

The Association for
Decentralised Energy



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Bringing Energy
Together

Combined Heat & Power
District Heating & Cooling
Demand Side Services

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Shared Warmth

A heat network market that
benefits customers, investors,
and the environment

January 2018 | Industry Heat Network Task Force Report



The Association for
Decentralised Energy



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Bringing Energy
Together

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Executive Summary

Changing the way we heat our homes and businesses is a central part of transitioning to a low carbon economy.

Heat networks present a key decarbonisation tool, through connecting customers to heat sources such as waste heat from industry and power stations, large-scale heat pumps, solar, and bioenergy, through a network of insulated pipes. Heat networks can supply reliable, low cost, low carbon heat to homes and businesses.

Repeated analysis indicates that cost effective heat decarbonisation requires a major growth in heat networks, which could meet up to 20% of heat demand by 2050. However, current deployment rates are not sufficient to meet Government decarbonisation objectives. With the anticipated growth in the heat network market, important questions are raised as to how heat network customers can be assured a good deal and reliable service.

Heat network investability and customer protection are two sides of the same coin. Investors want assurance that customers will be content with the service, as it reduces the risk of investment. More investable projects can attract institutional investors, which lowers the cost of capital and results in lower heating bills.

The ADE established an industry Heat Network Task Force: a group of experts, from within and outside of the industry, who spent a year considering how best to address the two issues of investability and customer protection. This report is the culmination of that work.

The Task Force considered a full range of options, from industry action through to regulatory intervention, and a combination of the two. Network investability was considered first, as customer protection obligations can only be placed effectively on those with investable propositions.

The Task Force considered how best to address the investment risk associated with long term infrastructure like heat networks. At the point of investing in a heat network, the probability of all of the different heat customers connecting to a network is a vital element. Future customers cannot commit until the network is built, and investors cannot commit without future customers. The Task Force concluded that a regulatory framework to reduce investment risk caused by demand uncertainty was the best route to secure investment at lowest possible cost. This regulatory framework would be based around addressing the future heat demand risk; a policy proposal known as Demand Assurance.

An investment framework would also establish the route to ensuring customer protection. For customer protection to be effective it needs to be both binding on, and aligned with the interests of those supplying the service of heat provision. By making access to Demand Assurance contingent on meeting customer service standards, the investor has a direct stake in ensuring those standards are met. The Task Force carefully considered where regulation could have a role in increasing competitive pressure to improve customer outcomes; setting the balance between

**THE TASK FORCE HAS ONE OVERARCHING RECOMMENDATION:
ADDRESSING THE KEY CHALLENGES FOR HEAT NETWORK GROWTH REQUIRES
A REGULATORY FRAMEWORK THAT REDUCES INVESTOR RISK THROUGH
DEMAND ASSURANCE, AND SETS BINDING CUSTOMER PROTECTION STANDARDS
ON WHICH THAT DEMAND ASSURANCE IS CONTINGENT.**

regulation and market solutions. This report sets out a comprehensive set of principles that are needed to give heat network customers the same level of protections enjoyed by customers receiving heat by other means.

The Task Force has one overarching recommendation: addressing the key challenges for heat network growth requires a regulatory framework that reduces investor risk through Demand Assurance, and sets binding customer protection standards on which that demand assurance is contingent.

This document is not an exhaustive set of recommendations. It establishes the principles that need to be met, and the strategic mechanisms that can achieve the aims of Government. For the first time this report sets out considered proposals from industry and stakeholders as to how to deliver an investable sector that protects its customers. The challenge to decarbonise heat is often described as one of the most difficult areas in energy decarbonisation. Through credible proposals, the Task Force has set out how this challenge can be met in a way that works for all; driving investment up, while reducing customer bills and carbon emissions.



Image courtesy of Vital Energi



1. Introduction

Heat accounts for nearly half of all energy consumption in the UK and around a third of greenhouse gas emissions. Heat networks, using low carbon heat sources, are seen by the Government, the Climate Change Committee, and the Energy Technologies Institute as a key component of a cost-effective approach to decarbonising the UK's heat supply and meeting our emission reduction commitments under the Climate Change Act.^{1,2,3}

1.1 Heat networks

Heat networks comprise a network of insulated pipes which carry hot water from a central point to end customers, to provide heating and hot water. Heat networks come in many forms, with communal heat networks serving two or more end users in a single building; and district heat networks connecting to end users spread across multiple buildings.

1.2 Benefits of heat networks

In areas of dense population, where heat demand is concentrated, heat networks can provide cost effective heat to a range of customers. All the customers on a network will not use maximum demand simultaneously (this is known as diversity). This diversity enables a lower capacity of heat generation per customer than would be the case with individual solutions. By adding thermal storage, heat can be generated at times when it is cost effective, stored, and then supplied on demand. Thermal storage can further reduce the total capacity of heat generation needed and can drive down the cost of generation. This heat network efficiency is borne out by evidence. In December 2017, BEIS published the results of their first independent Heat Networks Consumer Survey⁴, which found that, on average, heat network customers pay £100 a year less for their energy than customers heating homes with gas.

Heat networks also enable cost effective decarbonisation of heat. Heat networks can take heat from various sources including waste heat, solar heat, and power station heat. This flexibility enables the best value low carbon heat source (or sources) in a given location to be used. As networks develop, heat sources can be added and changed, allowing the introduction of waste heat and new low carbon technologies and fuels, without disrupting the customer.

1.3 Estimated potential and the Clean Growth Strategy

According to the Committee on Climate Change, heat networks could meet up to 20% of total building heat demand by 2050⁵, up from today's level of 2%⁶.



1 DECC (2013) The Future of Heating: Meeting the Challenge
 2 UK Committee on Climate Change (2016) Next Steps for UK Heat Policy
 3 Energy Technologies Institute (2016) UK Networks Transition Challenges: Heat
 4 A report for BEIS by Kantar Public (2017) Heat Networks Consumer Survey Report
 5 UK Committee on Climate Change (2016) Next Steps for UK Heat Policy
 6 The Heat (Metering and Billing) Regulations 2014 Notification Data



Image courtesy of Vital Energi

The UK Government's Clean Growth Strategy⁷ maps three pathways out to 2050, to meet UK emission reduction targets – electricity, hydrogen, and emissions removal pathways. All the pathways result in heat networks supplying 17% of domestic heating and hot water, and between 17 and 24% of demand in the non-industrial business and public sector.

Heat networks are, therefore, considered by the Government to be a key component of meeting UK and Devolved Administration carbon reduction and fuel poverty targets in all heat decarbonisation scenarios.

In 2015, the UK Government announced £320m of funding through to 2021 through the Heat Network Investment Project (HNIP), with a view to delivering up to £2 billion in new investment. Scotland has an ambition for 40,000 homes to be connected to district or communal heating by 2020. The Scottish Government's District Heating Loan Fund, established in 2011, and Low Carbon Infrastructure Transition Programme have supported heat network investment in Scotland.

These policies aim to create a pipeline of new heat networks and kick-start the creation of a self-sustaining market. However, given the scale of growth needed and the long term nature of the investments, longer term policy and clear investment signals are needed to secure investment across the industry.

7 HM Government (2017) The Clean Growth Strategy

1.4 Customers on heat networks

Well designed and operated heat networks can deliver an excellent customer experience – which is a central component of achieving a successful heat network. As the supply is for heat, rather than fuel, customers pay an all-in-one price for heat provision and maintenance services, making them a very low hassle option. However, heat networks, like the power and gas networks, are natural monopolies and if poorly designed, built, and operated, can lead to unreliable service, and poorly controlled and costly heating. In addition, customer service standards are not mandatory across the sector. Where customers do not have another heating option, they can be at risk of poor customer service with limited recourse when things go wrong.

If Government, UK and devolved, are to achieve their ambitions for heat network growth, customers need to have a consistently good experience, fair and transparent pricing, and an assurance that when things do go wrong they will receive effective and fair redress.

The industry has made substantive progress in the area of design, build, and customer service on heat networks through the Code of Practice for Heat Networks, and the independent consumer redress scheme, Heat Trust. However, there is a limit to what these can cover (areas of price and contract length are subject to strict anti-competition law) and to their ability to ensure that all customers are covered (the schemes cannot oblige all operators to take part). These consumer issues have also been raised by other organisations.^{8,9,10,11}

For the heat network industry to have a strong future, the risk of poor customer experience must be tackled alongside the question of how to secure investment. Investable projects that lead to satisfied customers are the vital core of achieving heat network growth in the UK.

INVESTABLE PROJECTS THAT LEAD TO SATISFIED CUSTOMERS ARE THE VITAL CORE OF ACHIEVING HEAT NETWORK GROWTH IN THE UK.

1.5 Establishing an industry Heat Network Task Force

In March 2017, industry established a Heat Network Task Force to consider the two key challenges for heat network growth: addressing the risks seen by potential heat network investors, and the risk of poor customer experience. The Task Force had representation from a wide array of stakeholders including investors, industry, and consumer groups, to ensure all aspects could be considered and addressed. In addition, a number of Government and departmental representatives were invited as observers. An overarching theme was to consider the actions that industry could take to address these risks and where, if at all, government or regulation had a role. The contents of this report represent the first time the industry has compiled a set of proposals and principles around which the role of heat networks in a decarbonising economy can be considered.

8 Which? (2015) Turning up the heat: Getting a fair deal for District Heating users

9 Citizens Advice (2016) District heating networks - Analysis of information request

10 Citizens Advice (2017) District heat networks 2 - Analysis of responses from private heat suppliers

11 Citizens Advice Scotland (2017) Different Rules for Different Fuels

1.6 Competition and Markets Authority heat network market study

On 7 December 2017, the Competition and Markets Authority (CMA) launched a market study into domestic heat networks.

The industry Heat Network Task Force report was developed before the launch of the CMA market study and was not, therefore, specifically drafted to address issues raised by the CMA study. This report does, however, address many of the main points identified in the market study statement of scope¹² and may provide helpful input into that Market Study. The CMA attended the Task Force as observers.

1.7 Structure of the report

The Task Force focused on two key issues for the sector: the investment challenge, and ensuring good customer experience. During the discussions, it became clear that enabling investment was the mechanism by which standards for customer protection could be enforced without deterring market growth. Customer protection and investability are intertwined, but for clarity of understanding this report first sets out, in chapter one, how heat network investment can be enabled. In chapter two, the report considers how those benefitting from investment support mechanisms can be held to account for the customer experience.



Image courtesy of Switch2

¹² CMA (2017) Heat networks market study – Statement of Scope

2. Aims and scope of the Task Force

Industry established the Heat Network Task Force to consider how to address the key challenges for heat network growth.

