



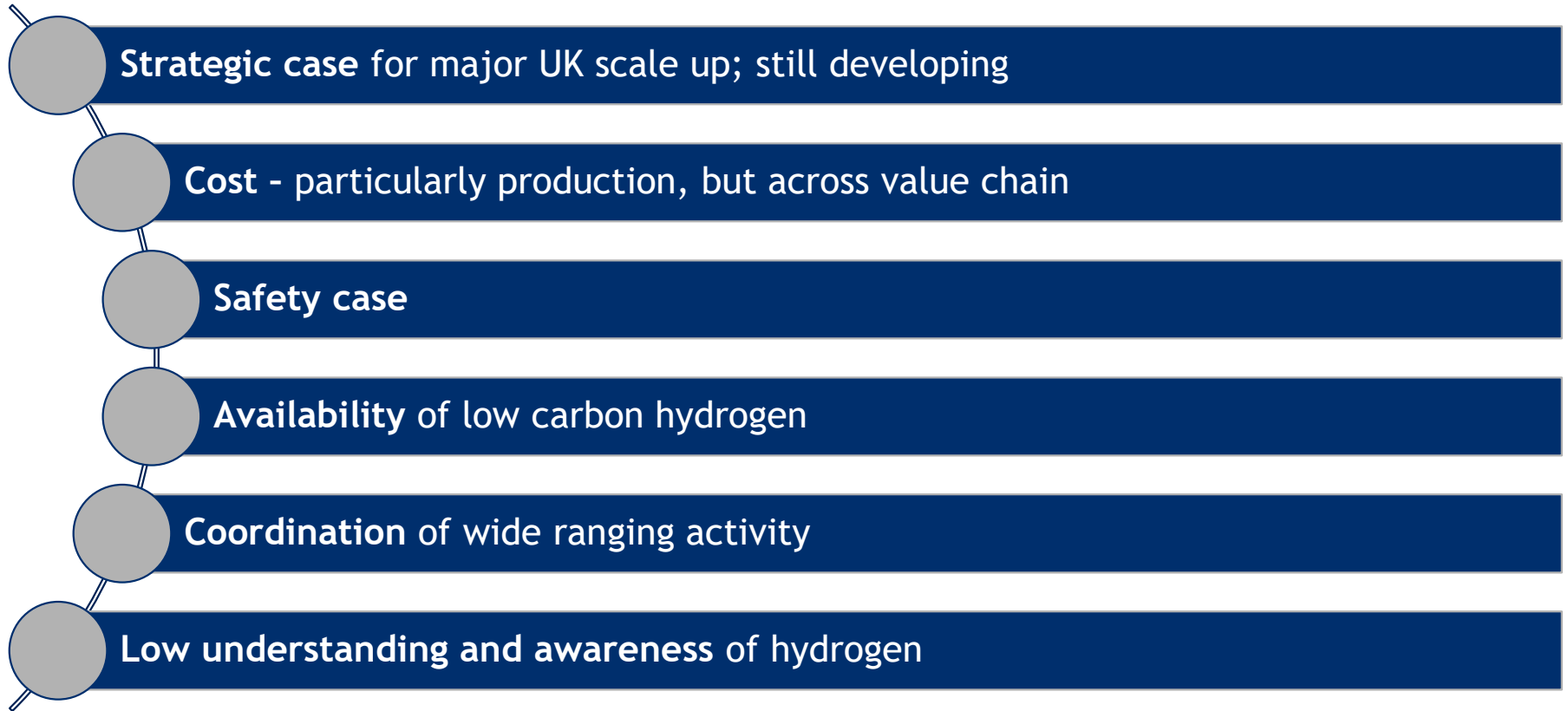
Clean Growth: Hydrogen in the UK low carbon economy

