

Networked Heat

Market design overview developed
by NESO Whole Energy Markets Team

June 2025



Market design guidebook developed by NESO Whole Energy Markets Team

Market design overview:

We have developed market design guidebooks to outline the current market structure and existing policy across each vector. They reflect our deconstruction of holistic market design into its principal component parts, in order to comprehensively represent the status quo design for each vector. This was our first step towards a comparison of holistic market design across the five vectors in our scope to explore opportunities for greater coordination across energy markets. For the avoidance of doubt, the guidebooks' purpose is to depict existing market design and policy, rather than to recommend future changes.

We intend for these vector guidebooks to serve as a point of reference for participants across the energy industry, to share understanding of how markets are structured and outline the latest policy developments as of publication date Q2 2025.

Our Market Design framework is made up of four key dimensions as set out below, and this framework forms the structure of each market design guidebook:

- A. Economic Regulation: Structure of the energy market across vectors, value chains and market participants
- B. Investment policy: Market interventions employed to achieve specific policy objectives
- C. Operational market design: The structure of wholesale and short-term operational energy markets to match physical supply and demand
- D. Cost allocation: Cost recovery for networks and investment policy.

Market dimensions	Market design elements						
A. Economic Regulation	Strategic planning		Level of competition in regulated activity		Governance and industry codes	Security of supply standards	Regulation of Retail market
	Stated target at national/regional level		Level of competition across activities	Access rights across activities	Decision makers & powers	Universal security of supply standards	Level of competition & unbundling
	Mandated targets at national/regional level		Jurisdiction boundary across activities	Connections across activities	Code governance	Metrics for standards	Pricing & contract mechanics
	Centrally administered property right allocation		Remuneration model across activities				Provision for retailer failure
	Carbon targets						
B. Investment policy	Supply	FOAK	Production		Decarbonisation		Energy adequacy
		Mature/tech-agnostic	Support mechanisms		Support mechanisms		Support mechanisms for energy adequacy
	Demand	FOAK	Consumption		Decarbonisation		Energy adequacy
		Mature/tech-agnostic	Support mechanisms		Support mechanisms		Support mechanisms for energy adequacy
			Windfall tax		Penalty for emissions		Support mechanisms for flexibility
C. Operational market design	Wholesale market	Locational granularity	Temporal granularity	Homogenous commodity	Dispatching	Gate closure	Contractual and information imbalance settlement
	Balancing & settlement	System balancing services		Energy balancing - normal		Energy balancing - emergency	
D. Cost allocation	Policy costs	Allocation across tax-payers and market participants	Payment responsibility (charging base)	Nature of charges (charging metric)	Inter-temporal cost allocation		
	Transmission network costs						
	Balancing costs						
	Distribution network costs						

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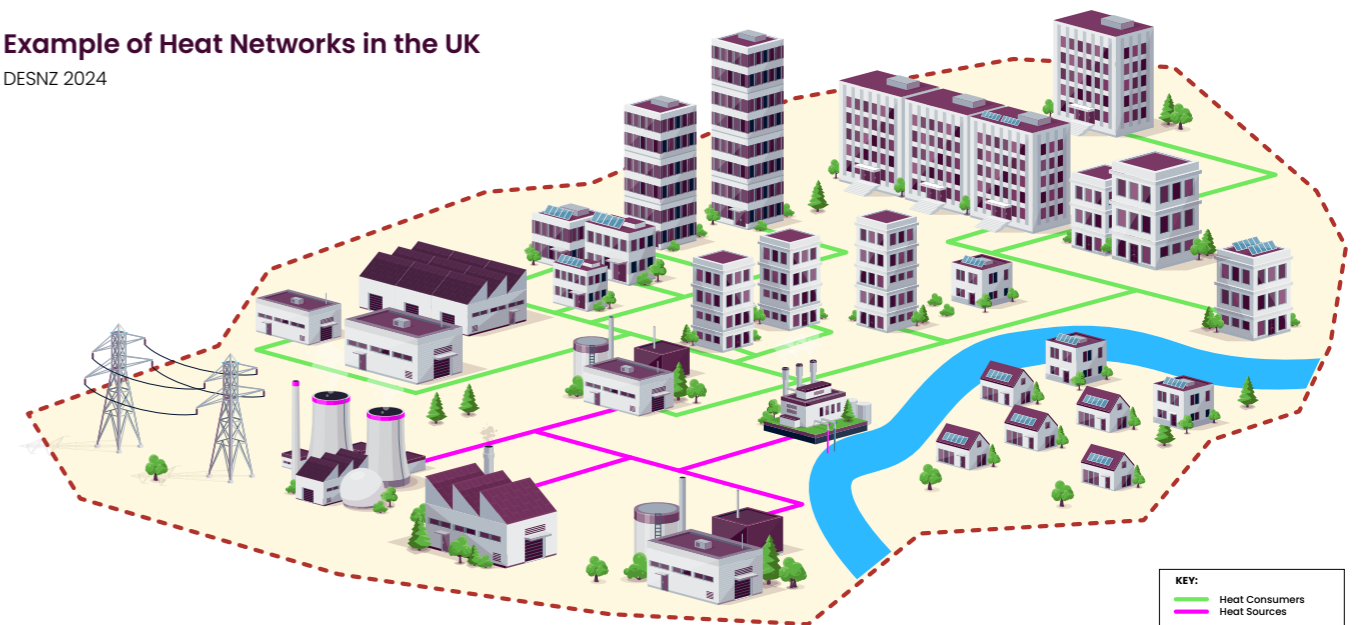
A. Economic Regulation: Structuring of the energy market across vectors, value chains and market participants

Strategic planning:

Level of government intervention in planning of infrastructure, further specified through the existence of regional & national, capacity or production targets, carbon targets, & centrally administered property right allocation.

