What's needed to become Carbon Neutral by 2050?

John Fisher, Managing Director, CHIC

24th September 2020

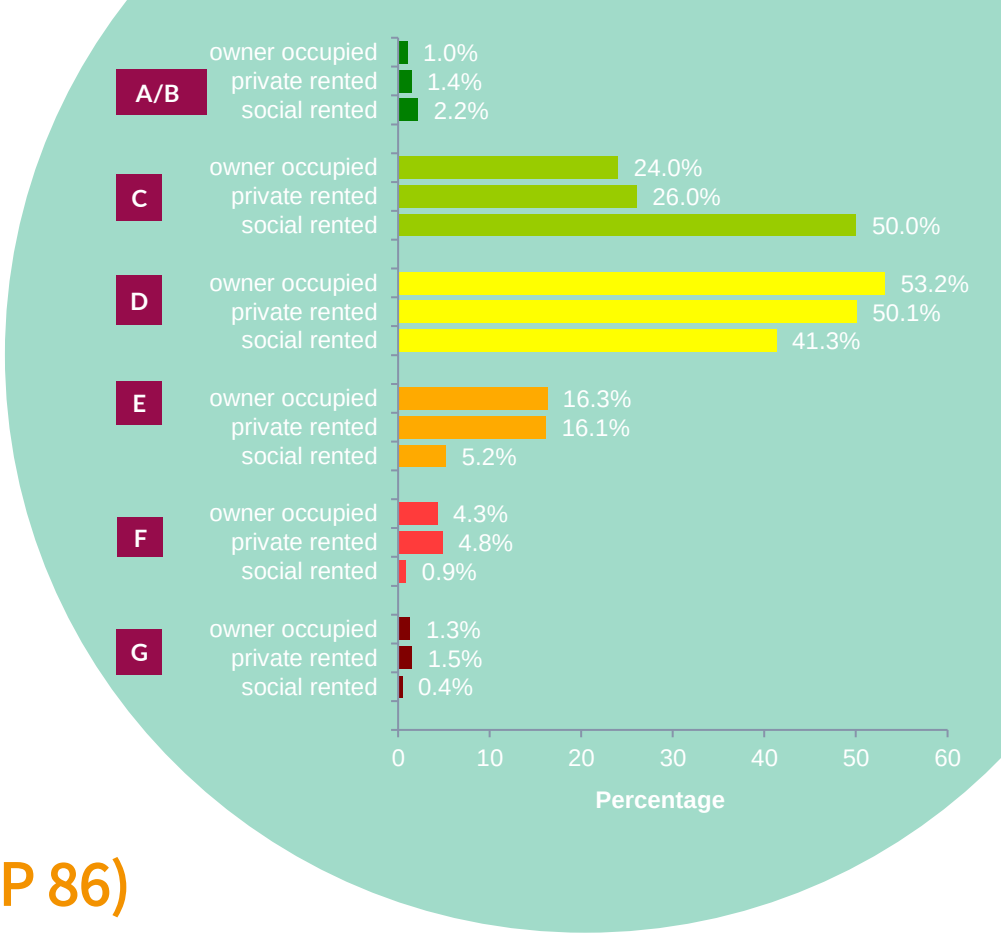
Background

John Fisher's Key Themes:

- Strategic Asset Management (25+ years)
- Compliance/Building Safety (10+ years)
- The next big challenge = **REDUCING CARBON**

Did You Know?

- 40% of UK carbon emissions come from our homes?
- UK Government = Net Zero-Carbon target by 2050
- Gas boilers to be banned in newbuild by 2025
- 81% of new homes EPC B (SAP 86)
- Most existing homes are C/D
- Social housing is better = more flats
- Landlords Asset management Strategies 30 years investment plans = 2050



What about the Tenant? Affordable Warmth?

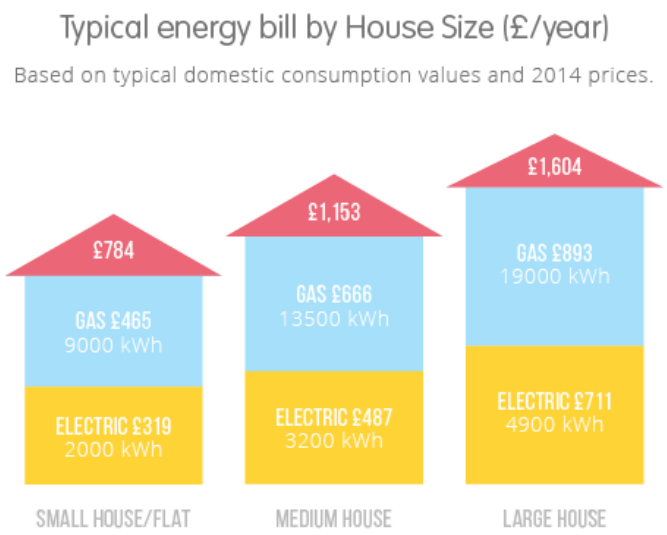
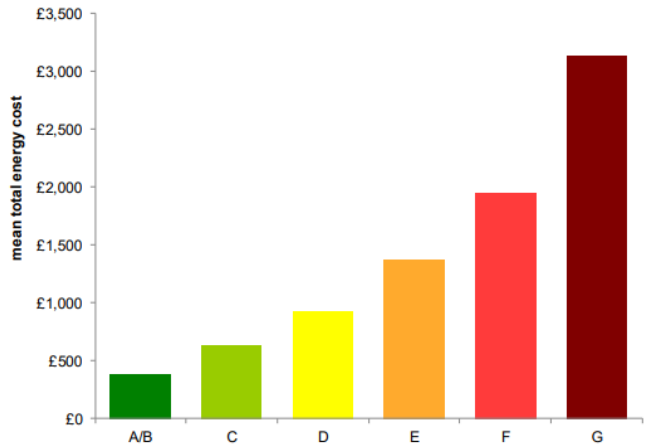


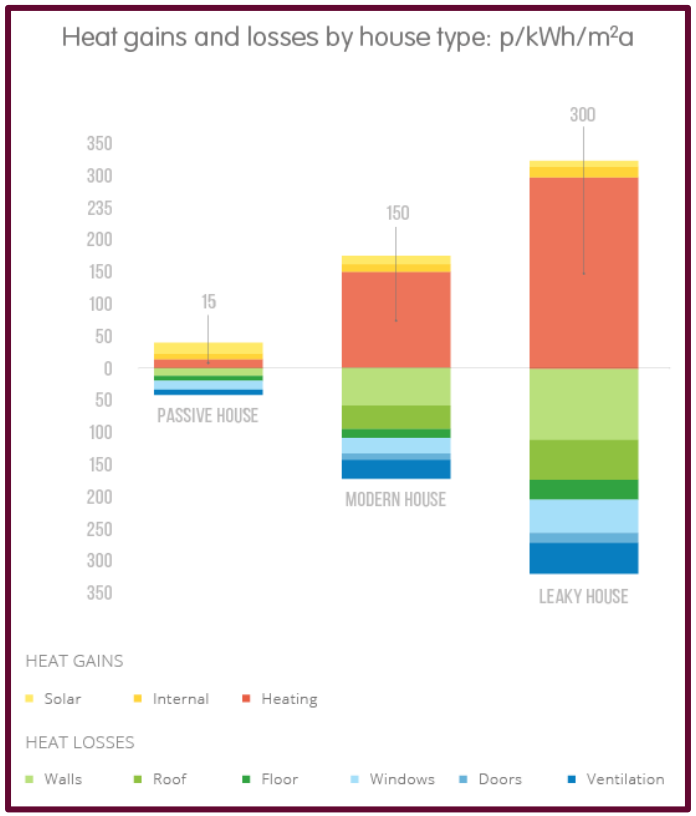
Figure 2.3: Average modelled annual cost of energy in homes, by energy efficiency rating, 2017

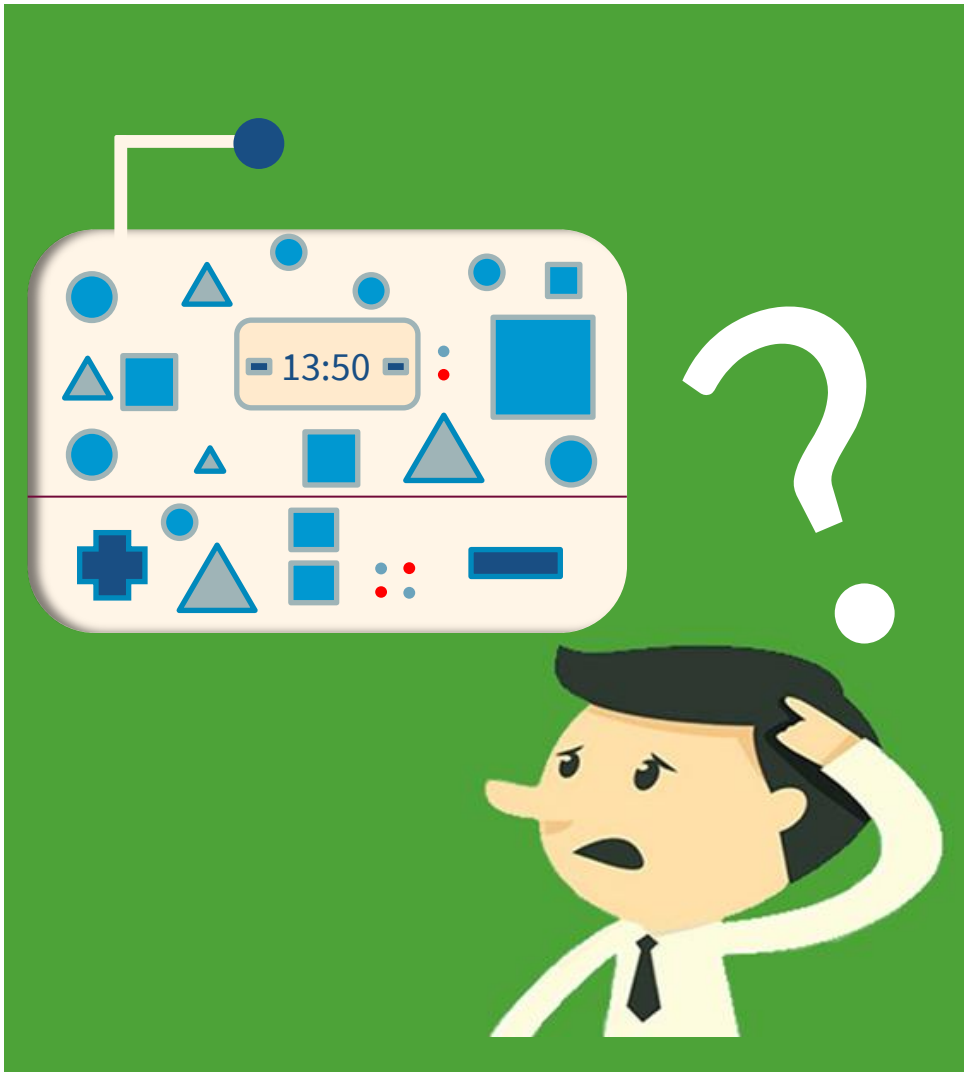


Base: all dwellings
Note: underlying data are presented in Annex Table 2.11.
Source: English Housing Survey, dwelling sample

£10 per week more to heat a D/E banded property than B/C

Keep it simple: Fabric First



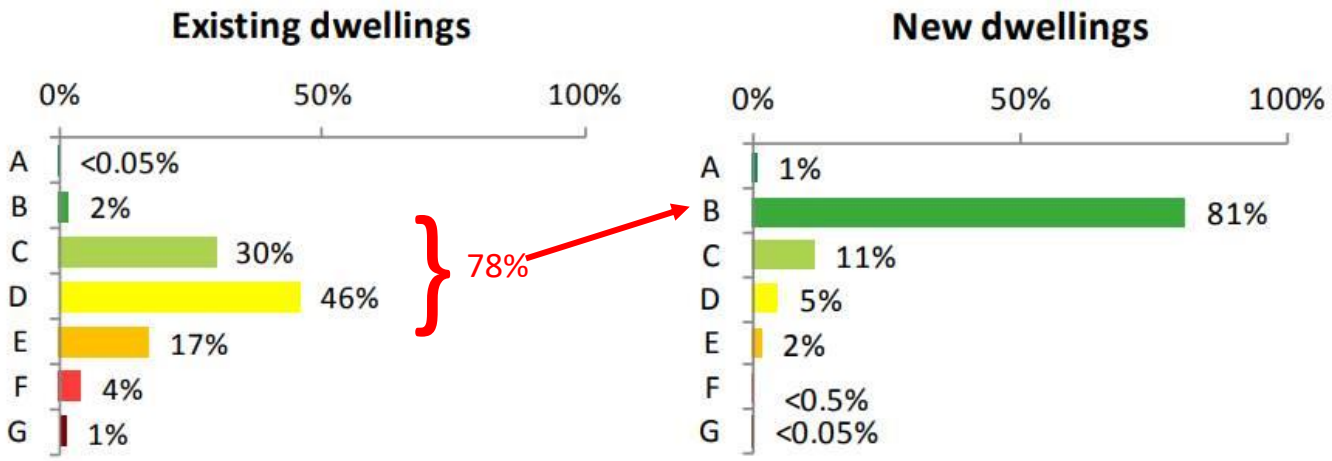


Health and housing =
keep the moisture out
(mechanical ventilation)

The Government on Carbon Neutral

- Mid-B average rating (SAP 86) = 80% carbon reduction in Climate Change Act 2008
- Balance for 2050 target = offset?

The scale of the asset management challenges



Challenges: conservation areas, listed buildings, solid walls, non – traditional dwellings

The Government on Carbon Neutral

- London Plan is calling for 20% of car parking spaces in new build developments to have ready to use chargers. The remaining 80% must be ready for them to be installed at a later date.
- Nationally the Government is working on changing building regulations to ensure all new homes can power electrical vehicles.

Where do we put all the charging points for existing homes? Who pays?

The Affordable Housing Sector

- 3.9m homes
- 17% of all UK homes
- Key contributor to building new homes
- Strategic asset management = **7/10**
- Carbon reduction strategies = 3/10

Solutions – New Build

- Off Site Manufacture
- Better quality/less waste/less energy
- Fabric First – super insulated
- All electric
- > SAP 86

TIME TO CHANGE THE APPROACH

3 New Contracts

Solutions – Existing Homes

- Fabric First – Insulation (lofts, floors, EWI, IWI, windows, doors)
- Mechanical Ventilation and Heat Recovery (MVHR)

  - Maintenance Issue
- More efficient heat sources – air source / ground source heat pumps
- PV panels
- Battery power storage
- Estate battery storage
- Communal and external lighting
- Redevelopment – find the tipping point

RETROFIT PLAN

Paying for it?

- £10 per week = > £10k of debt repayment
- Rebalance rents and energy costs?
- PV / battery packs for free – supplier pays and tenant gets reduced cost energy
- Integrating into normal planned maintenance costs (£1,220 p u p a)
- Designing maintenance out (damp = disrepair claims)

Cultural Change

- The sector needs to lead (not just react to legislation)
- Board / executive teams need to take action now
- Combine rent and energy costs to measure affordability – be flexible
- Embrace off site manufacture
- Must be mainstream, not niche
- Engage the whole business – behavioural change
- Customer accountability

ASSET MANAGEMENT STRATEGY = EFFICIENCY

ENVIRONMENT

Young want education on climate change at school

By Tom Bawden
ENVIRONMENT CORRESPONDENT

British children are calling for more education on climate change, with more than 2.5 million seven to 17-year-olds wanting increased teaching in school.

Research commissioned by Zurich Insurance, ahead of its first Youth Against Carbon Conference next month, found nearly a third of pupils want climate change and sustainability to be covered much more comprehensively at school. And nearly a quarter think young voices are not being listened to in the climate change debate.

Meanwhile, half support a ban or limit on non-recyclable plastics, while a quarter want businesses taxed according to their carbon emissions. A fifth also say they would support a fast fashion tax to raise funds to recycle old clothes.

The findings were published after reports that this year's Nobel Peace Prize could go to green campaigner Greta Thunberg and the Fridays for Future movement.

The winner of the $1m (£770,000) prize will be announced in Oslo on 9 October.

