

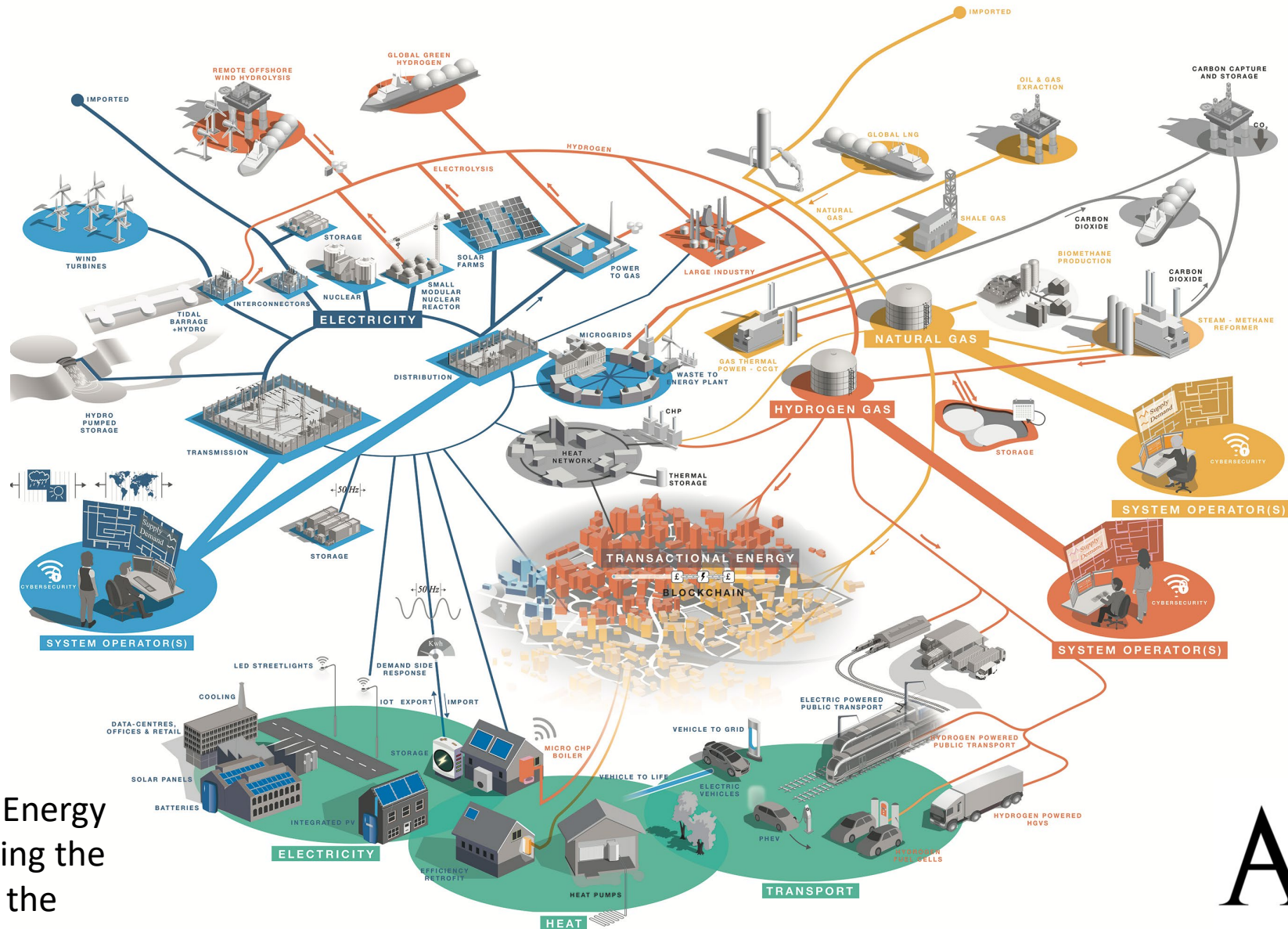


# Hy4Heat

demonstrating  
hydrogen for heat

Heidi Genoni **ARUP**

All-energy / Dcarbonise 2019 – 16 May



Arup's 'Future of Energy 2035' map, showing the energy system of the future

# Policy is set out in two key documents

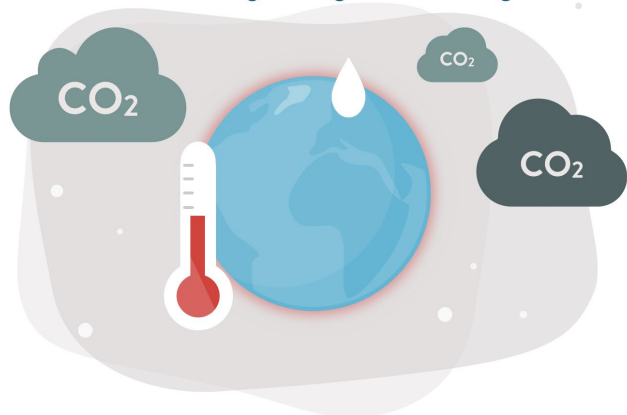
## **Clean Growth Innovation Challenges**

*“Clean fuels such as hydrogen and bioenergy could be used for transport, industry, and to heat our homes and businesses. We need to test how they