Example of Heat Networks in the UK

DESNZ 2024



Introduction

Heat networks (also known as district heating) supply heat from a central source to consumers, via a network of underground pipes carrying hot water. Heat networks can cover a large area or even an entire city, or be fairly local supplying a small cluster of buildings. This avoids the need for individual boilers or electric heaters in every building.

Heat is brought into each building through a 'heat exchanger' which, for a residential connection, is about the same size as a small gas boiler. Many possible technologies can provide the input to a heat network including heat pumps, energy from waste, biomass and biogas fuelled boilers and Combined Heat and Power (CHP) plants.

Heat networks are expected to play a crucial role in the UK's energy transition by 2050, anticipated to supply 20% of heat demand, up from 2%

today. The government has allocated funding to support this transformation, including a £320 million Heat Networks Investment Project. Heat networks can emit significantly less CO₂ than traditional gas boilers by leveraging centralised heat sources, utilising waste heat and renewable energy. Currently, around 90% of UK heat networks are gas fired, of which over 40% are gas fired Combined Heat and Power Plants (CHP), but we see that new networks being submitted for development have a high concentration of renewable energy technologies.

In the post-war period, heat networks in the UK were primarily developed by local authorities to supply social housing. However, issues with efficiency and overheating, along with a reduction in housing development by local authorities, led to a decline in their popularity. Today, networked heat projects are developed by both the public and private sectors, often through partnerships.

Heat networks currently supply heat to a low portion of housing in the UK (~0.5m out of 27m UK households, or approximately 2%).

Recent history of heat network policy & regulation

In 2014, the Heat Network (Metering and Billing) Regulations 2014 came into force in response to the requirements of the 2012 European Energy Efficiency Directive. These introduced an obligation on heat suppliers to notify the Secretary of State of their operation of a heat network and install individual meters for properties, ensuring consumers were only charged for heat they were using.

In 2018, partly in response by calls from Industry, the Competition and Markets Authority (CMA) raised three key concerns related to remaining regulatory gaps: the high price of being served by a monopoly, potential problems with the design and build of heat networks, and a lack of transparency and understanding of what they are by the general public. These concerns were addressed in the Energy Act 2023 and the heat network Scotland Act 2021.

The Energy Act 2023 introduces amongst others a regulatory framework for heat networks and powers to enable heat network zoning in England. More specifically:

- Regulator for networked heat: The Act designates Ofgem as the regulator for heat networks. It grants the authority to establish an authorisation regime, ensuring effective regulation of organisations that supply or operate heat networks. The Act also allows for the implementation of authorisation conditions and other regulations by both the government and Ofgem. Additionally, the Energy Act empowers Ofgem to set rules requiring heat network operators to publicly disclose detailed information, enabling consumers to understand their costs, including fixed charges, tariffs, and unit rates.
- Heat Network Zoning (HNZ): Introduced through the Energy Act 2023, is a policy framework that fosters collaboration among central and local governments, industry, and local stakeholders to identify

and designate areas where heat networks are considered the most cost-effective solution for decarbonising heat. This policy aims to streamline the deployment of heat networks in regions where they can provide the greatest economic and environmental benefits. Currently, the Heat Network Zoning Pilot Programme (HNZPP) is being tested in 28 English towns and cities of various sizes to gather evidence and inform the detailed policy design before full implementation. HNZ aims to:

- Develop a nationwide methodology for identifying and designating areas as heat network zones
- Require certain buildings and heat sources within designated zones to connect to the heat network within a specified timeframe. This mandate is expected to include new buildings, large public sector buildings, large non-domestic buildings, and domestic premises already utilising communal heating systems, with exemptions permitted if it is not a cost-effective low-carbon solution. Domestic premises within the zones that do not have communal heating may choose to connect voluntarily

- Establish a new Heat Network Zoning Authority, based within central government, to oversee the implementation of heat network zoning across England and set national standards
- Establish a Zoning Coordinator role (expected to be fulfilled by local government) with responsibility for designating heat network zones and enforcing requirements within them. Once the national modelling process has identified potential heat network zones in a town or city, the zoning co-ordinators will then refine the zone boundaries considering local factors.
- DESNZ have partnered with Arup and Ordinance Survey (OS) to enhance the heat network development process.

