

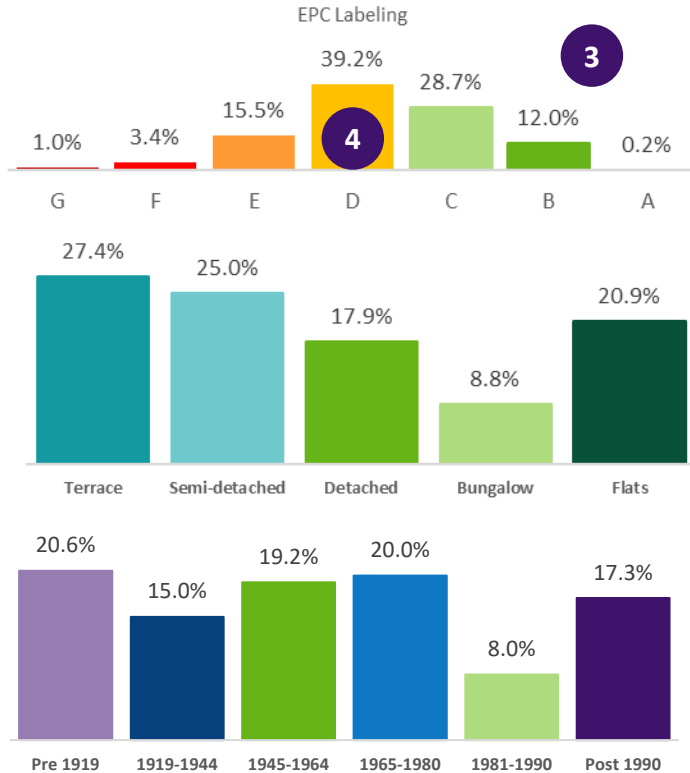


# The challenges for the housing sector and how low carbon technology can help

Alex Thomas – Key Account Director, Worcester Bosch

# New Technologies Impact UK Housing Stock

Housing Stock overview Existing Build UK



Ministry of Housing,  
Communities &  
Local Government

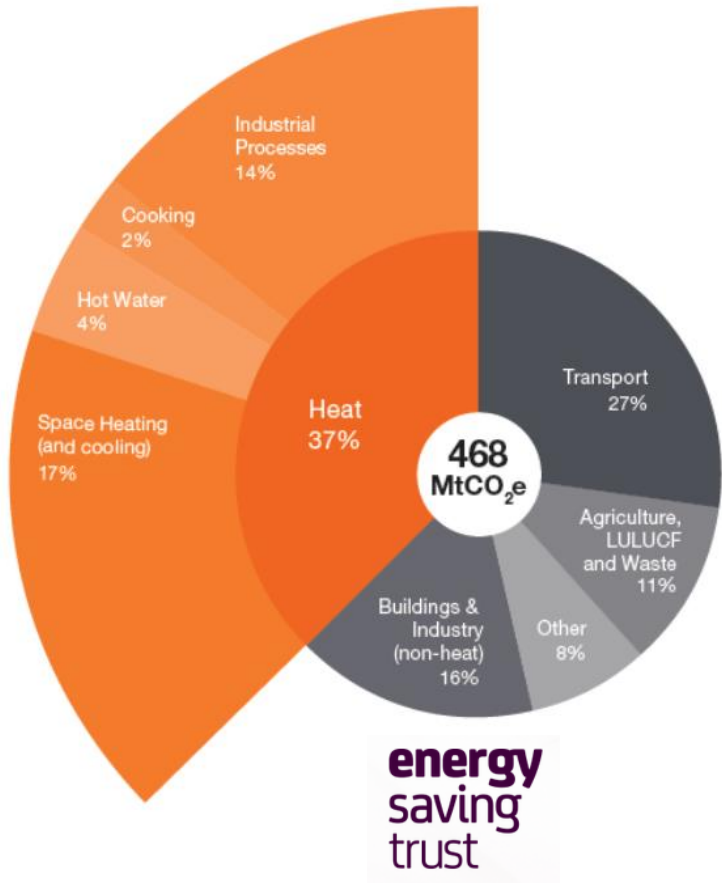
- **Renovation:**
  - RHI
  - Clean Homes Grant
  - Regional/Local initiatives
- **New Build**
  - Future Homes Standard