work in the existing gas network, whether they can fire industrial processes, and how they could be used in domestic appliances.”*

Clean Growth Innovation Challenges - Clean Growth Strategy



**Carbon Dioxide** is contributing to climate change and global warming



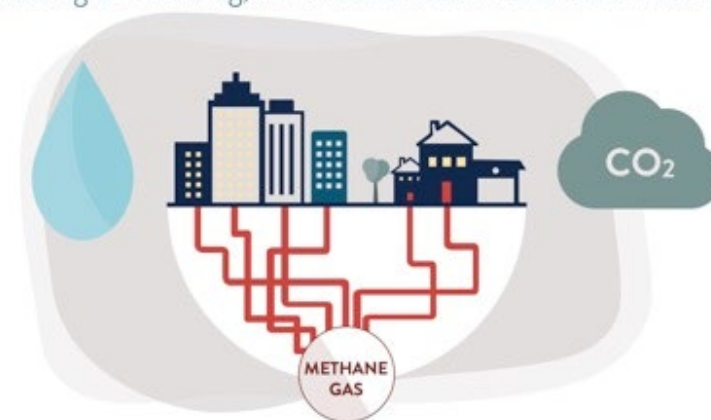
The UK government has a 2050 target to **reduce carbon emissions by 80%** of 1990 levels



Heating and cooling UK homes is about **half all energy consumption and a third of carbon emissions**