Summary of BEIS innovation programmes & policy

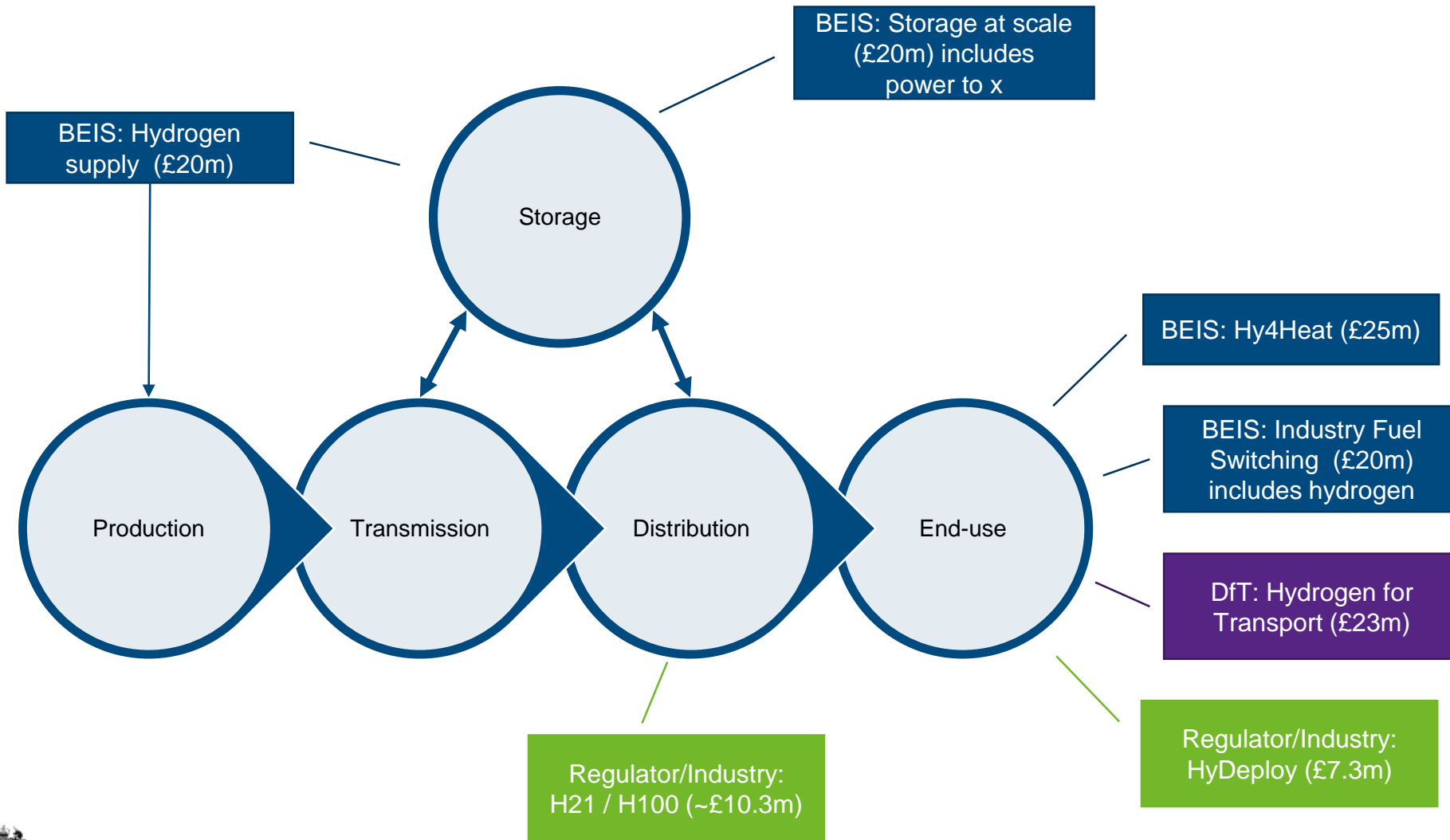
8 May 2019



Role for hydrogen? Need to address ...



Supporting innovation across hydrogen value chain, for a range of applications



...alongside wide ranging policy thinking

CCUS

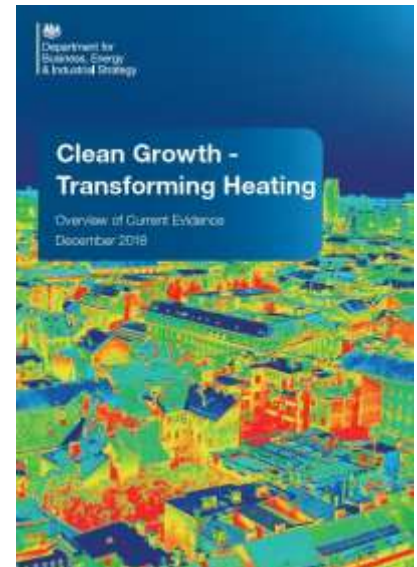
- Exploring pathways to deploy CCUS at scale in 2030s

Heat Strategy

- Assessing pathways to meet 2050 decarbonisation targets

Hydrogen Economy

- Developing strategic approach; UK and internationally



Policy and sector action - near to mid term opportunities?

