Ofgem Flexibility and Net Zero (FANZ) Survey

Findings report (Wave 1)

Fieldwork dates: 19th -25th June 2025

ofgem

Ipsos

Contents

Ofgem foreword

Ofgem is supporting the Government and the energy sector to transition from fossil fuels to clean power by 2030, and to reach Net Zero by 2050. To help achieve this, the Government's Clean Power Action Plan and the jointly published Clean Flexibility Roadmap envision significant contributions from consumer-led flexibility in future.

Consumer-led flexibility (CLF) refers to households and businesses adjusting when and how they use electricity, in response to price incentives or system needs. By reducing peak demand and limiting the need for new generation and network infrastructure, consumer-led flexibility can help lower system costs and deliver benefits for all consumers. All consumers should have the opportunity to participate in consumer-led flexibility, including low-income consumers and those in vulnerable situations.

Ofgem is here to protect all energy consumers, whether they take part or not. To do this, Ofgem requires a deep understanding of the diverse needs and experiences of energy consumers, so that we can help shape a fair, affordable and inclusive pathway to Net Zero for everyone.

Ofgem regularly conducts research with energy consumers across Great Britain. This new Flexibility and Net Zero survey aims to build the evidence base on consumers' attitudes and behaviours in relation to low carbon and flexibility products and services. The first wave of this survey represents a step change in understanding domestic consumer perceptions and behaviours on this topic. For the first time, we have linked responses from a nationally representative survey with detailed smart meter consumption data. This allows us to move beyond what consumers say they do, to understand how they use energy in practice, helping to identify where there may be gaps between stated intentions and real behaviour. It also enables us to infer which households could be most able to provide flexibility, where potential is currently untapped, and which groups may be at risk of being left behind as the market evolves.

The findings highlight the scale of the consumer-led flexibility challenge set out in the Clean Power Action Plan and Clean Flexibility Roadmap. While consumers can make a meaningful contribution, existing behaviours and adoption patterns alone are unlikely to deliver flexibility at the scale required. Expanding participation will depend on widening access to low carbon technologies, addressing perceptual and affordability barriers, and ensuring flexibility offers are understandable and trusted.

Distributional considerations are central. Those with the lowest flexibility potential are more likely to be renters or on lower incomes, raising the risk that the benefits of flexibility accrue unevenly. This evidence reinforces Ofgem's statutory role in supporting Net Zero while protecting consumers, ensuring that consumer-led flexibility develops in a way that is fair, inclusive and does not disadvantage those less able to participate. The FANZ survey provides a robust foundation for tracking progress over time and informing proportionate policy and regulatory decisions as consumer-led flexibility evolves.

Glossary of terms

Consumer-led flexibility Consumer-led flexibility refers to households and businesses adjusting when and how they use electricity in response to price incentives or system needs. For domestic consumers (households) this could mean reducing their electricity usage at peak times (e.g. through 'smart charging' an electric vehicle, or time-shifting usage of other electricity use). If achieved at scale, consumer-led flexibility has the potential to reduce the operating costs of the energy system, which could result in lower bills for all consumers.

Electric vehicle Electric vehicles use electric motors to drive their wheels. They derive some or all their power from large, rechargeable batteries. In this survey we focus on fully electric cars or vans which are plugged-in and charged. Note this does not include hybrid vehicles.

Flexibility potential In this study, flexibility potential is defined as the amount of peak-time electricity a household could reduce or shift from peak periods to off-peak in future. This does not take into account any energy consumption already taking place at off-peak times in the home (such as off-peak charging).

Hard barriers for adoption Broadly defined as structural, material constraints such as cost, infrastructure, and property limitations or simply barriers that would be difficult to change.

Heat pump A specific type of electric home heating which extracts heat from the outside environment, such as the air or ground, and uses it to heat the home.

Home battery A large battery which allows storing electricity for later use in the home.

Low carbon technologies Low carbon technology products produce less pollution than their traditional energy counterparts. In this survey it covers technologies such as EVs, solar panels, home battery storage, smart heating controls or heat pumps.

Net Zero The UK is committed to reaching Net Zero by 2050. This means that the total greenhouse gas emissions would be equal to the emissions removed from the atmosphere, with the aim of limiting global warming and resultant climate change.

