Unlocking Hydrogen’s Potential
How Deblending can create new opportunities for transport

Lloyd Mitchell
FutureGrid Deblending Manager
The National Transmission System (NTS)

The role of gas:

- **23m** Gas customers across the UK
- **85%** of UK households use gas for heat
- **881 TWh** of energy is supplied by the NTS each year

UK gas demand:

- **39%** Power Generation
- **38%** Domestic Use
- **23%** Industrial & Commercial

- **7,660km** high-pressure pipe
- **94 bar** maximum pressure on the network
- **23** compressor stations
- **504** above-ground installations
- **8** connected distribution networks

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

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 deblending 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

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Why Hydrogen for Transport Applications?

In 2035 – no more diesel engine trucks (<29 T GVW) can be sold in the UK

Hydrogen can provide a solution for hard to electrify rail lines such as rural long-distance lines

Projected 75–95TWh of UK demand for hydrogen-based fuels by 2050

DfT Clean Maritime Plan

Hydrogen can support aviation both directly and through alternative fuels
The case for hydrogen transport

A Toyota Mirai just did 623 miles on a single tank of hydrogen

Mirai breaks Hyundai Nexo’s record for going furthest on a tank of hydrogen

Jan 2021

Green hydrogen costs 'can hit $2/kg benchmark' by 2030: BNEF

A scaled-up industry could deliver green hydrogen for a benchmark cost of $2/kg in 2030 and $1/kg in 2050 in many parts of the world according to Bloomberg New Energy Finance.

Oct 2021

Opportunity for further ~£2/kg reduction
LCOH: £4.50/kg by 2030

Producing green hydrogen for $1/kg is achievable in some countries by 2030': WoodMac

Dramatic drops in the price of electrolyzers, combined with low-cost renewable energy, can enable green H2 to be the cheapest form of hydrogen by the end of the decade, analyst says

H₂ supply costs in 2030 for deblending from NTS vs. tube trailer and on-site production at HRS

Blended pathway

Pure H₂ pathway

Toyota Mirai sets 845-mile hydrogen mileage record

Toyota’s hydrogen fuel cell Mirai travels a record-setting distance between fill-ups with the help of professional hypermilers and simple maintenance.

Oct 2021
Transport use cases

World’s first hydrogen-powered digger set to drive on UK roads

The first digger powered by a hydrogen combustion engine will soon be on UK roads and building sites.

Aberdeen’s hydrogen double decker buses notch up 100,000 miles of operation

Apr 2021

Mercedes-Benz hydrogen truck prototype covers more than 650 miles on one fill

Oct 2023

China’s First Hydrogen Fuel Cell Vessel Enters Service

Oct 2023
A global-first, world-class hydrogen test facility

Demonstrating high-pressure gas transmission assets can transport hydrogen and providing the evidence for the transition.
**FutureGrid Deblending**

**Entry & Bulk Separation**
- Extractor 1
  - 200kg/day at 98% purity for industry/combustion
- Extractor 2
  - Natural gas is recycled

**Purification & Compression**
- Purification
- Compression
  - 40kg/day at 99.9% purity for fuel cell applications

**Refuelling Station**
- Refuelling pump
  - Vehicle
- Buffer Storage

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**FutureGrid Deblending Project Partners**
- National Gas Transmission
- Project Partners
  - DNV
  - ERM
  - Hydrogen
  - ELEMENT 2
  - Cadent
  - Northern Gas Networks
  - SGN
  - WALESWEST UTILITIES

**National Gas Transmission**