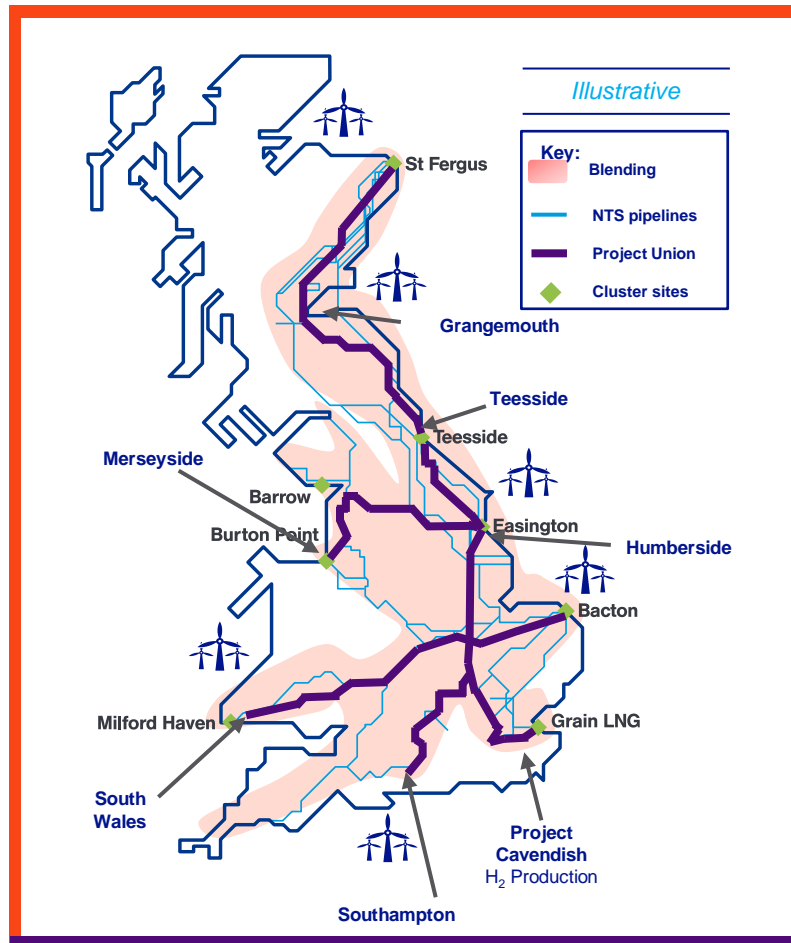


The case for a shared hydrogen network

- A shared hydrogen network is essential to **efficiently unlock the hydrogen economy**
- Infrastructure Investments can support a **green equitable future** delivering UK wide economic benefits

Dual Pathway to a hydrogen NTS: hydrogen blending and rollout of 100% hydrogen pipeline connections

Delivering a blend of hydrogen across the NTS in parallel to a strategic rollout of 100% transmission pipeline sections



Rollout of **blending** across the NTS

Strategic rollout of **100% pipeline** connections

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 debinding 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