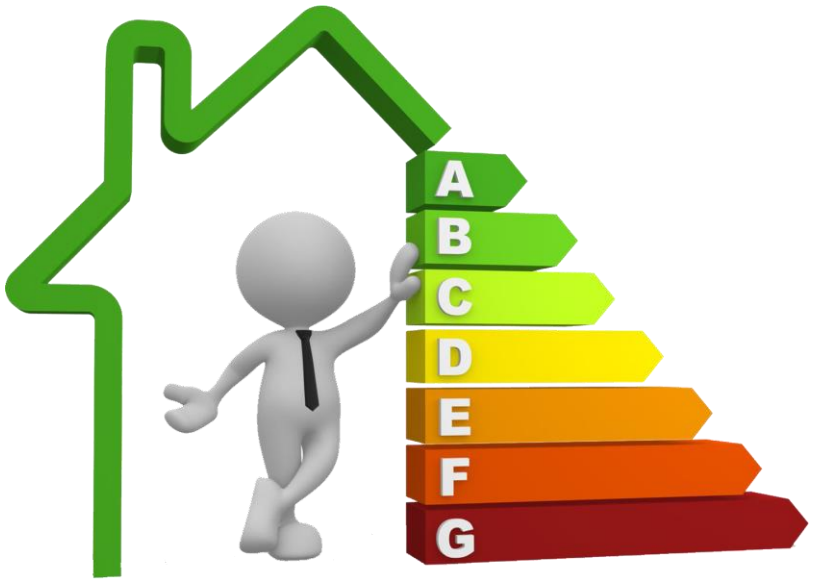
Case Study – 1

- 10,000 homes RP
- Mixed housing stock:
  - low and medium rise
  - traditional and non
  - all ages

Case Study – 2

Current Position

- Average SAP 68 (High EPC D)
- Average Fuel Bill:
  - £580 per annum
  - £11 per week



Case Study – 3

Solving the Problem?

- 14 possible options for work to property
- 1 – 12 may apply to any property
- Average of 6 will work

Case Study – 4

Capital Cost

- £185m
- Average of £18,500 per property
- Average of £2,200 per option

Case Study – 5

Outcomes

- Average SAP > 90
- Most (all but a handful) EPC A & B
- Fuel cost reduced to £60 pa/£1.15 per week
- Savings £10 per week
- £10 per week = £10,400 borrowing (shortfall of £8,100 per unit)

Case Study – 6

Solution?

- £10 per week saving = £520 per year
- @ 5% interest and capital = loan of £10,400
- Funding shortfall of £8,100
- Or £270 pa over 30 years
- Paid for through efficiencies, existing programmes (e.g. windows) and ‘new money’

My Musings

- Do I believe these figures? Not yet
- Can all stock be EPC B/A? No – listed/conservation/too small for IWI etc.
- Should we sell? No – private sector challenge is even worse
- Strategic solution? Will involve more radical demolition and regeneration plans than hitherto – my gut says 15%-20%

Timescale

- Update asset management strategies by 2023
- OSM mainstream by 2023
- 27 years to deliver Retrofit challenge = nearly ‘normal’ planned asset lifecycle

NEEDS TO START NOW

Not just about the homes though…

- Offices
- Staff
- Scheme Based Staff
- Contractors
- Technology

Thank you

The decarbonization of existing social housing in Wales

Christopher Jofeh

Thursday 24 September 2020

The Well-being of Future Generations (Wales) Act 2015

A Prosperous Wales

A Resilient Wales

A More Equal Wales

A Healthier Wales

A Wales of Cohesive Communities

A Wales of Vibrant Culture & Welsh Language

A Globally Responsible Wales

Benefits for Wales of residential decarbonisation

- improved energy security, with a more resilient economy that relies less on imported gas
- less investment will be needed to generate, store and transmit decarbonised energy
- reduced impacts on vulnerable households from increases in energy costs
- reduction in fuel poverty
- public funding leverages in private funding
- an enhanced skills base
- the creation of a substantial market for Welsh firms supplying energy efficiency products and services
- higher employment and higher incomes

Benefits for Wales of residential decarbonisation

- fewer people on benefits
- increased economic activity generating increased tax revenues to pay for better public service
- lower rent arrears for social and private landlords
- improved air quality
- improved learning, because children learn better in warm homes
- work on homes will provide opportunities to protect them against overheating
- warmer and dryer homes in winter will lead to physical and mental health benefits (particularly for children, the disabled and the elderly), which will reduce demand on the NHS and social care
- the regeneration of public housing estates and widespread neighbourhood improvement

Better Homes, Better Wales, Better World

Decarbonising existing homes in Wales

Report to Welsh Ministers from the Decarbonisation of Homes in Wales Advisory Group

18 July 2019

Cartrefi Gwell, Cymru Well, Byd Gwell

Datgarboneiddio cartrefi presennol yng Nghymru

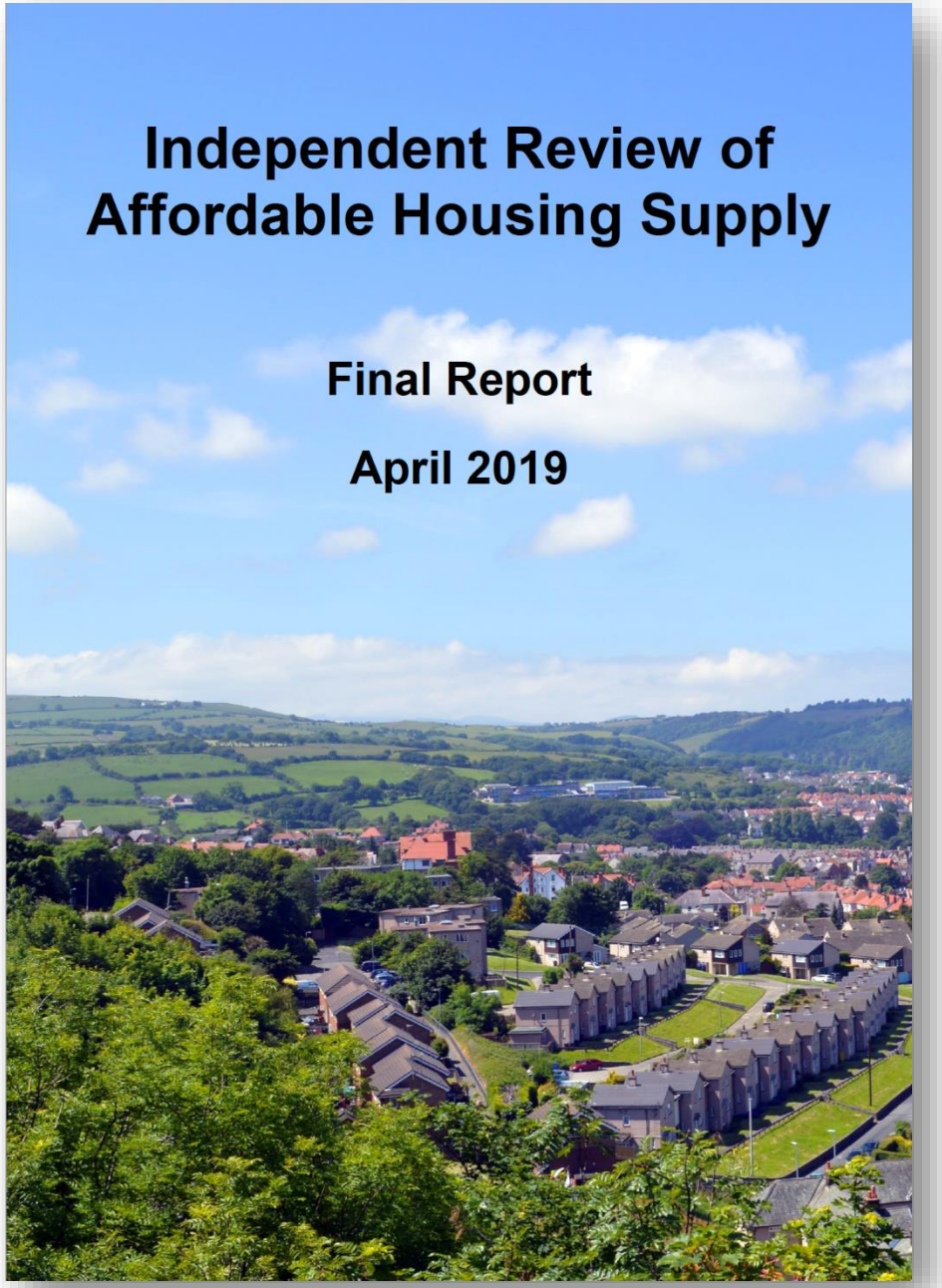
Adroddiad i Weinidogion Cymru gan y Grŵp Cynghori ar Ddatgarboneiddio Cartrefi yng Nghymru

18 Gorffennaf 2019

Two recommendations of *Better Homes, Better Wales, Better World*

- All Welsh homes to achieve EPC A by 2050
- All Welsh homes in social ownership to achieve EPC A by 2030

Image: The Senedd © Wojtek Gurak/Flickr



Two recommendations

- Welsh Government should introduce a requirement for all new affordable homes to be near zero carbon / EPC A using a fabric first approach from 2021, supplemented by technology (renewables) if required.

- Welsh Government should set a longer-term goal of 2025 at the latest to have the same standards for all homes irrespective of tenure.

Homes of today for tomorrow

Decarbonising Welsh Housing between 2020 and 2050

Stage 1: what works?

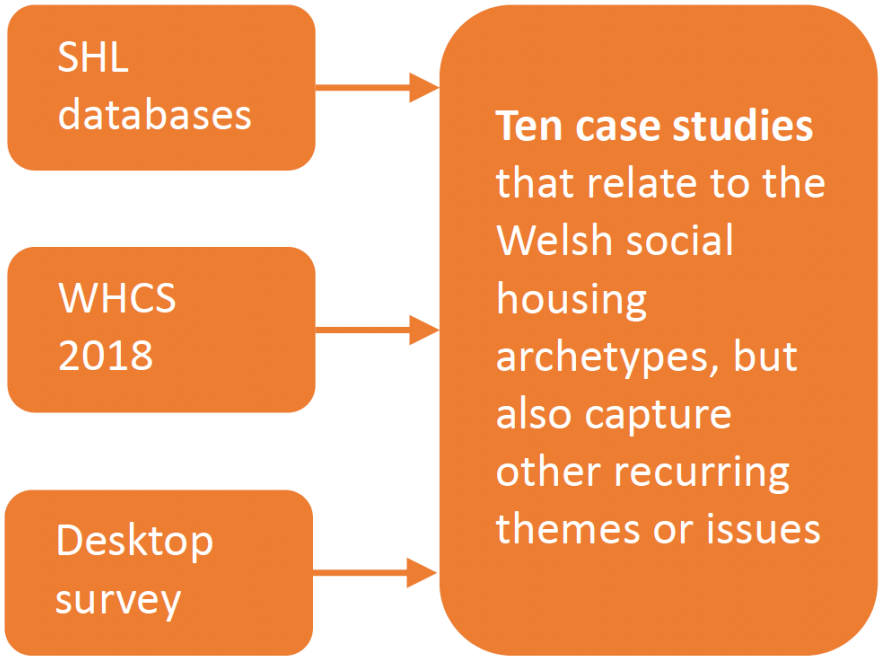
Stage 2: modelling the total housing stock

Stage 3: exploring the social housing stock

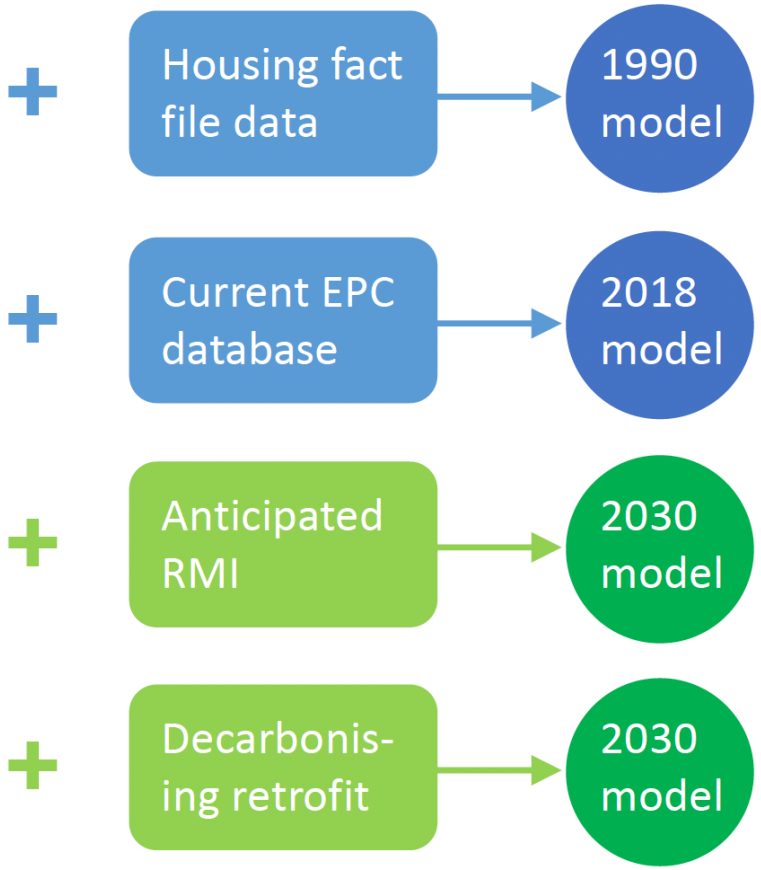
Simon Lannon and Ed Green, 11.06.2020 – updated 16.06.2020

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

Stage 3:
exploring the social housing stock



Identifying ten social housing case studies



Comparing RMI with retrofit for decarbonisation to explore the tension between capital cost, potential decarbonisation and impact on fuel bills

case study 03:

Semi-detached house, 1945-64

Carmarthenshire County Council

Headlines:

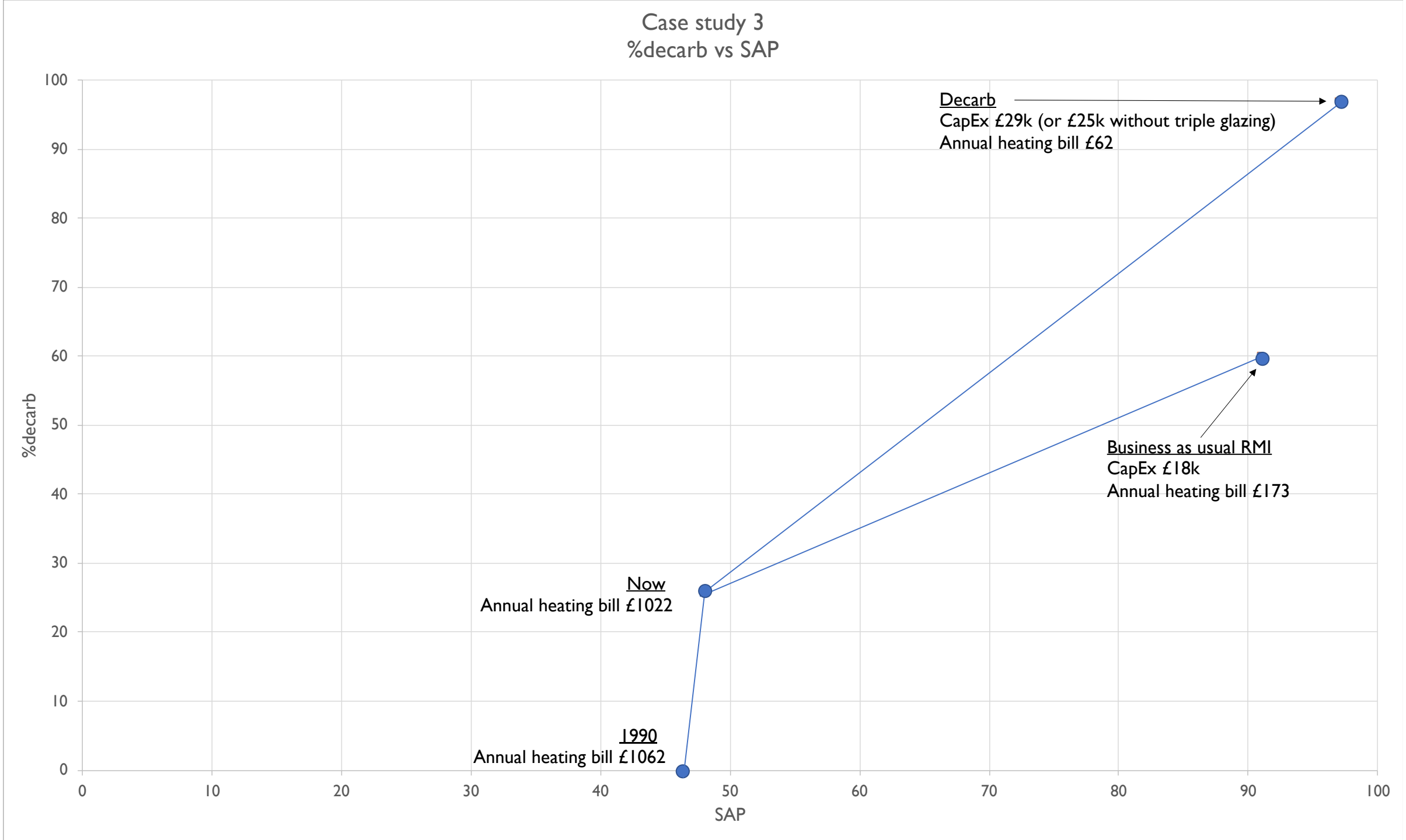
- **True cost of decarb, poor quality house**
- **An off-gas dwelling**
- **A motivated tenant**