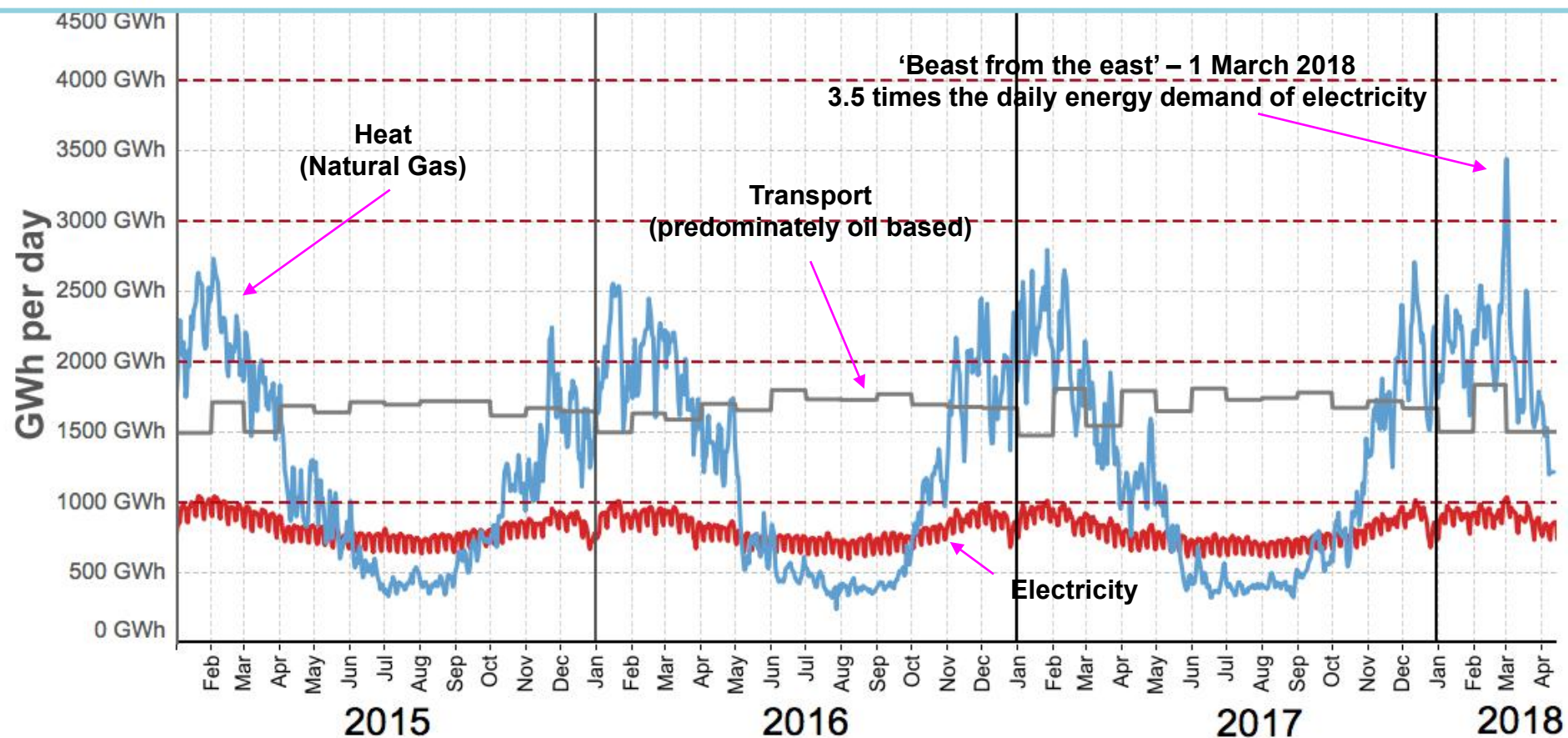


**80% of homes and business** use natural (methane) gas. When used for heating and cooking, this releases water and carbon dioxide





# The challenge – UK energy demand



Data are from National Grid, Elexon and BEIS. Charts are licensed under an Attribution-NoDerivatives 4.0 International license

Charts can be downloaded from <http://bit.ly/energycharts>



by Dr Grant Wilson [grant.wilson@sheffield.ac.uk](mailto:grant.wilson@sheffield.ac.uk)