Peak/off-peak times	In this study, peak electricity times are defined as between 8am and 11am, and 4pm to 10pm. Off-peak electricity times are defined as between 11am and 4pm, and 10pm to 8am.This definition follows the Electric Vehicles (Smart Charge Points) Regulations 2021. Note that definitions of peak-time can vary in the retail market.
Solar panel	Solar panels, or photovoltaics (PV), convert the sun's energy into electricity.
Smart EV charger	A smart charger can monitor, control, and report on its charging functionality to an operator via a centralised or cloud-based network. For example, it can align charging with periods of low electricity demand or high renewable energy supply and automatically adjust charging times and rates based on real-time grid conditions, electricity prices, and user preferences.
Smart meter	A device that digitally records electricity or gas consumption in intervals and communicates the information to the consumer's energy supplier for monitoring and billing.
Smart heating controls	These are devices that enable users to programme their boiler or heating system online/by smart phone.
Soft barriers for adoption	Broadly defined as more attitudinal knowledge barriers such as lack of awareness, preferences, and perceptions.
Storage heater	Electric heater that generates and stores heat during the night and releases the heat when needed e.g. to warm your home during the day.
Time of Use tariffs	Electricity tariffs where the cost of electricity is cheaper at certain times of day.
Washing machine	The survey asked about washing machines or using the wash cycle on combined washer/dryers. Washing machines were included in the research to serve as an example of energy intensive household appliances, whose use can be shifted to off-peak periods.

Executive summary

As Great Britain's energy system transitions from fossil fuel-powered generation to clean power by 2030, consumers are playing an increasingly important role in adopting low carbon products, services and behaviours. Ofgem has an important role to support the government in the energy system transition while protecting the interests of current and future energy consumers in Great Britain.

Ofgem's new Flexibility and Net Zero (FANZ) tracker survey is designed to measure and monitor domestic energy consumers' engagement with flexibility and low carbon products and services in Great Britain. This publication reports on the first wave of the survey, conducted in June 2025. The survey was carried out online by Ipsos using their Knowledge Panel – a random probability panel. A nationally representative sample of 4,385 domestic energy consumers in Great Britain took part.

Where data was available and participants' consent was obtained, a subsample of 1,085 participants' survey responses were linked to up to 13 months' worth of historical half-hourly electricity and gas consumption data. This data linking was required to provide Ofgem with evidence to understand how much flexible energy could be contributed to the system from different consumer groups, based on current uptake of some technologies. The key findings are outlined below.

Note: this research was conducted before the outbreak of the 2026 Middle East conflict and the government's announcement on making plug-in solar panels more widely available, which may impact on some of the measures outlined in this report.

The desire to use low carbon products and services is mainstream and extends beyond early adopters

Most surveyed domestic energy consumers (62%) say they want to use products and services that reduce carbon emissions. Consumers who already have low carbon products at home are more likely to say they want to use products that reduce carbon emissions (e.g. 79% of home battery storage users, 76% of heat pump users), as are consumers aged 25-34 (71%) and those aged 75+ (69%).

A step change in the adoption of low carbon technologies is possible in the near future, with 14% saying they intend to adopt an EV in the next two years

Uptake of low carbon technologies remains concentrated with 18% of domestic energy consumers saying they use at least one of the four headline low carbon technologies (fully electric vehicles (8%), solar panels (10%), heat pumps (3%), home battery storage (4%). However, a further 14% of those who do not have a fully electric vehicle (EV) say they are likely to adopt one in the next two years, rising to over a quarter amongst those earning £100,000+ (26%). If realised, this would amount to a considerable increase in the short-term.

Cost remains the primary barrier across most technologies. 67% say they are unlikely to adopt an electric vehicle in the next 2 years, primarily due to the purchase price (55%). Perceptions of insufficient range (33%) and a preference for non-EV or hybrid vehicles (32%) are also commonly cited barriers.

Among those who say they do not have a heat pump, 5% say they will adopt one in the next two years. This is predominantly driven by those who already have low carbon technologies in the home (13% of EV users and 9% of home battery storage users). For those unlikely to adopt (73%), the top barriers given are: the cost of purchase/installation/use (43%), the need for home improvements (33%) and the hassle/disruption of installation (29%).

Similarly to electric vehicles and heat pumps, the top barrier cited to the adoption of solar panels is the cost of purchase/installation/use (48%), while for home battery storage the most commonly reported barrier was a lack of knowledge about it (38%).

