Department for Business, Energy & Industrial Strategy

HEAT NETWORKS CONSUMER SURVEY

Results Report

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HEAT NETWORKS CONSUMER SURVEY RESULTS REPORT

A report for BEIS by Kantar Public

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Executive Summary

Introduction

Heat networks, sometimes called district heating networks, are distribution systems of insulated pipes that take heat from a central source(s) and deliver it to a variety of different customers such as public sector buildings, offices and domestic flats. There are around 5,500 district scale and 11,500 communal scale heat networks in the UK, together providing 10TWh per year (around 2% of UK buildings heat demand).[1]

Heat networks have a number of features of “natural monopolies” - they can require a relatively large initial capital outlay during construction and installation and operators derive income from this over long periods of time through billing end-users of heat, and potentially raising entry barriers for other operators. Additionally, once installed end-users have limited ability to switch to an alternative heat supply.

There have been a number of qualitative research projects looking into the consequences of this on domestic end-user consumer experiences. In December 2016, The Department of Business, Energy and Industrial Strategy (BEIS), appointed Kantar Public to deliver a large scale postal survey to quantify consumer experiences of heat networks in England and Wales for the first time. This report summarises findings from the survey.

Methodology

A systematic random sample of properties thought to be on a heat network, stratified by variables of interest, was produced for this research mostly from regulatory data. Selected households received a paper questionnaire and follow-up reminder packs, and were offered the option to respond online. A comparison group was also drawn to match as closely as possible the demographics and characteristics of heat network respondents, except for being on a heat network – this is to compare ‘like with like’.

Survey responses were received from 5,502 consumers, including 3,716 where the household was identified as being served by a heat network (HN), and a comparison sample of 1,786 non-heat network consumers (non-HN). The heat network sample included consumers from both district (multiple buildings) and communal (one building) heat networks. This reflects a 21% response rate. Responses were received from consumers across 2,218 different heat networks.

[1] Heat Metering and Billing Regulations (2014), Notification Data, https://www.gov.uk/guidance/heat-networks.

Results

Profile of heat networks and heat network consumers

Compared with census data for the general population in England and Wales, heat network consumers were much more likely to live in: flats and maisonettes, smaller and generally newer homes, homes rented from a local authority or housing association and larger urban homes (particularly in London).

In terms of economic activity, the main difference between heat network consumers and the wider population was the proportion of people who were retired. More than four in ten (44%) heat network consumers were retired; compared with 14% in the wider population.

Around half (48%) of heat network consumers identified as being served by a communal network (covering only their building). Three in ten (30%) identified as being served by a district network (covering other buildings as well). However, consumer knowledge of network type was limited. Nearly one fifth of heat network consumers (19%), didn't know whether they were served by a communal or district scheme.

The rest of this summary uses survey findings to address the main research questions.

Technical service

How satisfied are consumers with their heating and hot water system? Is it performing as they expect?

Overall, heat network consumers were just as satisfied with their heating systems as non-heat network consumers. Nearly three-quarters in both populations said they were 'satisfied' or 'very satisfied'. Among heat network consumers, the key drivers of satisfaction were: the reported reliability of system, the perceived fairness of price, satisfaction with the level of information provided about their system, experience of under-heating, experience of over-heating, and satisfaction with handling of complaints.

What level of control do consumers have over their heating system? What controls do they have installed?

The survey shows heat network consumers have less control over their heating, compared with non-heat network consumers. They were more likely to report having and using thermostatic radiator valves (TRVs) but were less likely to have a central thermostat or heat programmer. Only 26% of heat network consumers had a heat programmer that they used (compared with 46% of non-heat network consumers).

Lack of control seems to be driving wasteful cooling behaviours; heat network consumers were more likely than non-heat network consumers to open windows (HN: 87%, non-HN: 79%), and use electric fans to cool their homes when they experienced over-heating (HN: 49%, non-HN: 44%). Lack of control also seems to be a cause of over-heating in the heat network sector (see discussion below).

How many consumers feel they should have greater control?

Despite differing levels of control, heat network consumers were no more or less satisfied in general with their level of control. However, heat network consumers who were struggling financially were more likely to be dissatisfied with their level of control (20%, compared with 10% who were not struggling financially).

How many consumers feel their dwelling is over-heated/under-heated?

Levels of reported over-heating were higher among heat network consumers – 39% had been uncomfortably warm in the last 12 months, compared with 22% of non-heat network consumers. There was also evidence of persistent over-heating in the heat network sector, with heat network consumers around four times as likely to say their home was 'always' too warm (HN: 13%, non-HN: 3%).

Common reasons given for over-heating among heat network consumers included lack of control (HN: 23%, non-HN: 19%) and not being able to the turn the heating off (HN: 11%, non-HN: 7%). This was consistent with the relatively low incidences of heat programmers and central thermostats in the sector.

Heat network consumers were less likely than non-heat network consumers to report under-heating (HN: 16%, non-HN: 29%). But, when under-heating did occur it was more likely to be because the heating system had stopped working; 37% of heat network consumers who experienced under-heating gave this as a reason, compared with just 15% of non-heat network consumers. In contrast the most common reason for under-heating among non-heat network consumers was the cost of heating the home (non-HN: 55%, HN: 24%).

How many consumers have experienced interruptions in service? How frequently?

Service interruptions are relatively common in the HN sector. More than a third of heat network consumers reported experiencing an interruption/ loss of heating in the last 12 months (HN: 37%, non-HN: 24%) and were also more likely to have experienced multiple interruptions in the last 12 months (HN: 21%, non-HN: 11%). Whilst more frequent, service interruptions experienced by heat network consumers were more likely to have been resolved within 24 hours. However heat network consumers were also more likely to have experienced outages lasting a week or more compared with non-heat network consumers. This suggests that the experience can differ greatly for heat networks consumers.

Billing arrangements, price, and consumer perceptions of price

How much do Heat Networks consumers pay?

There is evidence of great variation in pricing in the heat network sector, with pockets of heat network consumers paying high annual prices, including consumers paying more than £1,000, or even £2,000, per year. The mean average price reported was similar on heat networks and domestic gas heating systems, however the median price suggested that heat network consumers paid, on average, around £100 less for their heating and hot water compared with non-heat network consumers.

How many Heat Network consumers think they pay a fair price compared to others? To what extent is this due to over-pricing?

Heat network consumers who paid a separate heating and hot water or combined energy bill were as likely as non-heat network consumers to say they paid a fair price. However, among heat network consumers, those who were struggling financially were far more likely, than those who were not to say the price paid was not fair (50%, compared with 19%).

There is little evidence that perceived fairness is linked to over-pricing. *On average*, heat network consumers and non-heat network consumers reported similar annual prices. And, there is only a weak correlation between price paid by heat network consumers and perceived fairness. Heat network consumers who paid based on actual or estimated use (35%) were more likely to say they felt that pricing was *not* fair, compared with consumers who paid a set fee (22%).

How are their heat bills calculated? How many bills are based on actual consumption?

A large proportion of heat network consumers were billed in way that does not incentivise energy-saving behaviours. Only 27% reported paying based on actual use, compared with 53% of non-heat network consumers. Relatively large proportions of heat network consumers reported paying based on overall building use (20%), or paid a set price that didn't vary with use (18%).

What billing information do consumers receive? Are consumers aware of what they are paying for? What is the level of billing transparency in the sector?

There is evidence of relatively poor transparency in the heat network sector. Heat network consumers reported that they were less likely to receive any form of bill, account summary or statement, compared with non-heat network consumers (HN: 62%, non-HN: 81%).

Heat network consumers' bills, summaries and statements also tended to include less information compared with those of non-heat network consumers. For example, heat network consumers were around half as likely to be informed of: the amount of heating they had used (kWhs) (HN: 30%, non-HN: 61%); the per-unit price (HN: 28%, non-HN: 57%); or any standing or set charges (HN: 26%, non-HN: 47%). Despite this, heat network consumers were no less satisfied with the level of information they received.

The Heat Trust's service standards seem to be aiding progress in this area as consumers on Heat Trust registered schemes received more comprehensive billing information.

How many consumers would like to receive more information?

A fifth of heat network consumers (20%) said the amount of information provided on their bill was 'too little'. This was moderately higher than among non-heat network consumers (14%). Heat network consumers on heat networks that were not yet registered with the Heat Trust and consumers without a meter tended to be the least happy about the level of billing information they received.

Customer service: information and complaints

How many have raised a complaint about their Heat Network? How many would like to? / Was it resolved to their satisfaction?

A relatively high proportion of heat network consumers had either complained, or had reason to complain about their system; 32%, compared with 26% of non-heat network consumers. Heat network consumers who did complain were less likely to be satisfied with how the complaint was resolved (HN: 45%, non-HN: 55%).

What information have consumers been given/do they have access to?

Heat network consumers were less likely than non-heat network consumers to have received information about: the type of heating system they had (HN: 41%, non-HN: 47%), maintenance and servicing arrangements (HN: 28%, non-HN: 32%), and how to change the temperature (HN: 30%, non-HN: 37%).

Despite this, the majority of heat network consumers (59%), and non-heat network consumers (60%), said they were satisfied with the quality of information they received about their heating and hot water system.[2]

Limitations and scope for future research

This research goes a long way to addressing the research questions and adds significant new insights to the evidence base. A key limitation of this work derives from the lack of a reliable comprehensive source of population data for heat networks in England and Wales. Therefore our survey's representativeness cannot be guaranteed with absolute certainty. Nevertheless, we are confident that this survey covers a robust cross-section of the market to produce highly reliable findings (acknowledging this inherent limitation). We believe this survey to be the most reliable source of data on domestic heat network consumer experiences to date, with quality assured by virtue of the large sample size, randomised sampling methodology, and demographically-matched comparison group.

Secondary limitations arise, as with all survey research, from a reliance on the accuracy of responses received. This is particularly relevant in our research to the discussion of pricing and billing, where we found that such information was not consistently provided to heat network consumers (such as the size of standing charges, and what is or isn't included in bills). Finally, our analysis of system performance and to some extent billing is necessarily based on *consumers' perceptions* rather than *direct observation* of bills or performance.

Despite these limitations, this research represents an substantial expansion of knowledge on heat network consumer experience and quantifies, for the first time, the prevalence of consumer issues only previously uncovered through qualitative studies.

[2] This difference is not statistically significant.

Contents

1. Introduction

Background

In December 2016, The Department of Business, Energy and Industrial Strategy (BEIS), appointed Kantar Public to undertake a survey to determine domestic consumer experiences of heat networks in England and Wales.

Heat networks in the United Kingdom (UK)

Heat networks distribute thermal energy in the form of steam, hot water or chilled liquids from centralised sources to consumers.[3] On a city level, where multiple buildings or sites are supplied, it is referred to as 'district heating systems'. If a single building with more than one final customer is supplied, it is referred to as a 'communal heating system'. The survey covered heat network consumers both on district and communal systems. Where there were differences between the two types of systems, these are discussed.

The most recent figures, from 2014, estimated 5,500 district and 11,500 communal heat networks are operated in the UK.[4] Combined, these networks provided 10 TWhs per year (around 2% of heating demand in UK buildings). Historically, district heating systems serving the domestic sector have been instigated by local authorities, connecting council and community buildings. These buildings are seen as long-term, stable anchors underpinning the capital investment required during initial network development. Examples include Sheffield, Nottingham, Westminster (Pimlico), Southampton, Birmingham and Woking. Some authorities, such as Aberdeen, built up heat networks to alleviate fuel poverty. Heat networks grew substantially during the council house building boom between the 1950s and 1970s. However, many of the systems were decommissioned in favour of individual heating of buildings by natural gas.[5]

Across Europe, heat networks have become an established measure to improve energy security, reduce energy dependency and provide a low carbon heat supply whilst generating local revenue. In Denmark, 2017, about two thirds of households are supplied by heat networks which take half their heat from locally available renewable energy sources. [6]

[3] Some local energy services companies also supply electricity to consumers through a private wire network (typically generated during heat production i.e. combined heat and power plant)
[4] Heat Metering and Billing Regulations (2014), Notification Data, https://www.gov.uk/guidance/heat-networks
[5] A technical guide to district heating, FB 72, BRE publications, 2014
[6] Country by Country Survey, Euroheat & Power, 2017

In the UK, BEIS (formerly the Department of Energy and Climate Change) estimates that by 2030 around 20% of the domestic heat demand could come from district heating networks.[7] BEIS's Heat Network Delivery Unit (HNDU) has been supporting heat network concept and feasibility studies since 2013, through both the provision of expert advice and oversight and of fiscal support.

Existing regulation

The heat network market is largely unregulated and mainly consists of local monopolies. However, the Competition Market Authority (CMA) supervises the sector to avoid price collusion. The sale of heat is also governed by consumer protection legislation. Additional steps to improve consumer protection have been introduced through the EU Energy Efficiency Directive 2012/27/EU. The directive has been transposed into UK law through the Heat Network (Metering and Billing) Regulations 2014 (amended in 2015). Thus, the basis for metering and billing actual consumer use has been set.[8]

Since 2015, a voluntary customer protection scheme has been operated called Heat Trust. Currently over 50 heat networks have registered with Heat Trust, mainly covering new buildings served by large energy service companies. Heat Trust has developed a set of customer service standards that registered networks are expected to meet. These standards build on the standards set for gas and electricity and aim to ensure:

- Customers receive a heat supply agreement, setting out clear terms
- Customers receive a customer information pack
- Bills clearly separate fixed and variable charges
- Service is restored 24 hours after any unplanned outages
- Guaranteed service payments for when outages are not restored within the agreed timeframe
- There is additional support for vulnerable consumers, including holding a priority services register
- Eight- week timeframe for heat suppliers to resolve complaints
- Customers can access the independent Energy Ombudsman

The existing evidence base

Prior to the survey, the evidence base on heat network consumer satisfaction and experience was limited. Available evidence was largely qualitative or anecdotal in nature. This is the first research to quantify the consumer experience of heat networks. The survey provides a nationally representative picture of heat network consumer satisfaction and

[7] The Future of Heating, Meeting The Challenge.UK, Department of Energy & Climate Change, 2013
[8] The policy introduced the requirement to install heat meters or where technically not otherwise feasible heat cost allocators (at radiator level) and domestic hot water meters.

experience and how this compares with the experiences of non-heat network consumers. The survey also provides insights into how consumer experience varies by different types of heat network and different types of heat network consumers.

Previous evidence in the sector was largely concerned with experiences of consumer detriment. While this evidence was inconclusive and did not provide a nationally representative picture, qualitative studies have been carried out which suggest there may be an issue of detriment in the sector.

Summary of existing evidence for heat network consumer detriment

Previous qualitative studies were combined as responses to a 2016 consultation on the Heat Networks Investment Project (HNIP).[9] These responses and on-going complaints to BEIS, the Competition and Markets Authority (CMA) and Citizens Advice, indicated that there may be negative consumer experiences within the heat network sector. Broadly, the qualitative research prior to the current survey highlighted concerns of consumer detriment in the following areas:

Billing and pricing issues

The largest number of complaints in the existing evidence relate to billing and pricing. These include a lack of billing information, a lack of transparency in bills, concerns about unfair pricing (which may be linked to a lack of transparency in bills) and generally inconsistent practice in metering use and billing by suppliers.

Lack of information

A lack of information provided to end-users about their heating system in general, consumer rights and how to make complaints. In particular, a lack of information provided to new and vulnerable consumers, such as details about contracts and prices. It also suggested a lack of information about how to operate the heating system.

Technical standards

Some consumers have reported issues with the efficiency and reliability of heat networks. Research by the Joseph Rowntree Foundation highlighted breakdown issues specifically in communal heating systems, with consumers expecting higher system reliability.[10] The research also suggested a general inconsistency in maintenance and efficiency standards, as well as the handling of network disruption. For instance, in the event of service disruption, some suppliers provide additional services akin to that of regulated utility provision in the gas sector, but others do not. Under-heating or over-heating of homes has also been reported.

This survey was commissioned to better understand experiences of heat network consumers as a whole and how representative any consumer detriment is across the

[9] https://www.gov.uk/government/consultations/consultation-on-the-heat-networks-investment-project-hnip
[10] http://www.changeworks.org.uk/sites/default/files/District_heating_delivering_affordable_and_sustainable_energy_report.pdf

sector. The survey represents the first robust quantitative evidence on the end-user satisfaction and consumer experience of heat networks.

Aims and objectives

The overarching aim of the research was to provide a statistically robust representation of experiences across the domestic heat networks sector, helping BEIS understand the current state of the sector. More specifically, the research assessed:

- Current levels of consumer satisfaction across the domestic heat networks sector
- Service levels across the domestic heat networks sector
- How common detriment is in the sector
- How experiences differ between heat network consumers and non-heat network consumers living in similar properties
- How experiences differ for different types of heat network consumers

Within these broad objectives, the research aimed to answer a set of detailed research questions:

Customer service and assistance, awareness and satisfaction

- What is the level of awareness about heat networks amongst heat network consumers?
- What information have consumers been given/do they have access to? What information were they given before joining a heat network? What information have they been given whilst using a heat network?
- How many are aware of what they should be aware of?
- How many consumers are aware of the complaint reporting and handling procedures?
- How many have raised a complaint about their heat network? How many would like to?
- How was their complaint dealt with? Was it resolved to their satisfaction? If not, why not?

Pricing, billing and metering

- How much do heat networks consumers pay?
- How many heat network consumers think they pay a fair price compared to others? To what extent is this due to over-pricing?
- How are their heat bills calculated?
- How do consumers pay their bills?
- When do consumers pay their bills? How often is this?
- How many consumers are satisfied with when and how they pay their bills?

- What billing information do consumers receive? Are consumers aware of what they are paying for? What is the level of billing transparency in the sector? How many bills are based on actual consumption?
- How is this delivered to consumers?
- Do consumers understand this information?
- How many consumers would like to receive more information? What information would they like to receive?
- How many consumers have a Heat Meter?

Technical service

- What level of control do consumers have over their heating system? What controls do they have installed?
- How many consumers feel they should have greater control? What level of control would they like? What aspects of control are they missing?
- How satisfied are consumers with their heating and hot water system? Is it performing as they expect?
- How many consumers feel their dwelling is over-heated/under-heated?
- How many consumers have experienced interruptions in service? How frequently?
- How often is maintenance carried out? How are repairs handled?