Clean Growth Grand Challenge: Industrial Clusters mission

- Supported by Industrial Strategy Challenge Fund
- Bringing together innovation and policy thinking
- Government, business, places in partnership



We will maximise the advantages for UK industry from the global shift to clean growth



Hydrogen Supply Competition - BEIS

~£20 million

Identify how to supply low cost, low carbon hydrogen at scale
Reduce costs by accelerating development of low carbon bulk hydrogen supply solutions

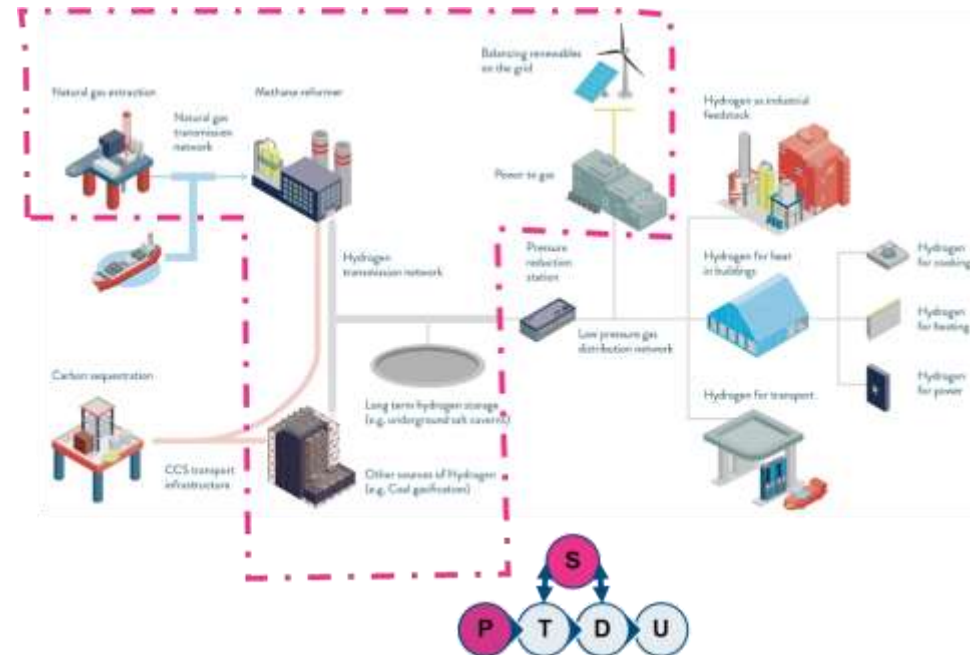
Targeting hydrogen supply for industry, power, buildings and transport

Phase 1 competition

£5m; initial design & engineering study up to £500k per project

Split into three key areas; Low Carbon; Zero Carbon; and Storage

12 successful projects; results announced Spring 2019



UK Innovation in hydrogen for heating


Department for
Business, Energy
& Industrial Strategy

Hydrogen Supply Competition - BEIS

Low carbon hydrogen – Sometimes referred to as “Blue” Hydrogen

The established large scale production method is Steam Methane Reformation (SMR);

- **Carbon capture and storage (CCS) is required to make this low carbon.**
- **This hydrogen is roughly twice the cost of natural gas**

The hydrogen supply competition is looking to support low carbon hydrogen production that can

- **Produce even lower carbon hydrogen**
- **Uses waste to make hydrogen**
- **Potentially as much as 50% cheaper**



UK Innovation in hydrogen for heating

Hydrogen Supply Competition - BEIS

Zero Carbon Hydrogen – Sometimes referred to as “Green” Hydrogen, important in a very low carbon society

Electrolysers use electricity to separate water into hydrogen and oxygen.