The Task Force considered that, to enable government ambition on heat networks to be met, there were two necessary prerequisites. The first was ensuring that customers on heat networks had reliable, affordable heat. The second was that investors needed to be able to consider heat network infrastructure in a similar way to other infrastructure investments. That is, long term, low risk returns on investments. The Task Force, therefore, focused on addressing the following two key questions:

- **Protecting customers:** How can industry and Government ensure heat network customers receive good service and a fair deal?

Customers on heat networks should receive good value heat and the same, or greater, levels of service as those receiving other services for the provision of heat.

- **Achieving equitable investment:** What can industry and Government do to reduce investment risk for new heat networks to a level equitable with new gas, water, and power network investments?

The aim was to reduce the cost of capital and hence the cost of heat to customers, while simultaneously increasing investment into the sector to meet government objectives.

The Task Force was focused on addressing new heat network investments including both completely new heat network developments and extensions to existing networks. A key reason for this approach is that the Task Force considered the investment risk for existing networks has already been addressed.

The Task Force considered that exploring existing networks was important, but that this should be the focus of separate work. As such, recommendations contained within this report relate only to new heat network investments.

2.1 Task Force members and observers

Task Force members were drawn from all areas of the industry, working together for the achievement of the Task Force objectives. They included: consumer representatives, heat network developers, investors, consultants, metering and billing companies, ESCo's, and local authorities.

BEIS, Ofgem, the CMA, and the Scottish Government took part as observers, and the Welsh Government took part via bilateral meetings with the secretariat (the ADE).

A list of members and observers to the Task Force can be found in Appendix 1.

3. Devolution and local powers

The Task Force wishes to acknowledge the complexities of devolution and local powers in this policy space.

While heat policy is devolved, other intersecting policy areas are not. For instance - customer protection is not fully devolved, and gas and electricity regulation is the purview of Ofgem (operating in GB and UK jurisdictions).

The Task Force started from first principles to seek the best solutions to progress the creation of a self-sustaining market for heat networks by addressing the two key issues identified.

The recommendations set out in this report could be applied in a range of UK jurisdictions. A key value for investment is consistency of approach between jurisdictions, as this can support market growth and enhanced consumer understanding of the market, as well as reducing administrative burden for organisations working throughout the UK. The group did not, however, explore explicitly what should or should not be further devolved, and this report seeks to make no explicit or implicit comment on this topic.

In the heat network sector, some devolved nations (Scotland in particular), as well as cities and local governments already have their own policies and policy proposals. For example, in November 2017, the Scottish Government published Scotland's Energy Efficiency Programme: Second Consultation on Local Heat & Energy Efficiency Strategies, and Regulation of District and Communal Heating, which proposes a regulatory framework for heat networks in Scotland.

The Task Force gratefully acknowledges the input of representatives of devolved administrations – in this case, especially representatives of the Scottish and Welsh Governments, and the Cities of London and Bristol.

Heat is, at its heart, a local issue. There is extraordinary value to be had at a local level in informing and shaping heat networks. This report seeks to help inform all governments and authorities in the UK as they consider how to develop heat network policies.

4. Elements of a heat network

Heat networks are a means of supplying heat and hot water to homes and businesses through a network of insulated pipes. Heat networks comprise three main elements: generation, distribution, and supply.

4.1 Generation

The generation system typically comprises one or more energy centres housing technologies such as gas and bioenergy-fired combined heat and power (CHP), biomass boilers, heat pumps, and energy from waste facilities. Heat networks can also harness existing heat sources by facilitating the collection and distribution of waste heat, and

other renewable heat sources such as geothermal energy. Energy centres often have thermal stores (large, well-insulated hot water tanks) allowing heat from generation to be stored rather than being supplied immediately to customers. Storage effectively disconnects heat production from heat consumption enabling heat to be produced at the most cost-effective time of the day. For example, a heat pump on a network could operate

at times of lower electricity prices (such as high wind and solar output), reducing the cost of heat to customers. As the power system decarbonises, demand flexibility will become increasingly valuable to accommodate increasing renewable generation. Thermal stores enable heat networks to provide such flexibility.

4.2 Distribution

A heat network distribution system comprises a network of insulated pipes which transport hot water from the point of generation or collection to the end customer. The distribution system can be broken down into:

The primary pipe network – the network of insulated pipes that transport heat from the point of generation or collection to the connected buildings.

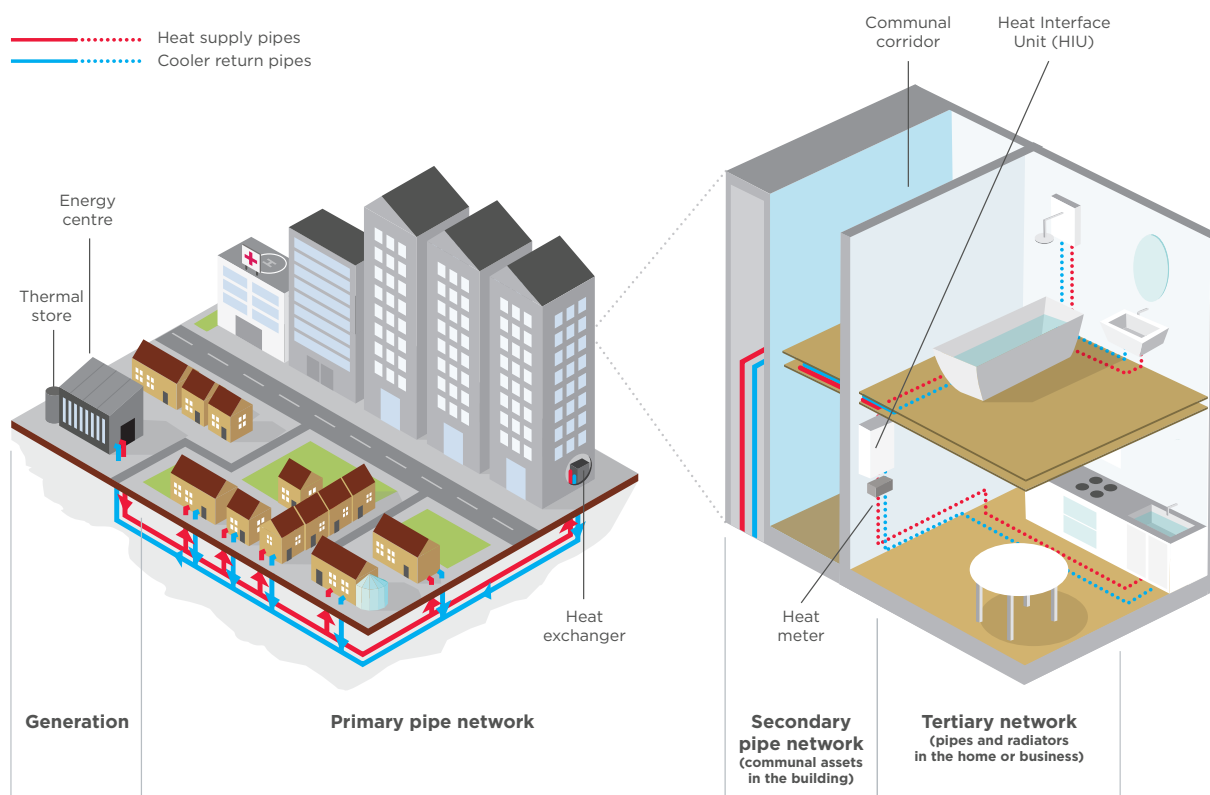
The secondary pipe network – the network of insulated pipes in a building. If the building has

multiple individual heat users (for example, a block of flats) the secondary pipe network transports heat through the communal areas to the point before it reaches the end customer. A heat exchanger transfers heat from the primary pipe network to the in-building secondary pipe network.

The tertiary network – a heat interface unit (HIU) transfers heat from the secondary pipe network to the individual home or business. The network after the HIU is generally the tertiary network (heating system), where the heat is used by the customer. In homes, the heat interface unit is similar in appearance to a domestic gas boiler.

4.3 Supply

Supply is a service to the end customer, comprising the sale of heat, heat metering and billing, and customer interactions including customer information and complaint handling. This is normally the principle point of contact between the heat network and the customer.



CHAPTER 1 – MAKING HEAT NETWORKS INVESTABLE AT SCALE

Heat networks are large infrastructure projects with high capital costs and long returns on investment. Key to understanding what investors seek when considering such projects was to explore the perceived risks and rewards, as they relate to the investment being made.

5. Risk and regulation

Risk is inherent in all markets and for all investments. When considering an investment, investors evaluate the risk profile (the number and type of risks, and the potential impacts of those risks) of the market or organisation they are considering for investment. For the investor to proceed, the investment must fall within their risk tolerance for the investment type. The greater the investment risk, the higher the return sought. In a higher risk project, investors consider that there is a lower probability of the money made available to the project (for example, a loan) being paid back (or providing a return) to the investor. This risk is compensated for by increasing the cost at which money is made available. The cost of capital (for example, the interest rate on a loan) rises with the risk.

In heat networks, the capital is for a long term investment (network assets last in excess of 50 years). The cost of capital will, therefore, form a key part of the cost of heat to end customers. Rather like the interest on a mortgage, a small change in the cost of capital can have a very large impact on the total cost of the investment over its lifetime and, therefore, on both customer bills and the viability of the investment itself. By reducing risk in heat network investments, the cost of

capital can fall, making more investments possible and helping to drive down customer bills.

Investment risks can be any risks that reduce the possibility of achieving the anticipated return on investment. Risks are therefore diverse, from issues that may cause project delays (for example, access to land) to those that increase operational costs (such as dissatisfied customers or poor network efficiency). Many of the risks associated with investment in the regulated network utility markets such as gas, electricity, and water, have been mitigated by regulatory frameworks. These risk mitigations include:

- Assurance of network revenues;
- Technical performance and build standards;
- Customer protection standards; and,
- Land access rights.

These regulatory frameworks have helped to create low risk investment profiles in the regulated network utility markets, thereby attracting low cost capital to the sector. If the heat network market is to grow and deliver cost effective heat to customers, investments in the sector will need a similar risk profile to those in the regulated network utilities.

IF THE HEAT NETWORK MARKET IS TO GROW AND DELIVER COST EFFECTIVE HEAT TO CUSTOMERS, INVESTMENTS IN THE SECTOR WILL NEED A SIMILAR RISK PROFILE TO THOSE IN THE REGULATED NETWORK UTILITIES.

