

Heat Networks

Demand



**A qualitative assessment of
factors affecting pace of
delivery and capex reductions
in heat networks**

A QUALITATIVE ASSESSMENT OF FACTORS AFFECTING PACE OF DELIVERY AND CAPEX REDUCTIONS IN HEAT NETWORKS

Executive summary

Heat accounts for 37% of the UK's total greenhouse gas emissions and needs to be tackled in a way that reduces carbon emissions whilst delivering reliable and sustainable heat in a fair and efficient transition. Heat networks have the potential to deliver low-carbon heat to multiple buildings, through reliable, cost-effective long-term infrastructure that utilises clean energy and can use recoverable heat that would normally be lost. In addition to helping reduce carbon emissions, building the infrastructure for a heat network brings benefits to local communities through job creation and local investment. Heat networks are well-established in many countries, but the market in the UK is still nascent with the government set to introduce policy, regulation and technical standards that will support the growth of the sector. Building infrastructure projects can involve high capex and lack of an established project process can impact how quickly a project can go from inception to construction.

To better understand the drivers and barriers facing heat network schemes, two independent research projects were conducted, one examining factors that could reduce capex and one exploring factors affecting how quickly heat network projects could be rolled out and under what conditions. Both projects were qualitative, with research based on semi-structured interviews with carefully selected stakeholders representing the heat network supply chain. Although conducted independently, several consistent themes emerged across both projects providing a clear indication of what will be important for government, local authorities and industry to focus on. These themes provide a steer for the sector to be able to build an environment where heat networks can be constructed where they provide the most cost-effective route to clean, cheap heat well into the future.

Key Messages and recommendations

Standardisation builds confidence	Clearer, consistent processes and contracts will cut delays, lower costs, and give investors, councils, and customers greater trust in the sector.
Statutory rights matter	Heat networks need the same legal powers as other utilities to reduce costs and speed up delivery, particularly for roadworks and land access.
Certainty drives investment	A government-backed plan for long-term rollout is needed to give companies the confidence to invest, expand, train staff, and innovate.
Supply chain bottlenecks	Expertise is concentrated in a few firms. More contractors and trained workers must be brought in if the sector is to grow quickly.
Visibility and success stories	Positive case studies should be promoted to demonstrate consumer benefits and counter negative press.

Opportunities for Action

Government	• Publish a strategic roadmap • Roll out the regulation and policies that support heat networks • Clearly support the use of heat networks to deliver clean heat
Industry and government	• Invest in training to grow the skills base, opening-up the market for contractors and expanding and strengthening the UK supply chain • Raise visibility of heat networks and shout about success stories
Industry	• Invest in agreeing standard set of installation practices, contracting strategies and supporting guidance documentation

Heat networks can expand rapidly and deliver clean, affordable heat to communities across the UK. To do this the sector needs clearer government commitment to heat networks as a way to deliver clean heat and more transparency through clearer processes for planning and procurement.

Introduction

Heat networks have the potential to deliver low-carbon heat to a large number of properties quickly, and in many urban cases provide the most cost-effective route to delivering low-cost, low-carbon heat into the future (HM Government UK, 2025). They are widely used across Europe, with both expanding and well established, mature heat network industries (Euroheat & Power, 2024). There are many additional benefits to installing a heat network infrastructure which range from an increase in jobs and skills development locally and nationally, to increased savings across the electricity grid as heat networks have the potential to act as thermal storage and support the national grid (Wilkinson, 2025; S. Siddiqui, 2021). The Climate Change Committee estimate that heat networks alone will have the potential to contribute 9% of low-carbon residential heat by 2040 which will rise to 20% by 2050 (CCC, 2025), with some analysis predicting a much higher percentage of 40% by 2050 (PWC, 2022).

The potential for market growth in this area is significant but at present the UK heat network sector is a nascent one that is evolving as policy and regulations are developed. To create a more favourable environment for quicker growth and expansion, there are significant policy and regulatory changes due to be released within the next year. These will complement other initiatives already in place, such as funding through the Heat Network Development Unit (HNDU), the Green Heat Network Fund (GHNF) and the National Wealth Fund (NWF) and should contribute to creating a more structured framework for the continued development of the heat network sector. However, high capex and challenges in progressing projects at pace can hinder the sector in realising its full potential. To explore this further, two research projects were conducted, independently of each other, to gain insight from stakeholders involved in heat networks to understand what they perceived to be the barriers to, and opportunities for, the growth of the heat network sector.