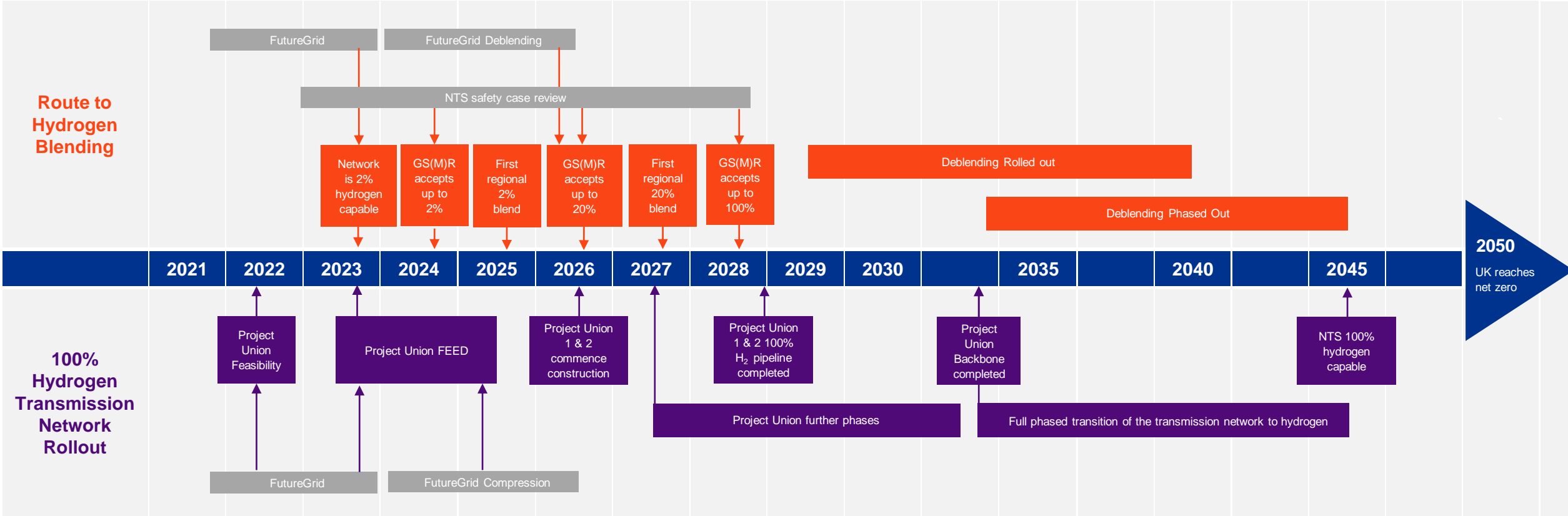


Providing flexibility and optionality

A dual pathway approach will ensure the most efficient and timely transition to hydrogen whilst ensuring those connected to the network are not left behind

Dual Pathway to a hydrogen NTS: hydrogen blending and rollout of 100% hydrogen pipeline connections

Delivering a blend of hydrogen across the NTS in parallel to a strategic rollout of 100% transmission pipeline sections



A dual pathway approach will ensure the most efficient and timely transition to hydrogen whilst ensuring those connected to the network are not left behind

We have engaged >75 cross industry stakeholders and received wide support for a 100% hydrogen network

Gas Transmission and Metering

Government



Consumers



Networks



Regulators



Producers



Clusters and projects



Stakeholder feedback

"If you can create a market for green H₂, you're not locked into bilateral contracts... The NTS gives you a market and a business case where you can scale H₂ a lot easier with less risk."

Tom Johnson, RWE

"The chemical sector net zero roadmap depends on H₂ and CCUS. As technology as it stands today, electricity is just not part of the question for most CIA members - they couldn't do it"

David Mitchell, Chemical Industries Association

"Project Union has clear benefits to the clusters and H₂ projects. In a highly distributed system, each individual project has to meet peak demand. If you connect the hubs, you massively improve resilience between them and increases asset utilisation. "

Nilay Shah, Imperial College London

We have now set up regional working groups to provide a forum to understand and align deliverables, inter-dependencies and assumptions between net zero projects within regions

Project Union

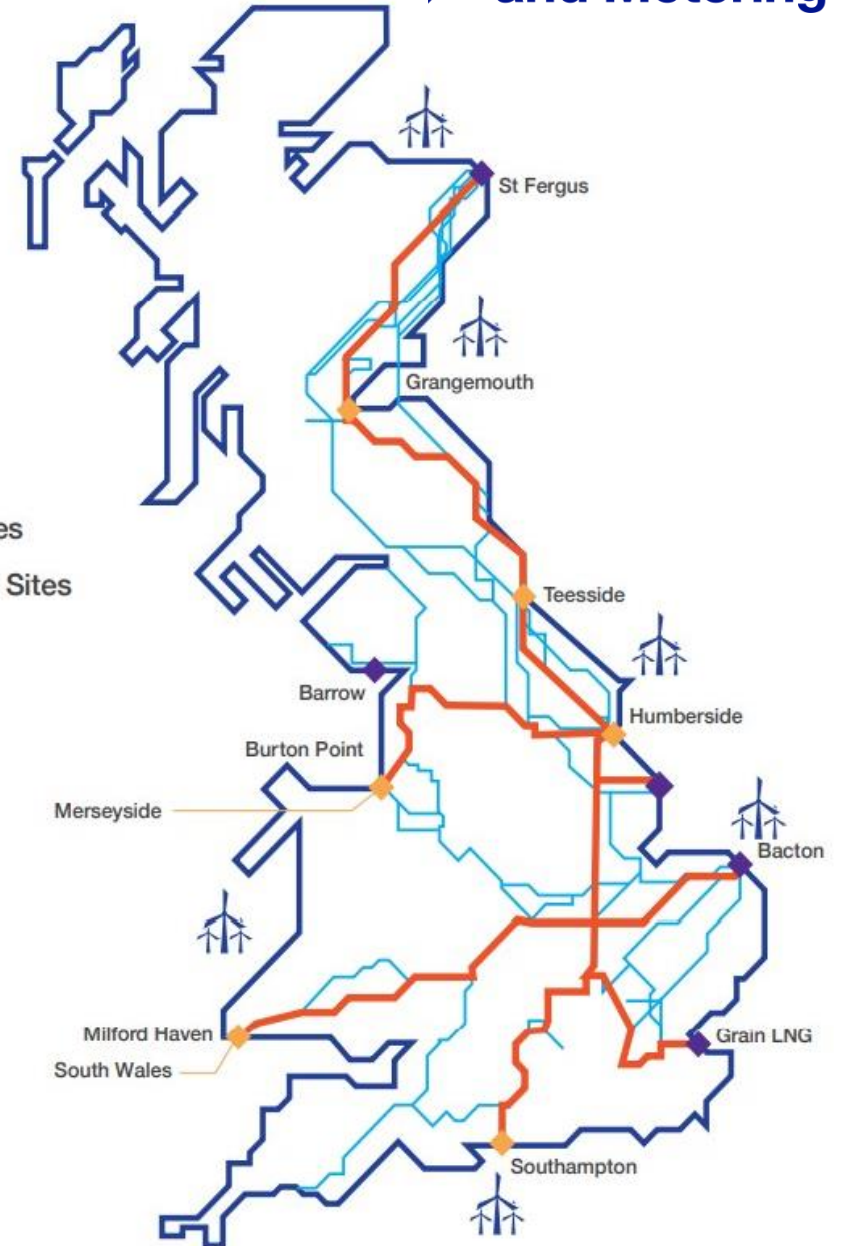
Project Union will connect, enable net zero and empower a UK hydrogen economy, repurposing existing transmission pipelines to create a hydrogen 'backbone' for the UK by the early 2030s.

