Heat Decarbonisation and Innovation

Oliver Sutton
Department for Business, Energy and Industrial Strategy

Why Heat Matters

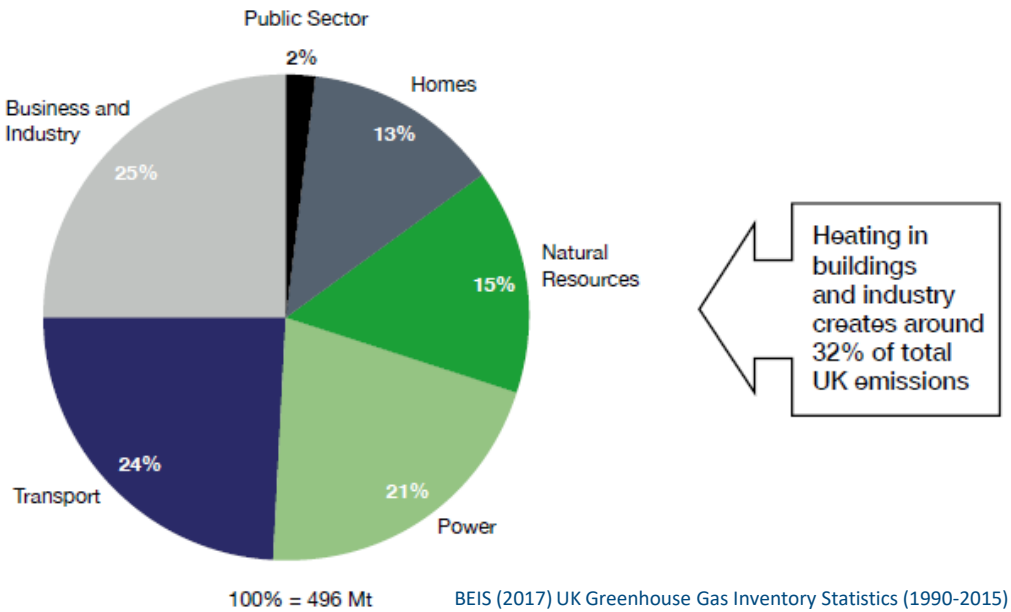
Heat is important. Our homes and buildings are central to our daily comfort and wellbeing, and the ability to keep ourselves warm and control our comfort is fundamental to our quality of life.

Heat is the single biggest reason we use energy in our society and accounts for almost half UK energy consumption. **It is the biggest source of greenhouse gas emissions in the UK**.

Action to decarbonise heat will play a key role in delivering our carbon budgets.

Meeting our 2050 target implies decarbonising nearly all heat in buildings and most industrial heat processes.