5.1 Heat network risks

The Task Force identified key areas of risk in the heat network market that could impact investment decisions and the customer experience:

- **Demand risk** – the largest risk facing new heat network investments, and the most challenging to mitigate. Demand risk is the uncertainty around whether connections to buildings (sources of heat demand) will happen, and that they will happen at the time set out in a business plan. A good understanding of the demand, and the probability of that heat demand not arising, as set out in a business plan, has to be fully understood before a final investment decision can be taken. Demand risk is often a catch-22, where potential customers will only agree a contract to connect to a heat network (removing demand risk) once the network has been installed, but the installation of the network cannot commence until contracts for connections are in place as there is no assurance of demand.
- **Superseding or stranding risk** – the risk that the heat network will become redundant before its value is depreciated.
- **Optimising for anticipated demand growth** – Designing the network to ensure it can meet expected demand growth as it is built out, while avoiding the risk of an inefficient network over the long term.
- **Performance risk** – the risk that the heat network will not operate to the standards specified at the start of the project. Issues could include inefficient networks causing energy waste, which adds to the cost of operation, potentially driving up customer bills and reducing investment returns. These risks can be mitigated by the setting and enforcement of design, construction, commissioning, operation, and maintenance standards.
- **Dissatisfied customers** – discontented heat network customers are likely to cost more to serve than contented ones, through complaint management. The customers may also seek to disconnect from the network. The key risks to customer satisfaction are:
 - Supply reliability – ensuring when customers turn on heat or hot water it is delivered
 - Supplier accountability – ensuring that suppliers are effectively accountable to their customers for the service they provide
 - The cost of heating – how much it costs to heat a home or office.



- **Achieving decarbonisation targets** – the Climate Change Act binds the UK to greenhouse gas reduction commitments. Heat energy is a major source of greenhouse gases and heat networks, alongside all other sources of heat, need to decarbonise. Heat networks can decarbonise and are already cutting carbon emissions, but they will need to continue that decarbonisation. A failure to decarbonise is an investment risk as it could create an unusable or stranded asset.
- **Land access rights for build, maintenance, repair, and replacement of network** – the inability to access land for plant and pipework during build and operation can cause needless administration and lead to costly project delays. Uncertainty over land access rights can be a significant project risk.
- **Network on network competition** – two heat networks in the same location competing with each other reduces the performance and efficiency of both networks – rather like building two identical roads side-by-side. As with gas, power, and water networks, heat networks are a natural monopoly and it is more cost effective to optimise one rather than have two competing side by side.

Image courtesy of Veolia



5.2 Risk mitigation and regulatory models in the gas and electricity markets

Many of the heat network investment risks identified by the Task Force are also present in the gas and electricity markets. A successful framework for heat networks will create a similar risk profile for heat network asset investment as currently exists for the regulated utilities.

A good starting point, therefore, was to consider how existing regulatory models reduced or reallocated the key risks (away from the investor) in the gas and electricity markets (Table 1). The models considered were:

- **RIIO** - Revenue = Incentives + Innovation + Outputs (electricity and gas)
- **OFTO** - Offshore Transmission Owner (electricity)
- **IDNO** - Independent Distribution Network Operator (electricity)
- **IGT** - Independent Gas Transporter (gas)
- **Interconnector cap and floor** (electricity)

Table 1. Regulatory risk mitigation in the gas and electricity markets

	RIIO Revenue = Incentives + Innovation + Outputs	OFTO	IDNO	IGT	Interconnector cap & floor
Minimum standards for design & construction	NERS and GIRS; Grid and Distribution codes	Grid Code	NERS	GIRS	Grid Code
Poor operation & maintenance penalised	Penalties/incentives plus guaranteed standards plus network output measures	Penalty for low availability	Guaranteed standards	Guaranteed standards	Revenue depends on availability
Minimum supply reliability standards					
Demand risk removed from owner/investor	Revenue not volume based	Yes	Take risk subject to contract	Take risk subject to contract	Cap and floor on revenues
Supersede or stranding risk fully removed from owner/investor	Revenue not dependent on volume within period	Revenue not dependent on volume	Take risk	Take risk	Floor on revenues limits stranding risk
Does model ensure decarbonisation of energy in network	Separate policy tools from Government, not regulator	Separate policy tools from Government, not regulator	Separate policy tools from Government, not regulator	Separate policy tools from Government, not regulator	Separate policy tools from Government, not regulator
Rights to access land for build, repair, and replacement of network	Yes	Yes	Yes	Yes	Yes
Sizing for anticipated demand growth of network	Well justified business plan	Over-sizing possible (not common)	Commercial decision	Commercial decision	Commercial subject to Ofgem assessment
Avoid network on network competition	IDNOs/IGTs compete for extensions	Competition via tender process	Competition for the market	Competition for the market	Ongoing competition with other interconnectors
Control of price charged to end customer	Network component capped	Revenue control	Capped at DNO rate	Capped at GDN rate	Revenue cap - excess returned to end customer
Cost sharing over more than immediate beneficiaries/users	Revenues set per licensed area	Costs socialised over wider users	No	No	Outside cap and floor is socialised
Supplier accountability	Yes – supplier switching	N/A	Yes – supplier switching	Yes – supplier switching	N/A

Agreement with statements ■ None ■ Partial ■ Complete

The large scale of low-cost institutional investment in regulated network utility assets demonstrates the success of regulatory models in reducing risk in these markets. The Task Force concluded that these models were informative and provided a good indication of the risk profile that needs to be achieved in the heat network sector. However, none of the models in place could be carried over to heat networks as designed. The gas and power networks were large, publically-owned infrastructure, developed by the state. These existing assets were then transferred to the private sector. Subsequent investment in these assets has been based on the ability to spread investment risk across a large customer base. In contrast, the UK does not have a large publically-owned heat network asset base against which investments can be de-risked. As a result, the Task Force concluded that a unique heat network risk mitigation model would be required. The Task Force also noted that, like gas and power networks, heat network infrastructure is a natural monopoly. With natural monopolies, it is cost inefficient to replicate the infrastructure in the same location. As a result, gas and power networks are all regulated, enabling both customer protection and asset investment. The Task Force concluded that a regulator for heat networks would be necessary.

Ofgem, the regulator for the gas and electricity markets, is moving towards more principles-based regulation, as this can allow more flexibility for suppliers to meet standards. Principles- and prescriptive-based regulation may work well in different markets, but consideration needs to be given to the less mature state of the heat network market. Any move towards principles-based regulation would need to be based on evidence that the market maturity could support it.

Recommended principles:

- Given the long term nature of heat network infrastructure assets, the Task Force concluded that a regulatory solution to address the investment risk for heat networks was necessary
- The Task Force concluded a regulator was the most effective way to ensure the two key questions of the report could be addressed – ensuring customer protection and enabling low cost of capital investments. Further consideration would need to be given as to whether this function was best placed with an existing regulatory body or an independent specialist body

THE TASK FORCE CONCLUDED A REGULATOR WAS THE MOST EFFECTIVE WAY TO ENSURE THE TWO KEY QUESTIONS OF THE REPORT COULD BE ADDRESSED – ENSURING CUSTOMER PROTECTION AND ENABLING LOW COST OF CAPITAL INVESTMENTS.

5.3 Proposed risk mitigation models for heat networks

The Task Force considered a number of risk mitigation and investment models that have been developed for heat networks. These include:

PipeCo – the PipeCo model proposes separating investment in heat network distribution pipes from investment in the heat generation and supply. In most cases, the distribution system is the most capital intensive element of a heat network. The pipework also has an expected lifetime of over 50 years, whereas the lifetime of typical heat generation and supply equipment will be 15-25 years. The expectation is that, if investors are able to invest in the distribution network as a single entity, the longer infrastructure lifetime will allow for longer payback periods than for investment in the heat network as a whole. By spreading the cost of capital for a large portion of the overall network cost, over a longer timescale, the cost to the customer per year can fall. This model also provides opportunity for refinancing of distribution networks by third-party investors interested in long-term investments.

The Task Force concluded that the PipeCo model alone does not sufficiently de-risk investment, as the question of the assurance of demand (demand risk) from future customers is unaddressed. However, the disaggregation may provide opportunity for greater competition in supply of some of the heat network services (this is explored further in section 12). It also creates different investment options (rather than an investor necessarily investing in the entire system) which could potentially be more attractive to institutional investors, and to the refinancing market.

Concession model – the concession model is based on the principle that a heat network

developer will be given an exclusive contractual right, by an authority (for example, central or local government), to build and operate a heat network in a particular location for a set period of time (usually several decades). This model, via the contractual arrangements, provides opportunity for mitigating many of the investment risks. These contractual arrangements could include measures such as guaranteed right to connect all new heat demands within the concession area, wayleave and access rights, minimum heat network build quality standards and decarbonisation measures.

However, even in new developments, where all new buildings are required to connect to the heat network, the concession model alone does not fully address the issue of future demand risk. Many large scale developments where concessions may be offered will be based on multiple phases of development, some of which may not come forward at the time or volume originally envisaged. Concessions may provide exclusivity of supply to new developments, but they do not provide any guarantee that the development will occur as planned. Likewise, in concession areas with existing buildings (where heat networks have some of their greatest potential for decarbonising heat), the concession model alone does not necessarily de-risk demand. It has been proposed that concession models could include a requirement that existing buildings, or certain existing buildings, be compelled to connect to a heat network, however this may not always be advisable.

Demand Assurance – a proposed model in which a heat network developer would produce a Strategic Plan for a heat network development. The plan would be based on reasonable expectation of heat demand arising from customer connections as the heat network is built out. The Strategic Plan would be submitted to a regulator (or their

agent) for consideration. Once a Strategic Plan was approved, a Demand Assurance covering the heat demand, based on customer connections set out in the Strategic Plan, would be offered to the developer. This Demand Assurance would assure investors that, should the heat demand not arise as predicted under the plan (either in capacity or timing), an element of the investment would be protected. As a minimum this protection would cover the cost of capital for demand shortfall. The Demand Assurance would operate as a safety net, ensuring that the heat network developer was incentivised to secure new heat customers as quickly as possible to achieve the returns anticipated. As part of the Demand Assurance, the developer would be obligated to meet conditions including minimum customer service requirements, and heat network design and build standards. These conditions would be based on mitigating the other risks associated with a heat network, including the risks faced by customers. The Strategic Plan and Demand Assurance proposals are further explored in sections 7.2 and 7.3.