By exploring the perceptions and experiences of different stakeholders in two related areas – capex and the pace of delivering heat networks – it was possible to build a picture of historical and current challenges and learn from real practical experiences, identifying where the opportunities are once the barriers are removed. Although the two research projects were conducted independently, the capex research as part of an MSc thesis (Daniels, 2025) and the pace of delivery as an ADE: Research project (ADE:Research, 2025), it was clear when assessing the outputs and recommendations that there are many common themes emerging; by addressing these there is the potential for industry and government to work together to reduce costs and save time, enabling a UK low-carbon heat network infrastructure to be created and the sector to become more established, with benefits both locally and nationally.

Methodology

Each research project consisted of qualitative analysis of interviews by participants from across the heat network sector. A total of 30 interviews (12 Capex and 18 Pace of Delivery) were completed over a 3-month period and independently analysed to identify the key challenges and recommendations for each research question. The breakdown of the participants' main specialism is shown in Figure 1. A literature review was conducted to identify research gaps and support project findings and finally a comparison of results from both research projects was made to highlight common drivers, barriers and recommendations.

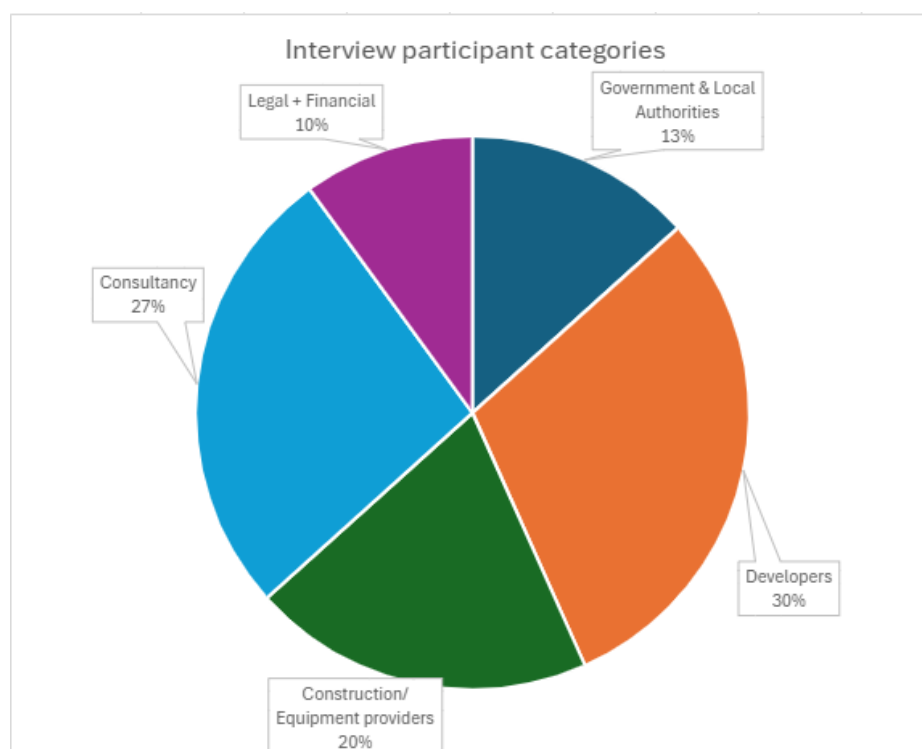


Figure 1. The breakdown of participants specialism within the heat network sector

