

# Westminster Energy, Environment & Transport Forum policy conference

Next steps for upgrading assets and ensuring that networks are fit for purpose - improving long-term reliability, security of supply, and overcoming delivery challenges

Chris Barron - Costain

# UK Gas System Configuration - Overview

COSTAIN

## UK Gas Supply

- **Beach Terminals**
  - St Fergus – North Sea off-shore production
  - Easington – Langed pipeline (Norway)
- **Bacton – Zeebrugge Interconnector** – European gas network
- **LNG Import Terminals**
  - Grain
  - Milford Haven

## National Transmission System (NTS)

- Owned & Operated by National Grid
- 7,660 km HP steel pipelines (450mm - 1200mm dia.)
- 23 compressor stations
- Circa. 750GWh of line pack storage capacity
- Direct connected customers:
  - Large industrials (typically located in industrial clusters)
  - CCGT power stations

## Gas Distribution Networks

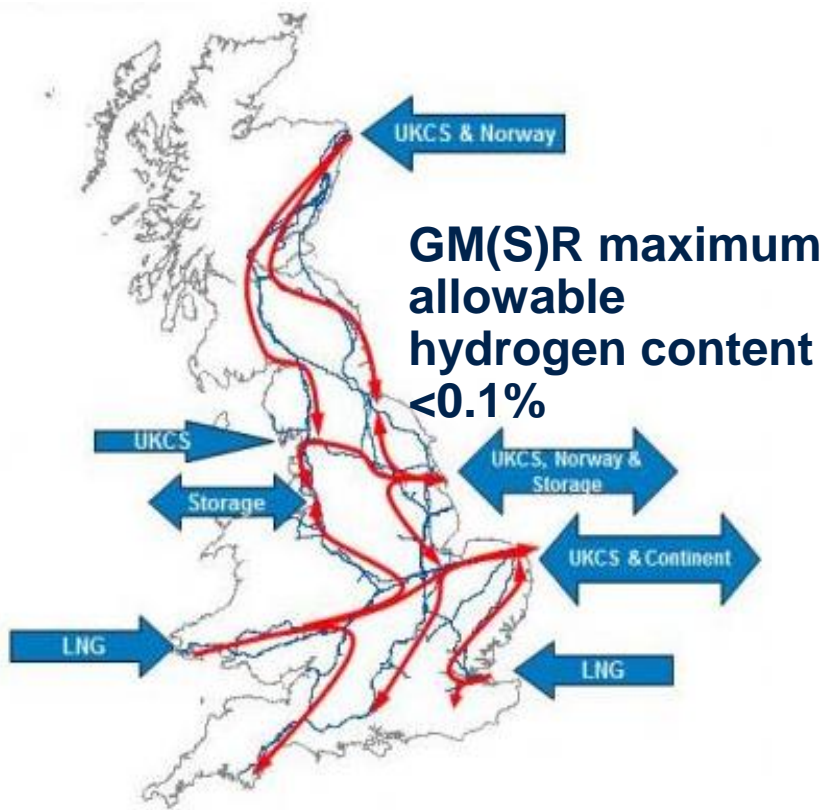
LTS  
> 7 bar  
Welded Steel

IP Network  
2 - 7 bar  
Steel / PE

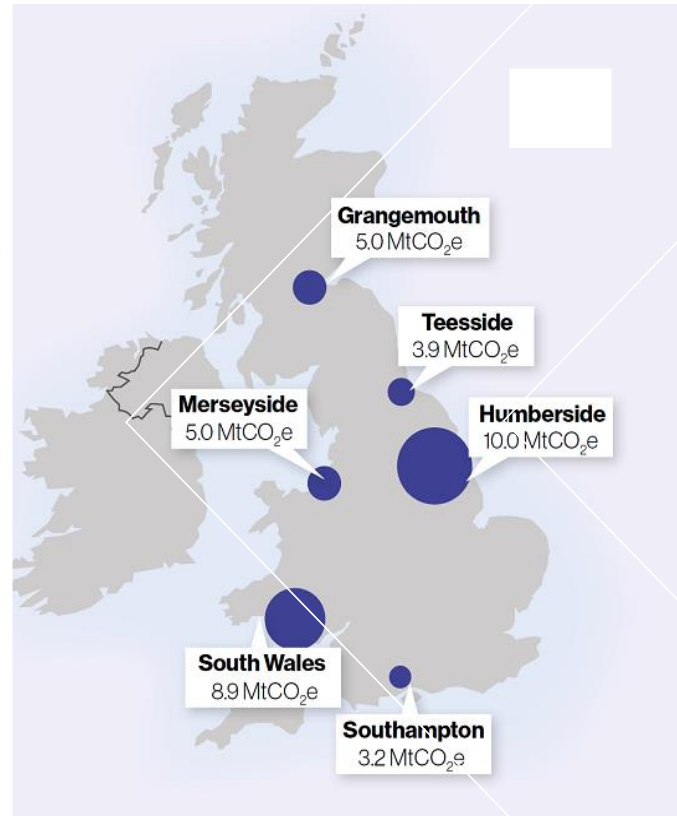
MP Network  
75 mbar to 2 bar  
Steel, PE, cast iron and ductile iron

