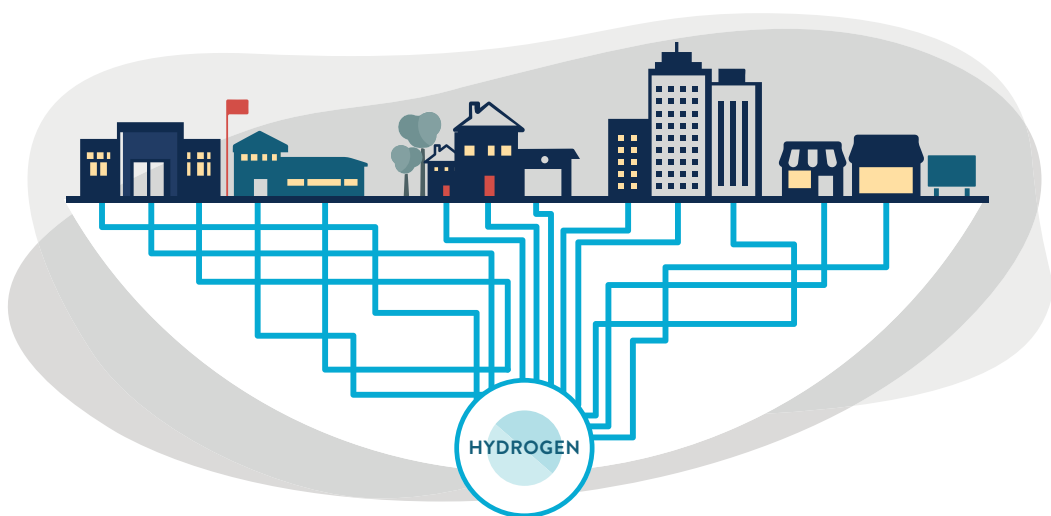


# Hy4Heat Progress Report

DECEMBER 2020



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## Letter from Mark Taylor

I am delighted that the Hy4Heat programme is now moving out of the laboratory and into the demonstration phase. This year has taken a very different path from any we expected, but despite this the programme has made significant progress and one example of this is that hydrogen boilers from Baxi Heating and Worcester Bosch have been installed in 'HyStreet' demonstration houses at DNV GL's Northumberland test site, as part of the H21 network innovation project.

It's evident that across industry and among the wider public, there's an increasing awareness and understanding of hydrogen's potential strategic role as a decarbonised energy carrier. I believe this is due, in part, to Hy4Heat and the positive response from the energy industry to meet the net zero by 2050 target.

In November 2020 the prime minister announced plans for the government's green industrial revolution. This included plans to pioneer hydrogen heating trials, starting in a 'neighbourhood' and then scaling up to a potential town by the end of the decade. This ten-point plan will turn the UK into the world's number one centre for green technology and I'm pleased to say our future £1 billion innovation portfolio will continue to accelerate the commercialisation of low carbon technology of which hydrogen has a significant part to play.

Building on the ten-point plan, Government expects to set out our more detailed national hydrogen strategy next year.

Another development this year has been the establishment of the Hydrogen Advisory Council to work with BEIS and industry, to identify and promote concrete actions required to enable the supply of low carbon hydrogen at scale for use across the energy system, addressing both near term challenges as well as maximising opportunities for business. Working with industry the UK is aiming for 5GW of low carbon hydrogen production capacity by 2030. Hydrogen has a substantial part to play in decarbonising industry and the industrial clusters all include a hydrogen component, alongside carbon capture and storage.

The UK can draw upon its strong, experienced gas-based manufacturing and consultancy base, which is well-placed to export products and expertise, stimulating economic growth and supporting the shift to net zero. Indeed, as we move into a year where the UK will be hosting the COP26 climate summit we need to showcase how the UK is a world leader in innovation both domestically and internationally. I'm looking forward to how the Hy4Heat demonstration facilities - boilers, cookers, fires - being created for exhibitions and conferences can play a part in this.

Over the past year, despite the issues that Covid-19 has posed, the Hy4Heat programme has continued to progress, thanks to the focus and dedication of the whole team and the many contractors who have responded flexibly and adapted to the changed circumstances. Of course it's to be expected that some of the appliance development will take a little longer due to Covid-19's impact on supply chains. To support the appliance, meter and component manufacturers, BEIS introduced remote milestone reviews; verifying milestone delivery without the need for physical site visits.

The Hy4Heat programme only has a few more months left to run, and work continues on the safety assessment, as well as the development of commercial appliances and a competency framework for the training and accreditation of gas engineers. Hydrogen and methane while similar in many ways do have different characteristics and there is still some significant evidence to gather for hydrogen conversion.



**Mark Taylor**

Deputy Director for Energy Innovation  
Science and Innovation for Climate and Energy  
**BEIS**

To support manufacturers, BEIS introduced remote milestone reviews, verifying milestones without the need for physical site visits



## Letter from Mark Neller

The Hy4Heat programme's strength has been to bring together a diverse group of companies and organisations, including engineering, appliance manufacturers, trade associations, the gas sector, academics, independents, specialists, the list goes on. Some have collaborated to manufacture appliances, others given guidance as the advisory panel, or provided oversight as the co-ordination group. Some have represented their members' interests, and some given feedback on new standards and certification development. All the organisations involved have played an enabling role in the potential of hydrogen providing a solution for the UK's early deep decarbonisation and 2050 net zero target.

This past year the focus has been on the safety assessment. We have completed all the experimental work and data analysis. All documents have been submitted to the HSE for review.

There's no escaping the enormous scale of the task to achieve net zero. The UK has made a strong start with decarbonising the electricity grid, but even on windy and sunny days, renewables still only represent about 15 per cent of the energy used. We need to continue to build up renewable electricity generation and hydrogen must play its complementary role alongside electrification in addressing the

decarbonisation challenge. A third of UK CO<sub>2</sub> emissions comes from heat, and some 20 million homes are connected to the gas grid which provides value for money, reliability and convenience - so finding an alternative that provides all these is a significant challenge.

