An accelerated hydrogen pathway for Scotland

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June 2022

SGN

Your gas. Our network.

UK and Scottish Government decarbonisation targets

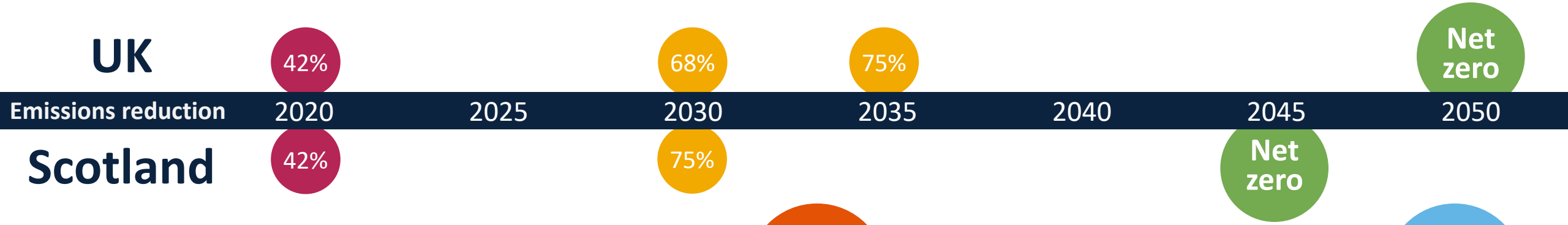
UK

Heat

- Awaiting hydrogen ready boiler consultation
- Decision on hydrogen blending by end of 2023
- UK Government decision on hydrogen for heat in 2026
- Ambition for 600,000 heat pumps/year by 2030
- Biomethane could treble from current levels by 2030
- Heat networks 5% by 2030 and 20% by 2050

H2

- UK production 10GW by 2030 (with at least half green hydrogen)
- UK Government supporting the development of hydrogen for domestic heat evidence base



