

Hydrogen Appliance Certification Engagement Event

Tuesday 7 August



Dr Steve Loades

BEIS Programme Manager Hydrogen
Innovation

Science and Innovation for Climate and Energy
(SICE)

Welcome

Agenda

Welcome and introduction	Dr Steve Loades , BEIS Programme Manager Hydrogen Innovation
Overview of Hy4Heat programme	Heidi Genoni , Hy4Heat Programme Manager
WP3 approach	Jeremy Few , Hy4Heat WP3 Manager
Q&A	All
Roundtable discussion	All
Networking lunch	All

Purpose of this morning

- An overview of Hy4Heat
- Focus on hydrogen appliance certification (WP3)
- Outline our proposed approach for WP3
- Discussions on challenges of WP3 and other related work packages
- A chance to give feedback directly to us
- Opportunity to network

Heidi Genoni

Hy4Heat Programme Manager

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 enable the government to determine whether to proceed to a community trial



Hy4Heat programme overview

2018

2019

2020

2021

Hy4Heat ends

WP1&9 PMC Managing WP's 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
Boilers, Cookers, Gas Fires

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



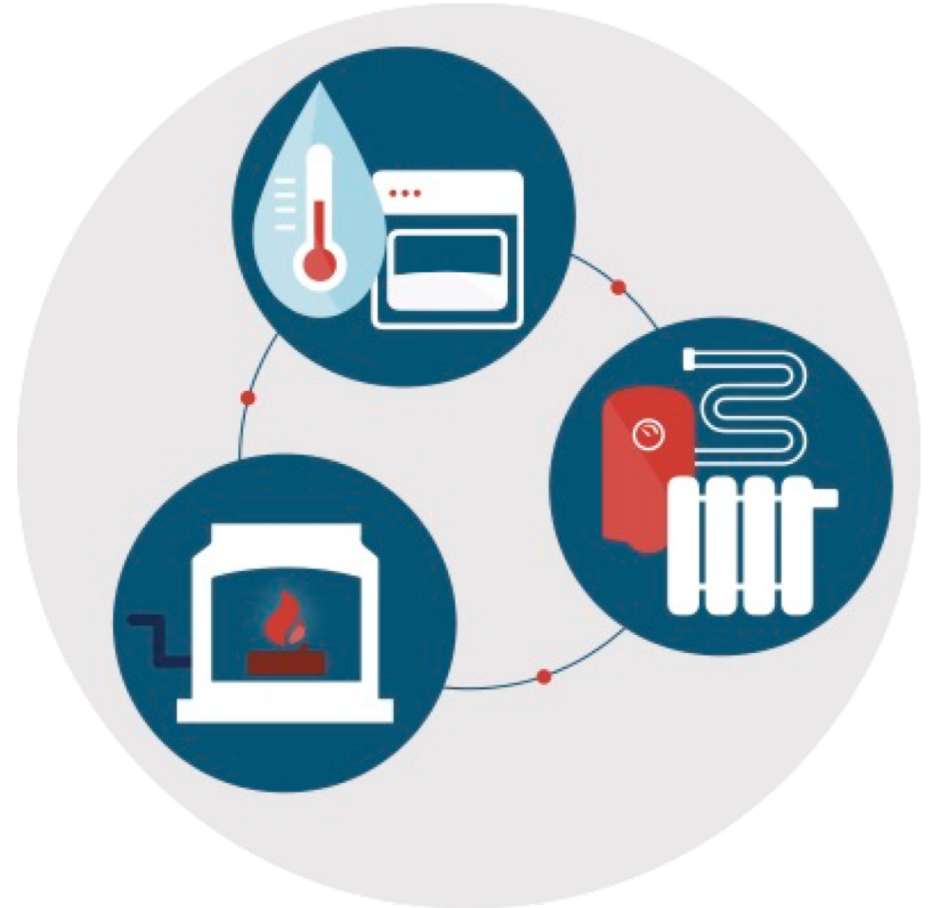
Hydrogen quality standards (WP2) update

- ITT published June 2018
- Bids received, evaluation underway



Domestic hydrogen appliances (WP4) update

- SBRI pre commercial procurement competition
- Hydrogen gas fires, gas boilers and gas cookers



Commercial / Industrial appliances (WP5/6) update

- Market study into commercial and industrial appliance sectors
- ITT published 30 July 2018
- Tenders due 24 August 2018



Safety testing (WP7) update

- Co-ordination group established with GDNOs
- Working on agreeing an approach and aligning Hy4Heat with other hydrogen programmes and initiatives



Jeremy Few

WP3 Work Package Manager

Starting point for WP3

*“To assure the safety of gas appliances and equipment converted to hydrogen it will be necessary to **develop an existing or establish a new appliance / equipment testing and certification capability.***

*This capability will provide **independent verification of appliance/equipment** quality and safety which is essential to **demonstrate safe operability** to domestic and business consumers. Ultimately this will support the safety management system requirement for trials.*

*This is likely to involve some substantial up-front work to **develop facilities, a testing regime** for domestic, commercial and industrial appliances and equipment (below seven bar applications) and the **necessary standards and design guidance.***

The contractor should consider engagement with the UK’s existing testing facilities as well as local authorities who may have the opportunity to develop a new facility to meet this requirement.

