Department for Energy Security & Net Zero

Understanding secondary heating behaviours

Research findings

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Policy and research background

Decarbonising buildings is a key priority for reaching net zero by 2050, as emissions from heating of domestic homes account for 17% of the UK's carbon emissions. Households will need to reduce reliance on heating systems which use fossil fuels. It is expected that in future large amounts of heat demand will be electrified in addition to transport, increasing overall demand for electricity.

Currently, some households use secondary heating methods alongside their primary heating. Some of these forms of secondary heating use fossil fuels, whilst others use electricity. The current research was commissioned to understand the use of secondary heating in more detail, specifically:

- What factors encourage the use of secondary heating (e.g., inefficient primary heating, cost, comfort, convenience, aesthetics)?
- Under what circumstances and how often do UK households use a given type of secondary heating?
- What are the factors that affect households' likelihood of changing their use of secondary heating altogether?
- How (if at all) would switching to a different type of primary heating (e.g., heat pump) change households' use of secondary heating?

Methodology

Fifty research participants were engaged in an online task, and forty-five of these were then engaged through one-to-one online interviews. Topics included: use of primary and secondary heating, factors that might influence reduction in secondary heating use, and whether the potential future adoption of a heat pump might impact their use of secondary heating.

Participants had a variety of primary heating types, with a weighting towards natural gas central heating. They also had a variety of secondary heating, with a weighting towards those who used electric-based systems. There was also a range of tenure types, property types, and other demographics including location, socio-economic group, age, ethnicity and gender.

Key findings

Why do households use secondary heating?

It emerged that participants wanted their heating to meet four needs. Primary heating was not always fulfilling these needs, leading to increased reliance on secondary heating options. The four needs were:

- **Keeping warm**. At a basic level, participants needed a heating system that can reach a desired temperature to keep them warm. Their primary heating system was not always able to do this, because of ineffective heating systems or poor insulation of properties.
- **Affordability.** Participants needed affordable heating. High energy costs or inefficient primary heating systems meant participants were choosing to use other secondary heating types which they perceived to be cheaper.
- **Flexibility**. Participants wanted their heating to be flexible to fit their lifestyle and routines, for example by being adjustable to one space or for use for a short amount of time. Participants often found secondary forms of heating more suitable for meeting this need.
- **Comfort.** Participants had found added advantages to secondary heating in the form of it bringing them emotional comfort and aesthetic pleasure.

Participants prioritised the need for keeping warm, affordability, flexibility and comfort to different extents, leading to definitions of different typologies of household (‘warmth focused’, ‘cost-constrained’, ‘control seekers’ and ‘comfort chasers’).

When do households use secondary heating?

The time at which participants used secondary heating was influenced by their lifestyles and routines and wasn’t always consistent even within households. All participants used their secondary heating more intensely in the autumn / winter when temperatures dropped – this was typically between October and March.

Other usage of secondary heating was driven by times in which people were at home and sedentary. This included weekends and late afternoon / evenings, typically between 5 and 10pm. There was some use of secondary heating intermittently throughout the day, especially in households where members worked from home.

What are the factors that affect households’ likelihood of stopping or reducing use of secondary heating altogether?

Participants were generally not considering reducing or stopping use of secondary heating, given that it was meeting the needs that their primary heating was not.

The factors participants mentioned that might influence them to reduce their usage of secondary heating were mainly the inverse of the reasons why they started using it in the first place. If their primary heating could fulfil their needs for keeping warm, affordability, flexibility

and comfort, they may no longer need to use secondary heating. Each typology of consumer may have different motivations for reducing use of secondary heating, depending on the needs and functionality they prioritise.

How (if at all) would switching to a heat pump change households' use of secondary heating?

Participants found it hard to imagine how their use of secondary heating would change if they had a heat pump, given their unfamiliarity with the technology. On balance, participants felt heat pumps might lead them to reduce use of secondary heating in some circumstances.

Some felt that having a heat pump may reduce their use of secondary heating if it could provide higher temperatures and allow them to control temperature better through the day and night, catering for the need to keep warm. Some reflected that heat pumps may meet their need for flexibility if they would allow individual spaces to be heated or boosted temporarily. However, participants had reservations around whether a heat pump would be more cost-efficient to run than their current secondary heating, and felt that heat pumps are unlikely to be able to match the aesthetics and emotional comfort of some forms of secondary heating.

Overall, participants reflected that, if they worked as described, heat pumps may go some way to meeting their needs.

Conclusions

From this research, the following can be concluded:

- Households were using secondary heating to fulfil needs that their primary heating could not.
- Use of secondary heating appears to coincide with wider peak demand for electricity.
- Participants were not considering reducing their use of secondary heating. This suggests a weak starting point for behaviour change, as it implies that motivation is low.
- There was an indication that heat pumps may reduce usage of secondary heating in households that prioritise keeping warm and flexibility. However, given this finding was based on asking participants to consider a hypothetical scenario, it should be taken with caution and verified though further research, for example with those who have recently adopted heat pumps.

Introduction

Policy and research background

The UK Government is committed to reaching net zero by 2050. Decarbonising buildings is a key priority for achieving this goal, with emissions from heating of domestic homes accounting for 17% of the UK's carbon emissions[1]. At present, 79% of homes in England are heated by mains gas, 11% of homes are heated by electricity, and the remainder are heated by oil, heat networks, heat pumps or other sources[2]. These methods are defined as a household's primary heating.

The Government will publish its Warm Homes Plan in 2025, which will set out plans to transform homes by making them cleaner and cheaper to run.

Currently, some households use secondary heating methods alongside their primary heating. Some forms of secondary heating use fossil fuels, for example gas fires, log burners and open fires. Other forms of secondary heating use electricity, for example electric heaters, electric fires and electric blankets.

More widely, increased use of technologies which use electricity, such as heat pumps and electric vehicles will lead to a significant increase in electricity demand. This makes it important to understand how electric-based heating systems may be used and what effect this could have on the energy system.

At present, little is known about how households use secondary heating. It is necessary to improve understanding of use of secondary heating and the impact it may have on peak demand, which may be acute if most secondary heating systems are direct electric. There is also a knowledge gap around whether there may be increased prevalence of secondary heating use as people move to lower temperature heating systems such as heat pumps.

Research objectives

The current research was commissioned to understand the use of secondary heating in more detail and address the gap in knowledge around why and when it is being used.

Specifically, this research has been conducted to explore four research questions:

1. What factors encourage the use of secondary heating (e.g., inefficient primary heating, cost, comfort, convenience, aesthetics)?

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1036227/E02666137_CP_388_Heat_and_Buildings_Elay.pdf

[2] Main fuel type or method of heating used in central heating, England and Wales - Office for National Statistics

2. Under what circumstances and how often do UK households use a given type of secondary heating?
3. What are the factors that affect households' likelihood of changing their use of secondary heating altogether?
4. How (if at all) would switching to a different type of primary heating (e.g., heat pump) change households' use of secondary heating?

Methodology

Research participants were engaged to complete an online pre-task and one-to-one remote interviews in December 2024 and January 2025.

Pre-task and in-depth interviews

The total target sample was 50 participants for the pre-task, of which 45 were scheduled for an interview.

The online pre-task consisted of three activities: an introduction to the household, questions on which primary and secondary heating sources were used and why, and a reflection exercise about heat pumps.

After completing the pre-task, 45 participants were invited to an hour-long, individual in-depth semi-structured interview with a moderator over Zoom. The interviews covered household structures and routines, current usage patterns of primary heating, as well as likes and dislikes. It then covered secondary heating usage patterns and reasons for use, and what factors, if any, would lead participants to reduce / stop their usage of secondary heating. It ended by covering participant's perceptions of heat pumps, and whether the potential future adoption of a heat pump would impact their use of secondary heating.

Sample

Participants used a variety of secondary heating, including electric fires, portable electric heaters, electric blankets, gas fires, open fires and log burners. The sample was weighted towards those who used electric-based systems, such as electric fires and portable electric heaters, in order to explore demand for electricity. Participants had a variety of primary heating types, with a large weighting towards natural gas central heating, given this is the most common form of heating. There was also a range of tenure types, property types, and other demographics including location, socio-economic group, age, ethnicity and gender.

A note on interpreting these findings

The findings are based on a small, purposive sample and are therefore indicative rather than representative of the views of the wider population. Additionally, insights into the likely impact of having a heat pump on secondary heating usage are not based on the lived experience of having one – instead, they are based on participants being presented with a hypothetical

scenario and some basic information about the attributes of heat pumps. The insights here could be validated and strengthened through future research with heat pump users.

Additional detail on methodology can be found in the Appendix.

Findings

Why do households use secondary heating?

This section first sets out the needs that participants look to fulfil with their heating. It then explores the different dimensions of each need in more detail, and how the needs link with each other.

Key findings

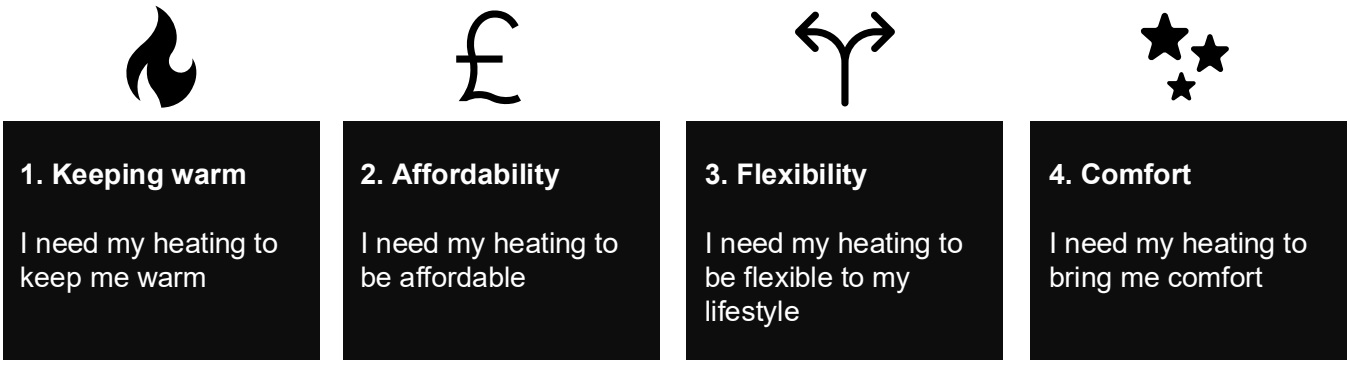
Participants used secondary heating for various reasons beyond simply keeping warm. Affordability, lifestyle needs (targeting specific areas of properties and times of day), and emotional factors like comfort, aesthetics, and fostering togetherness are key drivers.