Anticipated RMI

component:	specification	likely cost
Walls	External Wall Insulation 100mm	£2,957
roof	topped up to 300mm	£714
floor	No upgrade	
window, door	Standard high performance (upvc)	£3,664
Heating, hot water	Oil-fired boiler, wet central heating	£4,090
Airtightness, vent	Normal practice	
renewables	PV 4kWp	£7,000
Total cost		**£18,425**

Decarbonisation retrofit

component:	specification	likely cost
Walls	External Wall Insulation 150mm	£3,475
roof	topped up to 300mm	£714
floor	50mm over-floor insulation	£1,785
window, door	Triple Glazing composite (timber)	£7,328
Heating, hot water	Air Source Heat Pump	£8,180
Airtightness, vent	Best practice without MVHR	£739
renewables	PV 4kWp	£7,000
Total cost		**£29,221**


Case study 3
%decarb vs SAP
%decarb
SAP
0
10
20
30
40
50
60
70
80
90
100
Decarb
CapEx £29k (or £25k without triple glazing)
Annual heating bill £62
Business as usual RMI
CapEx £18k
Annual heating bill £173
Now
Annual heating bill £1022
1990
Annual heating bill £1062

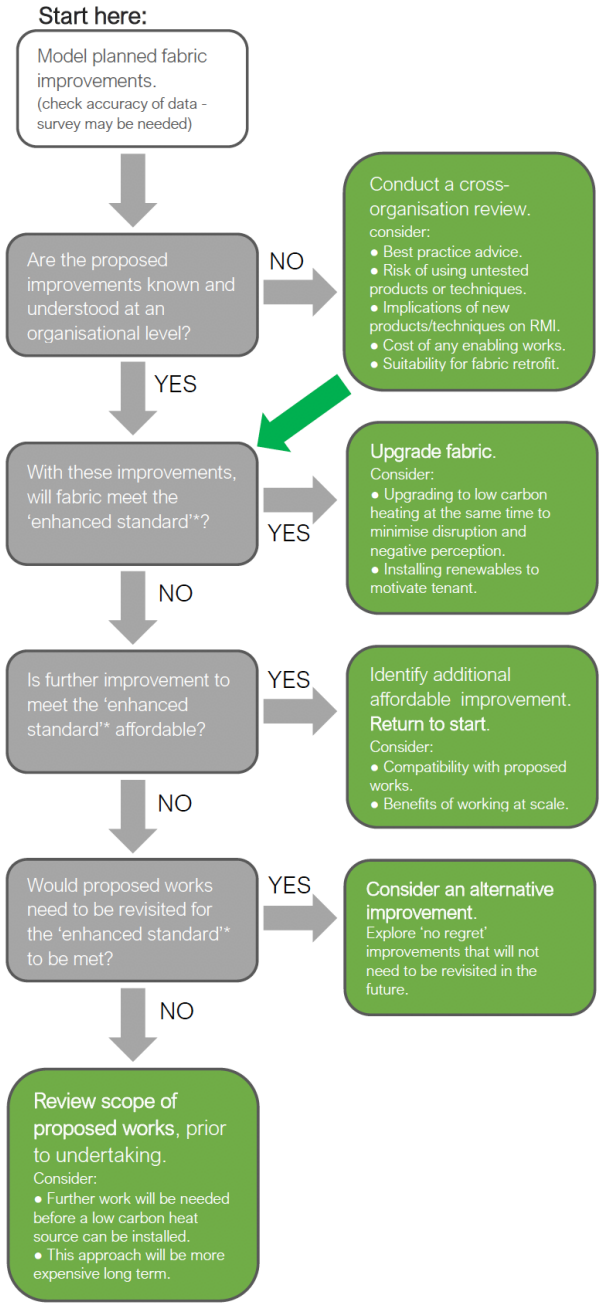
Tool 2: improving fabric

Reasons to improve fabric:

- Fabric failure
- Decarb strategy
- Affordable warmth
- Poor quality home
- Stock-wide activity

* 'Enhanced standard' describes a fabric specification at which transferring from the existing heating system to a low carbon heating system (e.g. air source heat pump) does not cause unacceptable increases in fuel bills for tenants.

See Tool 3 for more details. Case studies provide worked examples of an enhanced standard.



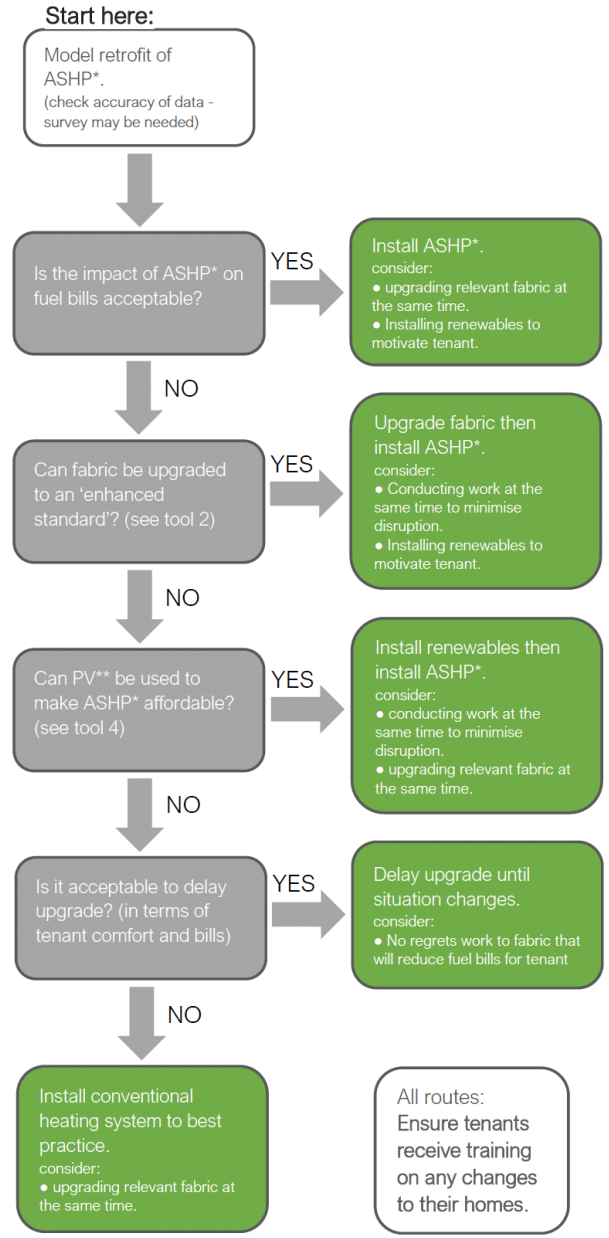
Tool 3: upgrading systems

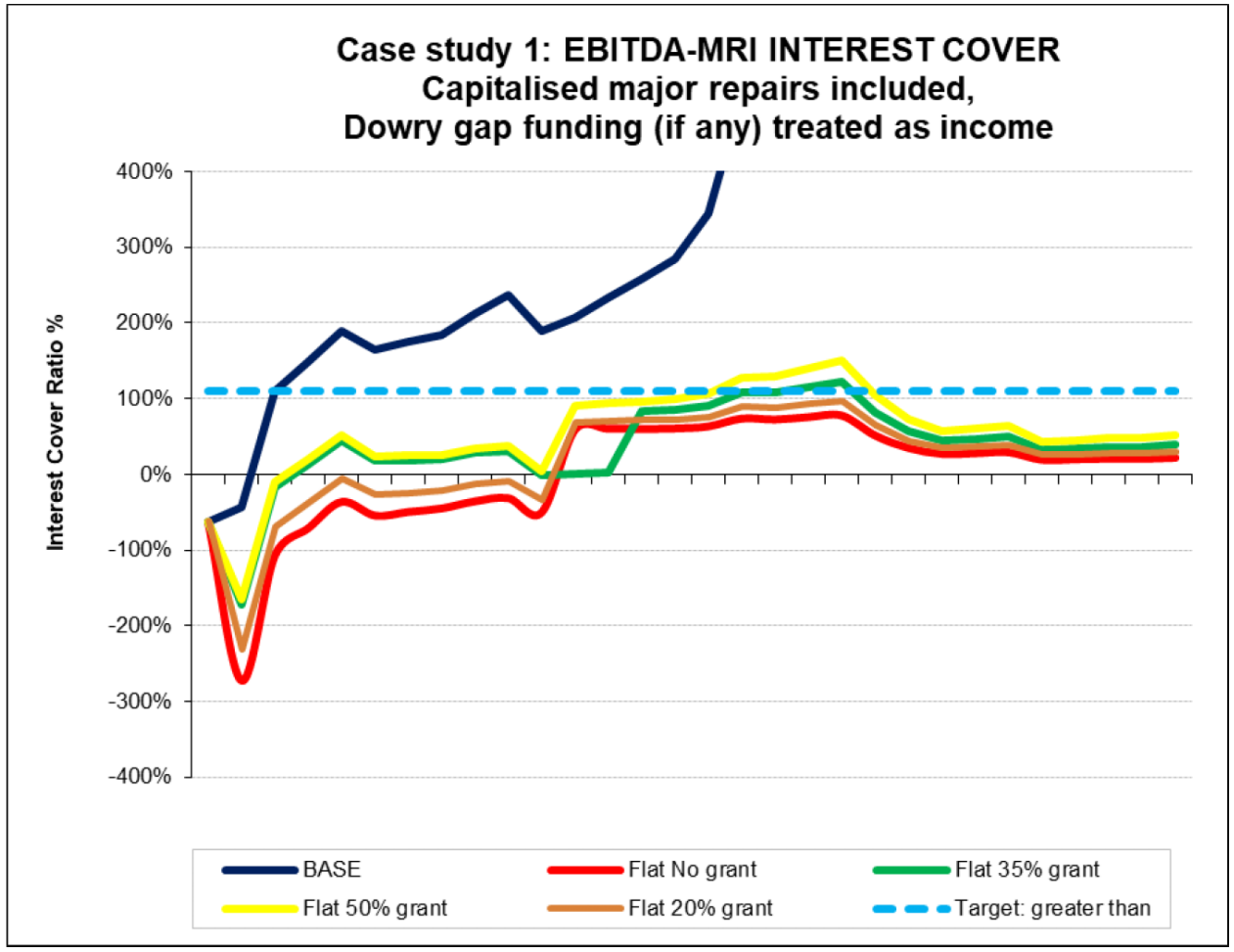
Reasons to improve fabric:

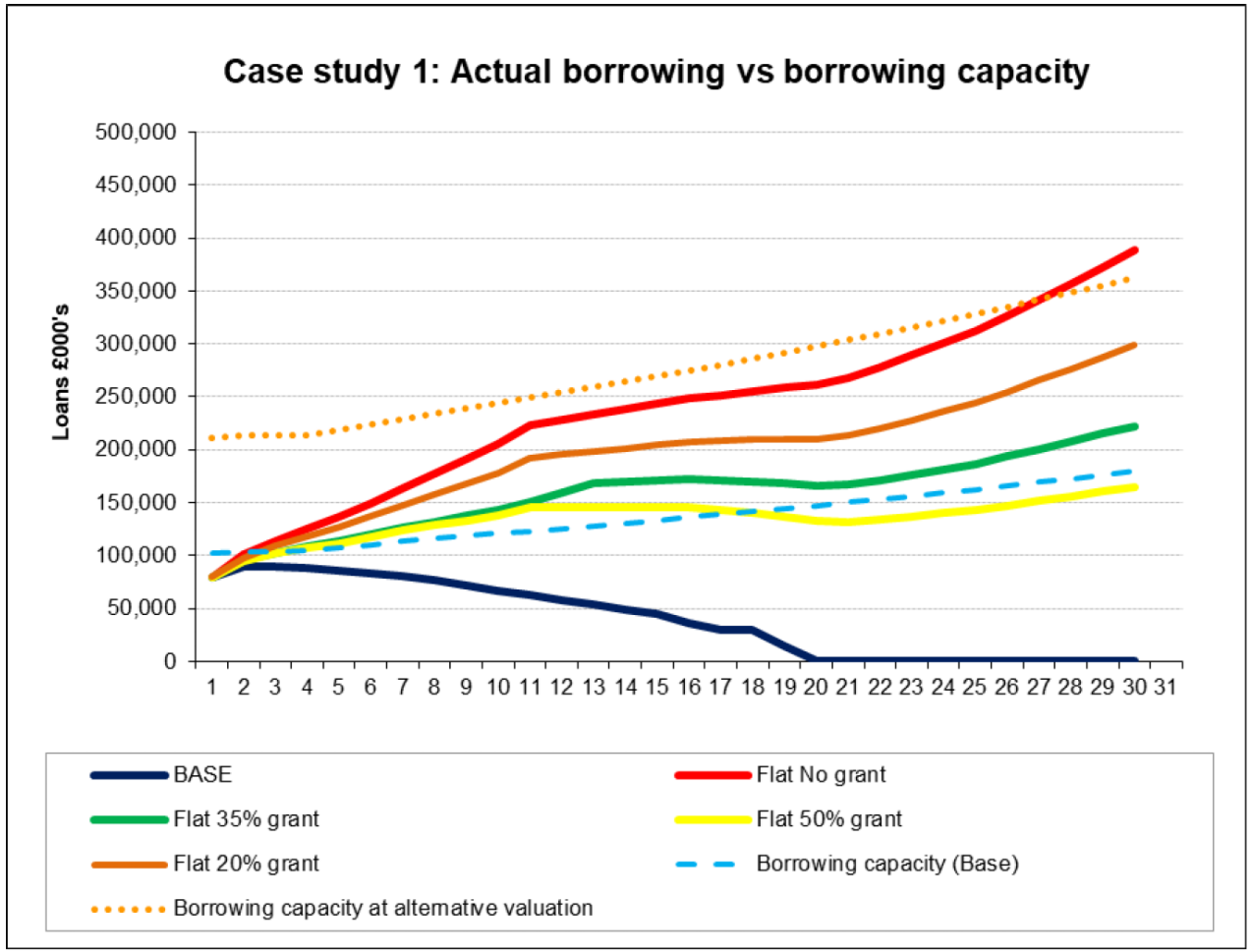
- Replacement cycle
- Boiler failure
- Decarb strategy
- Affordable warmth
- Poor quality home

* ASHP – For simplicity, and based on the case studies, this tool assumes that air source heat pumps (ASHP) are the preferred low carbon heating system. Other systems may offer greater benefit.

**PV – Photovolatics (PV) are assumed to be the preferred renewable, based on case studies. Other options may be more effective / desirable – see tool 4.





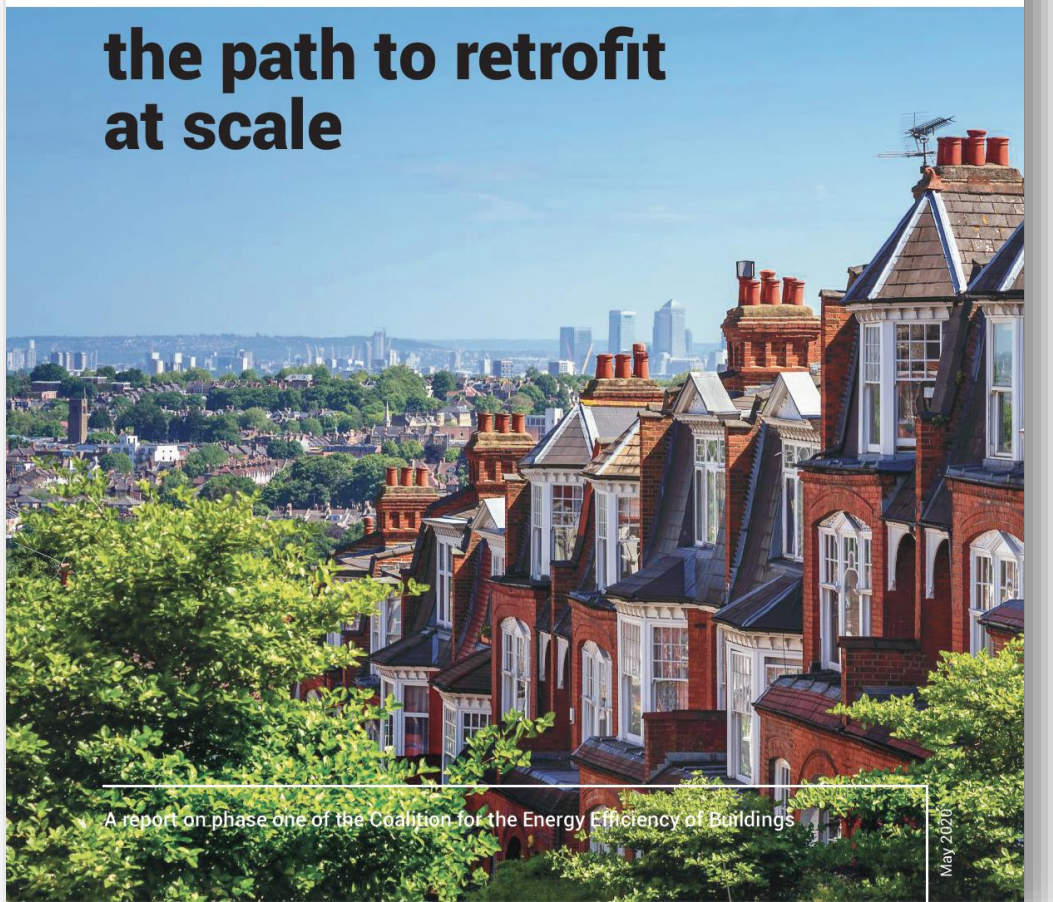


Source: Altair - Financing Decarbonisation in Wales, July 2020

Green Finance Institute

Financing energy efficient buildings:

the path to retrofit at scale



A report on phase one of the Coalition for the Energy Efficiency of Buildings

May 2020

Mobilising capital:

the portfolio of demonstrator solutions

These demonstatros seek to appeal across the breadth of housing tenures, geographies and socio-economic profiles, interact seamlessly with existing energy efficiency initiatives and inform government policy.