The research context

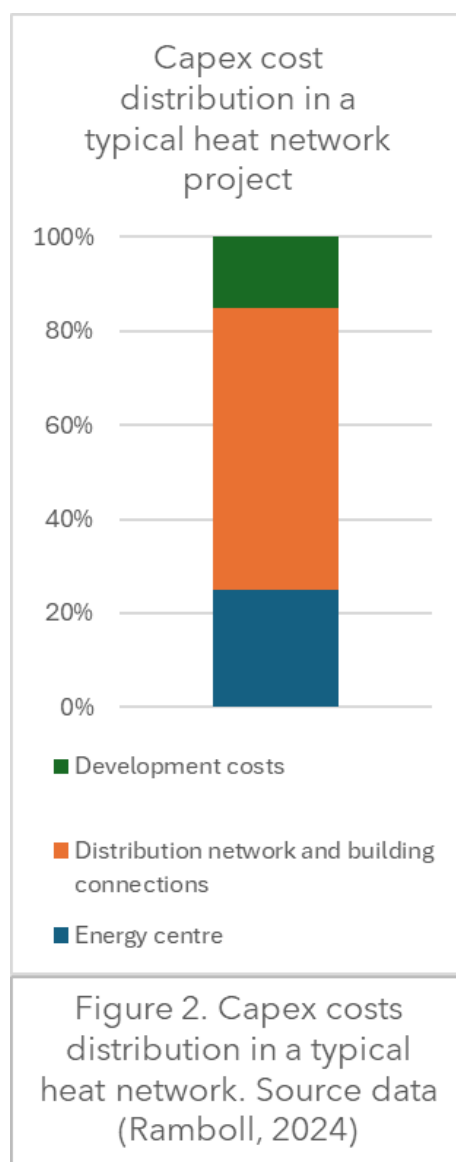
Capex: What factors are required to facilitate capex reductions of district heat networks in the UK?

Pace of Delivery: What factors affect the speed at which a heat network project can be delivered?

The high up-front costs, including technical and financial costs, needed to build heat network infrastructure are considered to be a key barrier to delivering heat networks (Millar,

2019) with construction costs for the energy centre accounting for approximately 25% of the overall capex, the distribution network and building connections, 60%, and development costs, the final 15% as shown in Figure 2 (Ramboll, 2024).

The largest contribution to capex, the distribution network and building connections, encompass civil works (mainly excavation and reinstatement of trenches), pipework and the associated installation and development costs. In terms of capex reduction, the focus should clearly be on reducing these costs at the construction stage, as they dominate overall capex. This was explored and reflected in the interviews with participants who emphasised that prioritising savings here is critical to see significant reductions in the overall capex spend.



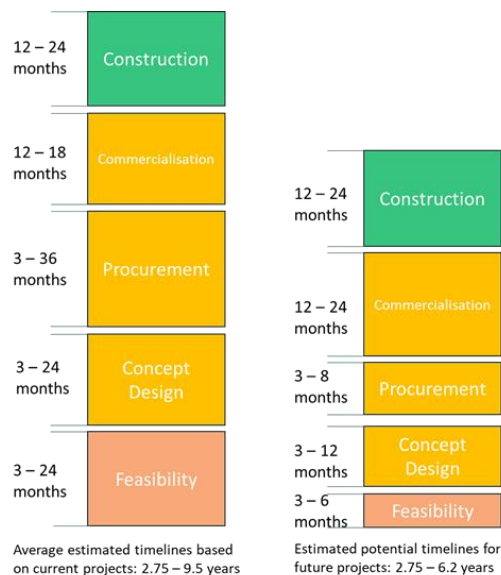
In the 2024 report by Ramboll, average costs of pipework, excavation and installation per pipe type ranged from 160 £/m - 1820 £/m for pre-insulated steel pipes (the most common type of pipe used in heat networks) to 110 £/m to 1250 £/m for uninsulated plastic pipes, with the breakdown of the costs per metre indicating that trench excavation alone accounts for up to 60 - 75%.

Feedback from the research interviews echoed these findings in the Ramboll report with participants noting that these costs can increase quickly given the lengths of pipes needed for projects stretching across cities. This can significantly escalate the capex needed. To reduce these costs suggestions from the interviews included exploring pre-dug trenches and alignment of works with other utilities' installation processes. This was seen as a practical option to reduce installation costs and adopt more efficient practices, particularly regarding new developments.

Additionally, participants described potential construction alterations and key areas for R&D and innovations, particularly focusing on soft-dig techniques, digging at a shallower depth, and promoting the use of a vacuum excavator to speed-up practices. Establishing a dedicated innovation

programme or fund was seen to be beneficial, but participants regarded the requirement for stronger coordination and collaboration across stakeholders to be more important. This is something that was also highlighted by those interviewed for the pace of delivery project and is discussed later in this paper.