Primary heating often falls short, particularly in achieving desired comfort and ambiance, leading to increased reliance on secondary heating options.

An overview of heating needs

Participants reported that they used secondary heating for several different reasons. It became clear that people do not have a single requirement from their heating, but that they want their heating to fulfil a range of different and often interlinked needs. These needs apply both to their primary and secondary heating.

Figure 1: Four needs that participants look to fulfil with their heating



1. **Keeping warm**: At a basic level, people need their heating system to achieve a desired temperature in order to fulfil a physiological need – to keep warm.
2. **Affordability**: The need to keep warm was always balanced with the need for affordability – a trade-off that was a pressing concern for participants.
3. **Flexibility**: Participants had an additional need for their heating to support their routines and lifestyle: to suit when they were using their property, for what purpose, and who was at home.

4. **Comfort**: Finally, some participants had more emotional needs they wanted their heating to fulfil – aesthetics, desire for cosiness and promotion of togetherness with family and loved ones.

Overall, participants' primary heating was not meeting all of these needs. Sometimes it did not meet people's basic need to keep warm. If it was able to keep people warm, it could not always do so affordably. In some circumstances it might do both, but fail to provide the flexibility needed to match people's lifestyles. And even if it was able to fulfil the need for warmth, affordability and flexibility, it was rarely able to meet people's comfort, aesthetic or emotional requirements. All this meant that participants found themselves using secondary heating to fulfil the needs that their primary heating could not.

The shortcomings of primary heating in meeting these requirements are illustrated by the way participants scored their heating in the pre-task exercise. Participants supplied various details about the primary and secondary heating systems they had at their property. They also evaluated their primary and secondary heating across a range of different criteria, scoring both from 1 to 10 on each factor.

This exercise allowed us to directly compare people's feelings towards their primary and secondary heating, and showed that they had more positive feelings about their secondary heating across most of the factors explored. In particular, they scored their secondary heating more highly in terms of effectiveness, perceived cost-effectiveness and on being aesthetically pleasing.

Understanding different heating needs

The below sections give further detail on the attitudes and behaviours of participants that related to each need.

Need 1: Keeping warm

All participants shared the desire to keep warm. Participants expressed frustration that they were unable to maintain a stable temperature in their home, leading to fluctuations which made them uncomfortable. This was true for participants with various types of primary heating systems. Participants were often unsure whether this was due to their poorly insulated properties, ineffective thermostats, the inability of a primary heating system to generate enough heat, or a combination of the three. This led to people using secondary heating to 'top up' their primary heating.

This need was particularly pressing for those who lived with vulnerable people, whether elderly relatives or those with health issues (often children) that required them to keep warm. An example was that of a retired participant living with his 85-year old mother, who feels the cold. He bought electric radiators to keep her warm, as they warm up quickly in colder temperatures and mean that he does not have to adjust his central heating programme.

Even when this need was less pressing, participants sometimes commented that they wanted house guests or house mates to feel warm, or that they wanted to cater for a spouse who preferred a warmer house. One example of this was of a participant who commented that her

husband needed extra warmth so they had bought an electric fire for their bedroom. She tended to use it less when he was away, relying instead on the primary heating.

Need 2: Affordability

The running costs of heating a property were a major concern for participants, and they were aware how expensive fuel and energy were, particularly in recent years. Secondary heating was being used to save money due to what they saw as the high cost of running their primary system. These participants were often using their secondary heating instead of their primary heating, rather than just in addition to it.

> *Anything to save. We use the electric blanket a lot more now, because we need to save. – Electric blankets, social housing tenant*

It is important to note that perception of cost-effectiveness is not always tied to actual costs. Some people's judgments in this area tended to be impressionistic. An example of this was a participant who used her electric heater to help her oil-powered central heating last longer and tide her over the winter until oil prices would be cheaper. When she turned on her central heating, she was acutely aware of being able to see the steam vent and could imagine the oil levels dropping in her tank. She was so concerned about the potential cost of needing to buy more oil that she preferred to use her portable heater in order to make it last. But she had not carried out specific cost calculations.

> *I can just switch on [the electric heater] rather than watching the steam out of the back of the house, and knowing that it's [oil] all just going. – Portable electric heaters, private tenant*

However, there were also participants – who had severe financial constraints – who had tried to calculate or monitor the cost of both their primary and secondary heating carefully, and had observed via their energy provider's app or smart meter how their spend changed when they used it to different extents.

They came to different conclusions based on this analysis: one such participant had monitored the impact of using their electric blankets, and concluded that it made little difference to their energy usage. However, another said that their secondary heating did make a significant impact. They would monitor their spend and if they had consumed more than £6 worth of energy in a day, they would rely only on their primary heating (storage heaters) rather than using the oil-filled radiator they had bought for their bedroom.

> *Having the storage heaters on costs £6 a day and it's still cold! I downloaded an app to see what different heating solutions cost. It's £2 a day for the oil radiators. – Portable oil-filled radiator, social housing tenant*

Overall, participants perceived that secondary heating was more economical. This may be because as well as absolute costs per unit of heat, a sense of control over costs is important. People want to be able to manage their heating expenses effectively, and find their primary

heating system gives them limited control over their energy usage compared to secondary heating options.

Need 3: Flexibility

Participants' daily routines differed greatly, not only from one household to another, but from person to person, from week to week and even day to day. This meant that flexibility was seen as an essential need – people wanted heating systems that could adapt to their changing needs.

In particular, the ability to easily adjust the heat output and target specific rooms appears to be highly valued. It was common for people to use secondary heating to heat just one space. Usually, they rationalised this by a desire not to waste money, but some talked about it feeling 'a waste' to warm the whole house with their primary heating.

> *It would be inefficient, it would be heating upstairs too much when I'm not in it. It would be a waste really, to heat the other rooms to 21 degrees just to keep me warm in the living room. – Open fire, homeowner*

> *These little gadgets are a godsend, because you're heating yourself rather than heating the house. – Electric fire, social housing tenant*

There were examples of participants adjusting individual radiators in their house to avoid heating unused spaces. But this was felt to require a large amount of effort given they would have to readjust radiators when others came home, or adjust them day-by-day depending on how they were using the spaces.

This ability to target heating was particularly important both for those that worked from home and spent much of the day in one particular room, and those who lived alone.

> *[We got the electric halogen heaters because] I work from home. It gives out a lot of heat. I am situated in one place, so I'll have it in the office. If it's a bit colder, why not have the halogen heater on? – Portable electric heater and electric blankets, private tenant*

Meeting the different needs of household members could also be a challenge. Some family members – typically elderly relatives or children – may need more or less heat than others, so primary heating systems needed to accommodate these diverse needs.

The desire for flexibility and control was also connected with ease of use. Simple controls and user-friendly interfaces make heating systems more convenient to operate.

> *You get a strong source of heat for a small device. It's very easy to use - you plug it in and it can turn - there's a rotating feature, or you can have it static. You can increase how many bars you are using. It's mobile - you can carry it around into whatever room you're using. – Portable electric heater and electric blankets, private tenant*

In addition, the speed of heating was also seen as crucial. Some participants wanted their homes to heat up quickly, especially when they were returning from being out in the cold, or when they needed an immediate boost of heat. Having primary heating that is slow to warm up emerged as a common reason for turning to secondary options. Even when participants had a gas central heating system that heated up relatively fast, they sometimes wanted instant heat on a very cold day.

> *I imagine [the heater is] not that energy efficient. I didn't get it thinking this would use a lot less energy than a radiator would. It's more that instant 'we need heat straight away' thing. I don't tend to think about how economical it is. I just need some quick heat in this room. – Portable electric heater, private tenant*

Need 4: Comfort

While much of the use of secondary heating was driven by practical considerations, it was also used for emotional reasons.

Cosiness and ambience are strong drivers: the visual appearance and the associated feeling of comfort and relaxation are very important to some households. This is a psychological and emotional feeling as much as a practical one, although physiological warmth does contribute to this feeling.

> *We're so used to having [the electric heater] on in the evenings that we don't really think about it. We bring food and just sit down, it goes on with the TV. It just feels really comfortable, really cosy. We might have a blanket over us which keeps the heat in as well. The cat will come down and see us. Under blankets, having a cat on your lap is the very definition of cosiness. – Portable electric heater and electric blankets, homeowner*

Nostalgia and tradition also played a part. Some participants had a long-standing association of certain heating methods with comfort and warmth – they remembered certain heating types from when they were young.

> *My mum had an electric blanket many years ago, and I guess that was probably instilled in me during childhood, remembering that comfort. That's probably why I went for it originally – Electric blankets, private tenant*

Togetherness recurred continually as an emotional driver of secondary heating use, particularly for those living with family members. They wanted to create a focal point for spending time together, and the act of gathering around a heat source was felt to enhance this sense of connection and togetherness. This was also felt to be important when people had visitors: the ability to create a warm, welcoming and homely environment was seen as highly desirable.

Some participants purposely sought out heating types that fulfilled these emotional criteria, particularly log burners or open fires, but also electric fires designed to look like real fires. Others did not necessarily seek out those features specifically, but viewed them as a bonus.

Typologies of participant

Participants prioritised these four needs to different extents – some needs were more important than others to each individual. This leads us to some different typologies of household.

