Heat - The Cinderella of Low Carbon Energy

2024 National Rural Conference

Neil Harrison, Director, Reheat

Who Are We?

Renewable Energy Consultancy & Engineering

Team of 25 engineers, consultants and support staff working on commercial and industrial scale decarbonisation projects across the UK and internationally.

Specialisms in on-site renewable heat technologies, community energy projects, training development and delivery and district heating, as well as bioenergy supply chains, forestry and heat supply.

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Low Carbon Heating

The Challenges

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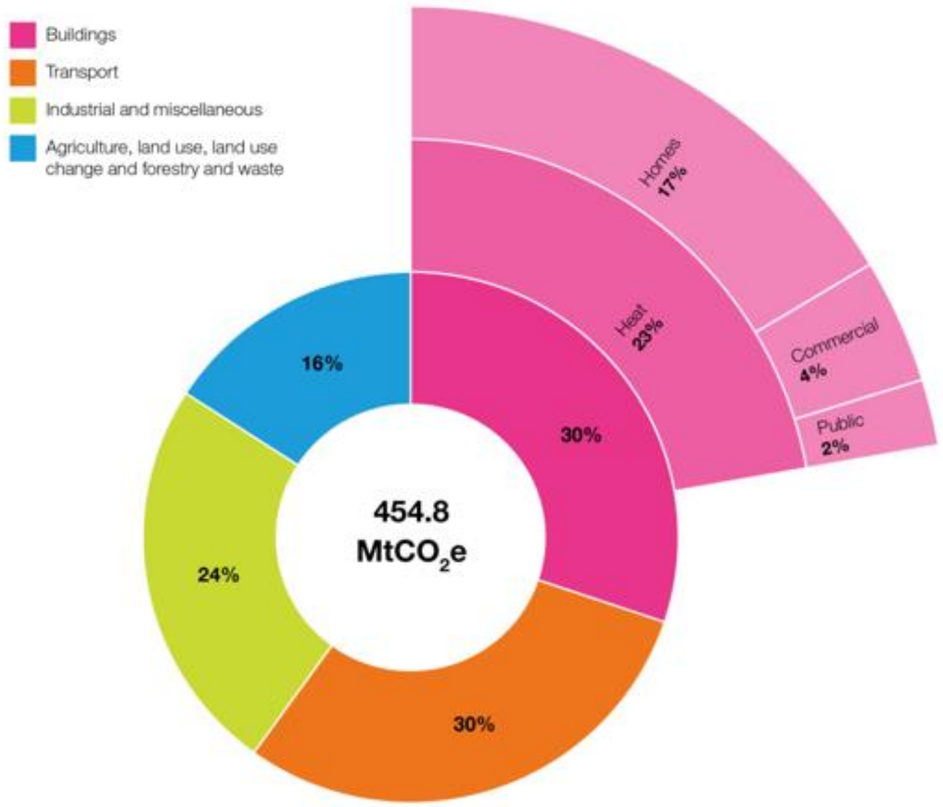
Low Carbon Heating - The Challenges



BEIS Heat and Buildings Strategy, 2021

Contributing to Net Zero

Net Zero - achieving equilibrium between greenhouse gas (GHG) emissions that are produced, and the amount that are removed from the atmosphere;

It can be achieved through a combination of emission reduction and carbon removal;

30% of UK CO_2 emissions are from heating, with homes responsible for ~17% of all CO_2e emissions;