While around half of consumers (49%) say they think a Time of Use tariff would save them money, perceptual factors are holding back engagement

Consumers were asked whether their household energy prices vary depending on the time of consumption. Those who say their prices vary were then asked to identify the specific type of time-varying tariff they are on. Out of all respondents, 16% report they are on a time-varying tariff and could identify the specific type. A further 16% say the price they pay for their energy varies by time of day, but could not identify which specific type their household is on. This could either indicate a lack of understanding around tariffs, or engagement with novel time of use propositions now available, where consumers are rewarded for shifting their electricity consumption to different times/days without changing their underlying tariff.[1] Among electric vehicle users, most (53%) say they are already on a Time of Use tariff.

Nearly half (49%) of all respondents say that they think a Time of Use tariff would/ does save their money, but only 17% of those not currently on a Time of Use tariff say they would switch to one in the next two years. Of all households, 41% say they are unlikely to switch to a Time of Use tariff. The most commonly selected reasons are perceptual: 27% cited a lack of guaranteed savings, while 22% said there was no particular reason/hadn't thought about it, and 21% said they don't know enough or haven't heard of such tariffs before.

[1] Some energy suppliers are now offering innovative pricing propositions where consumers are rewarded for shifting their electricity consumption to different times of day, or different days of the week, without changing their underlying tariffs In some cases these are linked to the National Energy System Operator's Demand Flexibility Service: https://www.neso.energy/industry-information/balancing-services/demand-flexibility-service-dfs. For more information on these pricing propositions, refer to LCP Delta's Beyond Tariffs report: https://www.lcp.com/en/insights/publications/beyond-tariffs-gb-household-flexibility-market-monitor.

Most EV users say they already exclusively charge off-peak, and laundry load-shifting shows potential, but heat pump flex is a challenge

Consumers were classified using a taxonomy framework according to how they use three technologies in the home (laundry appliances, EV chargers, and heat pumps), and whether they could shift their consumption to off-peak times.

Overall, over half of all households (57%) say they could shift their electricity use to off-peak times or already do this. Most of this potential participation in flexibility is derived from consumers' use of washing machines, reflecting their higher levels of ownership compared to other technologies:[2]

- **Laundry** provides a large near term opportunity with 54% of all households saying they could shift their laundry to off-peak times (even for relatively modest or non-financial motivations).
- Only 6% of all households say they have an **electric vehicle** and could shift the time it charges at present. Notably, 63% of all households with an EV say they already charge their vehicle at off-peak times, suggesting this behaviour is becoming normalised with an opportunity to increase this further.
- 2% say they have a **heat pump** and could shift when their heat pump runs. This suggests more limited and emerging flexibility, reflecting low uptake and less established usage patterns. Only 16% of those with a heat pump say they run their heat pump exclusively at off-peak times, and less than two in five (38%) of those using their heat pump at peak-times or constantly say they would be willing to shift their use to off-peak times.

This highlights that participation in flexibility is not one homogeneous behaviour, but varies significantly depending on the technology and level of market maturity.

When households' consumption patterns are taken into account, it emerges that most of the currently untapped flexibility potential is likely to be concentrated in a small group of early adopters of electric vehicles, who are willing to shift consumption to off-peak times more than they currently do

By linking survey participants' responses to their half-hourly electricity consumption data where available, an indicative estimate of each participant's flexibility energy potential could be calculated. This builds on the typology findings by estimating the annual amount of electricity that consumers are currently willing and able to shift to off-peak time when they charge electric

[2] Caution is urged in interpreting these results, as consumers' stated future intentions may not necessarily be reflected in their actions.

vehicles, run heat pumps and use washing machines. Participants were grouped into four quartiles based on this flexibility potential and compared by household and energy-related characteristics.

The flexibility potential estimates should be interpreted as indicative of the scale of domestic flexibility, rather than as precise forecasts. They are derived from a combination of observed consumption data and survey responses to hypothetical questions, and necessarily rely on assumptions about how consumers might behave in practice.

The analysis shows that in terms of the amount of energy that could be shifted at present, most flexibility potential is concentrated in a single group. One quartile accounts for the majority of flexible electricity use, mainly driven by households willing and able to shift EV charging and laundry. On average, this group has a flexibility potential of 243 kWh per household per year and is more likely to own low-carbon technologies than other households.

A second group has more modest potential (67 kWh per year), mostly from shifting laundry use, as many EV owners are already charging off-peak. The remaining two quartiles have very limited flexibility. The lowest-potential group is more likely to rent and have lower incomes, highlighting constraints on who can currently provide flexibility.

