



Hy4Heat

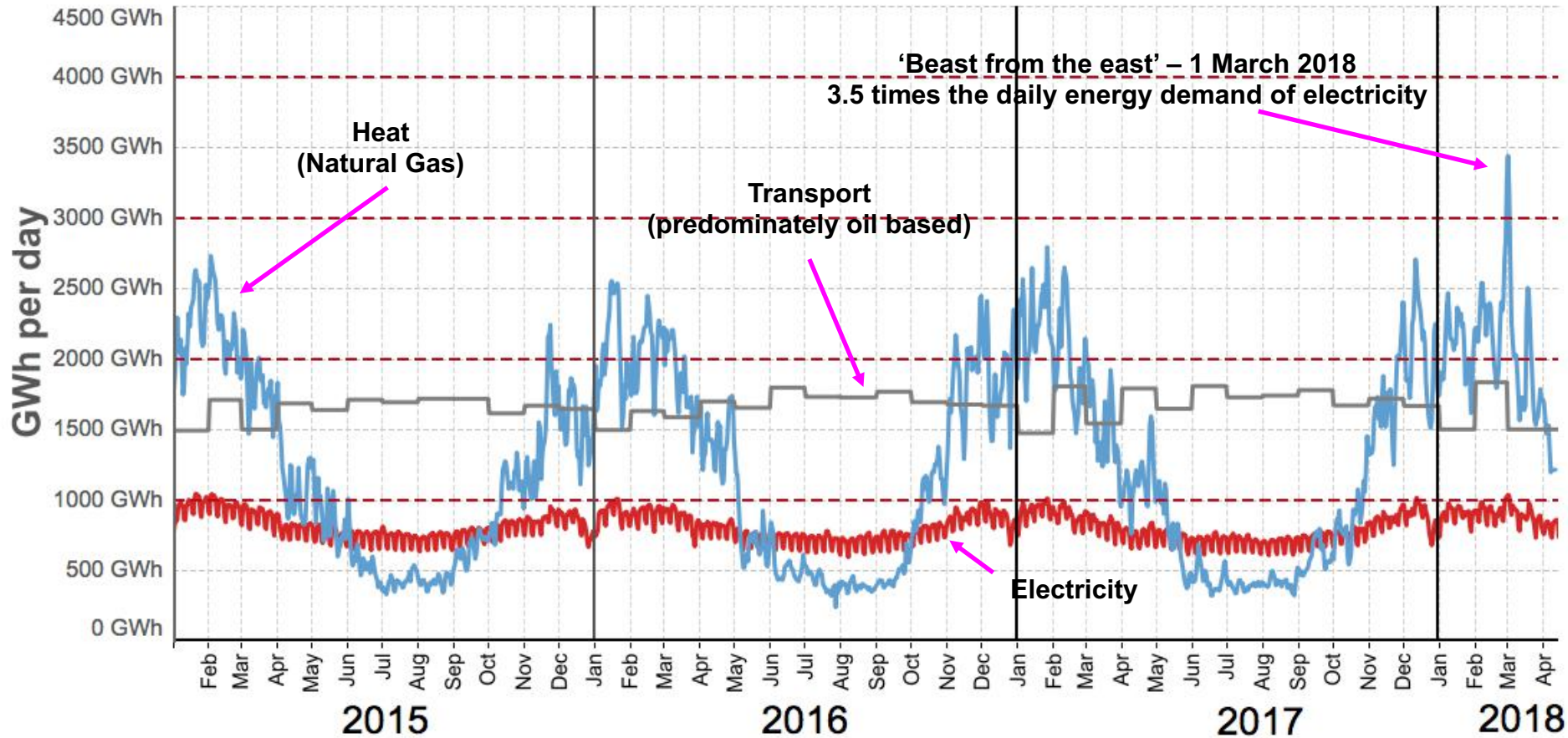
demonstrating
hydrogen for heat

Heidi Genoni, SGN IGEM,
28 Sep 2020

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The challenge – UK energy demand



UK Housing

- 85% of homes are supplied by gas
- Varied stock/types, many dating back to industrial revolution
- 80% of the currently building stock will still be in use by 2050