THINK BIG. START SMALL. SCALE FAST

Application for Innovative Housing Programme – Optimised Retrofit Programme (IHP/ORP)

2020-21 schemes only

Diolch

Thank you

chris.jofeh@arup.com

DECARBONISING HEAT

TOM COLLINS

Tom.Collins@uk.bosch.com

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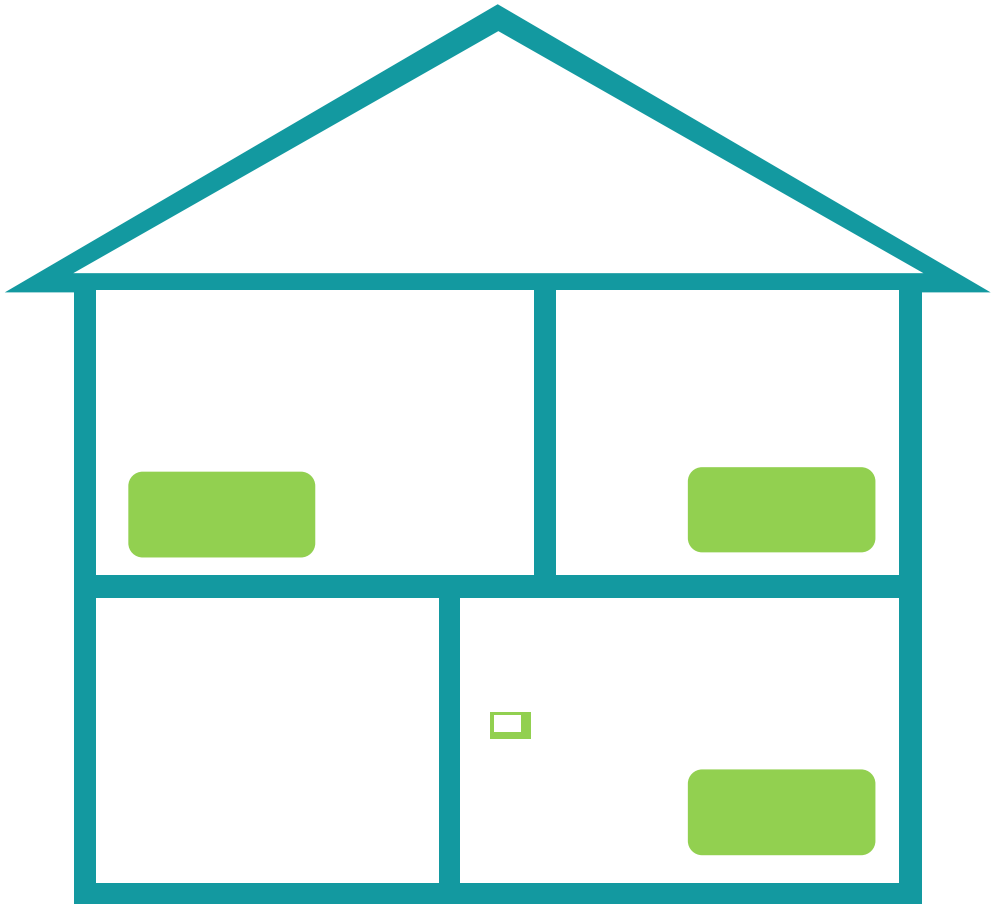
Decarbonising Heat

New Build

Decarbonising Heat
Conversion



Decarbonising Heat
Conversion

Decarbonising Heat
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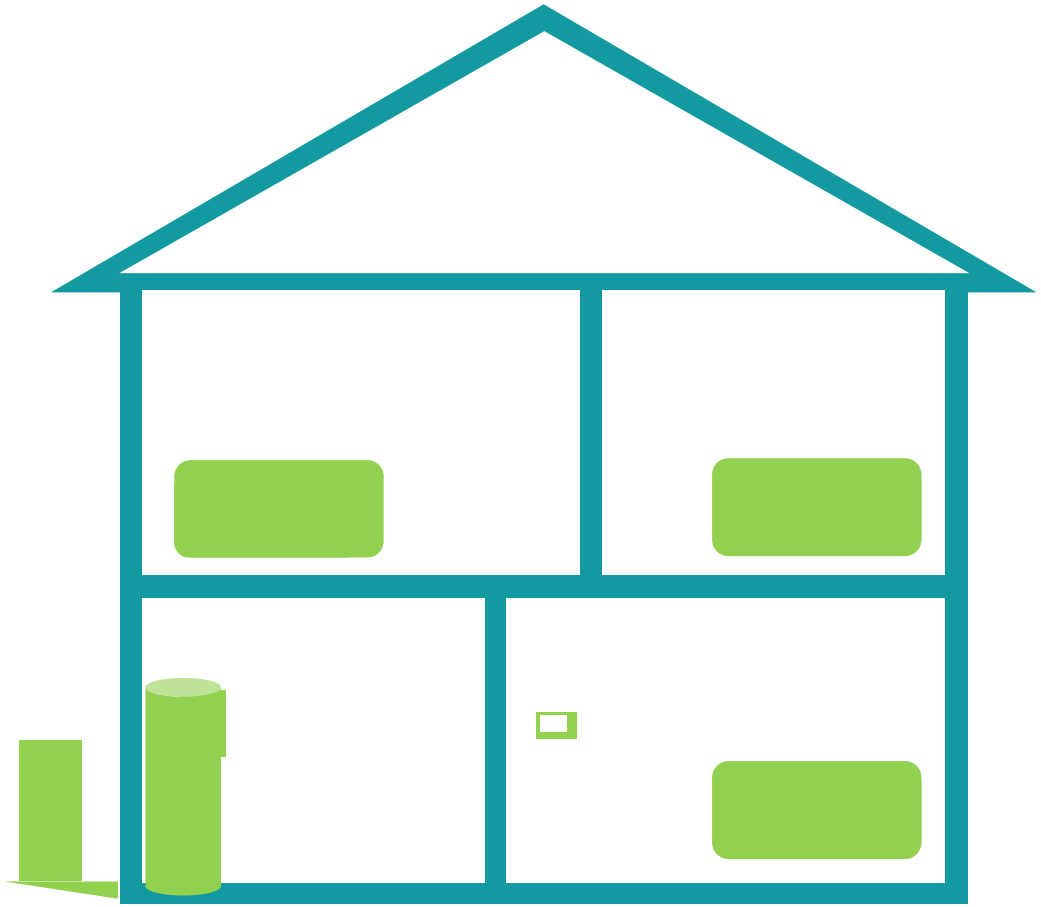

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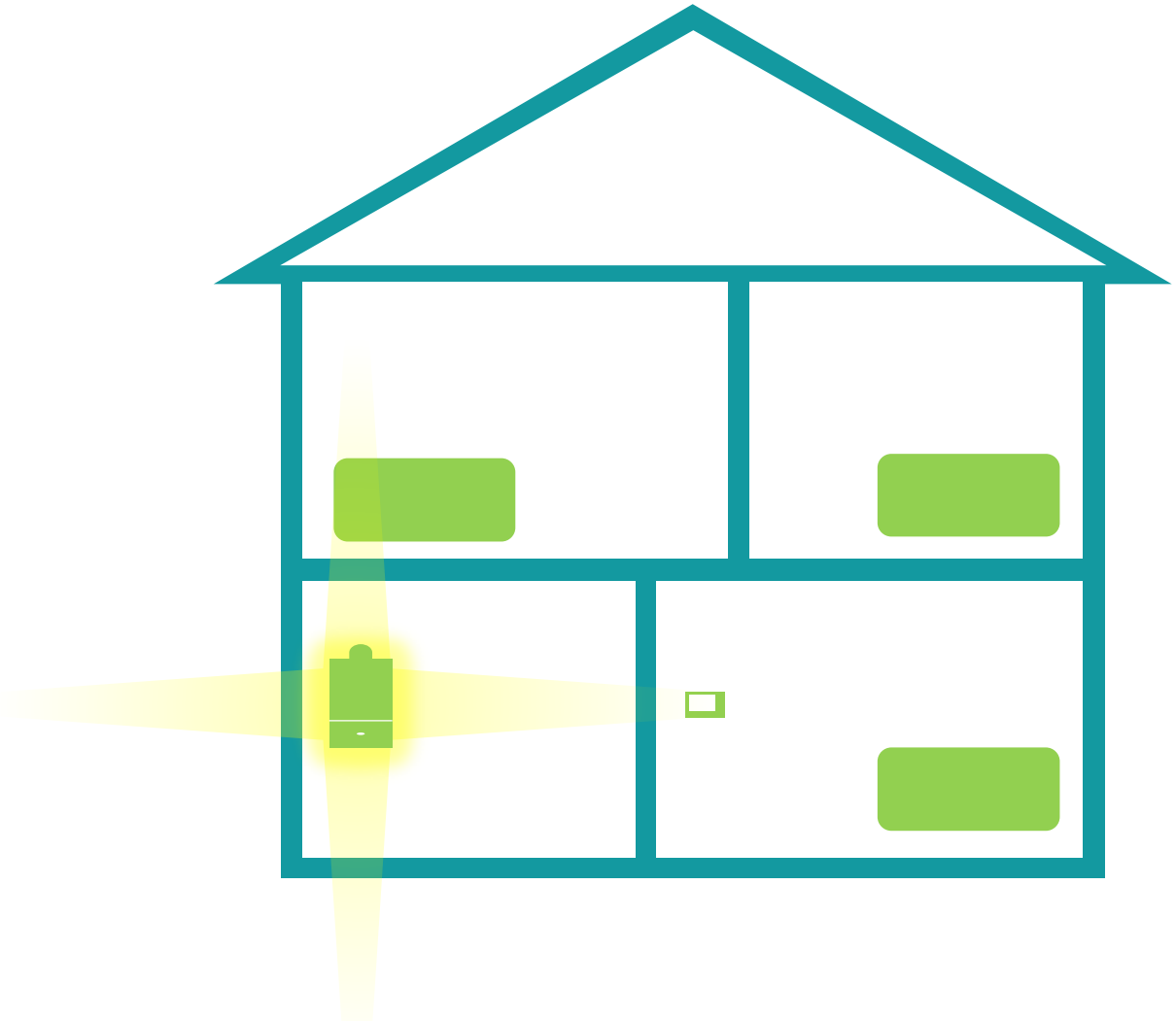
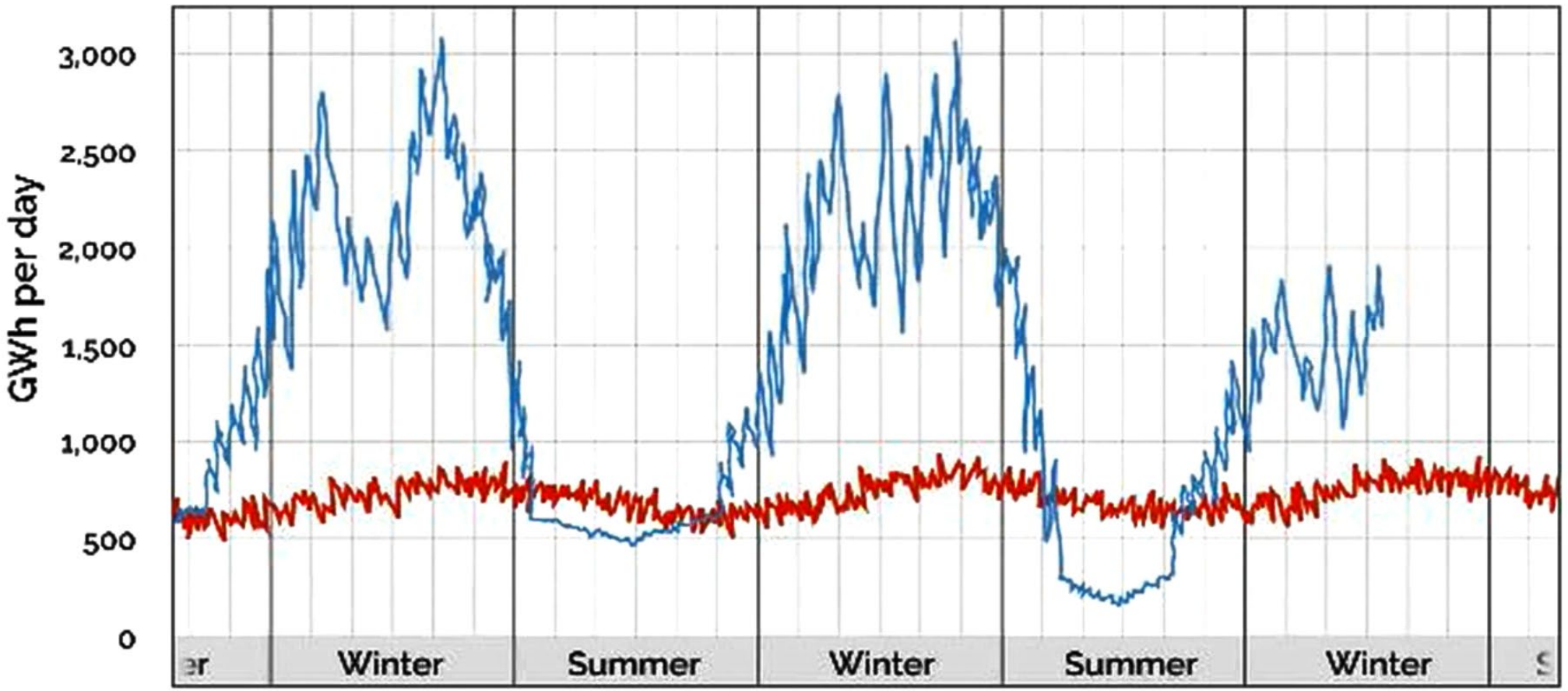


UK Seasonal Energy Demands



H21 Leeds City Gate

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Leeds City Gate

Department of Energy & Climate Change

Northern Gas Networks

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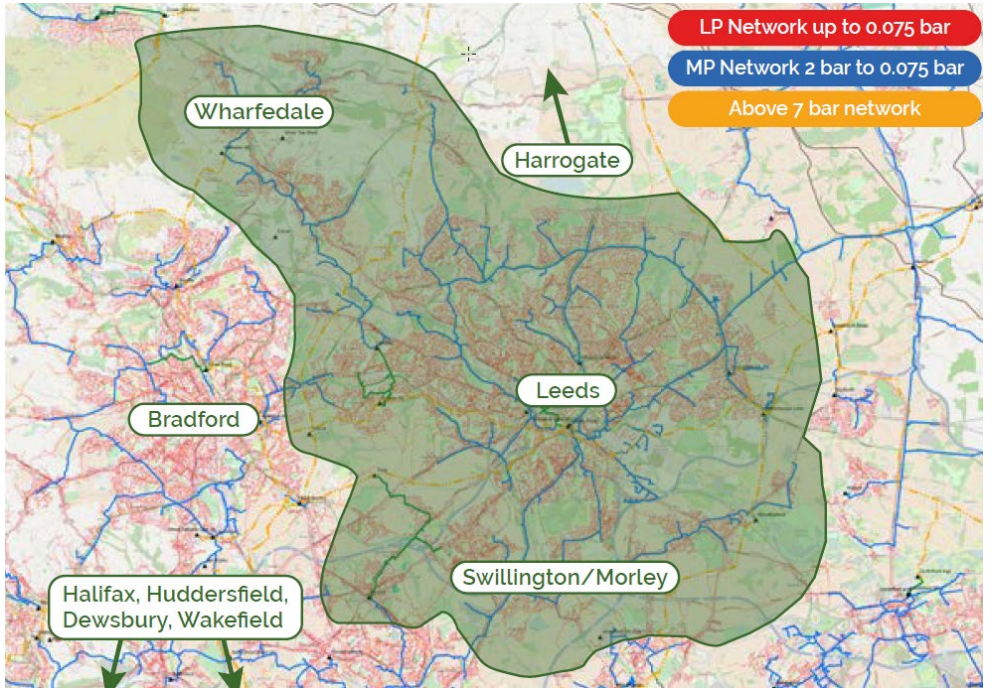
Leeds City Gate