While EV smart charging is normalised, many consumers show low comfort levels with the idea of an external company managing their EV charging or heating controls, which could be a barrier to automation

Consumers with an EV were asked about how they charge it. Most who charge at home say they use a smart charger at home (63%), while nearly three in ten (29%) told us they use a conventional charger without internet connectivity. Among those with a smart charger, the majority say they either rarely (41%) or never (39%) override the settings. This is consistent with the finding that 63% of all EV users say they exclusively charge their vehicle at off-peak times.

At present, only 2% of EV users say an external company manages their EV charging. All respondents were asked about their comfort with external control of their home heating or EV charging. While around a quarter of all respondents (26%) say they would feel comfortable with a company managing when their EV charges, fewer report that they would feel comfortable with a company managing when heating switches on/off (16%). Current EV users are more likely to report being comfortable with automation of EV charging (55% of EV users comfortable, vs 24% of non-EV users).

Overall, this research finds that domestic energy consumers across Great Britain are able to contribute towards low carbon and flexible energy consumption targets but their ability to do so is uneven. The findings reveal a strong baseline where different groups of consumers say they are willing and able to engage with flexible and low carbon behaviours in different ways. The findings also highlight that there is significant potential for consumers to contribute towards decarbonisation and consumer-led flexibility in the next few years. At the same time, the

research highlights some hard behavioural and structural barriers that different groups of consumers would need to overcome to engage with low carbon and flexibility products and services. As the costs of low carbon technologies fall, it will be important to monitor their uptake and usage by different consumer groups. This will support Ofgem to ensure that all consumer groups have the opportunity to take part in consumer-led flexibility, while those who do not take part are also protected from harm.

1 Introduction

1.1 Background and research objectives

Under the Energy Act 2023, Ofgem has a statutory duty to support the government in achieving Net Zero by 2050 and decarbonising the power system in Great Britain, while protecting the interests of current and future consumers. This requires careful consideration of consumer needs, perceptions and experiences related to decarbonisation and the growth of renewable energy, as not all consumers may be able to take advantage of low carbon and flexible products and services.

Ofgem's Flexibility and Net Zero Survey (FANZ), aims to build the evidence base on energy consumers' attitudes, behaviours and experiences in relation to low carbon and flexibility products and services in the energy market in Great Britain (GB), by measuring and tracking them over time. It will equip Ofgem to better protect consumers and incentivise those who can engage with such products and services to do so effectively.

The key policy question the research seeks to answer is:

- To what extent are domestic energy consumers in Great Britain able to contribute towards low carbon and flexible energy consumption targets?

Further, the following three sub-questions are:

- What are consumers' current perceptions and attitudes towards low carbon and flexibility products and services?
- To what extent are consumers engaging with low carbon and flexible products and services?
- To what extent do consumers have potential for developing flexibility capabilities through engagement with products and services?

1.2 Research design

The FANZ survey was designed to capture a robust, nationally representative picture of domestic energy consumers' engagement with low carbon and flexibility products and services across Great Britain. A key component of the project involved linking survey participants' responses to their actual electricity and gas consumption data where possible. This data was required to support Ofgem to explore how different types of consumers could contribute towards meeting flexible and low carbon energy targets, while ensuring prices are fair and that all consumers are protected. Ofgem partnered with Ipsos to conduct this research via their random probability online panel.

The first wave of the FANZ survey was carried out via Ipsos KnowledgePanel – a random probability online panel consisting of 30,000+ panellists who are recruited via high-quality address-based sampling, selected at random. This means that every household has a known chance of being selected to join the panel; improving the statistical reliability of the data. The panel also covers digitally excluded groups, achieved by providing members of the public without internet access with a tablet, basic internet access and training to enable them to complete surveys.

Ipsos developed survey questions in collaboration with Ofgem. Cognitive testing of the questions was carried out in May 2025 to ensure the questions were clearly worded and easy-to-understand for the wider target audience. Cognitive interviews were carried out with 12 individuals, recruited based on quotas to ensure a range of possible participants (in terms of age, gender, region, social grade, vulnerability and use of technologies of interest) and that the key questions could be tested.

The survey fieldwork was carried out between 19th - 25th June 2025. An overall representative sample of 4,385 domestic energy consumers in GB was achieved. This included targeted boost samples of lower-incidence groups (EV users and energy inefficient households, heat pump users and digitally excluded and offline consumers). Specific participants were targeted using pre-screening of panel members on the characteristics by which we were looking to boost. This was done to achieve sufficient sample sizes for low-incidence subgroups of interest.