Different types of consumers

- How do existing consumer protection measures affect experience? What impact do schemes like the Heat Trust have?
- How do experiences differ depending on the installed system infrastructure? Does performance differ? Does satisfaction differ?
- Do those in social housing schemes have different experiences to those in private schemes?
- Do those in smaller schemes have different experiences to those in larger schemes?
- Do experiences differ in older networks (pre-December 2014) to those in newer networks?
- Does having a Heat Meter correlate with lower bills?
- How do experiences compare to those in the domestic gas sector and the heating oil and gas market? (where appropriate)

The research formed part of the Department's wider work programme to inform future heat networks consumer protection policy, alongside the design and delivery of BEIS's £320 million Heat Networks Investment Project (HNIP).

Methodology

This section provides an overview of the survey methodology. For a more detailed account, readers may wish to refer the Technical Report.[11] For both heat network and non-heat network consumers the scope of the research (and therefore the sample) was restricted to England and Wales.

Sampling and weighting approach – heat network consumers

The principle source of sample for heat network consumers was the Regulatory Database (RD), consisting of the registered postcode for all heat networks that were known to BEIS. In addition to the RD, a database of recipients of ECO funding was used to provide additional postcodes that were known to be served by a heat network.[12]

With no comprehensive database of households served by heat networks available, a sample of addresses which were believed to be covered by heat networks was selected. The selection was based on an exact match with, or proximity to, the postcode of a registered heat network source.

Subsequently, Kantar Public used a combination of respondent answers and publicly available data from Energy Performance Certificates (EPCs), to more accurately define the final heat network status of respondents. **The final heat network sample consisted of households identified as being on a heat network by the respondent and/or the EPC data.** Households which were not identified as being on a heat network, were excluded from the final heat network sample.

Prior to analysis, the final heat network sample was weighted to account for: differences in probability of sample selection[13] and differences in levels on non-response. Non-response weights (which attempt to adjust for non-response biases) were modelled using data available for all addresses on the sample frame, including: region, Index of Multiple Deprivation (IMD) and Valuation Office Agency (VOA) area statistics on property types and property age. Further details on sample selection and weighting can be found in the technical report.[14]

Sampling and weighting approach – non-heat network consumers

Kantar Public designed a comparison group of non-heat network consumers to match as closely as possible the demographic profile of the heat network sample. Initially, census output areas (OAs) in England and Wales were selected which were similar in nature to

[11] Technical Report
[12] For more detail, please see Chapter 3 in the technical report
[13] We gave a higher selection probability to certain population sub-groups, for example, households in areas covered by networks registered with the Heat Trust. Please see the technical report for further details.
[14] Further detail is provided in section 4.2 of the Technical Report

those covered by the heat network sample.[15] Households were then randomly selected within these output areas to form the comparison sample.

As with the heat network sample, a combination of the participants' responses and publicly available EPC data were used to positively identify household status. Where a household was identified as being on a heat network by the respondent and/or the EPC data, this case was excluded from the comparison group.[16]

Prior to analysis, the comparison sample of non-heat network consumers was weighted using propensity score matching (PSM). PSM is a statistical method used to control for observed differences between two groups. While some minor differences remained after weighting, most differences were eliminated or greatly reduced. Accepting that some *unobservable* differences may remain, we still have a high degree of confidence that identified differences in survey estimates between heat network and non-heat network consumers were not caused by differences in the profiles of the populations.[17]

Survey approach

The survey was carried out using a self-completion approach, with a 16-page paper questionnaire posted to all selected addresses. BEIS originally planned to commission a face-to-face survey but a postal and online method was deemed appropriate for a number of methodological and practical reasons. These are detailed in the technical report. Principally a postal approach allowed us to deliver a much larger interviewed sample of heat network consumers than would have been achievable with a face-to-face survey. This maximised both the precision of our population estimates and the scope for sub-group analysis among heat network consumers.. A telephone approach was discounted on the limitations of the sample frame – chiefly the lack of consumers' names and contact details.

The questionnaire was structured around five broad sections:

- **Demographics and household profile**.
- **Heating systems** – including details of how participants heat and insulate their homes (including whether they were served by a heat network or not).
- **Technical service** – capturing the extent of issues such as over and under-heating and loss of heating and hot water.
- **Complaints and information provision**.
- **Billing** – including how payments are calculated, whether and how consumers received bills and the level of information on bills.
- **Pricing** – including an estimate of the price paid and attitudes towards this.

[15] According to statistics from the 2011 Census (including, property types, tenure, age and gender of occupants)

[16] In addition, the households from the heat network sample identified as not being on a heat network by both the respondent and the EPC data were added to the comparison group.

[17] Further detail is provided in Section 4 of the Technical Report

Questionnaires were accompanied by a covering letter, which explained the purpose of the research and provided the option for participants to take part online.[18] The research was branded as 'The Energy Survey' to offer as broad an appeal as possible to participants rather than focusing specifically on 'heating and hot water'. To maximise response, participants were offered a £10 gift card incentive as a "thank you" for taking part.

Fieldwork took place between April and July 2017, including a three week break in interviewing during the 2017 pre-election period. This delay meant a significant proportion of respondents took part during the spring and summer – a period when the survey topics would have been less salient. The effect of this cannot be quantified but it may have led to somewhat artificially higher levels of satisfaction. However, any effect would have been the same for both heat network and non-heat network consumers. Therefore, comparisons between these two groups remain valid. Two postcard reminders were sent to households that didn't initially take part. A second replacement questionnaire was sent towards the end of fieldwork. The final response rate was 21%.

In total, Kantar Public received 5,502 usable questionnaires; where the household was positively identified as either being served by a heat network or not. This included 3,716 heat network consumers and 1,786 non-heat network consumers. In total, 1,441 returned questionnaires were excluded from our analysis where it was uncertain whether they were on a heat network or not.

Development of the questionnaire and survey approach

To test and refine the survey, and assess likely response rates, a large-scale pilot was carried out in February 2017. Pilot questionnaires were posted to 4,800 selected addresses. This included a field test of the methodology employed for the main survey, including the options to take part on paper and online.[19]

In total, 926 participants took part in the pilot, with an overall response rate of 15%.[20]

Kantar Public also carried out 12 follow-up cognitive interviews by phone, generally within a week of the pilot participant taking part. These were to test and refine the survey approach. Findings from the cognitive interviews do not form part of this report.

[18] The letter included a survey webpage address and unique log in details
[19] Due to the timings of the pilot, the exercise did not include a second replacement questionnaire and required a shortened fieldwork period of three weeks.
[20] Responses from the pilot were not included in the final dataset and therefore were not used in this report.

Structure of the report

The main findings are structured around five chapters:

- **Chapter 2 explores the profile of heat network consumers**, how this compares to the general population in England and Wales and how the profile of heat network consumers varies depending on the characteristics of their network. This provides important context for the rest of the report.
- **Chapter 3 looks at overall satisfaction with heating and hot water service –** including how satisfaction varies by different types of heat network, and the key drivers of overall satisfaction.
- **Chapter 4 looks at the technical service provided and consumer experience.** The chapter explores overall satisfaction with heating and hot water service, reported reliability, issues with and control of heating and hot water.
- **Chapter 5 explores billing and pricing.** This includes whether consumers receive bills, how bills are calculated, information provided on bills, a breakdown of the price paid for heating and hot water and consumer perceptions of pricing.
- **Chapter 6 focuses on customer service and information** including awareness of consumer complaint procedures, whether or not consumers have had cause to complain, satisfaction with complaint resolution, levels of information provision and consumer perceptions of the level of information with which they are provided.

Reporting convention for statistical significance

Throughout the report, where the results for one group of respondents are compared against the results for another group, any differences discussed are statistically significant at the 95% probability level, unless otherwise stated. This means that we can be 95% confident that the differences observed between the subgroups are genuine differences, and have not just occurred by chance.

Where percentages shown in charts or tables do not total to exactly 100% this is due to a combination of rounding to the nearest whole number and because some questions allowed respondents to choose more than one response option.

For brevity, heat network and non-heat network are sometimes abbreviated to HN and non-HN respectively.

2. Profile of heat network consumers

Heat network consumer characteristics

In comparison to the profile of housing stock in England & Wales, households on heat networks are markedly different across a number characteristics. These differences reflect the nature and history of heat networks. Our non-heat network 'comparison group' was selected to mirror the profile of heat networks, instead of the 'typical' housing stock, to ensure comparisons of experiences were like-for-like.

Comparisons with data from the 2011 census show that heat network consumers were much more likely to live in flats or maisonettes, and smaller properties. Similarly, heat network consumers were more likely to be renting from a local authority or housing association, to live in newer homes and to have lived in their current property for a fewer number of years, compared with the wider population.

Heat networks are more likely to be situated in larger urban areas, particularly in London. Reflecting this, the regional distribution of heat network consumers in our survey differed markedly from the wider population. Nearly half of heat network respondents (46%) lived in London, compared to just 15% of the wider population in England and Wales.

In terms of economic status, the main difference between heat network consumers and the wider population was the proportion of people who were retired. Over four in ten (44%) heat network consumers were retired; the equivalent figure for the wider population was 14%. Connected to this, in 43% of heat network households there was at least one person aged 65 or older.

Vulnerable and financially struggling consumers

Consumers were asked if any members of their household had: long term health problems, caring responsibilities for someone with long term health problems, or any hearing/visual impairment; or, received extra support or assistance from their gas or heating supplier.[21] Those who met any of these conditions were classified as *vulnerable consumers*. Among the heat network population, 40% were classified as vulnerable consumers.[22] Roughly a quarter (27%) of heat network consumers were classified as financially struggling, as determined by their agreement with the statement 'keeping up with my heating and hot water costs is a bit of a struggle'.

[21] Including: help in reading or understanding energy bills, relocation of prepayment meters to ensure they can be used safely, or priority support in an energy emergency.
[22] This survey's definition of 'vulnerable consumers' does not include those aged 65+ by default, unless they also meet the criteria outlined above. This is in contrast to the energy market's typical definition.

Table 1 Differences in profile between heat network consumers and the wider England and Wales population[23]

Characteristic		Heat network consumers	Population in England and Wales
Property type	Flat/maisonette	**90%**	**21%**
	House/other	**6%**	**79%**
Building age	1960 – 1999	**55%**	**88%**
	2000+	**27%**	**12%**
Size (#bedrooms)	0 – 1	**60%**	**12%**
	2+	**37%**	**88%**
Tenure	Own/mortgage/part own	**20%**	**65%**
	Rent privately	**11%**	**15%**
	Rent from housing association	**32%**	**8%**
	Rent from local authority	**34%**	**9%**
Region	London	**46%**	**15%**
	Outside London	**54%**	**85%**
Child in household	No children	**89%**	**71%**
	One or more	**11%**	**29%**

Base: all heat network consumers (3,716)

In Table 1, the differences between the numbers in bold are statistically significant.

Heat network types

Survey responses were received from consumers across 2,218 different heat networks. The mean number of households supplied by each heat network was 224.[24] Although the average is better expressed as a median (63 households).[25]

Communal and district systems

Participants were asked whether their heat network covered only their building or other buildings as well. Around half (48%) of heat network consumers said their network covered only their building. These consumers were classified as having a communal system. Three in ten (30%) heat network consumers said their network covered other buildings as well. These consumers were classified as being on a district system. Nearly a fifth of heat network consumers (19%) didn't know and were excluded from related analyses.

The profile of the properties and consumers differed between district and communal systems. As shown in Table 2, properties on communal systems were more likely to be flats or maisonettes, new builds and smaller than properties on district systems.

[23] Wider population data taken from a number of sources, including the 2011 census, VOA 2016 data and the English Housing Survey 2015/16.
[24] Figures are taken from the dwelling counts provided in the RD and ECO databases.
[25] The median is a measure of central tendency.

Table 2 Differences in profile between communal and district heat networks

Characteristic		Communal	District
Property type	Flat/maisonette	**92%**	**86%**
	House/other	**4%**	**9%**
Building age	1960 – 1999	64%	60%
	2000+	24%	26%
Size (#bedrooms)	0 – 1	**65%**	**52%**
	2+	**32%**	**46%**
Tenure	Own/mortgage/part own	**20%**	**26%**
	Rent from local authority	**27%**	**38%**
	Rent from housing association	**41%**	**22%**
	Rent privately	9%	10%
Region	London	**38%**	**49%**
	Outside London	**62%**	**51%**
Child in household	No children	**93%**	**86%**
	One or more	**7%**	**14%**
Employment status	Full/part time work	**32%**	**42%**
	Retired	**54%**	**41%**
	Unemployed	4%	4%
Person aged 65+	Present in household	**53%**	**40%**
Vulnerable	Present in household	42%	38%
Financially struggling	Present in household	**23%**	**28%**

Base: Communal heat network consumers (1,521) and district heat network consumers (1,047)
In Table 2, the differences between the numbers in bold are statistically significant.

In addition, households on communal systems were more likely to have a member aged 65 or older than district systems (53%, compared with 40%). Conversely, consumers on district systems were more likely to agree that they were financially struggling (28%, compared with 23%).

Heat Network Operator

Heat networks have been categorised by who operated the network. This definition is based on a combination of who consumers received their bill from and who the freeholder was. There are three categories for heat network operator: private; local authority, or housing association. [26] Distribution across the three different types groups was relatively even – 26% of heat network consumers had a privately operated heat network and roughly a quarter had network operated either by a local authority (23%) or by a housing

[26] Consumers who didn't know this information or who failed to provide a response to these questions remained unclassified. There is also some degree of uncertainty in this definition. Some heat networks outsource billing to private companies, which makes it harder for some heat network consumers to identify who is actually operating their network.

association (24%).[27] Compared with other types of heat networks, properties on privately operated networks were more likely to be flats or maisonettes, newly built, larger and owned or rented privately. Consumers on private networks were also more likely to be in full-time employment.

Table 3 Differences in profile between properties with different heat network operators

Characteristic		Private	Local authority	Housing association
Heat network type	Communal	45%	38%	**64%**
	District	33%	39%	**22%**
Building age	1960 – 1999	**32%**	**71%**	**66%**
	2000+	**57%**	**3%**	**18%**
Size (#bedrooms)	0 – 1	49%	59%	**76%**
	2+	48%	39%	**19%**
Tenure	Own/mortgage/part own	**40%**	12%	7%
	Rent privately	**18%**	*%	1%
	Rent from housing association	**21%**	**1%**	**85%**
	Rent from local authority	**19%**	**84%**	**6%**
Region	London	**63%**	**55%**	**20%**
	Outside London	**37%**	**45%**	**80%**
Child in household	No children	88%	85%	**96%**
	One or more	12%	15%	**4%**
Employment status	Full/part time work	**59%**	**32%**	**15%**
	Retired	**27%**	**45%**	**70%**
	Unemployed	4%	7%	3%
Person aged 65+	Present in household	**26%**	**45%**	**68%**
Vulnerable	Present in household	**26%**	**45%**	**54%**
Financially struggling	Present in household	33%	26%	20%

Base: Heat network consumers on privately operated networks (1,128), local authority operated networks (772) and housing association operated networks (893).
In Table 3, the differences between the numbers in bold are statistically significant.

Households on networks operated by a housing association were much more likely to have a member aged 65 or older, especially when compared to privately operated networks. These households were also more likely to have a vulnerable person, compared with those on private or local authority operated networks. Consumers on privately operated networks were more likely to agree that they were financially struggling than those on other networks.

[27] The remaining heat network consumers didn't know who operated their network.

Metered and unmetered properties

The survey asked consumers whether their heating and hot water bills were based on actual household usage, estimated household usage, their building's usage, or a set price (which didn't vary with usage). Those who were billed based on actual or estimated household usage have been classified as being *metered*, and those that were not, as *unmetered*. Amongst heat network consumers, 36% were metered users and 41% unmetered users. Around a quarter (24%) didn't know, or did not want to answer this question (and remain unclassified).

As shown in figure 4, metered properties were more likely to be newer, larger and owned or rented privately. Consumers in metered properties were more likely to be younger, have a child in the household, and to have someone in full or part-time employment. Metered households were also more likely to be classified as struggling financially. Conversely, unmetered households were more likely to have a household member aged 65 or over as well as a vulnerable household member.

Table 4 Differences in profile between metered and unmetered properties

Characteristic		Metered	Unmetered
Heat network type	Communal	**43%**	**56%**
	District	**34%**	**30%**
Building age	1960 – 1999	**39%**	**70%**
	2000+	**47%**	**15%**
Size (#bedrooms)	0 – 1	**50%**	**65%**
	2+	**47%**	**32%**
Tenure	Own/mortgage/part own	**29%**	**18%**
	Rent privately	**15%**	**7%**
	Rent from housing association	**24%**	**40%**
	Rent from local authority	30%	33%
Region	London	**54%**	**41%**
	Outside London	**46%**	**59%**
Child in household	No children	**84%**	**92%**
	One or more	**16%**	**8%**
Employment status	Full/part time work	**54%**	**29%**
	Retired	**30%**	**55%**
	Unemployed	6%	5%
Person aged 65+	Present in household	**28%**	**53%**
Vulnerable	Present in household	**31%**	**45%**
Financially struggling	Present in household	**32%**	**22%**

Base: Heat network consumers billed based on actual use (metered) (2,824) and estimated use (unmetered) (1,629).

In Table 4, the differences between the numbers in bold are statistically significant.

Heat Trust registered networks

Part of the sample for this study was drawn from a database of heat networks registered with the Heat Trust.[28] The Heat Trust is a voluntary scheme where heat network suppliers can register, pledging to meet the customer service standards and customer protection requirements set out by Heat Trust. These standards build on the standards set for gas and electricity suppliers and aim to ensure that:

- Customers receive a heat supply agreement, setting out clear terms.
- Customers receive a customer information pack.
- Bills clearly separate fixed and variable charges.
- Service is restored 24 hours after any unplanned outages.
- Guaranteed service payments for when outages are not restored within the agreed timeframe.
- There is additional support for vulnerable consumers, including holding a priority services register.
- Eight- week timeframe for heat suppliers to resolve complaints.
- Customers can access the independent Energy Ombudsman.

Kantar Public received responses from 433 consumers on Heat Trust registered heat networks, the equivalent of 14% of all surveyed heat network consumers.[29] Of the 50 networks registered with Heat Trust at the time of fieldwork and included in the original sample, responses were received from consumers across 44 different heat networks (with an average of 10 responses per network). Table 5 shows the main differences between the profiles of those on networks that are and are not registered with the Heat Trust. Heat Trust registered properties were more likely to be newer, larger, owned or rented privately, and based in London. Households in Heat Trust registered properties were more likely to have children present and to have someone in full-time or part-time employment.

