

What could the state's role be in shared infrastructure for low-carbon heat?

Outcome note from roundtable facilitated by Nesta and Baringa, 25 November 2024

By Madeleine Gabriel (Nesta), Rebecca Teasdale (Baringa)

Background

Successful delivery of shared infrastructure for low-carbon heat requires coordination between multiple buildings and their owners, creating a greater requirement for coordination between multiple private and public sector organisations. This opens up specific roles that the state could fill.

Nesta and Baringa brought together heat network operators, other shared heat infrastructure developers (eg, providers of ground loop arrays), investors, umbrella bodies, the Department for Energy Security and Net Zero and Ofgem to discuss whether and how the state could play a more active role in supporting shared infrastructure for low-carbon heat. Nesta and Baringa facilitated the conversation, using a framework developed in previous work on the role of the state in the electricity market and drawing on broader energy system work, including on the role of Great British Energy Local.

What do we mean by shared infrastructure for low-carbon heat?

By shared infrastructure for low-carbon heat, we mean any low-carbon heating system where all or part of the system is shared between multiple buildings and homes. This includes heat networks, where heat is generated centrally and distributed to many buildings, as well as communal heat pumps and technologies such as networked ground source heat pumps, where each home has an individual heat pump but is connected to shared heating infrastructure outside the home.

Key challenges in developing shared heat infrastructure

Shared heat infrastructure developers face several challenges in building strong investment cases and 'getting pipes in the ground', including:

- **Timescales** – shared heat infrastructure may be lower cost than other low-carbon heating solutions over the long term, but takes years to become profitable and comes with significant upfront capex requirements.
- **Uncertainty of demand** – whether buildings will connect to and buy heat from shared infrastructure - is often the key project development risk and can create unacceptable levels of risk for investors and/or developers.
- **Low cost of gas relative to electricity**, which makes it difficult to provide decarbonised heat at a lower cost to customers and affects (perceived) competitiveness.
- **Coordination challenges** – for example, negotiating with waste heat sources and buildings that can form anchor loads.
- **Legacy** of household experiences with old and inefficient infrastructure, which may affect people's perceptions of what modern shared infrastructure heating systems can offer, and more generally consumers' perceptions of the value of low-carbon heat.

The role of the state in shared heat infrastructure, and how it might evolve

To date, the state – national and local – has adopted many different roles in relation to shared heat infrastructure, from enabler to investor, even in some cases to owning and operating. However, to date, this has largely been piecemeal and small-scale. At a national level, this has focused on creating market signals, most notably through developing legislation to establish heat network zoning regulation, providing financial support for heat network development and introducing powers for Ofgem to regulate heat networks.

Delivering shared heat infrastructure at a greater scale and pace to meet net-zero targets will require the state to do much more across all of these roles. This could include:

1. State as a planner

Consistent heat and energy planning at a national, regional and local level would provide greater certainty and help developers build investment cases for shared heat infrastructure.

- The state could provide more direction for heat decarbonisation, with plans setting out pathways (potentially building in optionality), rather than presenting scenarios. This would help reduce the range of uncertainty for developers and investors.
- The state should create plans at different spatial levels and ensure these are aligned and consistent - including the Strategic Spatial Energy Plan (SSEP), Regional Energy Strategic Plans (RESPs) and Local Area Energy Plans (LAEPs).

2. State as an investor

Government could use its funding mechanisms, or work with others to develop funding mechanisms, to attract more private finance by de-risking development. These could include demand-linked finance, or investment that is paid back when returns reach a certain level.

3. State as a development partner

State actors may not be best placed to act as developers of shared heat infrastructure, but can play an important role as a partner in joint ventures and in facilitating pre-development. Bristol City Council, for example, is a key partner in City Leap, acting as an enabler and planner.

The state has played a role in pre-development, for example carrying out feasibility studies. Experience from the sector suggests that when this results in a 'thin hand off' to the market, its effectiveness is limited, so it may not be the best use of limited state capacity. However, during early-stage development, the state may be able to identify data and information that would otherwise be inaccessible to the private sector – particularly in relation to practicalities and appetites to connect. In addition, national-level state actors could potentially provide more hands-on support to local areas in setting up joint ventures, working as a 'hit team' that helps spread knowledge from one area to another.