Table 1.1: Achieved sample, broken down by boost groups

Total achieved sample of domestic energy consumers in GB, of which:	**4,385**
Heat pump owners	196
Electric vehicles	398
Energy Performance Certificate (EPC) rating F-G	294
Digitally excluded	211

NB. Some of the above subgroup categories may overlap.

Weighting was applied to the data after fieldwork ended to correct imbalances in the achieved sample, using the latest official GB population statistics. This is a survey adjustment done after data collection to make the sample better reflect the target population. It re-weights respondents so that the sample's distribution on key variables match the population statistics (age, gender, region, indices of multiple deprivation (IMD), education, ethnicity, and household size). The boost samples were weighted to their natural proportions in the final overall sample.

Information regarding the demographic breakdown of the sample can be found in Appendix A.

After survey completion, 1,085 respondents consented to sharing up to 13 months of historical smart meter data on energy consumption and having this data linked to their survey responses. This was done to explore how different groups of consumers use energy and the implications

for their potential to contribute flexibility. A two-stage consent process, involving Ipsos and the data linking partner N3rgy (a data service provider), ensured data privacy and security.

Further details on the methodology can be found in the accompanying technical report.

1.3 Interpreting the findings

The percentages in the tables and figures of this report generally sum to 100 unless survey questions allowed the selection of more than one answer, or due to rounding.

In some cases, figures from questions which were answered by a sub-set of the population have been re-based on all respondents to provide estimates of household prevalence across the population of GB energy consumers. Where questions were asked of sub-sets of the population, the base is noted in the chart, table or in the text.

Any descriptions of differences between subgroups have been tested for statistical significance at the 95% level.[3] Only differences between subgroups that are statistically significant are noted in this report, unless otherwise stated.

Percentages are not reported if they are based on samples of fewer than 50 people. All percentages that are based on samples of fewer than 100 people are indicated with a cautionary footnote regarding interpretation.

The survey used in this research covered Great Britain only (i.e. excluding Northern Ireland). This is because Ofgem's remit covers Great Britain only.

[3] When looking at percentages, if a difference is statistically significant, this means we can be 95% confident that the survey result reflects a real change or difference in responses, rather than being down to chance. Where a change or difference is not statistically significant, we cannot be confident that it reflects a real change or difference in responses.

2 Findings

2.1 Low carbon and flexibility products: Where are we now?

2.1.1 Overview of findings

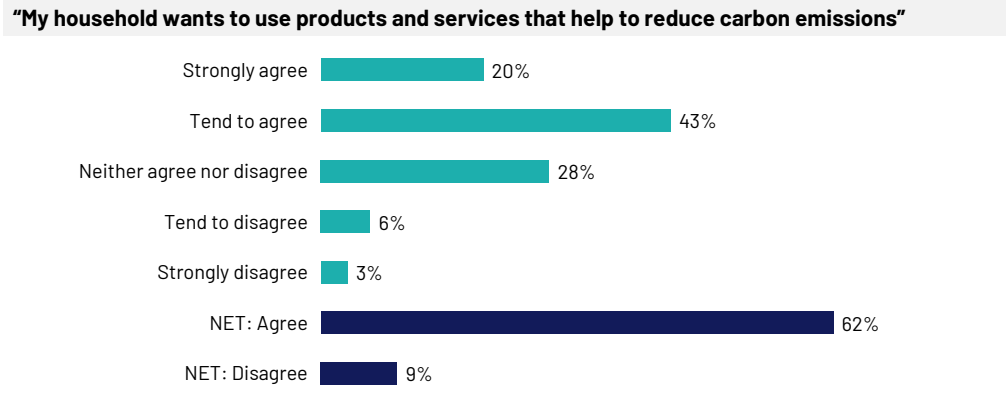
- Most households want to use products that lower carbon emissions, but only a minority see themselves as early adopters (agreeing that they are amongst the first to try a new product when it appears on the market).
- Adoption of electric vehicles (EVs), heat pumps and solar panels and flexible behaviours is mainly concentrated among early adopters: they are often from higher-income groups, they tend to be owner-occupiers and often based in rural locations. Costs, knowledge gaps and perceived suitability are some of the key barriers for adoption for others.