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

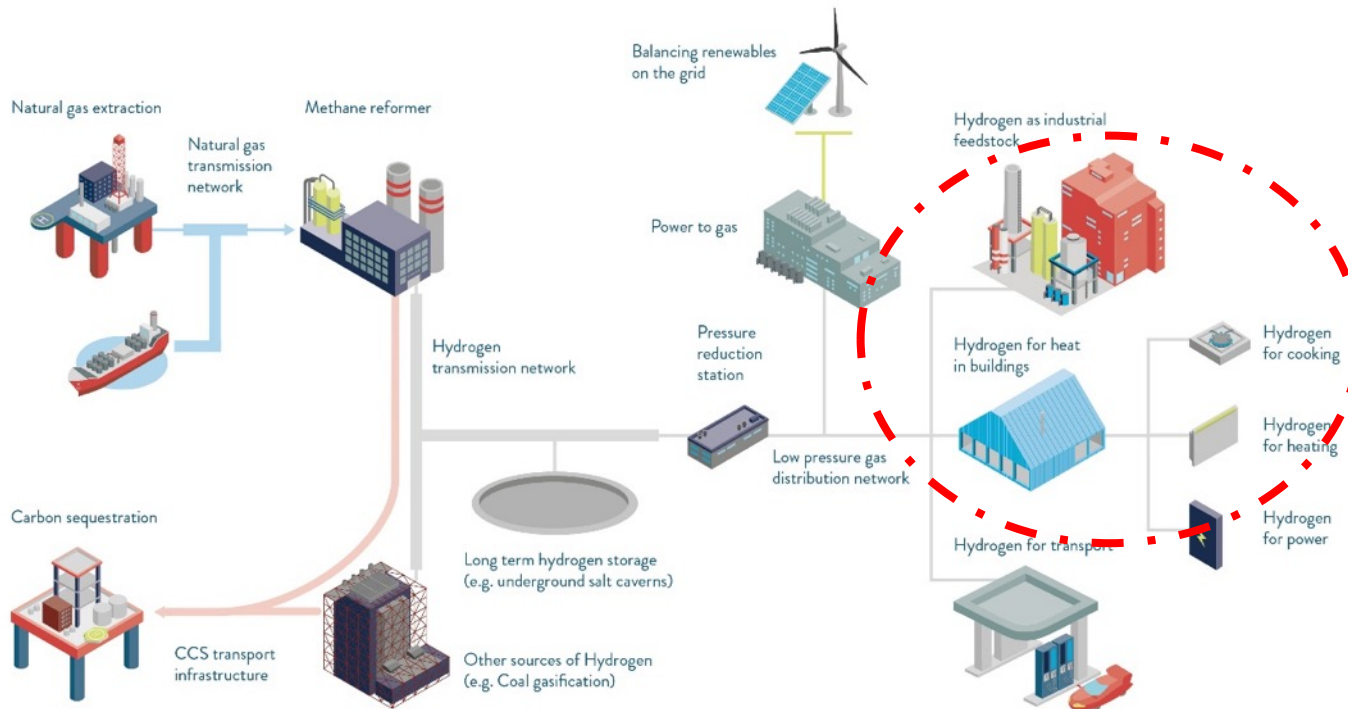
Charts can be downloaded from <http://bit.ly/energycharts>



by Dr Grant Wilson grant.wilson@sheffield.ac.uk



Hydrogen Economy - Innovation programmes



For example:

- **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



Hydrogen for Heat - Hy4Heat

- Innovation Programme, started in 2018
- Funded by Government Department of BEIS
- Use of ~100% hydrogen in existing buildings and homes (<7bar, downstream of the ECV – emergency control value)



Hy4Heat's 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.