Scotland

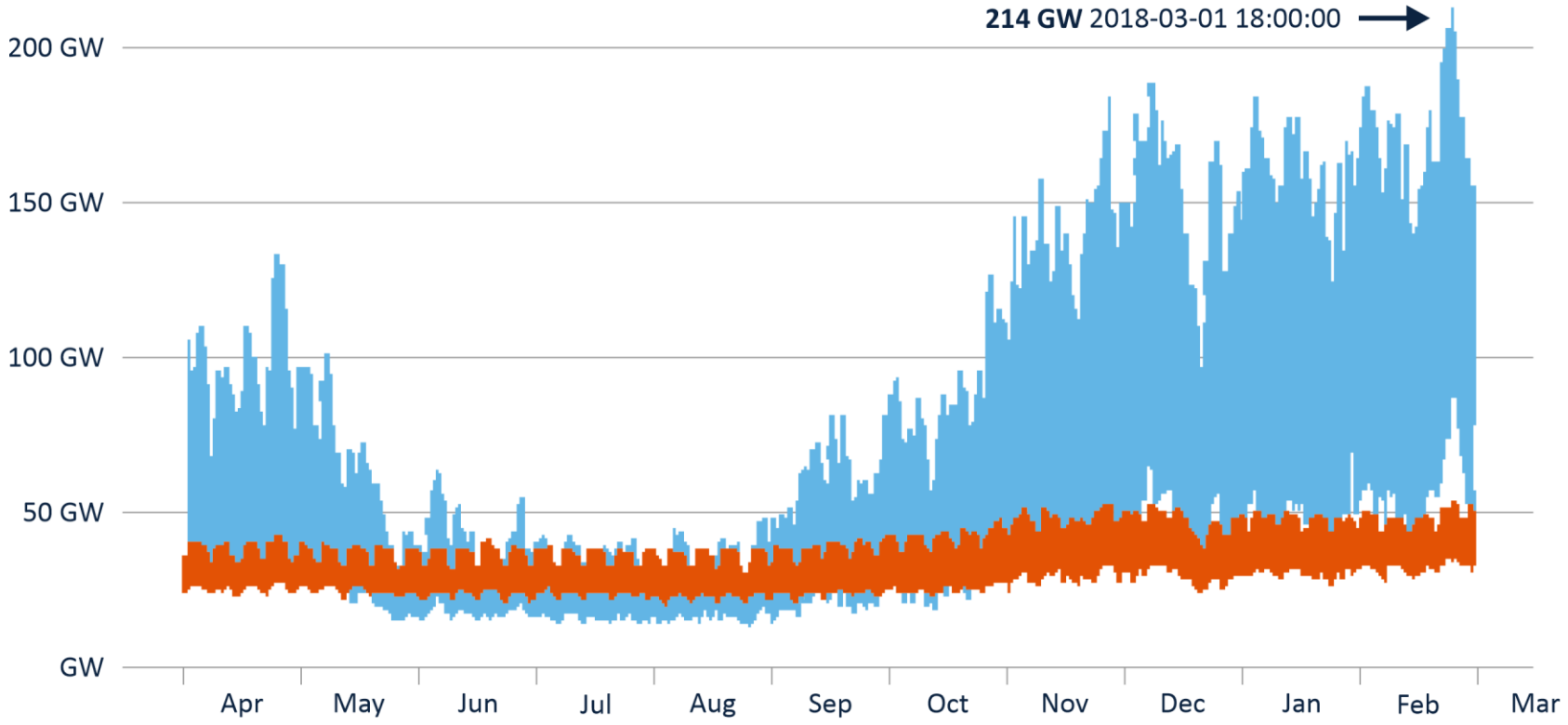
Heat

- 1 million homes and 50,000 non domestic buildings equivalent by 2030
- 20% blended hydrogen by 2030, 5% biomethane
- No natural gas in new homes consented from 2024
- 64,000 homes a year being converted to net zero by 2025 – the focus is on heat pumps and heat networks

H2

- Scottish production 5GW by 2030, 25GW by 2045