## KEY TAKE AWAYS

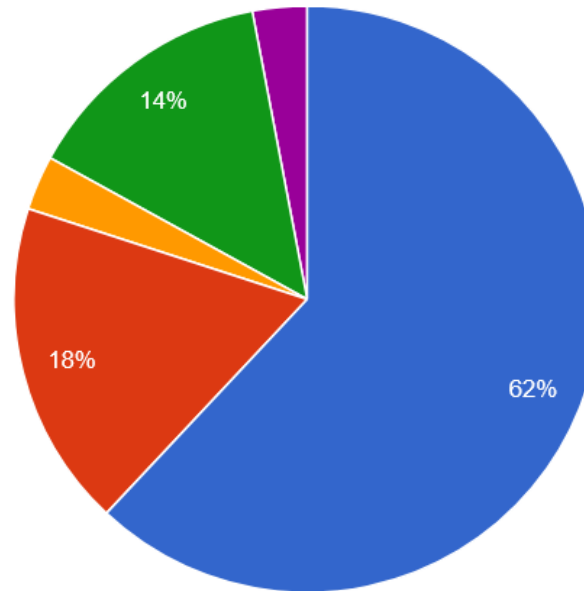
- 1 UK has a relatively old housing stock with an average size of 95m2
- 2 Over half of the houses are Terraced houses or Semi-detached houses
  - Looking at the EPC, only 40.9% has ABC labeling and therefore currently have HP potential.
- 3 A large D section in housing suggests a potential exists for Hybrid HP
- 4 Change in legislation & Grants drive HP sales. Future Homes Standard in 2025 for NB main driver
- 5

# UK Energy Mix

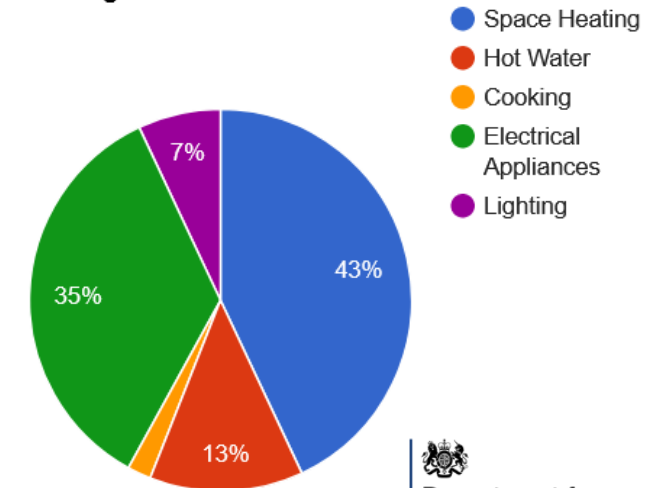
## The Carbon Challenge



Energy use in the average UK Household

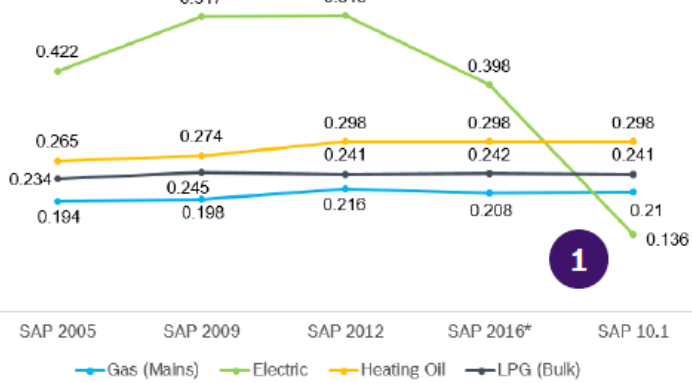


Energy cost assuming heating, hotwater and cooking are all gas fuelled

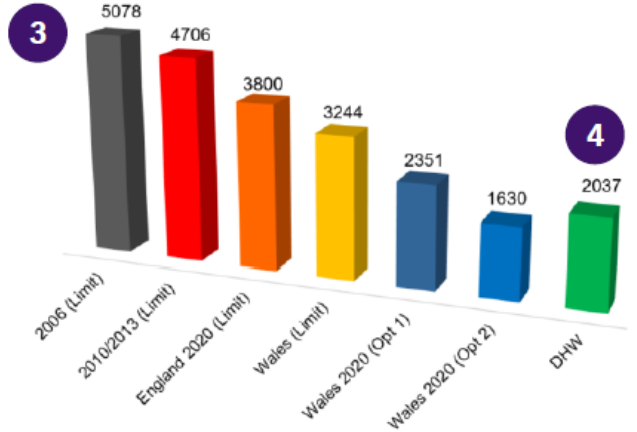
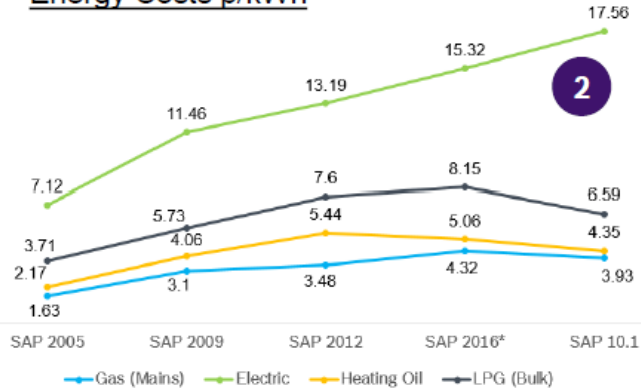


# Carbon Emissions (SAP) & Energy cost

Carbon Emissions



Energy Costs p/kWh



Space Heating Requirement (kWh/year)