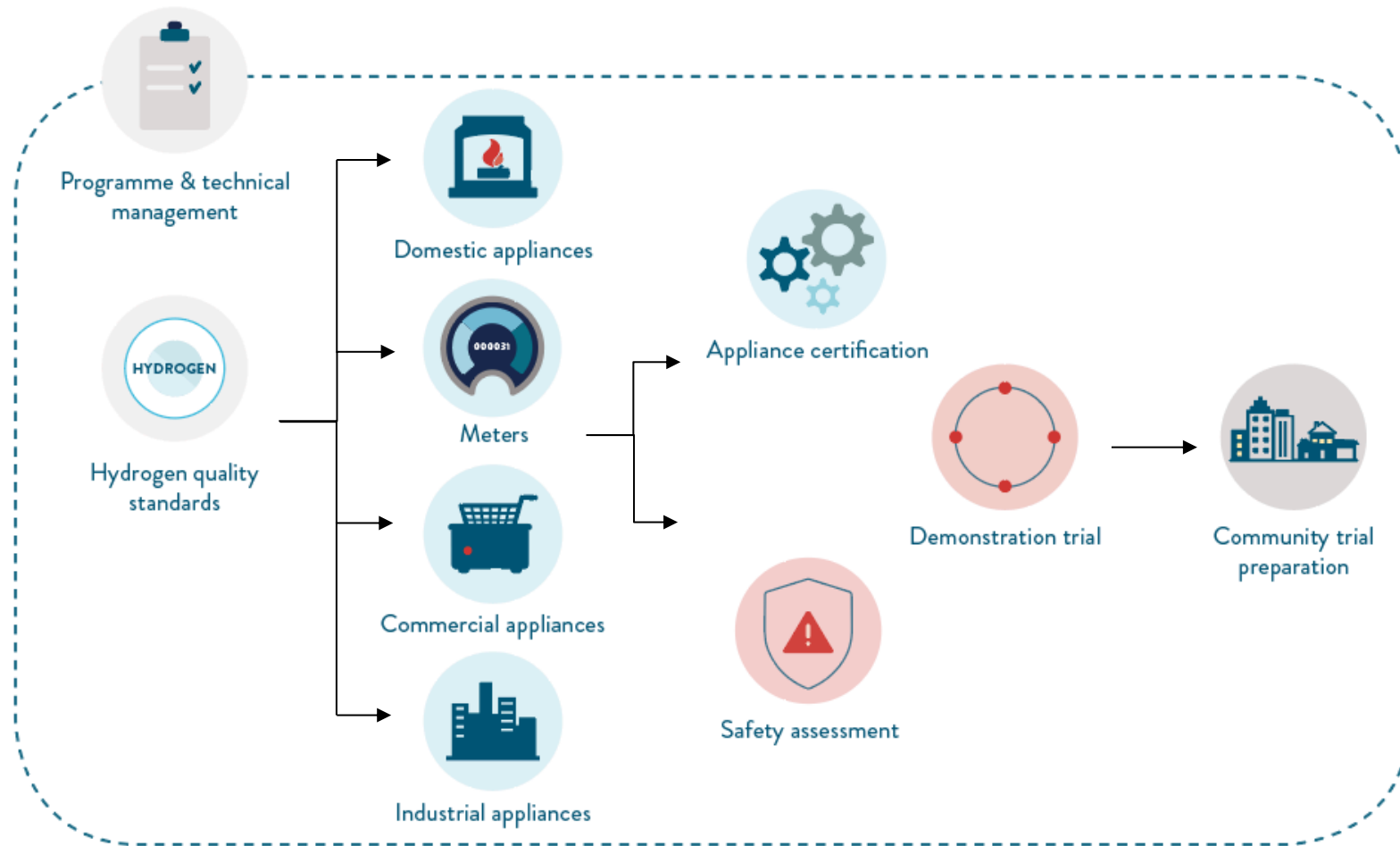
Hy4Heat success

- Evidence that the technologies are feasible (e.g. certified hydrogen appliances etc.)
- Evidence that it is safe to use hydrogen in our homes (i.e. safety assessment based on experimental results and empirical data)
- Evidence of initial consumer acceptance – demonstrations