- Scottish Government supporting the development of hydrogen for domestic heat evidence base

System challenge: decarbonisation of heat



Gas and electricity demand during the 'Beast from the East' in 2018

The gas network transports

four times

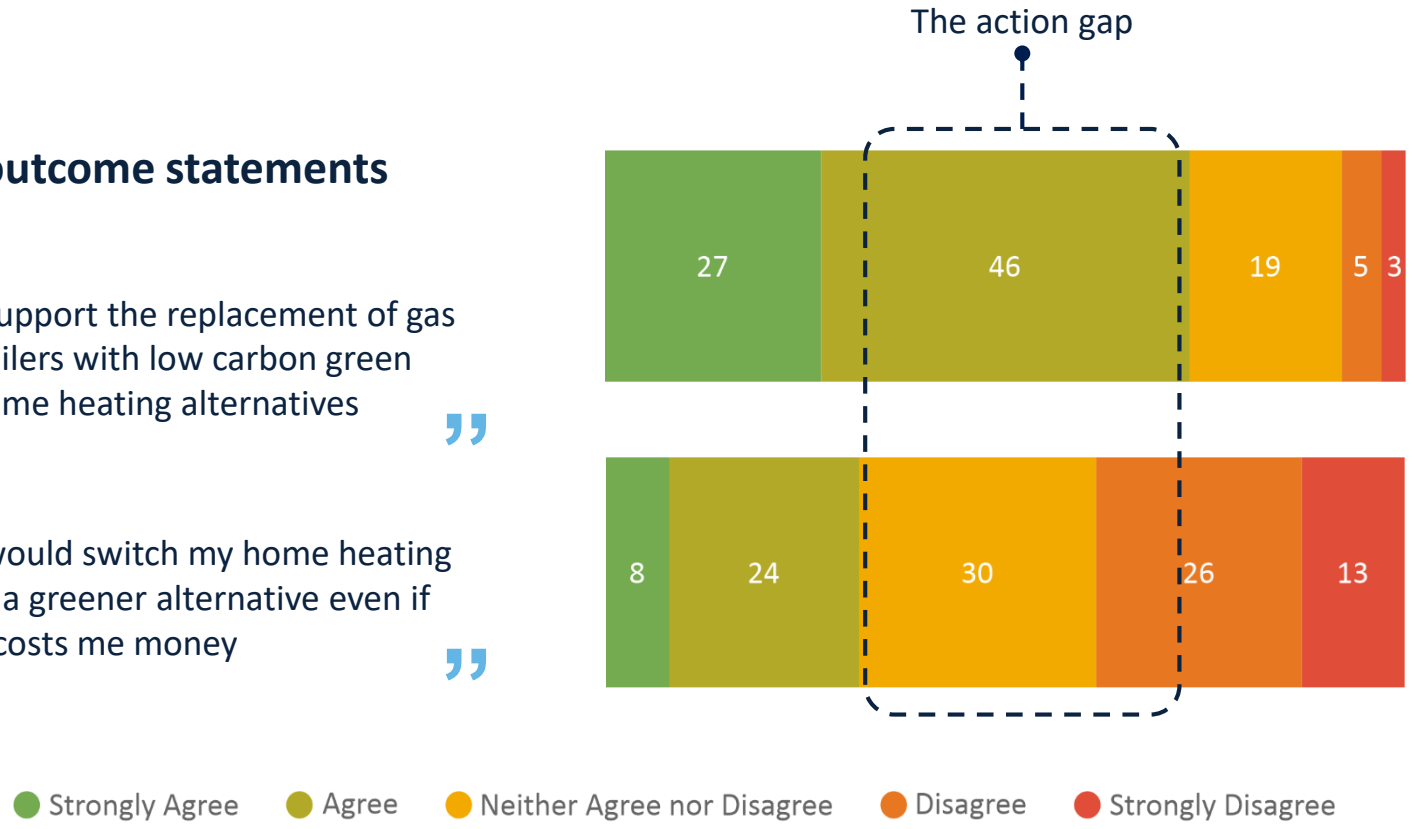
more energy a day than electricity networks in the winter and we need to ensure the energy system remains secure and reliable as we decarbonise heat.

