

THE SUPPLY CHAIN FOR NET ZERO

PROGRESS FOR UK INVESTMENT AND DELIVERY

GREEN INFRASTRUCTURE WEEK

27th April 2022





Heating and Ventilation



Building Electrical Systems



Networks



Flexible Energy System

We work with members to deliver industry change



Representation and engagement with key industry participants



Policy and Standards Development



Market Insight and End to End Supply Chain Representation



Legal and Compliance Services



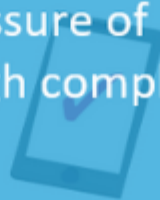
Statistical, export and e-commerce support



Knowledge of the implementing legal, commercial, technical and environmental demands



A forum to interact with competitors with the reassurance of thorough compliance



Export initiatives



- We have opportunities to deploy technologies that can help us reach Net Zero
- We will explain the state of play of four technology areas that are at different levels of market maturity
- We will also look at gaps between targets and delivery
- Relevant to policymakers, those in energy industry or research, and organisations looking to decarbonise
- Today we hope you will:
 - Learn about technologies
 - Understand the delivery challenges
 - Consider adopting our recommendations
 - Use your influence to increase deployment



1. Growing the supply chain for Net Zero

2. Control and system optimising in buildings – how can this alleviate pressure on billpayers now and in the future



3. Are we on track to deliver the UK's heat pump target?

4. How mass deployment of storage can reduce the overall cost of Net Zero



5. The delivery gap



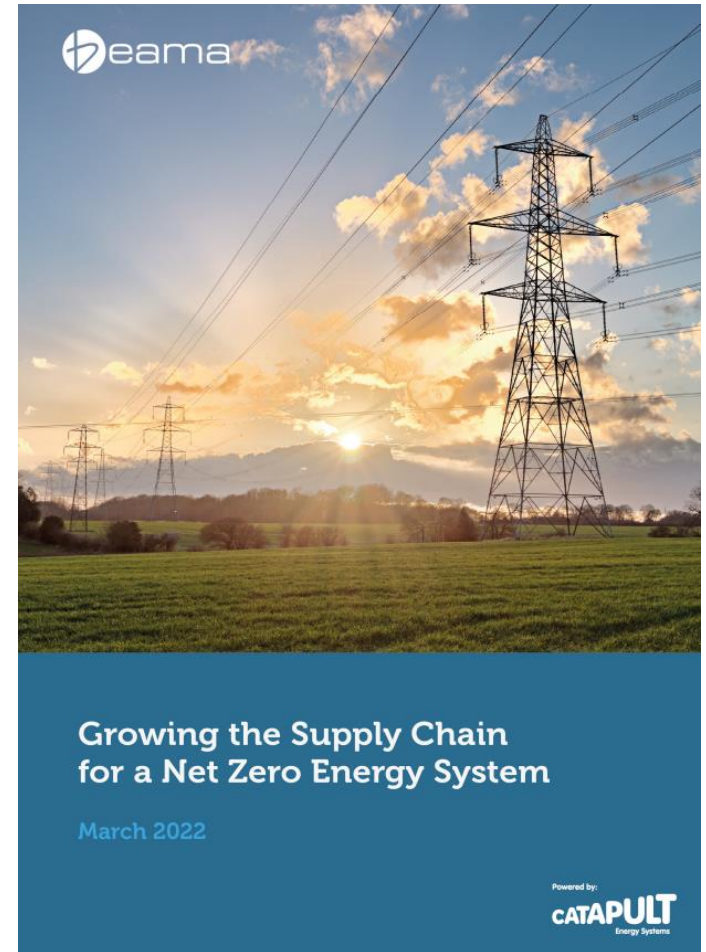
Growing the Supply Chain for Net Zero

Yselkla Farmer

- Known targets for Net Zero (eg heat pumps, EVs, electrification and hydrogen expansion)
- A need to invest in supply chain capacity but not enough confidence in the market
- Manufacturers are making decisions on where and how to invest today!

The research

- Modelled path to Net Zero by 2050 for the electricity supply chain (ESME and ITAM) – pathway to Carbon Budget 6
- Calculated product volumes for electricity networks and end use technologies
- The 6th Carbon budget necessitates early action – pre-2035
- The scale of change in some key sectors is unprecedented – not business as usual – in some product areas this could be 10X



BEAMA members say they can meet the needs from the electricity sector for a least cost Net Zero future by 2050...

...but before they can invest, there are several risks and constraints faced by the sector that need to be addressed...

...that can be overcome through a number of recommendations from BEAMA members:



£3bn per annum investment into domestic technologies such as heat pumps, chargers and storage prior to 2035

The electricity system supply chain is internationally competitive and complex

Beyond the UK Net Zero Strategy, develop further plans on longer-term infrastructure deployment with more detailed supply chain needs



£7bn per annum investment into electricity distribution networks prior to 2035 – including 20-40% increase in lines, cables and substations

Uncertainty on direction in UK policy has stalled investment

Form an industrial electricity supply chain council, backed by Government, which will develop a 5-year plan to support capital investment



85% BEAMA members surveyed expect to scale up by 20-100% to meet future needs, with some expecting to scale by 10x

There is typically an approximate five year lag time between investment and the resultant scale up

Near-term finance to adequately stimulate the market



The installer base for low carbon heating could need to be increased by a factor of 20

Skills shortages in key sectors are throttling demand

Review of the regulatory and planning system to enable investment ahead of need

Plan to urgently tackle scarcity of apprentices and support transfer of skills from high carbon sectors

Research results

- Our research deliberately presents an upper limit to investment, assuming no further innovation in technologies and their application or further innovations in flexibility markets.
- Our energy system modeling tells us a lot about what drives the cost of Net Zero and, importantly, how to reduce it through early action to support innovation in the supply chain, reduce supply chain risks and bring forward capacity for flexibility on the system.
- At a time when volatility of energy prices is at the heart of our energy security policy, ensuring a cost effective transition to net zero is paramount