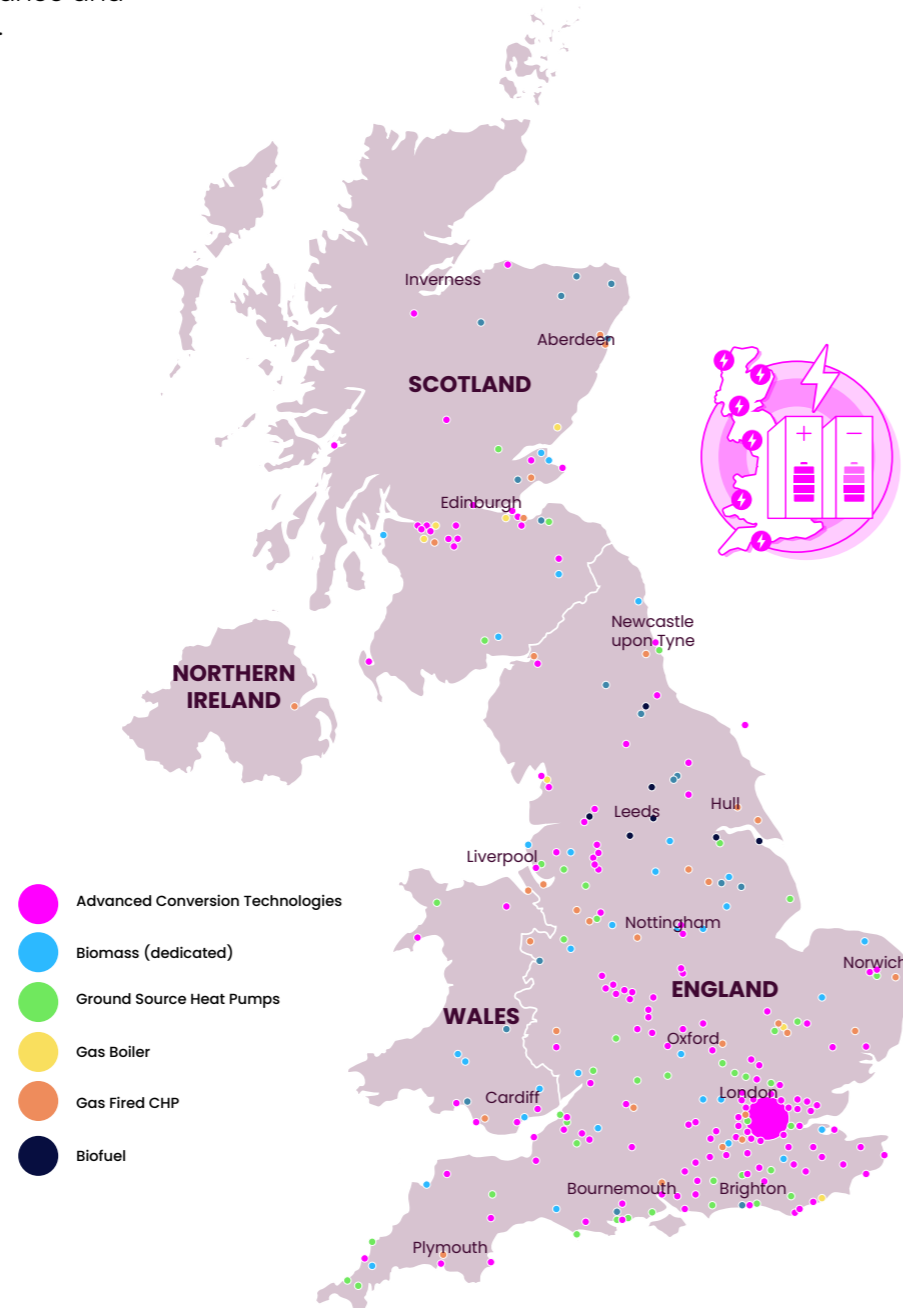


With OFGEM becoming the regulator for heat networks, they are currently consulting on the authorisation and regulatory oversight of heat networks in England, Scotland, and Wales (Great Britain). These proposals include how they will approach monitoring, audit, compliance and enforcement of authorised persons.

Heat Network Planning Database

DESNZ 2025

Map represents projects at various stages of development, excluding projects abandoned, application refused, or appeal refused.

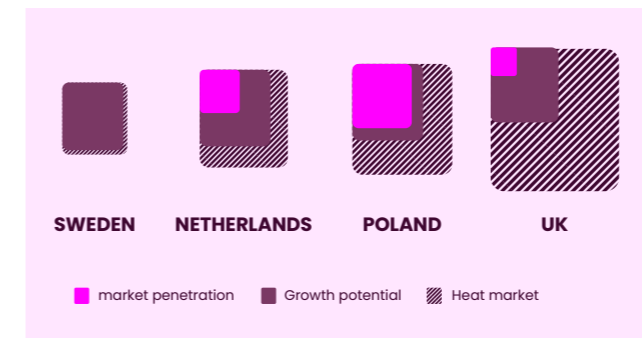


Government national stated or mandated targets

Currently, there are no national stated production targets. However, DESNZ's analysis indicates that heat networks could supply up to 20% of the UK's total heat demand by 2050, aligning with the Climate Change Committee's scenarios.