Customer challenge: the decarbonisation of heat

Key outcome statements

> I support the replacement of gas boilers with low carbon green home heating alternatives

> I would switch my home heating to a greener alternative even if it costs me money



From our research in Scotland, there is a clear divide in what people say they want and what they are willing to do

- **73%** say they support replacing their boiler with a greener alternative
- But only **32%** say they would pay for this switch.

A system transformation through hydrogen can increase consumer options and help to plug the gap.

Our approach to decarbonisation

Placing customers at the heart of the energy transition

Place customer at the heart of delivering a net zero solution that maintains the levels of service they experience today

Build the hydrogen evidence base with industry and government

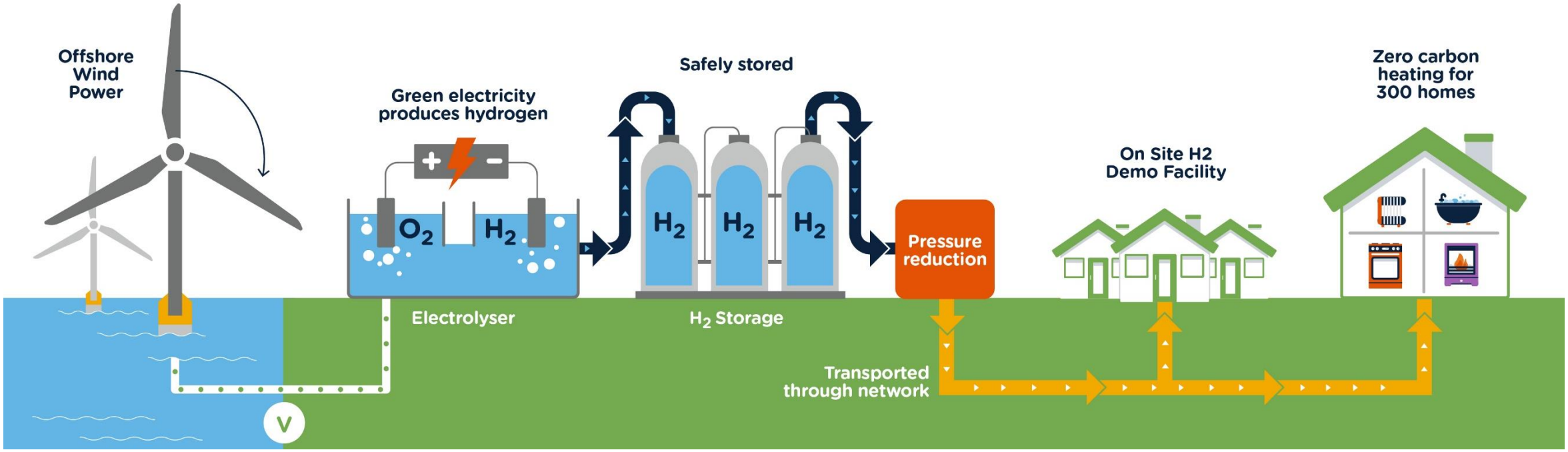
Build a credible net zero pathway through collaboration with other networks