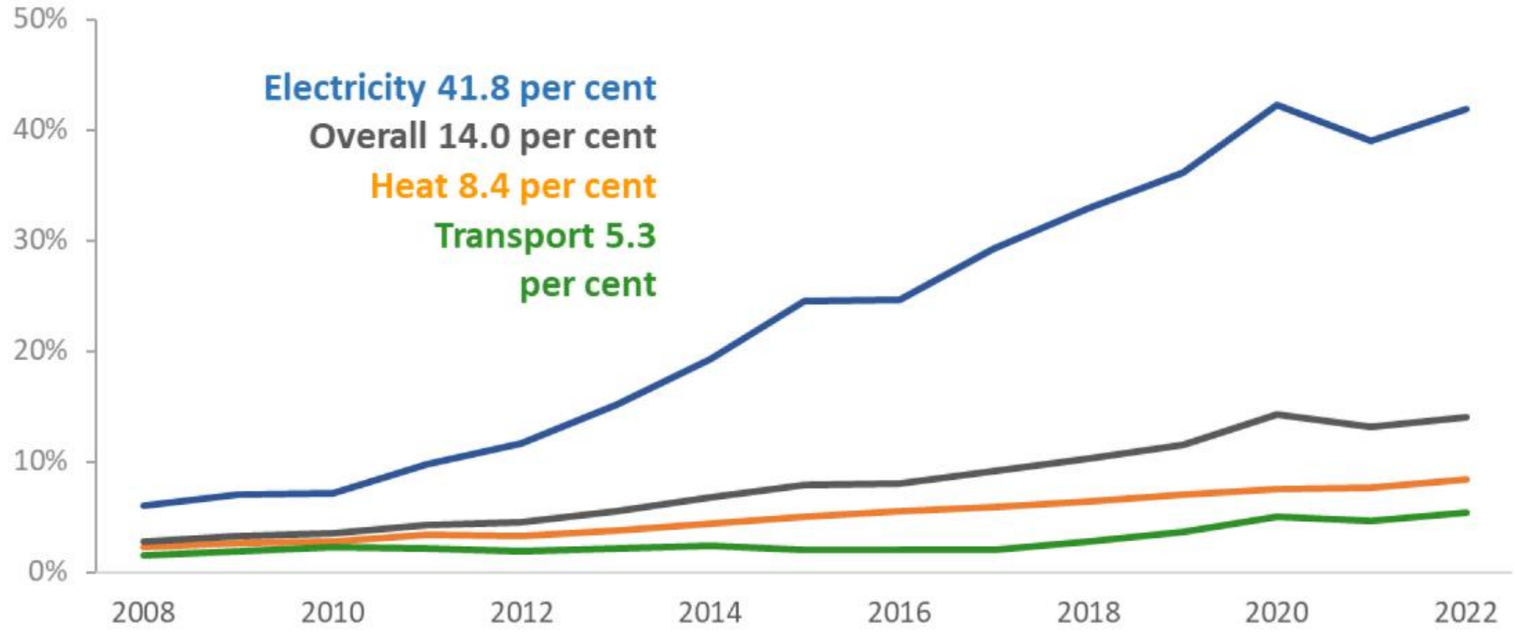
Heat has proven a stubborn sector to decarbonise at scale and has long been dubbed the “Cinderella” of renewables.

Low Carbon Heating - The Challenges

Renewable electricity is easy!

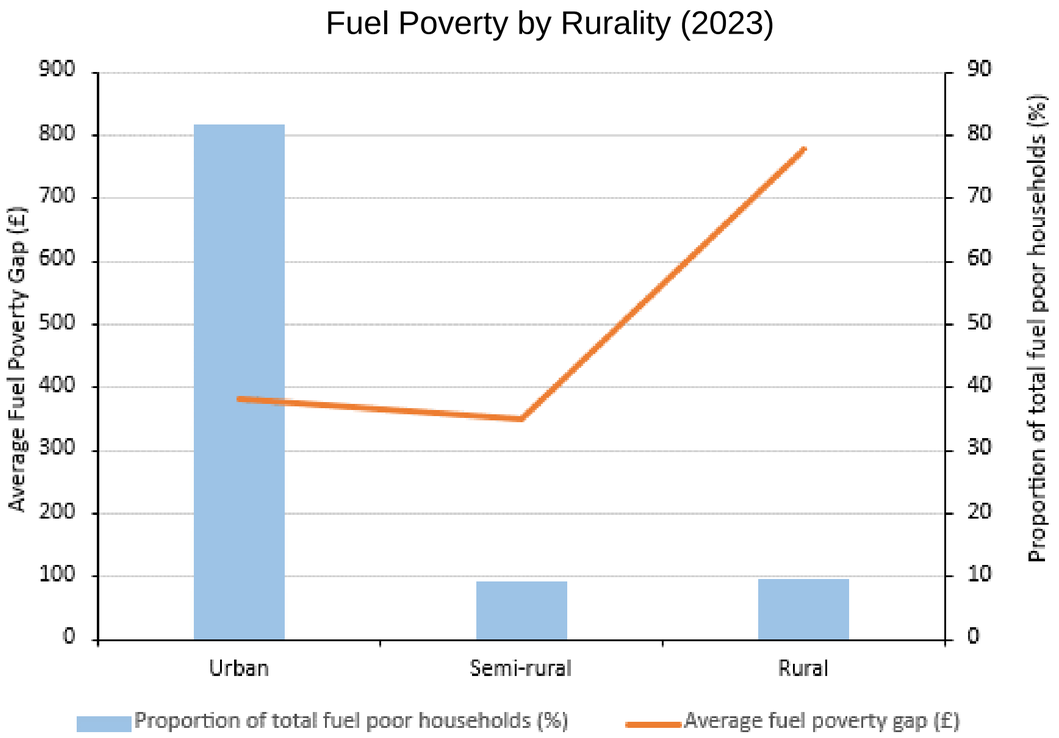
Renewable heat is different :

- Has to be **generated at or very close to point of use**;
- **Capex** associated with renewable options **is high** compared to FF options;
- **Opex** varies depending on technology type and grade of heat required.