Comparison of heat network capacity growth potential

DESNZ 2024

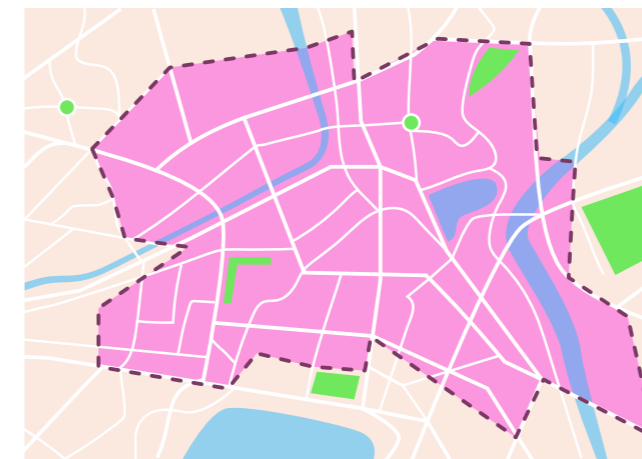


Government regional stated or mandated targets

In England and Wales there are no specific regionally stated or mandated targets for networked heat, however, the Heat Network zoning policy framework looks to develop 'heat zones' in local areas. Once these 'zones' have been identified, there could be targets to have networks of particular sizes. Heat network targets for Scotland are set out in the Heat Networks (Scotland) Act 2021.

Illustrative Heat Network Zoning Output

DESNZ 2023



Centrally administered property right allocation

Given how networked heat assets are varied and can cover private and public land such as roads and public buildings, acquisition and administration of property rights will be undertaken by the relevant parties.

Carbon targets

Currently no direct carbon targets have been set for networked heat. However, indirect carbon targets exist:

- The Climate Change Act which legally sets targets to achieve net zero in UK by 2050 and therefore defines targets across all vectors, including networked heat.
- The goal is to decarbonise electricity by 2030, which will impact gas-fired CHP systems and consequently the heat they provide to heat networks.



Level of competition in regulated market

Regulated level of competition & unbundling for activities such as transmission, distribution, interconnections, terminals, permanent storage (sequestration), system operations

Transmission network and system operation

Given the local nature of networked heat, no transmission network exists.

Distribution network and system operation

Level of competition and jurisdiction boundary

Heat networks are natural monopolies. Once built on site, there can be no competitive heat network built. However, if the heat network is of sufficient size, it can have several heat sources which could exist in a competitive market to provide heat, this is something we have not yet seen in the UK.

Heat Networks usually don't unbundle activities such as metering and billing, but this does happen, as in the case of ESCO (Energy Service Companies).

Remuneration model

Network costs can be recovered directly from the customers connected to each heat network or via inclusion in their rent. Currently, limited regulation exists, and remuneration models are specific to each heat network.

Access rights and connections

Currently, access rights and connections to the distribution network are specific to each heat network. In the future, Heat Network Zoning will introduce mandatory connections within a designated zone for new buildings, large public

sector buildings, large non-domestic buildings and domestic premises which are already communally heated.

System operations

The operation of heat network systems functions as a local monopoly, typically by the integrated heat network operator, i.e., the operator controls the heat supply, operates and maintains the pipework and meters. The cost of repair and maintenance is often included directly within consumer's heat bills. Roughly 10% of heat suppliers are dedicated Energy Service Companies (ESCOs) who are appointed by the building owners through long-term contracts spanning decades to provide metering and billing services.

Interconnectors

N/A for networked heat

Terminal

N/A for networked heat

Permanent storage (sequestration)

N/A for networked heat

Governance and industry codes

Decision makers involved in the energy sector & their respective powers, and code governance of the different vectors

Prime minister and secretary of state

The prime minister and secretary of state set strategic direction and drive major initiatives such as net-zero targets. In addition, they have a strong role during crisis management, e.g., during the recent energy crisis and formulate key energy policy, including:

- Defining the remit of government departments
- Generating roles and select delivery bodies to fulfil functions
- Driving inclusion of Net Zero into law

In addition, the Secretary of State has the ability to generate roles and select delivery bodies to fulfil functions, e.g. define a central body (zoning authority) and localised body for zoning (zoning coordinator). Next to this, the Secretary of State was provided, through the Energy Act 2023, with powers to introduce a price cap within heat networks should it be necessary to protect consumers.

DESNZ

The Department for Energy Security and Net Zero or DESNZ is established to ensure the UK's energy security and to support the transition to a net zero economy. It is mandated to shape energy policy, regulation, and implementation. It plays a crucial role in creating policy frameworks, strategic direction and targets by formulating primary and secondary legislation:



- Primary legislation: DESNZ has powers under the primary legislation related to networked heat, such as the 2023 Energy Act
- Secondary legislation: DESNZ uses secondary legislation to implement detailed rules and regulations, such as the Heat Network Technical Assurance Scheme (HNTAS), which is an initiative aimed at ensuring the technical quality, performance, and compliance of heat networks through standardised assessments and certifications
- Subsidy programs: DESNZ administers several funds to support the development and expansion of heat networks in the UK, e.g., Heat Networks Investment Project (HNIP) with total funding of £288m, Green Heat Network Fund (GHNF) with total funding of £288m and Heat Network Efficiency Scheme (HNES) with total funding of £77m.

Ofgem



Ofgem was appointed future regulator for Heat Networks in GB via the Energy Act 2023. Ofgem's powers as regulator will include:

- Ensuring consumers get transparent information, a fair price and reliable supply of heat.
- Introduce a licensing system to facilitate growth by ensuring heat network developers can access powers equivalent to other utilities, including the ability to excavate roadways
- Intervention if prices are disproportionate compared to either other networks with similar characteristics or an alternative comparable heating system, including a price cap if necessary

- Promoting technical standards and introducing carbon emissions limits on heat networks. Currently there is no mandatory code that heat network operators must follow.