LP Network  
30 mbar to 75mbar  
PE, cast iron and ductile iron

# Future UK Gas System - National Transmission Network



NTS Current Configuration and gas flows



Industrial Clusters



NTS – Conversion to UK Hydrogen Backbone

# Future UK Gas System – Distribution Networks



SGN

- H100
- Aberdeen Vision

NGN

- H21
- HyDeploy
- Zero Carbon Humber

Cadent

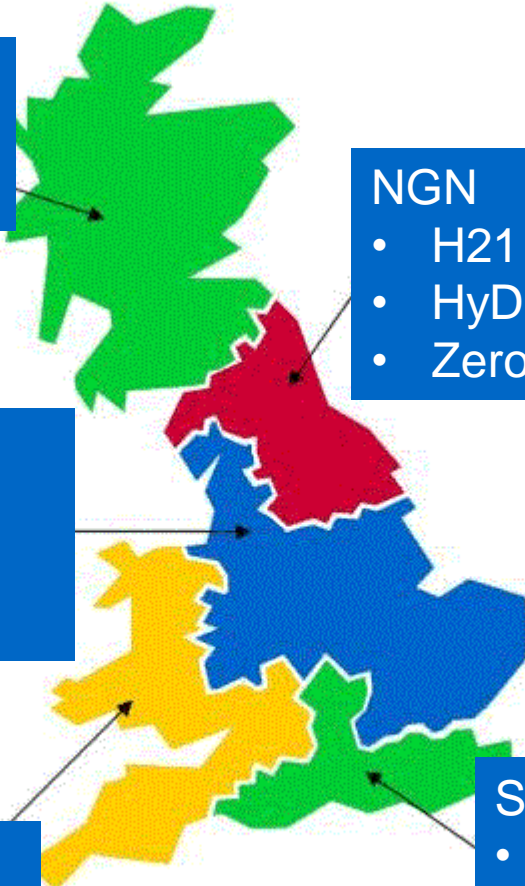
- HyNet
- HyDeploy

WWU

- SWIC

SGN

- Southampton Water



National Grid area	Number of LDZ offtakes
Scotland	19
Northern	15
South West	13
East Midlands	13
West Midlands	12
North West	11
East Anglia	11
North East	9
Southern	8
North Thames	5
South East	5
Wales	3
<b>Total</b>	<b>124</b>