- **The biggest electrolyser being built is 100x smaller than a normal sized SMR**
- **The hydrogen produced is currently much more expensive**

The hydrogen supply competition is looking to support green hydrogen that

- **Can be built at a greater scale**
- **Can better utilise renewable energy**



UK Innovation in hydrogen for heating

Hydrogen Supply Competition - BEIS

Hydrogen Storage – We need to store hydrogen to ensure it's available when we need

Hydrogen is not easy to store as

- **It does not compress easily; and**
- **It is a small molecule so can escape containment easily**

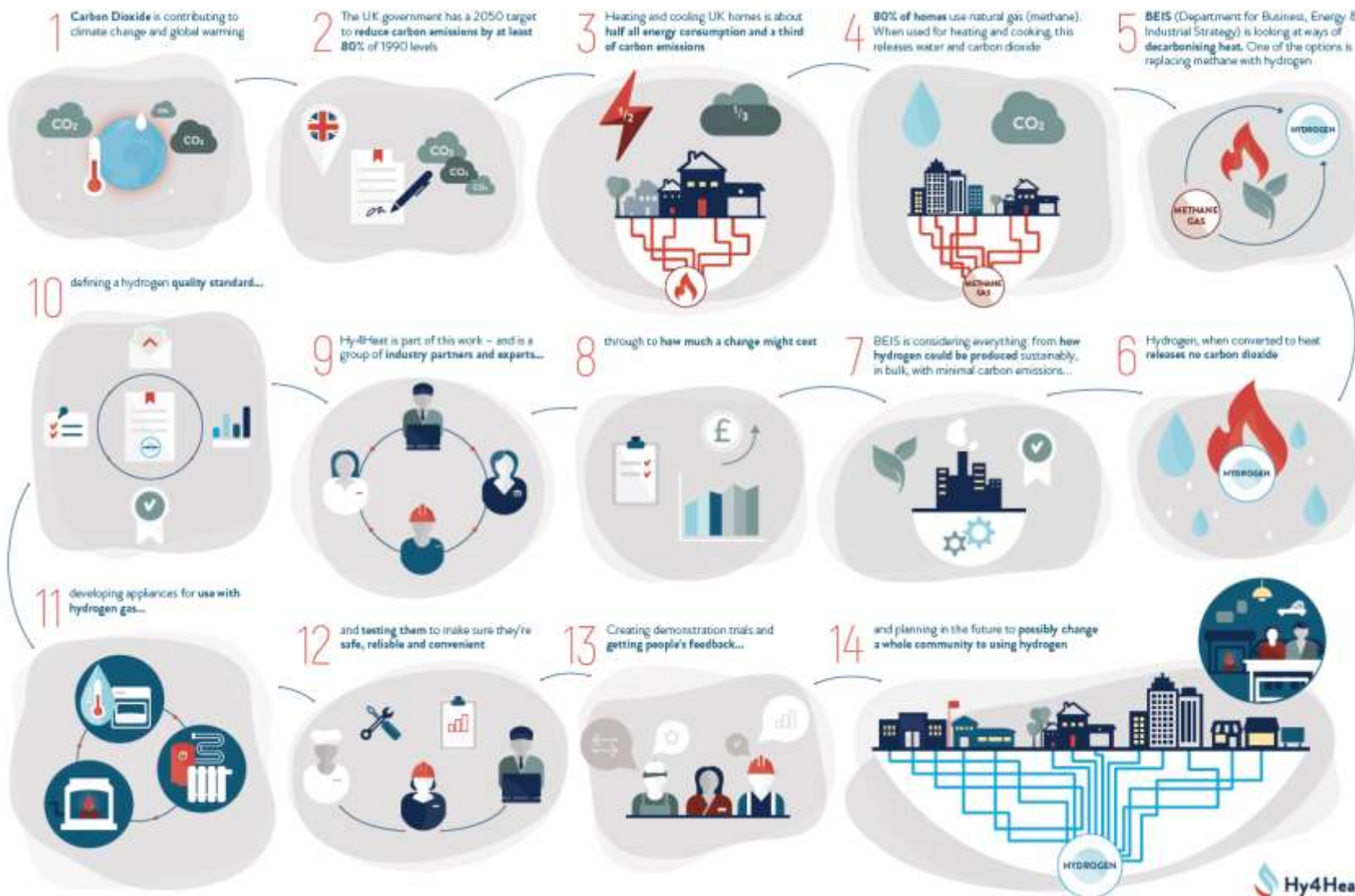
The hydrogen supply competition is looking to support hydrogen that