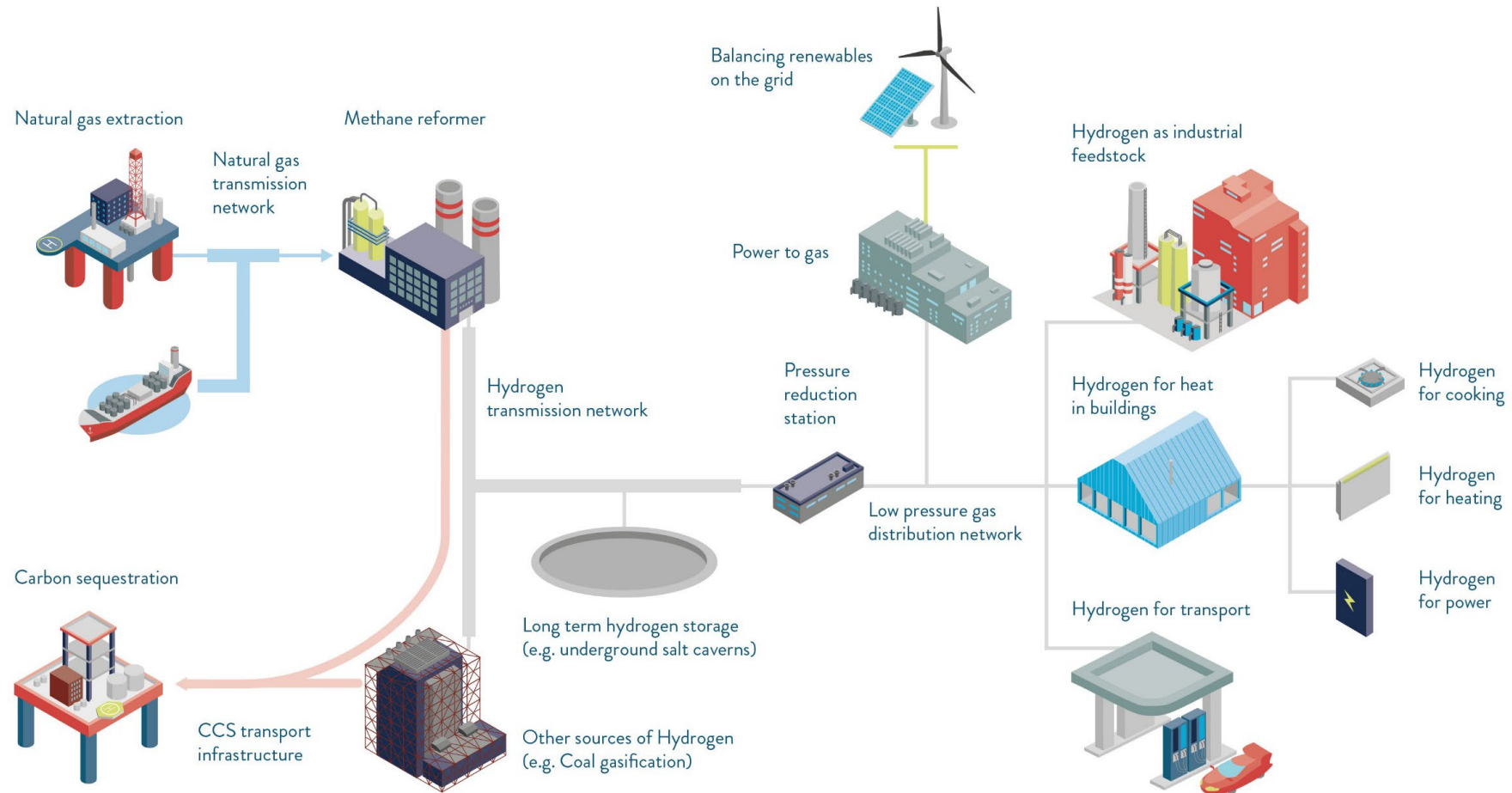
[Photo: Roger Wollstadt](#)