## KEY TAKE AWAYS

- 1 The carbon emission factor for electricity will fall significantly in the new version of SAP
- 2 However the energy cost of electricity will still be much more expensive than natural gas
- 3 Fabric improvements will result in reduced space heating demand in dwellings
- 4 In some cases DHW energy requirements could become greater than the space heating

# Heat and Buildings Strategy Oct 2021



Department for  
Business, Energy  
& Industrial Strategy

*The Government sets out its ambition that all new heating systems installed from 2035 will be low carbon*

- 30m buildings responsible for 30% of emissions.
- 5 principles for decarbonisation of heat
- Ambition to end Fossil fuel boilers by 2035
- Heat Pump first approach
- Boiler upgrade scheme - £450m or £5000 per private install
- 600,000 Heat Pumps every year from 2028 in UK
- Market based mechanism consultation – 12th Jan
- Biomass Update
- Hydrogen investment – seeking 9000 jobs for improved economy?



**NET ZERO  
EFFORTS**



**INNOVATION**



**FAIR &  
AFFORDABLE**



**BESPOKE  
NEEDS**



**WAIT ON  
HYDROGEN**

# Delivering our 600,000 heat pumps per year by 2028 target

We will need to **grow heat pump deployment to 600k** per year by 2028 to remain on track for net zero. To support this, we are:

- **Futureproofing new buildings** through the Future Homes Standard and Future Buildings Standard
- **Supporting households** who want to make the switch through the Boiler Upgrade Scheme from 2022
- **Ensure heat pumps are no more expensive to buy and run** than gas boilers through energy price rebalancing and upfront cost reduction
- Supporting technology improvement, through the **Heat Pump Ready innovation programme**
- Encouraging **UK manufacture** and **installer upskilling**
- Working with key stakeholders to **ready the electricity network**

Through this long term policy mix we aim to:

- Drive sustainable long term **growth** in clean heat supply chains and lay the groundwork for further ~~heat pump market~~ growth
- **Reduce the upfront cost** of installing a heat pump by 25-50% by 2025 and to parity with gas boilers by 2030 at the latest
- Support **new jobs** and create **~£2bn Gross Value Added** to UK economy
- Aiming for 30 fold increase in heat pumps are **manufactured in the UK** by 2028
- **Save nearly 200 MtCO<sub>2</sub>e** by 2037 in Carbon Budgets 5 and 6

# BEYOND “NATURAL” GAS

**The  
Guardian**

**Ban new gas boilers in UK from 2025 or risk missing net zero target, says CBI**

**Industry group says Britain's climate goals may be doomed without heating overhaul**

**The Telegraph**

**Gas boilers could be banned from all homes to ensure the UK meets carbon neutral target by 2050**

Government to publish White Paper setting out 'bigger decisions' that UK has to make to meet the target

**THE  TIMES**

**Gas boiler ban: how much will it cost me for an eco-friendly alternative?**

Everything you need to know about solar panels, heat pumps and hydrogen replacements