The Task Force concluded that a regulatory framework which includes a Demand Assurance linked to customer service obligations is the only model that addresses the vital risk of future heat demand. Such a framework provides an opportunity to mitigate the other key risks through conditions obligated as part of the Demand Assurance. This approach would enable investment through de-risking in the heat network market to a level equitable with the regulated utilities. The regulatory framework could also work alongside concession and PipeCo models, or elements of them, if desired.

THE TASK FORCE CONCLUDED THAT A REGULATORY FRAMEWORK WHICH INCLUDES A DEMAND ASSURANCE LINKED TO CUSTOMER SERVICE OBLIGATIONS IS THE ONLY ONE THAT ADDRESSES THE VITAL RISK OF FUTURE HEAT DEMAND.

It is possible that a customer ownership model, such as a co-operative, could provide demand assurance as heat network customers would also be heat network owners. While this is an interesting option, the Task Force was tasked with enabling as wide a range of business models as possible for heat network investment. The Demand Assurance proposal could be developed to work with community ownership models as well as others.

Recommended principles:

- A regulatory model which provides heat network developers with Demand Assurance, and binds those developers to standards to reduce customer risk, is needed to secure new heat network investment and protect customers
- The regulatory model should allow for the separation of network asset investments into separate entities, to reflect their unique investment profile, and to facilitate areas of competition

6. Key principles for a heat network regulatory framework

Having concluded that a regulatory framework was a necessary element to de-risk investment in the heat network market, the Task Force explored what principles need to be included within any framework.

The group considered that the offer of de-risking investment through Demand Assurance would create the opportunity to set binding requirements for those benefitting from that risk reduction, to enshrine these principles.

The key principles, listed below, are discussed in the following chapters of this report:

- **De-risk demand** – regulatory intervention is vital to de-risk demand
- **Enable expansion** – the regulatory framework should be designed to allow for expansion of heat networks. This includes expansion through interconnection with other networks
- **Price control** – regulatory control of some elements of the price charged to the end customer will be needed
- **Minimise customer risk** – the customer must not bear the risk of an unreliable or inefficient heat supply, poor customer service or poor value heating
- **Separation of generation, distribution, and supply** – the regulatory framework should provide the ability to separate out investment in the generation, distribution, and supply of heat. It is important to note that such separation can be valuable but it should only occur where it delivers clear end customer value
- **Network accountability** – any organisation providing poor and failing aspects of heat network operation should be at risk of losing the right to provide those services on that network
- **Decarbonisation** – the regulatory framework should facilitate heat network decarbonisation, in line with carbon reduction targets
- **Wayleave and access rights** – heat networks should be granted statutory access and wayleave rights to the same extent as the regulated utilities



Image courtesy of Switch2

7. Designing a regulatory framework incorporating Demand Assurance

This section considers the key principles for a regulatory framework and how each should be addressed under a Demand Assurance regulatory model.

7.1 De-risking demand

The main barrier raised by potential investors in the heat network market is demand risk. As explained earlier in this report (section 5.1), future heat demand risk is a key issue for heat networks that must be addressed if Government's ambitions for heat network market growth are to be achieved.

The Task Force defined the successful management of demand risk as:

'Having sufficient confidence about future scale, timing, and use of heat network connections, to allow investment in the design and build of a heat network at sufficient scale to make a viable return on investment. The consequential reduction in investment risk will also mitigate other risks such as customer dissatisfaction through poor service or performance'

Demand risk can be broken down into three areas:

- **Capacity risk** – heat networks are most efficient when they run at full capacity. To design efficient networks, it is important to accurately plan for both expected future connection capacity and for capacity reduction due to factors reducing customer demand (such as energy efficiency measures on the demand side, and warmer heating seasons).
- **Usage risk** – The risk of a heat network customer using less heat than forecast, or disconnecting from the network altogether,

resulting in falling demand and heat network performance. In extremis, this increases the risk of a stranded network asset.

- **Timing of use risk** – The most efficient heat networks will have a relatively flat demand profile, with smaller peaks and troughs in heat use over the course of a day. The heat demand can be evened out through improving building efficiency and connecting different building types, such as homes and offices which have different heat use profiles (offices generally use more heat on weekdays and homes use more heat in the evening and at weekends).

To successfully de-risk demand all three of these aspects must be addressed.

7.2 Strategic planning for cost effective heat networks

For the majority of heat networks, the cost of installing the primary pipe network is the greatest capital cost. It is vitally important to understand the expected future capacity of the heat network to ensure the primary pipe network is correctly sized. Oversizing increases construction cost and reduces operational efficiency. Undersizing may constrain the scope for future expansion, requiring pipe replacement during their useful lifetime. Such replacement creates unnecessary additional costs and disruption. Discussions at the Task Force meetings suggested that the risk of oversizing is greater than the risk of undersizing.

In the development stages of a heat network

project, the future scale, customer type, and heat demand of connected buildings must be strategically planned, so that revenue from future connections are reasonably forecast and the risk of over- or under-capacity sizing of the primary pipe network can be minimised.

Under a regulatory framework with Demand Assurance, a heat network developer would be required to prepare a Strategic Plan for the phased development of a heat network over a long period, for example up to 25 years. The Strategic Plan would be based on a high quality feasibility study and master planning process (such as the heat network development work supported by the UK Government Heat Network Delivery Unit, or the Scottish Government Heat Network Partnership for Scotland). The plan could be for a new heat network or for an extension of an existing heat network. The Strategic Plan would demonstrate the heat network, once built out, to be economically viable with the identified heat demand capacity being served.

The technical, legal, and commercial arrangements of the Strategic Plan would need to allow for interconnection with other heat networks. The plan would also need to demonstrate how progressive decarbonisation of the heat network would be achieved. It would also be required to evaluate demand reduction risk due to other factors, such as energy efficiency measures applied to connected buildings, customer loss, or warmer heating seasons. There may be significant value in developing the Strategic Plan in conjunction with the Local Planning Authority.

The Strategic Plan would be assessed by the regulator (or their agent) and, if approved, the total final connected heat capacity set out in the plan would be awarded Demand Assurance. As a minimum, the Demand Assurance would need to apply to the primary pipe network investment (the ‘regulated asset’) and provide the investor contractual assurance over the life of the project.

The Strategic Plan must be sufficiently technically and commercially robust to enable the regulator (or their agent) to undertake the necessary due diligence to minimise any long-term risk to customers or taxpayers of inefficient or stranded assets, and to assess value for money.

Recommended principles:

- Under the proposed regulatory framework, for the heat network developer to access the Demand Assurance, they should be required to prepare a Strategic Plan for the phased development of a heat network
- The Strategic Plan should include proposals for network expansion, managing future demand reductions, progressive decarbonisation of heat, and network interconnection

7.3 How the Demand Assurance will work

The Committee on Climate Change (CCC) recognised that the growth of low-carbon heat networks through the 2020s will require a supportive financing framework, which could include policies such as Government guarantees, to de-risk investments in large multi-stage heat network developments¹³. While the regulatory proposal here is not traditional Government guarantees, it sets out a route for the necessary de-risking identified by the CCC.

Revenue assurance is seen in the gas and electricity markets through the RIIO framework. Under this framework, the regulator sets the total allowable revenue that network operators can recover from charges for each transmission and distribution network. The policy seeks to

13 UK Committee on Climate Change (2016) Next Steps for UK Heat Policy

ensure network operators can recover reasonable costs and returns, subject to providing value for customers. Revenue assurance is also seen in the cap and floor regime for electricity interconnector projects, which sets maximum and minimum interconnector revenues subject to sufficient levels of availability. Costs from ‘topping up’ interconnector revenues if they fall below the floor are recovered through transmission network charges.

An inevitable part of the creation and approval of a Strategic Plan will be the assessment of the proposed costs to the customers of the network by a regulator. Some of the costs, such as the investment needed to construct the heat network as well as cost of capital to fund the investment, could be set out with a high degree of confidence in the Plan. Variable network costs, such as fuel cost for heat generation, vary over the life of a project and may be far less predictable.

The overall approach to costs and to charging these to the customer would necessarily be examined and, if well justified, approved by the regulator. The approval of the plan and the provision of the Demand Assurance would require approval of the fixed charges to those network customers. As a result, the fixed costs of the network and how these are passed through to customers is necessarily the subject of regulatory approval; in other words, a price control. This is explored further in section 7.4.

As a heat network is built out and more connections are made, the network costs are recovered over a greater number of customers and a higher total capacity. Through a more diverse customer base, the revenue risks decrease substantially, and the probability of claiming under the Demand Assurance also falls. At the same time, the potential size of the claim rises over time, as the network cost base grows. As the network grows, decreasing claim probability helps

minimise the overall cost liability of a Demand Assurance policy.

The regulatory framework would provide a range of benefits and obligations. The obligations, such as meeting minimum technical and customer service standards, serve to reduce customer risk. The benefits, such as Demand Assurance and the granting of wayleave rights, reduce investor risk and the cost of capital. Combined, the proposed regulatory framework mitigates key risks for all stakeholders, from investors to end customers.

THE PROPOSED REGULATORY FRAMEWORK MITIGATES KEY RISKS FOR ALL STAKEHOLDERS, FROM INVESTORS TO END CUSTOMERS.

The Task Force recommends that, as a minimum, the primary pipe network should be the asset provided with Demand Assurance.

Consideration should also be given to applying Demand Assurance to the secondary pipe network to ensure that buildings can connect to a network - an example of this might be the connection of an existing building that requires conversion of an electrical heating system to a wet in-building pipe network. Consideration should also be given to whether such an assurance could be made available for investing in heat generation assets. This could be for the appropriate installation of innovative low carbon heat generation (such as third party waste heat), or for some smaller heat networks which will need to be granted a Demand Assurance as a single entity with the assurance applied to the whole scheme (as unbundling in such instances is unlikely to drive down customer cost).

Recommended principles:

- A Demand Assurance mechanism should be established to apply to the primary pipe network as a minimum
- Consideration should be given to the extension of the Demand Assurance beyond the primary pipe network

7.4 Price control

The Task Force proposal for Demand Assurance requires third party analysis and approval of a Strategic Plan. As the business case will be based on customer charges in the Strategic Plan, it is right that these charges are established as a limit on what customers can be charged for the network asset costs. As noted earlier in this report, the Task Force considered that a regulator's approval of the Strategic Plan and, thus, of the fixed costs of the network and how these are passed through to customers, creates a price control mechanism as part of a regulatory framework.