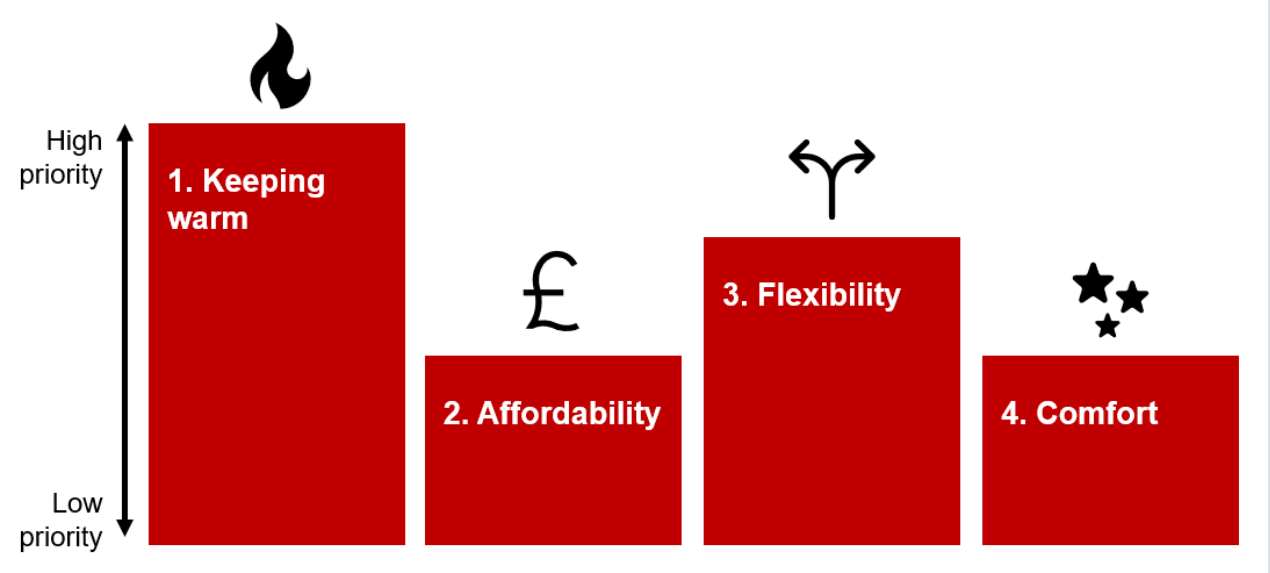
In reality, there is some overlap between typologies – the boundaries are not rigid and some participants exhibited characteristics of more than one typology. Nonetheless, each participant had some dominant features that allowed them to be categorised within one of the four typology groups. In the descriptions below, we have indicated the level of priority that the participants in each typology appeared to give to the different needs. It should be noted that this is based on an interpretation of comments given by participants, rather than by self-categorisation by participants themselves.

Typology 1: Warmth focused

Overview

Households where providing adequate levels of heat is a priority over other needs, as heating fundamentally affected the health and safety of the occupants.

Needs



Household characteristics

Tend to be households where members have medical needs, or where there are younger children or elderly relatives who have a greater need for heat.

Secondary heating types used

Use a variety of secondary heating sources, including electric blankets, portable electric heaters / fan heaters, and fires (gas, electric, wood-burner)

Priority needs

Warmth focused participants prioritised the ability of their heating system to **keep them warm** and sought a heating system which would first and foremost achieve their desired temperature. Some of these households had poor insulation and so heat escaped quickly, whilst others felt their primary heating system could not achieve the desired temperature regardless of insulation. The use of secondary heating became an especially critical ‘top up’ where primary heating fell short. Having access to the right amount and intensity of heat overrode all other considerations for people in this typology.

Whilst **affordability** may have been a concern for these households, it was overridden by the need to provide heat. Their primary focus was on providing heat by whatever means necessary.

A system with good **flexibility** was important to the extent that it would help meet the need for heat. For example, households sought heating sources which could heat certain areas of the house, could heat spaces quickly or could heat a person directly.

Whether the system **brought comfort** was low priority. Any features which made the system aesthetically or emotionally pleasing were perceived as a bonus rather than a key consideration.

Heating types used

Warmth focused participants in our sample chose secondary heating sources which:

- Were portable and easy to use, such as electric heaters.
- Heat the person rather than the space, such as electric blankets or electric heaters.
- Were controllable, such as electric blankets or electric heaters.
- Provide an extra boost of heat quickly, such as electric heaters, log burners, gas fires, or electric fires.

The lack of clear patterns in the choice of secondary heating may indicate that participants needed to heat their homes by whatever means necessary, and therefore chose whichever secondary heating sources were most readily available to them and perceived as most effective.

Jamie's household

Jamie recently retired and has been living with his elderly mum for over 20 years. She is home almost all day and Jamie tends to be home in the mornings and evenings, so there is typically always someone in the house.

Jamie has gas central heating which covers all rooms in the house apart from the kitchen, which was an extension. Jamie's mum often mentions feeling the cold particularly strongly, so the heating is on almost all day, every day throughout the year apart from in July and August.

However, because the kitchen is not connected to central heating, Jamie regularly uses his oil-filled electric radiators in that room. He turns the radiators on manually every day, and they are on from the moment he wakes up to the time he goes to bed. He does this so the kitchen always feels warm for his mum, who particularly appreciates feeling the warmth from the radiator itself.

"There needs to be something which is hot to touch. When there's no obvious heat source, and it's just warm, then [my mum] doesn't get the psychological feeling that it must be warm."

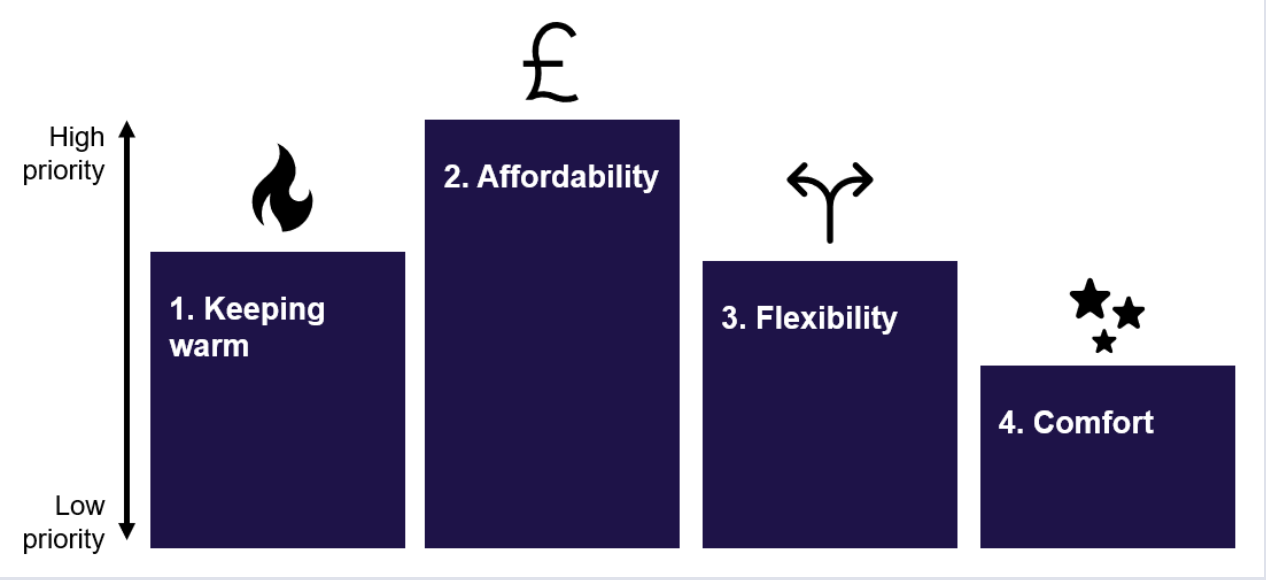
Although Jamie believes this is not the most cost-effective source of heating, and he probably wouldn't use the radiators if he lived alone, he thinks they provide essential heat for his mum.

Typology 2: Cost-constrained

Overview

Households where cost and affordability are a significant concern, and this impacts decisions around heating.

Needs



Household characteristics

Tend to be households where occupants are either young, in relatively low-paid occupations, or unemployed. Tend to be households where people live alone, and tend to be renters rather than homeowners.

Secondary heating types used

Use a variety of secondary heating sources, including electric blankets, portable electric heaters / fan heaters, and fires (gas, electric, wood-burner)

Priority needs

Cost-constrained households wanted to **keep warm**, but this was not their primary motivating factor when making decisions around heating.

Affordability was the cost-constrained household's greatest priority. Financial constraints meant that these households were largely focused on either minimising their use of energy or using heating sources which they perceived to be most cost-effective.

A system with good **flexibility** was important to the extent that it would help meet the need for affordable heating. These households sought control over their heating sources mainly so they could control their costs, rather than to suit their lifestyle overall.

Features which **bring comfort** were a low priority to cost-constrained households. Although some of the heating systems chosen did bring participants comfort, this was a bonus rather than an explicit consideration.

Heating types used

There were no clear patterns in the type of secondary heating sources chosen by cost-constrained households in our sample. These households chose secondary heating sources which:

- Were controllable, such as electric blankets or portable heaters.
- Were perceived to be more cost-effective than primary heating sources.

Catherine's household

Catherine lives with her partner in a rented house and is a full-time student. She tends to study from home, although occasionally works in a coffee shop in the afternoons. They tend to be at home most evenings of the week, from around 5pm.

Catherine's house is heated with electric radiators. They are all different models and have to be independently controlled – a system she finds complicated.

Her house is poorly insulated and loses heat quickly. To keep the house at a comfortable temperature, she feels the radiators would have to be on a lot of the time but she can't afford to do this. She monitors her energy usage with a smart meter and finds her electric radiators very expensive to run.

"They really vary, they're really expensive, and I just don't think they do that great a job."

As a result, she has decided to use her electric blankets in the evening to reduce her usage of the radiators. She finds them more cost-effective (according to the background information on the packaging they came in and her monitoring of the smart meter) and enjoys feeling the warmth around her.