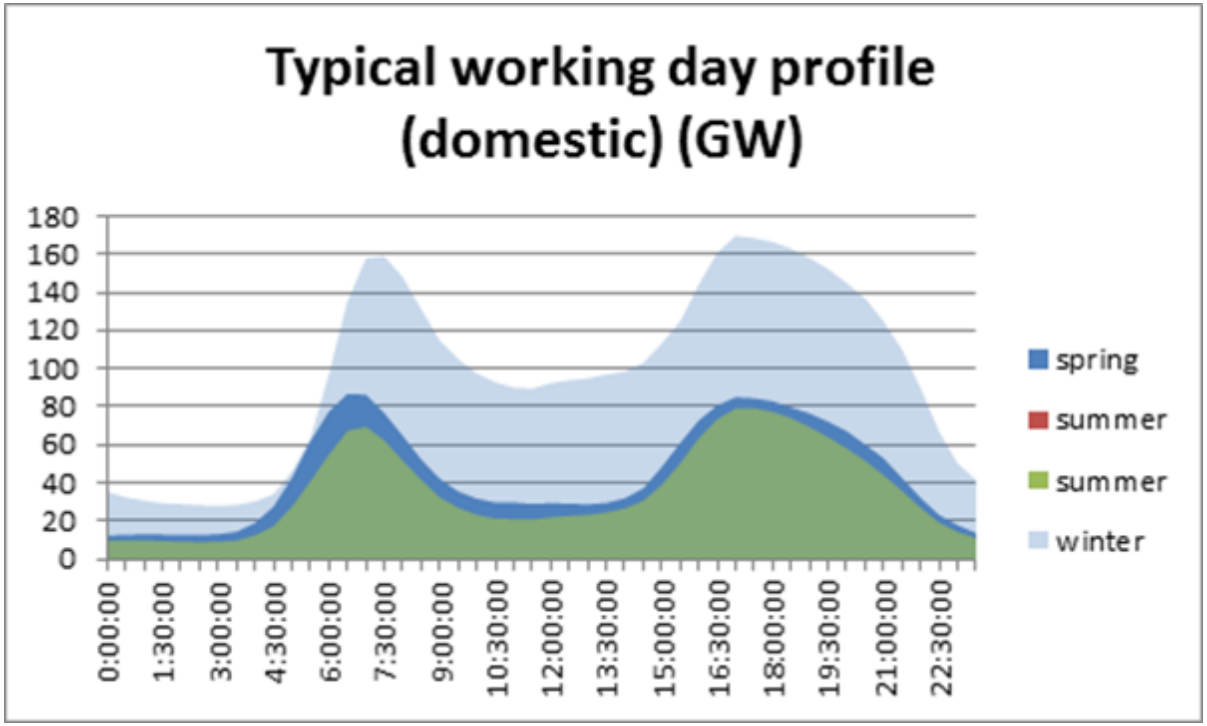
UK emissions by sector, 2015



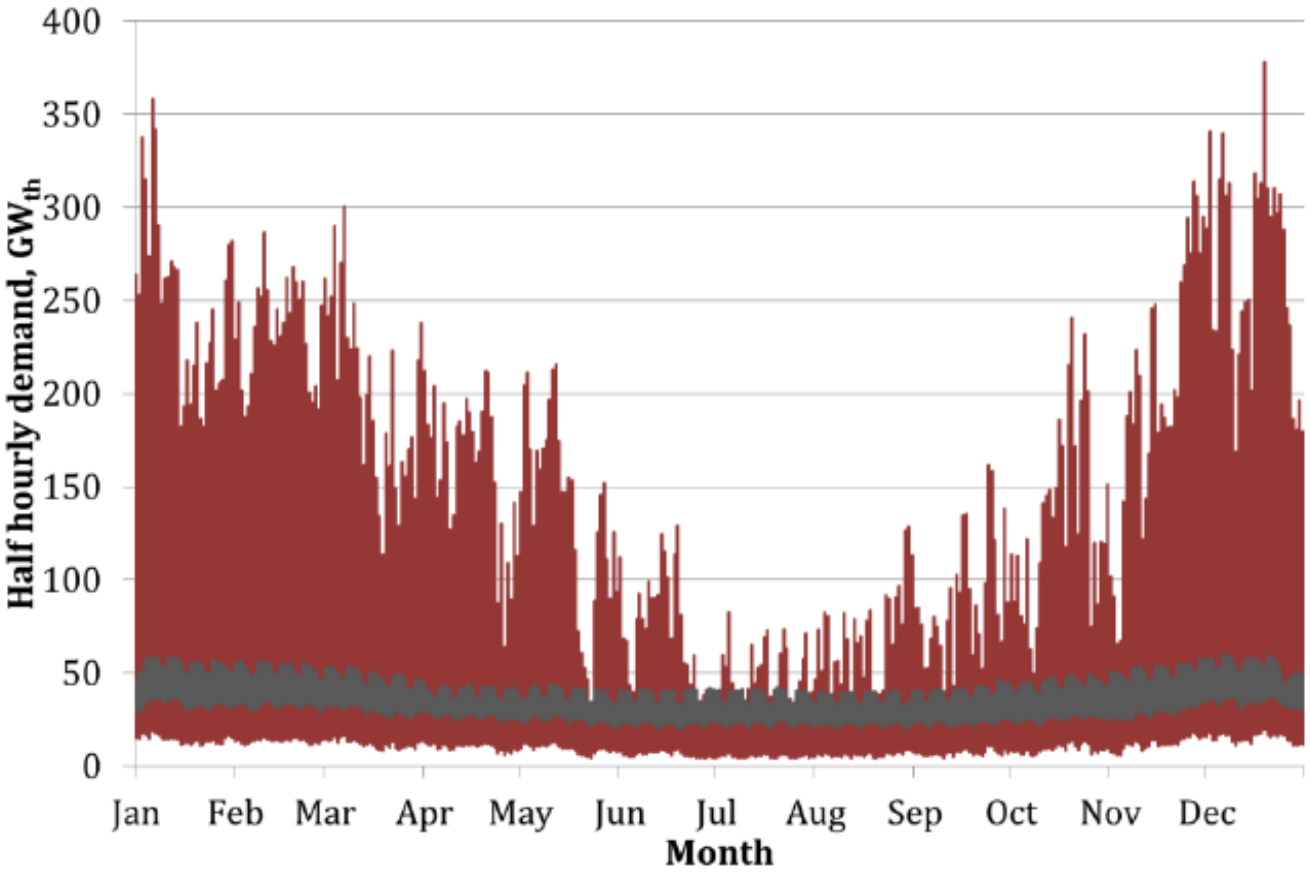
BEIS (2017) UK Greenhouse Gas Inventory Statistics (1990-2015) https://www.gov.uk/government/collections/final-uk-greenhouse-gas-emissions-nationalstatistics; BEIS analysis