We need innovation, expansion of flexibility markets, supply chain investment and effective supply chain planning

Recommendation: formation of the Electricity Supply Chain Council

Optimising heating controls and heating systems

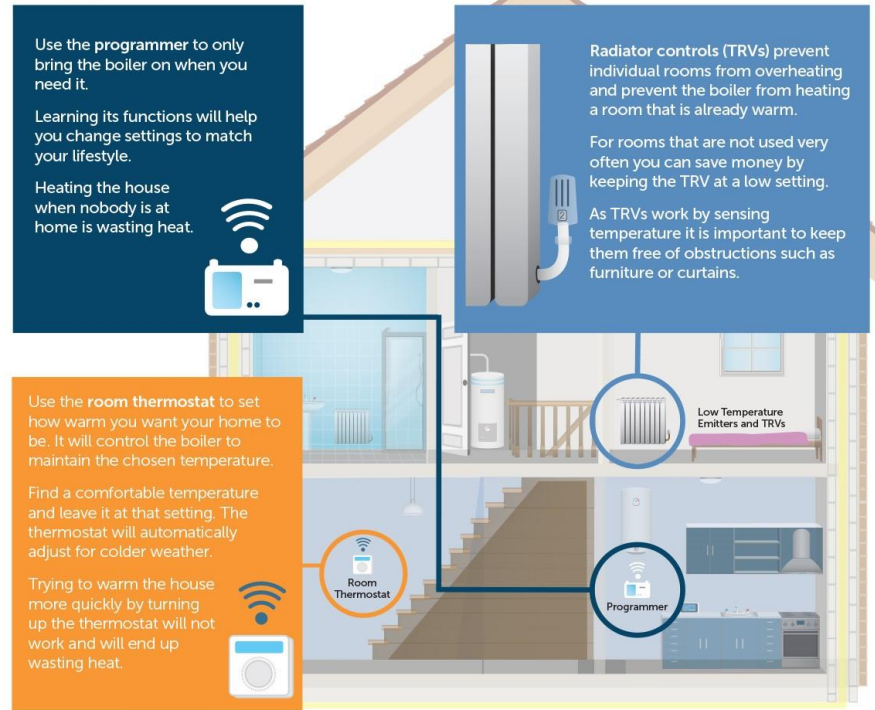
Colin Timmins

Optimising heating controls and heating systems

Taking control of your heating bills

A gas boiler is by far the biggest energy using appliance in your home – responsible for around 80% of total energy used. Understanding how to use the controls on your heating system, or replacing outdated controls, will make sure your boiler works efficiently.

Using your current heating controls



Upgrading your heating system

10% ENERGY SAVINGS

Replacing a standard room thermostat with one that controls the boiler using **load or weather compensation** will deliver savings whenever the heating is on. Research shows such control reduces gas usage by 10-12% depending on the type of control your existing boiler is compatible with.¹

Smart controls allow you to adjust time and temperature settings using your mobile phone. They may also sense whether you are in or out and adjust the heating settings automatically. Field trials show 6% less gas used in homes with a smart thermostat.²

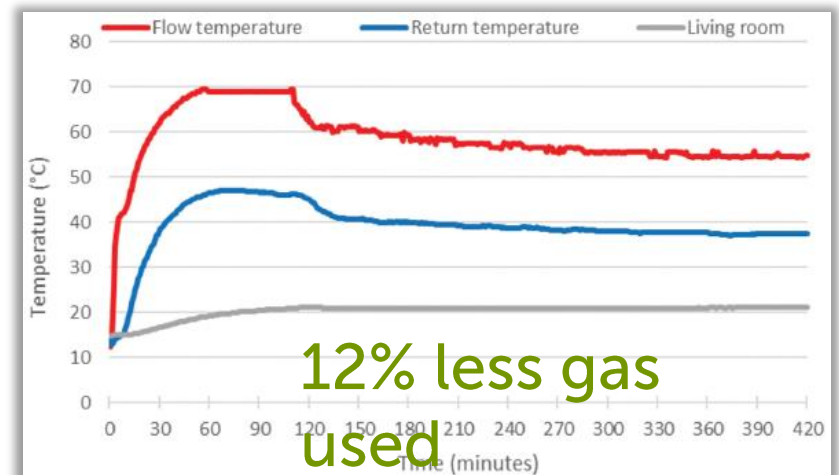
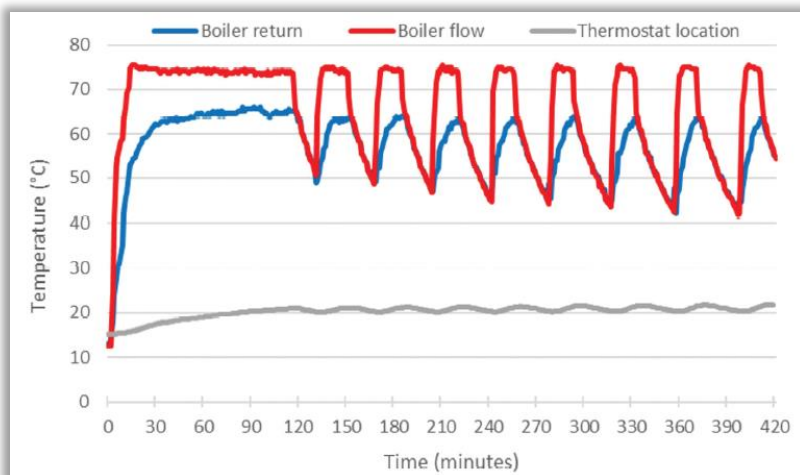
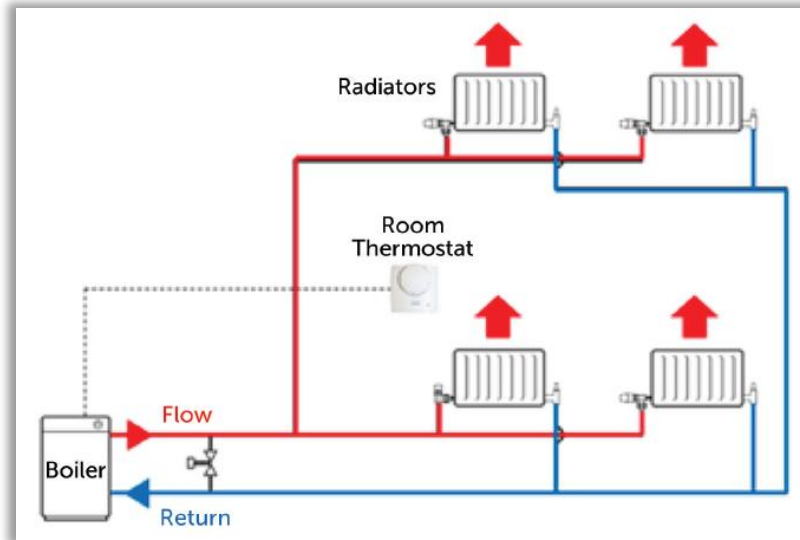
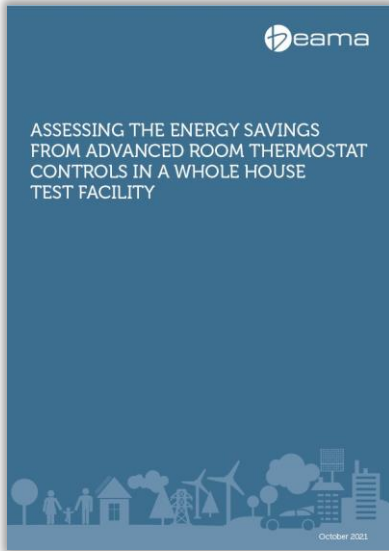
6% ENERGY SAVINGS