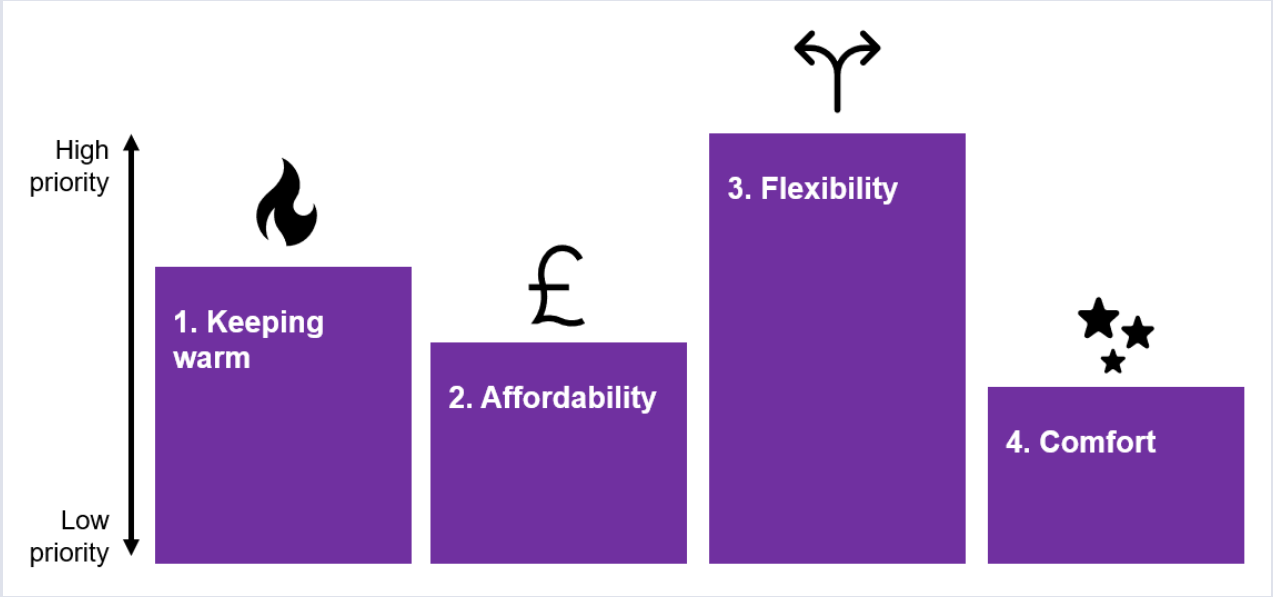
"If you've got something physically warm on you, then you don't need to have the heating on all the time."

Typology 3: Control seekers

Overview

Households where good functionality and control of heating systems are needed to suit members' lifestyles and habits.

Needs



Household characteristics

No distinct pattern in characteristics, with participants ranging in age, occupation, size of household and tenure type. Tend to work from home or be retired / unemployed, so spend more time in their home.

Secondary heating types used

Tend to use portable electric heaters, and sometimes fires (gas, electric, wood-burner).

Priority needs

Control seekers wanted a heating system that would **keep them warm,** but they did not have a critical need to be warm at all times, such as a medical condition.

Although **affordability** is a concern, it is not the largest driver for decision-making.

Functionality and **flexibility** are the greatest priority for these households. Households' different living arrangements and routines mean they seek personalisable and controllable heating systems. Most participants in this typology worked from home or spent the majority of their time at home because they were disabled, unemployed, or retired. Therefore, they often sought a heating system which would allow them to heat one room in their house only, so they wouldn't 'waste' energy by heating the whole house.

The presence of features which **bring comfort** was appreciated, but not essential to these households. Secondary heating sources which had additional aesthetic or emotional benefits were preferred, but households heating decisions were not driven by the need for these.

Heating types

Control seekers in our sample chose secondary heating sources which:

- Were controllable, such as electric blankets or electric heaters.
- Could give localised and/or personalised heat (that is, able to be directed at an individual, rather than just a space), such as electric blankets, electric heaters, or fires.
- Could provide instant heat, such as electric blankets, electric heaters, or fires.

These households tended to use portable electric or fan heaters. These heating sources were described as very easy to use, convenient and highly controllable and localised. In other cases, electric, gas or open fires were used. Again, these heating sources were popular because of their ability to provide localised heat and heat just one space.

Bill's household

Bill lives alone, is a full-time wheelchair user, and can't work due to his disability. He doesn't enjoy being indoors, so gets out as much as he can and tends to be home in the evenings only.

Bill has a gas boiler which he controls via an app. The heating is on all day, but he has programmed it to reach different threshold temperatures throughout the day – at a lower level in the mornings / afternoons when he is not in the house, and higher in the evenings when he is back home. It stays very low overnight.

Although Bill thinks that his central heating is effective overall, he doesn't feel that he can control the temperature of specific rooms well enough. Instead, he has opted to use a combination of his electric fire and portable electric heater in different rooms.

Bill uses the electric fire almost every morning for 30-45 minutes, to warm just the living room. He prefers not to boost the main system because he stays in the same room for a short amount of time in the morning.

"I don't often stay in the house for long, so I don't see the point of heating up the whole house."

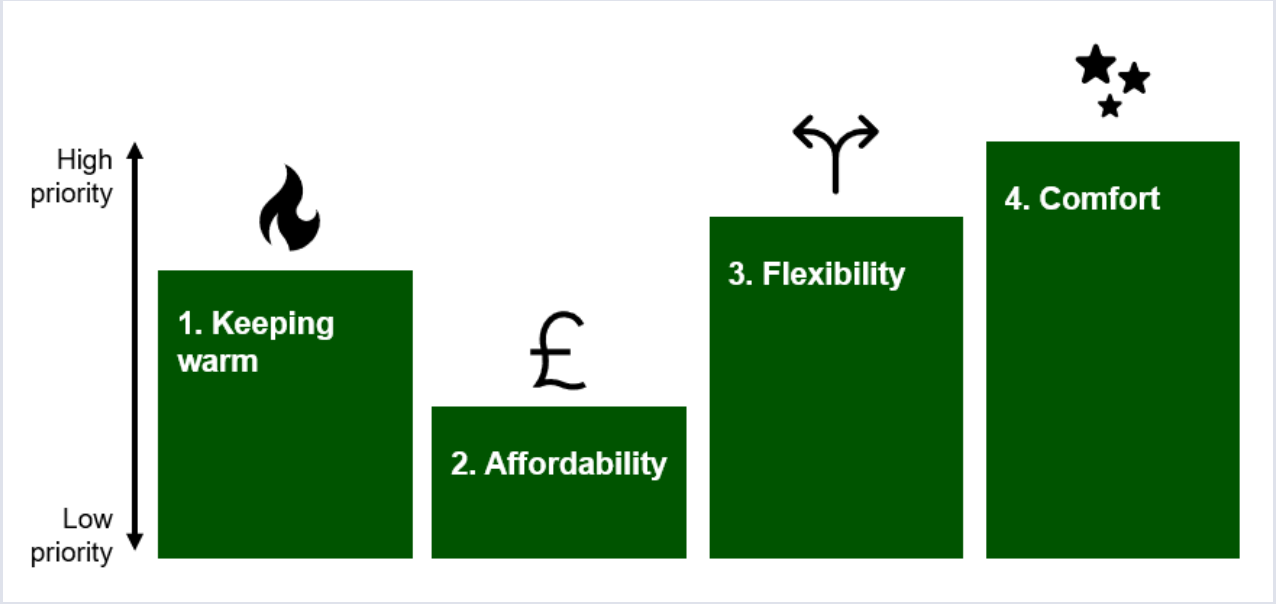
Similarly, he uses his portable electric heater a few days per week, in the evenings, to take the chill off in his bedroom. He switches it on for an hour at a time. These two sources of secondary heating therefore allow Bill to personalise his heating system and control the rooms he wants to heat at specific times, to suit his lifestyle and routines.

Typology 4: Comfort chasers

Overview

Households who want their heating system to bring aesthetic pleasure, cosiness and togetherness.

Needs



Household characteristics

Tend to be middle-aged, be in professional occupations and have children. Tend to be homeowners, because of greater autonomy to invest in more permanent heating systems, such as log burners.

Secondary heating types used

Tend to use fires (gas, electric, wood-burner) or electric blankets.

Priority needs

Comfort chasers wanted a heating system that would **keep them warm,** and in many cases this contributed to their feeling of cosiness – but they did not have a critical need to be warm at all times, for example due to a medical condition.

Whilst these households did not ignore **affordability** when making decisions around heating, the cost-effectiveness of the heat source was not a primary concern.

They preferred heating which could be **used flexibly** as it allowed them to complement their lifestyle choices. They sought a heating system which they could control and tailor to meet their needs.

Heating systems which could **bring comfort** were especially important for comfort chasers. These households were appreciative of the aesthetic aspects of their heat sources, which they particularly valued when entertaining guests. They also frequently mentioned the cosiness and comfort they gained from their heating, which created a homely ambience in their house. Some heating sources could provide a focal point for the family to gather around, which was important for cultivating a sense of 'togetherness' in the family.

Heating types

Comfort chasers in our sample chose secondary heating sources which:

- Were controllable, such as electric blankets or electric heaters.
- Could provide localised heat, such as electric blankets, electric heaters, or fires.
- Were aesthetically pleasing and create a focal point, such as fires, log burners, gas fires and electric fires.

Comfort chasers tended to use an electric / gas / open fire or log burner. Participants valued the cosiness of a fire both because of the warmth it provided, and because of the actual physical appearance of the flames / fireplace. Some also mentioned that the 'type' of heat they felt from fires was different to either their primary heating or other forms of secondary heating, as it felt warmer and more comforting. Comfort chasers who predominantly used fires referred to it as a more 'indulgent' source of heat, and often expressed gratitude or felt lucky that they had access to them. It felt like a privilege, which also contributed to the comfort they felt from using them.

Another secondary heating source which comfort chasers used were electric blankets. These were associated with comfort and cosiness and were almost exclusively used in the evenings. Participants liked feeling warmth directly on their body, and did not feel they could replace the cosiness of an electric blanket with other forms of heating.

Lola's household

Lola lives with her partner and her three-year-old stepson in a terraced house which her partner owns. She works from home three days a week, and her partner works at home about two days a week. Typically, everyone would be back home at around 5pm on a weekday.

Lola has gas central heating which runs throughout the whole house, and which she controls via a thermostat. The heating automatically clicks on and off when it reaches the pre-determined temperature. Most of the time during the winter, the heating is on in the mornings for a couple of hours and then turns on again around 5/6pm in the evening. Lola finds it be a reliable and hassle-free heating system, which is efficient and relatively controllable. Overall, her primary heating works very well for her and her family.

Lola also has a coal open fire in her living room, which she uses at least three times a week during the winter, in the evenings. When the fire is on, they turn their central heating off manually to make sure they don't have two sources of heating running at the

same time. Lola's primary reason for using the coal fire is that her and her partner simply enjoy the cosiness in the evenings.

"The fire does create a nice atmosphere, especially on cold, dark nights. It's really nice to get cosy."

Although she recognises the financial costs of buying fuel for a coal fire, she and her partner have made the intentional decision to keep using it because of the comfort it brings them. It provides warmth and comfort as well as emotional respite after long or difficult days at work.

"We were both really tired yesterday, to be able to slop on the sofa with the fire is just really nice."

When do households use secondary heating?

This section sets out the patterns in secondary heating use, drawing out trends in timings across the day and year. It then presents two vignette examples of secondary heating use with specific timings.