Hy4Heat programme work packages

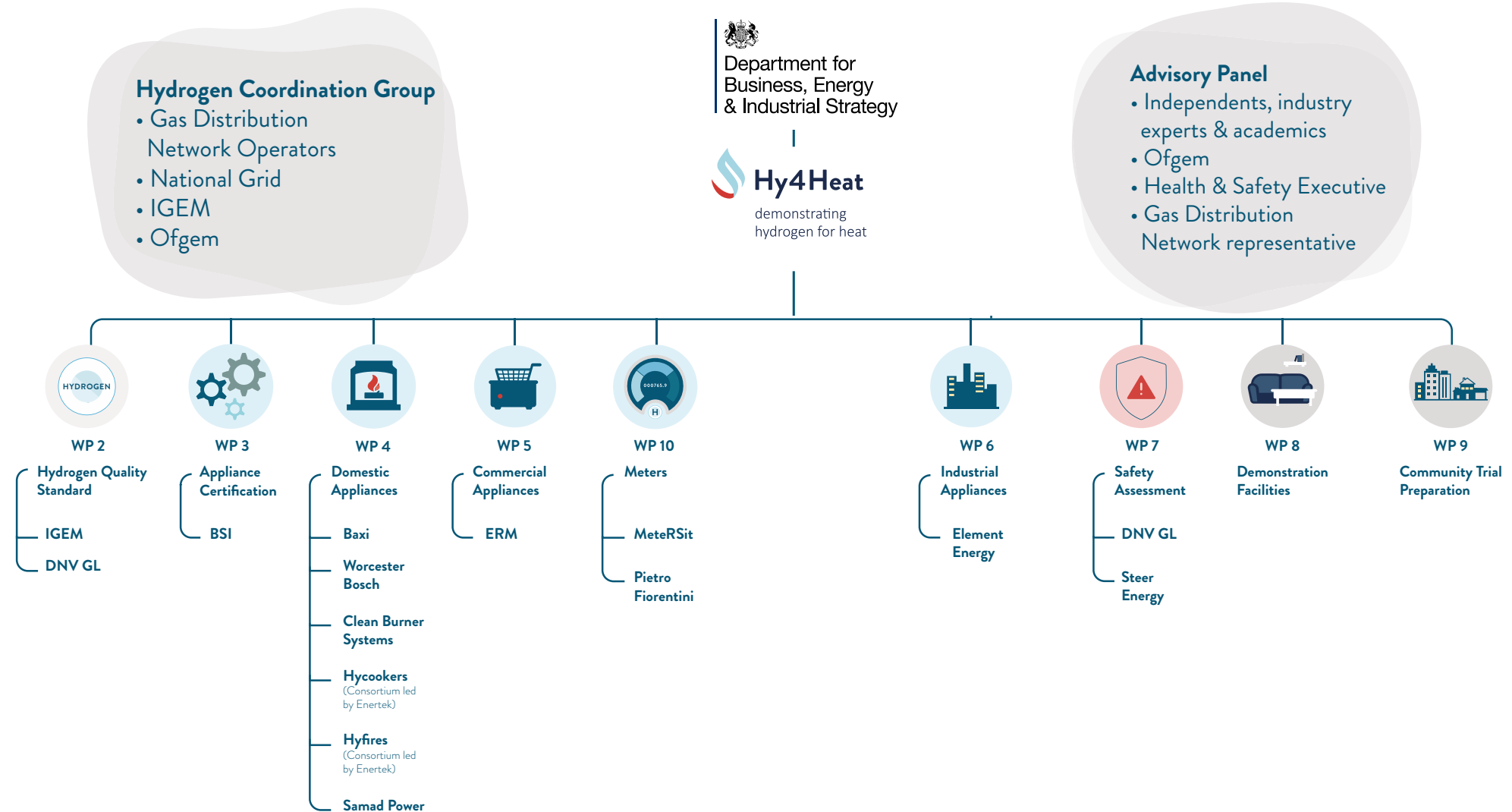


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Governance structure





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Hy4Heat

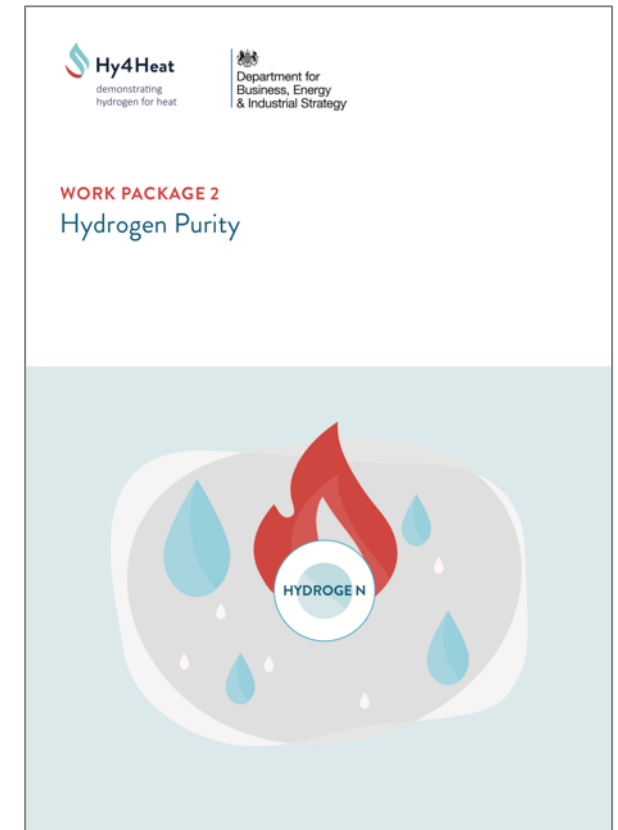


Hydrogen quality and standards

- IGEM hydrogen **Reference Standard** and **Enabling Standard** developed
- Hydrogen **purity** report – published (>98%)
- Hydrogen **odorant** report – published (same as NG)