Collaborate with energy sector, wider business and local authorities

Engage with stakeholders to understand needs to help create a thriving net zero market

- UK Government decision on the role of hydrogen for domestic heat in **2026**
- Prepare our network for a hydrogen system transformation
- Strong downstream and upstream industry partnerships

H100 Fife – demonstrating green hydrogen to customers



H100 Fife will provide technical and consumer evidence to support government policy decisions on heat decarbonisation

2020

Funding from shareholders, Ofgem and Scottish Government secured

2021

Planning and consent

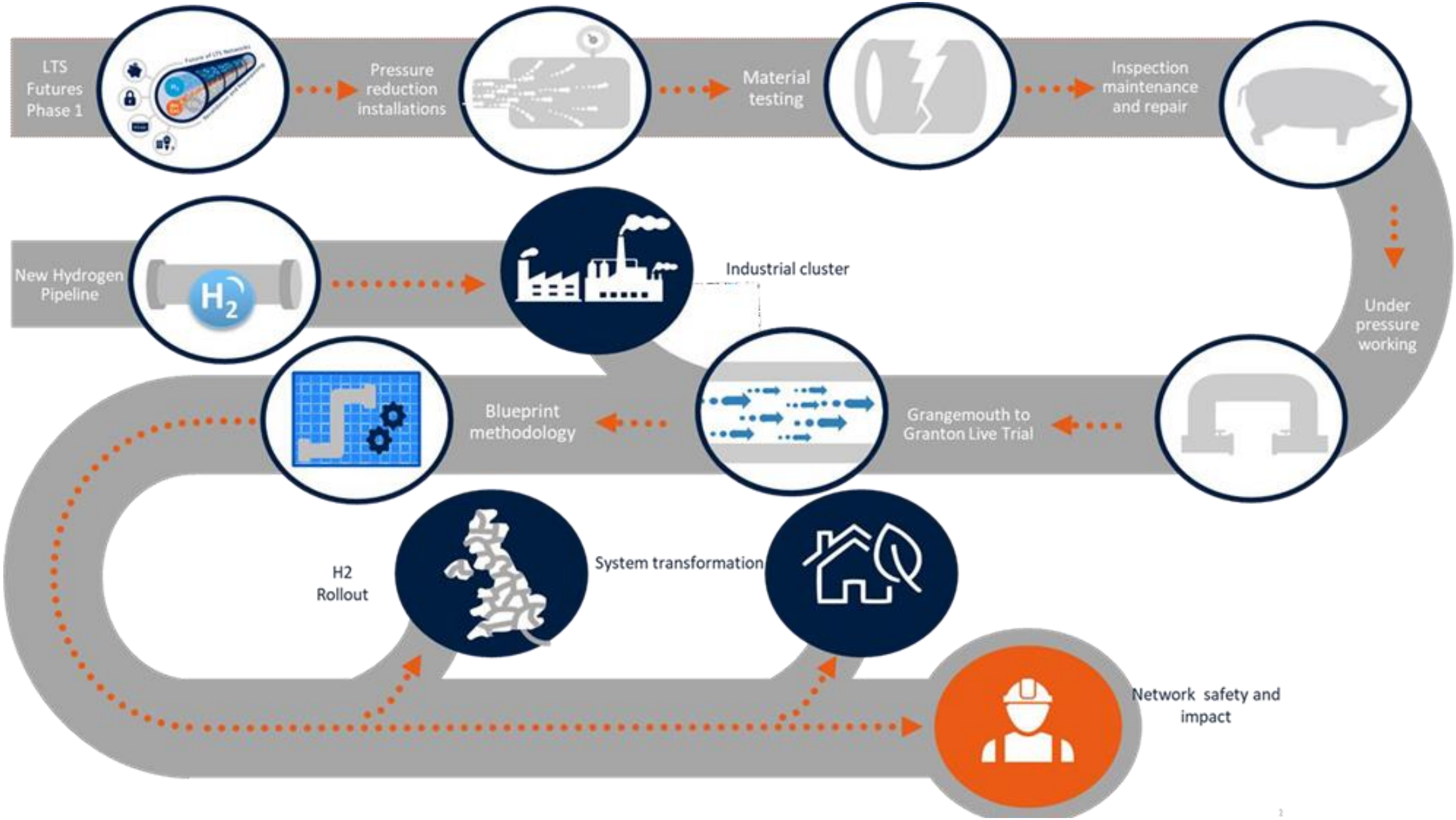
2022

Procurement and construction

2023

Delivering zero carbon heat/green hydrogen to customers

LTS Futures


LTS Futures Phase 1
Pressure reduction installations
Material testing
Inspection maintenance and repair
Under pressure working
Grangemouth to Granton Live Trial
Blueprint methodology
New Hydrogen Pipeline
Industrial cluster
H2 Rollout
System transformation
Network safety and impact

