

FutureGrid Deblending Project

Providing a reliable and scalable
supply of hydrogen for the transport
industry

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National Gas Transmission operates and maintains the network of high-pressure pipelines and compressors carrying natural gas across Great Britain

National Gas transmission map



National Transmission Direct Connections

- 35 Power Generation
- 15 Industrial
- 9 Storage Sites
- 4 Distribution Businesses
- 3 Interconnectors
- 2 LNG Terminals



c.5000 miles of pipeline &
>500 AGIs



>60 compressors across 21
sites



3x the energy transported
by the electricity grid



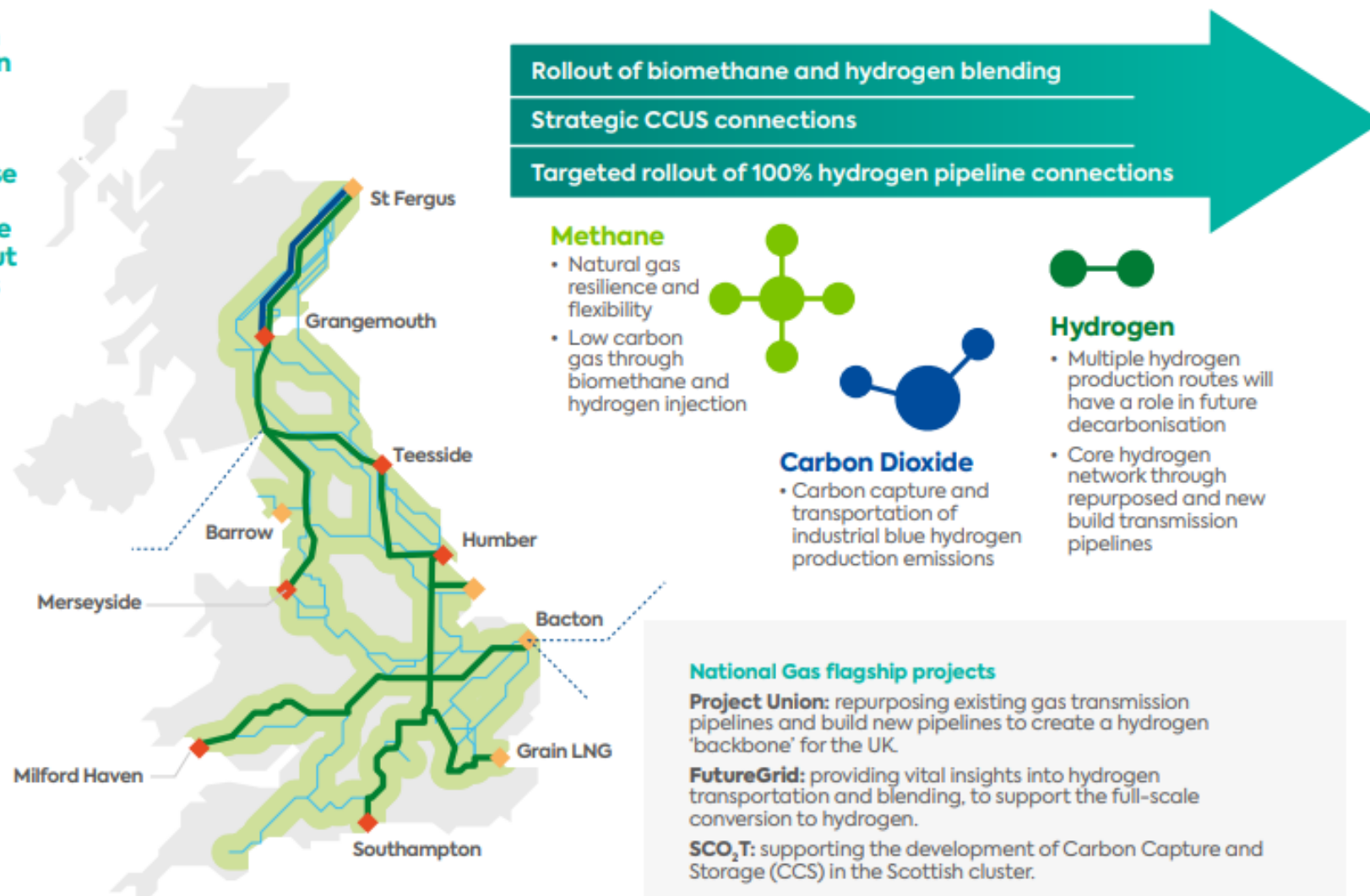
32% UK annual electricity
generated from gas

£7.99

Average cost of the NTS on typical
consumers' annual gas bill

The Three Molecule Approach

The three-molecule approach encompasses the continuation of natural gas delivery, while reducing the carbon content through biomethane and hydrogen blending with the use of Carbon Capture, Utilisation and Storage (CCUS) to capture emissions; alongside the rollout of 100% hydrogen pipelines as we transition to net zero.



Our vision for Project Union: East Coast

The East Coast region aims to be a foundation upon which the UK can build its hydrogen economy, delivering decarbonisation, resilience, energy security, and green economic growth.