Key findings

For all participants secondary heating use is more common in the winter and during the weekend, regardless of the secondary heating source.

Secondary heating tends to be used when people are sedentary, most notably in the evenings, which coincides with peak electricity demand, and sometimes during the day for those working from home.

Patterns of secondary heating use

Secondary heating use was influenced by their lifestyles and routines, and was not always consistent even within households. Nonetheless, there were some broadly identifiable patterns that emerged from the sample.

Use of secondary heating is more common in the winter

All participants used their secondary heating more often, and more intensely, in the autumn / winter when temperatures dropped. The point at which this occurred varied year by year, so participants did not start using their secondary heating at a consistent and predictable point every year. Most of the time however, secondary heating was used from the months of October to March.

There were examples of participants who used their secondary heating sources throughout the year, but infrequently. Often, this was the case with open fires and log burners – participants used them because of the aesthetics, rather than the warmth they provided. One participant, for example, kept using her log burner every day during the spring, but turned it on slightly later than she would during the winter – at 6pm rather than at 3pm.

> *I really, really, really like it. It's not just about the heat, it's about the aesthetics. – Control seeker, log burner, homeowner*

In other cases, participants' specific health circumstances meant they used their secondary heat sources more throughout the year because they were more susceptible to the cold.

Patterns of secondary heating use differ between weekdays and weekends

Almost all participants had different heating patterns during the weekdays and weekends, based on how much time they spent in their homes on these days. The majority of participants spent more time at home during weekends and hence used their secondary heating more frequently or for longer periods of time (starting fires earlier than normal, for example). People were more likely to all be home at the same time and gathered in the same room, especially in

their living rooms. This was true for all types of secondary heating, including electric blankets, any type of fire and electric heaters / fan heaters.

Secondary heating use is more common in the evenings and when sedentary, regardless of heating source

A common pattern was the use of secondary heating sources at times when people were sedentary. The times at which this occurred differed by household, but there were some distinguishable patterns.

Almost all participants used their secondary heating in the evenings, when external temperatures were lower, more household members were at home and household members were static in one room in their homes. 'Evening' times varied for all participants, based on when they came home from work or children came home from school, and what time they went to bed. Nonetheless, this tended to be between 5-10pm for most participants, which aligns with peak electricity demand[3]. All different types of secondary heating sources were used in the evenings.

It was common that participants were also sedentary during the daytime, either because they worked from home throughout the day or remained at home due to long-term health conditions or disabilities. As a result, they used heating during the day to keep them warm. There were no clear patterns of participants using secondary heating exclusively in the morning or exclusively in the afternoon – instead, they used it intermittently throughout the day whenever they felt cold. Participants were using fan heaters / plug-in electric heaters for this function. Slightly less common was the use of log burners / open fires throughout the day – participants would start using them in the mornings and kept them going until their bedtime. Again, this was most often the case when they were working from home all day, especially if accompanied by another household member.

Participants tended not to use their secondary heating overnight, aside from in specific cases where household members had a health issue or particular heat requirement.

Thomas's household

Thomas and his wife have lived in their rented flat for almost four years. They have very similar weekday schedules – they are out of the house from 7:30am-5:30pm every day. They are mostly out during weekends, but their schedule varies week by week.

They have gas central heating and control the heating via thermostat, so it turns on and off automatically. Typically, they turn their central heating on towards the beginning of November and use it until March. During those months, the heating will often be on between 6am-7:30am, and 5:30pm-8pm. They find their primary heating very effective and easy to use.

[3] https://www.sseenergysolutions.co.uk/business-energy/net-zero-hub/peak-energy-demand

Thomas and his wife nonetheless regularly use their portable electric heater, primarily in the evenings on weekdays and during the weekends. They use it when they want to heat a singular room, instead of extending heating to the entire house, or when their central heating hasn't kicked in yet and it's a particularly cold day. It is normally only on for about 30-45 minutes at a time. On a weekday, this would be in the evenings, around 6pm. On a weekend, the portable heater would be on intermittently throughout the day, depending on their plans.

"Say it's a Saturday and we don't want to turn the central heating on for the whole flat, we just use the electric heater."

What factors affect households' likelihood of reducing their use of secondary heating?

This section explores the motivation that participants felt to reduce their use of secondary heating, and why this might be the case. It then looks at individual factors that had the potential to influence behaviour, first overall and then by each typology in turn.

Key findings

Participants generally lack motivation to reduce secondary heating use, citing its necessity for warmth, comfort, and to supplement inadequate primary systems. Habit and the perceived low cost of secondary heating further inhibit change.

Potential triggers for change include improved primary heating controllability, affordability, and, for "comfort chasers," rising solid fuel costs or heightened health concerns.

Spontaneous consideration of reducing use

Motivation to reduce use of secondary heating is generally low

Participants tended to say that they were not considering reducing their use of secondary heating. This suggests a weak starting point for behaviour change, as it implies that motivation is low. They largely felt they had good reasons for using it: to supplement or replace inadequate primary heating, or to provide them with important emotional benefits.

The immediate need for warmth and comfort tends to outweigh any desire to reduce use for environmental or cost reasons. Notably, those using log burners and open fires did not spontaneously mention health or environmental concerns as a reason to reduce their use.

What is more, participants mostly felt that their secondary heating use was not costing them much: participants often said that they felt it was not a major expense, or that they are used to using it. The role of habit in preventing behaviour change is key: habitual use of secondary heating can be difficult to change, even when there are reasons to reduce use.

> *We have definitely thought that we shouldn't use the fire as much. But it's just a comfort now, everyone has become accustomed to having it on. I sometimes feel guilty, you could wear extra clothes, layers, sometimes I feel it's a waste, but everyone is accustomed to it and it's hard to break out of the cycle. – Warmth focused, electric fire, portable electric heater and electric blanket, private tenant*

Despite this, there were participants who had stopped or reduced their use of secondary heating. This was largely for safety reasons: concerns around bedwetting and electric blankets, or of the safety of pets (concern that a pet might tip its toys into an open fire or interfere with an electric fire).

Factors that may influence behaviour

The same factors tend to drive use or non-use of secondary heating

The factors participants mentioned that might influence them to reduce their usage of secondary heating were mainly the inverse of the reasons why they started using it in the first place. For instance, if poor controllability of primary heating was cited as a reason for use, a more responsive and flexible primary heating system was cited as something that might lead them to cut back.

Even if they were motivated to reduce their use, participants felt constrained because their primary heating did not work in the way they wanted it to. But beyond this, some felt that even if their primary heating was able to meet their practical needs, they would not stop using the secondary heating entirely because of the extra benefits it gave them: the cosiness of the feel of a warm blanket, the aesthetic pleasure of an open fire or the feeling of nostalgia.

Within each typology, a clear set of potential triggers emerged for reduced secondary heating use.

Typology 1: Warmth focused

This group largely felt compelled to use secondary heating to meet the specific needs – usually particular medical or age-related conditions – of individuals within the household, whether themselves or a relative.

As a result, they felt that they would only reduce their secondary heating use if these circumstances changed – if a child's medical condition improved, or if an elderly relative moved out – or if the effectiveness of the primary heating improved to allow them to meet these needs better. They say they will continue to use whichever form of heating they perceive warms them best.

> *I'm mainly using the electric radiator because of my mum. I'd probably stop using it if she moved into sheltered housing or passed away. – Warmth focused, portable electric heater and electric blanket, homeowner*

Typology 2: Cost-constrained

With cost the dominant consideration for this group, reduction is tied to their ability to access more affordable primary heating, or a response to being faced with a large heating bill. Some reported that they would rely solely on their primary heating if it was more affordable.

> *If we have had a big bill then we'll decide not to have any heating on. Octopus give a day to day rundown of how much we've spent, if it's over £6 we won't put oil filled radiators on. If we're struggling to pay then we won't use additional heating, we'll only have the storage heaters on. – Cost-constrained, portable oil-filled radiator, social housing tenant*

Typology 3: Control seekers

For this typology, the potential for reduction is linked to better control of heating within individual rooms. They also say they would reduce secondary heating use if their primary system was more responsive and heated rooms more quickly. It would need to match or approach the perceived efficiency of plug-in electric heaters, which are their preferred form of secondary heating and the way they quickly warmed a specific space. One participant felt that he would rely on the primary heating more if it was possible to regulate the level of heat in a specific room, rather than just having it at one level for the whole house:

> *Maybe if the heating could be controlled in the house that would be different. If you could control it in a particular room. – Control seeker, portable electric heater, homeowner*

Typology 4: Comfort chasers

This group were the most motivated by emotional rather than practical considerations in their secondary heating use, but their behaviour is still able to be shaped by external factors like cost. Some of those with open fires or log burners said they might well cut back if the cost of wood and solid fuel increased significantly. Once prompted, there was some level of concern about potential health impacts or environmental concerns, but these were currently being overridden by the enjoyment they get from their secondary heating. However, if these health concerns became more acute or pressing, they had the potential to influence behaviour.

> *We know someone with a multiple burner. She has a bad condition and she can't use her fire anymore because when she burns coal it causes problems with her lungs. – Comfort seeker, open fire, private tenant*

How (if at all) would switching to a heat pump change households' use of secondary heating?

This section outlines participants' reflections on whether having a heat pump as a primary source of heating would influence their use of secondary heating.

Key findings

Participants had concerns about installation costs and running costs of heat pumps.

Participants found it hard to imagine how their use of secondary heating would change if they had a heat pump, given their unfamiliarity with the technology.

They thought heat pumps may lead them to reduce use of secondary heating in some circumstances. However, participants were unsure if heat pumps would have the same functionality or effect as their current secondary heating – leaving them feeling that they may continue to use secondary heating in some circumstances.

Participants were presented with basic information on heat pumps, including how they work, how costs compare to gas boilers and what is needed for installation, as described in the box below.

Information given to participants on heat pumps

What are heat pumps?

Heat pumps are heating systems that take heat from the outside air, or from the ground outside your home, to heat homes and provide hot water. Heat pumps use electricity and a special liquid called a refrigerant to take warmth from the ground or air and provide central heating. They work well even when outdoor temperatures are well below freezing levels. Heat pumps are efficient, using a quarter of the energy a fossil fuel boiler uses to generate the same heat. Heat pumps are currently available and suitable for most UK homes.

What's it like to live with a heat pump?