Department for  
Business, Energy  
& Industrial Strategy

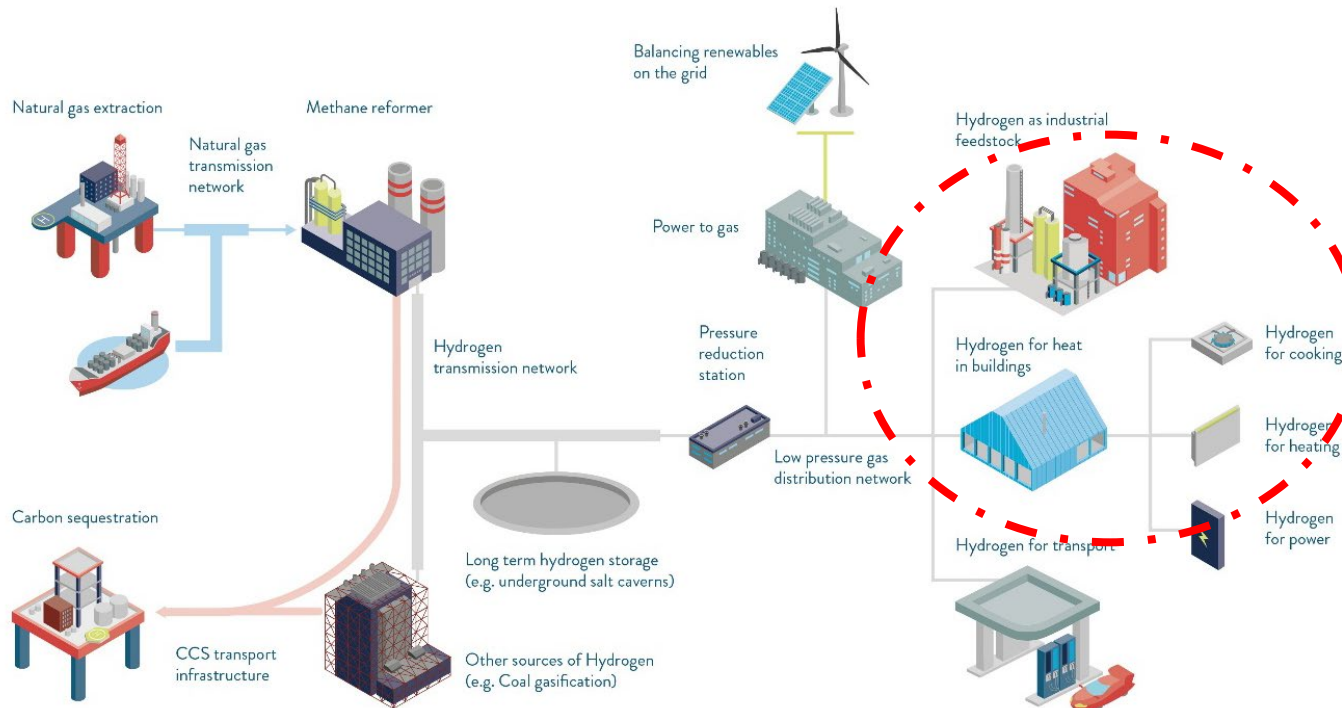


# Conceptual view of a hydrogen system





# Hydrogen innovation programmes



- **BEIS Hy4Heat – Hydrogen end use**
- H21 – hydrogen in the distribution network
- HyNet – End to end demonstration
- H21 – North of England feasibility study
- HyDeploy – Hydrogen blending 20%
- H100 – Hydrogen end use (new build)
- DfT – Hydrogen for transport
- BEIS – Hydrogen supply & storage
- BEIS – Industrial fuel switching