Other

Some voluntary codes exist, such as:



- CPI voluntary code: The Chartered Institution of Building Services Engineers (CIBSE) has an existing voluntary code for heat networks. A new edition of the CIBSE (Chartered Institute of Building Services Engineers) UK Heat Networks Code of Practice is due to be published in 2025, in collaboration with DESNZ. By setting minimum requirements and best practice options, it aims to improve the quality of feasibility studies, design, construction, commissioning, operation and maintenance of heat networks. In addition, its aims to improve energy efficiency and environmental impact. Although the CIBSE Code of Practice is currently voluntary, it is widely used in project specifications. The CIBSE CPI (2020) edition provides comprehensive recommendations for improving both new build and existing heat networks. It includes future-proofing options to maintain and enhance efficiency as technology evolves. Unlike the CPI (2015) edition, which focused significantly on the role of heat interface units (HIUs), the CPI (2020) takes a more holistic approach. It considers other system components, such as Thermostatic Radiator Valves (TRVs), to improve overall system efficiency. Finally, CIBSE codes are closed, meaning they do not have a formal process for modification or governance. Changes to these voluntary codes are managed internally by CIBSE without a structured mechanism for external stakeholders to propose modifications or updates.
- HNTAS: By 2025, the Heat Network Technical Assurance Scheme (HNTAS) is anticipated to

provide Ofgem with the ability to certify compliance with standards. HNTAS will ensure that technical standards, such as those outlined in CPI (2020), are adhered to not only during the design and construction phases but also throughout the operational lifecycle. HNTAS is expected to be closed and will be the only mandatory code to exist for networked heat systems.



- The Heat Trust runs a voluntary scheme which sets minimum standards of customer service and consumer protection for heat suppliers in Great Britain. These standards are designed to be comparable to those set out in Ofgem's licence conditions for regulated gas and electricity suppliers, including rules governing:
 - Treating consumers fairly
 - Providing clear and transparent information to consumers
 - Supporting consumers in vulnerable circumstances, in need of additional support or in payment difficulty
 - Customer service standards, incl. handling faults, emergencies and access to homes
 - Guaranteed performance standards, including compensating consumers for outages that don't meet these
 - Using and maintaining metering, including use of pre-payment meters
 - Maintaining Heat Interface Units (HIUs)
 - Calculating heat charges, changing tariffs, billing, back-billing and payment
 - Disconnection and reconnection of supply
 - Complaint handling and access to the Energy Ombudsman
 - However, there are four key areas for which the Heat Trust (as a voluntary scheme) doesn't set standards:
 - Provide comment or arbitration on pricing

- Provide guidance on contract length
- Set technical engineering or performance standards for heat networks
- Provide a supplier of last resort if a heat supplier goes out of business
- These issues are being addressed as part of planned statutory regulation.

Treasury

The Treasury plays a crucial role in shaping financial policies for the energy sector, ensuring alignment with the government's economic and environmental goals. Key responsibilities include:



HM Treasury

- Approval and risk management: Departments must obtain Treasury approval for transactions deemed novel, contentious, or repercussive.
- Fiscal oversight: The Treasury oversees public spending on energy infrastructure and initiatives, setting funding allocations for renewable energy and efficiency programs amongst others.

Devolved administration

Devolved administrations (collectively with the national government) set overarching policy and regulatory frameworks for the energy sector in the UK and consent to specific energy related initiatives of the national government. Given the highly regional nature of heat networks, there is a strong involvement of devolved administrations. However, the devolution of heat policy and heat network regulation across the UK is complex and is not aligned across devolved administrations, for example:

- In Scotland heat policy is devolved, and Consumer Scotland has been designated

as the statutory advocate for heat network consumers in Scotland. The Scottish Government has developed a Delivery Plan that outlines how the regulatory system for heat networks will be established and managed.

- In Wales heat networks and the definition of incentive schemes, are devolved, but regulation of heat networks is reserved to the UK Parliament.
- In Northern Ireland, the regulatory oversight of heat networks will be managed by the Northern Ireland Authority for Utility Regulation (NIAUR).

NESO



The remit of the National Energy System operator NESO, following the 2023 Energy Act includes following roles:

- A system planner providing strategic direction for electricity, gas and future systems.
- Independent advisor providing analysis and information to the Government and Ofgem
- The system operator for electricity.

NESO will promote three objectives as our primary duties:

- Net Zero
- Efficiency and Economy
- Security of Supply

As the energy system becomes more integrated, NESO also considers the role of heat networks within our whole system planning, markets and advisory functions. We support their development by identifying opportunities for coordination across energy vectors, ensuring the promotion of our objectives.

Energy security standards

Mandatory security standard metrics for network resilience and energy adequacy, and their statistical approach

Network

Currently, no universal security of supply standards exist for heat networks, and security of supply standards are specific to each individual heat network (eg, Vattenfall states that it operates resilient networks with multiple heat sources, thermal storage, and built-in redundancy, resulting in rare outages with over 99% heat availability throughout 2023. They continuously monitor their network using automated alarm systems to quickly detect and fix any faults). The major introduction of comprehensive standards is anticipated with the publication of the Heat Network Technical and Safety Standards (HNTAS), expected by 2025. HNTAS will mandate various technical standards to ensure the effective and efficient operation of heat networks, including security of supply standards.