Feasibility study for hydrogen in multi-occupancy buildings

BUILDING CATEGORISATION

ASSET INFORMATION REVIEW

OPTIONEERING FOR SOLUTIONS

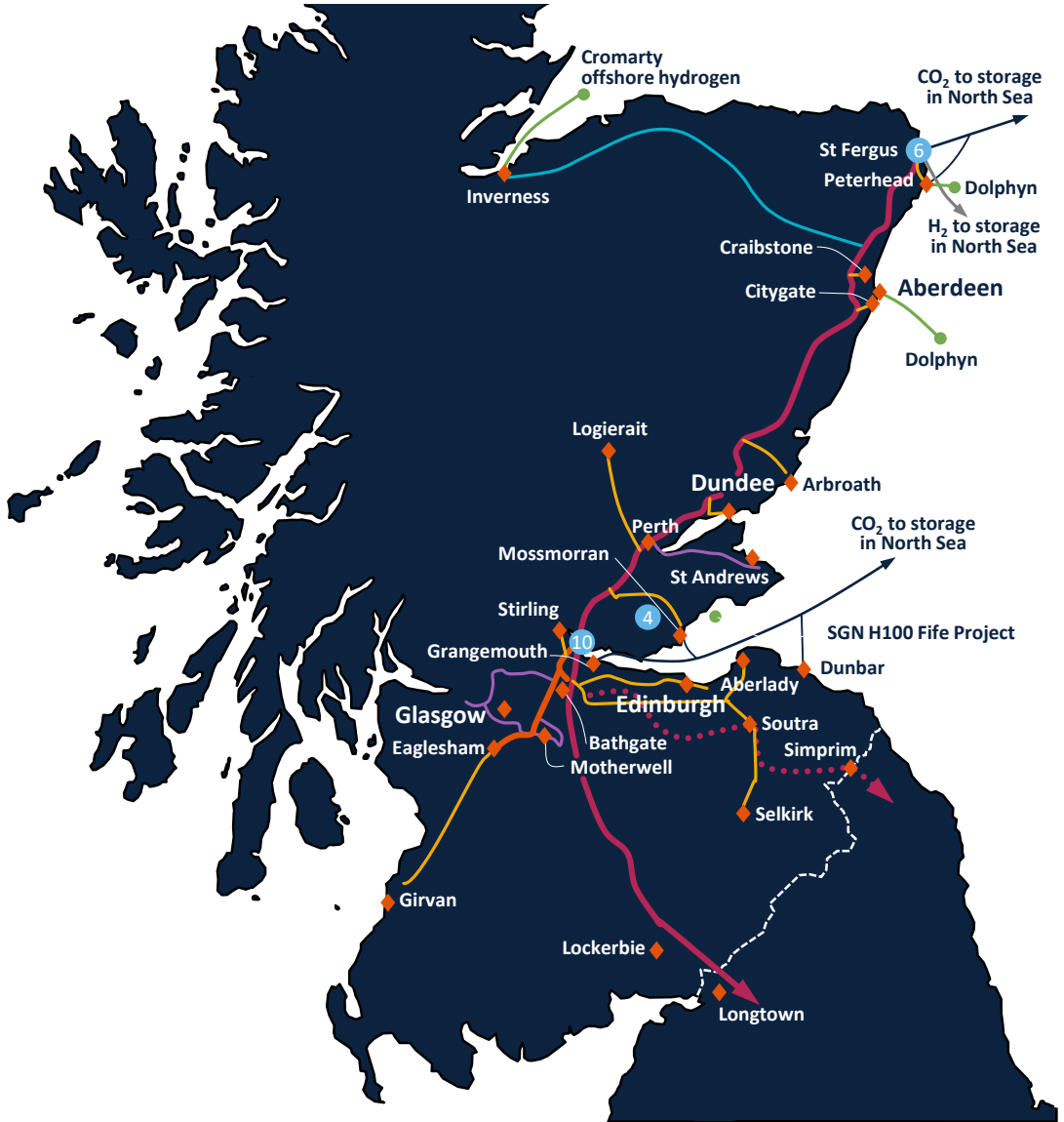
DEVELOPING AND TESTING PROGRAM

We are undertaking a feasibility study with subsequent infrastructure testing of MOB's to assess the technical and safety requirements for introduction of hydrogen - Split into above and below 6 storey buildings + complex buildings to build QRA to be applied to a MOB within a mapped Risk range

- Assessment for Above 6 storeys (additional control & safety systems)
- Assessment for Below 6 Storeys standard evidence testing.

Delivering a hydrogen network in Scotland

Supporting the delivery of Scottish Government 2030 targets



- Co developed by Wood plc with stakeholder input
- Distributed hydrogen production throughout Scotland
- Onshore hydrogen transmission system
- Offshore CO2 transmission to geological storage
- Acorn project is a central part of the pathway, producing hydrogen and capturing carbon

A three-phase approach is anticipated to deployment:

- Phase 1
  Aberdeen and St Fergus
- Phase 2
  Central Belt
- Phase 3
  East Coast

- New main hydrogen trunkline
- Alternative main hydrogen trunkline
- Main hydrogen spur line
- Repurposed existing spur line
- New hydrogen spur line
- New or repurposed spur line
- CO_2 network
- H_2 network (offshore storage)
- Proposed green hydrogen production
- Proposed blue hydrogen production (No. = SMRs/ATRs to be constructed)
- City/Town

Scottish Pathway

Projects - Renewable hydrogen

1 H100 Fife

2 Large Scale Green Hydrogen from Northern Horizons and Scotwind

3 South West Hydrogen – Green Hydrogen from existing and future onshore and offshore wind generation for injection to south west coast and flowing to Glasgow and the Central Belt

4 Green Hydrogen production for SIUs

5 Fort William Hydrogen from Hydropower and onshore wind

Projects - Low carbon hydrogen

6 Aberdeen Vision (Accelerated Pathway Phase 1) – Pipeline Pre-FEED, Aberdeen Conversion Planning, Hydrogen from St Fergus, Salamander Project and Dolphyn