- **Can be stored at scale underground**
- **Can be stored as a “hydrogen carrier”**



UK Innovation in hydrogen for heating

The Hy4Heat Programme



Hy4Heat mission

To establish if it is technically possible, safe and convenient to replace natural gas (methane) with hydrogen in residential and commercial buildings and gas appliances

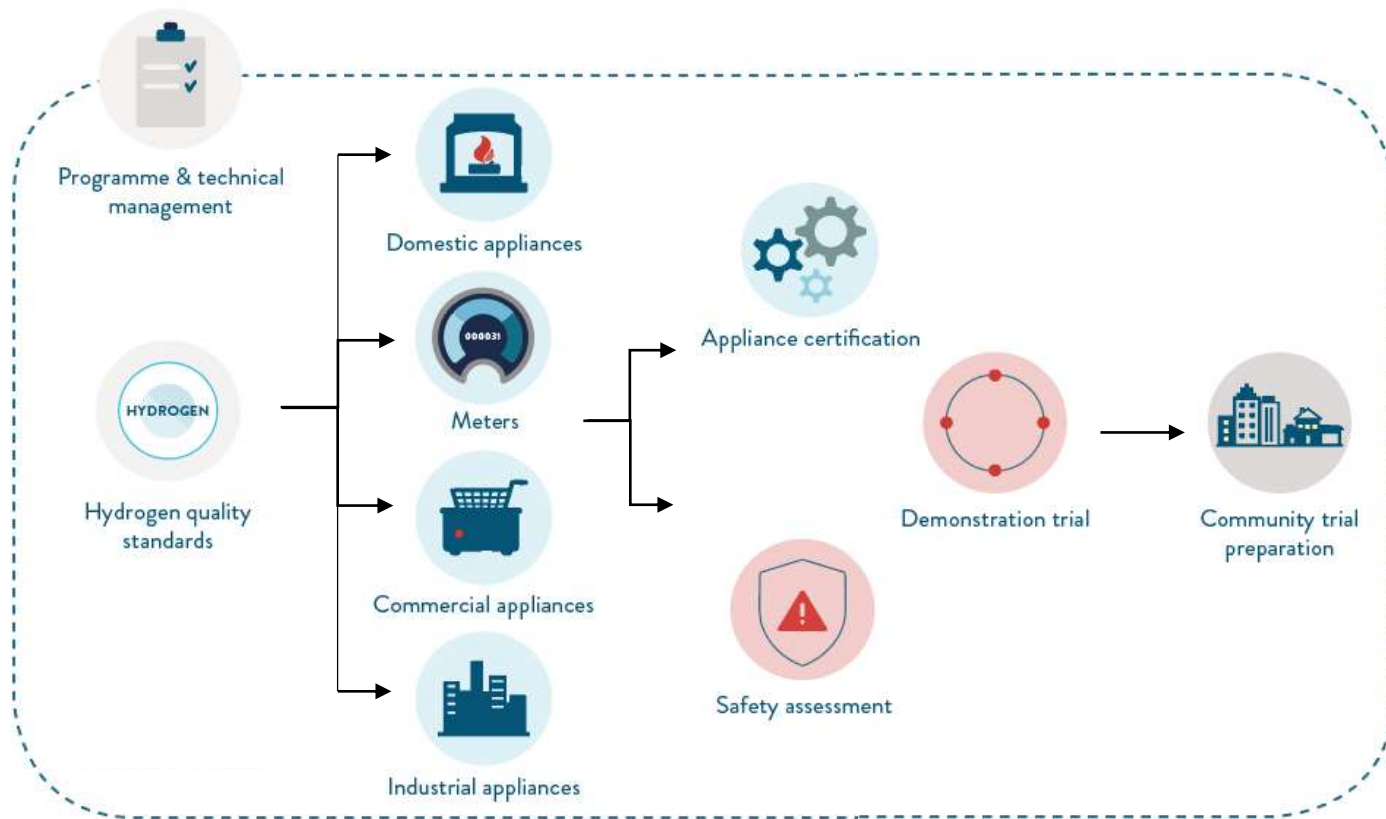
This will help enable the government to determine whether to proceed to a community trial of hydrogen