Although about half of households agree that using a Time of Use tariff would save them money, most of those currently not on a Time of Use tariff say they are unlikely to switch in the next two years. Generally, perceptual barriers to adopting Time of Use tariffs are holding back engagement with them. This suggests there could be potential for wider uptake of Time of Use tariffs in the near future.

2.1.2 Attitudes towards low carbon technologies and new products

There is a gap in consumer attitudes between wanting to reduce carbon emissions and readiness to adopt new technologies. Use of carbon-reducing products appeals to a majority: 62% agree (either strongly or slightly) that their household wants to use products/services that help reduce carbon emissions (Figure 2.1).

Figure 2.1: The extent to which household wants to use products/services that help reduce carbon emissions

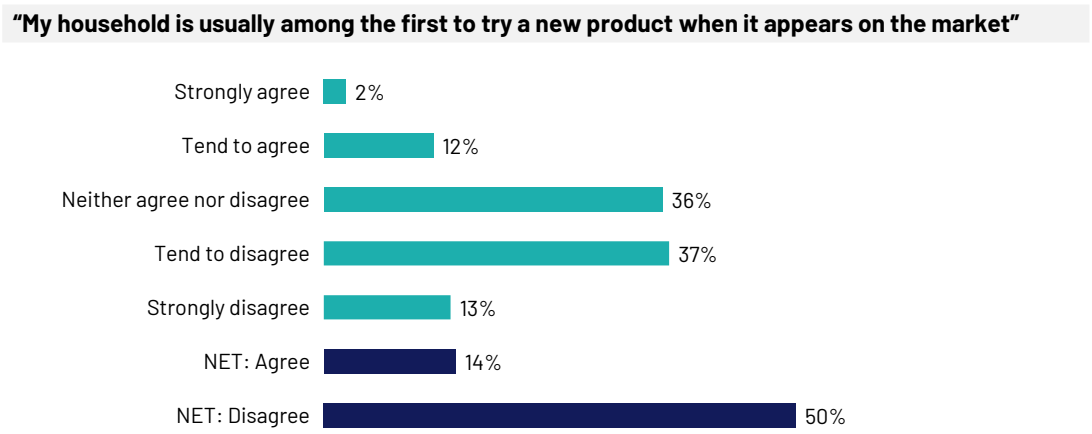


Base: All respondents (n=4385)
Q6. To what extent do you agree or disagree with the following statements? My household wants to use products and services that help to reduce carbon emissions

There were specific subgroups of respondents who emerged as more likely to want to use low carbon products and services than others. These included consumers aged 25-34 (71% v 62% on average) and 75+ (69%), those based in rural locations (69%), existing users of low carbon technologies (home battery storage (79%), heat pump (76%), EV (75%), solar panels (71%), smart home heating controls (67%)) and those in the middle household income group of £52,000-£99,999 (66%).

When asked about whether their household is usually among the first to try a new product when it appears on the market, only 14% see themselves as 'early adopters' (Figure 2.2).

Figure 2.2: The extent to which household is usually among the first to try a new product when it appears on the market



Base: All respondents (n=4385)
Q6. To what extent do you agree or disagree with the following statements? My household is usually among the first to try a new product when it appears on the market

Men are more likely to see themselves as early adopters (17% v 14% on average), as are people aged 25–34 (20%) or 45–54 (17%), and in the highest income bracket with annual household incomes of £100,000+ (26%). Those with children in the household are also more likely than average to see their household among first to try a new product (18% v 14% on average). By contrast, women (52%), people aged 65–74 (53%), residents of rural areas (54%), and those who do not use low carbon technologies are less likely than average to consider themselves early adopters (with no EVs (51%), solar panels (51%), heat pumps (51%), smart heating controls (53%)).

2.1.3 Take-up of low carbon technologies and flexibility products

Respondents were asked about the ways in which they heat their home, and whether they use certain low carbon products and potentially flexible appliances at home.