Whilst participants in the capex research interviews emphasised cost reductions at the construction stage would have the biggest impact, the feedback regarding the pace of delivery indicated that process improvements at the early stages of a project are important to speed up the delivery. Reducing delays and moving the detailed design work to the commercialisation stage was seen as a way of reducing costs as well as introducing time savings.



High-level approximate timeframes for the different stages of a heat network project were given by participants who were asked to estimate how long each stage of a project had taken and what they thought the timeframe improvements would be if suggested changes were implemented. The biggest potential time savings were expected

to come from improvements in the feasibility and procurement stages, but there were interconnected factors that affected the speed at which a project could be completed, many of which were also highlighted as drivers in the capex research. *Note: the times presented in this figure are estimates from the participants and not analysis of actual project data.*

Potential time saving of ~ 3 years through changes at early stages of a heat network project

Challenges highlighted that were common to both projects

Common themes emerged when comparing the output of the different projects and these are summarised in table 1. There are interesting details to explore within each:

➤ Standardisation of practices vs. Flexibility¹

Heat network projects by their nature are unique in so much that they must fit the specific local environment where they will be installed. Key factors such as the number of buildings and potential customers, the age of the locality and available space for the energy centre are just a few factors that dictate the final parameters. However, all participants commented that standardised processes, particularly regarding project frameworks, contracting strategies and installation practices,

¹ Note HNTAS had just been released at time of interviews and participants not seen the proposed process.

would greatly improve the rate at which projects can progress. For example, two solutions suggested during the research were:

- Industry and Local Authorities (LAs), working together, could produce a playbook detailing the different stages of a heat network project. Such a playbook could outline what to expect at each stage in terms of information required or outputs needed.
- A flowchart or user guide outlining what it means to be 'heat network ready' for anchor loads or new projects.

This call for standardisation was primarily due to the need to create familiarity and consistency within the sector as many of the delays seen at decision points are due to the lack of clarity, understanding or familiarity with heat network projects by key stakeholders who need to sign-off on large project funds.

In addition, the results from the capex research indicated a strong link between risk and capex, with commercial and construction risks currently inflating costs. To reduce this, participants recommended considering alternative contracting strategies for the sector, such as the NEC (New Engineering Contract) (Institute of Civil Engineers (Thomas Telford Ltd), 2025) frameworks and to move away from EPC (Engineering, Procurement, and Construction) style contracts which currently load risks onto contractors, creating "risk premiums". Standardisation of installation techniques was another suggestion to minimise risk and costs, with the potential introduction of a form of certification to validate skills and reduce faults.

A consistent recommendation from participants in both research projects was to involve stakeholders in the project planning as early as possible and to encourage collaborative approaches across all parties involved.

➤ Strategic roadmap

A strong recommendation was for the government to issue a clear strategic roadmap of work showing its commitment to heat networks as a significant infrastructure in the UK, and demonstrate sector visibility, providing confidence and commitment in the future of heat networks. This was seen as important to drive investment in innovation, training and job creation, with some perceiving the industry to be at a tipping point where investors may step away from the market if that support is not clearly signposted. Despite the government's financial support for projects, most participants agreed stronger involvement is necessary, particularly in facilitating more project opportunities to overcome the current fluctuations of work. The industry was described as functioning on an "ad hoc" basis and operating in "limbo", proving it challenging for stakeholders to maintain industry confidence and ultimately act on cost-reducing opportunities.

However, there was also some concern that if a roadmap of planned heat networks was issued (subject to competition law and contractual requirements) some national prioritisation of heat networks may be required in the early years to give the market time to invest in growth to accommodate the scale required. There was uncertainty on what basis any prioritisation could be implemented. An alternative interpretation of this is that the sector may require more support to facilitate this rapid growth in the initial stages of zoning and any national expansion of the heat network sector. Overall, there was optimism that the potential for local and national growth is there but a clearer government commitment to, and confidence in, heat networks is still required.

Finally, participants noted that clarity on use of funds and grants to support the transition to low-carbon heat would be useful to avoid situations where heat network schemes are put at risk due to anchor loads installing alternative low-carbon heat sources. This linked in with concerns regarding the potential to mandate some connections and the ongoing challenges with cost of heat counterfactuals to natural gas.