 **WORCESTER**

 **BOSCH**

# Decarbonisation

A “Technology Neutral” approach

TECHNOLOGY

#1



Hydrogen Ready Boilers

TECHNOLOGY

#2



Heat Pumps

TECHNOLOGY

#3



Hybrids

TECHNOLOGY

#4



Heat Interface Units



WORCESTER



Hydrogen Ready  
Zero-Carbon Boiler



# WORCESTER

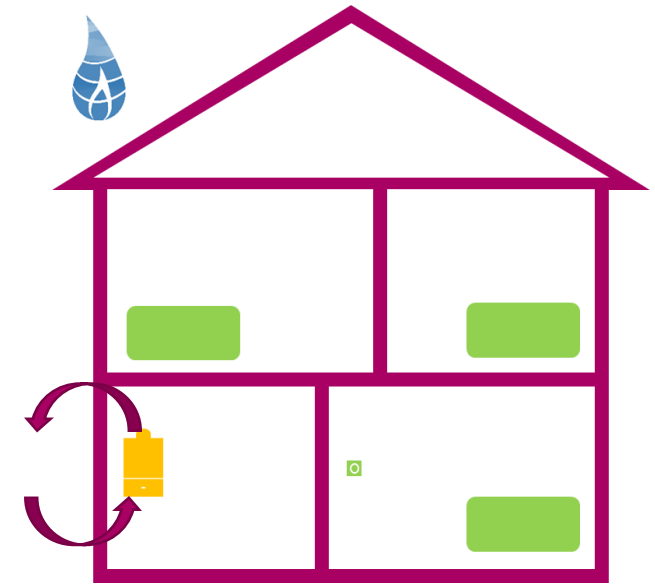
Bosch Group



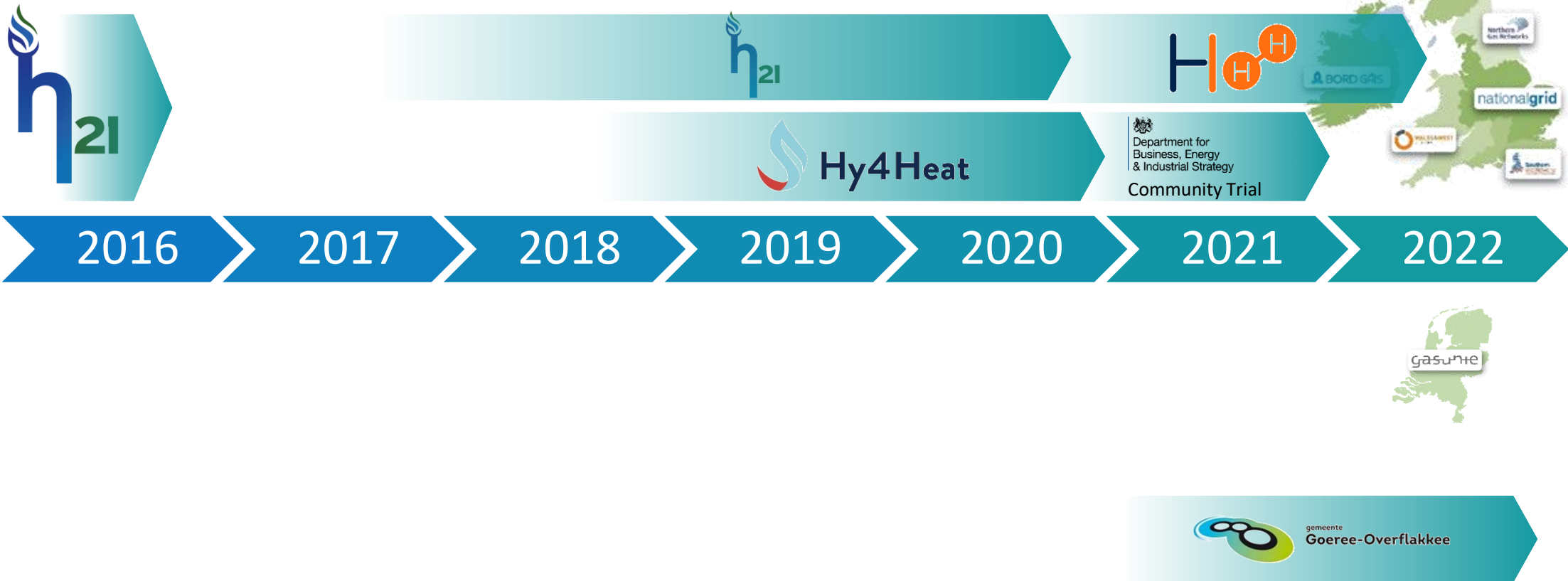
# Practical considerations for the Heating Industry

## Why does the UK love boilers so much?

- ▶ Consider largest market segment – replacement
- ▶ Electrification (air-source heat pump) requires:
  - ▶ Fabric improvement
  - ▶ New indoor appliance
  - ▶ New outdoor unit
  - ▶ Reinstatement of water tank
  - ▶ Possible New heat emitters (radiators)
  - ▶ New control (adapted behaviour)
- ▶ Gas requires:
  - ▶ New like-for-like indoor appliance



# Hydrogen Hydrogen Heat Projects



# Hydrogen Heat Projects



# Hydrogen investment. What is Hydrogen Blend?



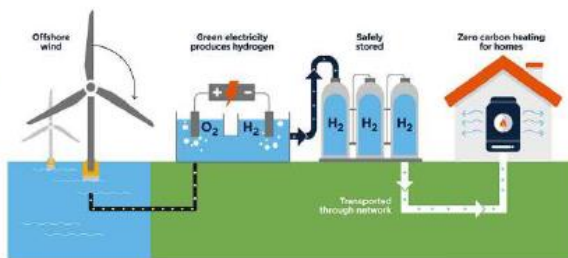
Hydrogen  
blend ready



Hydrogen Trials With Government (20% & 100% Mix)



HyDeploy: UK Gas Grid Injection of  
Hydrogen in Full Operation



20% H

TONNES OF CARBON

“  
BEIS IS COMMITTED  
TO WORKING WITH THE HEALTH  
AND SAFETY EXECUTIVE  
“TO ENABLE UP TO 20 PER CENT  
HYDROGEN BLENDING ON THE  
DISTRIBUTION NETWORKS BY 2023.”  
BEIS ENERGY WHITE PAPER  
”

THE EQUIVALENT TO  
**2.5M** CARS OFF THE ROAD

1. [www.energynetworks.org/newsroom/hydrogen-blending-what-is-it-and-why-does-it-matter](http://www.energynetworks.org/newsroom/hydrogen-blending-what-is-it-and-why-does-it-matter)