Currently, some guidelines and minded to policy to improve security of supply exist for heat networks. For example:

- The Heat Network forum, which promotes good practices within district heating, has developed a Heat Supply Agreement Principles document. This document outlines core principles for creating Heat Supply Agreements (HSAs). HSAs include terms for managing both planned and unplanned supply interruptions.
- The DESNZ / Ofgem consultation on Heat networks regulation: Implementing consumer protections included proposals to reduce service outages and drive improvements in consumer protection when these occur.

Energy adequacy

While awaiting the establishment and definition of the HNTAS, there are currently no specific regulations in the UK that set energy adequacy standards for heat networks.

HNTAS objectives and core principles

DESNZ 2024

	Vision	Enable low-emissions, reliable and affordable heat to be delivered to UK communities via heat networks
	Aim	Develop a heat network technical assurance scheme that ensures a minimum level of performance and reliability for heat networks in the UK
	Objectives	<ul style="list-style-type: none"> • Reduce carbon emissions and cost of heat by making heat networks more efficient • Improve affordability by reducing capital and operational costs • Improve consumer experiences with improved reliability and quality of heat supplied • Improve reputation and investor confidence in heat networks • Build evidence through better data collection and reporting on technical quality
	Core principles	<ul style="list-style-type: none"> • Outcomes orientated • Proportionate • Adaptable • Preventative • Deliverable • Enforceable

Regulation of retail market

Specific retail market interventions, including elements such as price caps, mandated or incentivised usage-based and/or time-of use pricing, and mechanisms for guaranteed supply continuity under retailer failure.

Unbundled retail function

Heat networks are natural monopolies that can include a single building all the way to parts of a city, and are vertically integrated with no retail market. A retail market would mean customers have the option to buy heat from a number of organisations, which is not the case.

Powers to enable price cap and price cap in place

Currently, there is no price cap in place. As the appointed regulator for heat networks, Ofgem can intervene if prices are disproportionate compared to other networks with similar characteristics or an alternative comparable heating system. Ofgem is considering implementing a benchmarking process to compare heat network prices for consumer protection. This benchmarking process entails:

- A benchmark that compares heat network prices against various potential standards.
- If prices are assessed as excessive, Ofgem will engage with the operator to conduct a detailed pricing investigation, analyzing cost structures, efficiency, and profit margins. Following this, Ofgem may mandate pricing adjustments, require rebates or refunds to consumers, and enforce cost efficiency improvements.

In addition to Ofgem, under the Energy Act 2023, the Secretary of State has powers to introduce various forms of price regulation, including a price cap, should it be necessary to protect consumers.

Ability to change supplier and contract duration

Individual customers connected to a heat network cannot switch to another network or retailer as each heat network operates as a natural monopoly. The typical duration of a heat network contract in the UK can vary, but it is often long-term, typically lasting up to 25 years. This extended duration is due to the significant infrastructure investments required for heat networks and the need for stable, long-term revenue to support these investments.

- For example, Southwark Council states that if a homeowner disconnects from the system, it can cause pressure imbalances and potential breakdowns, leading to additional maintenance. To prevent increased costs for other residents, homeowners wishing to disconnect must pay all costs incurred due to their disconnection, including direct costs like material and labor, and indirect costs, such as those otherwise recoverable if the property remained connected. The average cost for disconnection is approximately £39,500, depending on the property size and condition of the heating system.

Minimum capital requirements for suppliers for license

To date, there is no minimum capital requirements for suppliers to hold when holding a license.

However, the UK government is in the process of introducing a voluntary licensing regime as part of wider reforms to regulate the heat network market and protect consumers.

Tariff pricing

Bills may include both fixed and variable charges, which are sometimes not itemised separately, particularly in larger building management systems. Fixed fees cover infrastructure, maintenance, and administrative costs, while variable charges are based on actual energy consumption, based on metered heat. Additionally, charges may be reviewed annually to account for changes in energy costs and other costs e.g. Inflation, the cost of repair and maintenance is often included directly within consumer's heat bills. For example:

- Within the Swaffham Heat Network, charges include a standing fee equivalent to the cost of owning and maintaining an oil boiler, and a variable fee based on heat consumption measured in kWh, reviewed annually against the heating oil component of the CPI
- Within Bristol City Leap, charges consist of a fixed annual fee based on connection capacity to cover various operational costs, and a variable heat charge rate covering the cost of fuel (electricity, biomass, and gas) required to generate heat for the network

To date, no time of use tariffs (ToUT) within heat networks has been identified. To implement time of use tariffs (ToUT), metering is required. The Heat Network (Metering and Billing) Regulations 2020 mandate that heat suppliers must install meters for each final customer in viable class buildings, which are newly constructed or originally constructed for such connections on or after September 1, 2022. For open class buildings, which are not in the viable or exempt class but connected to communal heating or district heat networks, meters must also be installed unless it is not technically feasible or cost-efficient, and all meters must comply with the new requirements by September 1, 2022. While regulations mandate installation of meters, it is not yet known whether those meters would be sufficient to be allow for ToUT.