Hydrogen offers a solution, if with necessary mitigations it can be assessed to be as safe and reliable as natural gas. This potential solution would minimise the need for the public to make a conscious decision to switch energy systems - a most desirable outcome from a consumer point of view. People could continue to use boilers, fires and cookers that are almost identical to today's products but with no CO<sub>2</sub> emissions.

The development of 'hydrogen-ready' appliances from companies such as Baxi Heating and Worcester Bosch could be a game-changer in terms of the cost and impact on the public of a potential conversion of the gas grid from 100% methane to 100% hydrogen. Also manufacturers have indicated reduced NO<sub>x</sub> levels, another positive. This hydrogen decarbonisation pathway is the result of BEIS's forward-looking science and innovation team and its use of the Innovation Fund and Hydrogen Supply competition programmes.

The Hy4Heat programme is drawing to a close and next year the study will be complete. It will form the bedrock of hydrogen community trials, such as SGN's H100 hydrogen trial in Fife in 2023 funded by Ofgem, moving to villages by 2030. So, as well as contributing to decarbonisation, Hy4Heat's legacy could be providing the opportunity to use the UK's strong gas-based manufacturing and consultancy base to create new jobs and to stimulate economic growth.

There's been interest in Hy4Heat from Australia, the USA, Germany and other European countries, and all those involved should be very proud of being part of this world-leading hydrogen programme.



**Mark Neller,**  
UKIMEA Energy Leader Arup, Hy4Heat  
Programme Director

This past year the focus has been on the safety assessment. We have completed all the experimental work and data analysis.



“The UK is already a world leader in investigating the use of hydrogen for heating, replacing fossil fuels like natural gas with hydrogen and hydrogen blends.” Ten Point Plan for a Green Industrial Revolution November 2020

### Our Mission

Hy4Heat’s mission is 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.

### About Us

There is growing international consensus that hydrogen will be essential to successfully tackling climate change. So BEIS is working to develop hydrogen as a strategic decarbonised energy carrier for the UK which will be an essential element of the UK’s efforts to transform and decarbonise our energy system in line with our legally binding 2050 net zero commitment. Hydrogen can be used across multiple end-use sectors, including industry, transport, heat, and power. BEIS is looking to support and develop low carbon hydrogen production methods, which will position hydrogen as a highly effective decarbonisation option, particularly in hard-to electrify sectors and processes.

At the end of 2017 BEIS appointed Arup to be the programme manager for the Hy4Heat programme. Arup partnered with technical and industry specialists: Kiwa Gastec, Progressive Energy, Embers and Yo Energy, and together the team oversees the programme and technical management of all the work packages.

For the past three years Hy4Heat has been exploring whether replacing natural gas (methane) with hydrogen for domestic heating and cooking is feasible and could be part of a plausible potential pathway to help meet heat decarbonisation targets. To do this the programme has been seeking to provide the technical, performance, usability and safety evidence to demonstrate whether hydrogen can be used for heat in buildings.

### Covid-19

During the Covid-19 crisis, the programme’s different workstreams have been able to continue to progress, while safeguarding the health and wellbeing of colleagues. Whenever possible people have worked from home and, in response to Covid-19, BEIS introduced a ‘remote review of milestones’ for appliance manufacturers under work packages 4, 5 and 10. This provided the option to verify delivery without needing a physical site visit.

Covid-19 has meant some elements of the programme have been delayed and will continue past March 2021. One example is the development of demonstration facilities to be shown at industry conferences, events and exhibitions. And, due to lab closures and supply chain issues, the delivery dates of several appliances have also been extended.

## Hy4Heat Programme Governance Structure

Hy4Heat's success is reliant on collaboration of different companies and organisations collaborating. As well as the clear lines of accountability and responsibility to deliver the programme contractually, the Hydrogen Co-ordination Group and the Advisory Panel give oversight, advice and guidance and are formed of different parts of the energy industry, academia, commercial sector and regulating bodies.

The large number of suppliers, contractors and subcontractors delivering the various work packages are undertaking the majority of the programme's output.

### Hydrogen Coordination Group

- Gas Distribution Network Operators
- National Grid
- Igem
- Ofgem

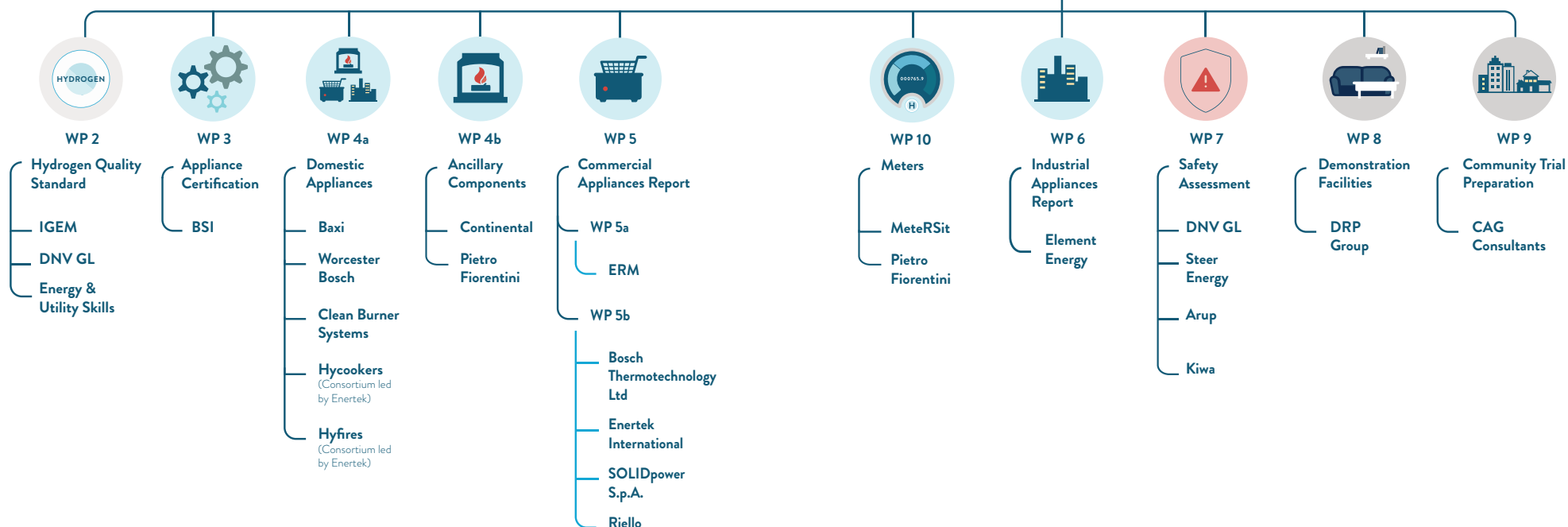
Department:  
for Business  
Innovation & Skills