➤ Statutory rights and powers, inclusion in Street Works

Currently heat networks are not classed as utilities or national infrastructure and the lack of statutory undertaker rights and compulsory purchasing powers etc. were flagged as a barrier to increased pace as it affected negotiations with third-parties, applications for land rights and requests for permits and permissions. Where LAs had available land, this proved to be the quickest route to establishing energy centres (essential for heat network projects) but negotiations with private landowners were often more drawn out and caused delays. The industry requires formal recognition by the government and rights to support legitimacy, and reduce additional costs incurred, such as from lack of inclusion in Street Works guidelines and having to obtain construction licences. Granting statutory rights and powers would not only reduce direct costs but strengthen the industry's stance and provide confidence to stakeholders that future industry development aligns with government ambition.

In addition, many participants felt LAs are key stakeholders influencing capex, largely due to council levies and fees that projects face, particularly in large cities. Both developers and contractors highlighted that parking bay suspensions and road closure fees significantly inflate costs, with several participants noting that capital grants were often diverted to cover these costs. Beside reducing these fees, participants suggested that stronger and more proactive local authority cooperation, use of council-owned land, and local area energy plans (England and Wales)/ Local heat and energy efficiency strategies (Scotland) could help support stakeholder collaboration, while increasing public awareness of heat networks.

➤ Supply chain

The supply chain was felt to be adequate for the present rate of growth and there were concerns that it was too shallow to be able to grow at the rate required to meet the anticipated demand through heat network zoning. It was noted that long-term procurement and purchasing strategies could be improved to reduce costs, by sourcing materials locally and in bulk to deliver significant cumulative savings (subject to competition law restrictions). However, the current project-by-project approach, due to a lack of market visibility, limits forward thinking for stakeholders, and deters investment in growing the supply chain, either through employing more people, establishing training courses or investing in manufacturing or research and development.

Expanding the pool of contractors and consultants was argued as critical by participants, as the limited number results in higher prices. The main suggestion was the government could facilitate new entrants from the general construction market who may bring innovative approaches to practices and ensure specialist training programmes and apprenticeships are in place to support growth in the number of skilled workers with knowledge of district heating.

➤ Sector visibility

There was a certain level of frustration that the benefits of heat networks are still not widely known or promoted. Some participants noted that the government schemes such as Advanced Zoning Programme (AZP), Zoning and Consumer regulations should be more widely promoted and felt this was an area where government and the industry could do a lot more to promote confidence in the sector. More promotion of successful district heat network schemes, promotion of the social value commitments and additional benefits were flagged as work that is needed to improve knowledge of the heat network sector. Not only is this seen as a way to encourage participation in heat network schemes it is also seen as a way of saving costs and time; one of the barriers identified in the pace of delivery research was the delays caused by lack of understanding of heat networks by stakeholders who are key to sign-off stages in the projects, but are not involved on a regular basis. This visibility aspect also linked in with the need to standardise processes and create more familiarity around the heat network sector.

Conclusions and recommendations

Historic projects were hampered by different factors, including a unique combination of global market changes over the past decade. As the sector was in its infancy there was little to follow regarding best practice and many of the earlier projects were learning as they progressed. Examples from countries where heat networks are more established have been helpful, but the UK market is very different in many ways. Participants described it as more adversarial, and cost focused and felt that establishing industry norms for processes, guidance and contracts would contribute to building trust and familiarity with the sector and enable it to grow in a more structured and streamlined way.

Participants felt the UK heat network market is at a tipping point in its development with enormous potential to deploy low-carbon heat, increase jobs and skills locally and nationally. There is also the potential to introduce heat networks as a major national infrastructure for the future, providing the sector is supported by policy, regulations and standards and is backed by the government. Raising visibility as well as improving the factors discussed was seen as critical to encouraging customers and obtaining buy-in from all stakeholders across all relevant organisations.

Analysis of the anatomy of a heat network project has provided insight into the key drivers and barriers (listed in the table) and estimated timescales indicate that there is the potential to increase the roll-out and reduce project times by up to approximately 3 years. Additional work to dive deeper into quantifying the timeframes of a sample of projects (e.g. from the HNDU pipeline) may give better insights, in addition to the policy and regulation related changes that can be introduced by government.