Given the variable nature of the build-out of a network, it may be optimal to award the operator minimum and maximum network revenue generation levels (i.e. a 'cap and floor') from 'use of system' charges on the primary pipe network. This mechanism protects investor revenue and customer costs. Where a network fails to raise the minimum revenue, the network operator would be able to make a claim under the Demand Assurance. Should the total network revenue exceed the cap, the network operator would be expected to pay back the excess. Both the cap and floor elements would need to take account of the circumstances in which changes in revenues relate to changes in costs. For example, a more rapid build-out could lead to increased

network revenues but also increased investment costs. A similar cap and floor model exists in the power interconnector market and the Task Force considered that this may be a good approach for heat networks, though more detailed work is needed to confirm if this is the best model for heat network investments and customers.

A price control provides protection for customers; however it forms only a part of the final heat price paid by the end user.

The Task Force explored additional mechanisms for price control options that could be put in place for heat networks, which would aim ensure a fair final heat price paid by customers. These included:

- A fixed cap on the final heat price
- A relative cap on the final heat price - based on either an alternative heat source price (gas or electricity), the heat network market average price, or a formula based on the input costs for a given network

There was significant debate over the options for price controls and their relative benefits and risks. The Task Force concluded that, at this stage, it was right to recommend a price control applying only to the primary pipe network receiving the Demand Assurance. Other options for ensuring a fair final price, such as competition and transparency, are explored later in this report and should be considered as alternatives to end customer price caps.

The Task Force concluded that the wider debate on price transparency and the role of regulation could only be carried out as part of a wider detailed design of the Demand Assurance mechanism, and the success in increasing competition for other services surrounding heat supply on a network. Such research should be evidence-based and focused on giving customers the best outcome, which includes ensuring that the infrastructure investment remains low risk.



Recommended principles:

- A revenue cap and floor should be considered for the regulated asset under the Demand Assurance, to ensure customers' interests are protected
- Further consideration of the role of regulation in price transparency and in controls applied to new heat networks covered by this regulatory framework should take place as part of detailed design of the Demand Assurance, but robust evidence should be required to regulate costs beyond the network assets covered by the Demand Assurance

7.5 Enabling heat network expansion

Large scale city-wide heat networks have the greatest potential to reduce heating bills by exploiting economies of scale, providing a wider customer base to spread the costs. By connecting mixed-use buildings with differing heat demand profiles, the heat load becomes more even, improving system efficiency. Large scale heat networks are built out over time, in phases. They can also link up to existing communal heating schemes. The early phases of development require the installation of primary pipework sized to meet the future planned capacity of the network. This may result in reduced initial operational efficiencies and increased early construction costs, which can only be spread over the limited number of initial customers. As a result, the early stages of large scale heat network developments are rarely commercially viable. While large scale heat networks have the greatest efficiency potential when delivering near capacity, they

also pose a risk of inefficiency if that capacity is not realised. As a result, any Demand Assurance needs to balance the costs of sizing for network development and the risks of oversizing.

Recommended principles:

- The Demand Assurance should allow for future expansion, while being robust enough to mitigate the risk of long-term primary pipe network oversizing

7.6 Compulsory connection

The Task Force explored the idea of compulsory connections to heat networks as a mechanism to further reduce demand risk and allow for better future capacity planning. Compulsion to connect can have a range of meanings. For this report, compulsion means a requirement for a customer to connect to a heat network where robust analysis demonstrates a positive cost benefit analysis compared to an alternative with the same constraints (cost, carbon emissions etc.)

The Task Force considered that compulsion to connect can contribute to demand risk reduction and facilitate the expansion and increased efficiency of heat networks. Given the likely role of Local Authorities in supporting heat network

development, encouraging or mandating existing public sector buildings to connect to heat networks would be valuable in a positive cost benefit scenario.

Mandating connection of new developments (subject to a cost benefit analysis) through planning permission, such as is required under the London Plan, should also be considered, to achieve an optimal local energy solution.

7.7 Third party access

The Task Force considered the right to third party access for heat provision into a heat network. The Task Force concluded that, in principle, third party access for heat provision to a network should be allowed.

The Task Force noted, however, that careful consideration should be given to how any unplanned third party heat input would impact the existing heat generation assets on that network. In particular, the avoidance of creating stranded generation assets through new heat provision, causing existing generation assets to operate at significantly reduced capacity factors. The resulting asset write-downs would increase both customer cost and investment risk on the generation side.

Image courtesy of Veolia





Recommended principles:

- Mechanisms should be put in place to allow third party heat generation and input to connect to new heat networks covered by this regulatory framework, under certain conditions

7.8 Who underwrites Demand Assurance?

In heat networks, like gas and electricity networks, the infrastructure costs are a significant component of the customer's energy bill. In gas and electricity networks, investment risk is shared across millions of network customers. This cannot be replicated in the heat network market, as the limited existing heat network assets do not provide a sufficient customer base to spread the investment risk. It is unclear if a Demand Assurance would need to be socialised across a wider base.

Further work is needed to determine if wider socialisation of liabilities would be needed and, if so, what the best option for that would be. Careful consideration would need to be given to minimising potential burdens and risks to wider customers.

Recommended principles:

- Analysis is needed to determine what, if any, liabilities of Demand Assurance need to be socialised across a wider customer base
- If wider socialisation of the Demand Assurance is needed, further thought should be given to determining the best option for implementing this

8. Decarbonisation

A key benefit and driver for the development of a strong heat network market in the UK is the ability of heat networks to facilitate heat decarbonisation via the utilisation of waste heat, renewable, and low carbon heat sources, and through scale efficiencies.

It is vital that heat networks deliver deep decarbonisation, as set out in the Clean Growth Strategy. Experience in other countries demonstrates that this is achievable, and the Task Force considered options for how this may be delivered.

A conflict may exist between decarbonising heat and providing low cost heat (however, lessons from the power sector suggest that low carbon heat may become cheaper than conventional options as they become more mass market). In determining the heat generation technology to be used in a heat network, consideration must be given to both carbon reduction targets and the final heat cost. Broader policy concerns such as fuel poverty and local air quality issues also need to be taken into account.

While heat networks are generally lower carbon than the prevailing counterfactual through the deployment of gas CHP, lower carbon fuels and technologies will be needed to decarbonise heat networks going forward. The transition to low carbon heat networks, such as hybrid energy centres with a range of technologies, can have a cost impact that undermines the scheme economics or risks driving up customer cost. As with the power network, ensuring heat network

decarbonisation, while providing good value heat will require dedicated policy instruments. Any heat decarbonisation policies or future low carbon technology incentives should be accessible to heat networks.

To secure Demand Assurance, there should be an obligation on the heat network developer to demonstrate an emissions reduction plan, showing how decarbonisation could be secured in line with carbon budgets. The delivery of emission reductions can be achieved in two ways.

- **Option one** is the provision of policy instruments which encourage investment in low carbon solutions (such as the renewable heat incentive) or those that discourage higher carbon investments (such as carbon taxation or regulatory restriction). In this option, heat networks would be required to facilitate the connection of lower carbon heat sources, and policy measures would be required to ensure that the economics of such investments were viable. In this instance, it would be vital that policies applied equally to heat across the energy system, not just within heat networks, to prevent competitive distortions between heat supply and other forms of heating.

- **Option two** is to make the granting of Demand Assurance conditional on the decarbonisation of a heat network. In such an instance it would be important that the Demand Assurance ensured that the investment in low carbon technologies was viable. If such investments increased customer costs, it would be important to ensure that heat network policies were aligned with wider heat decarbonisation policies. Such heat market wide constraints or obligations are vital to prevent market distortions favouring one heating system over another. The risk of an obligation on heat networks alone is that customers may be encouraged to switch to a higher carbon solution for a cost benefit, undermining Government's decarbonisation objectives.

Emissions reductions can be achieved by lower carbon heat generation, reducing the overall heat demand (via energy efficiency measures) and by harnessing waste heat, therefore reducing the amount of new heat being generated. Any decarbonisation mechanism should provide the option to decarbonise via demand reduction as well as via heat generation and the utilisation of waste heat. The methodology for allowing decarbonisation via demand reduction must be sufficiently robust to prevent the gaming of a regime, such as through artificially inflated initial emissions figures to give the impression of steeper abatement trajectories.

Recommended principles:

- The decarbonisation mechanism should provide the option to decarbonise via demand reduction as well as via heat generation and the use of waste heat
- To secure Demand Assurance, the regulator must determine the heat network offers a route to decarbonise heat which also provides good value to the end user
- Consideration needs to be given as to how best to drive heat network decarbonisation, whether through decarbonisation targets for those in receipt of Demand Assurance, or through wider policy instruments
- The regulatory framework, and the interventions required alongside it, should ensure that the heat flowing through the heat network achieves decarbonisation in line with UK, Scottish, and Welsh Government carbon reduction commitments



Southampton District Energy Scheme (geothermal)

9. Wayleave and access rights

Gas, electricity, and water network developers have statutory rights to allow them to construct networks in a logical way, avoiding costly and inefficient detours around parcels of land. These are known as wayleave and access rights. Heat network developers do not have these same statutory rights. This inequality creates additional construction risk for heat network developers compared to the regulated utilities, and can increase the construction and operating costs through additional, unnecessary pipe laying. These risks apply not just to the developer of a heat network but also to its customers, in terms of operational performance, efficiency, and cost.

Risks associated with a lack of regulatory access rights include:

- Failure to secure the necessary permissions to allow construction of the heat network
- Delays in construction while permissions are being sought
- Lack of ongoing access rights for essential works and maintenance
- Risk of third parties taking advantage by increasing the cost of access rights
- Lack of immediate access rights to deal with emergency situations such as a leak

In addition to increasing the risks associated with construction, operation, and maintenance of heat networks, the lack of these regulatory rights also leads to longer development time and bureaucracy, as permissions and contracts are negotiated, further increasing the cost to developers and, in turn, to customers.