### Advisory Panel

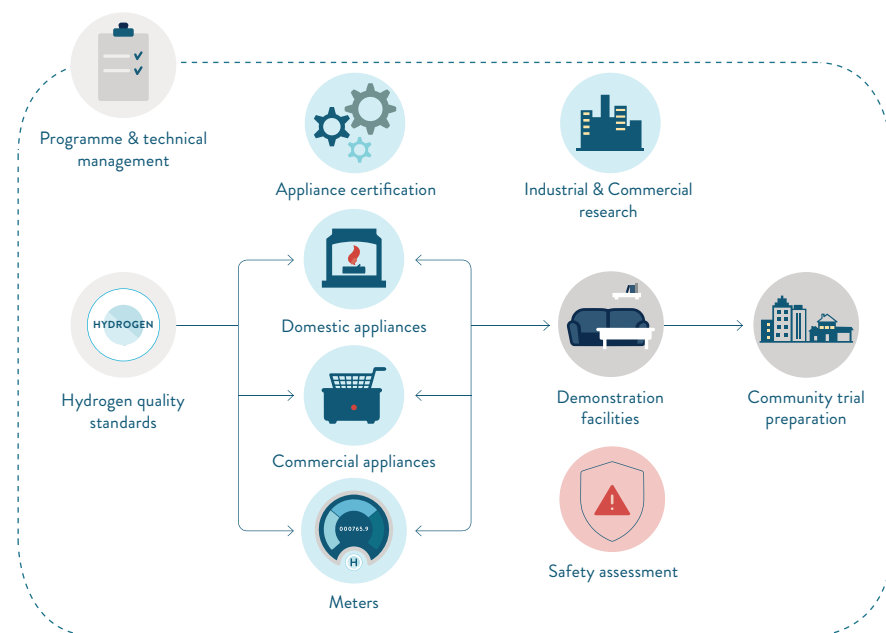
- Independents, industry experts & academics
- Ofgem
- Health & Safety Executive
- Gas Distribution Network representative

ARUP+



## Work Package Overview

The Hy4Heat team oversees the programme and technical management of all the other various, interdependent, work packages. Work package 1 is the programme management and oversight of all the other workstreams.



### PROGRAMME MANAGEMENT AND TECHNICAL OVERSIGHT

#### WORK PACKAGE 1

Responsible for the overall delivery of the programme; oversight and governance duties including supporting procurement, managing delivery contracts, engaging with wider industry.

### STANDARDS AND CERTIFICATION

#### WORK PACKAGE 2

- Hydrogen gas standards
  - defining the purity of the gas and odorant to be added
  - determining if there's a requirement to add colourant to hydrogen
- Developing a competency framework for training, accreditation and registration of hydrogen gas engineers

#### WORK PACKAGE 3

- Hydrogen appliance certification of a new generation of appliances; new standard PAS4444 is to be used

### APPLIANCE METERS AND ANCILLARY COMPONENT DEVELOPMENT

#### WORK PACKAGE 4a

- Development of domestic hydrogen appliances: including gas fires, cookers and boilers.

#### WORK PACKAGE 4b

- Development of ancillary equipment such as control valves and excess flow valves, needed for the safe installation of hydrogen appliances

#### WORK PACKAGE 10

- Development of smart hydrogen gas meters

#### WORK PACKAGE 5b

- Development of a number of commercial appliances such as catering equipment, space heating, fuel cell and boiler cascade system



## RESEARCH REPORTS

### WORK PACKAGE 5a

- Research into the variety commercial appliances and the issues to be addressed in their conversion or replacement with hydrogen appliances



### WORK PACKAGE 6

- Research into the variety of industrial appliances and the issues to be addressed in their conversion or replacement with hydrogen appliances



## SAFETY ASSESSMENT AND EXPERIMENTAL TESTING

### WORK PACKAGE 7

- Assess the safe use of hydrogen gas in domestic properties and buildings including ignition, gas leakage accumulation and ventilation of gas releases in different enclosed spaces within a typical domestic property



## DEMONSTRATIONS AND PLANNING FOR POTENTIAL COMMUNITY TRIALS

### WORK PACKAGE 8

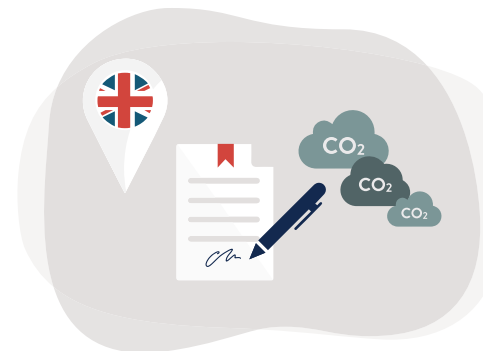
- Demonstration facilities to show prototype hydrogen appliances