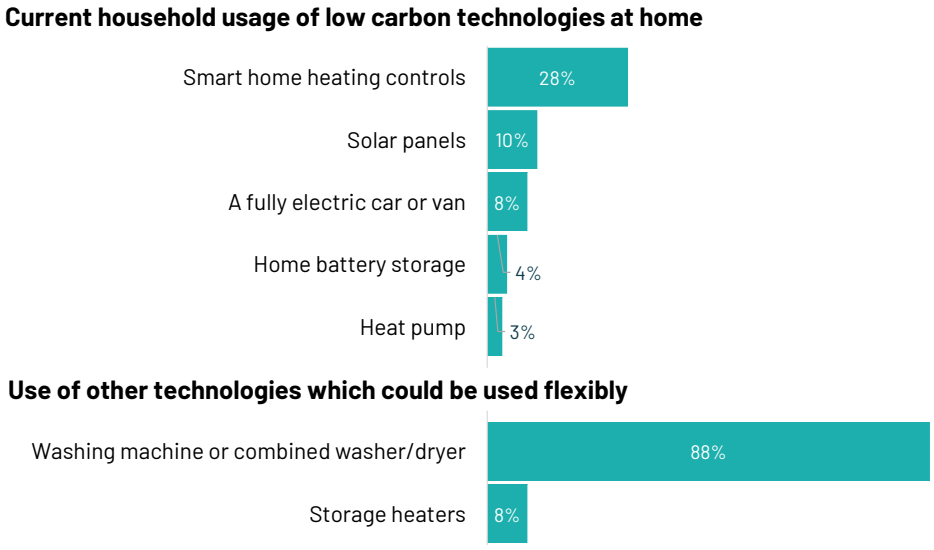
The vast majority of households report using gas central heating to heat their homes (84%), in line with official statistics.[4] Portable electric heaters are second most commonly used for heating, reported to be used by nearly a quarter (23%).

2.1.4 Take up of low carbon and flexibility products overall

Nearly a third of households (28%) say they use smart home heating controls, but use of other low carbon technologies and products remains low. Reported take-up and use, according to this survey which showed a predefined list of technologies of interest, varies by product: solar panels are used by 10%, fully electric cars/vans by 8%, storage heaters by 8%, home battery storage by 4%. Three per cent of households say they use heat pumps, which is slightly more than the ONS data which suggests that 1.4% of properties in England and 1.5% in Wales have a heat pump[5].

The survey also asked about appliances such as washing machines (or combined washer–dryers). Washing machines were included in the research to serve as an example of energy intensive residential appliances, whose use can be shifted to off-peak periods. Most households say they have a washing machine or combined washer-dryer (88%) (Figure 2.3).

Figure 2.3: Current household use of low carbon technologies and other technologies which could be used flexibly



Base: All respondents (n=4385)

[4] The level of gas central heating use indicated in the survey broadly aligns with the latest 2021 census (https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/census2021howhomesareheatedinyourarea/2023-01-05) and Nesta's estimates https://www.nesta.org.uk/project/finding-ways-to-deliver-cheaper-electricity-by-rebalancing-levies/how-different-households-use-energy/#:~:text=The%20vast%20majority%20(84%25),higher%20relative%20to%20gas%20prices.

[5] ONS data shows 1.4% of properties in England and 1.5% in Wales have a heat pump. https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/energyefficiencyofhousinginenglandandwales/2025#heat-pumps

Q8. Which, if any, of the following products or appliances does your household currently use at home? – includes Q3 responses

EVs

Across consumers, 8% say that they currently use an EV, which is believed to be a higher estimate than many other data sources. According to UK government's vehicle licencing statistics, around 4% of cars in the UK were battery electric in June 2025.[6] The following demographic groups were found more likely than average to say that they use an EV:

- Men (9% compared with 8%)
- Adults aged 35-44 (11%) and 45-54 (10%)
- Those working full-time (10%)
- Owner-occupiers of their accommodation (9%)
- Higher annual income households: £52,000-£99,999 (10%), £100,000+ (21%)
- Those who have children in the household (12%)

Linked to this, users of other low carbon technologies are also more likely than average to say they use an EV: home battery storage (30%), heat pumps (15%), solar panels (18%) and smart home heating controls (13%).

Many of these characteristics align with previous research, such as with Ofgem's Future Insights report which notes that EV uptake to date has been by early-adopters – individuals typically characterised by affluence, being less price-sensitive and having a greater appetite for risk,[7] as well as the EV Driver Tracker 2025 for the Department for Transport.[8]

This survey indicates a potential increase in EV use in the short term. Of those who currently claim not to have an EV, 14% say they are likely to get one in the next two years, while 67% do not anticipate getting one within this timeframe. Younger people (27% of 25-34s), full-time workers (19%) and higher-income households (20% of those on £52,000-£99,999 and 26% of those on £100,000+) are more likely than average to say they will get one in this time, suggesting that the profile of EV adopters will remain broadly the same.