[Photo: Roger Wollstadt](#)

Hy4Heat programme work packages



Hy4Heat programme overview

2018

2019

2020

2021

WP1&9 PMC Managing WPs in preparation for a Community Trial

Hy4Heat ends

WP2 Quality and standards

WP7 Safety and risk assessment

WP3 Development of appliance certification

WP4 Development of certified domestic appliances and WP10 Metering development

WP8 Demonstration trials

WP5 Commercial appliances
Understanding the market

Potential commercial appliance development

WP6 Industrial appliances
Understanding the market

Potential industrial appliance development

Possible
Community Trial

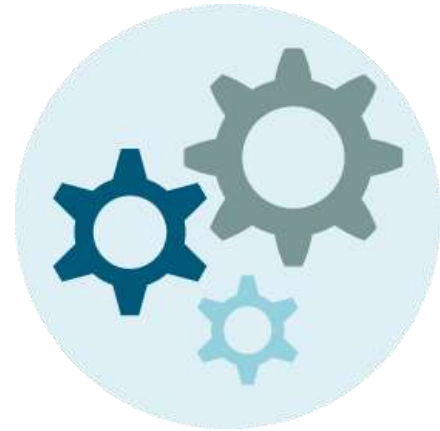
Hydrogen quality standards (WP2)

- IGEM revising relevant existing standards and considering:
 - Dangerous substances and explosive atmosphere regulations Materials
 - Leakage rates
 - Ventilation
 - Installation
 - Air supply, etc.
- DNV GL - Purity & Colourant
- NPL - Odorant



Hydrogen appliance certification (WP3)

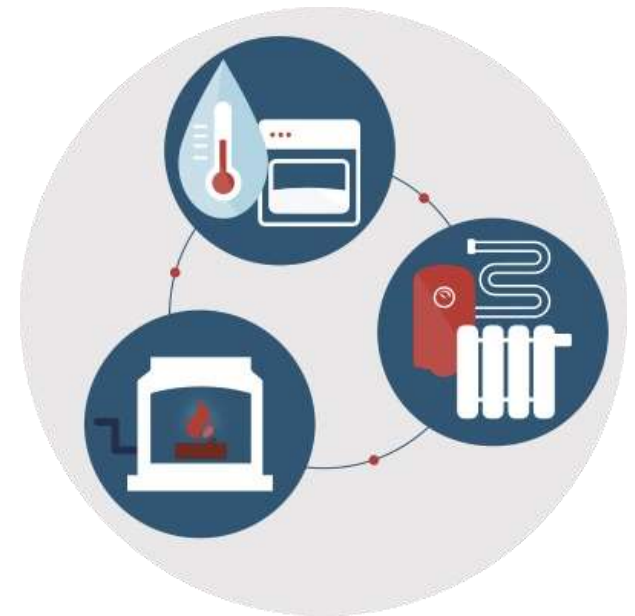
- Hydrogen appliances to be certified under GAR (Gas appliance regulation)
- Establishing an appliance testing and certification committee
- BSI (British Standards Institute)