Heat pumps maintain a constant temperature (rather than switching on and off through the day) to keep homes warm during winter efficiently. They may take longer to heat your home compared to a regular boiler, so many people install smart controls alongside their heat pump to ensure their home is warm when they need it to be. While heat pump running costs are currently similar to or slightly higher than gas boilers for many households, they are expected to become cheaper over time as electricity prices fall relative to gas and system efficiencies improve. Heat pumps are expected to last 15-20 years. As with gas and oil boilers, heat pumps should be serviced every year.

Some themes emerged relating to participants' initial reactions to heat pumps. These themes are not covered here in detail, given this topic has been explored in greater depth in other research. However key themes were:

- Some participants felt that installation and running costs meant there was little incentive to install a heat pump.
- There were concerns around space required for units, whether heat pumps would become obsolete within the life span of the technology, and whether engineers would be available for maintenance work.

It is important to note that the concerns and perceptions that participants had about heat pumps were sometimes based on incorrect or incomplete information. This has been noted where relevant in the sections below.

How heat pumps may influence secondary heating use

Participants were asked to consider how having a heat pump instead of their current primary source of heating might impact their use of secondary heating. They were asked to assume that a heat pump had been installed in their property and think about how the heat pump would suit their lifestyle and needs.

In general, participants found it hard to imagine how their behaviour would change in this hypothetical situation, given their relative unfamiliarity with the technology. For example, some participants found it hard to understand how heat pumps maintain a constant temperature (rather than switching on and off throughout the day) and struggled to imagine how they would control the system to meet desired temperatures at different times of day. Some were sceptical that the technology would work as described. Overall, there was a consensus that it was unclear how future heating behaviours may change, and findings below should be interpreted with this in mind.

Participants tentatively thought their usage of secondary heating might reduce, but raised questions about cost and boosting heat

Participants were unsure how their use of secondary heating would change, but some tentatively thought they might reduce usage of secondary heating to varying degrees depending on the circumstances.

The participants who had this view tended to be those who used log burners or open fires to both boost the heat in the evenings and for aesthetic and emotional comfort reasons. They thought they may reduce their use of these, if the heat pump could provide a good temperature in the evenings.

> *I'd probably only use the log fire on special occasions, at a dinner party or Christmas. It would become more of a luxury, than a practical essential thing that is now for extra heat. – Cost constrained, electric blanket and open fire, private tenant*

Other participants were encouraged by the perceived ability to better control temperature throughout the day through smart controls and liked that the heating wouldn't have to be switched on and off manually.

> *If it works like it says it does and I wouldn't need to turn the heating on and off all the time, then it would definitely have a positive effect on my daily heating use. – Cost constrained, electric fire and portable electric heater, social housing tenant*

> *I don't think I'd need to use additional heating if the main system could be set to different temperatures throughout the day, covering times like when I get home from work or goes to bed. – Control seeker, portable electric heater, private tenant*

But there was uncertainty about how cost-effective heat pumps would be. The stimulus shown to participants indicated that 'over time heat pumps are expected to become cheaper over time as electricity prices fall relative to gas and system efficiencies improve. Given this uncertainty, they reported that even with a heat pump, they would be likely to carry on using secondary heating because they believed it would be cheaper to run than a heat pump.

Some participants liked that their secondary heating could be used to heat individual spaces temporarily and were unsure if this would be possible with a heat pump. Other participants said heat pumps may not reduce their use of secondary heating as they didn't believe heat pumps would cater for fast heating up or cooling down of spaces – which could sometimes be wanted when people first arrived home or required for those with specific medical conditions.

> *Sometimes you need an instant hit, I don't think [a heat pump] would affect our use [of secondary heating]. With children you need instant warmth sometimes. If we really wanted to crank up the heat in the house that would take time, and then we'd use the electric blanket and the heater. You can warm the rooms up in 5 minutes. – Warmth focused, electric fire, portable electric heater and electric blanket, private tenant*

> *I might find it hard if I needed that instant boost of heat and it couldn't provide that. So I might still need that secondary source of heating for that. – Control seeker, portable electric heater, private tenant*

Others weren't convinced that heat pumps could provide the cosiness that they currently experienced with secondary heating – especially when using heating types such as electric blankets, opens fires, log burners and electric heaters. They didn't believe that the targeted warmth and aesthetics provided by these secondary heating types could be replicated by a heat pump.

> *I wouldn't stop using my electric blankets, I enjoy the comfort and cosiness too much. – Control seeker, portable electric heater and electric blanket, private tenant*

> *With the heat pump, if we could maintain a comfortable steady temperature, we might be more likely only to use additional heating if there was a sudden drop in temperature. But we might still use the log burner, maybe a couple of logs, just for the aesthetics. It's sometimes nice just to have the fire on in the background. – Control seeker, electric fire and open fire, homeowner*

> *I'd probably still use [the electric blanket] because [with heat pumps] it takes a long time for the heat to come into the house. – Warmth focused, electric blanket, social housing tenant*

There were examples of participants who felt that heat pumps would meet their needs

There were some examples where participants thought they would stop using their secondary heating if they had a heat pump. These were participants who were using secondary heating to boost the temperature of their homes. They felt that if the heat pump could help them achieve their desired temperature, they would have no need for secondary heating.

For example, one household had moved from a hot country to the UK recently, and keep the gas central heating on during the night, whilst also using an electric fire in their bedroom to add extra warmth. They felt that if the heat pump helped achieve a better temperature in the property during the night, they would not need the electric fire.

Even those who were positive about the idea of a heat pump talked about some occasions when they may revert back to using secondary heating.

> *When you get in and you're cold to the bones, it might not work for myself. If you're coming home and you can feel [the heating] then it's not a problem. But I might be using the heaters at that point. – Control seeker, portable electric heater, social housing tenant*

Cost-constrained and comfort chasers may be least likely to reduce their secondary heating use if they had a heat pump

There were some patterns in how participants in each typology reacted to the idea of heat pumps. However, given this insight is based on a small sample size and a hypothetical scenario, the following should be taken as tentative conclusions.

Some **warmth focused participants** (typology 1) felt that heat pumps may meet their needs. This was because they prioritise the need to keep warm and heat pumps were generally viewed to meet this need (if the correct insulation is in place). However, some warmth focused participants said heat pumps may not reduce their use of secondary heating as they didn’t believe heat pumps would cater for fast heating up or cooling down of spaces – which could sometimes be required for those with specific medical conditions.

Cost-constrained participants (typology 2) who prioritise the need for affordability generally said they may carry on using secondary heating given that they perceived it to be more cost-

effective than their primary heating and, by association, a heat pump (given that running costs are currently similar).

Control seekers (typology 3) who prioritise the need for flexibility were split in terms of whether heat pumps would meet their needs. Some felt that, compared to a heat pump, existing forms of secondary heating would be more likely to be able to meet their need for heating just one space, or boosting heat for a short period of time. Ultimately, it would require a mindset shift for these people to accept the functionality of a heat pump which would be running continuously, rather than switching on and off throughout the day.

Comfort chasers (typology 4) who prioritise aesthetic and emotional comfort felt that heat pumps may not stop their use of secondary heating – however heat pumps may encourage them to reduce their usage, seeing as some used secondary heating such as electric and open fires for both heat and aesthetic reasons.

Conclusion

Findings against the four research questions are set out below.

Why do households use secondary heating?

Participants were using secondary heating because primary heating couldn't always fulfil their needs. At a basic level, participants needed a heating system that can reach a desired temperature to keep them warm and a system that is affordable. Their primary heating system was not always able to do this, because of ineffective heating systems, poor insulation of properties, and high energy costs. Therefore, they were turning to other options.

Some participants wanted their heating to be flexible to fit their lifestyle and routines, for example by being adjustable to one space or for use for a short amount of time. Again, this was not always possible in their primary heating systems but was achievable by using secondary heating such as portable electric heaters.

Secondary heating presented added advantages in some instances in the form of emotional comfort. This was generally the case for participants who used open fires, electric fires and log burners.

Participants prioritised the need for keeping warm, affordability, flexibility and comfort to different extents, leading to different typologies of household ('warmth focused', 'cost-constrained', 'control seekers' and 'comfort chasers'). However, regardless of the particular needs that were prioritised, primary heating systems often fell short in meeting those needs, leading to an increased reliance on secondary heating options.

When do households use secondary heating?

Secondary heating use was influenced by participants' lifestyles and routines and wasn't always consistent even within households.

All participants used their secondary heating more intensely in the autumn / winter when temperatures dropped – this was typically between October and March.

Other usage of secondary heating was driven by times in which people were at home and sedentary. This included weekends and late afternoon / evenings, when household members were more likely to be at home and together in one room, mainly living rooms. Usage at these times aligns with peak demand for electricity.

Some participants used secondary heating intermittently throughout the day to keep one space warm, for example when they were sedentary in their office / working space.

What are the factors that affect households' likelihood of stopping or reducing use of secondary heating altogether?

Participants were generally not considering reducing or stopping use of secondary heating, given that it was meeting the needs that their primary heating was not. This suggests a weak starting point for behaviour change as motivation is currently low.

The factors participants mentioned that might influence them to reduce their usage of secondary heating were mainly the inverse of the reasons why they started using it in the first place. If their primary heating could fulfil their needs for keeping warm, affordability, flexibility and comfort, they may no longer need to use secondary heating.

How (if at all) would switching to a heat pump change households' use of secondary heating?

Participants found it hard to imagine how their use of secondary heating would change if they had a heat pump, given their unfamiliarity with the technology. Some felt that having a heat pump may reduce their use of secondary heating if it could provide a better temperature and allow them to control temperature better through the day and night. Others had reservations around cost-efficiency of running a heat pump, and whether individual spaces could be heated or boosted temporarily. There was a sense that heat pumps are unlikely to be able to match the aesthetics and emotional comfort of some forms of secondary heating such as open fires, log burners and electric blankets, which were important to some.

Overall, participants felt that, if they worked as described, heat pumps could go some way to meeting their needs. There was an indication that heat pumps may reduce usage of secondary heating in households that prioritise keeping warm and flexibility. However, given this finding was based on asking participants to consider a hypothetical scenario, it should be taken with caution and verified though further research, for example with those who have recently adopted heat pumps.

Appendix

Methodology and sample

Online pre-task

A pre-task for participants to complete prior to their interviews was designed and launched on Recollective, a platform which allows participants to complete tasks and upload visual content. This pre-task consisted of three activities: an introduction, questions on heating behaviour, and a reflective exercise about heat pumps.