### WORK PACKAGE 9

- Planning and preparation for a potential community trial using hydrogen, if BEIS decides to progress to community trial stage

## PROGRAMME MANAGEMENT AND TECHNICAL OVERSIGHT



 Department for  
Business, Energy  
& Industrial Strategy

**ARUP+** KIWA | EMBERS | YOENERGY  
PROGRESSIVE ENERGY

## WP1: Programme Management

As well as being responsible for the overall delivery of the programme, the Hy4Heat programme team oversees and manages the other work packages. It performs oversight and governance duties such as:

- supporting procurement activity and contractor appointments
- managing work package delivery contracts and checking milestone achievements
- identifying potential risks and putting in place mitigation measures where possible
- undertaking engagement activity with the established stakeholder group and wider industry and producing quarterly newsletters
- producing regular reports and updates for BEIS

Since the start of the programme in late 2017, the programme management of Arup and technical management of Kiwa Gastec has established a robust, transparent and evidence-based approach, giving regular industry updates, reports and presentations on progress. Embers, Yo Energy and Progressive Energy have played supporting roles, providing expert advice and insight throughout.

## Highlight dates

### 2018

- 16 March 2018, stakeholder engagement event
- October 2018 Hy4Heat website launched
- 20 December 2018 Hy4Heat presented at COP24, Poland
- 20 December 2018 annual progress report

### 2019

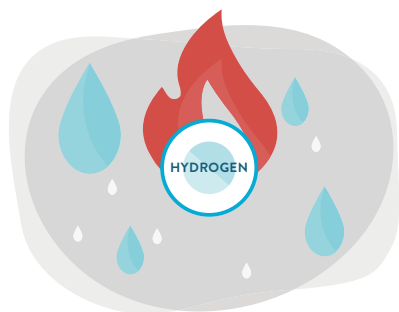
- 7 December Hy4Heat presented at COP25, Spain
- 20 December 2019 annual progress report

### 2020

- 9 March 2020 stakeholder engagement event
- December 2020 annual progress report



## STANDARDS AND CERTIFICATION



### WP2: Hydrogen Quality Standards

DNV GL was appointed to assess the options available for using hydrogen in relation to purity and colourant. In this work DNV GL was supported by NPL, HSL, Element Energy and Loughborough University

- The Hydrogen Purity report makes a recommendation for a minimum hydrogen purity level of 98%, as well as maximum levels for other likely trace components
  - The Hydrogen Colourant report is a study to determine if there is a requirement for adding a colourant to hydrogen to ensure that safe burning and user acceptance is achieved and to investigate the optimum solution if a colourant is required
  - The Hydrogen Odorant report finds that Odorant NB is suitable to use with 100% hydrogen, as it meets the minimum requirements for odorants already used in natural gas.
  - IGEN (Institution of Gas Engineers & Managers) is reviewing the relevant standards for hydrogen
  - Energy & Utility Skills has been appointed to develop a Competency Framework for the training, accreditation, and registration of gas engineers working with hydrogen.
- Highlight dates**
- 2018**
- 15 June 2018, ITT published
  - 8 October 2018, IGEN to develop hydrogen standards
  - 20 October 2018, DNV GL to conduct studies into hydrogen purity and colourant
- 2019**
- 21 May 2019, DNV GL present work to WP4 appliance developers
  - 24 July 2019, Hydrogen Purity Standard presented at IGEN
- 2020**
- 27 February 2020, Hydrogen Purity report published
  - 11 May 2020, Energy & Utility Skills to develop a Competence Framework for gas engineers
  - 14 August 2020, Hydrogen Odorant report published

## STANDARDS AND CERTIFICATION



bsi.

### WP3: Hydrogen Appliance Certification

Hydrogen appliances are to be certified under GAR (Gas Appliance Regulation). These regulations will be aimed at providing guidance on the testing and certification of hydrogen gas appliances for notified bodies and appliance manufacturers.

BSI has developed a new publicly available standard, PAS 4444, to be used primarily on the Hy4Heat programme but the aim is that it can form the basis for widescale standardisation of hydrogen-fuelled appliances. This is a guide to be followed by appliance manufacturers regarding functionality, safety, installation, operating and servicing requirements for their hydrogen-fuelled and hydrogen/natural gas dual-fuelled or converted appliances.

It covers the functional specification of the appliance, including specific advice on the demonstration of safety, including worst case conditions to stress the appliance in excess of that it is likely to experience in normal service.

The PAS is aimed at:

- Manufacturers of hydrogen-fired gas appliances
- Manufacturers of gas appliances that are designed to be converted to use hydrogen
- Notified Bodies and other appliance test houses

#### Highlight dates

##### 2018

- 30 April 2018, Notified Bodies and Test Labs in UK and EU surveyed
- 7 August 2018, Domestic appliance certification engagement event
- 30 November 2018, BSI awarded contract

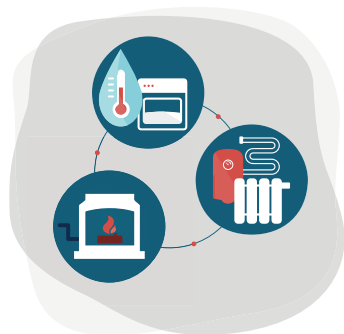
##### 2019

- 14 May 2019, PAS 4444 draft presentation given to WP4 appliance developers

##### 2020

- 27 April 2020, PAS 4444 2020 published
- November 2020, BSI asked to initiate work on installation standards

## APPLIANCES, METERS AND ANCILLARY COMPONENT DEVELOPMENT



### WP4: Domestic Hydrogen Gas Appliance Development

Work package 4a is the development of domestic hydrogen appliances to demonstrate the safe use of hydrogen as a fuel in providing domestic heating, hot water and cooking requirements. It aims to provide critical evidence of end use application, safety, in-use emissions, and functionality.