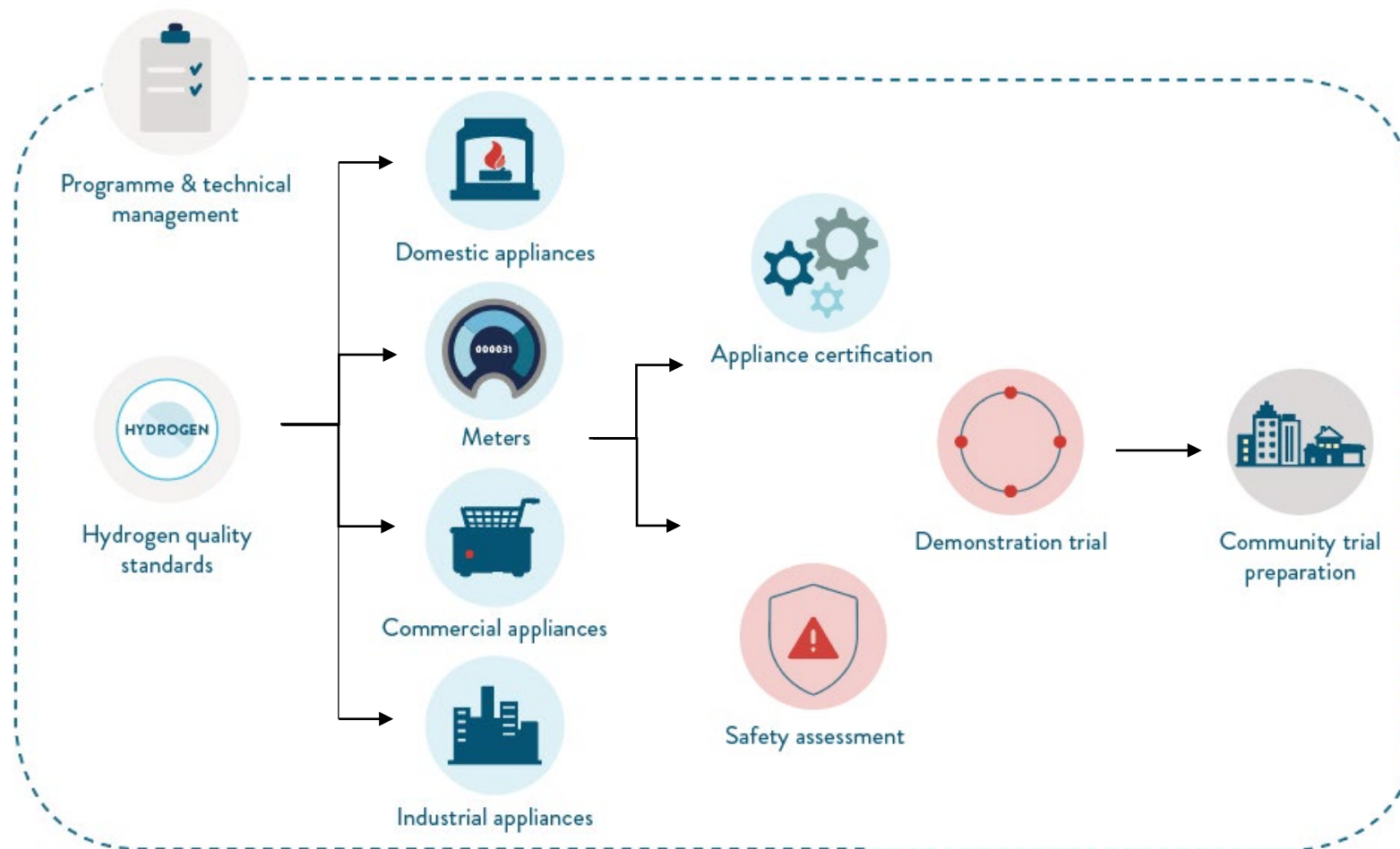
# Hy4Heat mission

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



# Hy4Heat programme work packages



# Hy4Heat programme timeline overview

2018

2019

2020

2021

Hy4Heat  
ends



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



WP2 Quality and standards



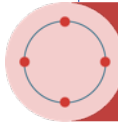
WP7 Safety and risk assessment



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)

- IGEN – Standards, review and revision of existing relevant standards e.g.
  - Materials
  - Leakage rates
  - Ventilation
  - Installation
  - Air supply, etc.
- DNV GL - Purity & Colourant
- NPL - Odorant



## Safety assessment (WP7)

- Comparing hydrogen with natural gas
- Building on knowledge and evidence that exists already e.g. collaborating with the GDNO's
- Further experimental testing about to commence
- HSE engagement