[28] www.heattrust.org
[29] Heat Trust consumers were down-weighted to reflect the actual prevalence of Heat Trust registered networks in England and Wales – 5%.

Table 5 Differences in profile between Heat Trust and non-Heat Trust registered properties

Characteristic		Heat Trust registered	Not HT registered
Heat network type	Communal	**25%**	**63%**
	District	**75%**	**37%**
Building age	1960 – 1999	**4%**	**71%**
	2000+	**96%**	**29%**
Size (#bedrooms)	0 – 1	**31%**	**63%**
	2+	**69%**	**37%**
Tenure	Own/mortgage/part own	**48%**	**19%**
	Rent privately	**25%**	**10%**
	Rent from housing association	**18%**	**33%**
	Rent from local authority	**8%**	**35%**
Region	London	**88%**	**44%**
	Outside London	**12%**	**56%**
Child in household	No children	**77%**	**90%**
	One or more	**23%**	**10%**
Employment status	Full/part time work	**87%**	**35%**
	Retired	**6%**	**46%**
	Unemployed	**2%**	**6%**
Person aged 65+	Present in household	**6%**	**44%**
Vulnerable person	Present in household	**14%**	**41%**
Financially struggling	Present in household	**37%**	**26%**

Base: Heat network consumers registered with Heat Trust (533) and not registered with Heat Trust (3,183).
In Table 5, the differences between the numbers in bold are statistically significant.

Reflecting the differences by region, age of property and network operator, households on networks that were not registered with Heat Trust were much more likely to have a member aged 65 or over as well as a member who is vulnerable. However, households on Heat Trust registered networks were more likely to be struggling financially.

Key analysis variables for the main body of the report

Throughout the report, headline comparisons are made between heat network consumers and non-heat network consumers. We also look, specifically, at how the experiences and perceptions of heat network consumers vary depending on household characteristics or the characteristics of their heat network.[30]

However, as the preceding section demonstrates, the characteristics of households and heat networks are often highly interrelated. For example, a difference observed between Heat Trust and non-Heat Trust households may well be explained by other correlated characteristics such as metering or property age.

This being the case, Kantar Public conducted regression analyses to determine which characteristics were most *strongly* associated with certain key outcomes:

- Overall satisfaction with heat network service
- Satisfaction with the level of control over heating
- Experience of over-heating
- Perceived fairness of price
- Perceptions of the level of information on bills
- Whether consumers had complained or had reason to complain
- Satisfaction with information provided by their provider

This analysis allows an estimate of the influence of consumer, household or heat network characteristics, while keeping all other variables fixed. Kantar Public identified six variables which were consistently strongly associated with responses to all or most of the key outcomes listed above:

- Extent to which consumers agree 'keeping up with heating and hot water costs is a bit of a struggle'
- Whether there is a vulnerable person in the household31
- Whether there is a person of pensionable age in the household

[30] Further detail on how heat network and non-heat network consumers were sampled and weighted are provided in Sections 3 and 4 of the Technical Report

[31] Vulnerability is defined as having or caring for someone with a long-term illness, physical or mental health problem, having a hearing or visual impairment of other communication needs, having temporary problems which affect their ability to use their heating, or needing extra support or assistance from their gas or heating supplier.

- Metering (whether or not the household was billed based on actual or estimated household usage)
- Property age
- Property size (number of bedrooms)

Throughout the report, we focus on these variables when discussing how consumer experience varies by sub-groups within the heat network population. In addition to these six variables, there is commentary about the type of scheme (communal or district) as this is of particular interest in understanding the heat networks sector.

Full results for a wide range of population sub-groups can be found in the data tables which accompany this report.[32]

[32] Data Tables

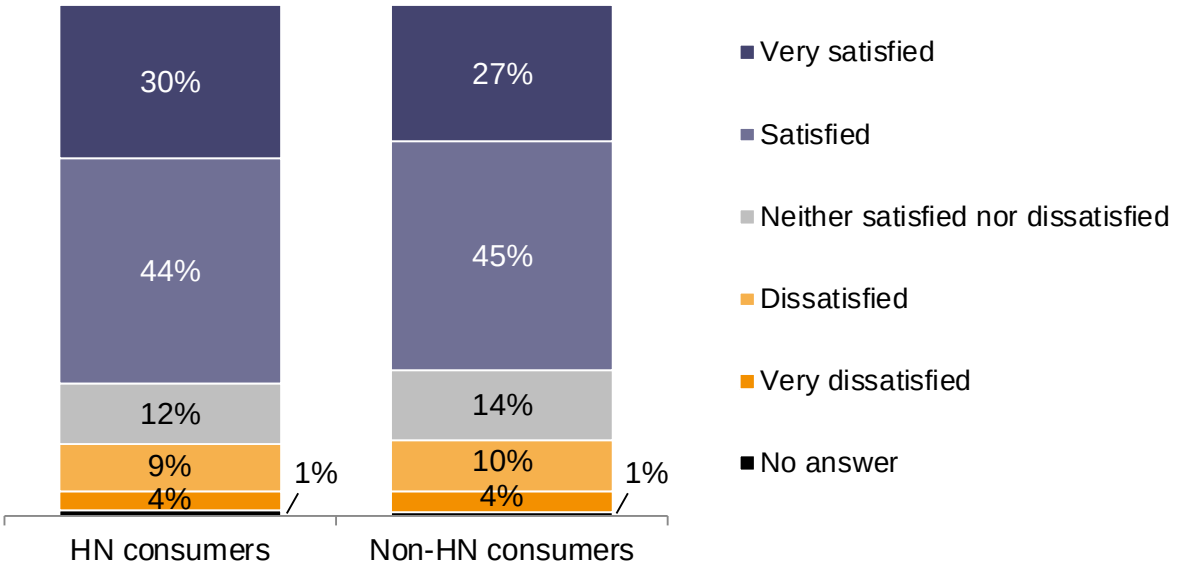
3. Satisfaction with heating and hot water service

- Overall, heat network consumers were at least as satisfied with their heating systems as non-heat network consumers. Roughly three quarters of both types of consumer were satisfied overall.
- There was considerable variation in the heat network sector. Satisfaction varied depending on type of network. Heat network consumers on communal networks were slightly more positive than those on district networks – 78% were satisfied compared with 71%. Consumers on housing association networks were more satisfied than those on private or local authority networks (81% were satisfied, compared with 71% and 72%).
- Regression analysis was carried out to better understand the underlying factors which affect satisfaction among heat network consumers.
- Satisfaction was most strongly influenced by reported reliability of heat networks. After controlling for other factors, the odds of being satisfied were 4.3 times higher for heat network consumers who said their heating system was ‘very reliable’ compared with those did not.
- Perceived fairness of price was also critically important. Controlling for other factors, the odds of heat network consumers being satisfied were 2.7 times higher for those who viewed the price as fair than for those who did not.
- Satisfaction was also affected by the level of information that heat network consumers receive about their system. Controlling for other factors, the odds of heat network being satisfied were 3.3 times higher for those who were satisfied with the information received, compared with those who were not satisfied with the information received.

How satisfied are consumers with their heating and hot water system?

Levels of satisfaction were comparable between heat network consumers and non-heat network consumers. Nearly three-quarters in both groups said they were ‘satisfied’ or ‘very satisfied’ (see Figure 1).

Figure 1 Satisfaction with heating system overall



Base: All consumers; HN consumers (3,716), comparison group consumers (1,786)

Among heat network consumers, the level of satisfaction varied with the characteristics of the system and their property. Consumers on communal systems were more satisfied than those on district systems (78%, compared with 71%). More than eight in ten (81%) consumers on heat networks operated by housing associations were satisfied, compared with around seven in ten consumers on networks operated privately or by a local authority (71% and 72%, respectively). However, the underlying drivers of satisfaction are better explored using a regression model, as described below.

Key drivers of satisfaction

The previous section highlighted how certain characteristics of heat networks and consumers themselves were associated with overall satisfaction. However, overall satisfaction is also highly likely to be affected by different aspects of heating systems, the service consumers received, and how these things are perceived by consumers. In this

section, we present a logistic regression model[33] which predicts overall satisfaction[34] based on specific aspects of a consumer's experience of their heat network:

- Reported reliability of system.
- Experience of under-heating
- Experience of over-heating
- Satisfaction with the information provided about their system
- Satisfaction with handling of complaints
- Perceived fairness of price

This approach estimates the influence of a single factor on overall satisfaction, independently of the other variables in the model. This helps identify which of these factors are most closely associated with overall satisfaction. The model included satisfaction variables thought to be important for the overall satisfaction.

The model also controls for a range of other characteristics of households and heat networks including: property type, property age, number of people in the household, and others. Details of the full model, including these controlling variables, are included in the technical appendix to this report. In this discussion, the focus is on the predictor variables listed above.

The principal outputs from a logistic regression are the odds ratios, summarised in Table 6. All of the predictor variables in the model were categorical variables and the odds ratio indicates the size of the effect of the predictor on the outcome variable when comparing one category to another. For example, Table 6 shows that for predictor variable 1 (that consumers report their system as reliable), the odds of a consumer reporting overall satisfaction with their heat network system[35] are more than 4 times as great if consumers said their system was 'very reliable' as opposed to 'fairly reliable'/'not very reliable'/'not at all reliable'/gave no answer.

- An odds ratio below 1 indicates that consumers in the specified category are less likely to be satisfied than consumers in in the reference category.
- An odds ratio greater than 1 indicates that consumers in the specified category are more likely to be satisfied than consumers in the reference category.

[33] Logistic regression is a statistical technique to analyse the relationships between multiple variables where the outcome variable is binary. It finds the equation that best predicts the probability of the outcome given the variables included in the model.

[34] Respondents were classified into one of two groups depending on whether they said they were satisfied with their heating system (either 'Very satisfied' or 'Satisfied'), or not (either 'Neither satisfied nor dissatisfied', 'Dissatisfied', or 'Very dissatisfied'.

[35] Overall satisfaction was captured using a five-point scale. In the model 'satisfied' includes those who were satisfied to any degree (either 'satisfied' or 'very satisfied').

Table 6 Results from regression model - overall satisfaction with heating system

Predictor variables	Odds ratio
1) System rated 'very reliable' vs. 'fairly reliable'/'not very reliable'/'not at all reliable'/no answer	4.264***
2) Perceives price as 'fair'/'very fair' vs. 'not fair'/'not at all fair'/no	2.770***
3) Satisfaction with information received	
'Very satisfied'/'satisfied' vs. Neither'/'dissatisfied'/'very dissatisfied	3.334***
'Very satisfied'/'satisfied' **vs. did not receive**	2.658***
4) Not experienced under-heating/no answer vs. experienced under-	1.953***
5) Not experienced over-heating/no answer vs. experienced over-	1.598***
6) Satisfaction with handling of complaint	
'Very satisfied'/'satisfied' vs. 'Neither'/'dissatisfied'/'very dissatisfied'	2.874***
'Very satisfied'/'satisfied' vs. did not complain	1.428**

*Results significant at the 95% are marked **, results significant at 99% are marked ***.*
Base: HN consumers (3,679)

What are the drivers of satisfaction?

All six predictor variables were strongly associated with overall satisfaction. Reliability of service had a particularly strong association with overall satisfaction. The odds of being satisfied were 4.3 times higher for those who said their heating system was 'very reliable' compared with those did not. As discussed in Chapter 4, the majority of heat network consumers (93%) said their heating system was 'very' or 'fairly' reliable, with relatively few saying it was 'not very' or 'not at all reliable'.

Perceptions of price were also strongly associated with overall satisfaction; if heat network consumers perceived the price paid for heating and hot water as fair, they were also more likely to be satisfied with the service overall. The odds of being satisfied were 2.8 times higher for those who viewed the price as fair than for those who did not.

However, while price is clearly a very important factor, other elements of the wider service experience had a similar impact on overall satisfaction. In particular, the odds of being satisfied were 3.3 times higher for consumers who were satisfied with the information received than those who were not satisfied with the information received (and 2.7 times higher than those who said they did not receive any information). The odds of being satisfied were 2.9 times higher for consumers who were satisfied with the handling of complaints than those who were not satisfied with the handling of complaints (and 1.4 times higher than those who did not complain).

Finally, both over-heating and under-heating were associated with overall satisfaction; the odds of being satisfied were 2 times greater for those who had not experienced under-heating and 1.6 times greater for those who had not experience over-heating.

4. Technical service

- Heat network reliability was comparable to non-heat networks. Around nine in ten of both sets of consumers said their system was ‘very’ or ‘fairly’ reliable.
- Heat network consumers tend to have less control over their heating, compared with non-heat network consumers. While they were more likely to have and use thermostatic radiator valves (TRVs), they are less likely to have a central thermostat or heat programmer.
- Lack of control seems to be driving wasteful cooling behaviours; heat network consumers were more likely than non-heat network consumers to open windows (HN: 87%, non-HN: 79%), and use electric fans to cool their homes when they experienced over-heating (HN: 49%, non-HN: 44%).
- Despite differing levels of control, heat network consumers were no more or less satisfied with their level of control compared with non-heat network consumers; 14% of both heat network and non-heat network consumers were dissatisfied with their level of control. However, heat network consumers who were struggling financially were more likely to be dissatisfied with their level of control (20%, compared with 12% who were not struggling financially).
- Levels of over-heating were far higher among heat network consumers – 39% had been uncomfortably warm in the last 12 months, compared with 22% of non-heat network consumers. There is also evidence of persistent over-heating in the sector, with heat network consumers around four times as likely to say their home was ‘always’ too warm (HN: 13%, non- HN: 3%).
- Common reasons given for over-heating among heat network consumers included lack of control (HN: 23%, non- HN: 19%) and not being able to the turn the heating off (HN: 11%, non-HN: 7%).
- More positively, heat network consumers were less likely than non-heat network consumers to experience under-heating (HN: 16%, non- HN: 29%).
- Service interruptions were relatively common in the sector. More than a third of heat network consumers had experienced an interruption/ loss of heating in the last 12 months (HN: 37%, non- HN: 24%). Heat network consumers were also slightly more likely to have experienced multiple interruptions in the last 12 months.

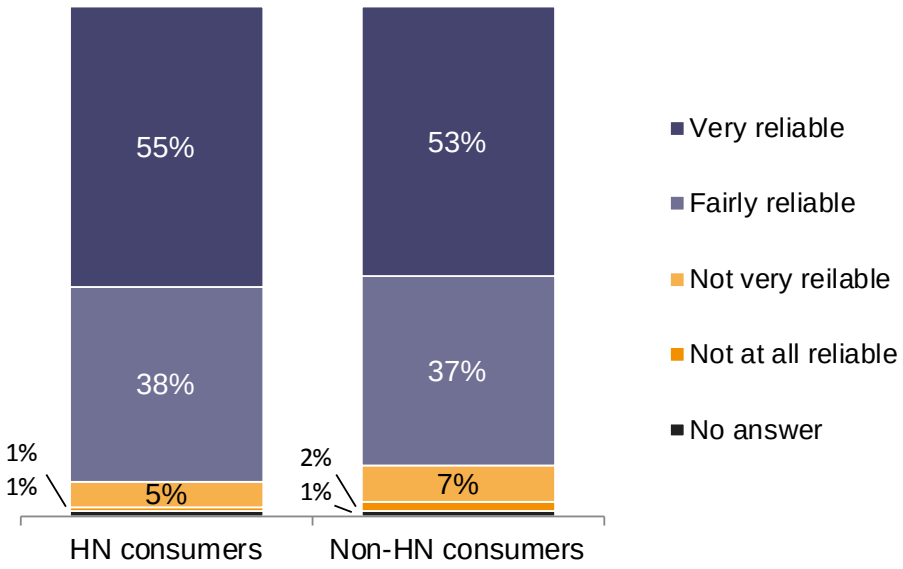
Performance of heating and hot water service

This section looks at reported reliability of heating systems, and consumers' experiences of system performance. The discussion also covers prevalence of service loss and experience of over and under-heating. In Chapter 2, we highlighted seven key factors which explained a high proportion of the variance in heat network consumers' survey responses. These have been adopted as the key analysis variables throughout the report. In relation to technical service, three of these factors were particularly strong drivers of heat network consumers' experiences and perceptions [36]: age of property, presence of a meter, and whether or not there was anyone aged 65 or older in the household. These factors are of importance consistently throughout Chapter 4.

How reliable are heat networks?

Heat networks were seen as no more or no less reliable than non-heat networks. As shown in Figure 2, just over half of all consumers - both heat network and non-heat network - said their heating system was 'very reliable'. However, in both populations, this leaves nearly half who felt their system was, at best, 'fairly reliable'.

Figure 2 Reliability of heating system for heating consumers' homes



Base: All consumers; HN consumers (3,716), comparison group consumers (1,786)

Among heat network consumers, reported reliability varied according to a number of characteristics of the network. Those on housing association operated networks were most likely to say their heating system is 'very reliable' (66%; privately operated networks: 53%, local authority operated networks: 50%). Perceptions also varied depending on whether

[36] Specifically, whether consumers had experienced overheating, and their perceptions of levels of control

consumers were served by a communal or district system (60% 'very reliable', compared with 51%).

How many consumers feel their dwelling is over-heated?

Over-heating may be explained by a number of factors, including but not limited to:

- Disadvantageous thermal retrofitting - where retrofitted buildings require less heat but radiators and branch pipework now emit too much heat.
- Very energy-efficient new build properties may be prone to over-heating during hotter spells (independent of the installed heating system)[37].

Heat network consumers were more likely than non-heat network consumers to report over-heating (HN: 39%, non- HN: 22%).[38] Consistent with this, over-heating was a particular issue for heat network consumers in newer properties, and homes on privately operated networks. More than half (52%) of heat network consumers in properties built 2010 or later and, 47% of those in buildings built 2000-2009 had experienced over-heating. In comparison, a little more than a third (35%) of those living in buildings built before 2000 reported over-heating.