For the industry there is a clear call to improve the operating environment for the sector by working together to establish standard practices, including agreeing standard equipment or other technical aspects. Additional focus groups may be beneficial to test out some of the recommendations proposed to see if this is something that the industry feels it can deliver.

Both industry and government would benefit from a clear strategic roadmap of projects, but this may be difficult in context of intellectual property challenges. However, some signal that the work will be there in the future is required to give assurance to the sector so that the investment in the supply chain can be scaled up, providing growth opportunities across the country. Without this there is concern that the heat network sector will not be able to fulfil its potential.

Finally, there was optimism that pace of delivery of heat network projects can be improved with several participants noting that more streamlined processes (whether through internal company initiatives or through funding application processes) are already producing results.

Recommendations (grouped by audience)

Table 1. Summary of the key issues highlighted in the interviews from the Capex and Pace of Delivery research projects

Standardisation vs. Flexibility² Intended audience: Industry, government and LAs	➤ Strong demand for greater standardisation of processes, contracts, and terminology to cut costs and delays, and to build trust in the sector. ➤ Lack of consistency (RIBA stages, HNTAS stages, local authority approaches) creates confusion, bespoke processes, and delays in project sign-off. ➤ Standardisation is not only about efficiency – it helps reduce 'first-of-a-kind' risk and provides comfort for investors, local authorities, and senior decision-makers. ➤ However, need to keep in mind that standardisation potentially restricts the LAs opportunity to negotiate and social value commitments and specific local requirements (particularly in how zoning is implemented) become much more important in this context.
Statutory Rights and Local Authority Interfaces Intended audience: Industry and LAs	➤ Lack of statutory undertaker rights is a major cost and delay driver. ➤ Current reliance on multiple licences, permits, and negotiations inflates capex (e.g. parking bay suspensions, road closures). ➤ Developers frustrated that heat networks lack parity with other utilities. ➤ Compulsory Purchase Order (CPO) powers are particularly critical for energy centres and deep pipework installations. ➤ Tension between developers and local authorities over costs/fees and coordination, but LAs seen as pivotal in brokering land use and ensuring alignment of anchor loads. ➤ Statutory undertaker rights will be introduced by government through a licencing regime (called the installation and maintenance licencing regime) to be managed by Ofgem. ➤ Mandation to connect, <i>within limits</i>, was raised and may be considered in future policy, however concerns remain around connection fees and implications for anchor loads, with LAs concerned about how to bridge the gap left by the removal of funding such as PSDS, for example.

² Note HNTAS had just been released at time of interviews and participants not seen the proposed process. However, subsequent analysis indicates mismatch with RIBA stages and need for realignment of terminology.

Investment Certainty & 'Roadmap' Intended audience: Government	➤ Interviewees repeatedly called for a clear government-backed signal that heat networks are a long-term infrastructure priority. ➤ There is a need for certainty and confidence in the potential for future projects to de-risk investment, expand the supply chain, and incentivise innovation.
Supply Chain Capacity Intended audience: Industry	➤ Current supply chain adequate at today's scale but not future-proofed for zoning and mass rollout. ➤ Expertise is concentrated in a few high-demand consultancies, creating bottlenecks. ➤ Contractors with district heating experience are in short supply. Equipment suppliers more confident about scaling than consultancy/skills providers.
Sector Visibility and Narrative Intended audience: Government, Industry and LAs	➤ Heat networks remain poorly understood by senior decision-makers, investors, and the public. ➤ Developers spend significant time educating councils and clients, delaying approvals. ➤ Success stories are under-promoted; the sector needs a new wave of credible, consumer-positive case studies. ➤ Visibility is not only PR: it directly affects pace of delivery and investor confidence.
Specific Capex Drivers and Opportunities Intended audience: Government, Industry and LAs	➤ Distribution networks (trenching and civils) and energy centres account for the majority of costs. ➤ Local authority charges can be significant. ➤ Innovation opportunities: • Aligning trenching with other utilities. • Shallow/soft digs, vacuum excavation, above-ground or external-wall pipes, modular building. • Alternative arrangements for equipment such as HIU or pipe placements and the use of polymer pipes for smaller in-building networks. ➤ Contracting strategies to improve risk-sharing could reduce premiums.

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