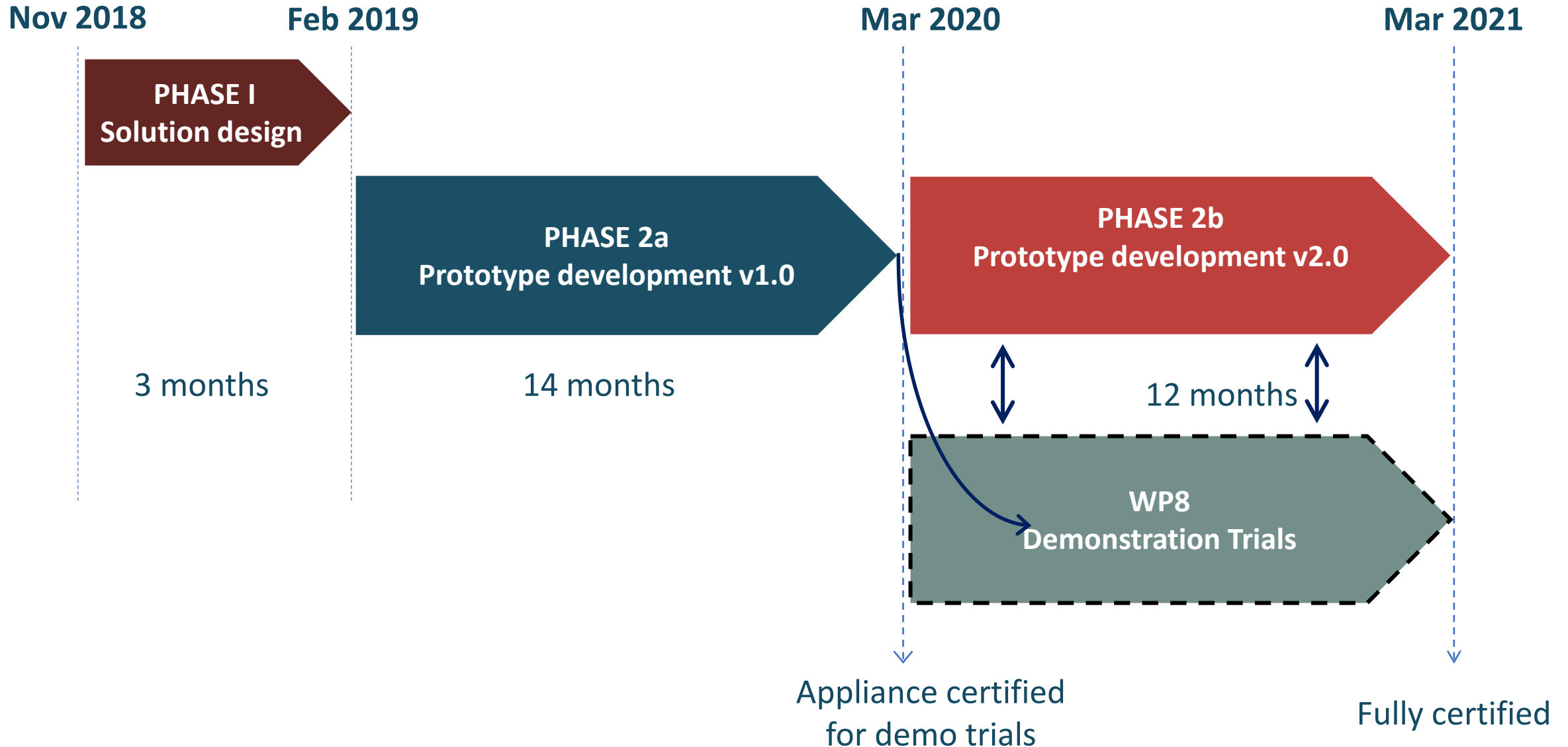
## Domestic hydrogen appliances (WP4)

- Need to develop appliances to enable hydrogen end use:
  - gas boilers
  - gas cookers
  - gas fires
  - innovative hydrogen appliances
- Approach broadly 'like for like' and 'hydrogen ready' replacement
- SBRI Pre-Commercial Procurement innovation competition currently underway and into Phase 2





# Phased competition structure – Domestic Appliances



## Hydrogen appliance certification (WP3)

- Hydrogen appliances to be certified under GAR (Gas Appliance Regulation)
- BSI (British Standards Institute) developing PAS 4444



**bsi.**

## Hydrogen meters (WP10)

- Need to develop hydrogen meters to enable hydrogen end use
- Fiscal and smart enabled meters
- OJEU Innovation Partnership procurement currently underway





## Commercial / Industrial appliances & equipment (WP5&6)

- Market study into commercial and industrial sectors
- Contracts awarded to:
  - ERM (WP5)
  - Element Energy (WP6)
- Reports to be published in coming months



**elementenergy**



## Commercial hydrogen appliances (WP5)

- Industry stakeholder engagement event on 21 May 2019
- Seeking to procure the development of commercial:
  - Catering appliances
  - Space heating and hot water
  - Innovative appliances
  - Critical system components e.g. connectors, sensors, fittings and valves



## Demonstration trial (WP8)

- Unoccupied demonstration trial e.g. showroom, mock up home etc.
- Using prototypes developed in work package 4 & 10