4. State as an enabler

The state (and regulated businesses, eg, DNOs/GDNs) could go much further in enabling heat infrastructure, for example by:

- Rebalancing policy costs on electricity and gas bills, to reduce the unit price ratio between electricity and gas and provide a greater incentive for electrification.
- Raising awareness and understanding among consumers, demystifying, and helping to overcome the scepticism of shared heat solutions to increase engagement and adoption.
- Enabling GDNs and DNOs to support shared heat infrastructure by collaborating more with the heat industry to enable whole system benefits (eg, reducing peak electricity demand in constrained areas). For example, the regulator could introduce mechanisms to ensure regulated businesses are enabling the best whole-system solution rather than reacting to the market.
- Enacting connections reform for large loads, for example, incentivising data centres to connect to the electricity network in places where they can also provide waste heat offtake to a heat network.

- Putting in place other incentives or regulations to enable waste heat offtake, so this is low cost or even free to access for shared heat infrastructure.
- Implementing national planning rules to ensure new build and communal heat networks are ready to be connected to larger heat networks when these become available in an area.

5. State as a coordinator

The state could reduce some of the coordination challenges inherent in developing shared heat infrastructure, for example by:

- Identifying public buildings, for example, NHS estate, that could form anchor loads and ensuring they connect to shared heat infrastructure rather than investing in separate decarbonisation solutions.
- Support with scheduling so that utilities can coordinate in digging up roads, reducing costs and disruption for residents.

6. State as a trusted messenger

National and local state actors could help to build trust in shared heat infrastructure solutions among citizens and consumers. This may come about as a result of the state playing roles such as investor and development partner, as well as through broader public information and high-level narrative on the future of heat.

Opportunities to enable successful heat decarbonisation through shared infrastructure

Institutional support for shared heat infrastructure

Several new and emerging institutions could play a role in supporting shared heat infrastructure. £3.3 billion has been set aside for **GB Energy** to invest in local projects. This could play a pivotal role by:

- Supporting **pilot community projects** for heat networks
- Enabling **local authority engagement** with communities to explore and implement shared heat solutions
- Facilitating **public-private partnerships** between energy groups, communities and private entities
- Allocating resources for **consumer education**, addressing misconceptions, and promoting heat network benefits

The mooted **Warm Homes Agency** could broaden its remit to include non-residential buildings, given that shared heat infrastructure is likely to serve both. The **National Wealth Fund** could potentially play a role in derisking the development of shared heat infrastructure. The government could invest in early-stage, innovative propositions for waste and geothermal heat to bring them to market more quickly.

More widely, the government's **Clean Power Mission** could more explicitly acknowledge that heat decarbonisation (through both individual home solutions and shared infrastructure) will be a key user of additional clean energy. Institutional leadership for delivering clean heat is currently somewhat fragmented.

Modelling costs and benefits of shared heat infrastructure

Understanding the costs and benefits to consumers and the system as a whole of different approaches to heat decarbonisation could show where and in what circumstances shared heat infrastructure is more cost-effective. Industry and government could collaborate to create a shared framework to model the costs of different solutions. This could work hand in hand with zoning in the heat networks sector, to ensure the right heat solution is enabled in specific areas.

The development of this model is likely to best sit with a technology-agnostic body. This would help define a clear articulation of the benefits for the state in pursuing roles outlined above, define a clear route forward for shared heat infrastructure, and therefore, provide a framework for government support to be allocated to solutions that are best at a whole system level.

Conclusion

Shared heat infrastructure can play an important role alongside other solutions in decarbonising heating in the UK and meeting our climate ambitions. The roundtable suggested an appetite for greater collaboration between industry, investors and the state to realise the potential of shared infrastructure for low-carbon heat, and set out a range of roles the state could play in doing so. With considerable policy development currently underway, there is a clear opportunity to explore these roles and how they might help deliver government ambitions for low-carbon heat and clean power.