Currently, usage-based pricing is partially adopted within heat networks. Even though the Heat Network (Metering and Billing) Regulations 2020 require heat suppliers to install meters, in 2022, only 40% of operators used the existing meters to calculate their bills

Mechanism for guaranteed supply under retailer failure

Networked heat doesn't have an unbundled retailed market; there are currently no specific regulations in the UK that set mechanism for guaranteed supply under retailer failure for heat networks. However, the Energy Act 2023 regulation on heat networks includes the appointment of Ofgem as heat networks regulator to help to ensure consumers get a fair price and reliable supply of heat. The Energy Act includes that while currently no 'supplier of last resort' mechanism exists in the heat networks market, it includes the intent to give the regulator powers to address this.

B. Investment policy: Market interventions employed to achieve specific policy objectives

Supply:

Mechanisms to incentivise supply side investments

Production

Mechanisms incentivising or disincentivising investment with production as the key policy objective, via support mechanisms or windfall taxes

Currently, there are no investment support mechanisms which are specifically designed to support the production of heat in heat networks (i.e. support for the generating unit independent of whether it's a low carbon source or not)

Decarbonisation

Mechanisms incentivising investment with decarbonisation as the key policy objective, either through support mechanisms or emission penalties.

There are several support mechanisms currently available to assist both existing and new heat network projects.

The Heat Network Transformation Programme, introduced by the Heat and Buildings Strategy, provided £338m investment over 2022-25 to scale up low-carbon heat network deployment and enable local areas to deploy heat network zoning. This program provides funds to:

- **Heat Network Efficiency Scheme (HNES):** It is a £80 million grant support programme spanning years 2023-2024 to 2027-2028 in England & Wales for existing heat networks and communal heating systems to part-fund the installation of improvement measures and carry out optimisation studies. The main objectives are:
 - Reduce carbon emissions by making heat networks more efficient
 - Reduce customer detriment to improve consumer confidence
 - Help prepare the heat network market for sector regulation and technical standards

Applications are awarded funding on a competitive basis to maximise:

- Addressing customer detriment (prioritising projects with higher proportions of residential "customers in need")
- Improvements to network operational performance (efficiency/losses)
- Carbon emissions savings
- Value for money

- The Green Heat Networks Fund (GHNF):**
 Provides £288m in grant funding in England from 2022–2028 to support the commercialisation and construction of new low and zero-carbon heat networks and the retrofitting and expansion of existing heat networks. The fund ensures low carbon heat networks by requiring applicant projects to meet a minimum carbon gate score of 100gCO₂e/kWh per thermal energy delivered. The maximum grant the scheme will provide is 50% of the commercialisation and construction costs and 4.5p/kWh of delivered heat over the first 15 years of operation
- It was envisaged that HNES and GHNF would be complementary schemes offering existing networks a two-stage pathway to low carbon operation:
 - HNES delivering performance improvements to enable efficient and effective future decarbonisation
 - GHNF delivering the switch from fossil fuel generation to lower carbon heat sources
- The Scottish Government launched a £200m Scotland Heat Network Fund in 2022. It offers long-term support to enable the delivery of heat networks, making capital grant funding available to both the public and private sector

- The Business Rates Relief Fund in the UK provides 100% relief on business rates for properties primarily used as low-carbon heat networks. This relief, which was discretionary in 2022/2023 and became mandatory from April 2024, aims to reduce operational costs and encourage the development of environmentally friendly heat networks.

Penalty for emissions

Through the UK ETS, combined heat and power (CHP) plants, boilers, or other fossil fuel-based heat sources used to provide heat to district heating networks are penalised for their emissions. The UK ETS applies to all sites with a total rated thermal input of all gas-combusting assets exceeding 20MW.



Energy adequacy & flexibility

Mechanisms incentivising investment with energy adequacy and/or flexibility as the key policy objective, through support mechanisms.

To date, no specific support for projects aimed at delivering energy adequacy within heat networks have been identified.

Demand:

Mechanisms to incentivise demand side investments

Consumption

Mechanisms incentivising investment with consumption as the key policy objective, through support mechanisms for consumption.

The Energy Bills Discount Scheme (EBDS) that ran from 1 April 2023 to 31 March 2024 aimed to ensure that domestic customers on heat networks did not face disproportionately higher heat and hot water bills when compared to customers in equivalent households who are supported by the Energy Price Guarantee (EPG). Heat suppliers were required to apply for this discount and pass the savings on to their consumers. This scheme was introduced in 2023, when some heat network consumers experienced bill increases of up to 700%.

available to registered social landlords, local authorities, and energy service companies.

- Interest-free and low-cost loans are available to individual property owners in Scotland who want to connect to a nearby heat network. These loans are provided by Home Energy Scotland and the Energy Efficiency Business Support Service, subject to eligibility. Additionally, support is available through the Community and Renewable Energy Scheme to help community buildings connect to nearby heat networks.

As some households in designated zones may be required to connect to existing heat networks (to ensure that operators can recover their investment costs), Ofgem has been consulting on a Heat Network Regulation focusing on consumer protection to ensure these consumers have similar levels of consumer protection as the alternative heating solutions (gas, electricity).