- ✓ Repurpose ~2,000km 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

- Project Union
- NTS Pipelines
- Industrial Cluster Sites
- Strategic Production Sites

Routing is illustrative

Gas Transmission and Metering



ProjectUnion

Project Union benefits



Decarbonisation of industry & power

Fair access to green and blue hydrogen enabling businesses to decarbonise. Access to transmission enables green hydrogen production to scale.



Energy storage & resilience

System resilience to move and store sufficient volumes across the country



Connectivity & efficiency

Connect production and storage with demand, enabling system efficiency through shared infrastructure



Market coupling

Connect isolated production sites enabling competition, reducing costs and improving security of supply



Levelling up & job creation

Potential for >100,000 jobs by 2050, and contribution of £13billion to GVA



Global leader in green innovation

Attract global investors by getting best value from national infrastructure and enabling rapid scale up



Flexibility & optionality

Flexibility in power generation, storage and consumption. Optionality in future hydrogen decisions whilst maintaining gas networks' delivery.



Consumer-centric

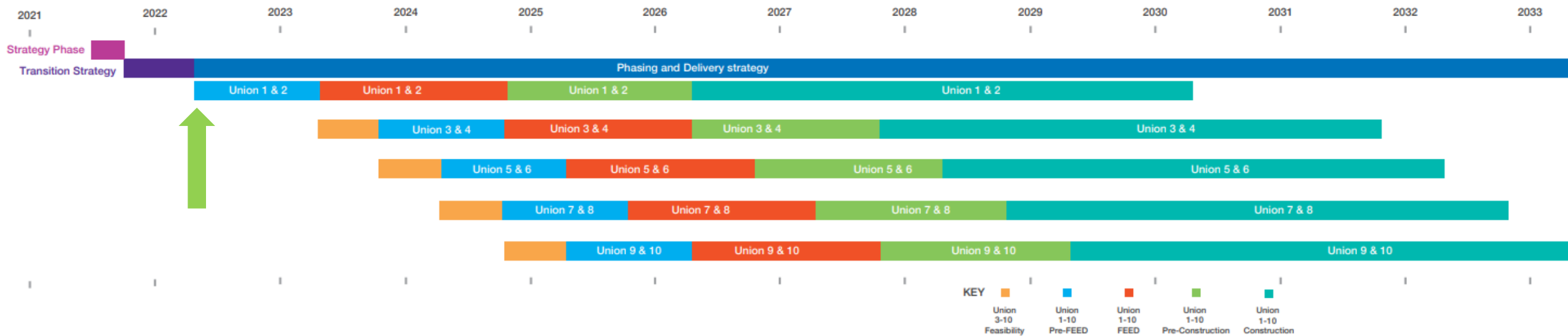
Innovative, cost-effective consumer focused energy solutions, e.g., the pilot hydrogen town brings scalability & phasing.