Digest of UK Energy Statistics, DESNZ 2023

Low Carbon Heating - The Challenges



Rural Disadvantages Include Heating

Rural properties are typically larger, older, difficult to insulate and very costly to heat as a result;

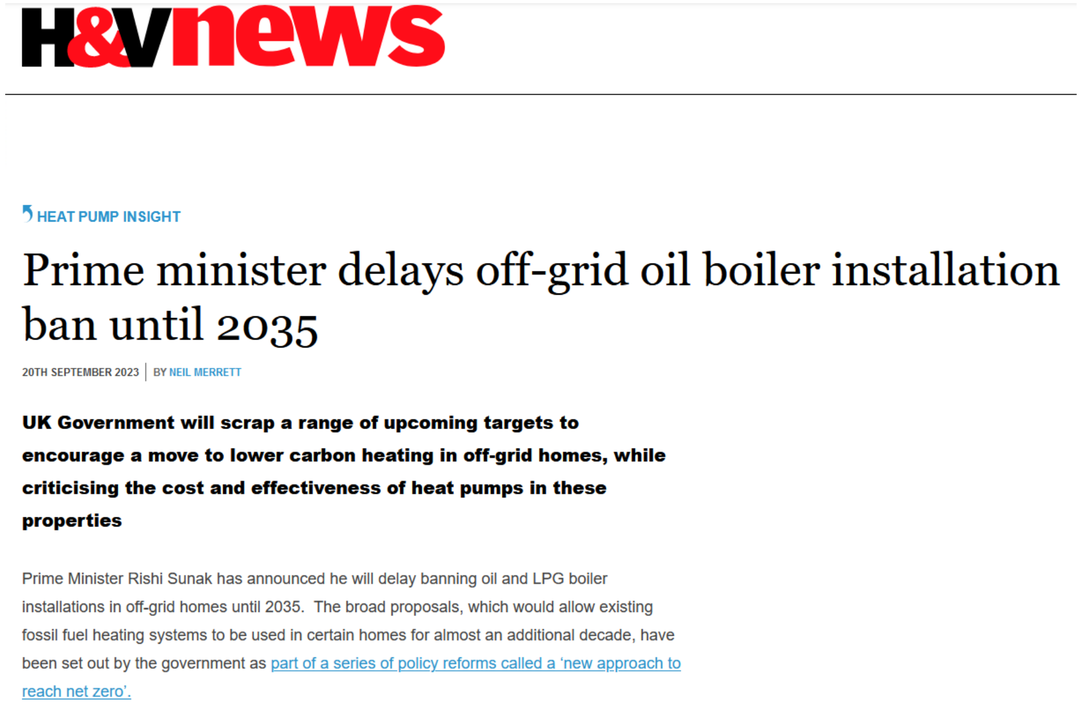
Those in rural areas typically need to spend 10-20 percent more on everyday requirements than urban inhabitants, and the more remote, the higher the percentage;

Domestic fuel costs are higher in rural areas due to the reliance on tanker-delivered fuels, solid fuels or electricity - not mains gas grid;

Combined, these factors result in a far higher fuel poverty gap, particularly in remote rural areas.

Low Carbon Heating - The Challenges

- Clean Growth Strategy: 80% reduction by 2050 compared to 1990 levels
- Heat in buildings: 40% of UK energy & 30% of GHG emissions
- Government Programmes: RHI & BUS delivering at a snails pace.
- NDRHI: 22,000 installations
- 1.1 million homes off grid homes using fossil fuels – 78% using heating oil
- Phasing out of fossil fuels – heat pump first (only?!) approach
- Net zero consistent liquid biofuels *could* play a role