# Hydrogen Home - Gateshead

## Manufacturers Days throughout 2022





# Heat Pump units – Air to Water





# COP efficiency

**CS7001iAW 5 ORE-S**

**CS7001iAW 7 ORE-S**

**CS7001iAW 9 ORE-S**

**CS7001iAW 13 ORE-S**

Flow Temperature	SCOP (equivalent to SPF <sub>3</sub> SEPEMO SH only)
35	4.41
36	4.35
37	4.29
38	4.23
39	4.17
40	4.10
41	4.04
42	3.98
43	3.92
44	3.86
45	3.80
46	3.74
47	3.68
48	3.62
49	3.57
50	3.51
51	3.45
52	3.39
53	3.34
54	3.28
55	3.22

Flow Temperature	SCOP (equivalent to SPF <sub>3</sub> SEPEMO SH only)
35	4.77
36	4.70
37	4.64
38	4.57
39	4.51
40	4.45
41	4.38
42	4.32
43	4.25
44	4.19
45	4.12
46	4.05
47	3.98
48	3.91
49	3.85
50	3.78
51	3.71
52	3.64
53	3.57
54	3.50
55	3.43

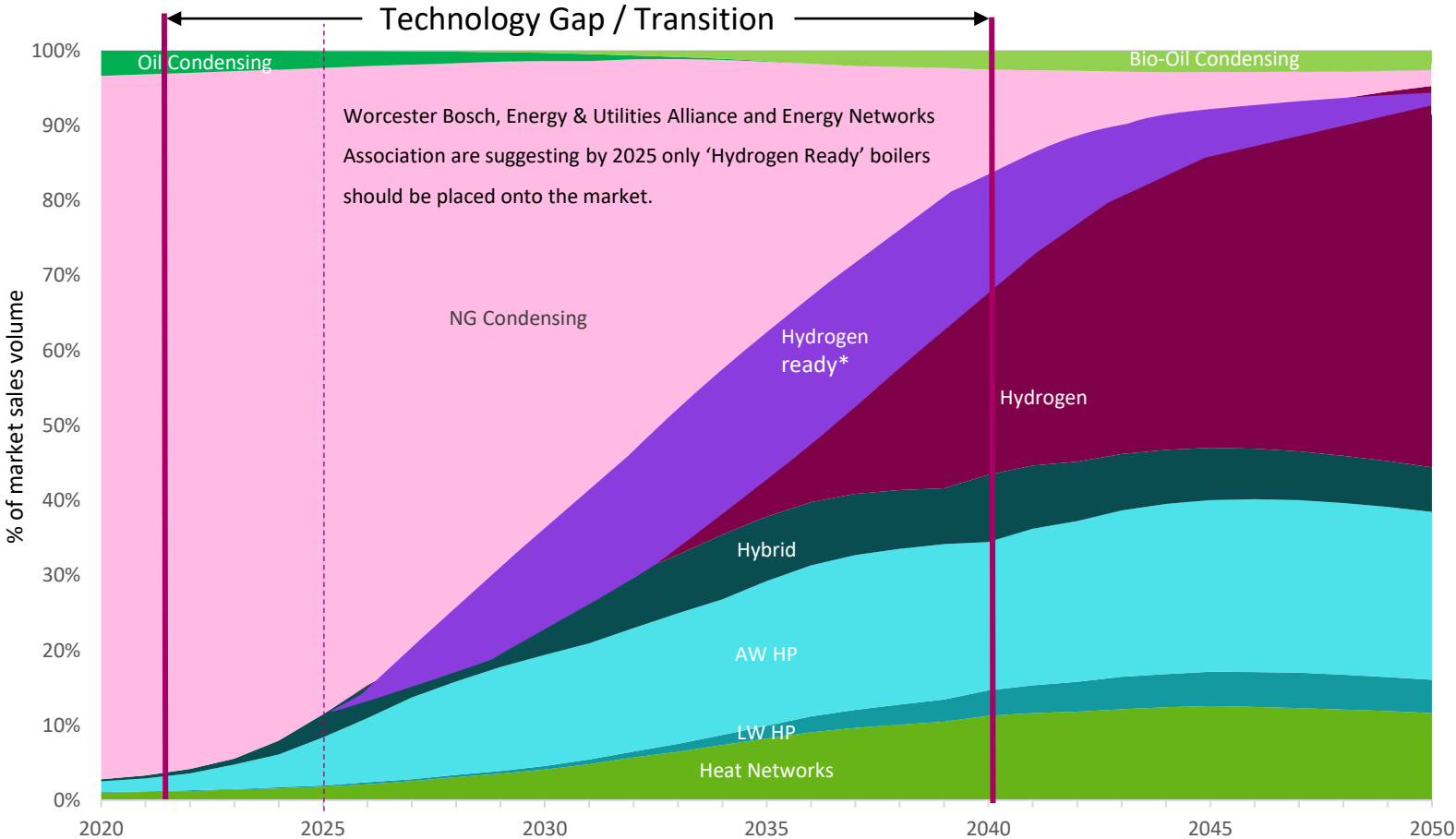
Flow Temperature	SCOP (equivalent to SPF <sub>3</sub> SEPEMO SH only)
35	4.57
36	4.53
37	4.48
38	4.43
39	4.39
40	4.34
41	4.29
42	4.25
43	4.20
44	4.15
45	4.10
46	4.04
47	3.97
48	3.90
49	3.84
50	3.77
51	3.70
52	3.64
53	3.57
54	3.50
55	3.44