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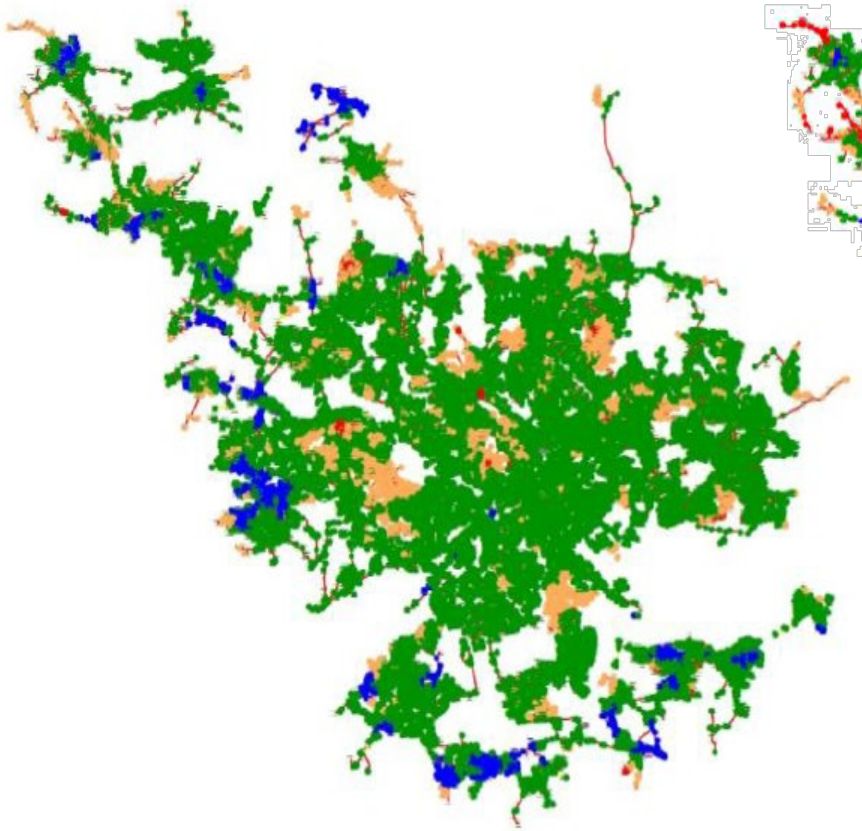
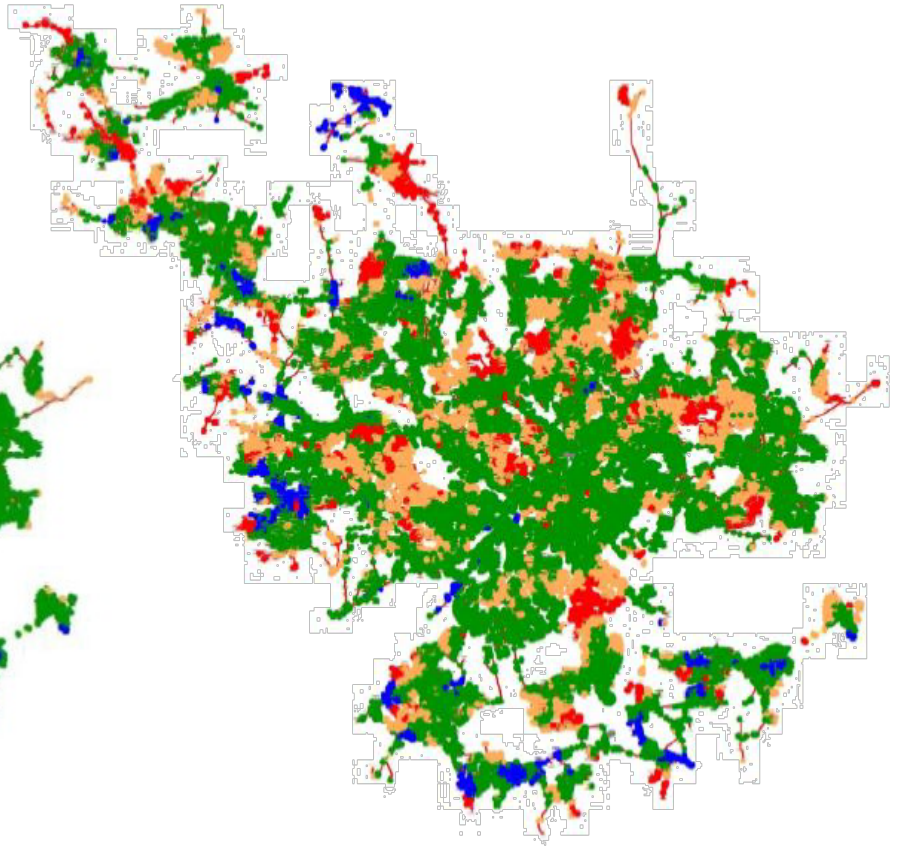
Pipeline Pressures

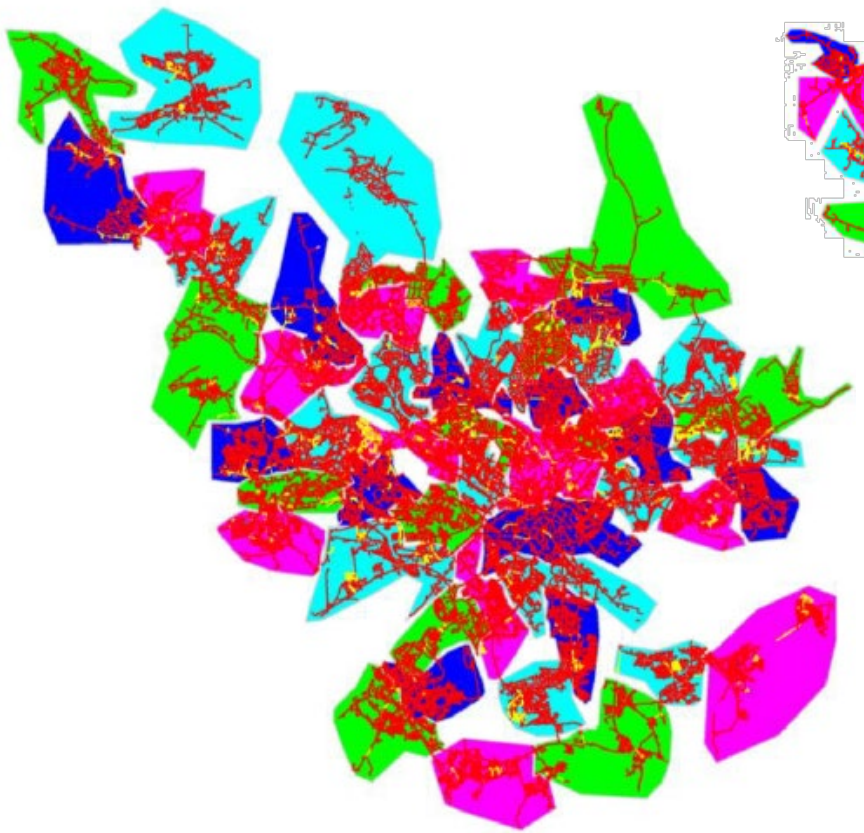


Natural Gas

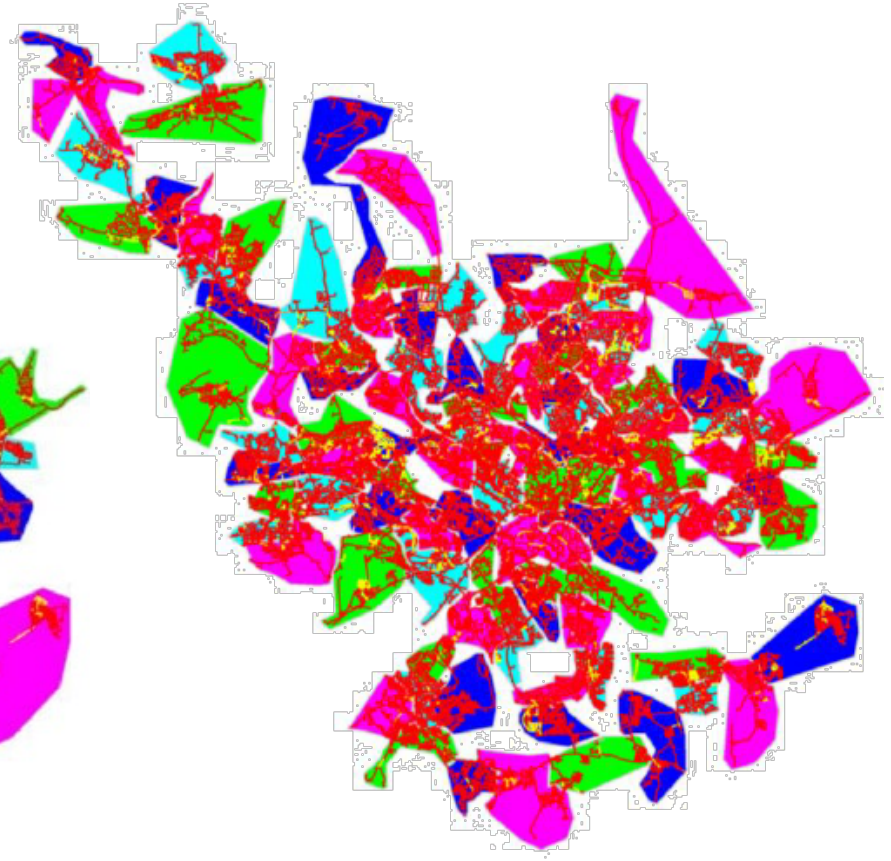


Hydrogen

Isolated Meter Point Clusters



5,000 Meter Points Isolated



2,500 Meter Points Isolated

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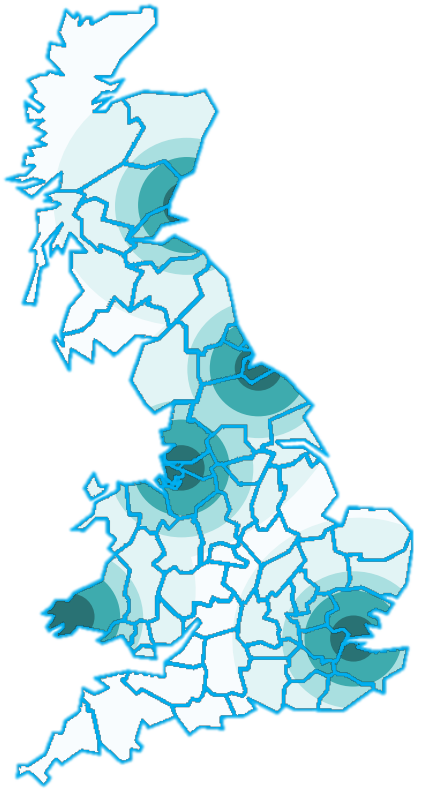
NGN

https://commons.wikimedia.org/wiki/File:Sheringham_Shoal.jpg, cropped

Hydrogen for Heat
UK Hydrogen Deployment

- Industrial-Cluster centric
- Blending (≤ 20%) followed by conversion
- New (high pressure) transmission capacity
- Re-purposing of existing (low pressure) distribution pipework



Hydrogen for Heat
Hydrogen Heat Projects

Department for Business, Energy & Industrial Strategy
Community Trial

2016 2017 2018 2019 2020 2021 2022

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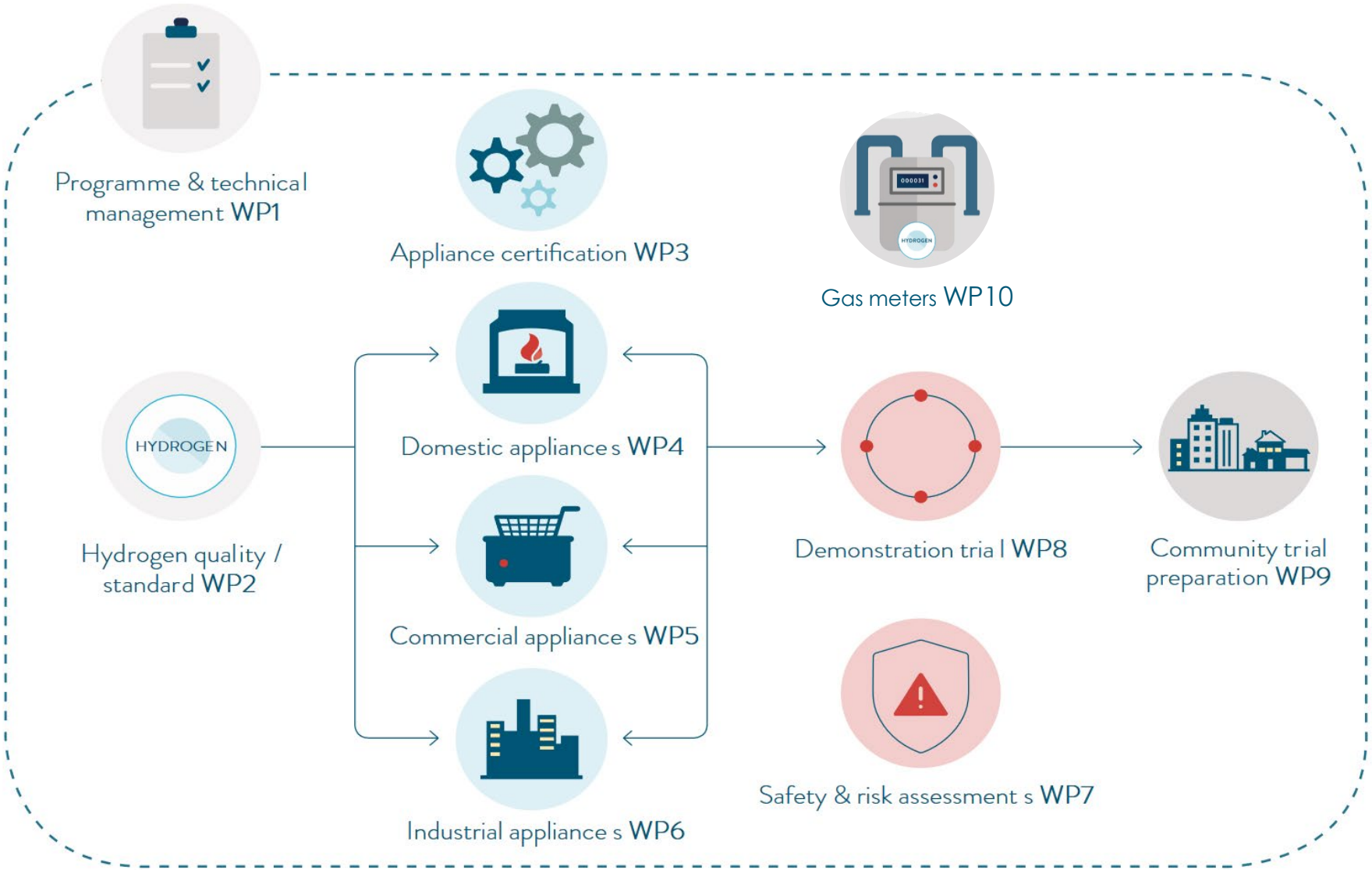
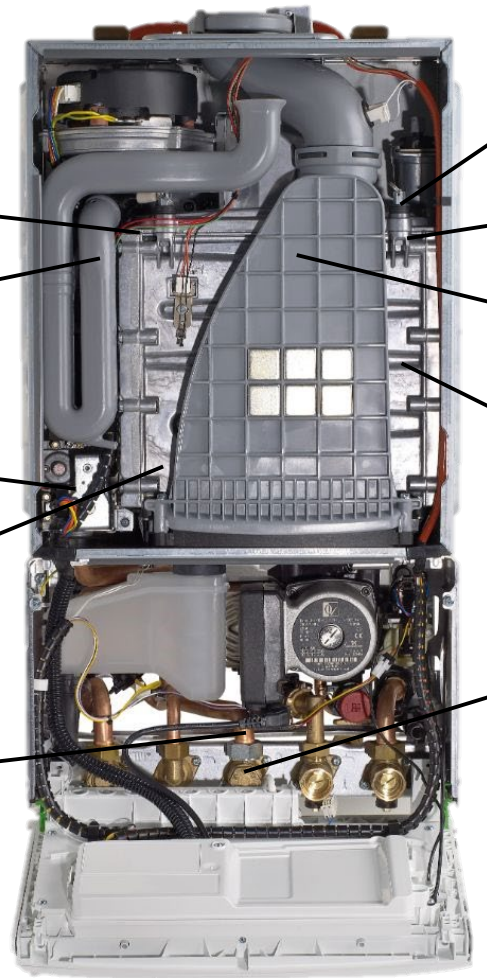
WORCESTER BOSCH