Recommended principles:

- The regulatory framework for heat networks should include statutory access and wayleave rights to install and maintain distribution pipes, and rights for compulsory purchase on private land, to the same extent as the regulated utilities of water, gas and, electricity

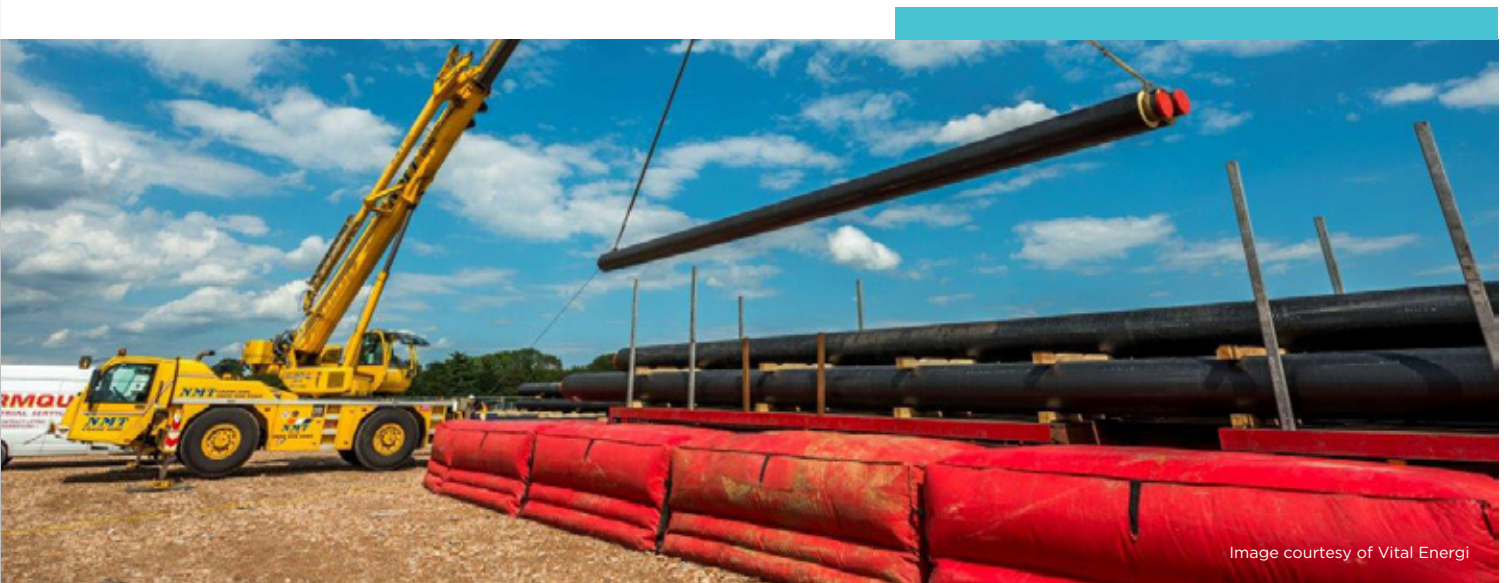


Image courtesy of Vital Energi

CHAPTER 2 – MINIMISING CUSTOMER RISK

This chapter considers how, as part of the regulatory framework proposed in chapter 1, mitigation of customer risk can be effectively achieved.

The important role of price control in minimising customer risk has been explored in section 7.4.

10. Ensuring transparency

10.1 Standardisation of heat network bills

One of heat network customers' overriding complaints relates to billing, back-billing and the application of standing charges. Of the complaints received by Ombudsman Services for Heat Trust-registered schemes, 74% related to billing and back-billing and, of these billing complaints, 54% related to the level of standing charge and a lack of clarity on what costs are recovered from standing charges¹⁴.

The methodology for calculating heat network tariffs varies from scheme to scheme. The allocation of components in a heat bill between the fixed and variable costs are also not standardised. This lack of standardisation across the sector, and lack of transparency in billing information, can be confusing and undermine trust in the heat network and the heat supplier. It creates difficulty in comparing heat pricing across heat networks, and also in identifying heat network maintenance charges. In some cases, maintenance charges may be the duty of someone other than the heat bill payer (for example, a landlord rather than a tenant).

The Task Force discussed that this area is one in which the industry is unable to act alone. If the industry were to set standards as to what could and could not be included within heat bills and their structure, it would risk falling foul of competition law. Therefore, while the Task Force considered that standardisation of key elements

of the heat bills would be valuable, this was an area for a regulator working with the industry to set standards. The Task Force also noted that it was vital that, while transparency and standardisation were important, the establishment of innovative tariffs and service provision were enabled by any policy.

The Task Force considered that further work was needed to define the elements that can reasonably be included in heat network bills. Consideration will need to be given to the variability of scheme specific costs and different approaches to billing, and how this will be factored into the methodology

Recommended principles:

- A standard methodology for the elements that can be included in heat network tariffs should be developed by a regulator, with industry, and applied consistently across heat networks with access to Demand Assurance
- Any standardisation of what can be included within tariffs must not prevent innovative approaches to tariff or bill setting

¹⁴ Heat Trust (2017) Heat Trust Annual Report: Findings from year one

10.2 Cost comparison

In Denmark, heat network cost comparison tables¹⁵ are freely available and allow heat network customers to easily identify how their heat bill compares to customers on other heat networks. This transparency helps to build trust in the sector and drives competition between networks.

In the UK, the lack of available pricing data and absence of standardised approaches for what is included within heat network tariffs means it is difficult for heat network customers, and potential customers, to understand and compare heat network heat costs.

Heat Trust has developed an online Heat Cost Calculator¹⁶ that allows domestic heat network customers to calculate an estimate of the cost to heat their home and hot water had it been fitted with a modern gas boiler, for comparison with their heat network bill. This helps domestic heat network customers understand their heat bill, including the fundamental differences between a gas bill and a heat bill - the heat bill includes costs not included in a gas bill, such as repair and maintenance of the system, and the equivalent cost of domestic boiler replacement.

There is currently no process or tool to allow individual heat networks to be compared to the wider heat network sector.

The Task Force recommends that those heat networks supported through Demand Assurance be required to submit data for the purpose of cost comparison across the UK.

Recommended principles:

- Heat networks supported through Demand Assurance should be required to submit data to a third party, to allow cost comparison with other heat networks

10.3 Customer contract length

As with heat networks, the gas, electricity, telecommunications, and water networks are natural monopolies. Customers wanting to access a given utility must be connected to the relevant distribution network. When a customer changes utility provider, they do not switch to a different network, they switch supplier. This ability to switch supplier provides a valuable point for competition.

In the gas and electricity markets, contracts between the energy supplier and customer can be up to 24 months long. In the heat network market customer contract length can often relate to the length of the asset life. Unlike other utilities, heat networks are relatively small entities and are often wholly owned as one asset, from generation through to supply. As a result, the ability to change supplier is more difficult to put in place. This can create customer dissatisfaction if customers have poor service and feel they have limited options for redress.

In response, the industry has started to see a growth in structures which allow asset owners to retender for the services elements of heat networks, such as metering, billing, and customer service. These approaches are not, however, standardised across heat networks. This is a complex area, as some service elements involve an investment in assets to improve that service (metering systems, for example) and very short contract lengths may prevent such investment, undermining the customer experience.

Further consideration should be given to the separation of service provision from asset ownership, and of appropriate maximum contracts lengths for those services. This is explored further in Section 12.

¹⁵ Dansk Fjernvarmes statistik – Benchmarking Annual Report – in Danish

¹⁶ Heat Trust's Heat Cost Calculator, <http://heattrust.org/index.php/heat-cost-comparator>

10.4 Clear customer information

The recent Communication Works survey¹⁷ demonstrates that the majority of people in the UK do not clearly understand what a heat network is. Additionally, customers moving into a property served by a heat network are not always informed that the property is connected to a heat network, how it works, and what the customer can expect. A lack of clear information can lead to confusion over issues such as how a heat bill is calculated, the requirement for planned maintenance downtime, and who the heat supplier is. This lack of information leads to easily avoidable customer complaints, and contributes to reputational damage and customer mistrust. The Task Force considered that a vital part of making heat networks mainstream in the UK is the provision of better information to customers.

Heat network operators may not be informed in advance of changes in occupation of properties on a heat network.

As a result, the heat network operator may not be in a position to directly provide potential customers with access to information at the time they are considering moving to a new home or office. The Task Force considered that it is the responsibility of heat suppliers to ensure clear, easily accessible information about heat networks is freely available. However, there would also need to be a greater responsibility on estate and letting agents to ensure potential heat network customers are provided with this information before contracts for the property are signed or exchanged.

Recommended principles:

- The regulatory framework should ensure that all heat network customers have access to clear information on all aspects of being a heat network customer



Image courtesy of Energetik

¹⁷ Communication Works (2017) Winning Hearts and Minds: Scenario-driven stakeholder analysis on how to make District Heating Successful in the UK

11. Existing industry standards

All energy customers, gas, power, or heat customers, are at risk of a poorly performing system or supplier. In the regulated utility market, regulatory frameworks ensure minimum standards for design, construction, and supply reliability, and penalise poor operation and maintenance. These frameworks mitigate the risk of a negative customer experience due to unreliable or poor service. They ensure networks are well built, reducing the risk of interruption of supply. Similar protections need to be put in place in the heat network sector, through minimum technical and customer protection standards.

The heat network industry has worked with key stakeholders over the past five years to create both the ADE-CIBSE Code of Practice for heat networks, to drive up the technical standards, and Heat Trust, to deliver consumer protection in the heat network sector.

11.1 Technical standards

The ADE-CIBSE Code of Practice for heat networks¹⁸ sets technical standards for heat network development from design to construction, and through to operation. Commitment to meet the standards of the code is increasingly required by Government policy mechanisms, including the Heat Network Investment Project. However, the Code of Practice was not designed as a compliance scheme and therefore cannot be used to hold those designing, building, commissioning, operating, and maintaining networks to account. To ensure high quality heat networks are consistently built, there needs to be a way to certify that compliance with robust standards is achieved.

The ADE, working with industry, Government, and other key stakeholders, is developing a Heat Network Technical Compliance Scheme, which will agree and maintain enforceable minimum

standards for new heat networks. The Compliance Scheme will provide quality assurance to all stages of heat network development to help ensure good levels of service to end customers. It will involve a mechanism by which all those involved in the initial briefing, design, construction, and operational stages of heat networks can be held accountable for build quality and network performance. Initial outputs of the Compliance Scheme are scheduled for launch in autumn 2018. The scheme is aimed to work in tandem with Heat Trust, combining the technical and service elements of heat network operation to drive improved customer experience.

The Task Force recommends that certification with robust heat network technical compliance standards should be a condition for heat networks with access to Demand Assurance. Any compliance scheme should build on existing standards and practice where possible, to minimise cost and maximise compliance. The Task Force considers it important that minimum technical standards should extend to in-building works, including the secondary pipe network and the HIU, as this is integral to overall heat network performance.

Recommended principles:

- Industry and government should continue to work together to develop a Heat Network Technical Compliance Scheme
- Certification with standards such as those developed under the Heat Network Technical Compliance Scheme should be a requirement for new heat networks with access to Demand Assurance

¹⁸ ADE and CIBSE (2015) Heat networks: Code of Practice for the UK

11.2 Customer service standards

Since its launch in November 2015, Heat Trust has been providing domestic and micro business heat network customers a level of heat service standards which are comparable to customers on gas and electricity networks in those areas addressed by Heat Trust. Heat Trust is currently the only route that heat network customers have to access dedicated Energy Ombudsman services for independent complaint resolution at no cost to the customer (all gas and electricity customers have access to the Energy Ombudsman).