Flow Temperature	SCOP (equivalent to SPF <sub>3</sub> SEPEMO SH only)
35	4.60
36	4.53
37	4.46
38	4.40
39	4.33
40	4.27
41	4.20
42	4.13
43	4.07
44	4.00
45	3.93
46	3.88
47	3.82
48	3.77
49	3.71
50	3.65
51	3.60
52	3.54
53	3.49
54	3.43
55	3.38

# New Technologies

## Primary Heating Technology Gap/Transition - UK

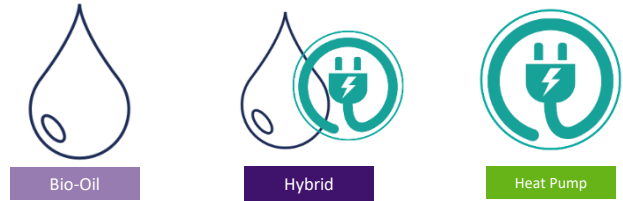
\* Hydrogen Ready = NG Condensing boilers prepared for simple conversion to Hydrogen



### Replacement ON-Mains Gas



### Replacement OFF-Mains Gas



### New Build



**UK TECHNOLOGY MIX TO DIVERSIFY AS DECARBONISATION TAKES HOLD  
MARKET VALUE TO INCREASE AS MARKET DECARBONISES**

# Heat Networks and HIU's

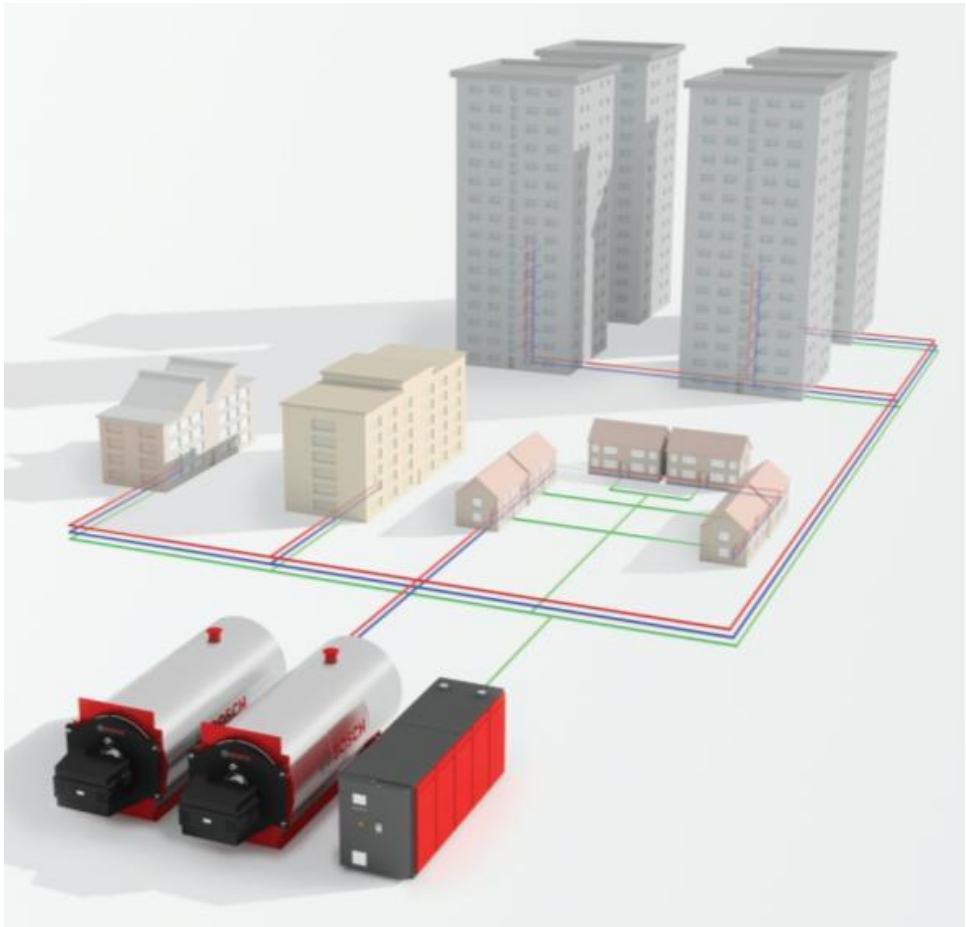
## High density heating

Government ambition to achieve the target set by the CCC of 18% of UK heating demand to be met by district heating by 2050.