This testing capability should also be able to provide a demonstration facility for end use acceptability for the commercial and industrial sectors”



Notified Body / Testing Lab survey

- All those surveyed believed that hydrogen appliances could be certified under the current Gas Appliance Regulations
- The majority of Notified Bodies have the ability / capability to certify hydrogen appliances and Notified Bodies / Test Labs have (limited) experience in testing hydrogen appliances
- It's envisaged existing Notified Bodies will have the capacity to certify the volume of appliances produced for WP4
- Majority expected only a small increase in certification lead in times, if any at all

Notified Body / Testing Lab survey

- There are currently no specific (harmonised) standards for testing hydrogen appliances but, like other unconventional gas appliances currently tested, Notified Bodies have experience of using combination of standards or creating bespoke test methods to demonstrate compliance
- This method could be used for testing hydrogen appliances developed for Hy4Heat

Conclusion: Consensus required on how existing standards will used

Survey conclusions

- All those surveyed identified that there were risks specifically relating to the testing of hydrogen appliances, this included:
 - Higher explosion risk
 - Leakages will be harder to identify
 - Some design limits and choices may no longer be appropriate as Hydrogen is more volatile
 - Additional laboratory safety devices would be added for hydrogen testing
 - Engineering practices may need to be adjusted – minimising voids, number of compression joints
 - Flame monitoring solutions may require investigations for efficacy and reliability
 - Will need to be assessed holistically for risk, similar to natural gas or LPG

Conclusion: there will be differences in how appliances need be tested

Survey recommendations

From the industry engagement conclusions are that Hy4Heat:

- Develop some standardised guidance on how to apply current standards to ensure consistency across the industry
- Developed by and in collaboration with industry stakeholders
- This will support WP4 hydrogen appliance development
- It is too early to revise existing standards due to limited experience

Summary of WP3 objectives

Gain an industry consensus on how hydrogen appliances will be certified by Notified Bodies

- to provide greater clarity to manufacturers taking part in WP4
- and, where possible, address the unknowns and assumptions Notified Bodies will have to make during certification



Clarification of scope

Work Package 3

- Will focus on the certification of hydrogen appliances and appliance standards required for WP4 appliances

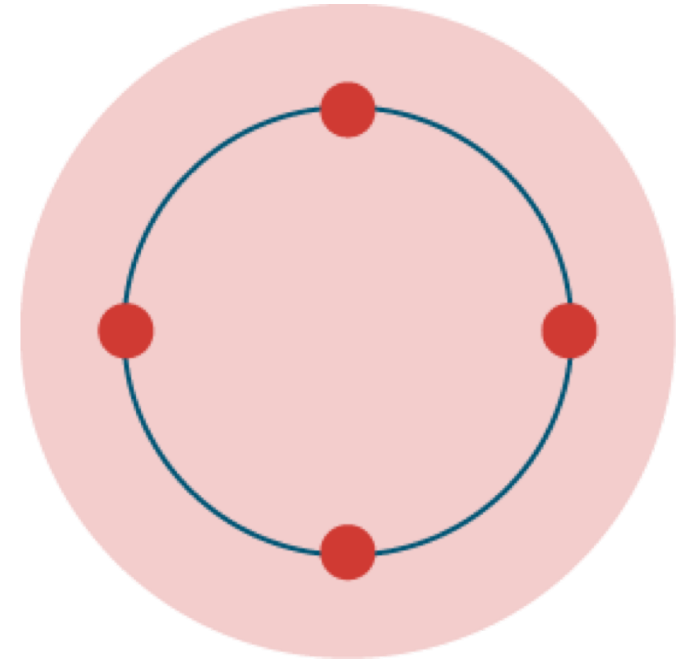
Work Package 8

- Will explore the possibility of establishing a hydrogen development and testing facility to support WP4 in conjunction with a unoccupied demonstration trial