18% ENERGY SAVINGS

If you don't have **TRVs** on your radiators, getting these added can significantly reduce wasted heat. Research shows a boiler can use 18% less gas when TRVs are used to avoid barely noticeable levels of overheating in rooms not controlled by the central room thermostat.³

References:
¹ Tests by Salford University, on behalf of BEAMA and OpenTherm (2020). <https://www.beama.org.uk/resourceLibrary/salford-tests-on-load-and-weather-compensation.html>
² Study by the Behavioural Insights Team on the savings from smart thermostats, 2017. <https://www.bit.team/publications/evaluating-the-next-learning-thermostat2>
³ Tests by Salford University, on behalf of BEAMA and BRE (2018). <https://www.beama.org.uk/resourceLibrary/salford-university-tests-to-establish-the-energy-savings-from-trvs---2018-pdf.html>

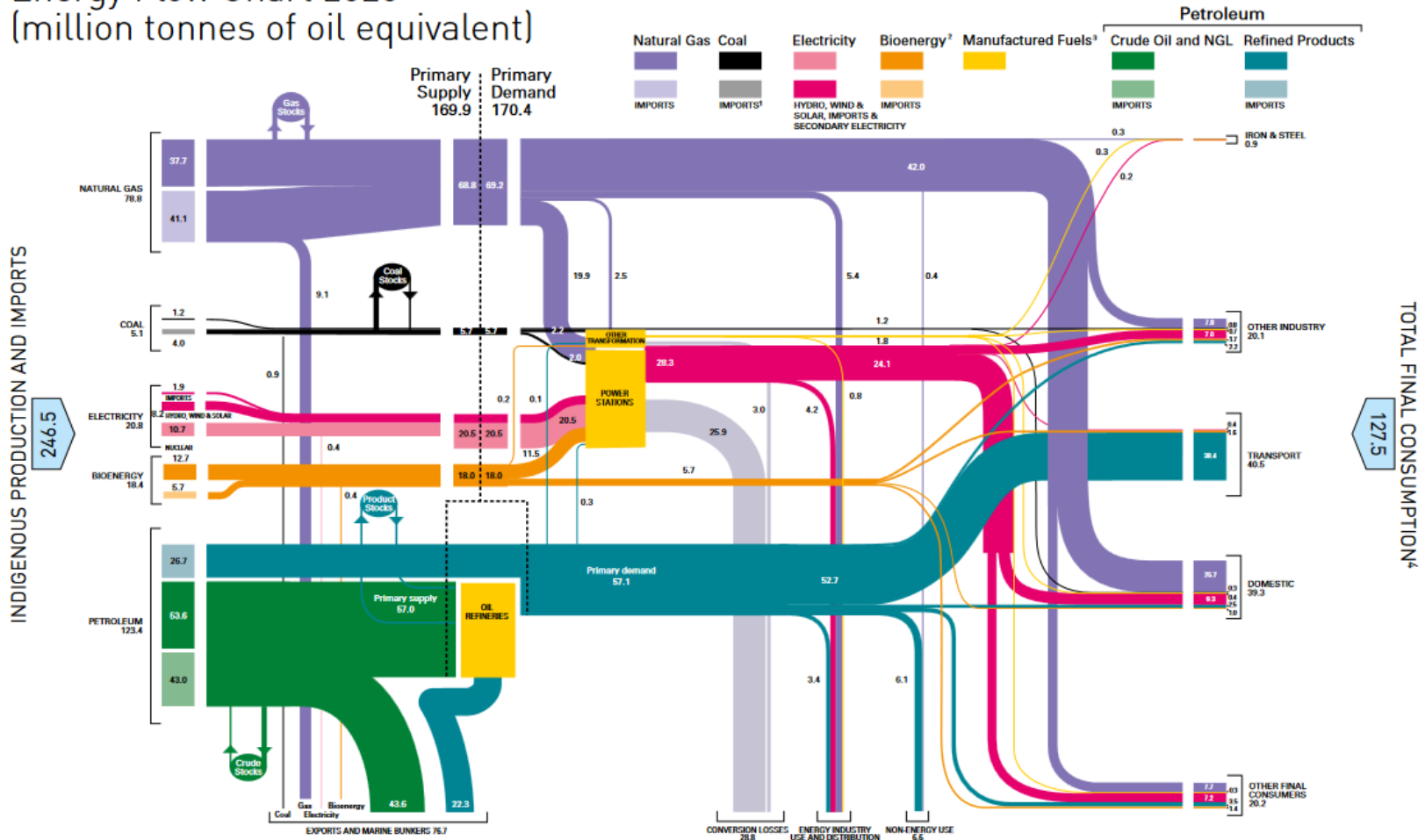
Optimising heating controls and heating systems