Decarbonisation

Mechanisms incentivising investment with decarbonisation as the key policy objective, either through support mechanisms or emission penalties

Support mechanism for decarbonisation

Several support mechanisms exist for the adoption of low carbon heating technologies amongst which heat networks where available:

- The Scottish Social Housing Net Zero Heat Fund is a £200 million initiative by the Scottish Government aimed at helping social landlords install zero direct emissions heating systems and enhance energy efficiency in existing social housing by 2026. The fund covers up to 50% of project costs, with a maximum of £5 million per project, and is

Penalty for emissions

UK ETS for regulated activities includes some heat networks (based on their fuel, e.g. Gas fired CHP would be included) and costs are passed on to consumers.



Energy adequacy & Flexibility

Mechanisms incentivising investment with energy adequacy and/or flexibility as the key policy objective, through support mechanisms.

To date, we have not identified any specific support schemes aimed at delivering energy adequacy through using demand side measures.



C. Operational market design: Market design elements that match supply and demand and enable stable and reliable day-to-day operations

Wholesale market

Operational market design related to facilitating the matching of supply and demand

Given the local character of heat networks, there is no national wholesale market. Still, some relevant considerations can be made on the operational market design:

- Locational granularity: Prices are site specific, various factors contribute to this variation, including the size and efficiency of the heat network, the types of buildings connected and the charging methodology set by the network operator.
- Dispatching: Heat network operators manage dispatch, controlling both the generation and distribution of heat within the network.

- Although the vast majority of new heat networks are metered, many older ones are not. According to the Heat Trust, only 30% of consumers on heat networks had individual meters (2015 data) and only 40% of operators (2022) used these to calculate bills.

Balancing and settlement

Processes and mechanisms to manage and reconcile discrepancies between supply and demand and ensure operability of the system

System balancing services

Mechanisms and contractual arrangements employed by system operator to facilitate real-time system operation, including sub-settlement period energy balancing (to resolve short-term discrepancies between supply and demand), and ancillary services to maintain system stability and security

No balancing services have been identified within existing heat networks, as the supply assets are operated by the vertically integrated network operator. In addition, balancing within heat networks is less time critical than in other energy systems because heat networks benefit from the natural inertia of thermal systems. This inertia means that changes in demand and supply do not need to be balanced in real-time, unlike in electricity networks.

Energy balancing – normal

Routine processes and mechanisms to ensure balance of supply and demand under typical operating conditions, further specified through the primary balancer, residual balancer, dispatch mechanism and gate closure where applicable

Heat network operators are the primary balancer within heat networks. No residual balancer has been identified.

Energy balancing – emergency

Procedures and mechanisms implemented to address severe imbalances between supply and demand that threaten the stability and reliability of energy system, further specified through the central balancing function, wholesale market closure, balancing notice and load shedding merit order.

Heat network operators oversee energy balancing within the heat network in case of emergency. Load shedding for heat networks is not as explicit as it is for electricity or natural gas systems, but is highly site-specific.

D. Cost allocation: Allocation mechanisms of various costs

Policy costs

Costs incurred from providing policy support to achieve specific government objectives, generally for investments

Allocation on taxpayer and market participants

Policy costs are allocated to market participants through energy bills through a variety of charges and levies. The remainder of the costs of policy funding are allocated to tax-payers

Charges (levies), charging base and basis

Policy support for heat networks including the Heat Network Efficiency Scheme (HNES) and the



Green Heat Network Fund (GHNF) are distributed across taxpayers.

Network heat customers that are businesses are subject to the Climate Change Levy (CCL), although exemptions and reliefs apply. Energy suppliers are responsible for collecting the CCL by including it in the energy bills of non-domestic customers. The CCL rates, specified by the government per kilowatt-hour (kWh) for different types of energy, are applied to the total energy consumption of non-domestic users.

Heat network customers are eligible to access support from the Energy company obligation (ECO) scheme.

Transmission network costs

Costs incurred to remunerate network transmission companies to account for investment, operational & maintenance costs for transportation over long distances

There are no transmission networks for networked heat.

Balancing costs

Costs incurred by the system operator to ensure real-time balance between supply and demand, including the procurement and deployment of balancing services

Balancing costs incurred by the heat network operator (if any) are included in the overall operational costs of the integrated system and are passed on to the consumers.



Distribution network costs

Costs incurred to remunerate network distribution companies to account for investment, operational & maintenance costs for final stage transportation to end users

Allocation on taxpayer and market participants

The networks costs are allocated to the users of the heat network.

Payment responsibility (charging base)

Allocation of network and balancing costs across market participants, including allocation between supply (producers) and demand (consumers), and any exemptions or discounts for specific groups/technologies

Distribution network costs are fully recovered from consumers.

Charging metric (charging basis)

Metric used to charge market participants for network or policy costs, generally either on an energy or capacity basis, including those designed to allocate costs to usage or capacity at specific times of the day or year.

The charging basis is typically expressed in £/MWh or a fixed fee.

Inter-temporal cost allocation

To date, we have not identified any inter-temporal cost allocation of heat network distribution costs. Given that this aspect is not regulated, heat network operators are free to use any depreciation methodology they deem appropriate, which could include accelerated or deferred depreciation.



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