7 Blue Hydrogen Production at Grangemouth

8 Blue Hydrogen Production at Mossmorran

9 Glenmavis Masterplan – Blue and/or Green Hydrogen Production

Studies

10 H2 Edinburgh & south east Scotland Hydrogen Study

11 H2 Tayside Study

12 Balgonie Hydrogen Storage

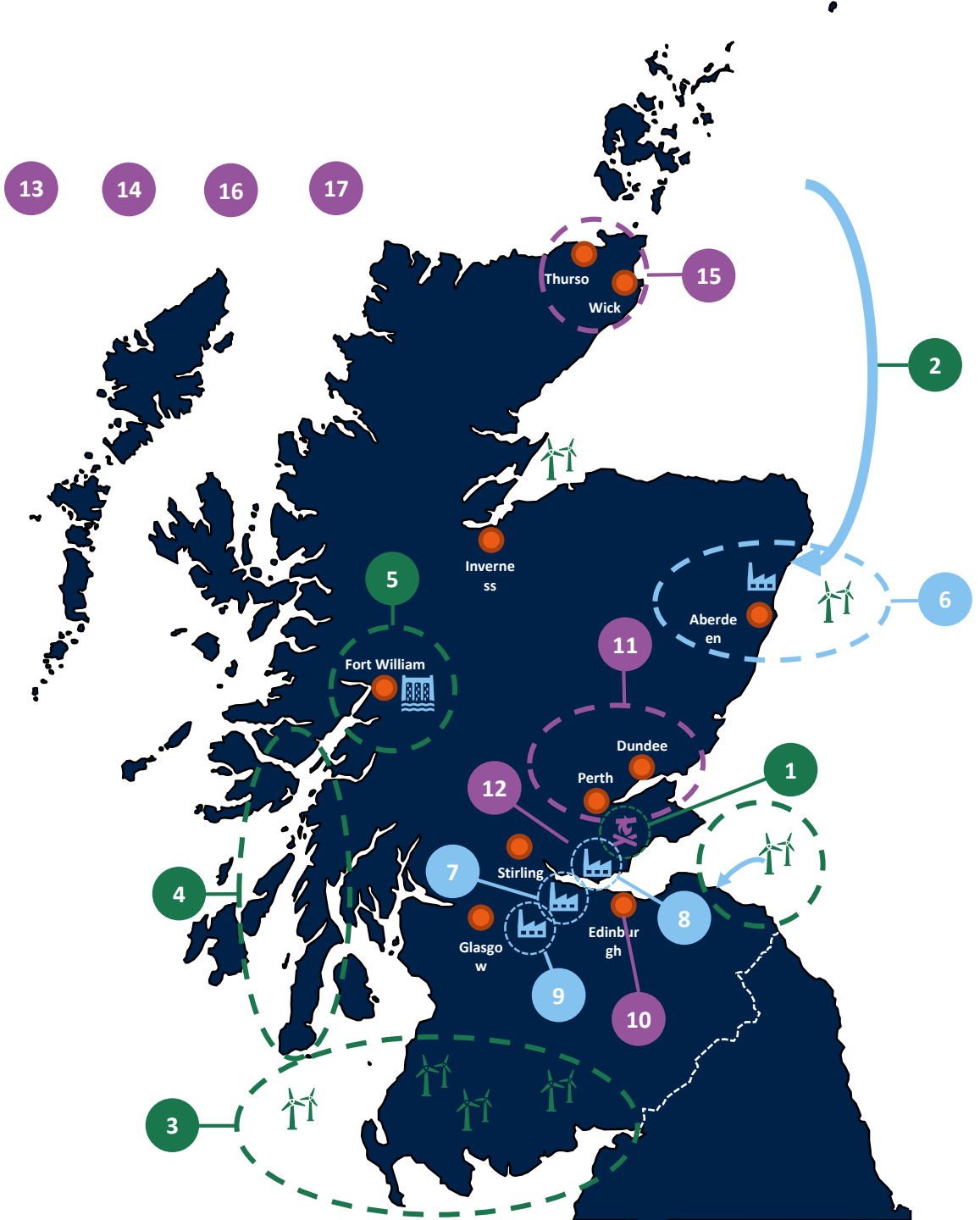
13 HyScale LOHC Feed

14 Water Study

15 SIU CNG Biomethane

16 BEIS Hydrogen Business Models (GGG)

17 Just Transition Study



Delivering a hydrogen network in Scotland

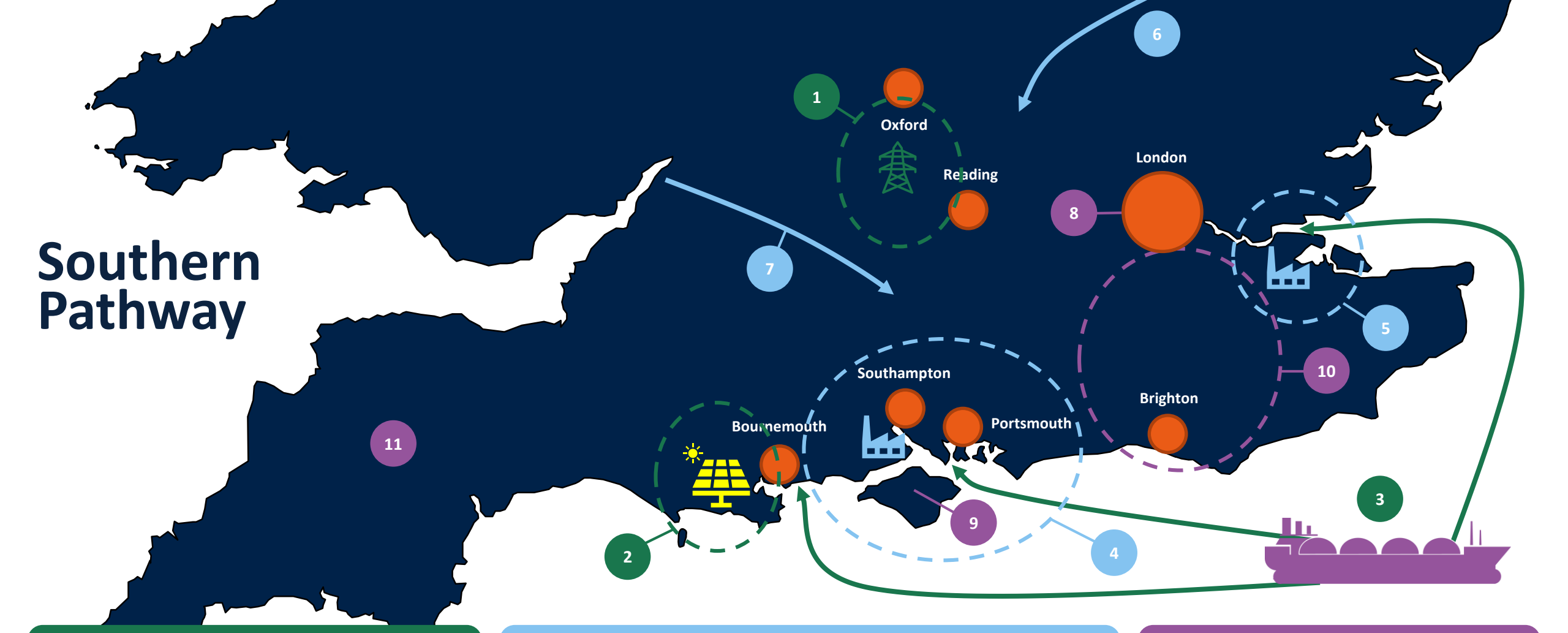
Our work in Aberdeen

- NE Network and Industrial Cluster project phase 1 conversion (Aberdeen Vision); targeting the conversion of Aberdeen City and Aberdeenshire
- Pipeline pre-FEED phase underway linking hydrogen production and key network locations
- Below 7-bar planning underway to deliver sectorisation and conversion plan to enable system transformation of north east gas networks
- Facilitating blue hydrogen production at St Fergus and green hydrogen production from offshore wind (Salamander and Dolphyn)

Central Belt & Fife

- Pre-FEED work under preparation to plan new pipeline infrastructure to enable system transformation in the Central Belt and Fife.
- Below 7-bar planning required to deliver network conversion plan.
- Designed around proposed large scale blue hydrogen production at Grangemouth and Mossmorran.
- Glenmavis also under consideration for the development of hydrogen production.