Work package 4b is the development of ancillary equipment such as control valves and excess flow valves, needed for the safe installation of hydrogen appliances.

#### WP4a objectives are to:

- Deliver prototype appliances which can demonstrate safe use of hydrogen as a fuel in providing domestic heating, hot water and cooking requirements
- Contribute to positive stakeholder engagement through use of the prototype appliances in the unoccupied demonstrations
- Understand and where feasible address, the challenges and risks associated with progressing the appliances to a volume manufacturing stage
- Understand the challenges and potential solutions for a transition to hydrogen including products that simplify the switch-over process, for example dual-fuel, hydrogen-ready, or adaptable

#### Highlight dates

##### 2018

- 15 June 2018, hydrogen appliance stakeholder engagement event
- 31 August 2018, ITT for SBRI competition published
- 31 August 2018, online webinar to support applications
- 9 November 2018, successful applicants notified
- 26 November 2018, guidance document for phase 1 issued

##### 2019

- 8 February 2019, clarification questions answered and published ahead of phase 1 report submissions
- 29 April 2019, phase 2a guidance note issued
- 14 May 2019, Phase 2a kick-off stakeholder event held

## APPLIANCES, METERS AND ANCILLARY COMPONENT DEVELOPMENT



A number of organisations have completed or are nearing completion of developing safety certified appliances, including:

- Boilers (combi and regular/system) Baxi Heating and Worcester Bosch
- Cookers (stand-alone hob, integrated freestanding cooker) HyCookers a consortium led by Enertek
- Fires (standard, mid-range, executive) Hy4Fires a consortium led by Enertek, and a consortium led by Clean Burner Systems

#### WP4b

The development of ancillary system components that are compatible and safe for use with hydrogen, are underway, including:

#### Ancillary System Components, including:

- Piping - including connecting hoses and metal pipe
- Pipe fittings for connecting pipes
- Gas valves
- Gas pressure regulators
- The emergency control valve

#### Excess flow valve

#### Highlight dates

##### 2020

- 28 January 2020, WP4b ITT for ancillary components published
- 26 February 2020, WP4b ITT clarification Q&A published
- 9 March 2020, Developers present at stakeholder engagement event
- 13 July 2020, Continental and Pietro Fiorentini appointed W4b contracts
- 7 August 2020, Remote milestone review guidance note
- 10 August 2020, Phase 2b guidance note issued
- October 2020, boilers developed by Baxi and Bosch are displayed in DNV GL's Spadeadam facility in Northumberland



 **Pietro Fiorentini**

 **MeterSIt**

### WP10: Metering

Pietro Fiorentini and MeterSIt are the organisations developing hydrogen smart meters (SMETS2). The aim of work package 10 is to provide critical evidence on the feasibility of producing fully-certified hydrogen smart meters within the space constraints of current meters. They will also include the safety feature of an excess flow valve (EFV) to automatically restrict the gas if needed.

#### Highlight dates

##### 2018

- 14 December 2018, Engagement event for potential manufacturers

##### 2019

- 28 March 2019, ITT published
- 31 July 2019, Two companies appointed to develop meters
- 5 December 2019, Project scope clarification issued



**BOSCH**   
Thermotechnology

 **Enertek International**

 **POWRMATIC**

 **NORTEK**  
GLOBAL HVAC



**RIELLO**  
Energy For Life

### WP5b: Commercial Appliances and Equipment Development

**Work package 5b** is the development of hydrogen commercial appliances such as catering equipment and boiler cascade systems. Suppliers have been appointed and are working on the development of a number of commercial appliances including:

Catering and production heating  
(e.g. chargrill, griddle, hob, fryer etc)

Production heating

Dry space heating  
(e.g. fired heaters, radiant heaters, unit air heaters)

Wet space heating  
(e.g. boiler cascade)

Combined heat and power  
(e.g. heat led CHP unit)

#### Highlight dates

##### 2019

- 21 May 2019, WP5 Commercial appliance engagement event – presentation
- 2 August 2019, WP5b ITT published
- 9 August 2019, WP5b webinar
- 23 August 2019, WP5b first set of clarification questions answered
- 2 September 2019, WP5b second set of clarification questions answered
- 5 September 2019, Revised ITT and second set of clarification questions re-issued

## RESEARCH REPORTS



### WP5a: Understanding Commercial Appliances

Understanding Commercial Appliances is a market research study into the variety of commercial appliances and the issues to be addressed in their conversion or replacement with hydrogen appliances. This study has been carried out by Environmental Resources Management (ERM).

The study is thought to be the largest and most in depth consideration of natural gas appliances in the UK commercial sector to date. Engagement with stakeholders revealed that sector level population data does not exist for most appliances, and that the commercial sector is heavily segmented, reflecting the diversity of the commercial appliance market.

The technical challenges to developing hydrogen appliances for use in the commercial sector are deemed to be surmountable and should largely be addressed by domestic appliance development programmes already underway and existing hydrogen boiler applications in the industrial sector.

#### Highlight dates

##### 2018

- 25 May 2018, PIN published for understanding commercial and industrial appliances
- 26 July 2018, ITT published for understanding commercial and industrial appliances
- 24 October 2018, ERM (Environmental Resources Management) appointed to produce a research report on commercial sector appliances

##### 2020

- 4 November 2020, Understanding Commercial Appliances report published

## RESEARCH REPORTS



Advisian

elementenergy

### WP6: Understanding Industrial Appliances

The report from Element Energy, supported by Advisian and Cardiff University, focuses on converting current industrial natural gas heating technologies to use 100% hydrogen.

The aim of the study is to assess the technical requirements and challenges associated with industrial hydrogen conversion and estimate the associated costs and timeframes.