Hy4Heat



Hydrogen for Heat
The Technical Challenge



Flame Detection

Ignition

Gas-Air Ratio Control

Condensate Removal

Materials Compatibility

Flashback Prevention

Conversion

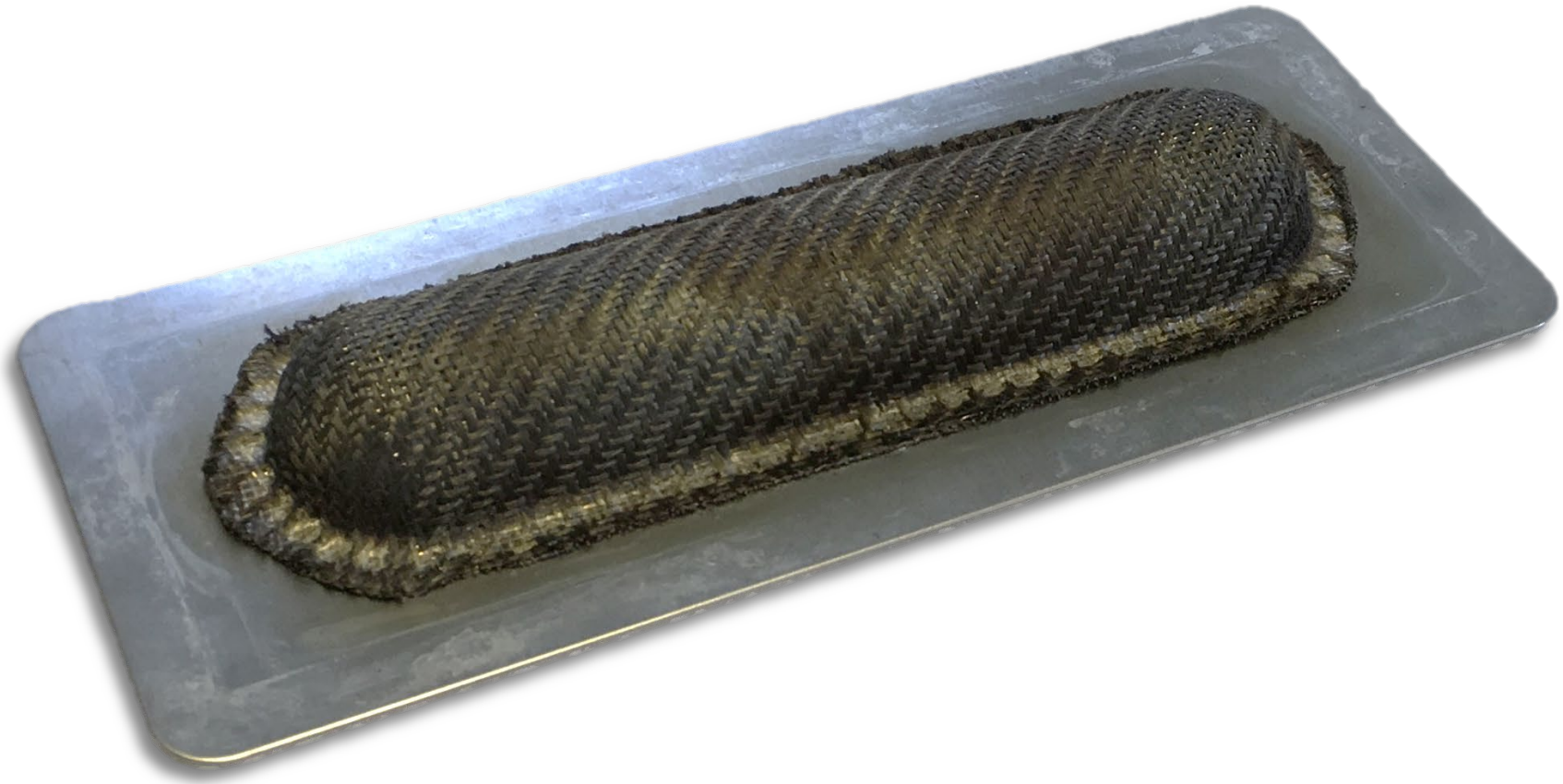
Performance

Thermoacoustics

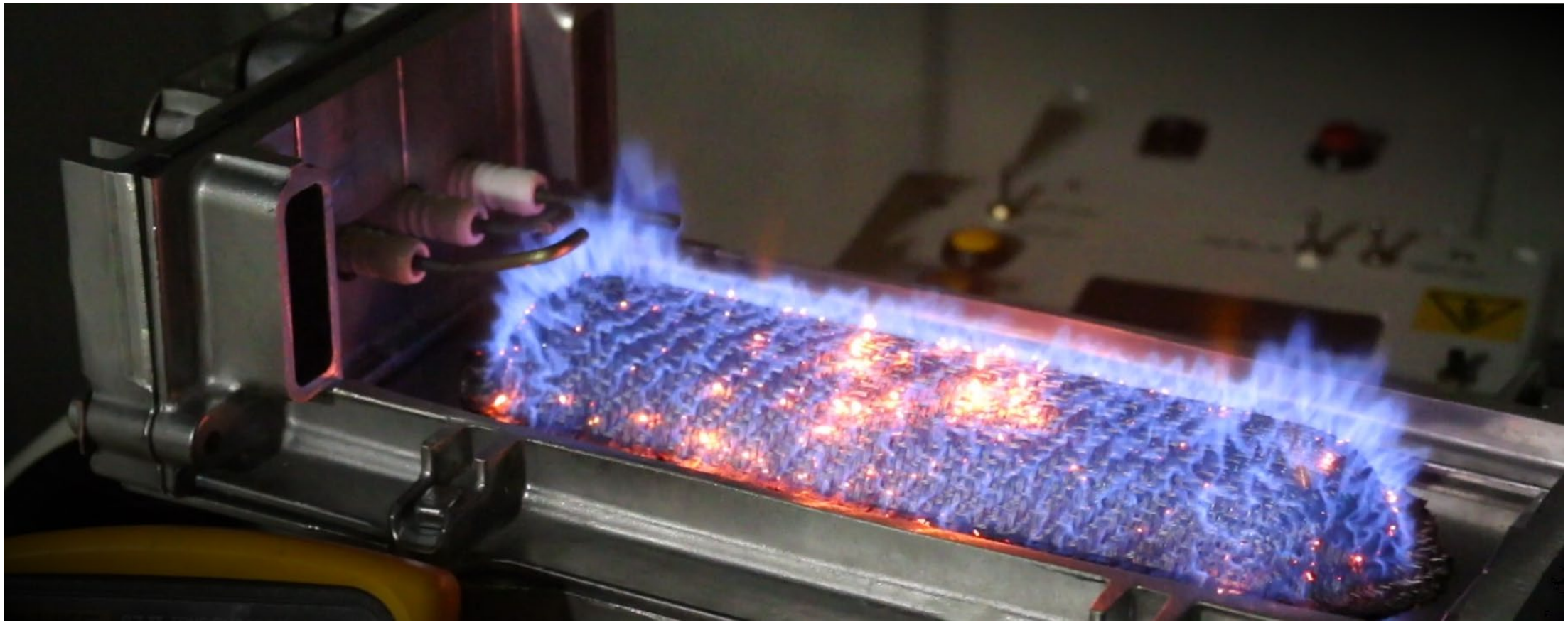
Gas Soundness

Safety Case

Hydrogen for Heat
The Technical Challenge

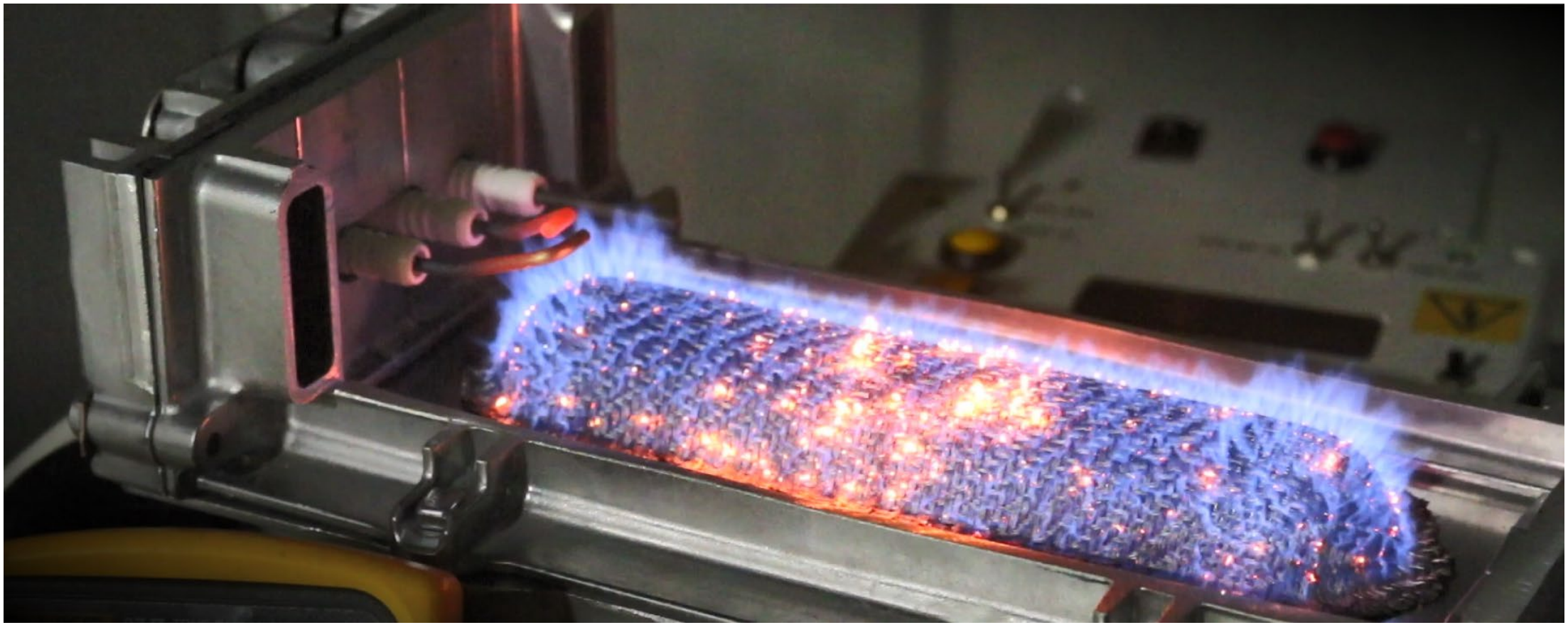


Hydrogen
The Technical Challenge

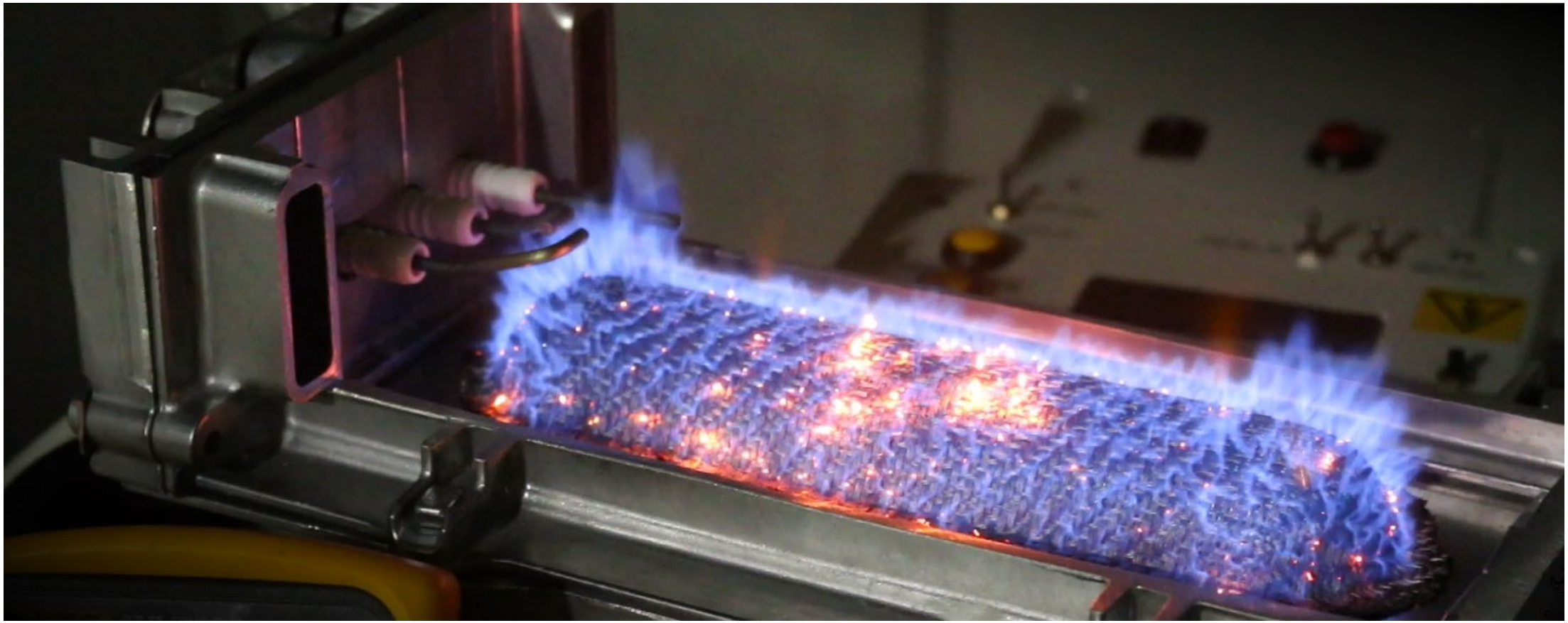


Hydrogen
The Technical Challenge

23% H_2

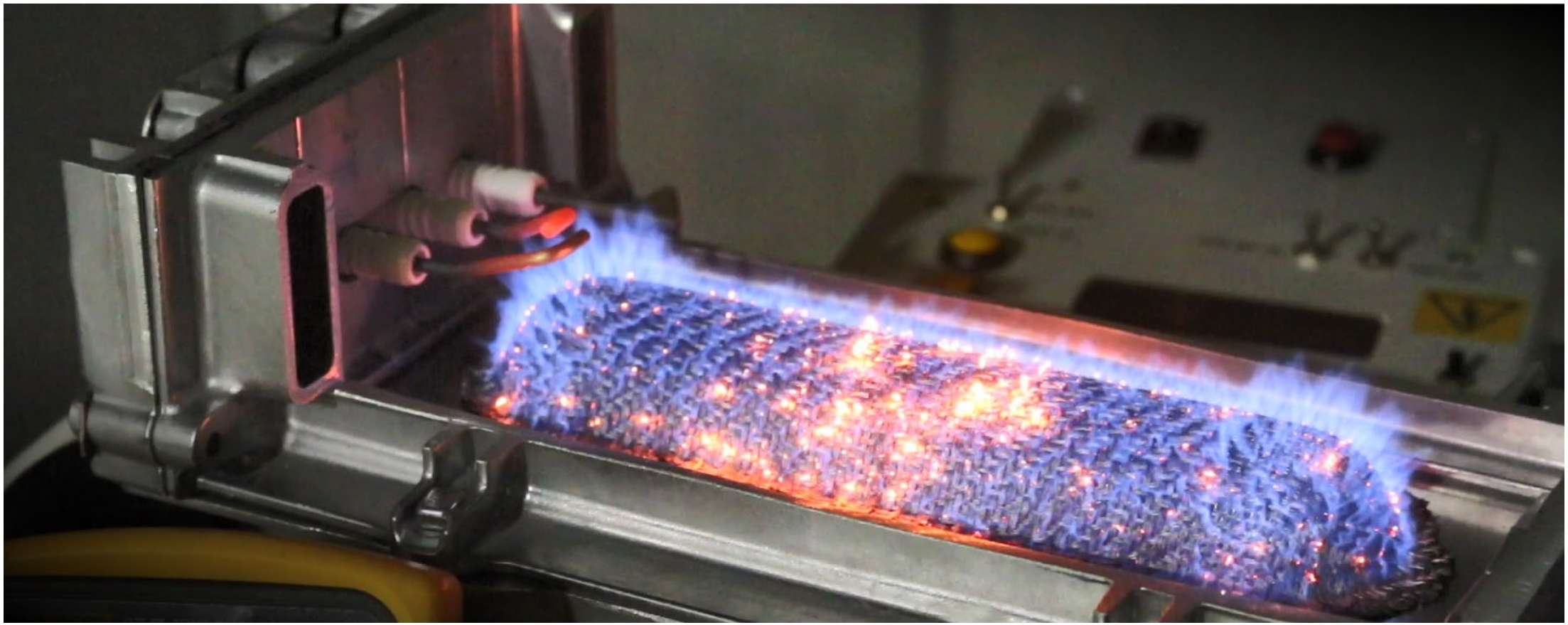


Hydrogen
The Technical Challenge

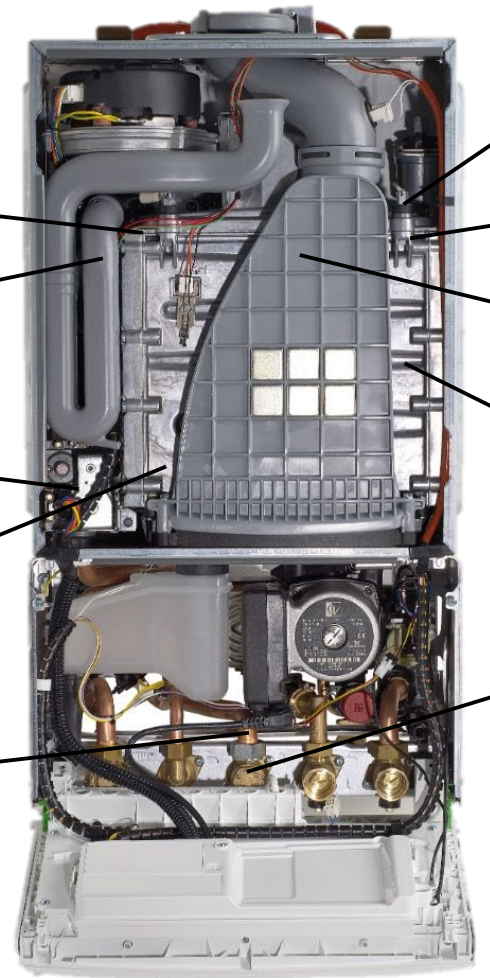


Hydrogen
The Technical Challenge

23% H_2



Hydrogen for Heat
The Technical Challenge



Flame Detection

Ignition

Gas-Air Ratio Control

Condensate Removal

Materials Compatibility

Flashback Prevention

Conversion

Performance

Thermoacoustics

Gas Soundness