How we use Heat - Homes

Heat usage is variable: much higher in winter than summer, with peaks in demand at times of day when people are home and awake. Alternative solutions will have to encompass adequate supply and storage, and demand balancing.



How we use Heat – across the year



Source: Robert Sansom (2015) – Decarbonising Low Grade Heat for a Low Carbon Future

International insight

Participants

BDH

Rijksdienst voor Ondernemend Nederland

TNO innovation for life

alliander

Berenschot

Department for Business, Energy & Industrial Strategy

DELTA Energy & Environment

University of ULSTER

energy technologies institute

CATAPULT Energy Systems

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY TOMORROW TODAY

TU Graz

EDF

Fraunhofer ISE

EPRI ELECTRIC POWER RESEARCH INSTITUTE

OAK RIDGE National Laboratory

DANISH TECHNOLOGICAL INSTITUTE

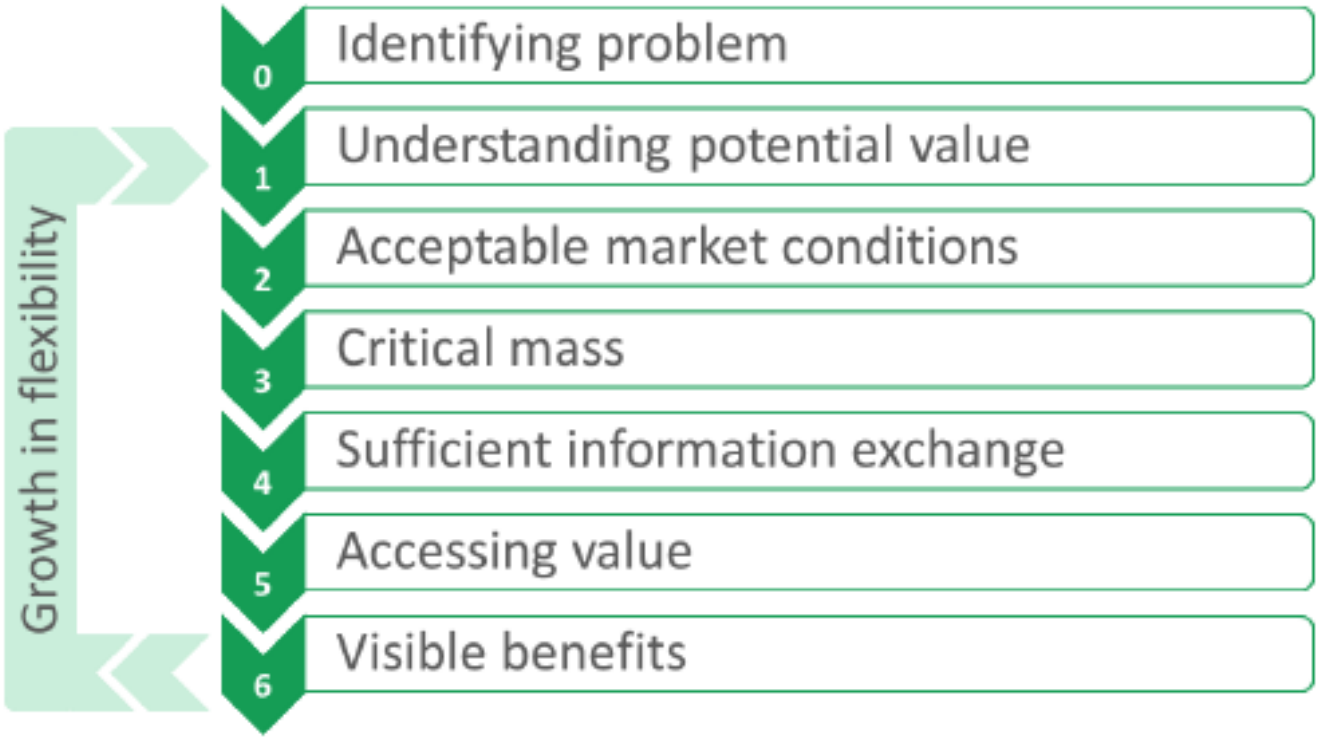
Lucerne University of Applied Sciences and Arts HOCHSCHULE LUZERN