The study covers just over half of fossil fuel use in manufacturing (120 TWh out of a total of 215 TWh) and identified 90 TWh of industrial energy use which could be switched to hydrogen by 2040. This included 15 TWh of demand for firing applications, for which biomass and electrification are rarely technically suited. More recent analysis to extend the scope of this work, suggests that full decarbonisation of stationary combustion in manufacturing is possible using hydrogen, CCUS, bioenergy with carbon capture and storage (BECCS) and electrification.

#### Highlight dates

##### 2018

- 25 May 2018, PIN published for understanding commercial and industrial appliances
- 26 July 2018, ITT published for understanding commercial and industrial appliances
- 24 October 2018, Element Energy awarded contract to write a research report on understanding industrial appliances

##### 2019

- 10 April 2019, Understanding industry appliances presentation and workshop

##### 2020

- 22 January 2020, Publication of the report into the conversion of industrial equipment to hydrogen

## SAFETY ASSESSMENT AND EXPERIMENTAL TESTING



ARUP



### WP7: Safety Assessment

This work package focuses on assessing the safe use of hydrogen gas in domestic properties and buildings. BEIS has appointed DNV GL and Steer Energy to conduct a range of comparative experimental tests, using both natural gas and hydrogen, that simulate scenarios found in domestic environments to assess and evaluate the relative risk of using hydrogen versus natural gas - as part of demonstrating and de-risking the use of hydrogen for heating in UK homes.

Experimental testing has been undertaken to support the safety assessment. Additionally information from GDNOs has been collated to support this work. This information will then feed into the quantitative risk assessment (QRA) and consequence model to support the safety assessment.

Arup and Kiwa Gastec have worked on the QRA and this has been focused on a comparative assessment. It compares the overall level of risk associated with hydrogen to the current level of risk associated with methane gas.

#### Highlight dates

##### 2019

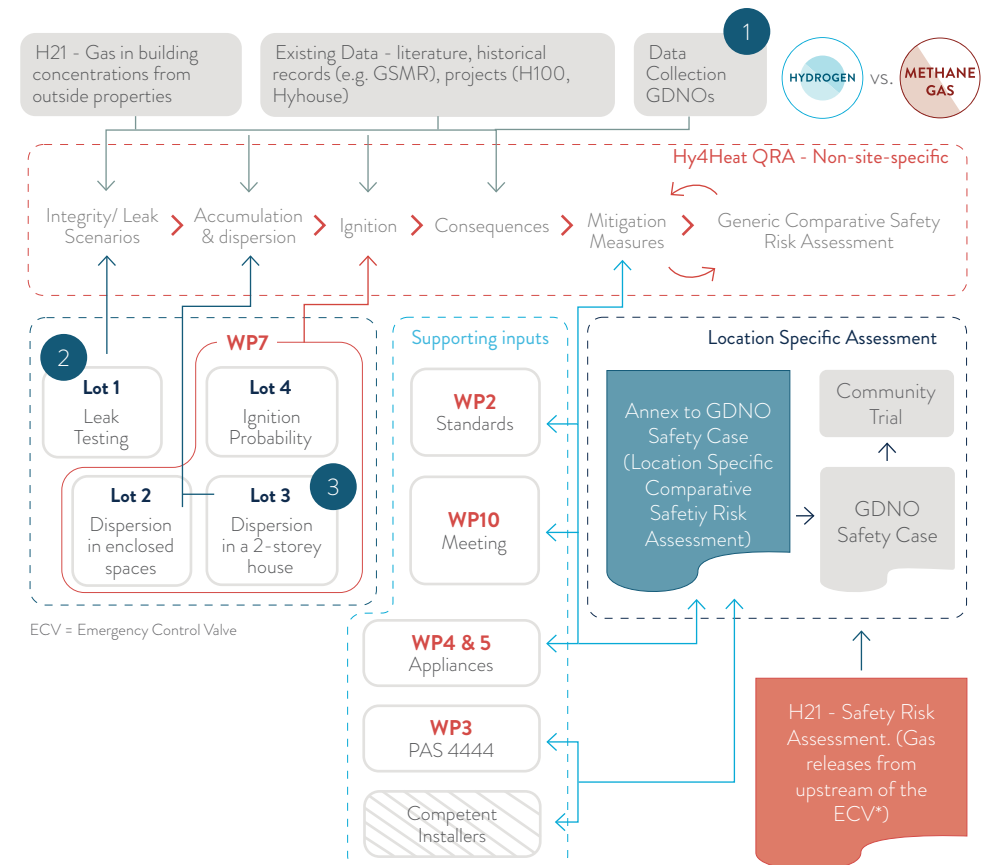
- 6 March 2019, WP7 ITT published
- 5 June 2019, BEIS appoints WP7 contractors

- Risks and incidents related to carbon monoxide are excluded as part of this assessment i.e. risk reduction in the overall safety by removal of carbon monoxide risk will not be used to evaluate the safety risk of using hydrogen
- Assessment will consider fatalities and serious injuries

As the risk assessment is comparative, and in order to limit the number of variables these are the required elements:

- Assumed two-storey brick-built terraced house (multi-occupancy buildings, e.g. blocks of flats, are excluded)
- Pipework infrastructure within a property is the same for methane and hydrogen
- Property ventilation and air tightness based on current levels and building regulations
- Low pressure, downstream of the ECV, scenarios considered (up to 75mbar)
- Meter box located within the property
- Existing odorant used in the network will also be used for hydrogen gas