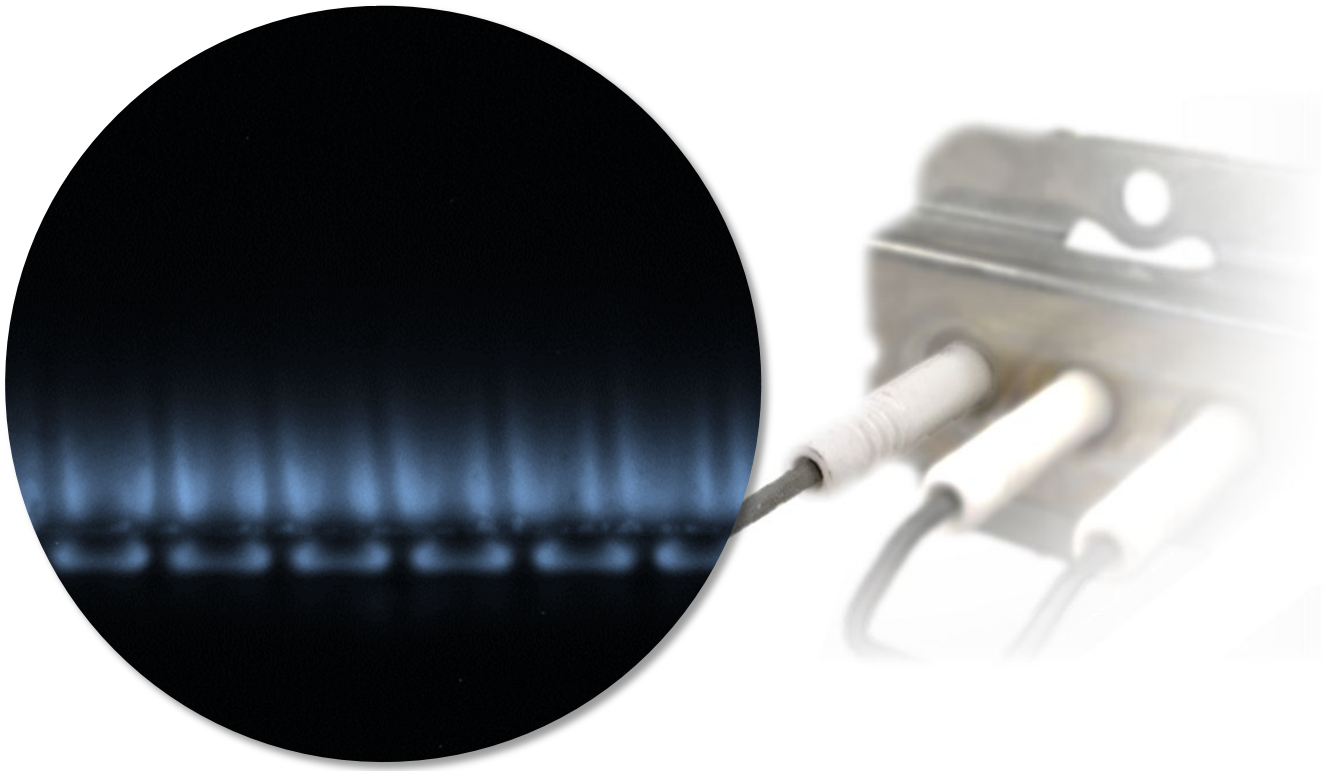
Safety Case

Hydrogen for Heat

The Technical Challenge | Flame Detection

Hydrogen for Heat

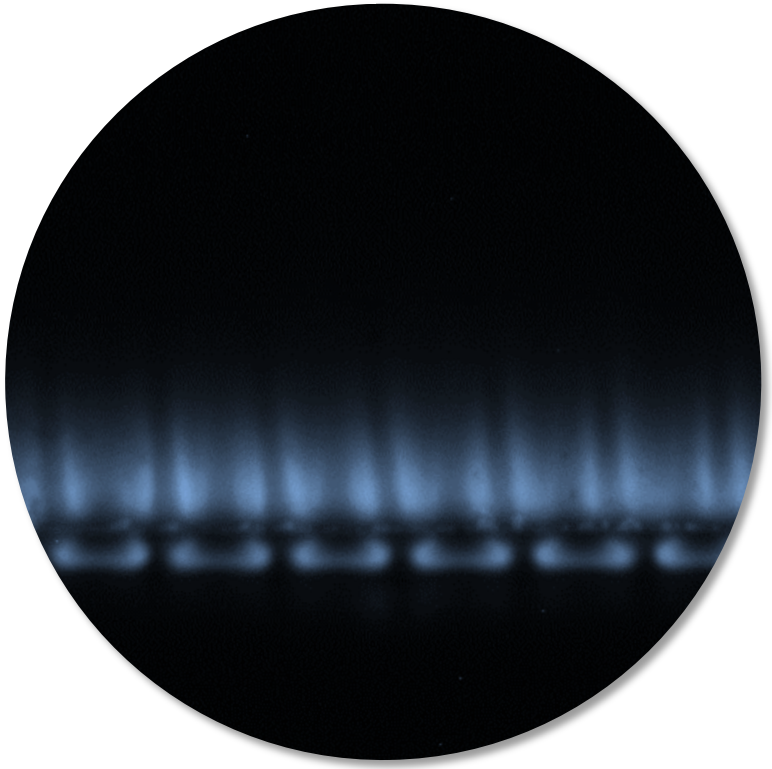
The Technical Challenge | Flame Detection



H_2

Hydrogen for Heat

The Technical Challenge | Flame Detection



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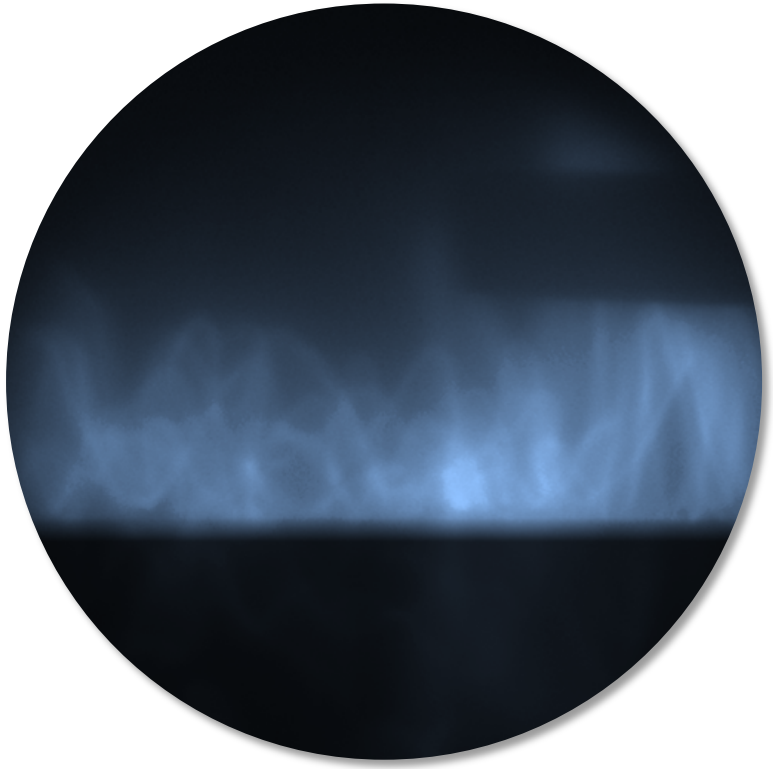
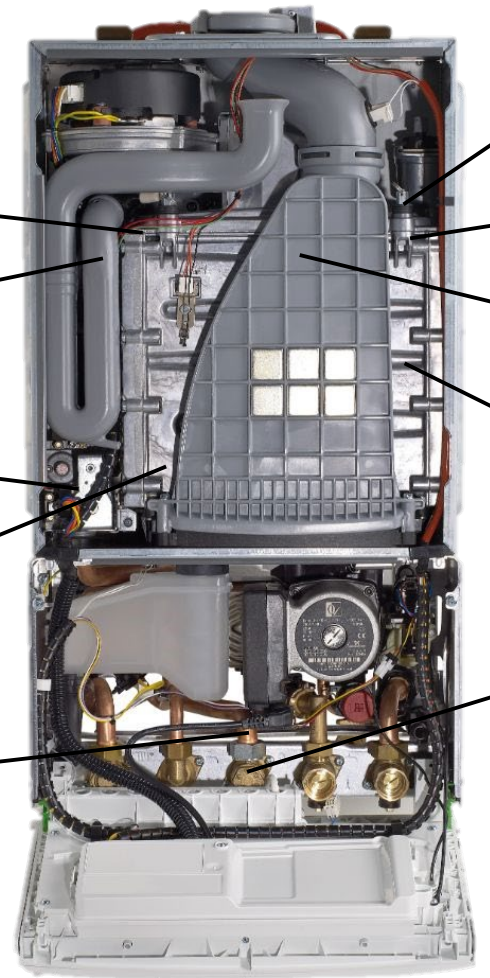


CH_4

Hydrogen for Heat
The Technical Challenge



Flame Detection

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Hydrogen for Heat
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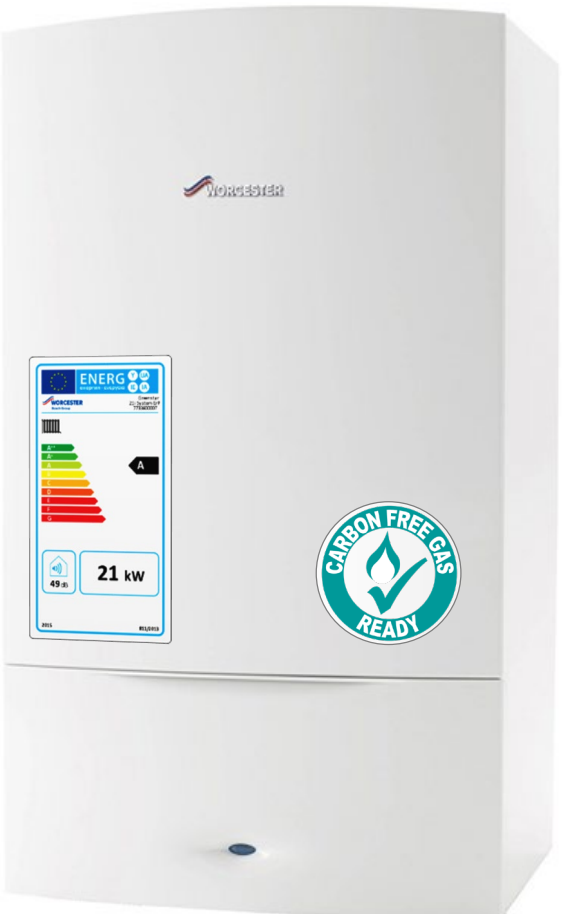
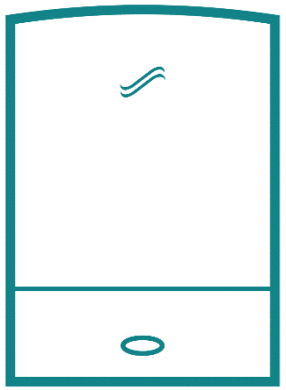


Hydrogen for Heat
Conversion Options



Hydrogen for Heat
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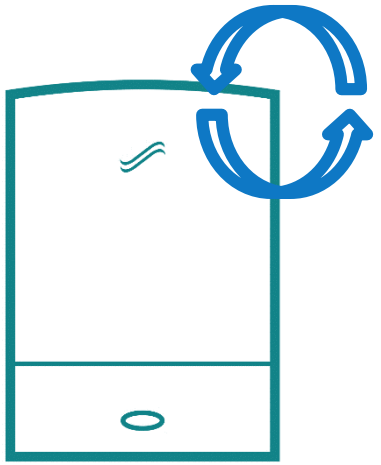
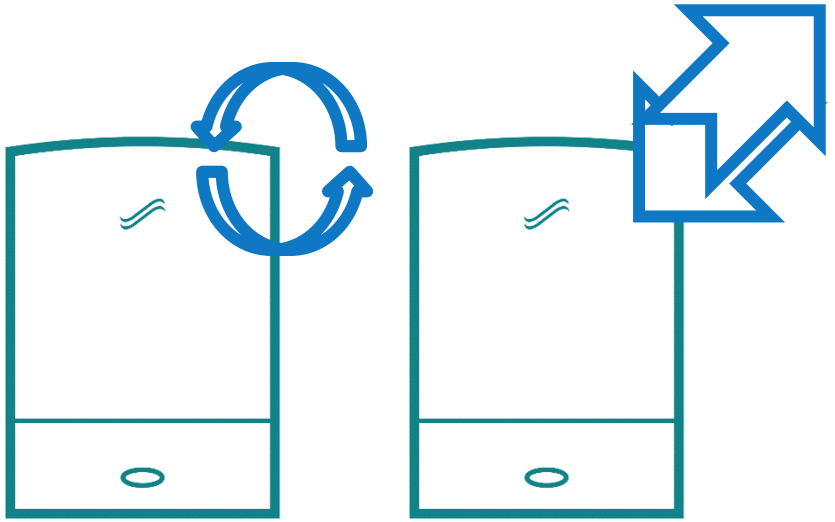
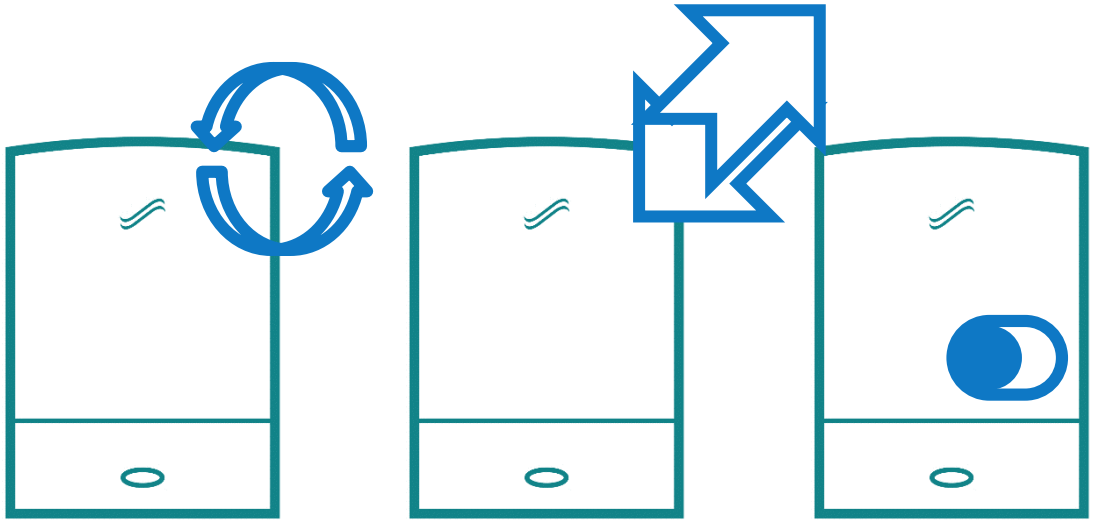