H&V news

HEAT PUMP INSIGHT

Prime minister delays off-grid oil boiler installation ban until 2035

20TH SEPTEMBER 2023 | BY NEIL MERRETT

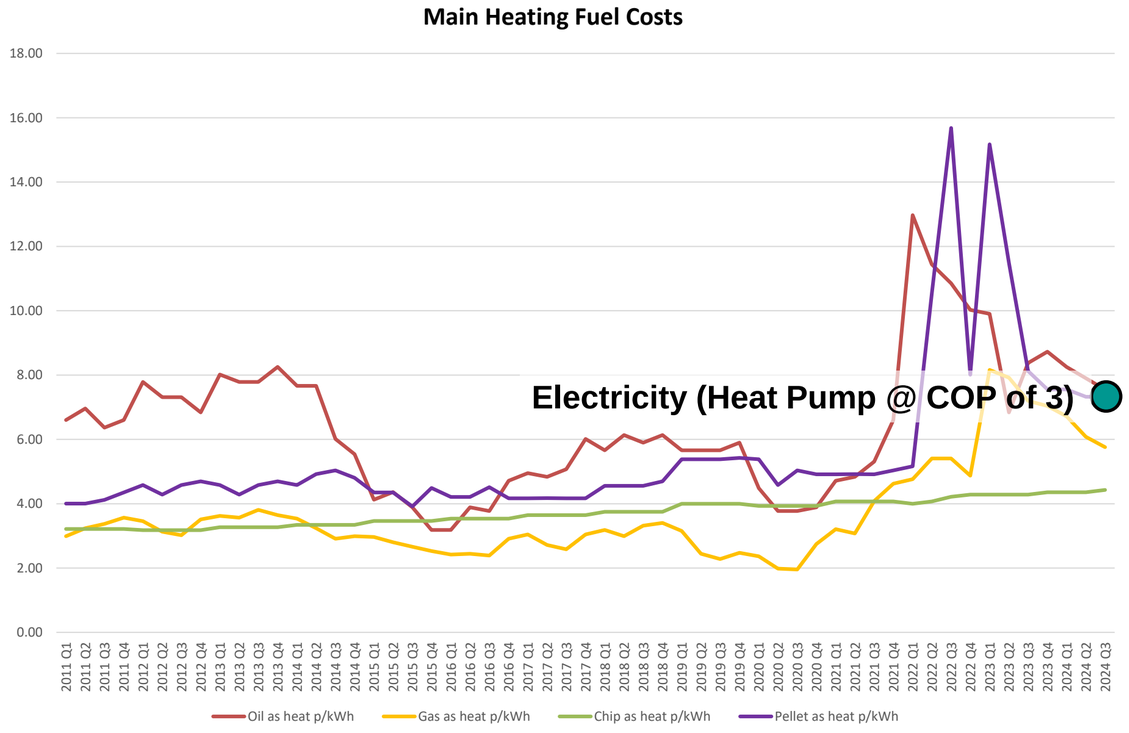
UK Government will scrap a range of upcoming targets to encourage a move to lower carbon heating in off-grid homes, while criticising the cost and effectiveness of heat pumps in these properties

Prime Minister Rishi Sunak has announced he will delay banning oil and LPG boiler installations in off-grid homes until 2035. The broad proposals, which would allow existing fossil fuel heating systems to be used in certain homes for almost an additional decade, have been set out by the government as part of a series of policy reforms called a 'new approach to reach net zero'.

Low Carbon Heating - The Challenges

Electricity 22.36p/kWh

Bio Oil 22p/kWh



Heat Prices 2011-2024

A Just Transition

The Just Transition means greening the economy in a way that is as fair and inclusive as possible to everyone, creating decent work opportunities and leaving no one behind, i.e. not penalising the less well off or marginalised;

With planned bans on new oil and gas boilers for the next decade or potentially even sooner, the potential for impact on the poorest in society is considerable;

Not everyone can afford to decarbonise their home heating.

Low Carbon Heating - The Challenges

Decarbonisation to avoid future costs

Carbon emissions have been priced into fossil fuels to a greater or lesser extent for over a decade through things like Climate Change Levy and Emissions Trading Scheme.

Carbon prices are only going to increase - UK is towards the bottom end of carbon taxation rates in countries where they are applied, but this will have to change as government push to decarbonise the economy.

"These new regulations will fundamentally change the way we get around them."

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Low Carbon Heating

The Opportunites

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Low Carbon Heating - The Technologies

Wide range of technology options, driving energy is the sun, geothermal or electricity.

- Solid biomass
- Bio-liquids
- Bio-gas

Possibility of CHP

- Direct electric
- Heat pumps
- Geothermal

Solar PV or Bio-CHP may play a role.

- Solar thermal

Combustion chamber, 1MW biomass steam boiler, Nc'nean Distillery

Low Carbon Heating - The Approaches

District Heat Main Installation, Cumbria

National, Regional and Site-Specific

UK is taking a range of approaches to heat decarbonisation with national, regional and local programmes;

The various LEP’s and Mayoral Authorities across England have on-off grant programmes and small numbers of advisors - some rural focus;

DESNZ has the Boiler Upgrade Scheme - a capital grant for individual domestic low carbon heating technologies which is well-suited to rural areas & a range of support for heat network projects (strong urban focus);

Scotland has CARES programme, which has been running since 2010 and in 2022 launched the Community Heat Development Programme.