Heat Trust now protects more than 30,000 customers across 51 networks, and is increasingly accepted as the minimum standard in Government policy and industry practice. Therefore it is important to protect its role, to ensure ongoing consistency in standards for consumers and for industry parties.

Heat Trust is now regularly being used to set minimum customer service standards in the industry, however, the industry is not able to make the scheme mandatory for all heat networks. The Task Force recommends that all heat networks accessing the benefits of Demand Assurance should be required to meet the customer protection standards set out in Heat Trust, and that customers on those networks have free access to a dedicated ombudsman service. These standards include independent compliance audit of the networks.

Heat Trust is not, however, able to cover price or contract length nor can it provide a supplier of last resort. All of these issues are addressed in sections 7.4 (price), 10.3 (contract length), and 14 (supplier of last resort). An obligation to meet the standards of Heat Trust and the Heat Networks Technical Compliance Scheme, combined with the recommendations on price, contract length, and supplier of last resort, provide a full suite of proposals to address customer risk.

AN OBLIGATION TO MEET THE STANDARDS OF HEAT TRUST AND A HEAT NETWORK COMPLIANCE SCHEME, COMBINED WITH THE RECOMMENDATIONS ON PRICE, CONTRACT LENGTH, AND SUPPLIER OF LAST RESORT, PROVIDE A FULL SUITE OF PROPOSALS TO ADDRESS CUSTOMER RISK.

Recommended principles:

- Require new heat networks with access to Demand Assurance to meet customer protection standards, such as those found in Heat Trust
- Ensure domestic customers connected to heat networks with Demand Assurance have free access to a dedicated ombudsman service
- Under the regulatory framework, allow networks to use Heat Trust membership to demonstrate to the regulator that service standards are being met

12. Separation of generation, distribution, and supply

In the UK, heat networks are often owned and operated as a single entity, i.e. the generation, distribution, and supply assets and services are owned and operated as one.

The Task Force considered the option of a disaggregated heat network model. In this model, the primary pipe network owner is likely to be the scheme owner and the holder of the Demand Assurance. However, instead of also operating the service elements of the heat network, the network owner would have services contracts, including for heat generation/provision, network operation, maintenance, metering, billing, and customer services.

It may be the case in this model that the heat network owner would own the primary pipe network alone, or that they may also own other elements such as heat generation plant(s) and in-building secondary pipe networks.

A disaggregated heat network model facilitates the introduction of competition and greater accountability of poor performance, as discussed below. It also introduces the opportunity for separate investment models, allowing, for example, private sector shorter term contracts for metering and billing services, and long term ownership of the primary and secondary pipe networks by a different entity (such as an infrastructure company or local authority). In this situation, the asset investment is recovered over a long period, via a use of a system charge for the delivery of heat.

Such separation of heat network services may not be deliverable on all networks (for example, very small networks), or immediately, but the Task Force considered it to be a principle that should be applied to networks where it delivers end customer benefits and investment risk reduction.

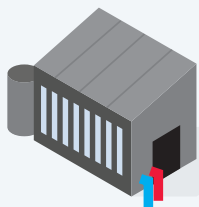
12.1 Introducing competition via network disaggregation

A disaggregated heat network model allows for individual elements, such as operation, maintenance, and metering and billing services, to undergo regular competitive tendering processes, to introduce greater competition to the market by allowing a network wide customer switch. This is comparable to a big customer switch in the power sector.

Disaggregation could facilitate competition in heat generation by allowing heat input from new heat sources, including multiple heat inputs on the same network. Multiple heat sources to a network are seen in other countries, including where customers both supply and buy heat using solar or waste heat as inputs. By opening up the heat network to competition, there may be increased scope for cost efficiencies, carbon reduction, air quality improvement (through cleaner heat sources) and improved levels of customer service.

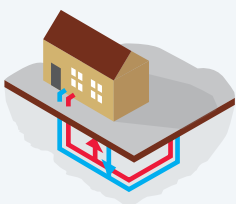


Heat network assets and services



Generation

Heat generation and supply elements typically have a 15-25 year life span. This lifespan is currently used to calculate the payback period expected by investors – even though investors must invest in both generation and distribution.



Distribution

The primary pipe network is typically the most expensive element of a heat network and has a lifespan of more than 50 years. Enabling investment in the primary pipe network as a single entity will allow for longer payback periods and reduced capital costs which can be passed to customers in reduced fixed costs.



Supply

Introducing competition in supply will enable a network-wide switch of supplier (where all customers on a heat network change supplier at the same time). Competition drives a reduction in costs and an increase in customer service standards.



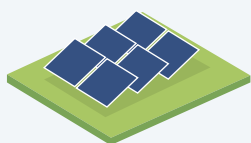
Metering and billing

Metering and billing is a service component of heat supply. Increased competition drives a reduction in costs and an increase in customer service standards. The ability to re-tender service provision contracts will enable contracts with poorly performing service providers to be terminated.



Operation and maintenance

Further cost efficiencies and improved performance can be realised in the operation and maintenance of the network with contracts awarded through a procurement process.



Additional generation

Separating investment in generation, distribution and supply enables additional generation capacity to be installed on heat networks, creating competition and innovation. Additional generation could come from many sources, including waste heat from industrial processes and data centres, or solar and geothermal energy.

Disaggregation may also introduce opportunities for innovation, and a greater opportunity to exploit available waste heat sources.

The Task Force considers it to be better to introduce competition where possible and where it will be beneficial to the customer. This may limit the regulated asset to the element where competition is not possible – the primary (and, in some cases, secondary) pipe network.

Further consideration needs to be given to the contractual arrangements between the heat network owner and any disaggregated elements, to ensure avoidance of heat generation technology redundancy, and unfair risk to service provider business models [see section 7.7].

12.2 Network accountability

The contractual separation of heat network generation, distribution, and supply will enable heat network operators to hold poorly performing individual service providers to account, substantially reducing the risk of customer dissatisfaction.

Any organisation providing poor and failing aspects of network operation would be at risk of losing the right to provide those services on that network. In the case of loss of contract, the contract would go out for retender and a new service provider brought in.

The Task Force expects liability for poor performance would sit with the Demand Assurance holder. They would choose how to manage this liability via contracts for the various organisations providing the heat network services, and would ultimately be accountable to the regulator. The Demand Assurance holder could use contracts to de-risk liabilities contracted out to a third party (for example, regulated penalties for poor customer service).

Recommended principles:

- The regulatory framework should provide the ability to ultimately separate out the elements within the generation, distribution, and supply of heat, to allow greater competition and accountability, and the introduction of a variety of investment models. Such separation may not be deliverable on all networks (for example, very small networks), or immediately



Image courtesy of Energetik

13. Right to disconnect

Customers on heat networks are not currently able to change supplier of their own volition. If a network is providing inadequate levels of service, or poor value, this inability to switch supplier can result in customer detriment, and provides limited incentive for the operators of underperforming networks to make improvements. Such instances pose a risk to customers, and also to the wider heat network industry and, by extension, the investors. If potential heat network customers hear of a poorly performing heat network serving dissatisfied customers they may become reluctant to join a heat network themselves.

The Task Force considered whether customers should be able to disconnect from a heat network where they experience poor performance or value, with no ongoing charges. Discussions in the group highlighted several important issues that could arise from customer disconnection.

One of the key issues is the impact individual customer disconnection will have on the remaining customers on that heat network. The demand reduction resulting from disconnection can have a significant impact on whole system efficiency, causing further problems for a network, and may result in higher costs for remaining customers. Standing charges may increase due to the smaller pool of customers, and variable charges may increase due to system inefficiency.

Another important consideration is that, in some cases, the option to disconnect from a heat network may not be technically or financially viable – such as in areas where no alternative heat provision options are available, or where they are cost prohibitive, for example in off gas grid buildings that do not have the electrical capacity to introduce electric heating options.

With a clear regulatory framework, as in power and water, the customer risk arising from inability to switch to a different network is mitigated

through regulatory protections. A similar regulatory approach in heat networks can be adopted. In addition, competition for service provision, such as operation, maintenance, and metering and billing services can help to mitigate customer risk where other heating options are not available. This may provide a route for network owners to resolve network issues (as discussed in section 12).

The Task Force recommends that in the case of a poorly performing network, a clear complaints process with independent review of the case should be established for heat network customers. Mechanisms should be put in place to enable the network owner to resolve the identified issues. If a satisfactory conclusion is not reached, powers should be granted to the regulator to declare a network owner 'unfit' and be either forced to sell the heat network to another heat network operator, or to be appointed a Supplier of Last Resort (see section 14) – however this should be an option only when all other avenues of dispute resolution had been exhausted.

Recommended principles:

- A clear complaints process with independent review of the case should be established for heat network customers who experience poor performance or value
- Mechanisms should be put in place to enable the network owner to resolve the identified issues

14. Supplier of last resort and special administration regime

In any market there exists the risk that a company will fail. This risk is mitigated for gas and electricity customers via legislation¹⁹ which gives the regulator, Ofgem, powers to appoint a Supplier of Last Resort (SoLR), or to seek an energy supply company administration order. These measures ensure customers of failed suppliers continue to receive supplies of gas and electricity.

No standardised protections exist in the heat network market, so the risk exists that customers on some heat networks could lose heat supply. This risk is often mitigated through contracts where the original site developer has ‘step in rights’ to take over operation; however there is no standardisation in practice. The Task Force considered that the provision of a SoLR was a key missing area for the heat network sector. A regulator needs to be able to make this protection available to heat network customers.

The Task Force considered that a SoLR mechanism should ensure continuity of heat

supply, represent the best possible deal for customers, and ensure that tariff arrangements, credit balances, payment plans, and debt management plans of the failed supplier’s customers are protected.

The cost and practicality of protection of tariff arrangements and other billing and customer service arrangements will need to be considered. It may be necessary for the appointed SoLR to make transitional arrangements to allow eventual alignment with their existing customer payment options.

While the Task Force recognises the SoLR and special administration regime will initially be available only to heat networks with access to Demand Assurance, given the importance of customer protection from failed suppliers, the Task Force recommends that the regulator make arrangements to eventually widen the scope to include all heat networks.

Recommended principles:

- In the event that a heat network supplier ceases trading or loses their right to operate a network, regulatory mechanisms should be put in place for the appointment of a Heat Supplier of Last Resort and special administration regime



19 Energy Act 2011 and The Energy Supply Company Administration Rules, 2013

15. Next steps

Heat Networks have been identified by the UK and Scottish Governments as a key component of a decarbonised energy future. They are vital to enable the efficient use of waste and renewable heat sources and to achieving carbon reductions in heat, in line with UK carbon reduction commitments.