elementenergy



Certification of hydrogen appliances

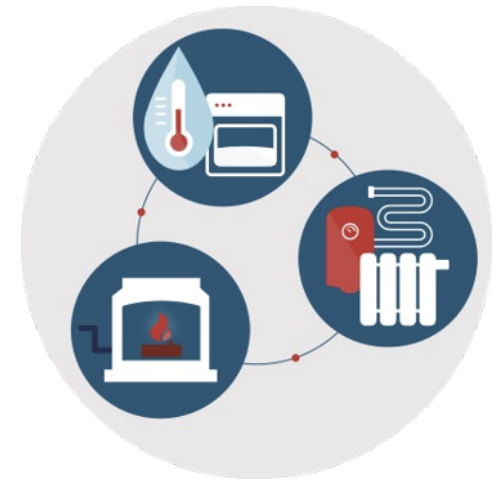
- Appliances certified under GAR (Gas Appliance Regulation)
- **British Standards Institute** has developed **PAS 4444** – *‘Guidance on the development and testing of hydrogen appliances’*
- BSI PAS 4444 – published



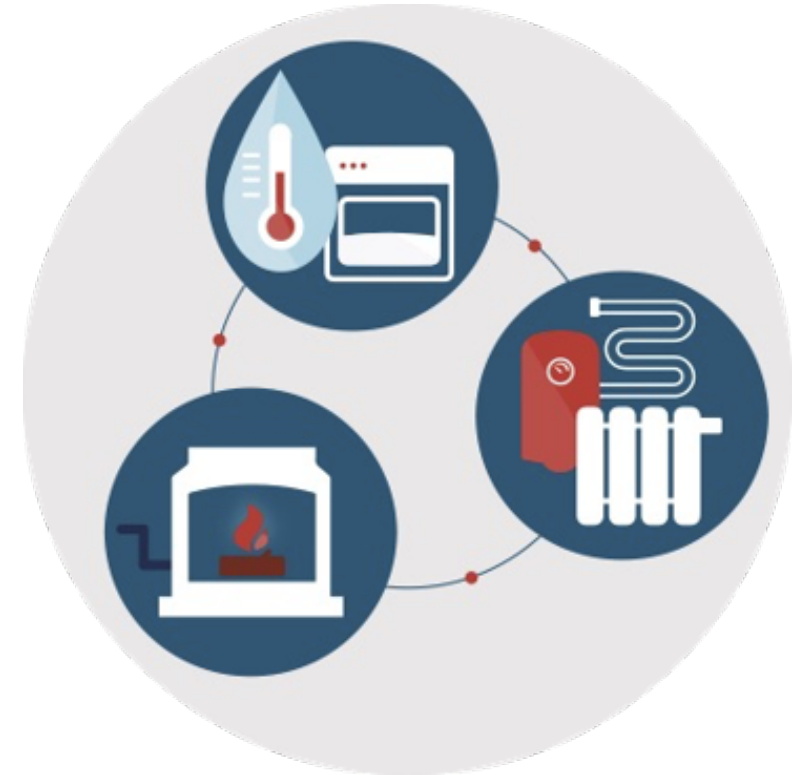
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Development of domestic hydrogen appliances