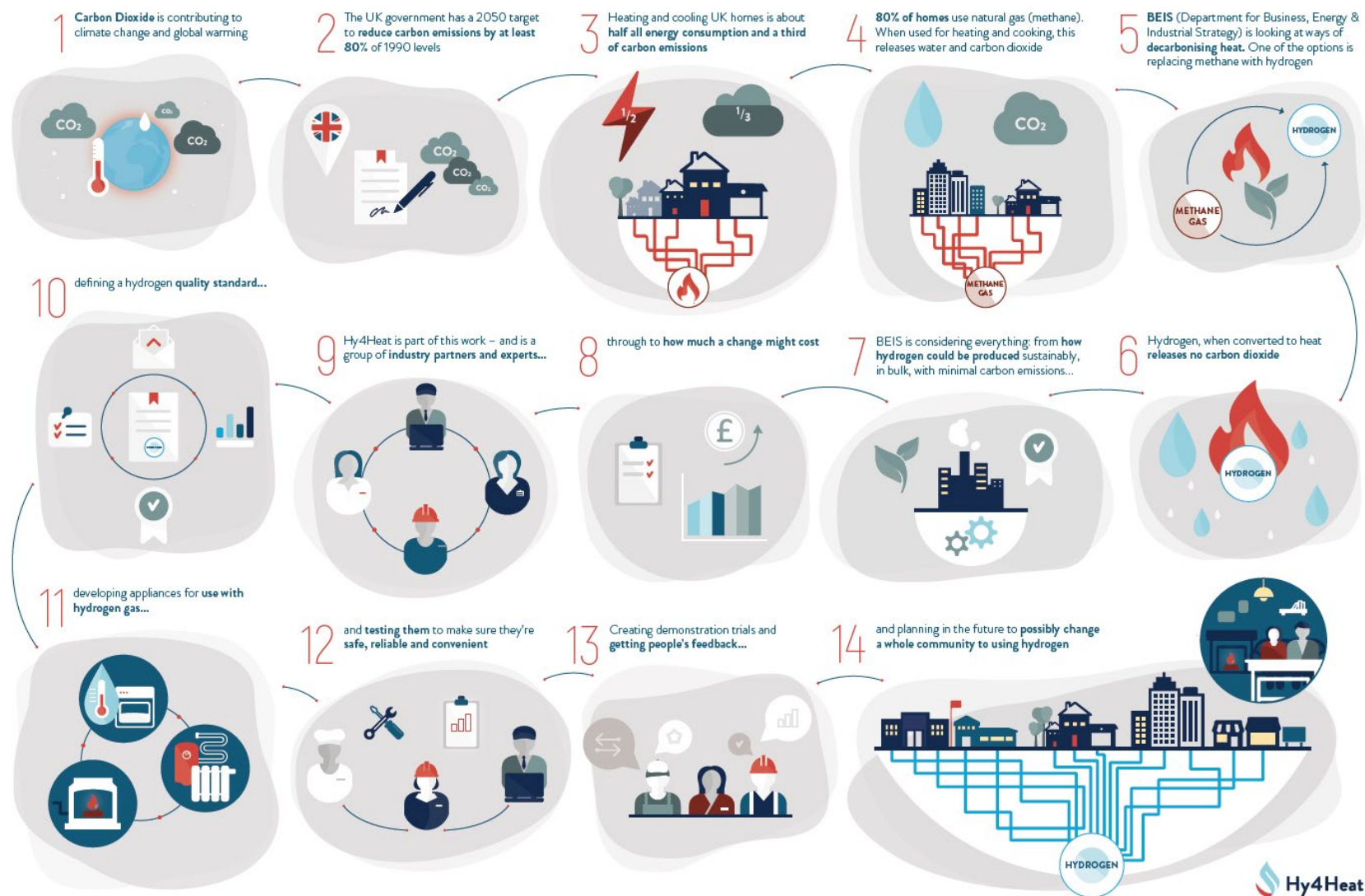


## Potential community trial (WP9)

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



## The Hy4Heat Programme



[www.hy4heat.info](http://www.hy4heat.info)

@Hy4Heat

[hy4heat@arup.com](mailto:hy4heat@arup.com)

- Quarterly Newsletter
- Progress Reports
- Updates
- Documents/ITTs etc





# Summary

- Decarbonising heat is arguably the greatest challenge in meeting UK climate change targets
- There are a range of practical programmes and projects underway to provide evidence required
- It's difficult to envisage a future whole energy system solution that wouldn't involve hydrogen in some areas