한국에너지기술연구원 KOREA INSTITUTE OF ENERGY RESEARCH

http://heatpumpingtechnologies.org/annex42/

International insight

Critical path for HPs in smart grids



Heat Decarbonisation – What are we doing?

What is the pathway to 2050?

What are we doing in the meantime?

What else can we do to support the transition?

Action on heat in the Clean Growth Strategy

Homes

- Funding out to 2021 to build and extend **heat networks** across the country
- Phasing out the installation of high carbon fossil fuel heating in new and existing **homes off the gas grid** during the 2020s, starting with new homes
- **Improving standards** on the 1.2 million new **boilers** installed every year in England
- Reforming the **Renewable Heat Incentive** between 2016 and 2021

Commercial buildings

- Phasing out the installation of high-carbon forms of fossil fuel heating in new and existing **businesses off the gas grid** during the 2020s, starting with new build

Industrial decarbonisation

- **Joint industrial decarbonisation and energy efficiency action plans** with seven of the most energy intensive industrial sectors
- Policy framework to support the **long term low carbon development of energy intensive industrial processes**
- Consulting on supporting the **recovery and reuse of heat** produced in industrial processes

Heat Policies in BEIS

Current policy

Renewable Heat Incentive
Reforming the RHI to focus the scheme towards long-term decarbonisation

Heat Networks Investment Project Promoting heat networks through capital funding and other support

Industrial Action Plans
Developing joint decarbonisation action plans with Industry

Boiler Standards
Introducing a new minimum performance standard for domestic boilers to drive efficiency and give consumers greater control

Developing Policies

Off Gas Grid Properties
Developing a post RHI framework to phase out oil heating

Industrial Heat Recovery Scheme
Supporting the recovery and use of industrial heat that otherwise would be wasted

New Build Standards
Improvements to building regulations requirements.

Heat Networks
Examining the measures required to create a long-term framework and subsidy-free market growth

Innovation
Investing to bring down the cost of key technologies and address other key decarbonisation challenges

Long-term strategy

Strategic Options Work
Undertaking work now to strengthen our analysis of the range of potential approaches to decarbonising heat in the long term

CCUS
Developing deployment pathways, implement delivery and investment models and establish a new £100m Industry and CCUS Innovation Programme

Energy Intensive Processes
Policy framework to support the long term low carbon development of energy intensive industrial processes, such as CCUS and electrification

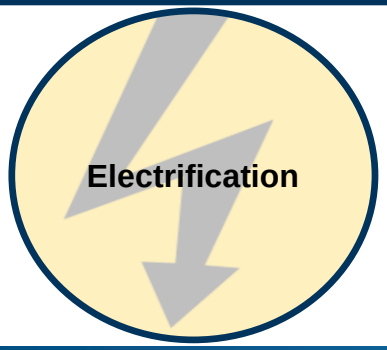
What We Are Doing – Long Term

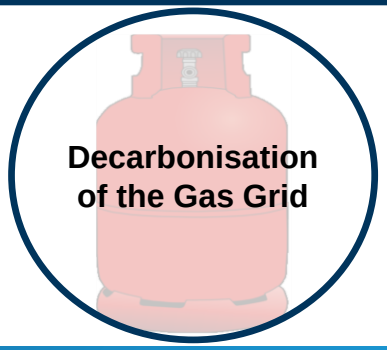
Meeting our 2050 targets implies decarbonising nearly all heat in buildings and most industrial heat processes.