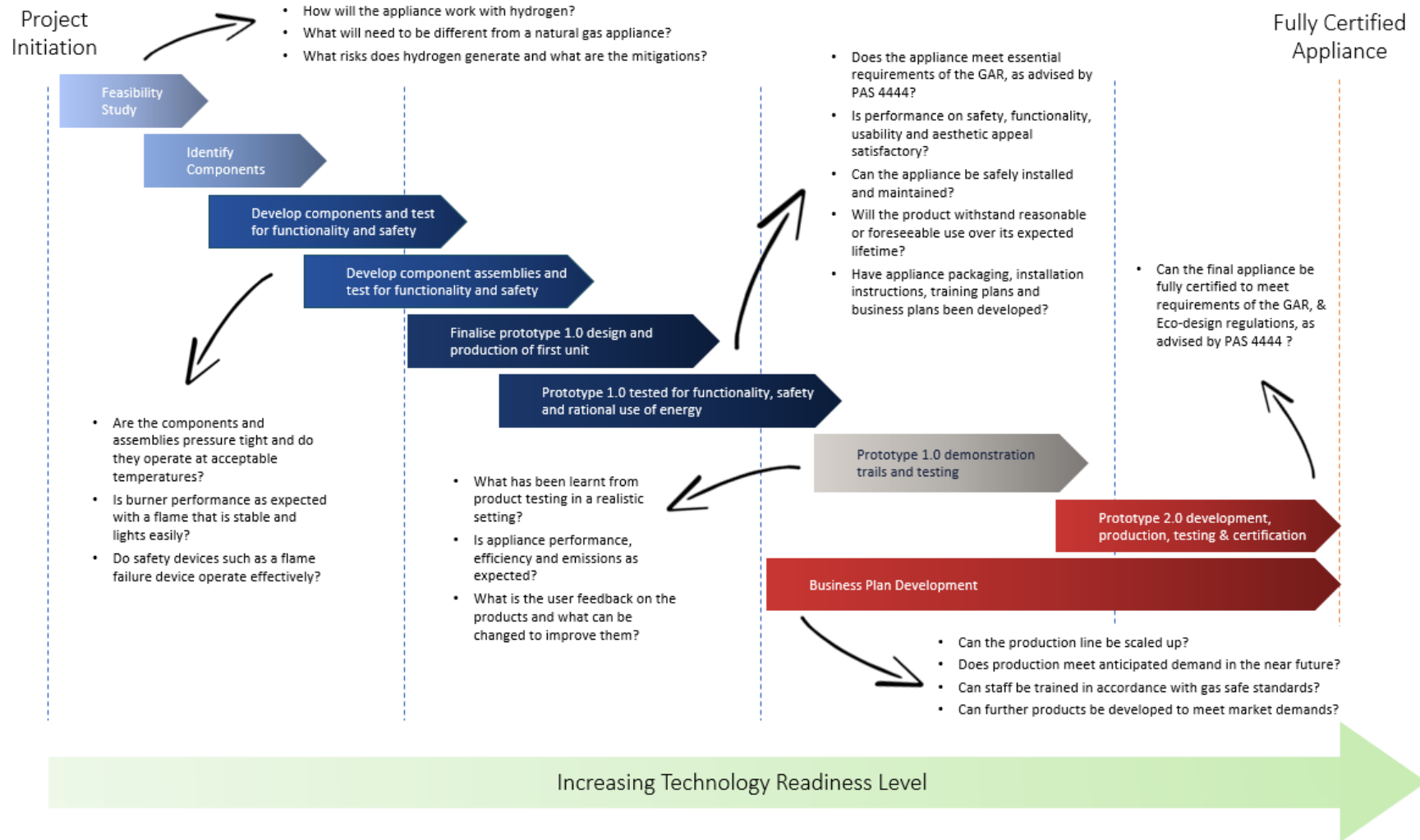
- Developing appliances that are **'like for like'** existing home gas appliances
- Developing **'hydrogen-ready'** appliances – supporting a more convenient transition
- Must meet, or improve upon existing emission, safety, and functional requirements
- Appliances being developed include:
 - boilers
 - cookers
 - gas fires
 - innovative hydrogen appliances



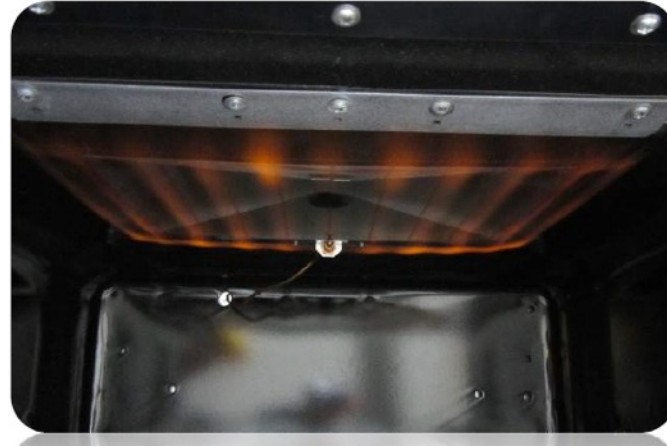
Organisations developing domestic hydrogen appliances (WP4)