Reasons for over-heating

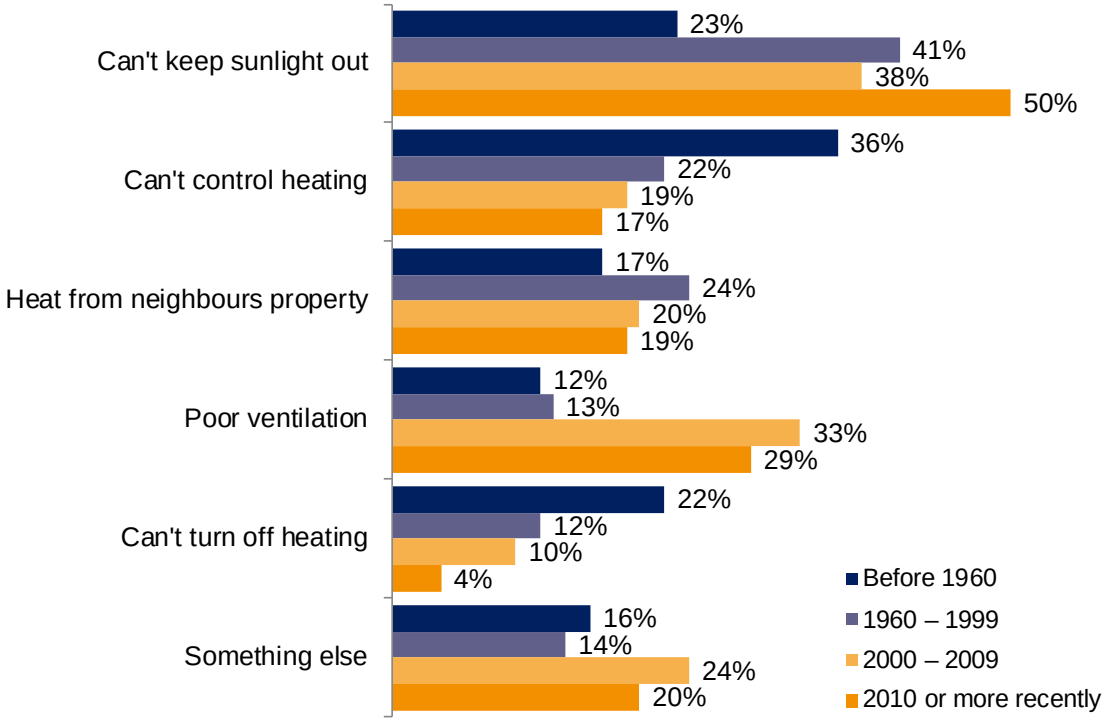
Heat network consumers were more likely than non-heat network consumers to experience over-heating because they couldn't turn their heating off (HN: 11%, non- HN: 7%). This was a particular problem for heat network consumers in unmetered homes; 15% said they could not turn off their heating (metered homes: 6%). A quarter of unmetered heat network consumers (25%) said their home over-heated because they were not able to control the temperature (metered homes: 16%).

Reasons for over-heating also varied strongly with the age of the property, with the lack of control being a more of an issue for those in older buildings. Specifically, 36% of consumers in properties built before 1960 said their home over-heated because they couldn't control their heating, with 22% saying it was because they couldn't turn their heating off. In contrast, those in properties built from 2000 onwards were more likely to cite poor ventilation as a reason for over-heating, compared with those in properties built before 2000.

[37] http://www.zerocarbonhub.org/sites/default/files/resources/reports/ZCH-OverheatingInHomes-TheBigPicture-01.1.pdf

[38] Consumers were asked whether their home ever became 'uncomfortably warm'. Those who answered 'yes' have been classified as experiencing 'overheating'.

Figure 3 Reasons why home over-heats among consumers whose homes get uncomfortably warm by property age



Base: HN consumers whose home ever gets uncomfortably warm – Home built before 1960 (190), home built between 1960 – 1999 (554), home built 2000-2009 (126), home built 2010+ (427)[39]

Actions to cool the home when uncomfortably warm

All consumers who experienced over-heating were asked how they cool their home, selecting their response from a pre-coded list of actions: opening a window, using an electric fan, turning off heating, turning down heating or using an air conditioning unit.

Some of these options can be described as wasteful, leading to increases in energy use to cool the home or heat being directly wasted. Potentially wasteful behaviours were more prevalent among heat network consumers, compared with non-heat network consumers. Nearly nine in ten heat network consumers (87%) said they opened windows to cool their home (non-HN: 79%). Around half (49%) said they used an electric fan to cool their home, compared with 44% of non-heat network consumers.

Timing and frequency of over-heating

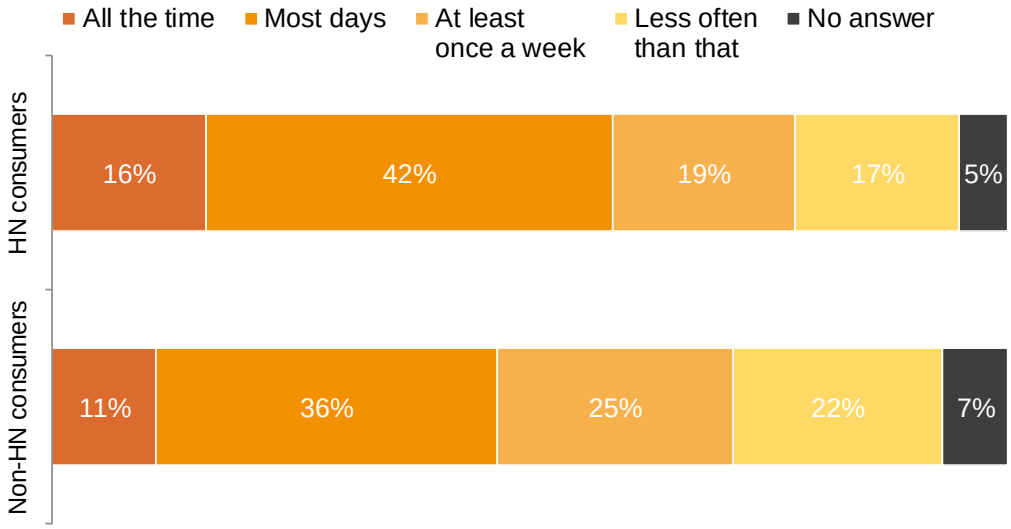
For those consumers who experience over-heating it is important to understand when and how often over-heating occurs. Where over-heating occurred, seasonal patterns were similar among heat network and non-heat network consumers. Three-quarters of both heat networks consumers (74%) and non-heat network consumers (76%) who experienced

[39] Those who answered “Don’t know” or did not answer this question are not included in this chart.

over-heating said this happened during the summer. For both groups, just 7% said their home over-heated during the winter.

However, there is evidence of higher levels of persistent over-heating among heat network consumers, compared with non-heat network consumers. As shown in Figure 4, heat network consumers who experienced over-heating were more likely to say their home over-heated all of the time, (HN: 16%, non-HN: 11%). They were also more likely to say their home over-heated 'most days' (HN: 42%, non- HN: 36%).

Figure 4 Frequency of over-heating among consumers whose homes ever get uncomfortably warm



Base: Respondents who have ever found their home uncomfortably warm
HN consumers (1,522), non-HN consumers (419)

How many consumers feel their dwelling is under-heated?

Under-heating was relatively uncommon for heat network consumers.[40] Around three in ten non-heat network consumers (29%) had experienced under-heating, compared with just 16% of consumers on heat networks. Heat network consumers living in older properties, were moderately more likely to have experienced under-heating (24% of those living in buildings built before 1960 had experienced under-heating). This probably reflects lower levels of energy efficiency in older homes.

Reasons for under-heating

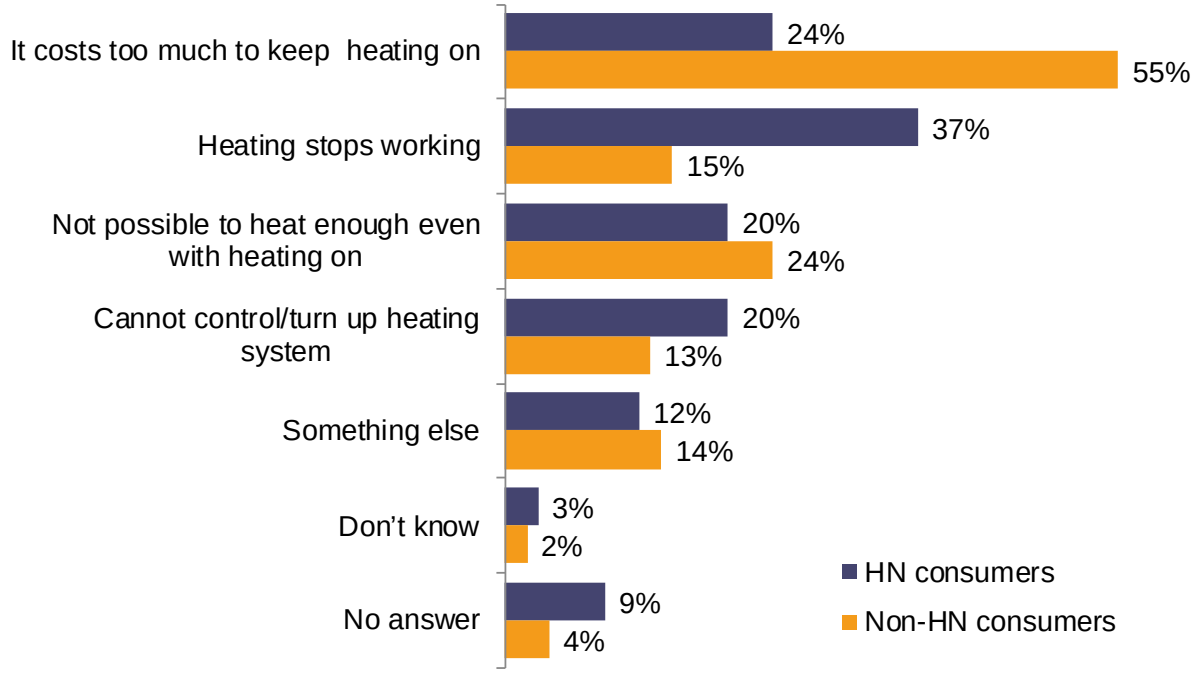
Compared with non-heat network consumers, heat network consumers were more than twice as likely to have experienced under-heating due to their system stopping working (HN: 37%, non- HN: 15%). Heat network consumers were also more likely to have

[40] Consumers were asked whether their home ever got uncomfortably cold. Those who answered 'yes' have been classified as experiencing 'under-heating'.

experienced under-heating because they were not able to control the heating system / turn up the heating (HN: 20%, non-HN: 13%).

Among heat network consumers, system failure was more common for those on district systems (47%), compared with those on communal systems (35%). There were also stark differences by operator type; more than half (55%) of consumers on local authority operated networks said under-heating was due to the system stopping working (compared with 30% for privately operated networks, and 32% for housing association networks).

Figure 5 Reasons why home under-heats among consumers whose homes get uncomfortably cold



Base: Those whose home ever gets uncomfortably cold
HN consumers (625), comparison group consumers (566)

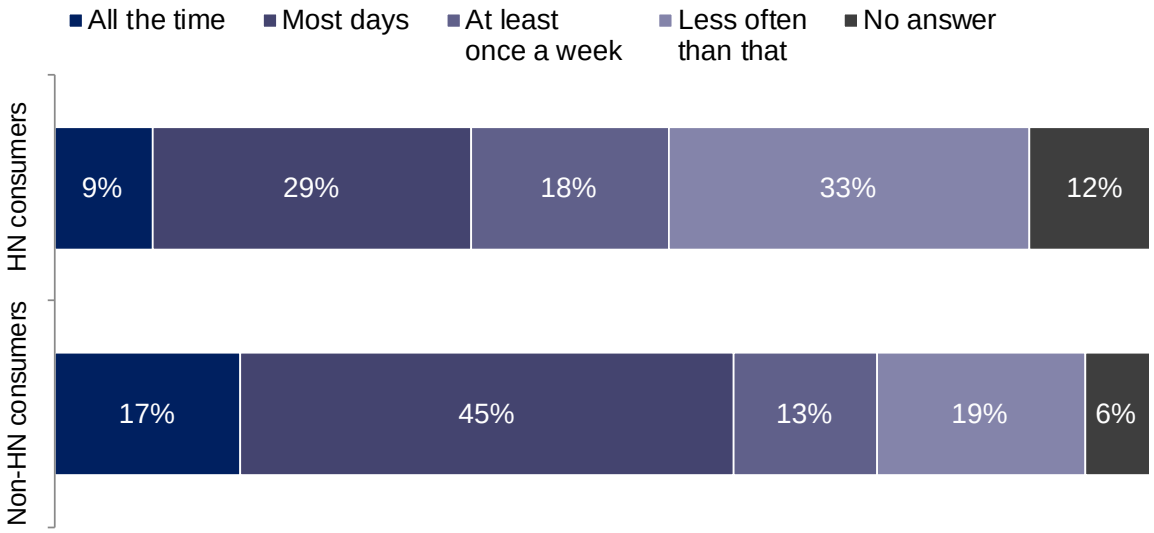
In contrast, non-heat network consumers' homes were much more likely to under-heat due to the cost of keeping the heating on (non- HN: 57%, HN: 26%). This is consistent with findings in Chapter 5 showing that heat network consumers pay lower bills on average and are less likely to pay based on household use. Heat network consumers in metered homes were much more likely than those in unmetered homes to report cost as a reason for under-heating (43%, compared with 9%).Nevertheless, heat network consumers in metered homes were less likely to say it costs too much to keep the heating on, compared with non-heat network consumers (43%, compared with 56%).

As might be expected, heat network consumers who were struggling financially were more likely to cite cost as a reason for under-heating (40%, compared with 13% who were not struggling).

Frequency of under-heating

Those heat network consumers who experienced under-heating did so less frequently compared with non-heat network consumers (see Figure 6).

Figure 6 Frequency of under-heating among consumers whose homes ever get uncomfortably cold



Base: Those whose home ever gets uncomfortably cold
HN consumers (625), non-HN consumers (566)

Heat network consumers in metered homes were more likely to say their home was uncomfortably cold 'most days' (37%, compared with 25% in unmetered homes). Conversely, those in unmetered homes were more likely to say this happened less than once a week (38%, compared with 23%). This is likely related to the cost of heating; those in metered homes having a direct link between household use and price paid.

Related to this, those on privately operated heat networks tended to experience under-heating more frequently than those on housing association, and local authority operated heat networks (33% of consumers on privately operated heat networks said their home was under-heated 'most days', compared with 18% of those on housing association operated heat networks)[41]. Heat network consumers on district schemes, were twice as likely as those on communal schemes, to say their home was uncomfortably cold 'all the time' (11%, compared with 5%).

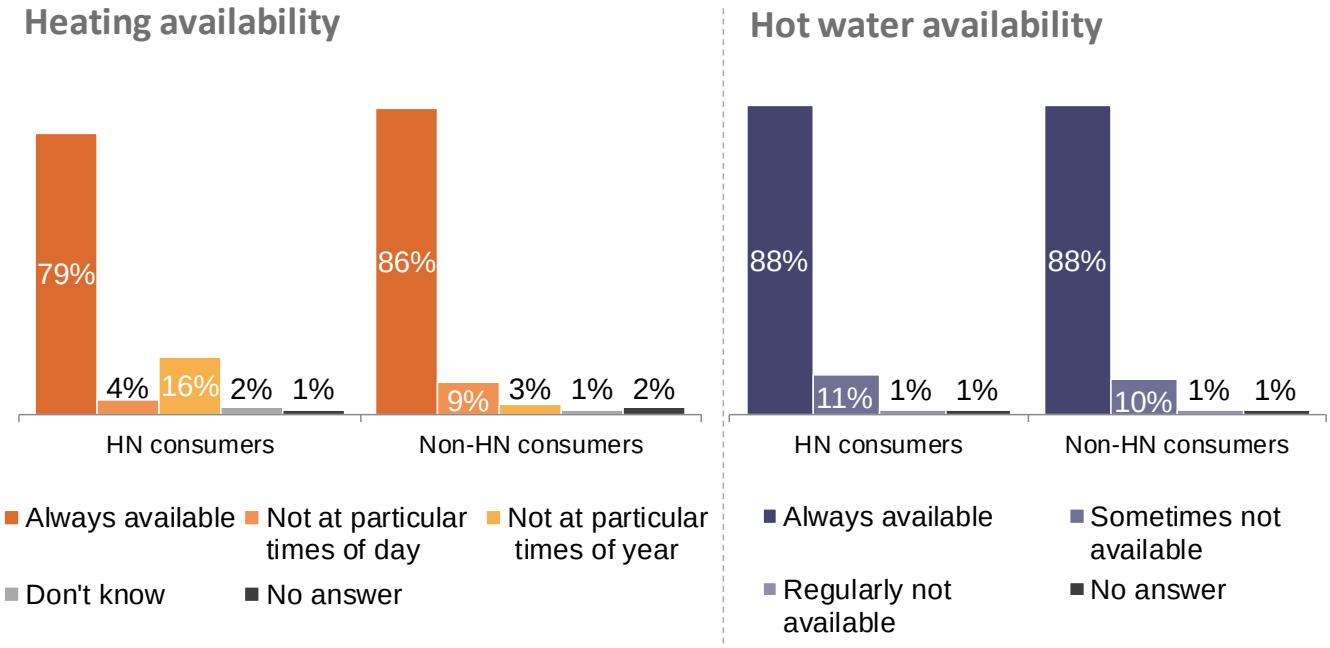
[41] Although not significantly different from either the corresponding figure for local authority operated heat networks was 28%

Are heating and hot water available at all times?

Fewer heat network consumers said heating was available at all times than non-heat network consumers (HN: 79%, non-HN: 86%). As shown in Figure 7, heat network consumers were particularly likely to face outages at particular times of the year, compared with non-heat network consumers (HN: 16%, non-HN: 3%). This is likely to be due to heat networks turning off heating systems during summer months, or at other times of year, to carry out maintenance activities.

A large majority (88%) of both heat networks consumers, and non-heat network consumers said hot water was 'always available'. As such the rest of this section focuses on availability of heating.

Figure 7 Availability of heating and hot water



Base: All consumers; HN consumers (3716), comparison group consumers (1786)

Differences in availability of heating among heat network consumers

Among heat network consumers, lack of heating availability was more common for those in older properties. Only 60% of those in homes built before 1960 said that heating was always available. This compared with 79% in homes built between 1960 and 1999, and 89% in homes built from 2000 onwards. Furthermore, those in homes built before 1960 were highly likely to say they did not have access to heating at particular times of year (36%). This compared with 17% of those in homes built between 1960 and just 6% of those in homes built from 2000 onwards.