Community Heat Development Programme

LOCAL ENERGY SCOTLAND

LOCALENERGY.SCOT
0808 808 2288
FUNDED BY THE SCOTTISH GOVERNMENT

CARES

Net Zero Scotland
Scottish Government

LET'S DO NET ZERO

Community Heat Development Programme

Aim

“Support community organisations and groups of householders to help develop their ideas for locally-generated, low and zero carbon heat project ideas”

Funded by Scottish Government under CARES

October 2022 to March 2025

Scope limited to feasibility activities

Primary output is feasibility studies for communities - three phase approach :

- ‘Initial Reviews’ to identify any showstoppers
- Feasibility studies - 10 days of Reheat expertise to support applicants
- ‘Final push’ tailored support to move projects on as far as possible

Focus on learning

- Community heat is still very new
- What works? What doesn’t?
- Which technologies are best suited to different applications?

CHDP Survey Visit

Community Heat Development Programme

Mainshill Steading, East Lothian

Community came into CHDP with a specific technology in mind - shared batteries to power direct electric heating.

A very specific technology without supporting evidence as to why this was the best fit.

We have suggested to the community to take a step back and do a full options appraisal or decarbonising solutions, including their suggestion.

Community are happy with that approach and are moving to full feasibility.

Interesting learning around misconceptions of best approaches to decarbonising.

Good learning for CHDP to look at larger battery storage options.

Community Heat Development Programme

Lochaline, Morven Peninsula

Interested in a communal solution for decarbonising their heating.

Biomass heat network identified as a viable solution.

Rural location with access to large commercial forestry operations means a local fuel supply with significant opportunity for adding value to local economy.

Community already have a local hydro scheme, so could potentially use revenue from that to fund a project. Also interested in using it as local electricity supply but some distance away.

About to move to Stage 3 support.

Biomass as a Source of Renewable Heat

Creation of local market for locally grown biomass

Recovery of low-grade material from forests

Improves forest economics - greater return from same resource

Clear signal to landowners - *“planting and managing forests is good business”*

Increase in planting rates and active woodland management

More and better managed woodlands

Improved quality of standing timber for higher value markets

Creation of local jobs in forestry & heat supply

Increased carbon storage

New woodland habitat creation

Cheaper

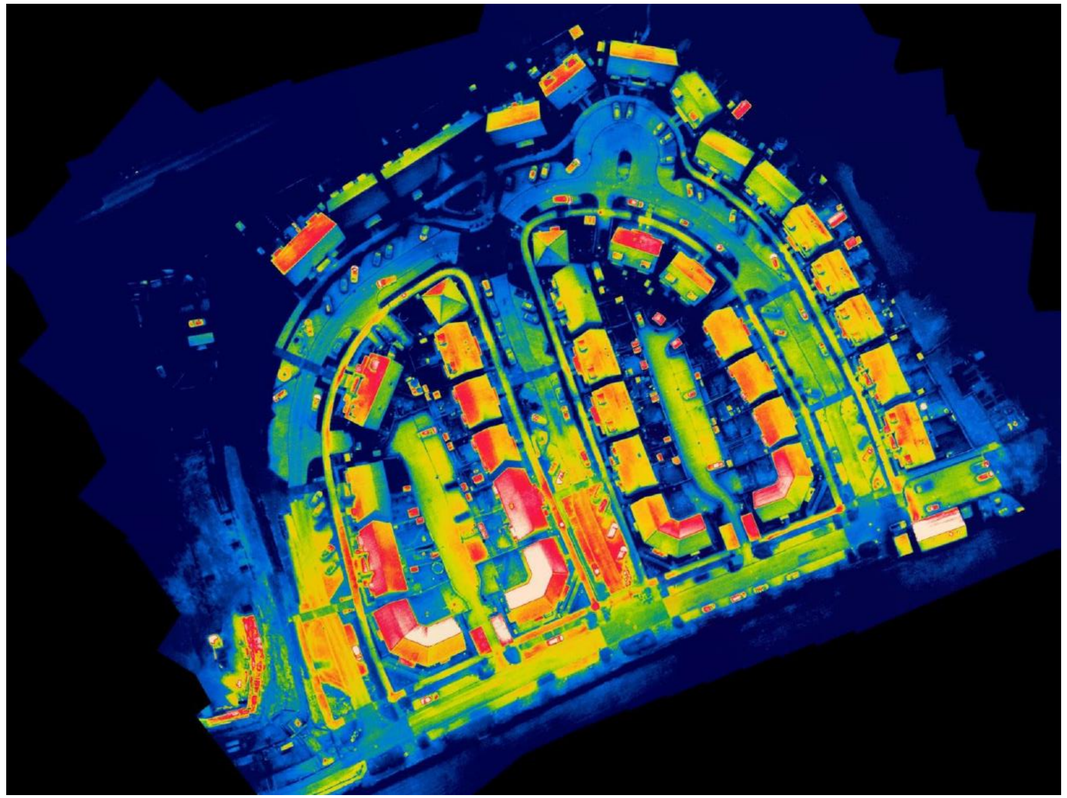
Less Volatile Pricing

Low Carbon - Carbon +ive

Rural Advantage

Local Wealth Creation/Retention

District Heating/Heat Networks - What?