The development of a national hydrogen supply chain will require a starting point with sufficient production capabilities, storage capacity, network connectivity and concentrated demand. Project Union: East Coast hosts a diverse industrial base with a central location of concentrated industrial sites, large scale gas storage capacity and offshore wind power.

PU: East Coast will deliver significant benefits for the region

27 TWh/year

of power demand connected through direct connects by 2030

1.3 TWh/year

of industrial demand connected through direct connects by 2030

11.4 TWh/year

supported for NGN to connect to by 2030

Up to 330km

of repurposed natural gas pipelines reducing new infrastructure required

3.6 TWh

of potential hydrogen storage capacity connected from Rough Gas Reservoir and Aldbrough by 2030

5 MtCO₂/year

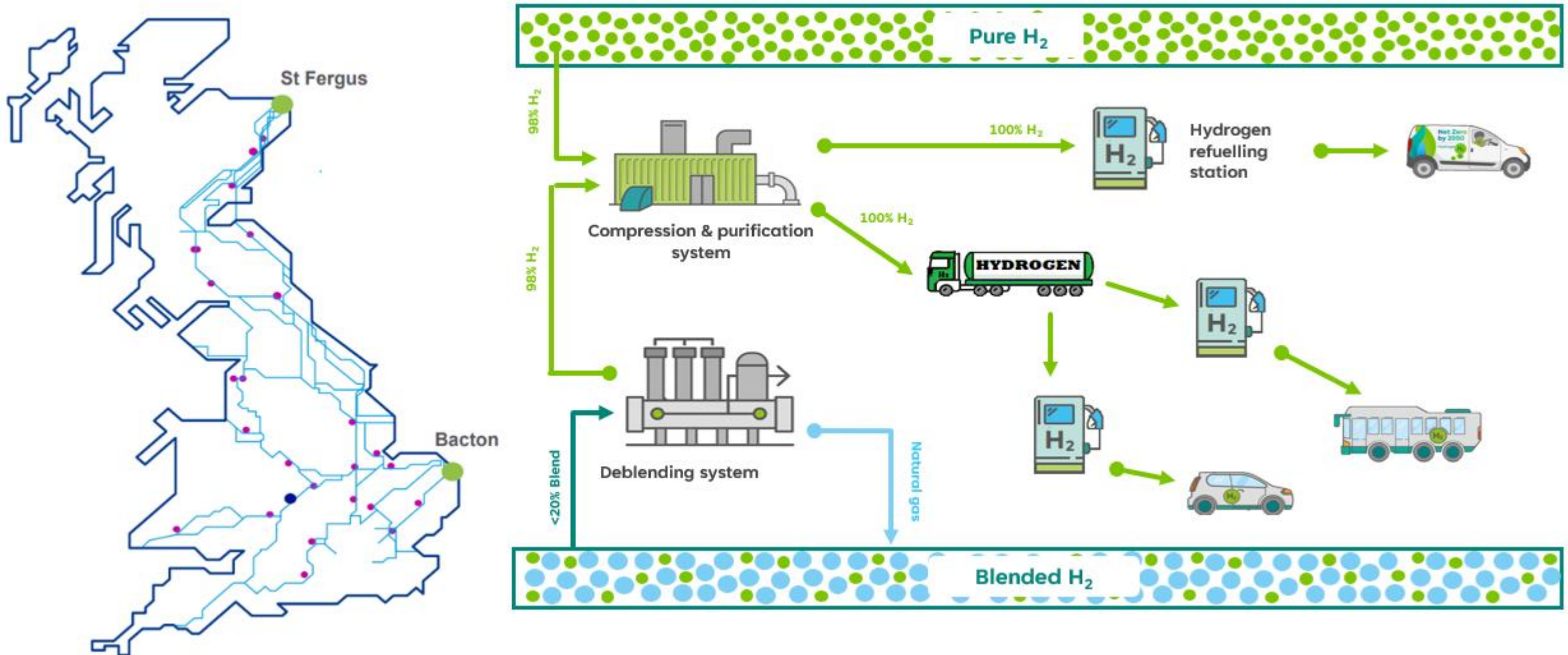
saved through fuel switching from natural gas by 2030



Network configuration is indicative and subject to change

Deblending Concept

Utilisation of the existing national gas transmission system to provide pipeline served refuelling across the UK.



Why?

1



Reducing consumer cost of hydrogen refueling

Deblending served hydrogen refuelling provides the opportunity to significantly reduce costs of hydrogen for transport purposes. This is possible due to the reduced need for tube trailer fuel deliveries as refuelling stations and connect directly to the NTS.

2



Enabling Scalability and Reliability of Supply

Deblending for hydrogen transport will encourage the hydrogen supply chain as hydrogen suppliers will have the opportunity to put their hydrogen on to the NTS and hydrogen vehicles will have a reliable refuelling network.