The introduction section included questions about the participant's personal life, asking them to rate their satisfaction with various areas of their life. They were also asked to describe their typical week and how much time they normally spend at home. The next section was about their heating habits. Participants uploaded videos of their primary and secondary heating and were asked to describe each type, when they use it and why. They were also asked questions about their heating priorities, and for their thoughts on their current heating systems. The final activity was about heat pumps, where participants were given an overview of what a heat pump is and asked for their thoughts on the advantages and disadvantages.

There were 50 participants who completed this task.

In-depth interviews

The main stage of the research consisted of 45 online interviews conducted with secondary heating users. All groups were conducted online via Zoom between December 2024 and January 2025 and moderated by Verian. Topic guides and stimulus materials were developed by Verian and agreed with DESNZ.

The interviews covered household structures and routines, current usage patterns of primary heating, as well as likes and dislikes. It then covered secondary heating usage patterns and reasons for use, and what factors, if any, would lead participants to reduce / stop their usage of additional heating. It ended by covering participant's perceptions of heat pumps, and whether they thought it would impact their use of secondary heating.

Sample achieved

Quotas	Required	Achieved
Total	50	50

Main heating source

Quotas	Required	Achieved
Natural gas central heating (i.e. a standard domestic boiler)	Min x7	31
Electric storage heaters	Min x2	4
Electric radiators	Min x2	4
Heat pump	Min x2	3
Solar panels	Min x2	2
Oil fuelled central heating	Min x2	3
LPG fuelled central heating	Min x2	3

Secondary heating source

Quotas	Required	Achieved
Electric fires	Min x10	12
Portable electric heaters	Min x15	28
Electric blankets, throws and pads	Min x5	16
Gas fire and/or an open fire/log burner/wood burning stove and/or ‘other’ heating source without using one of the previous 3 heating sources mentioned	Min x5 / max x10	7

Reason for using supplementary/additional heating

Quotas	Required	Achieved
Inefficient primary heating	Min x8	25
Increased comfort	Min x8	37
Aesthetic reasons	Min x8	12

Demographics

Quotas	Required	Achieved
Male	Ensure mix	19
Female	Ensure mix	31
Minority ethnic background	Min x8	14
SEG A	Max x5	0
SEG B	Mix	13
SEG C1	Mix	28
SEG C2	Mix	5
SEG D	Mix	1
SEG E	Max x3	3
Greater London	7	8
South East	8	9
South West	5	5

West Midlands	4	4
North West	5	6
North East	2	1
Yorkshire & the Humber	4	5
East Midlands	3	3
East of England	5	3
Wales	2	2
Scotland	3	2
Northern Ireland	2	2
Digitally Excluded	Min x3 / max x5	3
Detached House	Min x5	10
Semi-detached House	Min x5	24
Bungalow	Min x5	5
Terraced House	Min x5	11
Owner Occupier	Min x15	20
Social Housing Tenants	Min x15	15
Private Rented Sector Tenants	Min x15	15
Other	No min quota	0

Analysis and reporting

Following the interviews, thematic analysis was carried out by Verian researchers. This analysis involved mapping data for each participant against key topics and research questions before extracting common themes. The data were used to examine various hypotheses and draw conclusions against each research question.

Findings were organised into interim and full presentations for DESNZ colleagues, with ongoing input from DESNZ throughout the process.

Pre-task questions

Activity 1 – quick introduction

Life context

For each area of your life, think about how satisfied you are.

- Give each area a rating out of 10 (where 10 is the best).
- Use the text boxes to note down a quick summary of that area of your life, and why you have given it that score

Please spend no more than 1 minute per area.

1. Finances

How satisfied are you with this area of your life?

2. Family and friends

How satisfied are you with this area of your life?

3. Physical and mental health

How satisfied are you with this area of your life?

4. Home

How satisfied are you with this area of your life?

5. Work / personal growth

How satisfied are you with this area of your life?

6. Hobbies

How satisfied are you with this area of your life?

7. Society & the environment

How satisfied are you with this area of your life?

A typical week

Which of the following best describes how you spend your time during a typical week?

- I primarily work from home (e.g. remote worker, freelancer)
- I follow a hybrid work schedule (e.g. working outside the home 2-3 days per week)
- I primarily work outside the home (e.g. at an office)

- I am at home most of the time but not for work (e.g. caregiver, retired, not currently working, stay-at-home parent)
- Other – please describe in the textbox below

How much time do you and your household spend at home each week? What times of day are you and other members of your household typically at home?

Introduction completed

Thank you for the introduction! Now let's move on to your heating habits

Activity 2 – heating behaviours

Definitions

In this project, we'll be using the terms primary and additional heating.

Primary heating = the main heating source in your property, e.g. gas central heating, electric storage heaters, oil-fuelled central heating.

Additional heating = any supplementary or backup heat source used instead of or alongside your main heating system to provide extra warmth when needed, e.g. portable electric heaters, electric blankets, electric fires, gas fires.

Main heating

What is the main heating source in your property? (e.g. gas central heating, electric storage heaters, oil-fuelled central heating)

Please record a video on your phone (1-2 minutes max) showing us your main heating system. Please answer the following questions during your video:

- What type of heating is it?
- Where is it located?
- Which rooms does it cover?

Kindly avoid including your face and revealing anyone else's identity

Main heating set-up

When / how often do you tend to use this heating system?

What time(s) do you normally switch it on and switch it off?

Which member(s) of your household typically manage the heating?

Who in your household is responsible for paying the heating bills?

Additional heating – video

Aside from your main heating source, in what other ways do you heat your home (e.g. portable electric heater, electric fire, electric blankets, gas fires)?

Please record a video on your phone (1-2 minutes max) showing us your additional heating system(s). Please answer the following questions during your video:

- What type of heating system is it?
- Where is it located?
- Which rooms does it cover?

Kindly avoid including your face and revealing anyone else's identity

Additional heating set-up

Who in your household uses this additional heating system?

When / how often do you tend to use this heating system?

What time(s) do you normally switch it on and switch it off?

Why do you/ your household use this additional heating system?

Priorities

Instructions

- Move a card into a group by dragging-and-dropping it in the orange box labelled "Importance", below.
- Reorder cards by dragging them up and down or selecting "Move Up" / "Move Down" from card's menu.

What's important to you when it comes to heating? Please rank the items below in order of importance.

- Cost-effectiveness (what I get for my money)
- Being able to control which areas of my home are heated
- The effectiveness of the heating (i.e. that the heating can achieve a good/comfortable temperature)
- How quickly the space heats up
- Ease of turning on / controlling it
- The ambiance it gives
- How it looks / aesthetics

Reflections – main heating

How much do you agree or disagree with the following statements about your main heating?

My main heating source…

- Is effective (heats my home sufficiently)
- Is cost-effective (in terms of what I get for my money)
- Impacts negatively on the environment
- Is easy to use
- Could potentially be bad for my health
- Is aesthetically pleasing

Reflections – additional heating

How much do you agree or disagree with the following statements about your additional heating?

My additional heating source…

- Is effective (heats my home/a particular area sufficiently)
- Is cost-effective (in terms of what I get for my money)
- Impacts negatively on the environment
- Is easy to use
- Could potentially be bad for my health
- Is aesthetically pleasing

Almost done!

Thank you! You completed the section of activities about yourself and your heating.

Only one more activity left, which takes less than 5 minutes to complete. Please select 'Continue' to proceed.

Activity 3 – heat pumps

Heat pumps – introduction

What are heat pumps?

Please watch the video and read the text below.

Energy Saving Trust: What is an air source heat pump? (2021)
https://www.youtube.com/watch?v=aJ-W6Vv51XA

What is an air source heat pump?

- Heat pumps are heating systems that take heat from the outside air, or from the ground outside your home, to heat homes and provide hot water.
- Heat pumps use electricity and a special liquid called a refrigerant to take warmth from the ground or air and provide central heating.
- They work well even when outdoor temperatures are well below freezing levels.
- Heat pumps are efficient, using a quarter of the energy a fossil fuel boiler uses to generate the same heat.
- Heat pumps are currently available and suitable for most UK homes.

Heat pumps – reflection

What's it like to live with a heat pump?

- Heat pumps maintain a constant temperature (rather than switching on and off through the day) to keep homes warm during winter efficiently.
- They may take longer to heat your home compared to a regular boiler, so many people install smart controls alongside their heat pump to ensure their home is warm when they need it to be.
- Over time heat pumps should become cheaper to run than gas boilers, but current costs are similar.
- Heat pumps are expected to last 15-20 years.
- As with gas and oil boilers, heat pumps should be serviced every year.

Below are some real-life reflections from heat pump users:

"[It has] allowed us to live in a property which we can maintain at a steady 18°C rather than having the heat on for a couple of hours in the morning and the same in the evening"

"[I set it] to 15°C at night…And then during the day, I maybe set it to 18°C in the morning and 20°C in the evening"

"It's too soon to say whether the technology has significantly reduced bills"

After watching the video and reading the above information, what do you think might be the advantages and disadvantages of a heat pump for your household, specifically?

Thank you!

Topic guide

Background and research objectives

Reaching Net Zero by 2050 will require significant changes to how households heat their homes. To achieve this, consumers will need to transition from fossil fuel heating systems to low carbon heating. Heat pumps are the primary technology used to decarbonise homes at scale. Heat pumps offer a low carbon heating solution as they make use of electricity.

Currently, some households use secondary heating methods (e.g. electric heaters, gas fires) alongside their primary heating (e.g. gas central heating). Some of these secondary heating methods require the use of electricity.

More widely, increased use of technologies which use electricity, such as heat pumps and electric vehicles will lead to a significant increase in electricity demand. This makes it important to understand how electric-based heating systems may be used and what effect this could have on the energy system.

DESNZ has commissioned research to understand the user context in more detail: what factors drive secondary heating use (among households without a heat pump) and what might reduce use, as well as whether the introduction of a heat pump could change households' use of secondary heating. Overarching research questions are:

1. What factors encourage the use of secondary heating (e.g., inefficient primary heating, cost, comfort, convenience, aesthetics)?

2. Under what circumstances and how often do UK households use a given type of secondary heating?

3. What are the factors that affect households’ likelihood of stopping or reducing use of secondary heating altogether?

4. How (if at all) would switching to a different type of primary heating (e.g., heat pump) change households’ use of secondary heating?