Aerial Thermographic Survey of Rocks Green Estate, Ludlow, Shropshire
Plant room and heat network remediation for Connexus Homes

What is a heat network?

Centralised production of heat in an energy centre;

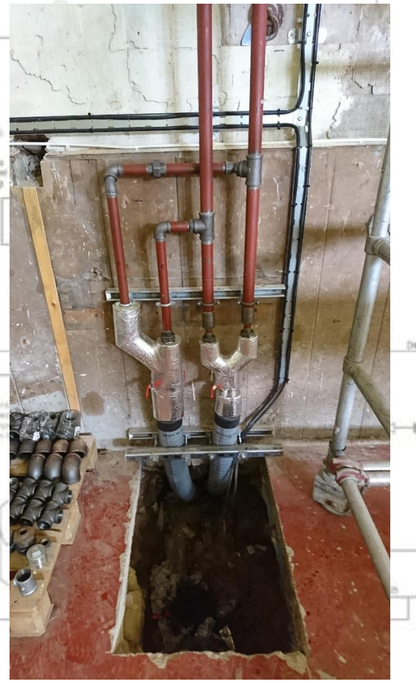
Distribution of heat underground (most typically) to points of use;

Heat distributed as hot water through highly insulated pipes and available for heating and domestic hot water;

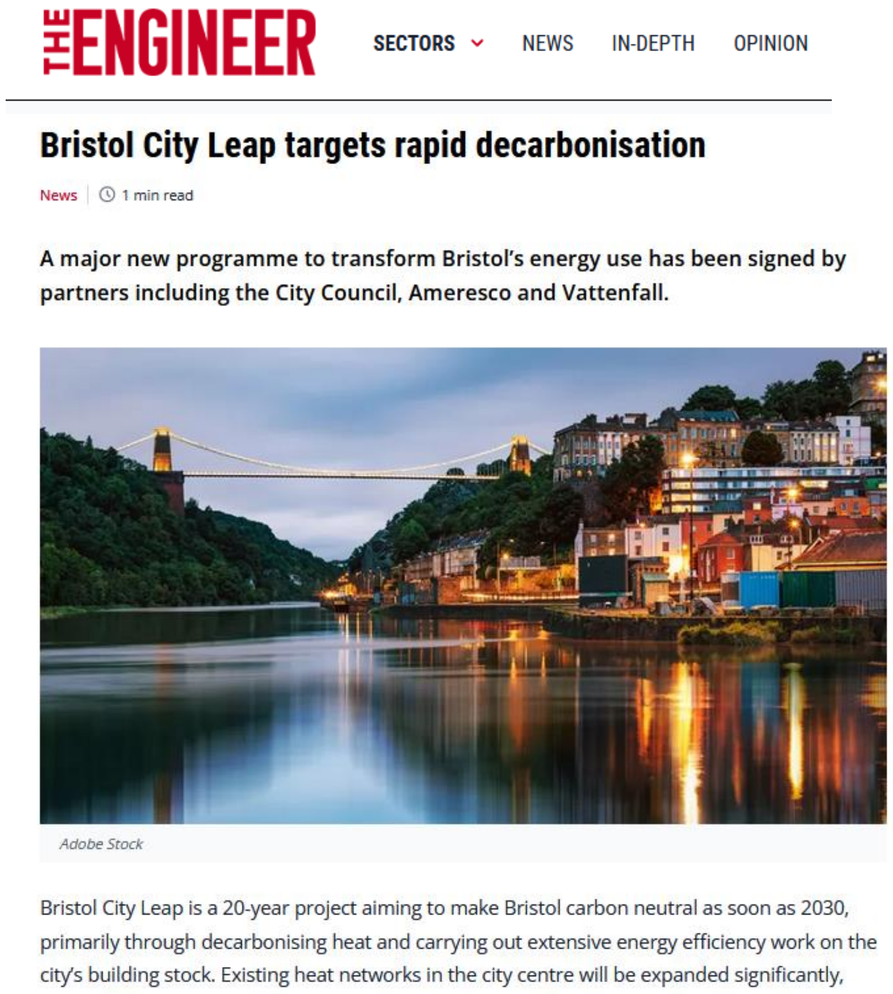
Heat metered and billed as consumed;

Infrastructure lifespan >50 years.

Heat Networks - What?



Heat Networks - Why?