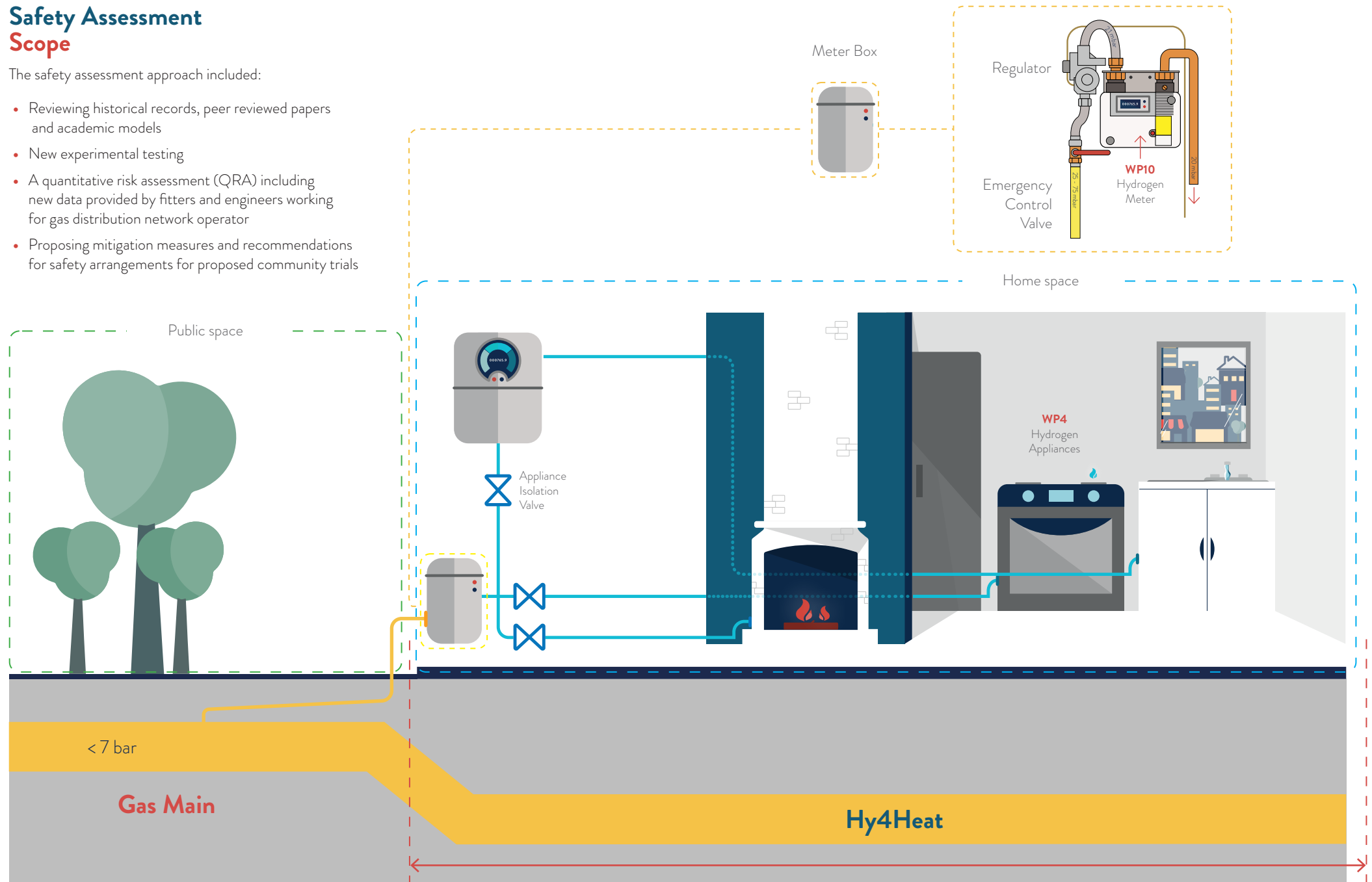
#### Key Assessment



## Safety Assessment Scope

The safety assessment approach included:

- Reviewing historical records, peer reviewed papers and academic models
- New experimental testing
- A quantitative risk assessment (QRA) including new data provided by fitters and engineers working for gas distribution network operator
- Proposing mitigation measures and recommendations for safety arrangements for proposed community trials



## DEMONSTRATION FACILITIES AND PLANNING FOR POTENTIAL COMMUNITY TRIALS



drp<sup>c</sup>

Logan Energy  
hydrogen technologies

### WP8: Demonstration Facilities

DRP Group has been appointed to develop a range of hydrogen appliance demonstration facilities. These facilities will be featured at industry exhibitions and conferences including exhibitions stands; a moveable unit with hydrogen appliances and a chef demo stand.

Due to Covid-19 these moveable demonstration facilities have not been produced, as yet.

#### WP8b fixed demonstration facilities

BEIS is seeking to support the construction of up to two fixed facilities to demonstrate hydrogen appliances and meters in a realistic domestic setting. A grant call has been issued to be allocated between up to two projects.

In the meantime combi boilers from Baxi Heating and Worcester Bosch have been installed at specially built demonstration houses at DNV GL facilities on a test site in Northamptonshire as part of the H21 innovation project, sponsored by Ofgem.

#### Highlight dates

##### 2018

- 14 August 2018, appliance manufacturers surveyed about access to testing facilities

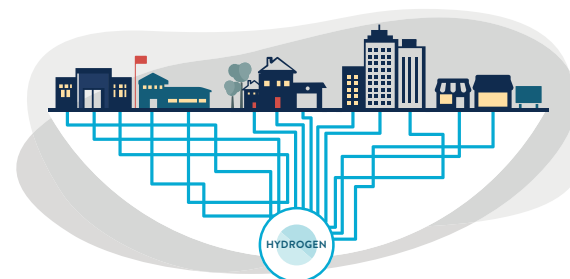
##### 2019

- 30 October 2019, WP8a Demonstration showrooms engagement event

##### 2020

- 19 March 2020, ITT published for demonstration facilities (WP8a)
- 9 April 2020, WP8 deadline extended
- 13 July 2020, DRPG, creative communications agency, appointed to develop demonstration facilities
- 23 October 2020, Grant call launched to support construction of fixed facility to demonstrate hydrogen appliances

## DEMONSTRATION FACILITIES AND PLANNING FOR POTENTIAL COMMUNITY TRIALS



CAG  
CONSULTANTS

### WP9: Planning for Potential Community Trials

Any potential community trial would take place after the Hy4Heat programme is completed.