# UK Gas System – Network Components

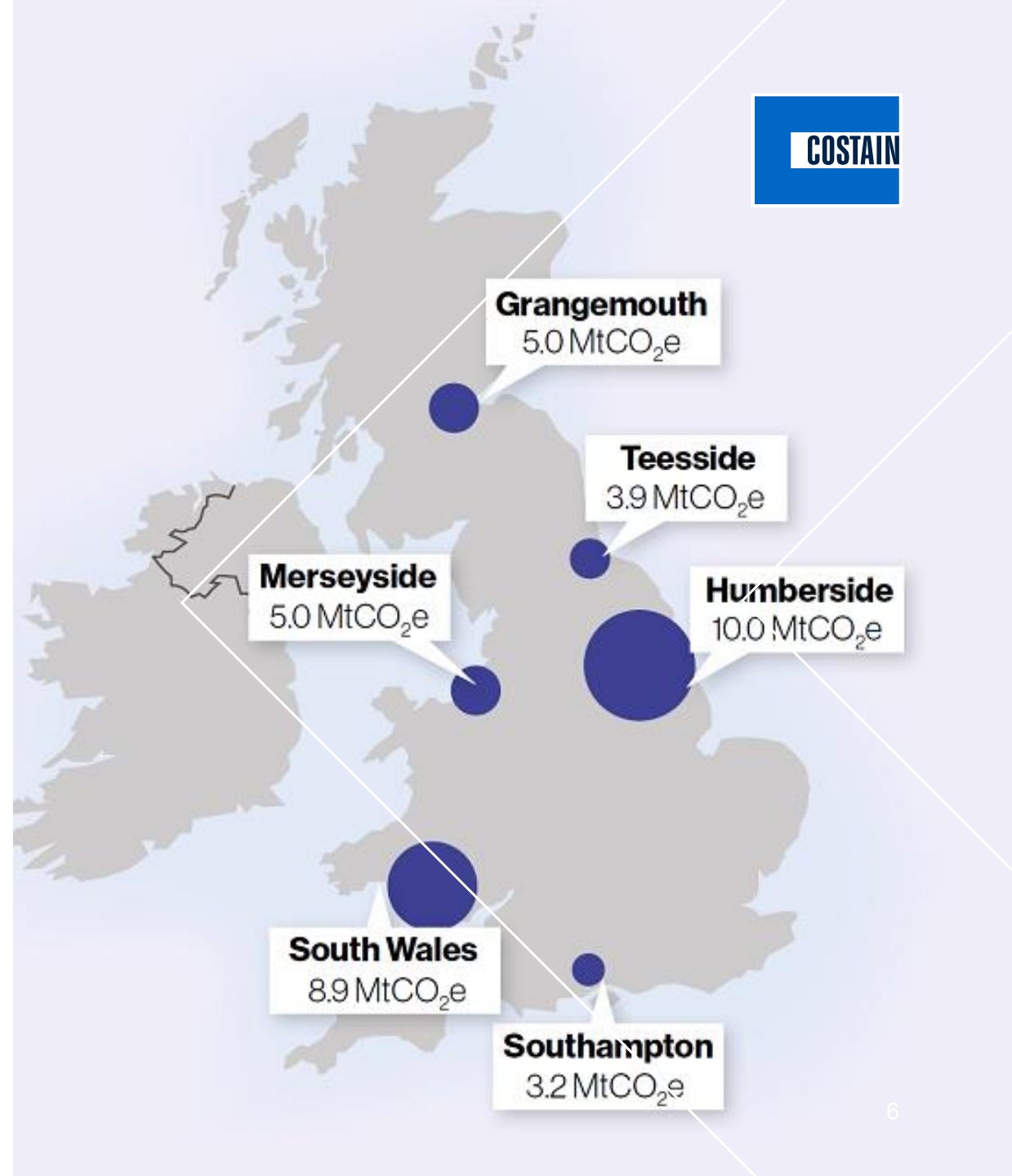


Distribution Network Components	Hydrogen blends (up to 20% h2)	100% Hydrogen
Steel pipelines	Dark Green	Light Green
Polyethelene pipelines (MDPE / HDPE)	Dark Green	Dark Green
Valves	Dark Green	Light Green
Steel pipeline fittings- tee's / bends /	Dark Green	Light Green
MDPE / HDPE pipeline fittings - tee's /	Dark Green	Dark Green
bends / flanges	Dark Green	Dark Green
District Regulator Station's	Dark Green	Light Green
Meters - Ultrasonic	Dark Green	Dark Green
Meters - Turbine	Dark Green	Light Green
Meters - Bellow type	Dark Green	Red
Industrial / Commercial end user	Light Green	Red
combustion equipment	Light Green	Red
Domestic appliances	Dark Green	Red
<b>Key:</b>		
Considered suitable for hydrogen duty	Dark Green	Dark Green
Require technical evidencing	Light Green	Light Green
Considered unsuitable for hydrogen duty	Red	Red

Transmission Network Components	Hydrogen blends (up to 20% h2)	100% hydrogen
Steel transmission pipelines (X52 and below)	Dark Green	Dark Green
Steel transmission pipelines (above X52)	Red	Red
Pipeline fittings - tee's / bends / flanges (X52 and below)	Light Green	Light Green
Pipeline fittings - tee's / bends / flanges (above X52)	Light Green	Light Green
Compressors	Light Green	Red
Mainline valves	Light Green	Light Green
Pressure reduction stream components at delivery points	Light Green	Light Green
	Light Green	Light Green
Pig launchers / receivers and associated pipework	Light Green	Light Green
Ultrasonic meters	Dark Green	Dark Green
Turbine meters	Light Green	Light Green
orifice plate meters	Light Green	Light Green
Industrial end user combustion equipment	Light Green	Red
<b>Key:</b>		
Considered suitable for hydrogen duty	Dark Green	Dark Green
Require technical evidencing	Light Green	Light Green
Considered unsuitable for hydrogen duty	Red	Red