THE ENGINEER SECTORS NEWS IN-DEPTH OPINION

Bristol City Leap targets rapid decarbonisation

News | 1 min read

A major new programme to transform Bristol's energy use has been signed by partners including the City Council, Ameresco and Vattenfall.

Adobe Stock

Bristol City Leap is a 20-year project aiming to make Bristol carbon neutral as soon as 2030, primarily through decarbonising heat and carrying out extensive energy efficiency work on the city's building stock. Existing heat networks in the city centre will be expanded significantly,

Why will we have more heat networks?

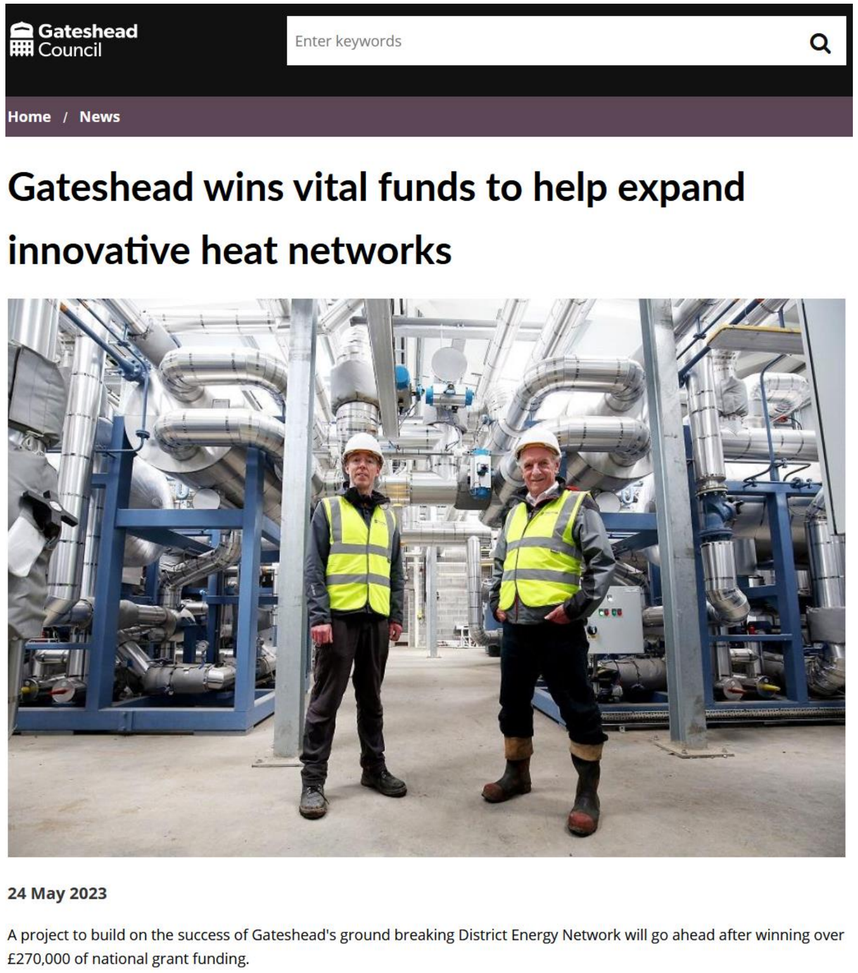
Growing and maturing market in the UK;

Focus on urban and peri-urban environments through zoning;

Acknowledgement that rural areas will also be suitable but not a great deal of activity;

Provides the opportunity to cost effectively decarbonise heat.

Heat Networks - Why?



Gateshead Council

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Home / News

Gateshead wins vital funds to help expand innovative heat networks

24 May 2023

A project to build on the success of Gateshead's ground breaking District Energy Network will go ahead after winning over £270,000 of national grant funding.

Contributing to Net Zero

Heat networks are long-term infrastructure, meaning renewal and replacement of heat-generating plant is separated from heat delivery - a network isn't locked into one particular technology, it's a vector;

Networks can be repowered and decarbonised as technology and policy changes, e.g. Gateshead moving from gas CHP to minewater heat pumps;

A heat network can receive inputs from multiple heat sources, and as they grow, the range and number of inputs can (and needs) to increase;

Where social objectives become a consideration then opportunities exist to reduce the cost of heat provided to customers and to vary the cost at a scheme level to provide individual support to customers (social tariff, hardship fund, etc…).