12% less gas used

Optimising heating controls and heating systems

Energy Flow Chart 2020
(million tonnes of oil equivalent)



FOOTNOTES:
 1. Coal imports, exports and power stations include manufactured fuels.
 2. Bioenergy is renewable energy made from material of recent biological origin derived from plant or animal matter.
 3. Includes heat sold.
 4. Includes non-energy use.
 This flowchart has been produced using the style of balance and figures in the 2021 Digest of UK Energy Statistics, Table 1.1. (gross calorific values basis)

Optimising heating controls and heating systems



THINKING OUTSIDE THE BOILER

How improved heat distribution systems could significantly reduce the cost of low carbon heating

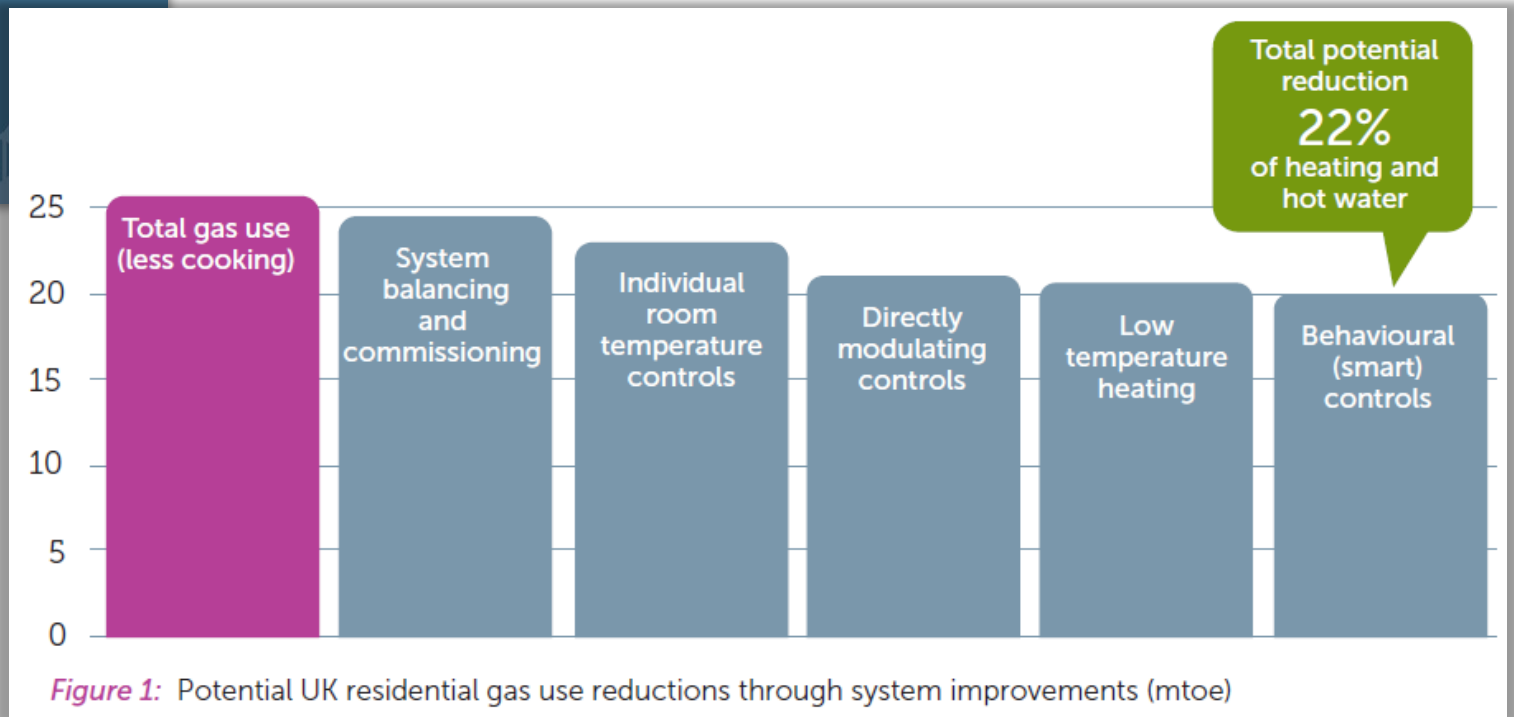
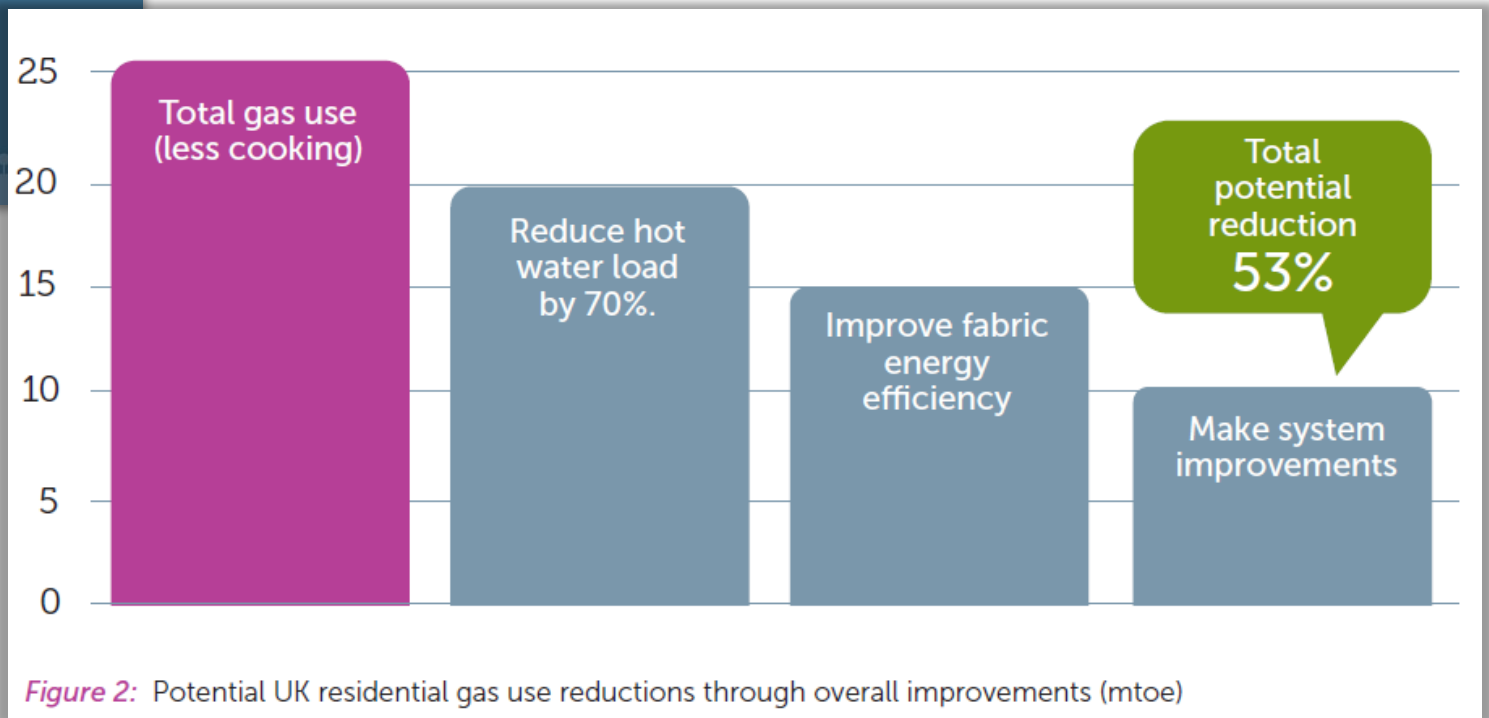
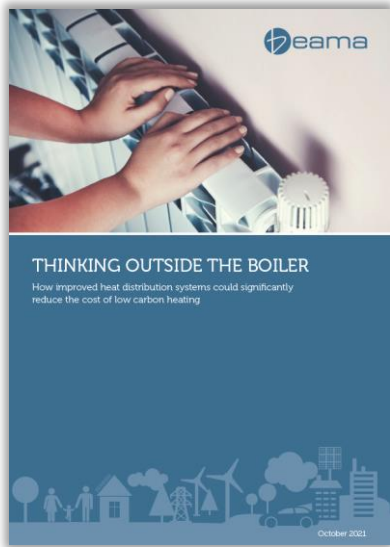


Figure 1: Potential UK residential gas use reductions through system improvements (mtoe)

Optimising heating controls and heating systems



Optimising heating controls and heating systems



Measures to improve system efficiency have the potential to reduce current gas consumption for heating and hot water by

22%

Allied to optimised fabric energy efficiency and a different approach for hot water the overall reduction in gas used for heating and hot water could be as much as

53%

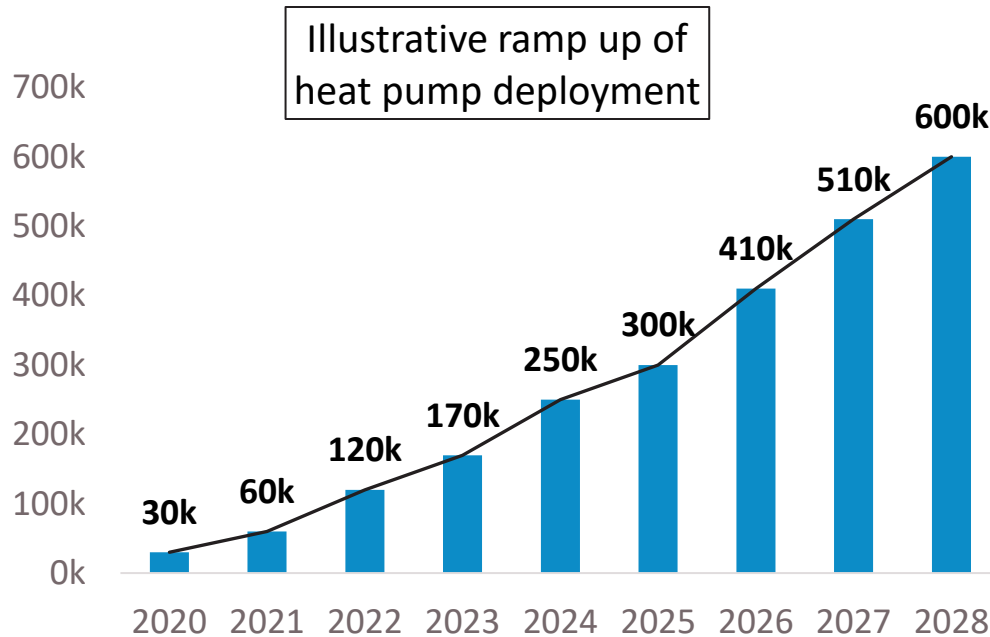
The same system measures would provide immediate benefits for the energy efficiency of existing homes.