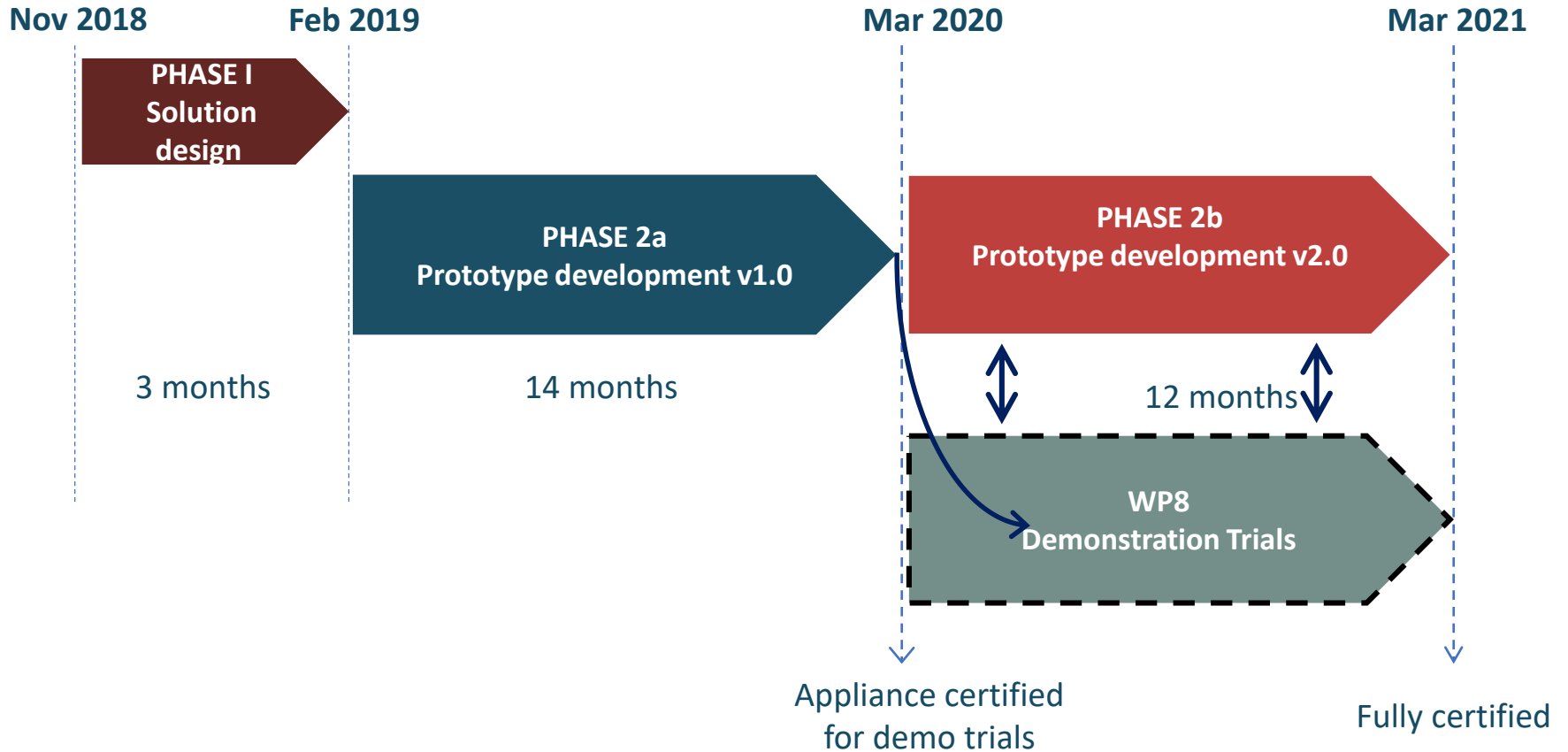
bsi.

Domestic hydrogen appliances (WP4)

- SBRI pre-commercial procurement innovation competition:
 - gas boilers
 - gas cookers
 - gas fire
 - innovative hydrogen appliance
- Phase 1 contracts have been awarded to 16 organisations



Phased competition structure



Domestic hydrogen meters (WP10)

- Looking at metering development
- SBRI pre-commercial procurement competition



Commercial & Industrial appliances (WP5 & WP6)

- Market study into commercial and industrial appliance sectors
- Contracts awarded to:
 - ERM (WP5) and
 - Element Energy (WP6)
- Reports by Spring 2019



elementenergy

Safety testing (WP7)

- Comparing hydrogen with natural gas
- Co-ordination group established with GDNOs
- Working on agreeing an approach and aligning Hy4Heat with other hydrogen programmes and initiatives
- H100 research on consequence testing forming key part of quantified risk assessment



Demonstration trial (WP8)

- Unoccupied demonstration trial
- Using prototypes developed in work package 4



Potential community trial (WP9)

- Planning and preparation necessary for a potential community trial
- Proposed to run from 2021 to 2023