Project Union will contribute to Energy Security

Enable transport of and fair access to indigenous supplies around the UK and opens up export opportunities by connecting to the European Hydrogen Backbone

ProjectUnion

Current Status and Next Steps



Feasibility

Pre-FEED

FEED

Pre-
Construction

Construction

FutureGrid

An ambitious programme to build a hydrogen test facility from decommissioned assets at DNV's facility in Cumbria to demonstrate the National Transmission System (NTS) can transport hydrogen.

Gas Transmission and Metering



Represent the NTS

A map of the United Kingdom with several key locations marked: St Fergus, Newcastle, Burton Point, Carlisle, London, and Milford Haven. Lines connect these locations, representing the National Transmission System (NTS) routes.

Follow Relevant Standards

An icon of a certificate or document with a star in the bottom right corner, symbolizing standards or certification.

Platform for Further Innovation

An icon of a document with a circuit diagram and a checkmark, symbolizing innovation and technology.

Future Expansion & Development

An icon of a globe with four people icons around it, symbolizing global expansion and development.

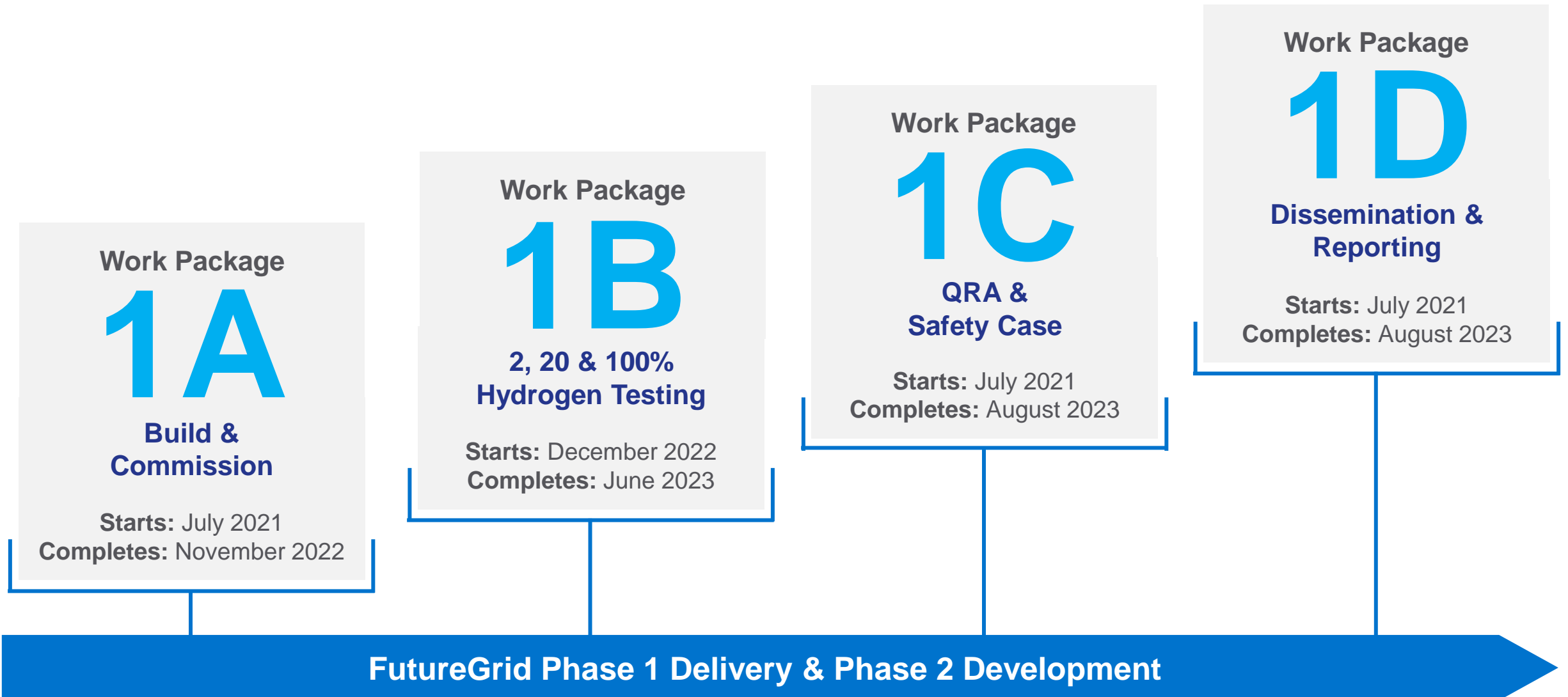
FutureGrid installation work



FutureGrid

Phase 1 Overview

► **Gas Transmission
and Metering**



thank you!

You can find out more information and contact us across our media channels:



Hydrogen@nationalgrid.com



nationalgrid.com/Hydrogen



Innovation at National Grid



@NationalGridUK