Are we on track to deliver the UK's heat pump target?

Chris Stammers

Are we on track to deliver the UK's heat pump target?

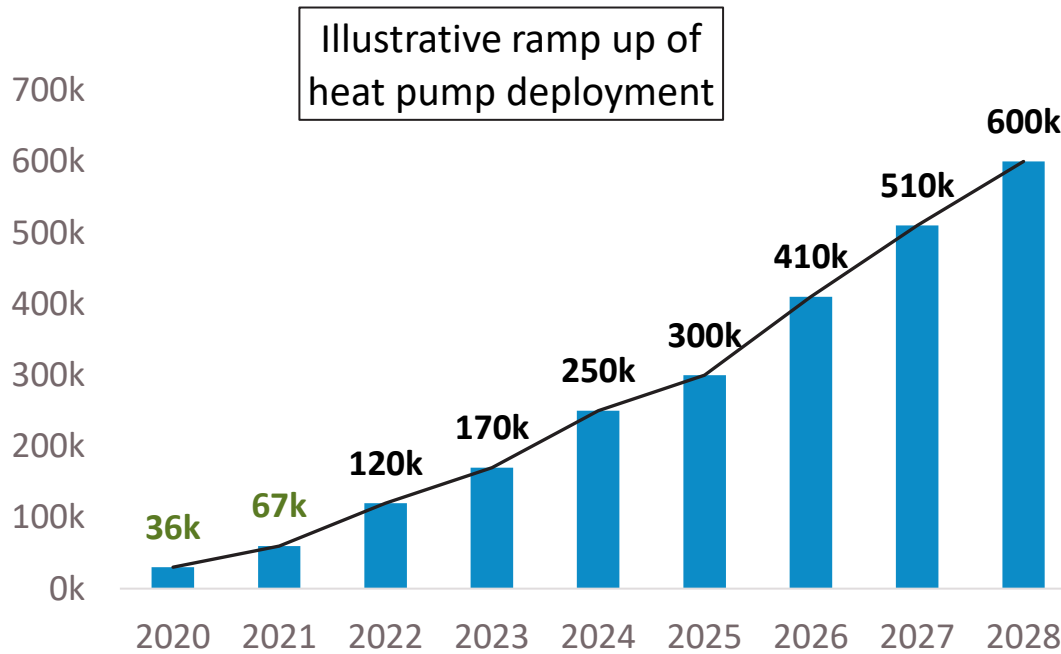
- The Government's ambition is to be installing 600,000 Heat pumps p.a. by 2028
- To increase sales from 2020 levels by a factor of 20 within 8 years



Source - BEIS

Are we on track to deliver the UK's heat pump target?

- Despite some obvious hurdles ... Yes , we are on track !



Source - BEIS

Are we on track to deliver the UK's heat pump target?

20

- There are still more hurdles to clear:

Installer constraints

- 2020 - 1,800 installers
- 2022- 3,500 installers

- Installers needed- 30,000 !

Installation standards

Only 30% of heat pump installations are undertaken by accredited installers

How do we get to 100% ?

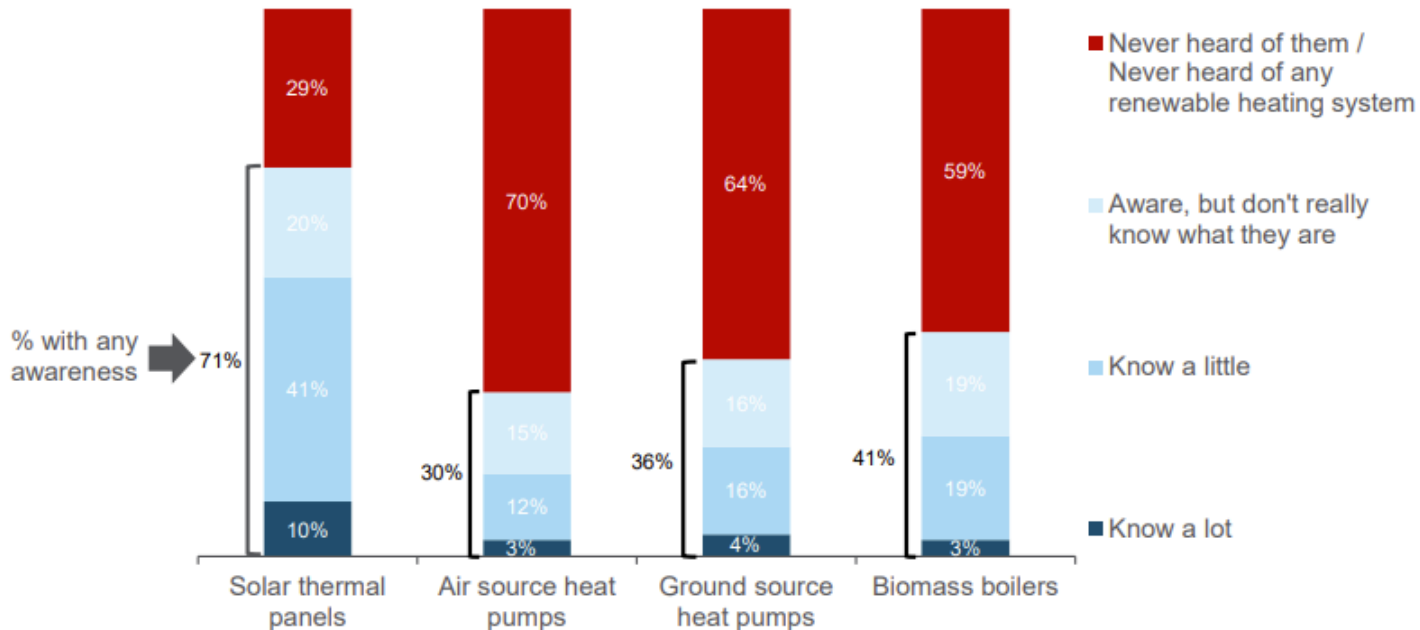
Are we on track to deliver the UK's heat pump target?