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A Rural Heat Network

Haydon Bridge, Northumberland

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Rural Heat Networks - Northumberland

Concept

Northumberland-wide approach to empowering rural communities to decarbonise their heating

Aim to develop a replicable and scalable model

Establish umbrella support organisation

- Development of new projects
- Procurement and installation
- Ongoing support

Individual community-scale projects

- Community owned or controlled
- Fast track - building on experience and learnings
- Technology agnostic

Partnership approach

- Community Action Northumberland
- Reheat
- Rural Design Centre

Strategic support

- Northumberland County Council

Rural Heat Networks - Northumberland

Pilot community - Haydon Bridge

- 998 properties all of which are off-gas, predominately on oil and solid fuels
- Relatively dense with potential anchor loads
- **Community drive and enthusiasm**

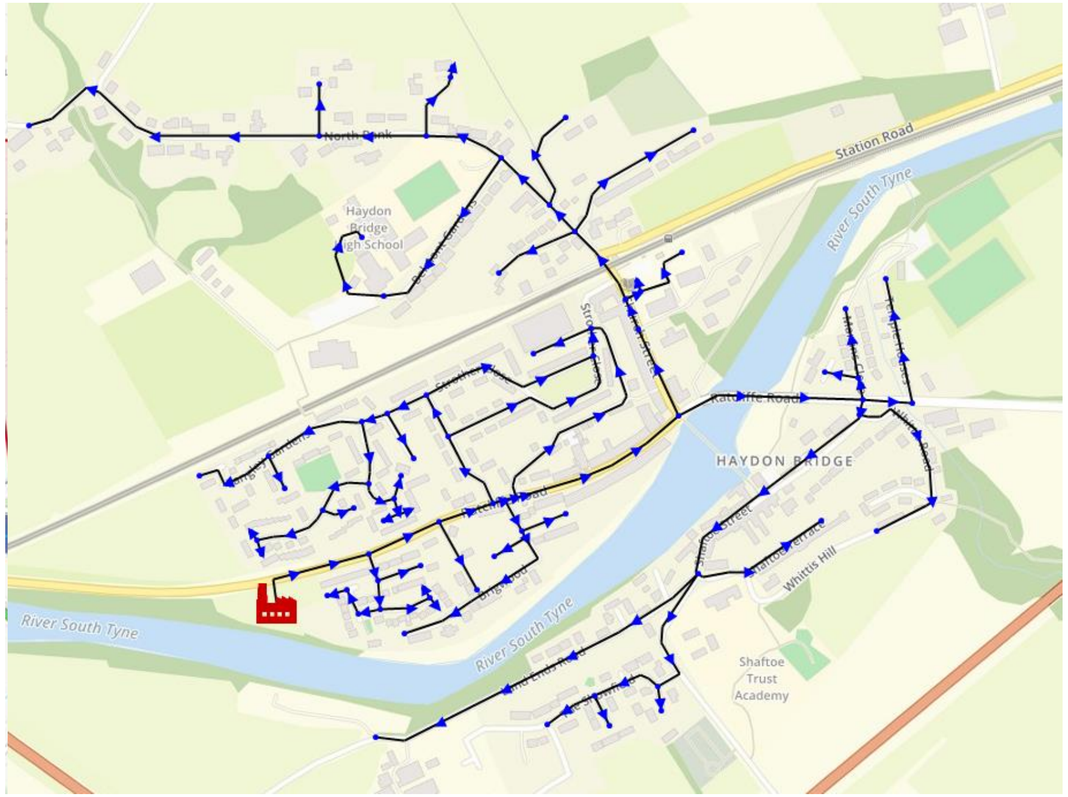
Work completed pre-funding (2022)

- Engagement of Haydon Bridge Development Trust
- Development of a comprehensive energy survey
- Support to community to publicise survey
- 177 domestic responses plus businesses, churches, etc

Funding via Energy Accelerator (2023)

- Took almost 2 years to secure funding
- Full feasibility study for Haydon Bridge
- Development of business model

Rural Heat Networks - Haydon Bridge



The Feasibility Study

- Energy and heat demand assessment
  - Identification of users, demand profile, sources of data & quality
- Energy centre assessment
  - Potential energy centre locations and energy sources
- Heat network route options
  - Route assessment along with constraints, terrain, water and flood risk, sub-soil type, soil depth, other environmental considerations, existing infrastructure and services
- Future proofing and phasing of the network
- Techno-economic feasibility
  - Energy tariffs, capital costs, connection costs, value added to local economy, sensitivity analysis
- Regulatory and non-regulatory risks

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In Summary

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In Summary

Heat decarbonisation has made painfully slow progress over the last 25 years.

- **Support programmes have delivered patchy results to date**
- **Scale of the challenge is enormous - 40% of the UK’s primary energy use**
- **Much of the technology is unfamiliar to end users and to policymakers**
- **Poor and ill-informed decision making leads to poor outcomes and reputational damage**
- **Heating industry is underprepared for the challenge - clear policy direction required**
- **Rural areas have advantages and disadvantages when it comes to heat decarbonisation**
- **The right approach and technologies can deliver significant benefits to rural areas**

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Thanks For Listening

Any questions?

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