Heat Interface Units (HIU)

The future of district heating



# Challenges

## Government Commitment

Supply chain partners and their role with Gov and industry.



# Beyond “Natural” Gas Bosch thermotechnology “White Paper”

A balanced sensible approach with bespoke options.



## Meet the team

Worcester Bosch’s R&D team have a history of developing innovative technology and products.

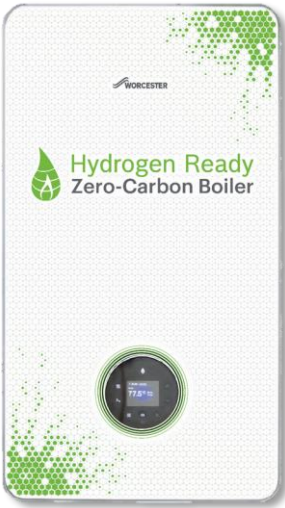


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# Fuelling the future

Working hand in hand with the government to decarbonise home heating.

# New Technologies – What Next? An agnostic approach



# SKILLS AND QUALIFICATIONS

PAS 2030:2019

Specification for the installation of energy efficiency measures in existing dwellings and insulation in residential park homes



 Department for Business, Energy & Industrial Strategy

**bsi.**



# Skills and Qualifications - Next Generation Engineers

## UK Profile (2017)



22.5m approx. **Gas Heated Homes** in UK



74k Companies on Gas Safe Register

128,000 Engineers

84% work in the Domestic sector



Each Gas Safe Engineer:

**16** Boiler Installations per year

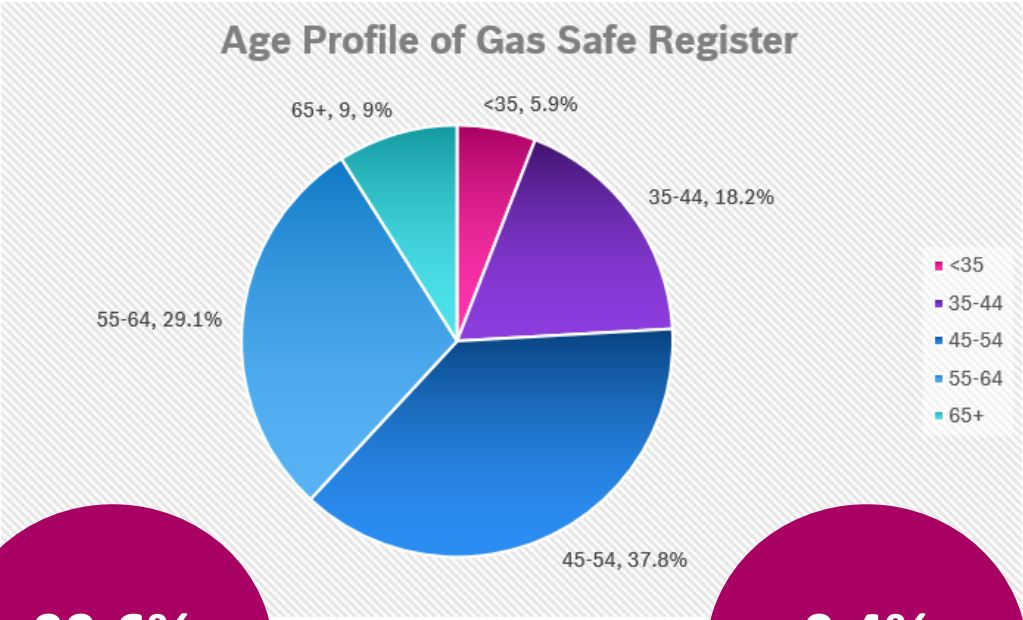
**199** Services per year





# Next Generation Engineers

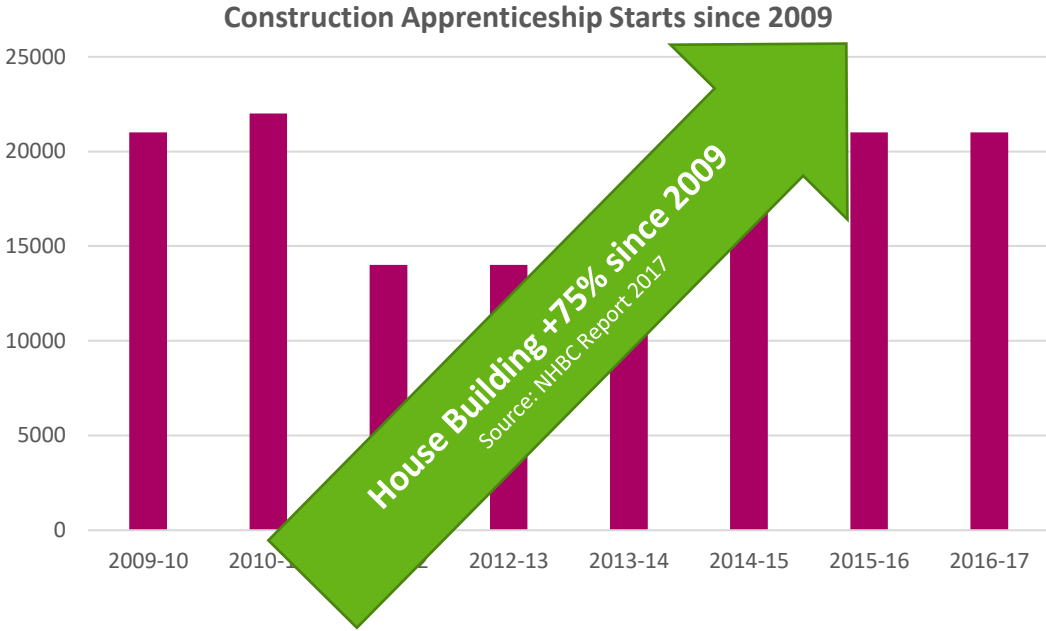
## Current Engineer Profile



**99.6%**  
Male

**0.4%**  
Female

Source: Gas Safe - Decade Review, Nov 2017

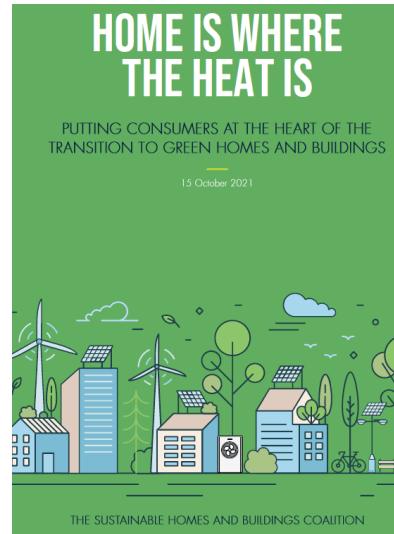


Source: House of Commons – Apprenticeship Statistics, July 2018

# Consumer Report

## Home is where the heat is.

- ▶ Technology Type
- ▶ Building type and age
- ▶ Opportunity to educate & engage
- ▶ Consumer behaviour
- ▶ Consumer personas & their journeys
- ▶ Gov, industry & value chain
- ▶ Working Together

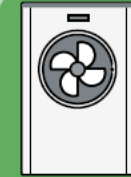
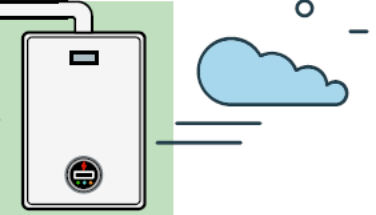


## THERE ARE MANY POTENTIAL ROUTES TO GREENER HOMES AND BUILDINGS

**ENERGY EFFICIENCY** measures play a vital part in greener homes and buildings. They will reduce underlying energy demand and are a prerequisite for installing some of these heating solutions such as heat pumps. Potential efficiency measures are detailed later in this report in the appendix.

**HEAT PUMPS** are an established technology that can immediately and substantially reduce emissions from heating your home. A heat pump uses the heat in the air or the ground as the main source of energy and requires electricity to operate. Some systems have high temperatures, although the current standard is to install low temperature systems. For every unit of electricity that is put in, the technology has the potential to produce 3 to 4 units of heat, depending on the type of heat pump and the external air temperature meaning they are more than 100% efficient. Heat pumps have been mass-deployed in other countries, including the Nordics and can deliver consistent comfort through cold winters.

**HYDROGEN BOILERS** can replace conventional gas boilers on a like-for-like basis, with hydrogen-ready boilers being developed by leading UK boiler manufacturers in the UK, and have lower requirements on space and thermal efficiency compared to heat pumps. They produce no carbon monoxide or carbon dioxide with water vapour being the main byproduct. Hydrogen is not currently available for domestic users. A decision is expected to be made by Government in 2026, following the ongoing work on trials and pilot projects to test the feasibility and safety of the conversion. Sufficient supply of hydrogen is also a prerequisite for the use in building heating and other end uses.



**HYBRID HEAT PUMP** systems combine a boiler and a heat pump to meet a building's heating and hot water requirements. They are likely to be important for properties where space is a constraint and are particularly suitable for low efficiency properties that are off the gas grid. They can also help transition homes on the gas grid and in some cases off gas grid, particularly in rural areas.

**BIOMETHANE** is a green gas chemically identical to methane that can be injected into the gas grid and deliver immediate carbon emission savings, without the requirement from consumers to change existing appliances.

**A DISTRICT HEAT NETWORK** is a distribution system of insulated pipes that takes heat from a central source and delivers it to a number of domestic or nondomestic buildings. The heat source might be a facility that provides a dedicated supply to the heat network, such as a combined heat and power plant; or heat recovered from industry infrastructure, canals and rivers, or energy from waste plants.



# THANK YOU



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