How many consumers have experienced interruptions in service?

Consumers were also asked whether they had experienced a *loss of heating* in the last 12 months. The questionnaire did not distinguish between planned and unplanned outages, so the findings in this section do not, directly, relate to system failure.[42]

Consistent with the preceding section on availability of heating, heat network consumers were more likely than non-heat network consumers to have experienced a heating loss in the last 12 months (HN: 37%, non-HN: 24%). Of those who had experienced loss of heating, heat network consumers were also more likely to have experienced multiple outages (HN: 56%, non-HN: 46%, of those who had experienced heat loss).

Looking specifically at loss of heating among heat network consumers, those on local authority operated networks were more likely to have experienced a loss in the last year (45%; privately operated schemes 36%, housing association operated schemes:33%). They were also more likely to have experienced multiple losses in the last 12 months.

Length of heating loss

Those who had experienced a loss of heating were also asked how long this lasted. The majority of both heat network consumers and non-heat network consumers said the loss lasted a day or less (HN: 63%, non HN: 54%, respectively). This indicates that heat network consumers, on average, experienced shorter losses (although more frequently on average). That said, there were small but notable proportions of heat network and non-heat network consumers who experienced lengthy losses; 18% of heat network consumers and 10% of non-heat network consumers who had experienced a heating loss said this had lasted a week or more.[43]

The Heat Trust requires all registered heat networks to restore heating within 24 hours of a loss. The survey suggests that this is service standard is generally met – 73% of consumers on Heat Trust registered networks who had experienced heating loss, said the loss lasted 24 hours or less. Losses on heat networks that were not registered with the Heat Trust tended to last slightly longer – 63% of losses lasted 24 hour or less.

Energy saving and levels of control

Consumers were asked how much thought they give to saving energy in their home, ranging from ‘a lot’ to ‘no thought at all’. Heat network consumers on average gave less thought to energy saving, being more likely to give ‘not very much’ or ‘no thought at all’ to energy saving in their home (HN: 24%, non-HN: 19%). Non-heat network consumers were slightly more likely to give ‘a lot’ of thought to energy saving (non-HN: 33%, HN: 27%).

[42] Planned outages might include a system shutdown to carry out maintenance. Generally this would be planned in summer months and consumers should have been given notice of the planned outage.
[43] The apparent difference between heat network consumers and non-heat consumers is not statistically significant.

Looking just at heat network consumers, those who were struggling financially were more likely to give 'a lot' of thought to energy saving (34%, compared with 24% of those who were not struggling financially).

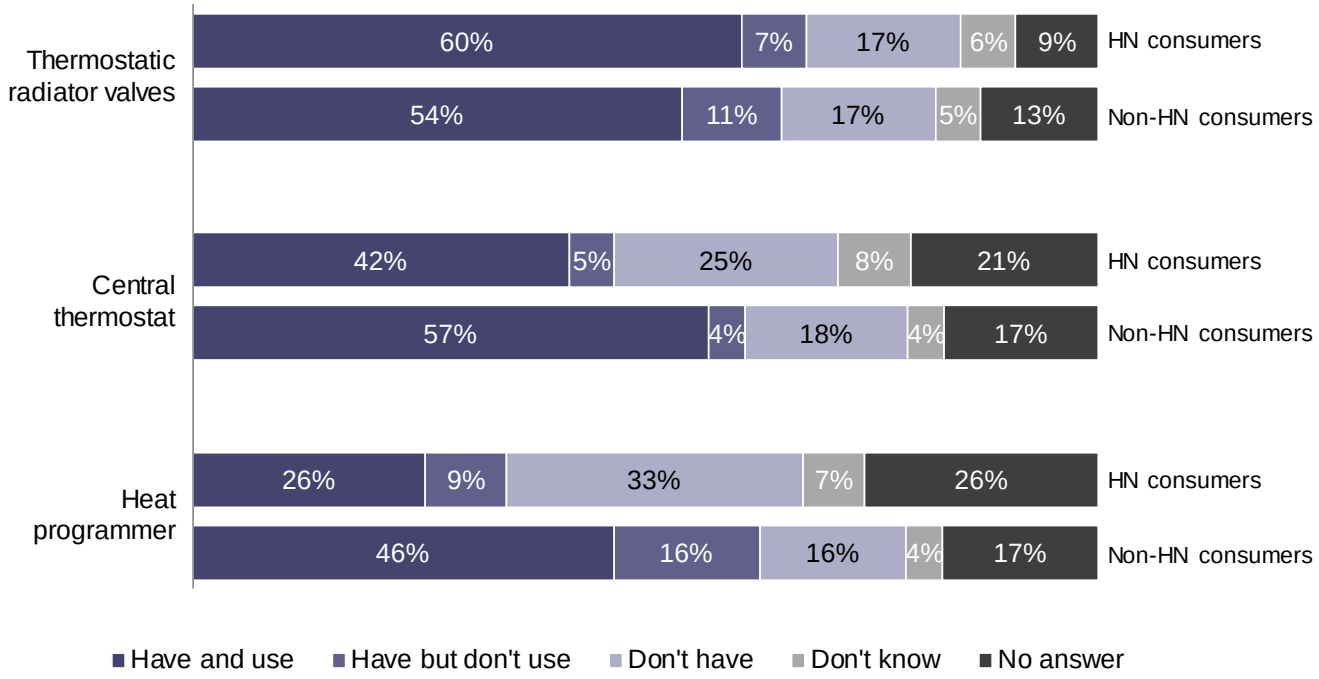
What level of control do consumers have over their heating system? What controls do they have installed?

Consumers were asked which devices they had in their home to control the temperature, and whether they used them. As shown in Figure 8 (below), heat network consumers were more likely to have and use thermostatic radiator valves (TRVs), but less likely to have a central thermostat or heat programmer.[44] Less than half (44%) of heat network consumers reported having all three of these measures in their home, compared with 68% of non-heat network consumers. This suggests heat network consumers have less control over their heating, compared with non-heat network consumers.

Heat network consumers living in newer homes were much more likely to have a central thermostat or heat programmer. Three quarters (75%) of those in homes built from 2000 onwards had a central thermostat. This compared with 41% of those in homes built between 1960 and 1999, and just 25% of those in homes built pre-1960. There were similar differences in prevalence of heat programmers by age of home. There were also variations depending on operator type. Consumers on networks operated by housing associations were more likely to have TRVs (77%) than those private or local authority operated networks (66% and 65%). Conversely, those on privately operated networks, were more likely to have central thermostats and heat programmer (64% and 55%), compared consumers on local authority (39% and 22%) and housing association (36% and 20%) networks.

[44] TRVs are fitted to hot water heating system radiators. They work by sensing the air temperature and regulating the flow of water through the radiator to keep the room at a particular temperature. Central thermostats regulate central heating and ensure the system is set to a particular temperature. Heat programmers allow occupants to specify when the heating comes on to ensure heating is only on when needed.

Figure 8 Devices to control temperature in home

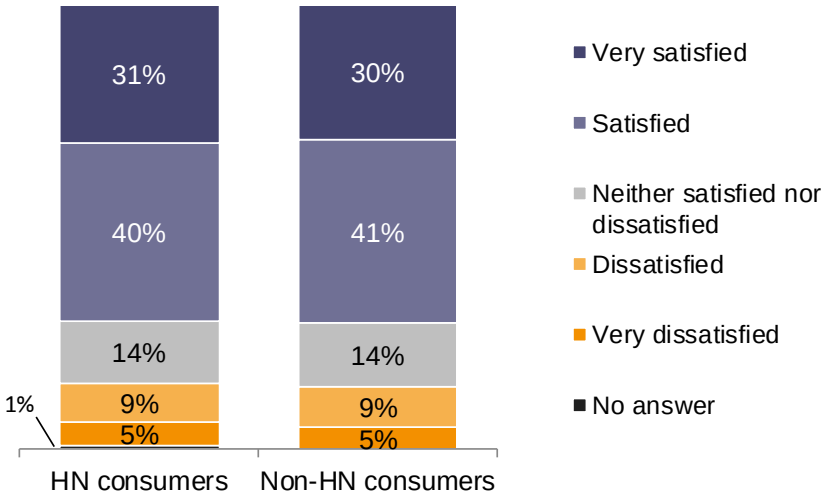


Base: All consumers; HN consumers (3,716), non-HN consumers (1,786)

How many consumers feel they should have greater control?

Despite differing levels of control, heat network consumers were no more or less satisfied with the level of control they had compared with non-heat network consumers (Figure 9). The majority of *all* consumers (both heat network and non-heat network) were 'satisfied' or 'very satisfied' with the level of control they had. Only a small minority in either population were dissatisfied (HN: 9%, non HN: 9%), or *very* dissatisfied (HN: 5%, non- HN: 5%).

Figure 9 Satisfaction with level of control over heating



Base: All consumers; HN consumers (3,716), comparison group consumers (1,786)

Heat network consumers who were struggling financially were more likely to be dissatisfied with the level of control (20%, compared with 12% who were not struggling financially) and less likely to be satisfied (66%, compared with 73%). This is consistent with earlier analysis showing that heat network consumers who were struggling financially were also more likely to give a lot of thought to energy saving in the home.

Heat network consumers in older properties were also more likely to be dissatisfied with the level of control. A quarter (24%) of those in homes built before 1960 were dissatisfied with the level of control, compared with 12% of those in homes build from 1960 onwards. Most likely this is related to the lack of devices to control the temperature in older homes. As discussed earlier in the chapter, those in older properties were less likely to have TRVs, heat programmers and central thermostats. Where these devices were absent, heat network consumers were more likely to be dissatisfied overall. To illustrate, 26% of heat network consumers who did not have a central thermostat were dissatisfied with the level of control (compared with just 9% of those who had and used a central thermostat).

5. Billing arrangements, price and consumer perceptions of price

- There is evidence of great variation in pricing in the heat network sector, with pockets of heat network consumers paying high annual prices, including some consumers paying more than £1,000, or £2,000, per year. The mean average price reported was similar on heat networks and domestic gas systems, however the median price (which is less affected by these uncommon but very high bills) suggested that heat network consumers paid, on average, around £100 less for their heating and hot water compared with non-heat network consumers.

- Heat network and non-heat network consumers were equally likely to say they pay a fair price. However, among heat network consumers, those who were struggling financially were far more likely, than those who were not to say the price they paid was not fair (50%, compared with 19%). There is little evidence that perceived fairness is linked to over-pricing.

- A large proportion of heat network consumers were billed in way that will not incentivise energy-saving behaviours. Meters were relatively uncommon for heat consumers; only 27% say they pay based on actual use, compared with 53% of non-heat network consumers. Relatively large proportions of heat network consumers paid based on overall building use (20%), or paid a set price that didn't vary with use (18%).

- There is evidence of relatively poor transparency in the heat network sector. Heat network consumers were less likely to receive any form of bill, account summary or statement, compared with non-heat network consumers (HN: 62%, non- HN: 81%). Heat network consumers' bills, summaries and statements also tended to include less information compared with those of non-heat network consumers. For example, heat network consumers were around half as likely to be informed of: the amount of heating they had used (kWhs) (HN: 30%, non-HN: 61%); the per-unit price (HN: 28%, non-HN: 57%); or any standing or set charges (HN: 26%, non-HN: 47%). Despite this, heat network consumers were no less satisfied with the level of information they received.

- The Heat Trust does seem to be aiding progress in this area. Consumers on Heat Trust registered schemes received more comprehensive billing information, reflecting Heat Trust's service standards.

- Around a fifth of heat network consumers (20%) said the amount of information provided on their bill was 'too little'. This was moderately higher than among non-heat network consumers (14%). Consumers on heat networks that were not registered with the Heat Trust and consumers without a meter tended to be the least happy about the level of billing information they received.

Introduction to billing arrangements, price and consumer perceptions of price

This chapter focuses on billing arrangements, how consumers' bills are calculated and the price paid by consumers. The analysis of price paid by consumers should be treated with a degree of caution due to levels of incomplete survey data (where participants didn't know or didn't provide price paid). As discussed throughout the chapter, the experiences of heat network and non-heat network consumers were markedly different. Notably, a high proportion (more than half) of heat network consumers did not pay separately for heating and hot water (either paying as part of a service charge or their rent). Therefore, where appropriate and to ensure direct comparability, analyses are limited just to those who paid separately for heating and hot water, or paid a combined energy bill (45% of all heat network consumers). It should also be noted that detailed analysis of price paid among non-heat network consumers is limited to domestic gas consumers, rather than the whole non-heat network population; excluding those with electric, oil, or other type of heating system.

Transparency of billing

There is evidence of lack of billing transparency in the HN sector. Heat network consumers were less likely to receive bills than non-heat network consumers, and those that did, tended to receive these less frequently.

How many heat network consumers receive a bill, account summary of statement?

Heat network consumers were less likely to receive a bill, account summary or statement detailing how much they paid for heating and hot water (HN: 62%, non-HN: 81%).[45] However, this partly reflects the high proportion of heat network consumers who say they pay as part of a service or rental charge. Limiting the analysis to those who pay for energy separately, the difference is smaller but still suggests heat network consumers were less likely to receive any kind of bill; 73% of these consumers said they received a bill, compared with 83% of non-heat network consumers.

How often do heat network consumers receive a bill, account summary or statement?

On average, heat network consumers who did receive a bill did so less frequently than non-heat network consumers. As shown in Table 7, limiting the analysis to those who received some form of bill, heat network consumers were twice as a likely as non-heat network consumers to receive only an annual bill (HN: 27%, non-HN: 11%). Conversely, it was more common for non-heat network consumers to receive quarterly bills (non-HN: 48%, HN: 27%). Non-heat network consumers were also more likely to say they could

[45] The remainder either said they did not receive a bill, summary or statement, or that they didn't know / left the question blank.

access billing information whenever they liked via an online system (non-HN: 9%, HN: 4%).

Among heat network consumers, those on privately run networks received more frequent bills: a third (35%) received a quarterly bill, compared with two in ten for local authority and housing association operated networks (20% and 18%, respectively). In this regard, the experiences of heat network consumers on privately run networks are closer to those of non-heat network consumers. There was no link between frequency of billing and whether or not heat network consumers were struggling financially.

Table 7 Receipt of bills, summaries and statements and frequency of receipt

	Heat network	Non-heat network
Base (all who pay for heating and hot water / energy separately)	*(1,800)*	*(1,649)*
Whether receive a bill, summary or statement	73%	83%
Base (all who receive a bill)	*(2,375)*	*(1,461)*
Annually	27%	11%
Twice a year	8%	9%
Quarterly	27%	48%
Monthly (or more often)	25%	18%
No fixed pattern	2%	3%
Online (whenever I like)	4%	9%
Other	2%	1%
Don't know/no answer	7%	5%

How is billing information delivered to consumers?

For both heat network and non-heat network consumers, the predominant mode of billing was by letter; 77% of heat network consumers who received a bill said this was by post, compared with 65% of non-heat network consumers. By comparison, non-heat network consumers were more likely to receive electronic bills than heat network consumers, either through an online account (non-HN: 26%, HN: 11%) or via email (non-HN: 19%, HN: 10%). Overall, this suggests that heat network billing systems are technologically less advanced than other parts of the domestic market.

Consumers on local authority (6%) and housing association (5%) operated heat networks were particularly unlikely to receive bills via email or online, compared with 32% of those on privately-run networks. However, postal billing was the norm for private, local authority and housing association heat networks, being far more prevalent than any other form of billing.

How consumers pay for heating and hot water and how their bills are calculated

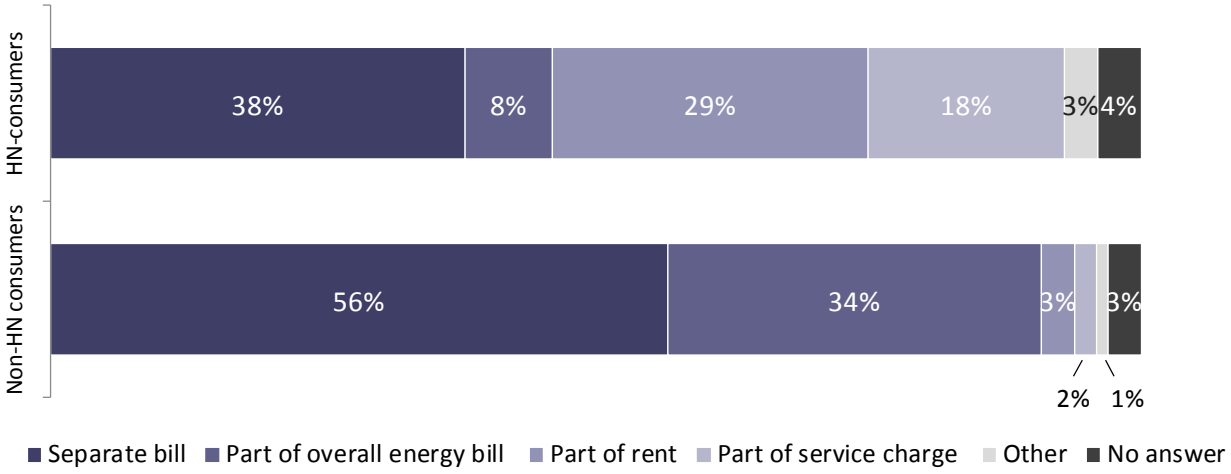
Evidence from the survey indicates that heat network consumers were less likely to be billed in a way which might incentivise energy-saving behaviours. They were less likely to

be billed based on actual or estimated household use. A large proportion of heat network consumers were billed as part of a central service, rental charge or based on building, rather than household, use.

Do consumers pay a combined energy bill, or receive a separate bill just for heating and hot water?

As shown in Figure 10, around half (47%) of heat network consumers paid for their heating and hot water either as part of a central service charge or their rent. This was markedly different to non-heat network consumers - just 6% of non-heat network consumers paid in this way. Critically, few heat network consumers who paid as part of a central service charge or rent said their bills were dependent on household use; 56% who paid a combined charge said their bills were based on overall building use or they paid a set price which didn't vary.