- **Implications for Networks**
 - Currently only around 20% of heat pump connections are notified to the DNO.
 - In the last two years alone, over 100,000 heat pumps have been connected to the grid somewhere in the UK, without being accounted for.
 - Automatic asset registration will help... but is not a complete solution.

Are we on track to deliver the UK's heat pump target?

- Consumer awareness of heat pumps is still low but growing!
- This was the consumer awareness levels in December 2019

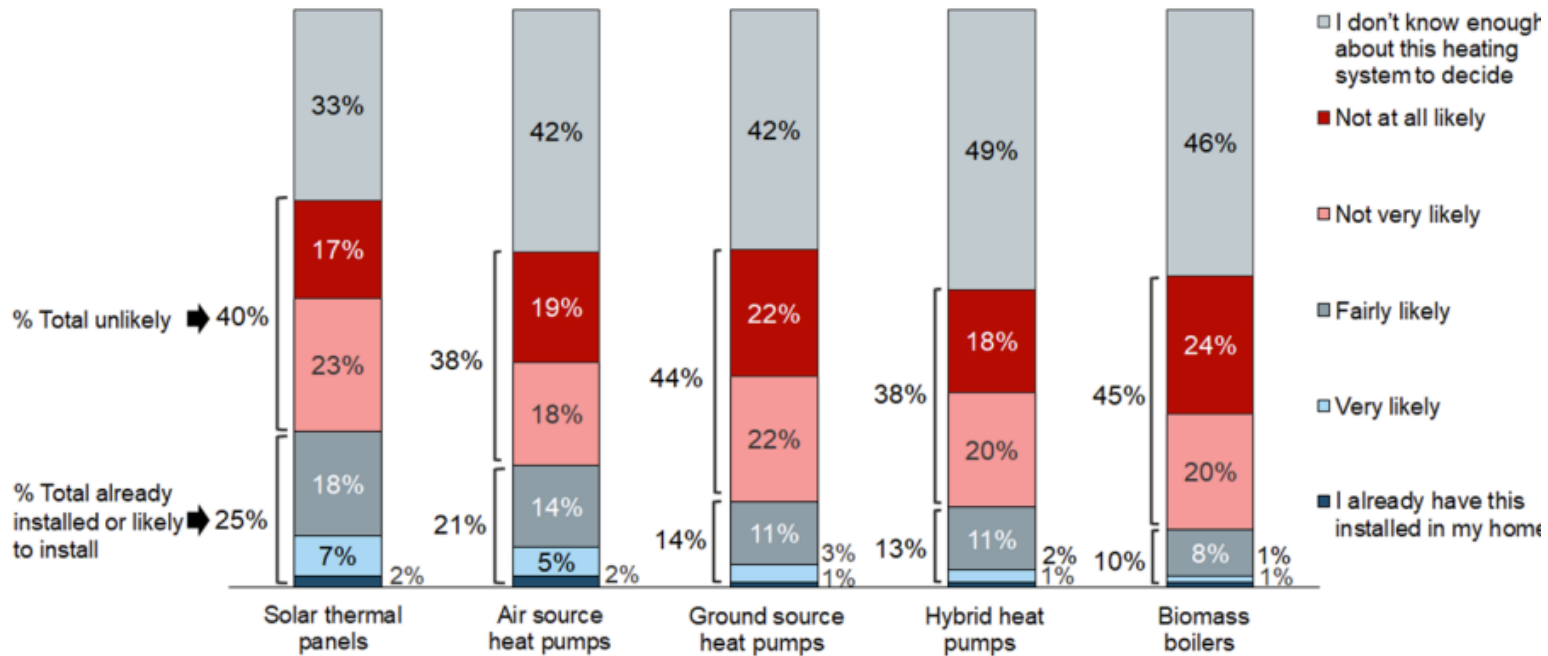
Figure 1: Awareness of specific renewable heating systems (based on all people), December 2019



Are we on track to deliver the UK's heat pump target?

..... and this is from the latest Public attitudes tracker

Figure 2.2: Whether likely to install specific low-carbon heating systems next time they need to change (based on owner occupiers excluding those who said they were not responsible for making decisions about this), Winter 2021



Are we on track to deliver the UK's heat pump target?

- The cost of buying and operating a heat pump is still high...
- ...but there are mitigations!
 - VAT reduction on renewables
 - Latest Energy Price Cap revealed the beginnings of a policy of re-balancing the relative costs of electricity and gas
 - The Government is still committed to the idea that industry will reduce the installed cost of a heat pump by up to 50%
 - The BUS is welcome, but late!