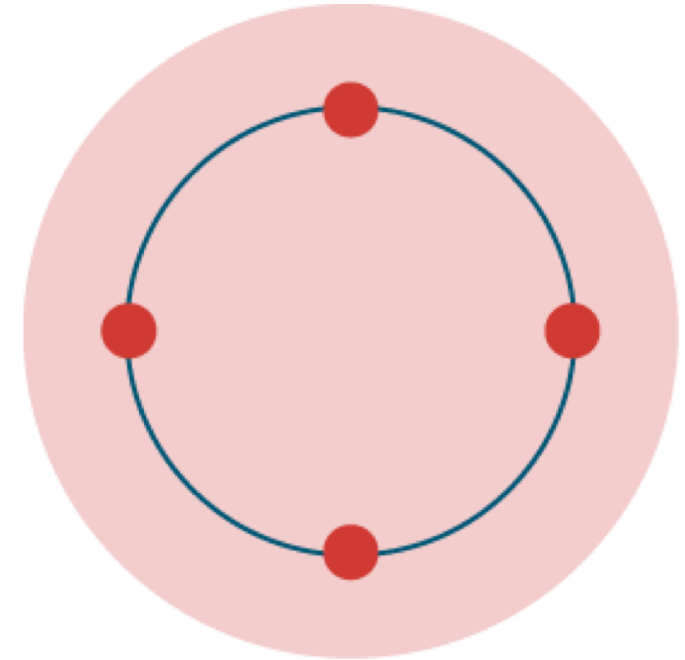
Develop and test facility requirements

- Sufficient space for testing WP4 appliances
- Multiple test bays to support a variety of manufacturers
- A secure hydrogen supply to meet demand
- 98% quality hydrogen to meet assumed quality standard



Develop and test facility update

- Gathering information regarding potential sites and location across the UK
- Keen to understand if such a facility exists that meets Hy4Heat's requirements
- All potential sites welcomed to express an interest in supporting Hy4Heat



WP3 Workshop Discussion

Today's WP3 discussion

1. Discuss the drivers for WP3 with a wider stakeholder group
 - requirement for certified hydrogen appliances,
 - no existing certified hydrogen appliances
 - currently limited experience with certifying hydrogen domestic appliances
 - differences and, as yet, unknown characteristics of WP4 domestic hydrogen appliances

Today's WP3 discussion

2. To confirm the approach proposed to addressing the issue of certification that would be acceptable to both manufacturers and notified bodies
3. To gauge support for proposed activity for WP3
4. To understand /confirm the effectiveness and value it will bring

An approach - for discussion

Establishing an appliance testing and certification committee

Key considerations:

- Roles, members and working arrangements
- Timescales
- Interaction with other work packages
- Technical challenges

Possible committee remit

- Provide guidance on how existing standards (e.g. BSEN15502 Condensing boilers, BS 7977-1 Gas Fires) can be applied to hydrogen.
- This could involve reference of existing hydrogen fuel cell burner standards to account for hydrogen safety.
- This would include advice on the Risk Assessments now required by the GAR

Possible committee remit

- Develop and issue guidance notes, based on the consensus, which advise on the collection of data set sets (both from laboratory and field test) to assist in certification



Possible committee roles

Chair

Chairs meetings, secures consensus on decisions, approve documents, ensures all views represented

Secretariat

Convenes meeting, collates views, record decisions, publish decisions and guidance



Possible committee members

Members

Reviews existing domestic appliance test standard, raise topics for discussion, propose guidance for testing hydrogen fuelled equivalent appliances

- Standards authorities
- Trade associations
- Notified bodies and UKAS Appliance testing laboratories
- Manufacturers and suppliers

Possible working arrangements

Agree Terms of Reference:

- Minimum quarterly meeting frequency
- Format for formal and informal guidance
- Meeting agenda published ahead of meeting
- Notes published following the meeting and send to the Hy4Heat distribution list
- Guidance published as necessary and referenced in meeting notes

Aligned delivery with WP4 delivery

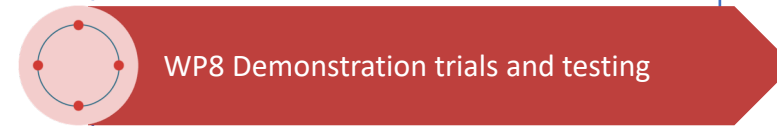
2018

2019

2020

2021

Hy4Heat
ends



Possible technical challenges

- Agreed test programmes between Notified Bodies and WP4 manufactures
- The types of delay ignition tests
- Limit gas composition to confirm safe combustion
- Hydrogen additives (colourant and odorant)
- Flue and ventilation considerations
- GAR risk assessment – deflagration/detonation

Discuss at tables

Discussion session

- Do you agree with the outlined approach - regarding existing certification?
- What do you think the main issues that need to be resolved are?
- How can they be overcome?

Discussion session

Do you agree with the suggested approach of establishing a committee?

- Who should be members?
- How regular should the meetings be?
- What do you think the main issues that need to be resolved are?
- How can they be overcome?

Discussion session

- What do you think the main technical challenges are with WP3 hydrogen appliance certification?
- How can they be overcome?

Final Q&A and summary



Hy4Heat