Accelerating innovation - the appliance development pathway



Images from Hy4Heat event March 2020



Reference fire NG

New burner hydrogen



Development of hydrogen meters

- Fiscal and smart enabled meters (SMETS2)
- Meter will include an 'excess flow valve'
'gas disablement functionality'



Developing commercial appliances

- Market study into commercial sectors – due to be published
- Commercial hydrogen appliances being developed:
 - Catering & production heating
 - Dry space heating
 - Wet space heating
 - Combined heat and power



Industrial heating equipment (WP6)

- Market study into industrial sector – report published
- A number of other BEIS innovation programmes developing this area further



Safety assessment

- Comparing risks of hydrogen and natural gas
- Building on knowledge, data, and evidence that already exists
- Undertaking experimental testing in a range of scenarios, covering:
 - Leakage
 - Accumulation
 - Dispersion
 - Ignition
- Analysis, QRA and consequence assessment
- Collaborating with GDNO's to gather more detailed incident data
- Engagement with the HSE



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Steer
Energy

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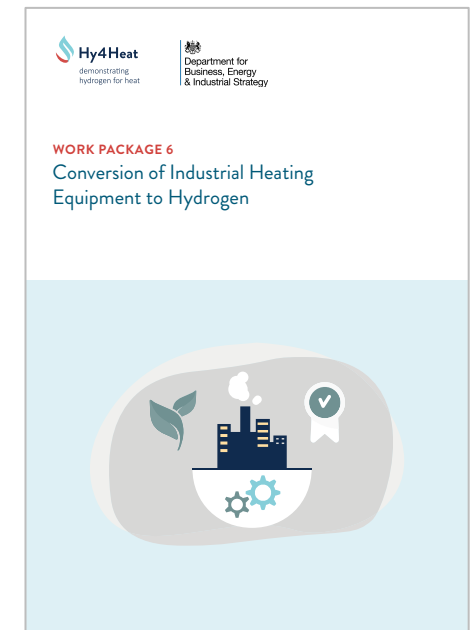
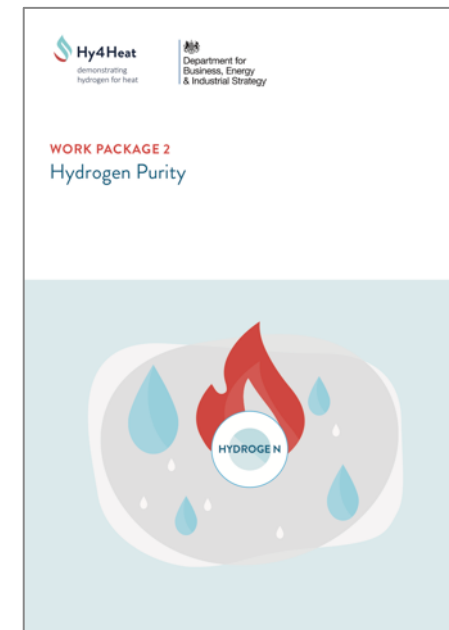
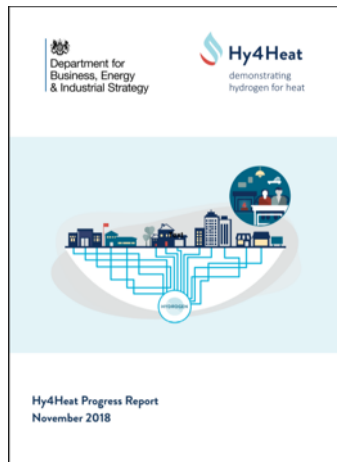
What to look forward to in the next 12 months...

- Showcasing the prototype hydrogen appliances in a home setting (e.g. kitchen, living room, bathroom, + cooking demos etc.)
- Evidence and disseminating knowledge – safety is critical
- Preparing for potential community trials



Sharing information

- www.hy4heat.info
- Newsletters / updates / tweets
- Key documentation e.g. ITTs, guidance notes etc.
- Reports



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

The Hy4Heat Programme