IDI overview

Interviews will be conducted via Zoom (or via telephone) and will last for 60 minutes. Participants will have completed a pre-task on the Recollective platform prior to the interview. Researchers will familiarise themselves with each participant’s pre-task answers prior to the interview to inform the questions asked during the interview.

Please note, this guide is not a script and is intended to be used flexibly, with participant responses guiding the flow of the conversation, topics covered in the order that they naturally arise, and probes used only when needed.

Researcher notes

Key things for researchers to note:

Key questions are those which explore why they use additional heating, the times of day in which they use it, and whether heat pumps would alter their use of additional heating.

In section 6 (heat pumps), please refer back to participant's earlier answers about reasons for using additional heating, and probe if these needs would be fulfilled by heat pumps. Please probe particularly into how they feel about the fact that heat pumps provide a constant temperature rather than being able to heat up spaces quickly – and whether they would still use their additional heating to fill this 'heat up quickly' gap.

Given that we will be using the COM-B model to structure our analysis, please note if factors they pick / talk about are more related to capability (e.g. knowledge of how to control primary heating), opportunity (e.g. effectiveness of primary heating, ease of use, habit) or motivation (e.g. how much they care about reducing usage).

Some additional researcher notes are included throughout the guide in blue.

#	SECTION	OBJECTIVE	APPROX TIMINGS
1	Introduction	• Moderator introduction • Explain research and give information on consent, withdrawal and recording • Establish rapport	3 mins
2	Household and routines	Recap on items submitted during the pre-task and establish: • Who lives in the household • Routines of household – when people are typically at home, and what they do when they are at home	5 mins
3	Primary heating	Recap on items submitted during the pre-task and: • Confirm type of primary heating • Understand usage patterns of primary heating • Understand likes and dislikes about primary heating system	10 mins
4	Additional heating	Recap on items submitted during the pre-task and:	20 mins

		• Confirm additional heating systems • Understand usage patterns of additional heating • Explore reasons for use • Capture specific scenarios when it was used	
5	Heating decisions	• Explore what factors, if any, would lead them to reduce / stop their usage of additional heating	10 mins
6	Heat pumps	• Understand participant's perception of whether heat pumps would impact their use of additional heating	10 mins
7	Wrap up	• Thank and close	2 mins

Introduction (3 mins)

Objective:
Moderator introduction Explain research and give information on consent, withdrawal and recording Establish rapport

Introduce the session

- Introduce moderator and Verian - an independent social research agency.
- Research is being conducted on behalf of Department for Energy Security and Net Zero (DESNZ). DESNZ want to understand more about how people decide to heat their homes, especially the use of additional heating such as electric or gas fires.
- Thank you for doing the pre-task.
- Interview will last 60 minutes.
- Research is voluntary – you are free to pause or end at any time without giving a reason.
- Research is confidential and anonymous – no personal details will be shared with DESNZ or publicly.
- Any questions?

House rules

- Please make sure you're in a quiet room, with minimal distractions.
- Please imagine that we are in the room together, close any other windows on your PC / put down your phone and be present to the discussion for duration of the session.
- There are no right or wrong answers and no rules to the discussion – just please be open and contribute your honest views.
- We only have a limited amount of time so if I move on the conversation at any point that is just to ensure that we stay on topic and can finish on time
- Any questions?

Recording

- Ask participant for permission to record, then start recording

Household and routines (5 mins)

Objective:
Recap on items submitted during the pre-task and establish: Who lives in the household Routines of household – when people are typically at home, and what they do when they are at home

Thank you for giving us some background about your household in the pre-task. I'd like to recap some of that to get us started.

- Who lives in your household?
    - (If appropriate, for children) How old are they?
    - (If appropriate) What do they do for work / how do they spend their time?
- Am I right in thinking that you live in a [terraced / semi-detached house etc] and that you [own / rent etc]?
    - How old is your property approximately? Is it a new-build or an older house?
    - How long have you lived in your current property?
    - How long do you think you will stay in this property?
- What days and times are the various people in your household typically at home?
- What sorts of activities do you and the other members of the household do when at home?
    - During the week?

- At the weekend?

IF ANSWERS GIVEN ARE TOO VAGUE / HIGH LEVEL, RESEARCHER TO PROMPT PARTICIPANT TO THINK ABOUT THEIR MOVEMENTS / ACTIVITIES LAST WEEK

Primary heating (10 mins)

Objective:
Confirm type of primary heating Understand usage patterns of primary heating Understand likes and dislikes about primary heating system

RESEARCHER TO ADJUST WORDING/FRAMING OF QUESTIONS IF NEEDED DEPENDING ON HEATING TYPE AND HOUSING TENURE TYPE.

- How well do you think your home keeps in heat? Have you or your landlord made any changes, like adding insulation or new windows, to help it stay warmer?'
- You said in your pre-task that the main type of heating in your home is [xxx] – is this correct?
- (If gas, LPG, oil central heating) How old is your boiler (if known)?
  - Have you / your landlord changed the boiler, and if so, when?
  - Why was this (if known)?
- (If electric radiator, electric storage heater) How long have you had this type of heating? Was it already installed when you moved in, or did you install it yourselves?
  - (If installed themselves) Why did you decide on this type of heating system?
- Which rooms in the house does it cover? Which rooms do you use it in?
  - How often do you use this heating system?
  - In which seasons?
  - On which days?
  - At what time of day?
  - What time do you switch it on and off?

IF PARTICIPANT IS STRUGGLING, RESEARCHER TO PROMPT THEM TO THINK ABOUT A RECENT TIME WHEN THEY USED IT / WHEN THEY STARTED PUTTING IT ON THIS AUTUMN / WINTER.

- Do you use any form of smart meter or thermostat to manage your heating? Please tell me about how you use it.

- What are the advantages of your main heating system? What do you like, if anything, about it?
    - If necessary, prompt: In your pre-task you said that it is [easy to use / efficient etc], can you tell me more about that?
- What are the disadvantages of this heating system? What do you dislike, if anything, about it?
- Can you tell me about a time/scenario when it hasn't worked so well / met your needs?
    - If necessary, prompt: In your pre-task you said that it is [expensive / hard to use etc], can you tell me more about that?

Additional heating (20 mins)

Objective:
Confirm additional heating systems Understand usage patterns of additional heating Explore reasons for use Capture specific scenarios when it was used

- You said in your pre-task that the additional type of heating in your home is [xxx] – is this correct?

RESEARCHER TO NOTE IF THEY HAVE MULTIPLE ADDITIONAL HEATING SYSTEMS AND ADJUST QUESTIONS/ TIMINGS ACCORDINGLY TO TRY AND CAPTURE DATA ON BOTH.

- Can you tell me a bit about where you use additional heating in your home?
- How long have you had this type of heating? Was it already there when you moved in, or did you buy/install it yourselves?
    - (If bought/installed themselves) Why did you decide on this type of heating device?
- Who in your household uses this heating system?
- How often do you/they use this heating system?
    - In which seasons?
    - In which rooms?
    - On which days?
    - [KEY QUESTION] What time do you switch it on and off?
    - How does usage differ throughout the year?
- [KEY QUESTION] Why do you/they use it?

    - If necessary, prompt: You said in your pre-task that you use it because [xyz]. Can you tell me more about that?
    - Probe: convenient, habitual, main heating ineffective, aesthetically pleasing, comfort, costs less etc
- I'd like you to think back to a time when you/ someone in the household used it recently. Let's talk through that situation using these prompts.

IF PARTICIPANT CAN'T REMEMBER A SPECIFIC SCENARIO, ASK THEM ABOUT A 'TYPICAL' TIME

- When was this (time of year, day of week)?
- What time of day was it?
- Talk me through the decision to use it:
    - What prompted the thought to use it?
    - Who was there?
    - How were you feeling?
    - Did you consider using something different / not using it? What made you change your mind?
    - How did you feel once you were using it?
    - How long did you use it for?

Reducing use (10 mins)

Objective:
Explore what factors, if any, would lead them to reduce / stop their usage of additional heating

- (If not already covered above) What are the advantages of this additional heating system, if any? What do you like about it?
    - What do you think additional heating provides that your main heating system doesn't?
    - If necessary, prompt: In your pre-task you said that it is [easy to use / efficient etc], can you tell me more about that?
- What are the disadvantages of this additional heating system, if any? What do you dislike about it?

    - If necessary, prompt: In your pre-task you said that it is [expensive / hard to use etc], can you tell me more about that?
- Are there specific circumstances that make you more (or less) likely to use additional heating?
- Have you ever considered stopping using it? Why / what happened?
- What, if anything, would prompt you to use this additional heating less, or stop using it altogether? (Allow spontaneous reaction)
    - Would any of these factors prompt you to reduce your usage? Why? (prompt cards)
    - What, if anything, would make it easier for you to reduce or stop using additional heating?

Heat pumps (10 mins)

Objective:
Understand participant's perception of whether heat pumps would impact their use of additional heating

In the pre-task you saw an explanation of heat pumps. Here's some information as a reminder. I want you to ignore anything to do with installing a heat pump in your home, and instead think about the overall concept of heat pumps, how they work, and the impact they might have on your home's heating.

EXPLAIN OVERALL CONCEPT AND IMPACT ON A PROPERTY'S HEATING

- How do you feel about the concept of a heat pump overall?
- Imagine your home had a heat pump instead of your current main heating system. How might this change your use of additional heating, if at all?

RESEARCHER TO REFER BACK TO PARTICIPANT'S EARLIER ANSWERS ABOUT REASONS FOR USING ADDITIONAL HEATING, AND PROBE IF THESE NEEDS WOULD BE FULFILLED BY HEAT PUMPS DURING THE QUESTIONS BELOW.

- Do you think you would still use your additional heating system?
    - (If yes) Why? What need/requirement would the heat pump not be able to fulfil? In what situations might you or other people in your household still use additional heating?
    - (If no) Why not? How would the heat pump meet your needs / requirements?
- We've discussed that heat pumps provide a constant temperature rather than having the ability to heat up spaces quickly. How do you feel about this? How might this impact your use of additional heating?

Wrap up

- Is there any other feedback you'd like to share?

Incentive

- Give details of how incentive is accessed – Recruiter (Acumen) will send to participant directly

Thank and close

This publication is available from: www.gov.uk/government/publications/secondary-heating-behaviours

If you need a version of this document in a more accessible format, please email alt.formats@energysecurity.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.