The recommended principles set out in this report, represent the first stage of industry-led work to create a heat network market which protects customers, drives down costs, and helps to meet decarbonisation targets.

Many of the recommended principles identified by the Task Force group require further work and detailed design. The ADE is keen to hear responses from stakeholders as it works with wider industry to develop the proposals contained in this document. The role of regulation is a complex one risking unintended consequences and requires careful consideration and implementation. This initial work seeks to inform the wider debate on the decarbonisation of heat.

The ADE will welcome responses from UK and devolved Administrations, as well as wider stakeholder responses to determine appropriate next steps.

To comment on this report please submit your views to **heat.networks@theade.co.uk**





Appendix 1 - Members and observers to the Heat Network Task Force

The ADE would like to thank the members and observers of the Task Force group who gave their time to provide input for this report

Members

Daniel Agostino	ICON Infrastructure
Ian Allan	Switch2
Paul Barker	Bristol City Council
Dom Barton	Metropolitan – BUUK Infrastructure
Dominic Bowers	WSP
Thomas Briault	ARUP
Casey Cole	Guru Systems
Alina Gheorghiu-Currie	Green Investment Bank
Nick Gosling	Vital Energi
Zoe Guijarro	Citizens Advice
Toby Heysham	Pinnacle Power
Simon Hobday	Osborne Clarke
Lucy Padfield	London Borough of Islington
Bindi Patel	Heat Trust
Guy Ranawake	The Ingenious Group
Brian Tilley	E.ON
Iain Watson	Green Investment Bank
Ben Watts	ENGIE

Observers

Matthew Bowhill	Competition and Markets Authority
Martin Crouch	Ofgem
James Davis	BEIS
Suzie Le Miere	Scottish Government
Lorna Orr	Scottish Government
Jessica Winnan	BEIS

Secretariat

Tim Rotheray (Chair)	The ADE
Sharon Youssefi	The ADE

The ADE would also like to thank Charlotte Gibson, Welsh Government, for her input.

Glossary of terms and abbreviations

Biogas - A gaseous fuel produced by the fermentation of organic matter

Biomass boilers - Technology which burns wood pellets, chips, or logs to generate heat

Combined Heat and Power (CHP) - Technology which generates electricity whilst also capturing usable heat that is produced in this process. A CHP engine can be powered using various fuels including gas biogas, biomass, or municipal waste

Clean Growth Strategy - Published by BEIS in 2017, the Strategy is a UK Government document which sets out the blueprint for Britain's low carbon future

Code of Practice for Heat Networks - The ADE/CIBSE Heat Networks: Code of Practice for the UK (also called CPI), sets minimum technical standards for heat network development from design to construction, and through to operation

Compulsory connection - A policy or initiative that mandates a premises, or all premises of a specific classification or circumstance, connect to a heat network

Concession model - A risk mitigation model based on the principle that a heat network developer will be given an exclusive contractual right to build and operate a heat network in a particular location for a set period of time

Cost of capital - The cost at which funding is made available to a heat network project (e.g. the interest rate on a loan)

Demand flexibility - The ability to enable flexibility in the timing of energy generation and use. Thermal stores enable heat networks to provide demand flexibility

Demand risk - The risk of the expected heat demand of a heat network not arising

Distribution system - A heat network distribution system comprises a network of insulated pipes which transport heat, in the form of hot water, from the point of generation or collection to the end customer. The distribution system can be broken down into the primary pipe network, secondary pipe network, and the tertiary network

Energy centre - Energy centres house heat generation technology, such as gas and biogas fired combined heat and power (CHP), biomass boilers, heat pumps, and energy from waste facilities. Energy centres often also house have thermal stores

Energy from waste - The generation of electricity and/or heat from the combustion of waste

Energy ombudsman - An independent dispute resolution service, approved by the energy regulator Ofgem to independently handle disputes between energy companies and their customers

Energy Service Company (ESCo) - A commercial or non-profit business providing energy solutions – such as the generation and supply of heat

Energy Supply Company Administration - A special administration regime for large energy supply companies, administered by Ofgem. It ensures uninterrupted and safe operation of essential services in the event of a large energy supply company becoming insolvent. It is a contingency measure in case Ofgem is unable to appoint a Supplier of Last Resort. The special administrator, unlike an ordinary administrator, has an obligation to consider consumers' interests as well as creditors

Fixed charge - Part of an energy supply bill. The fixed charge (also known as standing charge) for daily supply of energy to your premises. The fixed charge is not related to the amount of energy consumed

Fuel poverty - The condition of being unable to afford to keep one's home adequately heated

Generation system - The generation system typically comprises one or more energy centres housing technologies to generate or harness heat

Geothermal energy - Heat energy generated and stored in the earth

GIRS – Gas Industry Registration Scheme - An assessment scheme for gas providers throughout the UK. GIRS registered providers are able to undertake new gas connections, service alterations, or disconnections, dependent on the scope of their accreditation

Heat exchanger - In a heat network a heat exchanger transfers heat from the hot water flowing through the primary pipe network, to the water flowing through the in-building secondary pipe network

Heat network - A network of insulated pipes which carry hot water from a central point to heat users. Networks that serve two or more end users in a single building (e.g. a block of flats) are known as communal heat networks; when heat networks connect to end users in multiple buildings they are known as district heat networks

Heat Network Investment Project (HNIP) - The UK Government's capital investment programme that is expected to support up to 200 heat network projects by 2021 through grants and loans and other mechanisms

Heat offtake - The extraction of heat from a heat network by an end user

Heat pumps - A renewable energy technology that extracts heat from the ground, air, or water

Heat Trust - A voluntary scheme for customer protection in the heat networks sector. Launched in 2015, Heat Trust sets out a common standard in the quality and level of customer service that heat suppliers should provide their customers. It also provides heat network customers free access to the Energy Ombudsman

Heat Interface Unit (HIU) - In a heat network the HIU transfers heat from the primary or secondary pipe network to the individual home or premises where the heat is used by the consumer

IDNO model - Independent Distribution Network Operator model - Ofgem regulate the amounts that IDNOs can charge their customers for using their electricity networks via a 'Relative Price Control'

IGT model - Independent Gas Transporter model - Ofgem regulate the amounts that IGTs can charge new customers for using their gas networks via a 'Relative Price Control'

Interconnector cap and floor model - Ofgem regulates the revenue electricity interconnectors generate by placing minimum and maximum limits, i.e. a cap and floor, on the revenues. If an interconnector is unable to earn agreed set revenues from its operations, they will be topped-up to the floor level through transmission network charges. Conversely, by any revenues which exceed the cap will be paid by the interconnector and reduce the total transmission network charge

London Plan - The statutory spatial development strategy for the Greater London area, written by the Mayor of London and published by the Greater London Authority

Natural monopoly - The exclusive control of the supply of a commodity or service

NERS - National Electricity Registration Scheme - An assessment scheme for electrical service providers throughout the UK. NERS registered providers are able to undertake connections to the network, dig and fill trenches on and around the property to be connected, and install electrical switches and transformers

OFTO model - Offshore Transmission Owner model - a competitive tender process through which offshore electricity transmission licences are granted

PipeCo model - A risk mitigation model which proposes splitting up the investment of the distribution pipe network from the investment in the generation and supply

Primary pipe network - The network of insulated pipes that transport heat from the point of generation or collection to the connected buildings

Renewable Heat Incentive (RHI) - A UK Government scheme set up to encourage uptake of renewable heat technologies amongst householders, communities and businesses through financial incentives

RIIO model - Revenue=Incentives+Innovation+Outputs model - Ofgem's framework for setting price controls for gas and electricity network companies

Secondary pipe network - An in-building element of a heat network distribution system. If the building has a single heat customer (e.g. in a detached home) the secondary network forms the building heating system. If the building has multiple individual heat customers (e.g. a block of flats) the secondary pipe network transports heat through the communal areas to the point before it reaches the end consumer

Special administration regime - See: Energy Supply Company Administration

Standing charge - A fixed (usually daily) charge that is applied to a gas, electricity, or heat bill. The standing charge is not related to the amount of energy used and will be charged even if no energy is consumed

Supplier of Last Resort (SoLR) - In the event of an energy supplier failure the regulator can direct an alternative energy supplier to take over responsibility for a failed supplier's customers (i.e. to be a Supplier of Last Resort)

Supply - Supply is a service to the end customer comprising the sale of heat, heat metering and billing, and customer interactions including customer information and complaint handling. This is normally the principle interface between the heat network and the customer

Tariff - The pricing structure an energy supplier charges a customer for energy consumption. Energy tariffs include a 'fixed charge' (also known as standing charge) for daily supply of energy to your premises, and a 'variable charge' for the amount of energy you use

Tertiary network - An in-building element of a heat network distribution system. In buildings with multiple individual heat customers (e.g. a block of flats) the tertiary network transfers heat (via a Heat Interface Unit) from the secondary pipe network to where the heat is used by the consumer (the heating system)

Thermal store - A large, well-insulated hot water tank allowing heat from generation to be stored rather than being supplied immediately to customers

Variable charge - Part of an energy supply bill. A charge for the amount of energy consumed by the customer

Waste heat - Heat produced as a by-product of a process or technology that uses energy. Waste heat sources include electrical power stations, data centres, industrial manufacturing processes, or municipal waste incinerators

Wayleave and access rights - Statutory rights which allow utility network developers to carry out work and maintenance on privately owned land. Gas, electricity and water network developers have these statutory rights, however heat network developers currently do not

List of abbreviations

ADE	The Association for Decentralised Energy
BEIS	The Department for Business, Energy and Industrial Strategy
CCC	The Committee on Climate Change
CHP	Combined Heat and Power
CIBSE	Chartered Institution of Building Services Engineers
CMA	Competition & Markets Authority
ESCo	Energy Service Company
GIRS	Gas Industry Registration Scheme
HIU	Heat Interface Unit
HNIP	Heat Network Investment Project
IDNO	Independent Distribution Network Operator
IGT	Independent Gas Transporter
NERS	National Electricity Registration Scheme
Ofgem	The Office of Gas and Electricity Markets
OFTO	Offshore Transmission Owner
RHI	Renewable Heat Incentive
RIIO	Revenue = Incentives + Innovation + Outputs
SoLR	Supplier of Last Resort



The Association for
Decentralised Energy



ade

Bringing Energy
Together

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