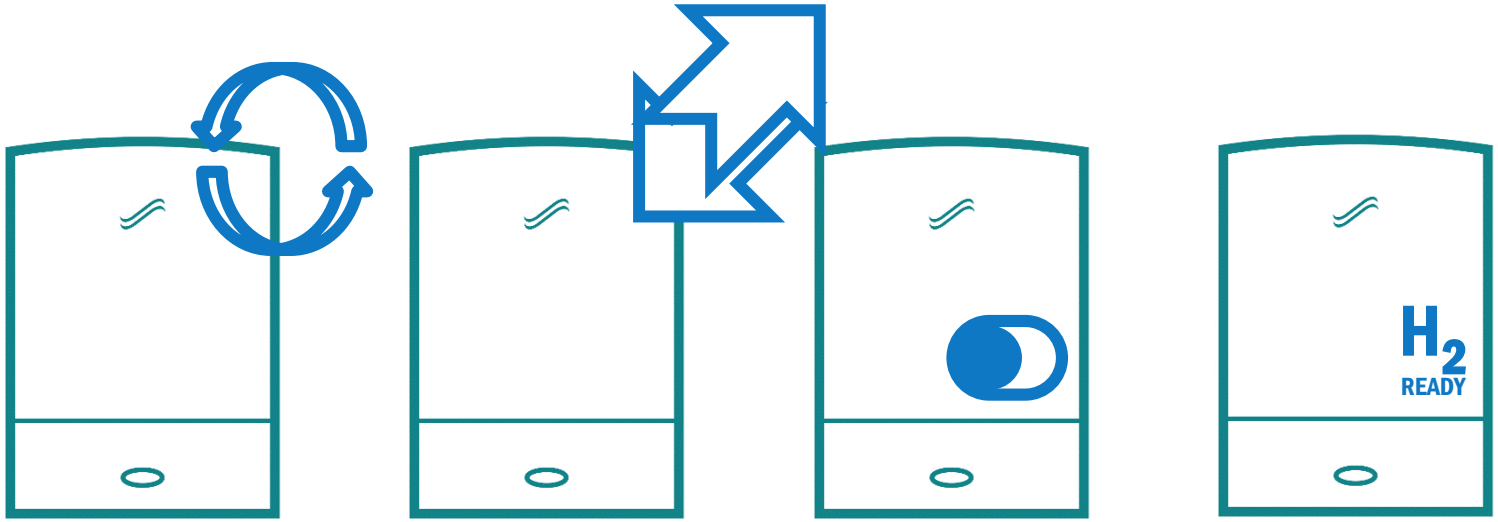
Hydrogen for Heat
Conversion Options



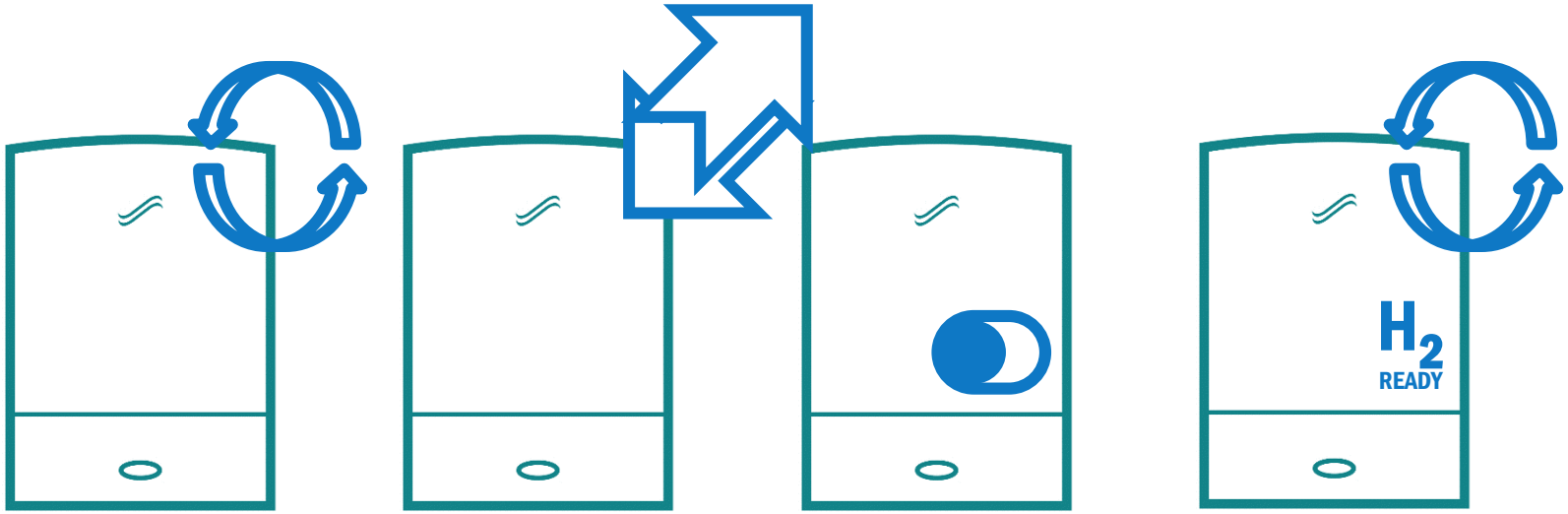
Hydrogen for Heat
Conversion Options



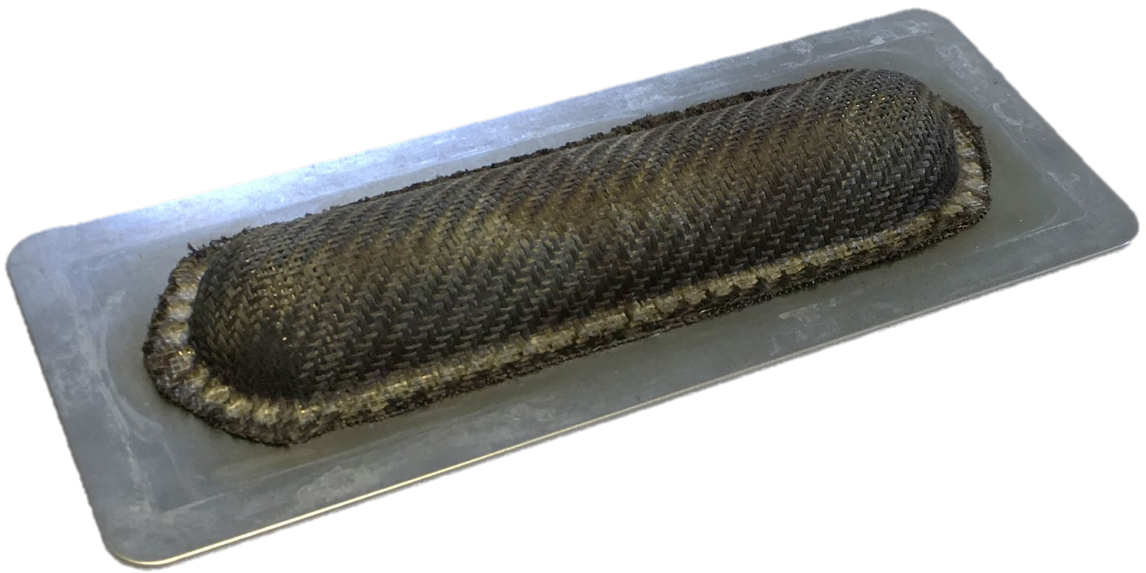
Hydrogen for Heat
Conversion Options



Hydrogen for Heat
Conversion Options

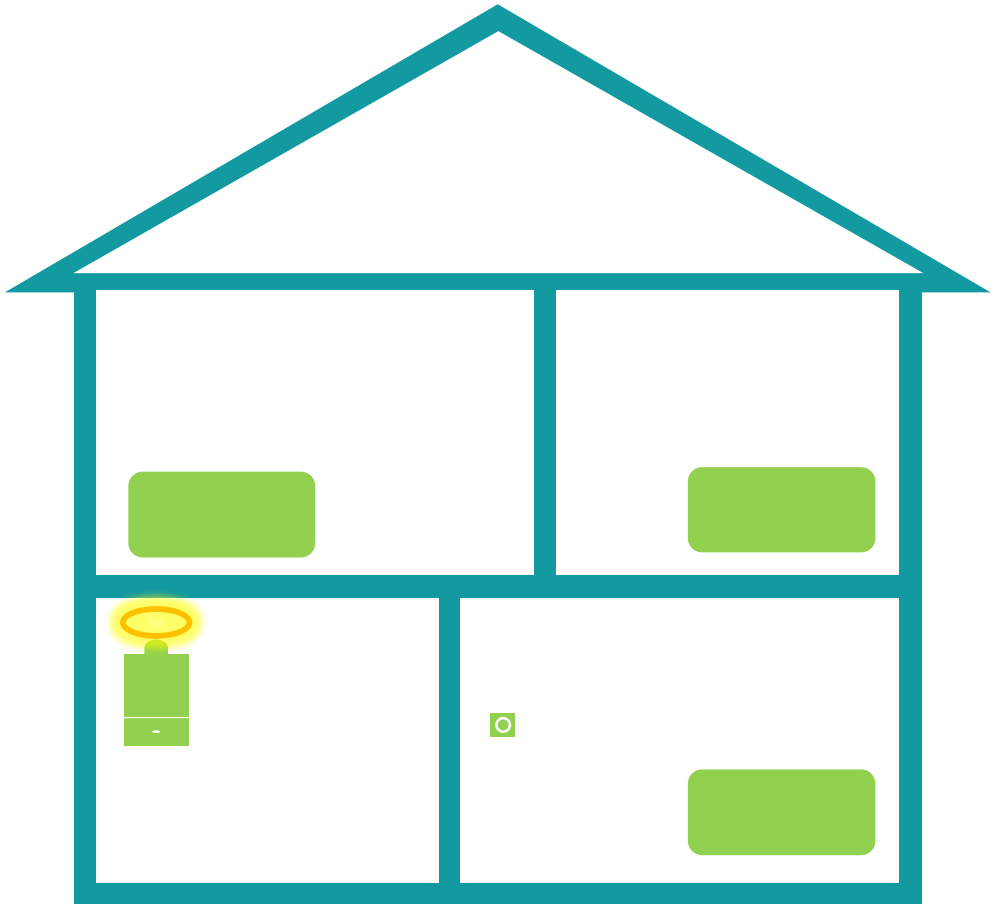


Hydrogen for Heat
Conversion



Hydrogen for Heat
Conversion

Hydrogen for Heat
Conversion



Hydrogen for Heat
Conversion

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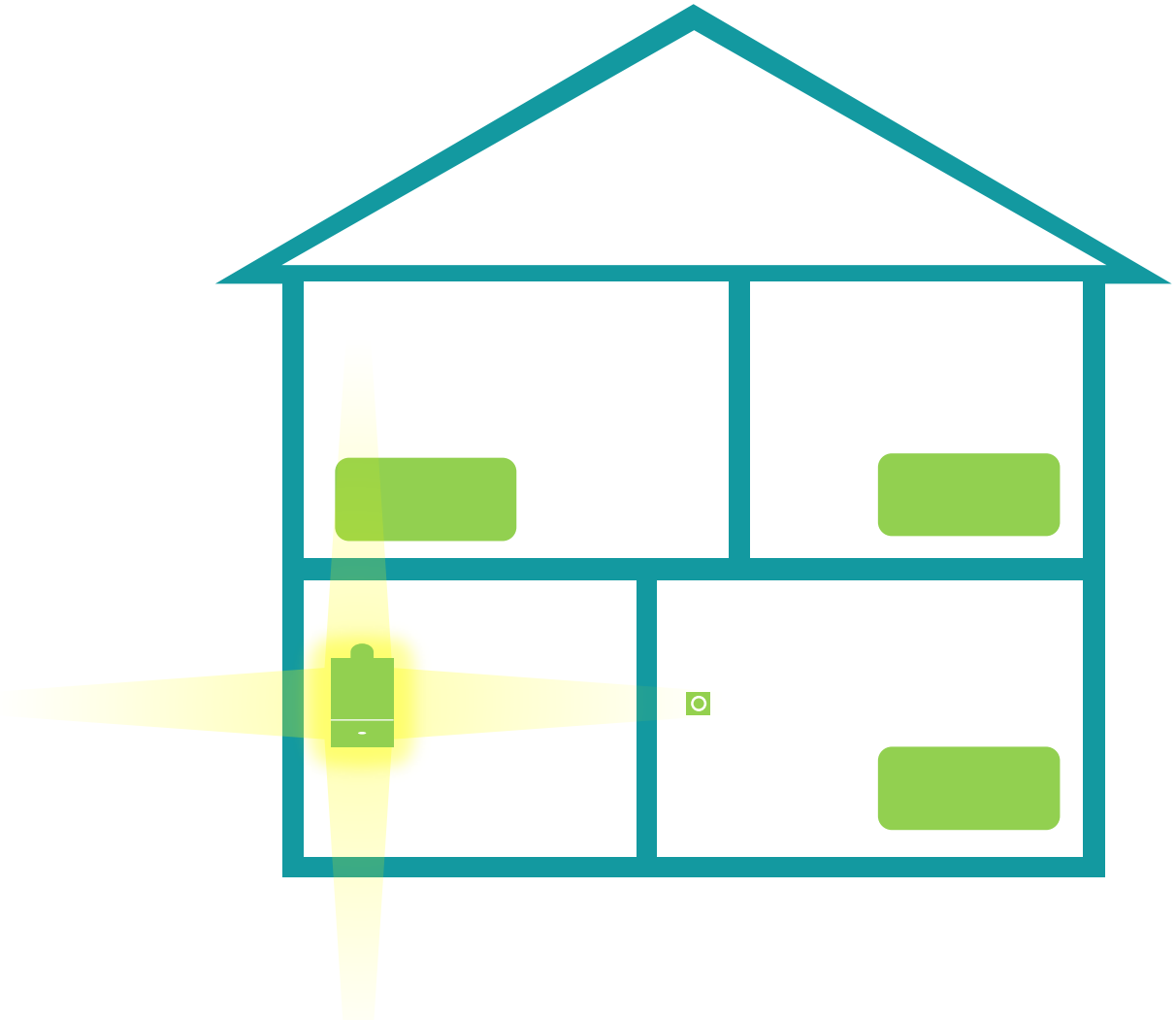

Hydrogen for Heat
Safer than Today


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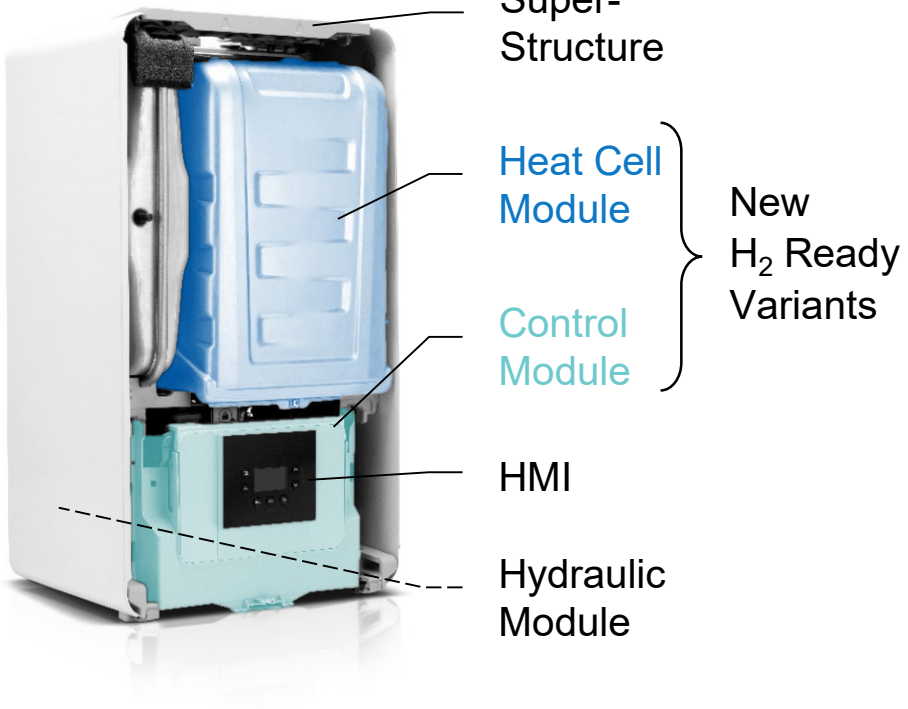
Hydrogen Ready
Zero-Carbon Boiler

Hydrogen for Heat

HyLife Project | Concept




Low
emission
ZONE

DECARBONISING HEAT

TOM COLLINS

Tom.Collins@uk.bosch.com

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