The government's ten point plan for a green industrial revolution - sets out a timescale of supporting the industry so that by 2023 hydrogen heating trials in a local neighbourhood can take place. Then by 2025 support the industry to begin a large village hydrogen heating trial and a possible pilot hydrogen town before the end of the decade.

To inform the planning of potential community trials, Hy4Heat commissioned a literature review and a small number of focus groups with members of the public to consider their willingness to take part in a hydrogen trial, asking them to consider what barriers and challenges would be faced and how to overcome them.

#### Highlight dates

##### 2019

- October 2019 Literature review into potential responses by the public to a hypothetical in-home hydrogen heating trial undertaken
- 5&6 November 2019 Focus groups held to explore potential responses by the public to a hypothetical in-home hydrogen heating trial

##### 2020

- 17 December 2020, literature review and focus group research published

## Engaging and Communicating with Stakeholders

Since the start of the Hy4Heat programme, it has been important for us to keep industry stakeholders informed and give relevant organisations ample opportunity to be involved in the various work packages, engagement events and so on. Early in the programme, at the suggestion of the advisory panel, we created a website to be an up-to-date information resource for anyone interested in finding out more.

More recently IGEN has created a Knowledge Centre to continue providing expertise to the industry and wider audiences. This digital platform will include resources on a wide variety of subjects; from hydrogen production, transmission, distribution and storage to applications, safety and training, including the latest research, as it emerges, from hydrogen projects currently underway across the UK and internationally.

Being primarily focused on an industry audience, rather than a consumer audience, didn't deter Hy4Heat from developing communication material that seeks to explain complex technical information in a simple, easy to understand way. In order to be as inclusive and accessible our aim has been to enable people without any specialist hydrogen knowledge to be able to understand the programme's mission. And for those individuals and organisations requiring the more detailed, technical information supporting the work, the reports and documents are published online, in line with our principle of transparency.

To reach a wider audience, BEIS and the Hy4Heat team have presented at industry

conferences and events, of course for most of this past year these have been online virtual conferences. However in early March, ahead of the national lockdown, we held our own major stakeholder engagement session in London, where presentations were given by, among others, BEIS, the domestic appliance and meter developers, and by organisations working on the safety assessment. This interactive event, with around 200 people attending, provided the opportunity for the audience to raise questions and make suggestions about possible future trials using hydrogen.

We adapted the Hy4Heat storyboard to assist some focus group research we carried out to understand the willingness of people to take part in a potential community trial, possible barriers and challenges and how they could be overcome. This was just an early indicative research and other projects such as the H100 project in Scotland is conducting more in-depth research in this area.

At the start we could identify some 60 people outside the delivery team who had expressed an interest in the Hy4Heat programme. Now we issue our quarterly newsletters and updates to around 800 people. And next year we hope to widen our audience even further. Already Baxi Heating and Worcester Bosch combi boilers have been fitted into demonstration homes on DNV GL's Northumberland test site. And specialist creative agency DRPG is building exhibition displays for the prototype hydrogen boilers, cookers, hobs, meters, to be showcased at conferences and events, whether attended virtually or in person, notably COP 26 in Glasgow.

As outlined in the government's ten point plan for a green industrial revolution, it's likely that community trials with hydrogen will be taking place before this decade is over.

So we hope that the stakeholder engagement groundwork already undertaken through the Hy4Heat programme can be the foundation that can be built upon by other future hydrogen projects and initiatives.

### The Hy4Heat Programme



Storyboard used with focus groups researching potential responses by the public to a hypothetical in-home hydrogen heating trial



## Companies and Organisations that are part of Hy4Heat

- Almaas Technologies
- Arup
- Baxi Heating UK
- Birmingham Burners (Walsall) Ltd
- Bosch Thermotechnology
- British Standards Institute
- Brunel University
- CAG Consultants
- Cardiff University
- Charlton & Jenrick
- Clean Burner Systems
- Continental
- DNV GL
- DRPG
- Element Energy
- Embers
- Energy & Utility Skills
- Enertek International Ltd
- Falcon Food Service
- Focal Point Fires
- Gazco
- Glen Dimplex Home Appliances
- Health and Safety Laboratory
- Institution of Gas Engineers & Managers
- Jacobs
- Kiwa
- Legend Fires
- Logan Energy
- Loughborough University
- MeteRSit
- National Physics Laboratory
- Nortek Ltd
- Pietro Fiorentini
- Powrmatic
- Progressive Energy
- Riello
- SolidPower
- Steer Energy
- Teddington Controls
- University of Leeds
- Valor Fires
- Worcester Bosch
- Worgas
- Yo Energy

## 2020 Progress Key Dates

- 22 January WP6 Report published regarding conversion of industrial equipment to hydrogen
- 28 January ITT for ancillary components published
- 27 February WP2 hydrogen purity report published
- 9 March Stakeholder engagement event
- 19 March ITT published for demonstration facilities (WP8)
- 27 April PAS 4444 published
- 11 May appointed to develop competency framework for accreditation and registration of gas engineers
- 22 June Continental and Pietro Fiorentini appointed WP4b contractors
- 13 July Global Creative communications agency, DRPG, to develop appliance demonstration facilities
- 7 August Remote milestone review guidance note published
- 10 August WP2b milestone guidance published
- 23 October Grant call to support construction of fixed facility to demonstrate hydrogen appliances
- 4 November Understanding commercial appliances report published
- 23 November Baxi and Worcester Bosch boilers installed at DNV GL's test site in Northumberland, as part of H21 project, sponsored by Ofgem
- 25 November IGEM and Energy and Utility Skills collaborate to develop Interim Technical Standards for gas installers
- 17 December, Literature review and focus group research published



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