3



Complimenting Battery Electric Vehicles

Battery electric vehicles provide a great opportunity to decarbonise the transport industry however in certain applications battery electric cannot provide the required function. Hydrogen vehicles are a complementary option to electric vehicles that provide an opportunity to support the decarbonisation of energy intensive vehicles such as HGVs and non-road transport.

4



Achieving Clean Transport by 2050

Hydrogen deblending for transport enables a whole new market of decarbonised transport options which will further plans to achieve Clean Transport by 2050.



Rollout Strategy

DIRECTION CONNECTION



Favourable for large-scale demands in close proximity to the NTS



Many of these large-scale demands are rail demands, with uncertainty about the rollout

TUBE TRAILER FROM DEBLENDING HUB



Competitive in the long-term but lower markup than direct connection to the NTS and requiring greater subsidy during the transition.



Captures a wider distribution and demand area.



Graphic showing large scale mobility clusters mapped against the NTS, requiring more than 5 tonnes per day of Hydrogen by 2050.

Beyond the commercial case, there are several other benefits to distribution via pipeline



Improved reliability of supply



Smaller site footprint



No local storage = lower risk



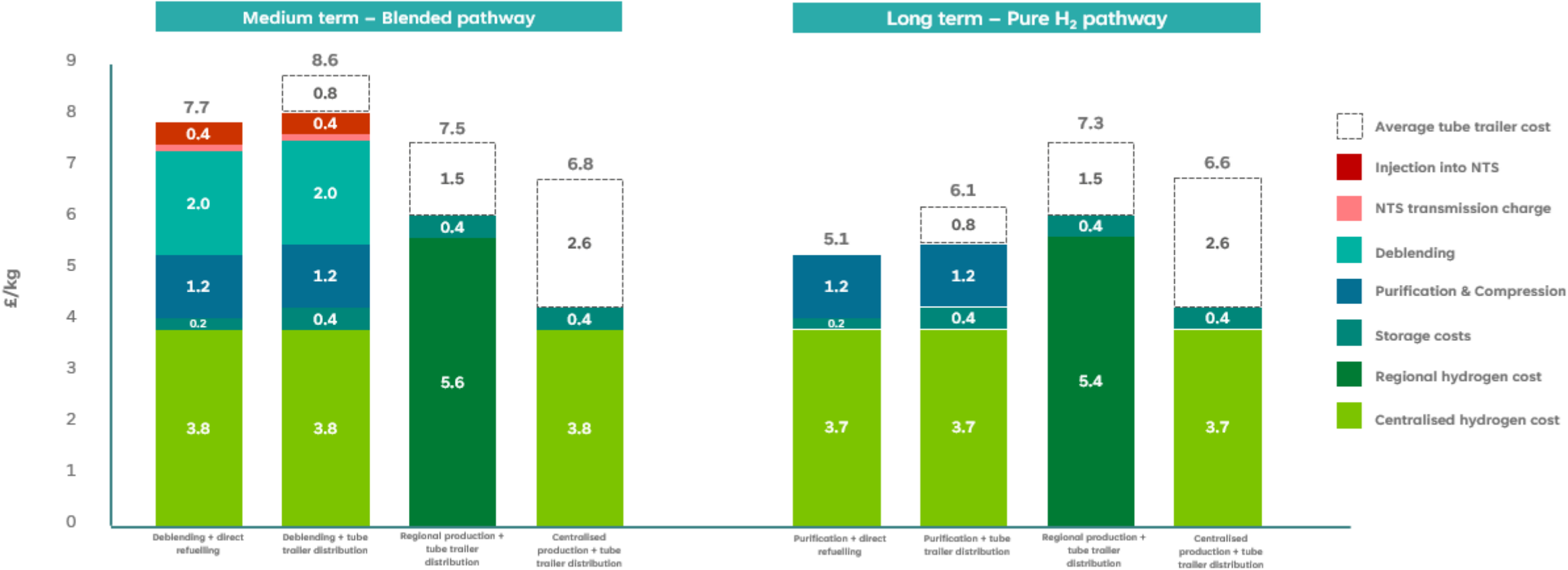
Greater site capacity

Cost of hydrogen

Cost drivers

Cost of hydrogen is currently one of the main blockers to the deployment of hydrogen vehicles. Costs remain high due to poor availability of hydrogen and the lack of a mature hydrogen market.

Delivery pathways



Stakeholder Group

Project Partners



TSOs



Automotive



Deblending



Others



Refuelling and Producers



Other Transport



Next Steps: Specification and concept for demonstration

Technical and commercial specification

- Covers both technical specialist engineering and business models and case.
- Support broad range of use cases: So useful to understand the limits of design and then possible optimisations or trade-offs within those limits.
- Support separate analysis of purification and debblending processes.
- Keen to hear direct from you, the experts!

Concept for a commercial demonstration

- Flow rate
- Throughput
- CAPEX
- OPEX
- Refuelling protocols
- Sizing (e.g., number of pumps)
- Pressures
- On-site storage and method (e.g., gaseous/liquid)
- Energy consumption of debblending and refuelling
- Ownership model
- Connection model
- Timelines
- Invest-ability/payback period



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