Figure 10 Whether consumers pay for heating and hot water separately to other household bills



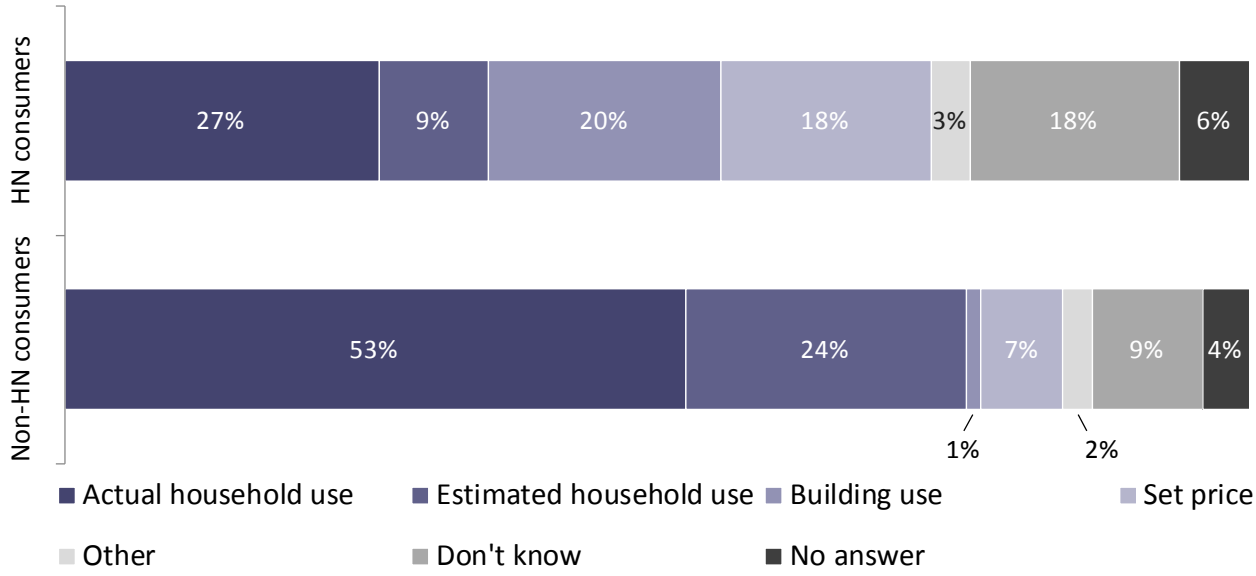
Base: All consumers; heat network consumers (3,716), non-heat network consumers (1,786)

There was a strong association between how heat network consumers paid for heating and hot water, and the age of their property. This is important, as age of property offers a proxy for age of heat network. In properties built pre-2000, 59% of heat network consumers paid for heating and hot water as part of a central service charge or rent. This was relatively uncommon in new builds (built between 2000 and 2017), where 22% paid for heating and hot water as part of a combined charge, and where three quarters (74%) paid a separate heating and hot water bill or paid as part of their overall energy bill. This strong link with property age is also evident in differences in payment by heat network operator. Consumers on networks run by housing associations or local authorities were much more likely to pay for heating and hot water as part of a combined charge compared with those on privately owned networks (78% and 77%, compared with 19%).

How are consumers' bills calculated?

As well as how they paid for heating and hot water, all consumers were asked how the amount they paid was calculated. Consumers' responses are summarised in Figure 11. For non-heat network consumers, largely domestic gas consumers, the norm was for bills to be based on actual or estimated use (77% said this was the case). In contrast, only around a third (36%) of heat network consumers indicated their bills were based on actual (27%) or estimated (9%) use. Nearly four in ten heat network consumers (37%) said they paid a set price which did not vary with usage or based on overall building usage, compared with just 7% of non-heat network consumers. It is also worth noting the high proportion of consumers who didn't know how their price was calculated. This was twice as high among heat network consumers, compared with non-heat network consumers (HN: 18%, non-HN: 9%). The findings suggest a relatively large proportion of heat network consumers' bills were calculated in a way that was either not transparent or did not incentivise energy saving behaviours.

Figure 11 How amount paid for heating and hot water is calculated



Base: All consumers; heat network consumers (3,716), non-heat network consumers (1,786)

Among different types of heat network consumer, there were some notable, if predictable, differences in how payments were calculated. Largely, these were associated with age of home. Specifically, 69% of heat network consumers in homes that had been built since 2010 said they paid based on actual or estimated use. This compared with just 28% of those in older homes. This reflects the legal requirement to install meters in all newly built homes since 2014. Heat network consumers on privately-run schemes were also more likely than those on local authority and housing association run schemes to pay based on household use (71%, compared with 16% and 12%). However, this partly reflects differences in age of property – privately-run schemes tended to serve newer properties.

What billing information do consumers receive?

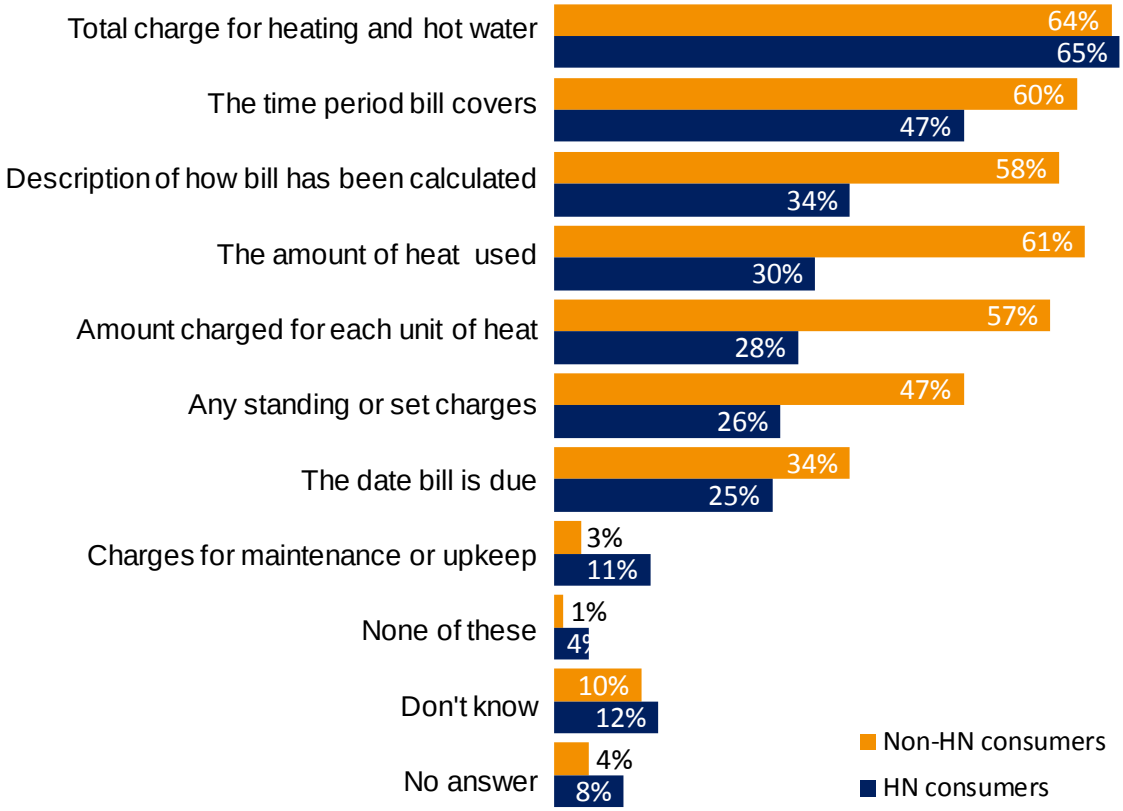
All participants were asked whether the price they paid included additional services (including things like maintenance and servicing). In addition, all participants who received a bill, summary of statement, were asked what information was included on this, and whether the level of information was about right, too much or too little. As well as providing a measure of level of information received, these questions also provide insight into levels of consumer awareness of what was and what should be provided. Overall, the findings point to relatively low levels of information and low levels of awareness among heat network consumers.

Among those who received a bill, summary or statement, heat network consumers were less likely than non-heat network consumers to say their bill included most types of detailed information (see Figure 12). They were just as likely as non-heat network consumers to say they received information on their total charge, but less likely to receive all other types of information. This included some very basic pieces of information, including *the time period the bill covered* (HN: 47%, non-HN: 60%) and *the amount of heat they had used* (HN: 30%, non-HN: 61%). As discussed elsewhere in this chapter, this points to many heat network consumers being billed in a way that was unlikely to incentivise energy-saving behaviours.

Heat network consumers were also around half as likely as non-heat network consumers to say they either received *information on standing charges* (HN: 26%, non-HN: 47%) or *information on the amount they are charged for each unit of heat* (HN: 28%, non-HN: 57%). This raises questions about the transparency of billing in the heat network sector, with the majority of consumers either not receiving information on standing charges or unit costs, or not knowing whether or where this information was provided.

Overall, the findings also suggest that a relatively high proportion of heat network consumers were not aware of what was and wasn't included in their bill. One in five (20%) either didn't know what information was included in their bill or didn't answer this question. This compares with 14% of non-heat network consumers.

Figure 12 Types of information included on bills, account summaries and statements among consumers who receive these



Base: All who receive a bill, summary or statement
HN consumers (2,539), ,non-heat network consumers (1,491)

The level of information provided for heat network consumers varied by several factors but, most notably, by whether schemes were registered with Heat Trust. As described elsewhere, Heat Trust sets services standards for registered members including billing information that must be provided (for example, bills must clearly separate fixed and variable charges). Reflecting these standards, consumers on Heat Trust registered schemes were much more likely than other heat network consumers to receive all types of information described above. For example:

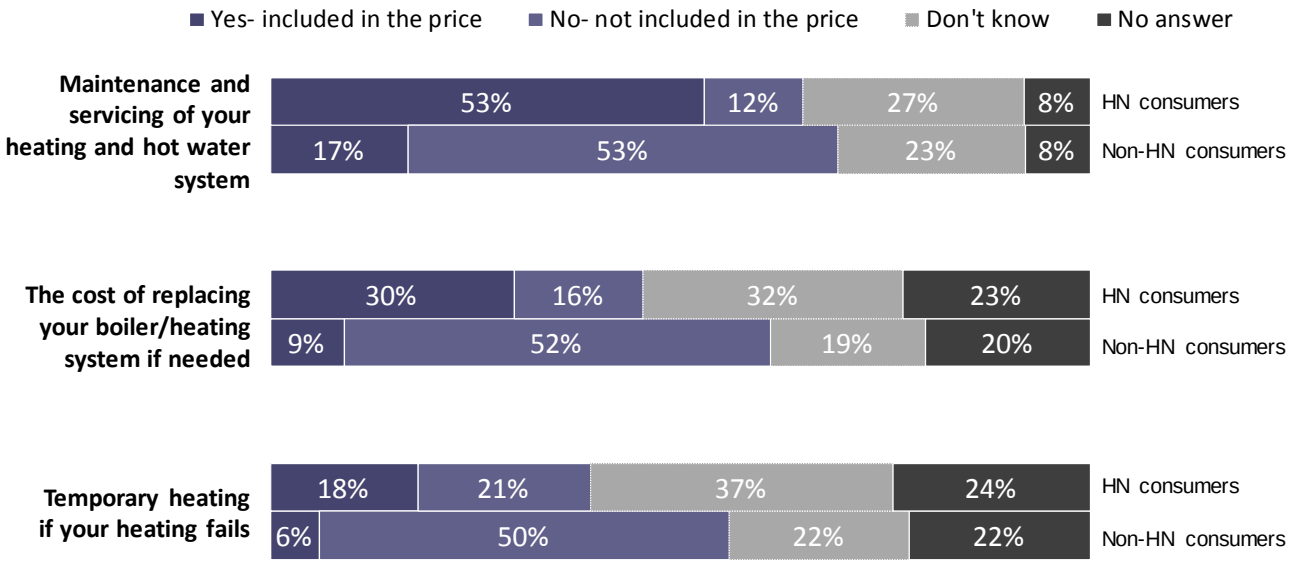
- 74% had a description of how their bill had been calculated (compared with 31% of those on non-registered schemes)
- 75% were told the amount of heat they had used (compared with 27%)
- 72% were told the amount they were charged for each unit of heat (the price per kWh) (compared with 25%)
- 65% were informed of any standing or set charges within their bill (compared with 24%).

What services are included in the price paid?

As shown in Figure 13, heat network consumers were around three times as likely to say that the following three additional services were included in pricing: maintenance and servicing, the cost of replacing the heating system and temporary heating. Despite this, the proportions were low. For example, only 18% of heat network consumers indicated that temporary heating was included in the price they paid. This is surprising given most heat networks should include each of the items in the price to consumers. Further, around one in ten heat network consumers said that maintenance and servicing were *not* included (12%), 16% indicated that the cost of replacing their heating system was *not* included, and 21% indicated that temporary heating was *not* included.

Responses are, probably, explained by limited awareness of what was and what wasn't included in pricing. Very high proportions of participants either didn't know if each service was included or chose to leave the question blank. More than half of heat network consumers didn't know if the cost of replacing their heating system (55%) or the cost of temporary heating (61%) were included in the price they paid. For both items, awareness was considerably lower among heat network compared with non-heat network consumers.

Figure 13 Additional services included in pricing and participant awareness of these



Base: All consumers; heat network consumers (3,716), non-heat network consumers (1,786)

Among heat network consumers, prevalence of additional services / awareness of these varied considerably by age of property and, relatedly, by heat network operator.[46] In particular, consumers in very modern buildings (2010+) which were served by heat networks were the least likely to say that each of the additional services were included in the price they paid. For example only 38% of heat network consumers in homes built since 2010 said that maintenance and servicing were included in the price they paid, 29% indicating this wasn't included. Similar differences can be seen by operator type, with heat network consumers in local authority and housing association run schemes more likely to have had each of these services included in the price they paid (or at least to be more aware of what was and wasn't included).

How many consumers would like to receive more billing information?

While levels of billing information appeared patchy, particularly for heat network consumers, the majority of participants who received a bill, felt the amount of information they received was 'about right' (HN: 74%, non-HN: 79%). That said, around a fifth of heat network consumers (18%) said the amount of information provided on their bill was 'too little', moderately higher than among non-heat network consumers (14%).

A regression model was applied to better understand which factors were linked to heat network consumers' views on billing information.[47] Whether the network was registered with the Heat Trust and presence of a meter stood out as key factors. The analysis shows that consumers on Heat Trust registered networks tended to be happier with the level of information they received; in contrast, once other factors had been controlled for, those on networks that were not registered with the Heat Trust were far more likely to say the amount of information was 'too little'.[48] This is supported by direct (non-regression based) analysis of the survey data where 21% of non-Heat Trust consumers said they received 'too little' information, compared with just 12% of Heat Trust consumers. This is positive, showing the Heat Trust's service standards do have an impact on consumer experience.

Presence of meter was also a key determinant of perceptions of billing information. Regression analysis shows that consumers with unmetered connections tended to be a lot less happy with the level of information they received.[49] This is supported by simpler

[46] As discussed in Chapter 1 there was a strong association with building age and network operator – with local authority and housing associations tending to cover older buildings on average.
[47] See Annex C in the Technical Report
[48] The odds of non-Heat Trust consumers saying they received 'too little' information were around double those of Heat Trust consumers. The factors controlled for were: heat network operator, non-metered system, not receiving separate bill for heating and hot water, no vulnerable people in household, age of property, not financially struggling, number of people in household, no children in household, no people aged 65 or above in household, number of bedrooms, property type, type of heat network (communal/district). An explanation of why these factors were selected is provided in Section 4 of the Technical Report
[49] The odds of unmetered consumers saying they received 'too little' information were around double those of metered consumers. The factors controlled for were: heat network operator, not registered with Heat Trust, not receiving separate bill for heating and hot water, no vulnerable people in household,

bivariate analysis of the survey data - 27% of heat network consumers with no meter said they received 'too little' information, compared with just 15% of those who did have a meter.

How much do heat networks consumers pay?

Overall heating and hot water costs

All participants were asked to provide the total cost of the last payment made for heating and hot water, when this was made and the period the payment covered. For a proportion of participants, this allowed us to estimate a total annual cost for heating and hot water. To ensure accuracy of data, a number of rules were applied to the calculation:

- Those with incomplete data were excluded from the analysis. For example, those who provided a total price paid but not the period the payment covered were excluded.
- For the non-heat network consumers, analysis of detailed billing data in this section is limited to domestic gas consumers (excluding those using e.g. electric heating or oil boilers to heat their home).
- Analysis of detailed billing data in this section is mostly limited to those who had their last bill with them when completing the survey.
- Outliers were also excluded – annual payments were capped at £6,000 per year and annual payments below £50 per year were also excluded from the analysis.

A valid annual estimate was calculated for 1,797 heat network consumers and 918 non-heat network consumers.[50] There are a number of measures we can use to compare costs between the two types of consumer. In Table 8, we have summarised mean cost, median cost and standard deviation in cost. The overall figures in Table 8 are also summarised for those consumers who had a recent bill in front of them and those who did not. Focusing on those who had a bill in front of them may provide more accurate cost estimates but, it should be noted, it may also be a source of bias; excluding consumers who are less inclined to find or even keep bills.

age of property, not financially struggling, number of people in household, no children in household, no people aged 65 or above in household, number of bedrooms, property type, type of heat network (communal/district).

[50] For the comparison sample, this analysis is limited to those with gas heating (who were asked how much they paid for gas in total). DECC statistics on energy trends estimates that 98% of all domestic gas use relates to heating and hot water https://www.gov.uk/government/statistics/energy-trends-september-2013-special-feature-articles-estimates-of-heat-use-in-the-united-kingdom-in-2012. Comparisons in this section are, therefore, specifically between the heat network and domestic gas sectors.

Table 8 Total annual cost estimates for heating and hot water

	Heat network	Non-heat network (domestic gas)
Base (all with a valid annual cost calculation)	*(1,797)*	*(918)*
Mean cost (to nearest £10)	£570	£640
Median cost (to nearest £10)	£450	£560
Standard deviation†	£532	£421
Base (consumers with a valid annual cost calculation and their bill in front of them)	*(1,091)*	*(529)*
Mean cost (to nearest £10)	£580	£600
Median cost (to nearest £10)	£440	£540
Standard deviation†	£578	£364
Base (consumers with a valid annual cost calculation but not their bill in front of them)	*(706)*	*(389)*
Mean cost (to nearest £10)	£550	£700
Median cost (to nearest £10)	£480	£590
Standard deviation†	£453	£485

† Standard deviation is a measure of the variance of data from the mean (calculated as the square root of variance, as calculated by measuring the difference between each data point and the mean of all data points).