- Opportunities for the integration of offshore wind also under review to ensure a resilient supply is available necessary for system transformation.
- Designed around Scottish Government target of 1 million homes on net zero heating by 2030.

Southern Pathway



Projects - Renewable hydrogen

1 Distributed green hydrogen opportunities

2 Solar Generation and possible Hydrogen Storage

3 Green Hydrogen Import Opportunity

Projects - Low carbon hydrogen

4 Southampton Cluster – Blue Hydrogen Production at Fawley

5 Project Cavendish and H2 London – Blue hydrogen production at Grain

6 Potential Hydrogen Import from East Coast Cluster

7 Potential Hydrogen Import from Bristol/South Wales

Studies

8 Capital Hydrogen Study

9 Isle of Wight Study

10 Sussex Hydrogen Study

11 Servitudes and Wayleaves Study

Next steps for policymakers

How can hydrogen be accelerated to help get the UK to net zero as quickly as possible?

PACE

Bring out the hydrogen-ready boiler consultation

Make changes to GSMR regulations to blend 20% hydrogen into the grid by 2023 at the latest

Publish hydrogen business models

AMBITION

Use constrained renewable energy surpluses to generate green hydrogen to decarbonise multiple sectors

Accelerate all credible CCUS hydrogen production projects into track one of the sequencing process

Expedite the FEED studies in Aberdeen, Edinburgh, Fife to confirm the potential decarbonisation on a regional basis

Thank you

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Your gas. Our network.