How mass deployment of storage can reduce overall cost of reaching Net Zero

Jeremy Yapp

How mass deployment of storage can reduce overall cost

Renewables are typically intermittent, and energy demand is becoming more variable and unpredictable

Intermittency and variability combine to pose:

- An energy system challenge
- A local energy challenge

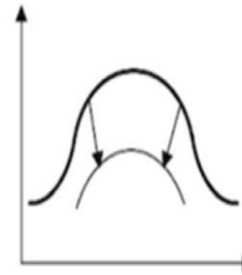
To address these national and local challenges, we need **flexibility**

Flexibility is about changing where or when electricity is consumed or generated

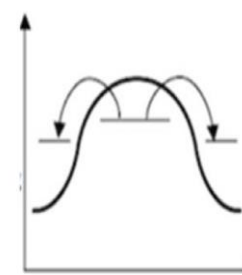
A key source of flexibility will be storage

Grid scale and seasonal storage will play a key role

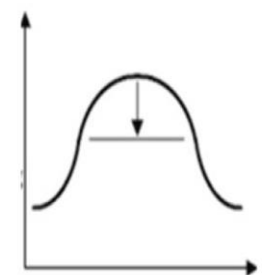
Distributed energy storage, in buildings and residential properties, will also be key, whether it be electrical storage (batteries and EVs) or thermal storage (building inertia, hot water tanks, etc.)



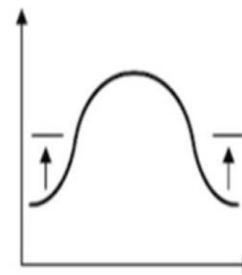
Conversion and energy efficiency



Load shifting



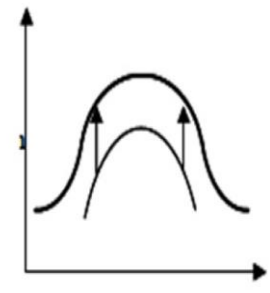
Peak clipping



Valley filling



Flexible load shape



Electrification

Thermal storage and networks

Thermal storage:

- Supports national networks by helping to balance the system
- Enables mass, aggregated response to mismatch between supply and demand
- Supports local networks by responding to congestion

- Reduces energy costs
- Reduces connection costs
- Enables new revenue streams

- Devices can offer highest benefits for homeowners when combined with smart controls and home energy management systems

2021 GB local flexibility markets are 3GW and growing

Net Zero and the electrification of heat

- Ambitious UK targets for Net Zero greenhouse gas emissions by 2050 and 68% emissions reductions by 2030 (on 1990 levels)
- Buildings emit one kg in every three of greenhouse gas
- This needs to be reduced to zero
- All or nearly all the UK residential, public and commercial buildings will rely solely on non-carbon energy for space heating and hot water
- Nearly all of this will be renewable electricity, especially after 2035

The importance of heat pumps

- Heat pumps will be crucial to Net Zero path
- This supports the argument for retaining and increasing the UK's stock of hot water cylinders in two ways:
 1. Greater electricity demand = more need for system flexibility
 2. A heat pump works best in conjunction with a hot water cylinder; retaining cylinder supports individual case for switching from gas to electric
- Retaining hot water cylinders helps prepare UK housing stock for electrification

What should we do?

To reverse the decline in distributed thermal storage

Government should ...

- Target the properties that are most suitable for a retrofit heat pump
- Support consumers (system upgrades & insulation) to make that cost effective
- Future-proof homes: improve energy efficiency, retain hot water cylinders
- Support industry to train and re-skill installers
- Educate consumers and industry about the value of thermal storage
- Make policy that complements other emerging markets, e.g. EV charge points

What should we do?

To reverse the decline in distributed thermal storage

Industry should ...

- Future-proof new homes by allocating space for a hot water cylinder where possible (and alternative thermal storage measures where required)
- Anticipate incoming regulations and promote low-carbon heating solutions in all homes
- Avoid removing thermal storage assets, especially in homes that are suitable for heat pumps and will need a hot water cylinder
- Aim to provide well-insulated, energy efficient homes, whether new or retrofit

The Delivery Gap

What options are there for more progress to Net Zero?

Simon Harpin

BEAMA influences two types of delivery to make progress to Net Zero:

1. Influencing stakeholders and policymakers to deploy key technologies
2. BEAMA members changing their organisational practices and setting examples of practical change

Delivery – Deployment of key technologies

- Underlying issues – awareness and policy gaps:

38%

ARE UNAWARE
OF THE
CONCEPT OF
NET ZERO

HOUSEHOLDERS
WILL NEED TIME
TO MEET PLANNED
REQUIREMENTS
FOR OWNER-
OCCUPIED HOMES

CONSUMERS
NOT YET READY
FOR
NET ZERO
COULD STILL
BENEFIT FROM
FUTURE-PROOFING
IF GIVEN THE
RIGHT ADVICE

BETTER ENERGY
PERFORMANCE
IS REQUIRED FOR
HOMES TO
MEET
NET-ZERO,
BUT IS NOT
REWARDED BY
POLICY

ABLE-TO-PAY
HOUSEHOLDERS
ARE MOST LIKELY
TO BENEFIT FROM
EXISTING AND
PLANNED LOW
CARBON HEAT
INCENTIVES

Delivery – Deployment of key technologies

- Beyond the recommendations already made...
- 3 potential game changers are:
 1. Government ideas on energy price balance
 2. Significant rise in awareness of Net Zero trajectory
 3. Green finance offers

Delivery – industrial decarbonisation

- BEAMA and our members are committed to Net Zero
- There is growing pressure from the supply chain to make progress
- Voluntary pledges (eg UN Race to Zero)
- How to declare? No single way of doing this but we host info on website on standards and schemes to make credible claims



- Please examine our research reports, guides and white papers at our [Net Zero Hub](#)
- Email simon.harpin@beama.org.uk if you would like more insight or wish to discuss anything with us