We know there are some no-regret measures but more work is needed to understand the advantages and disadvantages of different approaches for the longer-term decarbonisation of heat.

The Department is undertaking work to strengthen the analysis of the range of potential approaches to decarbonising heat.

We plan to publish initial findings from a number of studies later this year, and a full report on our review of the evidence by summer 2018.





2050 Pathways in the Clean Growth Strategy

The purpose of the three illustrative 2050 pathways is to demonstrate a range of practical ways in which emission reduction aims can be delivered with technology known today, and to underline some steps common to all, including:

- Making our homes and commercial buildings more energy efficient
- Shifting to low carbon sources of heating, such as through more district heating (providing 17-24% of our heat)
- Working with industry on how to improve efficiency and transition to clean fuels.

Electricity Pathway

- Electricity is the **main source of energy** in 2050
- **More electric cars**
- We **replace fossil fuel boilers with electric heating**
- **Industry moves to cleaner fuels**
- We use **80% more electricity** than we do today.
- Virtually all electricity comes from **renewables and nuclear**.
- **CCUS is not used** by 2050.

Hydrogen Pathway

- Hydrogen is used to **heat our homes and buildings, fuel many of the vehicles we drive and power industry.**
- We **adapt existing UK infrastructure** to deliver hydrogen. A national network of **fuelling stations supports the use of hydrogen vehicles**.
- A large **new industry supports hydrogen production** using natural gas and **capturing emissions with CCUS**.

Emissions Removal Pathway

- Sustainable **biomass power stations are used in tandem with CCUS.**
- **Carbon is removed from the atmosphere by plants** as they grow. When the biomass is used to generate electricity, **emissions are captured and stored.**
- Still **significant clean transition in other sectors** but successful innovation in emissions removal allowed more time for some of these changes.

Innovation

Over £150m is being invested out to 2021 by BEIS, Innovate UK and the Research Councils in energy efficiency, new heating technologies and the gas network, with additional funding from Ofgem for innovation by gas and electric network companies. This will address the key innovation challenges to meet our long-term goals including:

- **A new £10 million competition to test approaches for harder to heat homes**
- **A £25 million project on using hydrogen as an alternative to natural gas**
- **Research Councils investing around £19 million to research how people's energy choices can help them stop wasting as much energy.**
- **Research Councils supporting a £18 million hydrogen and fuel cells programme**
- **Ofgem providing GB gas network companies with up to £195 million for them to develop and demonstrate new technologies**
- **A £10 million challenge fund will focus on making low carbon heating technologies more attractive to the consumer**

Low-Carbon Heating Technology Innovation Fund

BEIS has launching a Low-Carbon Heating Technology Innovation Fund to reduce the cost of heat decarbonisation.

Specifically the fund will support, through capital grants, innovation which enables the replacement of existing fossil fuel heating systems with zero-carbon heating systems.

The Low Carbon Heating Technology Innovation Fund be open for applications until 2 January 2018.

Applicants can apply for between £200k and £2 million and will be required to provide a level of matched funding.

Key Messages

- Heat matters
- "Decarbonising heat is our most difficult policy and technology challenge to meet our carbon targets"
- The long-term pathway is currently uncertain. We are improving our understanding of the pros and cons of the different options, and supporting innovation
- In the meantime, we have an ambitious shorter-term set of policies, to deliver carbon savings for the 4th and 5th carbon budgets (to 2032)
- Projects like Smart Communities continue to provide us with invaluable insight in to the potential solutions to overcome the significant challenges for decarbonising heat.

Thank you

Any Questions?