In Table 8 the figures for non-heat networks are limited to domestic gas consumers (excluding those using e.g. electric heating or oil boilers to heat their home).

We should also note that the analysis doesn't factor in boiler replacement costs for non-heat network consumers. Many non-heat network consumers encounter a depreciation/replacement cost associated with their boiler.[51] This generally doesn't apply to heat network consumers.

[51] For non-heat network consumers, maintenance and repairs of the boiler is normally a cost on top of the energy bill whereas for heat network consumers this is often included in the bill.

The survey suggests a high level of variance in cost in the heat network sector. This is reflected in the larger standard deviations in cost for heat network consumers compared with non-heat network consumers. As noted in table 8, standard deviations indicate the level of variance of data from the mean. This high level of variance potentially raises questions about the fairness, or at least consistency, of pricing.

Among heat network consumers there was a relatively high proportion (64%) who paid below the mean cost of £580. But this was offset by a small but notable proportion of heat network consumers who paid very high annual prices. To further illustrate, 3% of heat network consumers, paid more than £2,000 per year (compared with 1% among non-heat network consumers), and 1% paid more than £3,000 per year.

When limiting the analysis to those who had a bill in front of them, there was a modest difference in annual estimated cost. Non-heat network consumers paid on average (mean) around £20 more per year, or the equivalent of 3% more per year.[52] This difference was not statistically significant. However, the difference in median costs was higher, with heat network consumers paying on average around £100 per year less than non-heat network consumers.

Median costs provide a measure of "central tendency" – with half of the population falling above and below this value. The heightened difference between median values, is further indication of greater levels of variation in annual cost among heat network consumers compared with non-heat network consumers.

Looking just at heat network consumers who had their bill in front of them, average costs varied by a number of factors. Property size, as we would expect, was a key factor – those in larger homes paid larger bills on average. More notably, the median annual cost was highest among:

- Local authority run schemes (median cost of £620 per year compared with £430 in privately run schemes and £310 in housing association run schemes).
- District schemes (median cost of £510 compared with £400 in communal schemes).

Standing charges and how these vary across heat networks consumers

All participants were asked how much the standing charge on their last bill was. An equivalent annual standing charge was calculated using this and frequency of billing. As with other detailed billing data in this section, analysis is limited to those who had their last bill in front of them (given this type of information will not generally be known accurately off-hand).

[52] Please note that the figures in the table are rounded to the nearest £10 and therefore the difference in mean cost looks higher than the difference between the rounded figures in the table.

As shown in Table 9, the estimated, average annual standing charges were similar for heat network and non-heat network consumers. This is perhaps surprising, given heat network consumers are typically charged for system maintenance and component replacement though the standing charge. Heat network consumers paid, on average, £10 per year more on standing charges but this was not a statistically significant difference.

Table 9 Standing charge – estimated annual charge

	Heat network	Non-heat network
Base (all with a valid annual cost calculation and their bill in front of them)	*(590)*	*(386)*
Mean cost (to nearest £10)	£210	£200
Median cost (to nearest £10)	£110	£100
Standard deviation†	£286	£229

† Standard deviation is a measure of the variance of data from the mean (calculated as the square root of variance, as calculated by measuring the difference between each data point and the mean of all data points).

In Table 9, the figures for non-heat networks are limited to domestic gas consumers (excluding those using e.g. electric heating or oil boilers to heat their home).

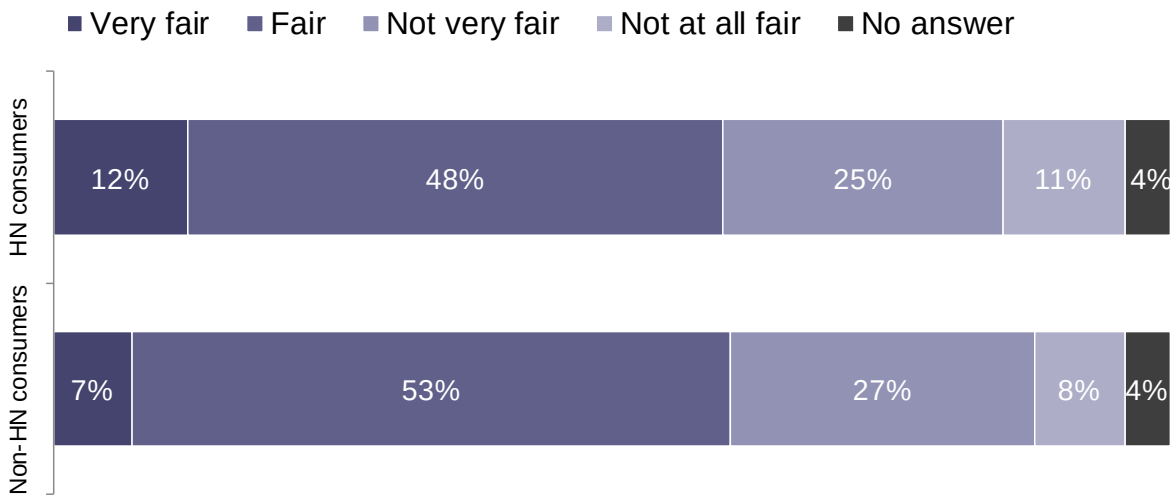
Perceptions of pricing

The section looks at consumer perceptions of pricing. Given a large proportion of heat network consumers didn't pay a separate heating and hot water bill, most of this analysis has been restricted to those who paid either a separate heating and hot water, or a combined energy bill. This provides a more meaningful comparison between heat network and non-heat network consumers. Those who paid for heating as part of a central service charge or rent have been excluded. This has the effect of slightly skewing the analysis towards heat network consumers in newer homes (given those in new builds were more likely to pay a separate bill).

How many consumers think they pay a fair price?

Overall perceptions of fairness are summarised in Figure 14. Perceptions were similar for heat network and non-heat network consumers. Six in ten, in both groups, said the price they paid was fair, leaving just over a third saying it was *un*fair. However, heat network consumers were slightly more likely to express stronger views towards pricing, with around one in ten saying they thought it was either 'not at all fair" (11%) or 'very fair' (12%).

Figure 14 Perceived fairness of pricing among consumers who pay for heating and hot water separately or as part of an overall energy bill – heat network and non-heat network consumers



Base: All who pay a separate heating/hot water bill or an overall energy bill
HN consumers (1,800), comparison group consumers (1,649)

Among heat network consumers, perceptions varied substantially depending on whether their bills were calculated based on estimated or actual use; 34% who paid based on actual or estimated use, felt that pricing was *not* fair (10% saying not at all fair). This compared with 22% who paid a set fee or paid based on building rather than household use. This suggests fairly contrasting views - those paying based on usage tending to be more negative about pricing. This despite paying *on average* slightly less per year than those who paid a set price, or who were billed based on building usage (see earlier in this chapter). The reasons given by heat network consumers for prices being *unfair,* are discussed below.

In Chapter 2, we highlighted seven key factors which explained a high proportion of the variance in consumers' survey responses. These have been adopted as the key analysis variables throughout the report. In relation to perception of pricing, whether consumers were struggling financially was, by far, the strongest driver of perceived fairness.[53] Reflecting this, heat network consumers who were struggling financially were far more likely than those who were not to say the price they paid was not fair (50%, compared with 19%).

[53] Regression analysis shows, once other factors are controlled for, those who were struggling financially were around five time as likely to say the price they paid was not fair, compared with those who were not struggling financially. Further detail is provided in Section 4 and Annex C of the Technical Report

To what extent is perceived fairness linked with over-pricing?

As discussed earlier in this chapter, 36% of heat network consumers described the price they paid as unfair. The reasons why they felt it was unfair are summarised in Table 10 (below).

The most common reason given was the price being 'too expensive generally' (34%) This was also the top reason among non-heat network consumers. More interestingly, many of the other reasons given relate to either a perceived disconnect between usage and price or lack of information / clarity in how prices are calculated. In fact, a fifth (20%) of those who said the price they paid was unfair, indicated this was because there was some kind of disconnect between usage and price.[54] This was twice as high for heat network consumers as for non-heat network consumers. This is consistent with research by Which? that concluded consumers often had difficulties 'working out whether heating bills are fair and accurate, fuelled by unclear billing and doubts over how efficiently their scheme is run'.[55]

As discussed earlier in the chapter, those who paid based on building usage, or a set fee tended to be more positive about pricing.[56] Despite this, a substantial proportion of heat network consumers felt that pricing was unfair *because* prices do not reflect actual usage.

[54] This includes those who said: have to pay for heating even when not in use / use little heating, high standing charge/high fixed charge, price doesn't reflect actual usage/doesn't get cheaper if you use less, or doesn't use the heating all year round / price doesn't reflect usage

[55] http://www.staticwhich.co.uk/documents/pdf/turning-up-the-heat-getting-a-fair-deal-for-district-heating-users---which-report-399546.pdf?utm_campaign=whichnews&utm_medium=social&utm_source=twitter&utm_content=Energyefficiencyreport143501042015&utm_term=twnews

[56] This was despite those on unmetered connections paying an average of £610 per year compared with £530 for those on metered connections.

Table 10 Main reasons given for price paid being unfair

Reason(s) why price paid is unfair	%
Too expensive generally	34
NET: Disconnect between usage and price paid	**20**
Have to pay for heating even when not in use / use little heating	**8**
High standing charge/high fixed charge	**7**
Price doesn't reflect actual usage/doesn't get cheaper if you use less	**5**
Can't change supplier	5
Bill hides the costs/doesn't explain the cost/cost isn't clear	5
Doesn't use the heating all year round / price doesn't reflect usage	**4**
Not enough information / don't know usage	4
Heating outages/heating not working/heating problems	3
Poor service	3
Base: All heat network consumers who said the price paid was unfair and who provided a reason why this was the case.	*876*

There was only a limited connection between price paid by heat network consumers and perceptions of fairness. Those heat network consumers who paid above the average annual price were more likely to say that pricing was unfair than those who paid below the average (68%, compared with 54%). For example, 56% of heat network consumers who paid more than £1,000 per year said the price they paid was *not* fair (19% saying not at all fair). This compared with an average of 36% among all heat network consumers saying not fair (and 11% saying not very fair). As discussed earlier in this section, there was a stronger connection between perceived fairness and how consumers' bills are calculated than the actual price they paid - those paying based on usage tended to be more negative about pricing.

How does price paid compare with expectation?

Participants were also asked how the price they paid for heating and hot water compared with their expectation when they first started using the system and previous heating and hot water systems.[57] It was most common for consumers to say that the price they paid was as expected when they first started using the system. However, on balance, more consumers said prices were higher than expected than lower than expected. This was particularly the case for non-heat network consumers – with a relatively high proportion saying it was higher than expected (44% compared with 36% of heat network consumers).

[57] Comparisons with previous systems were limited to those who had experienced a different system either in their current or a previous home.

For both heat network and non-heat network consumers, it was uncommon for them to say the price was a little or a lot lower than expected (around one in ten for both groups – 9% and 10%, respectively).

Consistent with the rest of this section, for heat network consumers, perceptions varied strongly depending on how their bills were calculated. Those who paid based on actual, or estimated household usage, were more likely to say the price was higher than expected - 51% compared with 26% who were billed a set price or based on building usage. This difference was unique to heat network consumers, with no equivalent difference among non-heat network consumers. Heat network consumers who were struggling financially, were also far more likely to say the price they paid was higher than expected (67%, compared with 26% of those who were not struggling financially).

Perceptions of cost against previous systems were more evenly balanced. Among heat network consumers, approximately equal proportions said the price was either higher than the previous, lower than the previous, or no different. For comparison, 39% of non-heat network consumers said the price was higher than their previous system compared with 34% of heat network consumers. Overall, this marks heat network consumers as being slightly more positive about the price they pay, compared with non-heat network consumers. This is consistent with the slightly lower average prices experienced by heat networks (see earlier analysis of price paid).

Consumers were also asked what type of system they had experienced previously, and whether the system had been in their current or previous home. For heat network consumers, this allows us to compare the experiences of those who had either experienced a non-heat network system in a previous home or experienced retrofitting of a heat network in their current home.[58] There was very little difference in perception of price paid, regardless of whether heat network consumers had experience of a different type of heating system.

[58] In total 1,357 heat network consumers had experienced a different type of system in a previous home and 206 had experienced retrofitting.

6. Customer service: information and complaints

- A relatively high proportion of heat network consumers had either complained, or had reason to complain about their system (HN: 32%, non-HN: 26%). Heat network consumers who did complain, were also less likely to be satisfied with how the complaint was resolved (HN: 45%, non-HN: 55%).

- The survey suggests most consumers - both heat network and non-heat network - knew who to go to if they had a complaint (just 2% in both groups said they didn't know). Among heat network consumers, most correctly complain to their network operator.

- Heat network consumers were less likely than non-heat network consumers to have received information about: the type of heating system they had (HN: 41%, non-HN: 47%), maintenance and servicing arrangements (HN: 28%, non-HN: 32%), and how to change the temperature (HN: 30%, non-HN: 37%).

- Despite this, the majority of heat network consumers (59%), and non-heat network consumers (60%), said they were satisfied with the level of information they received about their heating and hot water system. Heat network consumers were slightly more likely to report that they were 'very satisfied' (HN: 21%, non-HN: 18%).

- This disconnect between information provided and levels of satisfaction, suggests many consumers have low engagement with the information that is provided.

- The Heat Trust's service standards do seem to be improving levels of information in the sector. Heat network consumers on Heat Trust registered schemes were more likely to have received information about the type of system they had (69%, compared with 40%). More than half (56%) remembered being given a Heat Supply Agreement.

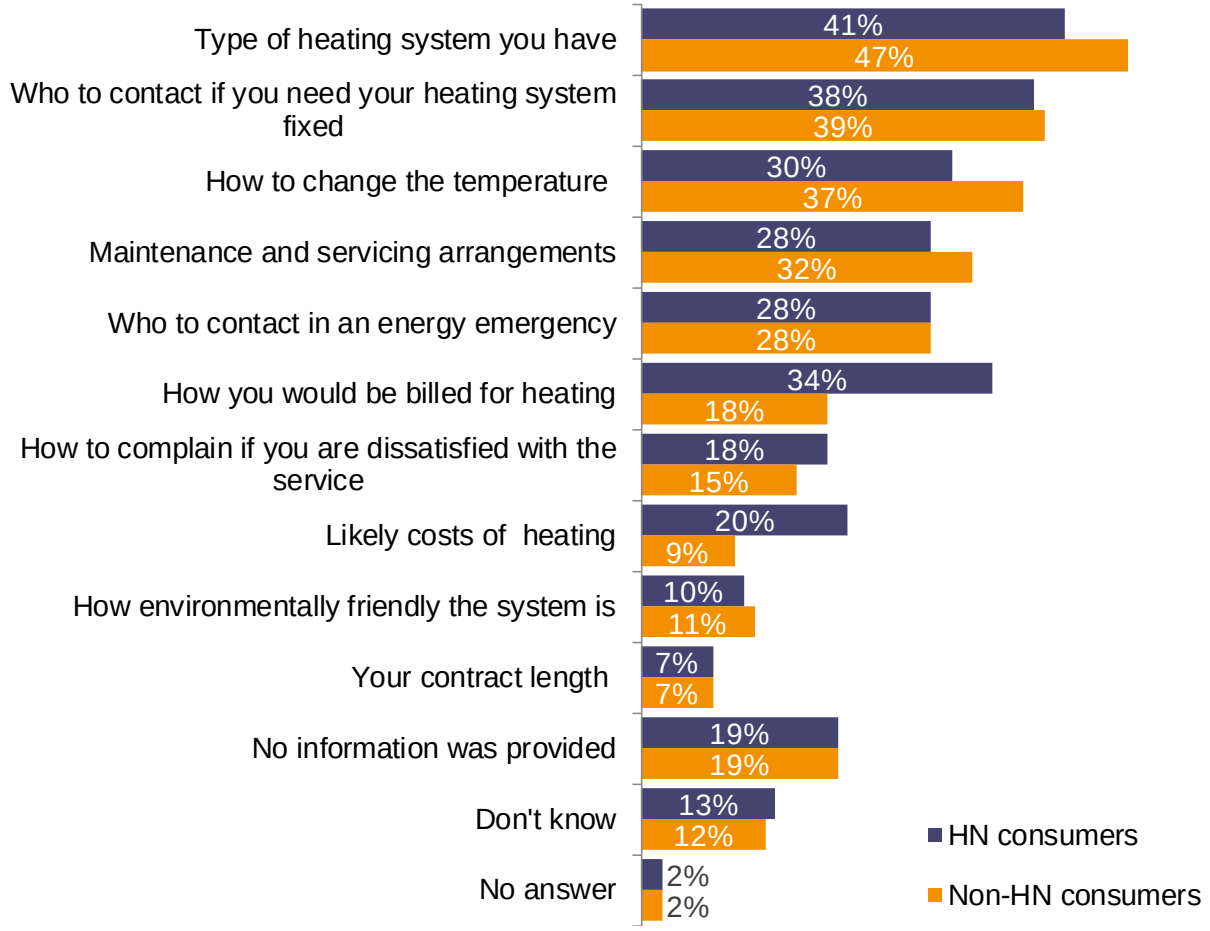
Information provision for consumers

What information have consumers been given or do they have access to?

The survey included a question asking consumers what information, if any, they received when they first started using their heating system.[59] As shown in Figure 15, heat network consumers were less likely than non-heat network consumers to have received several types of information. The most commonly received information was 'type of heating system' (HN: 41%, non-HN: 47%). Heat network consumers were also less likely to have received information on 'how to change the temperature in your home' and 'maintenance and servicing arrangements'.

As shown in Figure 15, heat network consumers were more likely than non-heat network consumers to have received information on 'how you would be billed for heating' and the 'likely costs of heating'.

Figure 15 Types of information received about consumers' heating system



Base: All consumers; heat network consumers (3716), non-heat network consumers (1786)

[59] The list was derived from Heat Trust standards, defining what types of information consumers on Heat Trust registered schemes should receive as part of their service.