# Industrial Clusters

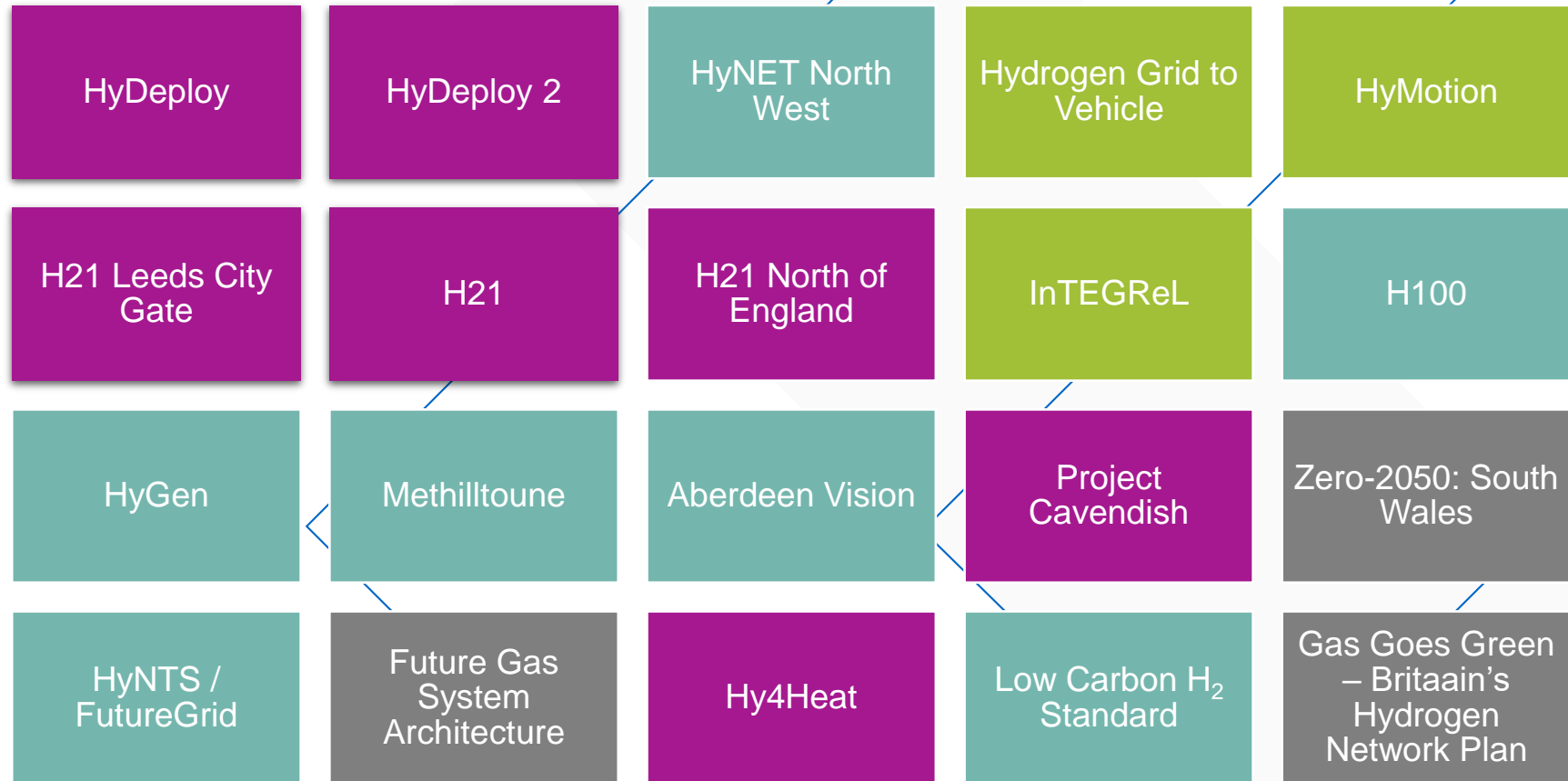
- 42% of domestic customers within industrial clusters
- 58% of HGV fleets are based within industrial clusters



# Key Network Considerations



- Ensuring the network can be operated safely
- Capacity of the network
- Material compatibility
- Conversion strategy



# Actions Required

## Government:

- ✓ Decision on heat
- ✓ Business models
- ✓ FOAK funding (hydrogen production)

## Gas Networks:

- ✓ Complete iron mains replacement programme
- ✓ Demonstrate blending 20% into network
- ✓ Provide technical evidence for 100% hydrogen conversion

## Regulator:

- ✓ Update GS(M)R for H2 blends
- ✓ Develop standard for 100% H2
- ✓ Determine RIIO-2 for various blends

## Others:

- ✓ Develop hydrogen production
- ✓ Develop H2 storage capacity
- ✓ Increased H2 and hybrid appliances manufactured at scale for industry and domestic users
- ✓ Increased manufacture of H2 vehicles and transport solutions at scale