The Heat Trust sets service standards which relate to consumer information. All Heat Trust registered heat networks must provide consumers with both a Heat Supply Agreement and a Customer Information Pack.[60] The expectation is that these are provided to consumers when they move into their home. The positive impact of these standards can be seen in the findings summarised in Table 11. Heat network consumers on Heat Trust registered schemes were more likely to have received all types of information covered in the survey.

Table 11 Information provision on Heat Trust registered schemes

	Heat Trust registered scheme	Not registered with Heat Trust
Base: All heat network consumers	*(533)*	*(3183)*
The type of heating system you have	**69%**	**40%**
How you would be billed for heating	**52%**	**33%**
Who to contact if need a problem with your heating fixed	**51%**	**38%**
How to change the temperature in your home (if you can)	**47%**	**30%**
Who to contact in an energy emergency	**42%**	**27%**
Maintenance and servicing arrangements	**39%**	**27%**
The likely costs of heating	**33%**	**20%**
How environmentally friendly the heating system is	**31%**	**9%**
Your contract length	**27%**	**6%**
How to complain if you are dissatisfied with the service	**25%**	**18%**
No information was provided	**9%**	**20%**
Don't know what information was provided	8%	14%
No answer	*	2%

*In Table 11 the differences between the numbers in bold are statistically significant. * denotes that the figure was between 0% and 0.5%.*

How many heat network consumers receive a contract including Heat Supply Agreements?

Consumers were also asked whether they had received a 'contract document, such as a Heat Supply Agreement' for the supply of their heating. As described above, this is a specific initiative for networks registered with the Heat Trust. Consequently, comparisons

[60] Heat Supply Agreements are discussed in more detail below.

below are limited to heat network consumers on Heat Trust registered schemes and all others.

Just over half (56%) of consumers in Heat Trust registered properties said they had received this document, 16% reported that they had not received this document and a further 26% did not know. Among other (non-Heat Trust) heat network consumers, 19% reported they had received this document, whilst 46% had not and 31% did not know.

When and how information is provided?

Consumers who had received information about their heating system were asked when they received it and from whom. Half of heat network (51%) and non-heat network (50%) consumers received information when they moved into their property. Heat network consumers were more likely to have received information before they moved in compared with non-heat network consumers (HN: 21%, non-HN: 12%). This may partly explain the differences in price expectations discussed in Chapter 5; heat network consumers were less likely than non-heat network consumers to say the price they paid was higher than they expected before they moved in.

Looking specifically at heat network consumers, those on schemes that were registered with the Heat Trust were much more likely to have received any information either before they moved in or as they moved in (81%, non-Heat Trust: 53%). As discussed elsewhere, this relates to the service standards the Heat Trust sets for networks that register with them.

The most common source of information for heat network consumers was their landlord (43% received information this way). Non-heat network consumers were less likely to have received information from their landlord (37%) but were more likely to have received information from the heating system installer (non-HN: 20%, HN: 7%) or their heating or energy supplier (non-HN: 15%, HN: 9%).

How satisfied are consumers with the level of information they receive?

Consumers who had been given information about their heating system, were asked how satisfied they were with the quality of the information they had received. A similar proportion of both heat network consumers and non-heat network consumers were satisfied overall (HN: 59%, non-HN: 60%). However, heat network consumers were slightly more likely to report that they were ‘very satisfied’ (HN: 21%, non-HN: 18%).

Complaints

Do consumers know who to contact if they have a complaint?

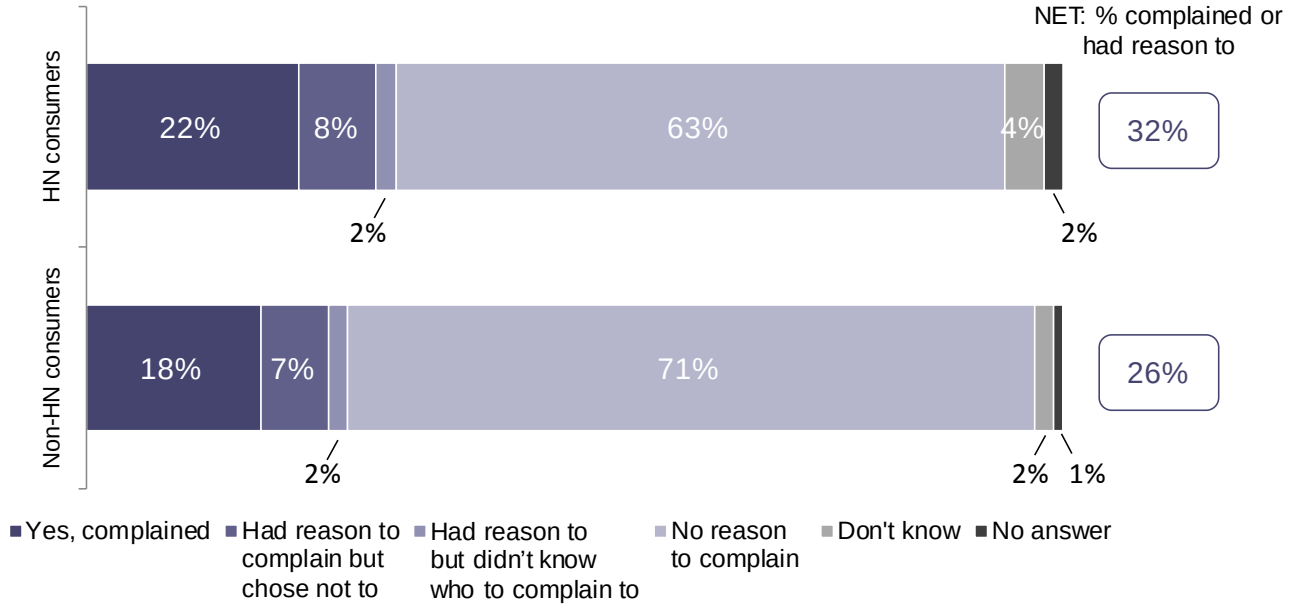
All consumers were asked, hypothetically, who they would contact to get a problem with their heating (or gas supply) fixed.

Looking specifically at heat network consumers, the findings suggest most consumers do know to contact the network operator; 84% of heat network consumers on local authority operated schemes said they would contact the council and 80% on housing association operated schemes said they would contact the housing association. As expected, heat network consumers were less likely to contact a 'plumber or gas engineer' (HN: 3%, non-HN: 11%). Encouragingly, only 1% of both heat network and non-heat network consumers said they didn't know who to contact in the event of a problem with their heating.

How many consumers have raised a complaint about their Heat Network or had reason to?

Consumers were asked whether they had made a complaint about their heating system, or if they had had reason to do so. If they had reason to complain, consumers could indicate why they hadn't complained. As shown in Figure 16, the majority of heat network consumers and non-heat network consumers had no reason to complain (HN: 63%, non-HN: 71%). However, heat network consumers were more likely to have complained or had reason to than non-heat network consumers; a third had complained or had reason to complain in the last 12 months.

Figure 16 Whether consumers had made a complaint or had reason to complain in last 12 months



Base: All consumers; HN consumers (3,716), comparison group consumers (1,786)

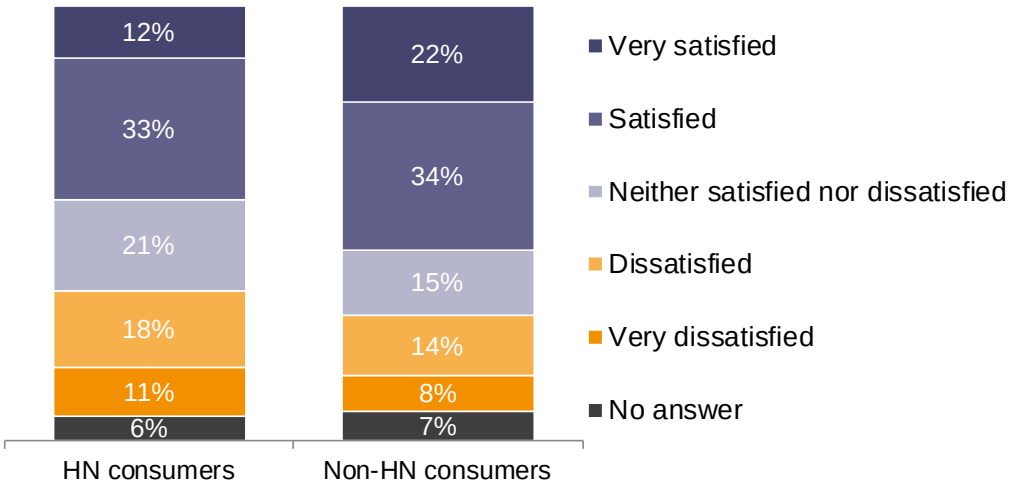
Looking specifically at heat network consumers, those who were struggling financially (31%) or who lived in properties built in 2010 or more recently (30%) were much more likely to have made a complaint (compared with an average of 22% across all heat network consumers).

Looking at the characteristics of heat networks and consumers' homes, consumers on district systems were more likely to have made a complaint than those on communal systems (27%, compared with 21%). Those in metered homes were also slightly more likely to have complained, compared with those in unmetered homes (25%, compared with 21%).

How was their complaint dealt with? Was it resolved to their satisfaction?

Consumers who had made a complaint, were asked how satisfied they were with the way the complaint was resolved. As shown in Figure 17, heat network consumers were less likely to be satisfied both overall, and specifically with the resolution of their complaint, compared with non-heat network consumers. Heat network consumers were also around half as likely as non-heat network consumers to say they were 'very' satisfied. Among heat network consumers who had made a complaint, 29% said they were dissatisfied with its resolution, with less than half indicating they were satisfied (45%).

Figure 17 Satisfaction with how complaint was handled among consumers who have complained in the last 12 months



Base: Those who have complained in the last 12 months
HN consumers (872), comparison group consumers (326)

Heat network consumers in housing association operated schemes were slightly more likely to be satisfied with complaint resolution than those on local authority, or privately operated schemes (55%, compared with 43% and 41%).

7. Conclusions

The survey provides the first reliable quantitative view of heat network sector. It allows us for the first time to make comparisons between the experiences and views of heat network consumers and a comparable of group of consumers who are not on heat networks. Moreover, comparisons between sub-groups of heat network consumers help us to understand which issues are most relevant to different types of consumers.

Before setting out the over-arching conclusions, it is useful to return to the original objectives of this research. These were to assess:

- Current levels of consumer satisfaction across the domestic heat networks sector.
- Service levels across the domestic heat networks sector.
- How common consumer detriment is in the sector.

In addition, this research provides evidence of the types of consumer detriment that have been highlighted in previous qualitative studies of heat network consumer experiences. These include: **lack of information provision, billing and pricing issues and technical standards.**

Current levels of consumer satisfaction across the domestic heat networks sector

Consumer satisfaction across the heat network sector is reasonably high and comparable with non-heat network consumers. Nearly three-quarters of all consumers said they were satisfied. Only a minority of heat network consumers said they were ‘very’ satisfied, so as initiatives in the sector are developed and services are improved, there is scope to strengthen this further.

There was considerable variation in satisfaction levels across the heat network sector, which was strongly linked to the technical performance of the system. Consumers in older properties (pre-1960), as well as those in recent new builds (2010+), those on district (as opposed to communal) networks and those on privately or local authority operated networks all expressed lower levels of overall satisfaction with their systems. In these parts of the sector, around one in seven consumers were dissatisfied with the service. Moreover, those who were dissatisfied were more likely to express concerns about the reliability of their service and to have experienced over or under-heating.

Service levels across the domestic heat networks sector

Most heat network consumers responded that they were happy with the overall service level – the majority (74%) said their heating system was ‘very’ or ‘fairly’ reliable, consistent with the non-heat network sector.. Whilst most felt their service was at least fairly reliable, only around half of heat network consumers (55%) felt their heating and hot water service was ‘very reliable’, although again this was consistent with the non-heat network sector.

There are parts of the heat network sector where systems are technically under-performing. Reflecting patterns of satisfaction and consumer detriment, those on district systems and those on privately or local authority operated networks were less likely to perceive their service as 'very reliable'. While the perceptions of reliability in the sector were consistent with the non-heat network sector, reported, measurable instances of consumer detriment were higher in the heat network sector (such as more frequent losses of heating and hot water and over-heating).

How common detriment is in the sector

Certain types of consumer detriment were more common among heat network consumers, compared with the comparison group of non-heat network consumers. Evidence of consumer detriment from this survey is largely in line with findings from previous research and analyses of consumer complaints.

Information provision

Overall, the survey suggests that, while most heat network consumers are satisfied with information provision, suppliers could still be doing more to facilitate engagement and help consumers make more informed choices. Heat network consumers were *less* likely than non-heat network consumers to have received information about: the type of heating system they had, maintenance and servicing arrangements and how to change the temperature. However, the Heat Trust does seem to be having a positive impact in this area – heat network consumers on Heat Trust registered networks tended to receive more comprehensive information about their heating systems.

Billing is an area that could benefit from increased transparency which may enable better decision making and behaviour. Heat network consumers were less likely than non-heat network consumers to say they received any form of bill, statement, or summary, with a third saying they received none of these. They also said they received bills less frequently on average and were less likely to have access to an online account (which would allow them to monitor cost and usage). Heat network consumers' bills, statements and summaries tended to include less information compared with non-heat network consumers' bills. For example, heat network consumers were around half as likely to be informed of: the amount of heating they had used (kWhs); the per-unit price; or any standing or set charges.

There was large difference in information provided on bills between heat network consumers on Heat Trust registered schemes and those on other schemes. For example, 74% of Heat Trust registered HN consumers had a description of how their bill had been calculated, compared with only 31% of those on non-registered schemes. This suggests Heat Trust standards could help to improve transparency.

Technical standards

The reported level of technical performance in the heat network sector is lower than in the rest of the market. While most heat network consumers say they were satisfied with the level of control they have over the heating and hot water, the survey suggests control devices were not as prevalent as in homes not on heat networks. Heat network consumers were more likely to use TRVs in their homes, but less likely than non-heat network consumers to have central thermostats or heat programmers. They were also more likely to have experienced over-heating due to a lack of control or because they are unable to turn their heating system off. More positively, heat network consumers were less likely than non-heat network consumers to have experienced under-heating.

Heat network consumers were more likely to have experienced problems with their heating and hot water supply. Levels of over-heating were far higher among heat network consumers compared with non-heat network consumers – around four in ten had experienced over-heating in the last 12 months. There was also evidence of persistent over-heating in the heat network consumer sector. The majority of heat network consumers that experienced over-heating said this happened at least ‘most days’.

Losses of heating were also relatively common in the sector. Heat network consumers were more likely to have experienced a loss of heating in the last 12 months, compared with non-heat network consumers (more than a third had experienced heating loss). However, heat network consumers on Heat Trust registered networks do so seem to be seeing better service. Where service interruptions did occur, those on Heat Trust registered schemes tended to have these dealt with more quickly than other heat network consumers. Service interruptions and loss of heating were also a cause of under-heating among heat network consumers.

Billing and pricing

Analysis of survey responses showed great variation in pricing within the heat network sector, with some heat network consumers reporting high prices of over £1,000 or £2,000 per year. The mean average price reported was similar on heat networks and domestic gas systems; however this data is skewed by a small number of consumers who pay very large bills. The median average reported price (which is less affected by these uncommon but unusually high values) suggests that annual heat network consumer bills are on average around £100 lower than for non-heat network consumers. A quarter of heat network consumers reported struggling to keep up with the costs of heating and hot water. This proportion was substantially lower compared with non-heat network consumers.

Maximising heat networks’ potential to change wasteful behaviours

Heat networks are an important part of government’s commitment to carbon reduction and green energy. However, there is evidence that networks are not always designed or managed in a way which maximises their potential.

A large proportion of heat network consumers are billed in way that does not incentivise energy-saving behaviours. Just over a third (38%), paid their bill based on actual or

estimated household use. Many heat network consumers paid based on overall building use or paid a set price that didn't vary with use. In contrast, 80% of non-heat network consumers were billed based on household use.

Heat network consumers were less likely to receive detailed information about energy use on their bills, making it difficult for consumers to monitor or control the amount of heating they used. Supporting this conclusion, we know that heat network consumers do give less thought on average to energy saving. There is also indirect evidence that lack of control may be driving wasteful behaviours. Heat network consumers were more likely than non-heat network consumers to open windows and use electric fans to cool their homes when they experienced over-heating.

Final conclusions

Satisfaction among heat network consumers is generally on par with that of consumers in non-heat networks. On various measures, consumer perceptions were not substantially different: overall satisfaction, reported reliability, satisfaction with the level of control over heating, perception of fair pricing and the level of information received about the system were all rated similarly by both groups. However, this research has highlighted some real differences in the level of service that heat network consumers receive, as well as considerable variation in service and pricing within the sector.

On average heat network consumers have less control over their heating, are more likely to experience over-heating and loss of heating, and have less information about their bills. Consumers on heat networks are not as concerned about saving energy in their homes as those not on heat networks.

The overarching aim of this research was to provide the first quantitative and statistically robust representation of experiences across the domestic heat network sector, helping BEIS understand the current state of the market. The research goes a long way in addressing this aim, answering most of the detailed research questions. The research encounters three main limitations to be considered when applying the results to modelling or policymaking, as detailed below.

With no single comprehensive source of population data for all heat network consumers in England and Wales, we cannot say with absolute certainty how representative the survey findings are. Nevertheless, we have used official regulatory data supplemented with additional sources to maximise coverage of the sector in our sample. Therefore, we are confident that the survey covers a reliable cross-section of the market and provides findings which are as reliable as possible (given this inherent limitation). This survey is by some distance the most comprehensive and largest scale research currently available concerning consumer experience of domestic heat networks and should be regarded as the most reliable source of data on this topic to date.

A further potential limitation of this survey (as with all survey research) is uncertainty into the accuracy of responses provided by the surveyed population. This is particularly

relevant in this work to the findings related to pricing and billing, such as the size of standing charges and what is or isn't included in consumers' bills, especially as we found that information provision to heat network consumers was often poor or inconsistent.

Finally, the authors recognise the findings on system performance are based on perceptions (our survey respondent's reports) rather than an objective measurement of heat network and other system performance. Additional research directly measuring price and performance (or collating existing industry data in these areas) might provide a more comprehensive and robust picture in some of these more technical areas.

However we are confident that, acknowledging these few potential limitations, this research is robust and are pleased to have added substantially to the evidence base in this important and growing new area of research.

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