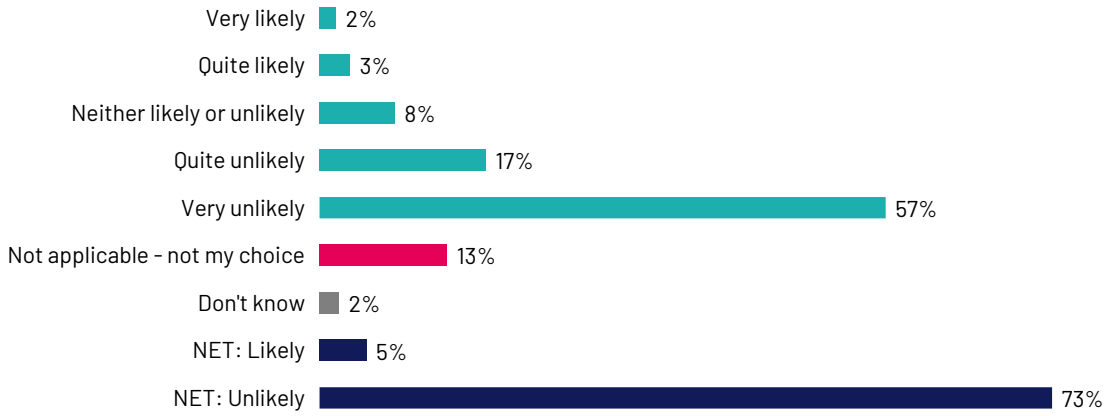
[6] UK government vehicle licencing statistics from 2025: Vehicle licensing statistics, United Kingdom: April to June 2025 - GOV.UK. Accessed 25th March 2026.
[7] Ofgem (2018). Future Insights Series: Implications of the transition to Electric Vehicles. Office of Gas and Electricity Markets. Available at: https://www.ofgem.gov.uk/sites/default/files/docs/2018/07/ofg1086_future_insights_series_5_document_master_v5.pdf Accessed 18 November 2025
[8] EV Driver Tracker, Department for Transport (2025) https://assets.publishing.service.gov.uk/media/68aee8ae960e2d135b4c8e83/ev-driver-tracker.pdf accessed on 18 November 2025

Heat pumps

Decarbonisation of heat is one of the biggest challenges to achieving Net Zero. Heat pumps used for heating can offer substantial carbon emission savings when compared to conventional gas boilers. For heat pumps, current usage is 3% based on the FANZ survey. This is slightly higher than ONS data which shows that around [9]1.5% of properties in England and Wales have a heat pump.[10]

An additional 5% of households without a heat pump say they are likely to get a heat pump in the next two years. Among those who do not currently have a heat pump, most say they are unlikely to get one in the next two years, and a majority are strong in that view: 57% say they are 'very unlikely' and 17% 'quite unlikely' (Figure 2.4).

Figure 2.4: Whether likely to adopt a heat pump in the next two years



Base: All respondents without a heat pump (n=4189)
HP1. How likely would your household be to change your central heating system to a heat pump in the next two years?

Existing users of EVs (13% compared with 5% average) and home battery storage (9%) who are not current heat pump users report that they are somewhat more open to getting one, reflecting the finding above that indicates that low carbon technologies tend to be adopted together or act as a gateway to other technologies.

On the contrary, older people (55+) are more likely than average to say that they would not get a heat pump, (between 80-84% compared with 73% on average), as well as those not working full-time (75%), those in higher-income brackets (from £52,000 to £100,000 and over) (78%) and based in rural areas (80%).

[10] https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/energyefficiencyofhousinginenglandandwales/latest NB. ONS data is based on EPC registration data which does not cover all properties.

Lack of agency is a notable factor, with 13% on average saying the decision is 'not their choice', concentrated among council and private renters (38% and 44% respectively).

Take up of multiple low carbon technologies

The majority (82%) say they do not use any of the low carbon technologies asked about in detail in the survey (EVs, solar panels, home battery storage or heat pumps), while 18% say they use at least one or more of these. Hierarchical clustering of the survey data confirmed that households with one low carbon technology are likely to adopt several of the low carbon technologies covered in this survey (which included fully electric vehicles, solar panels, heat pumps, and battery storage).

In terms of consumer profile, high-income homeowners and people in rural areas are more likely to say that they use one or more of these low carbon technologies. The following groups are more likely to say they use one or more low carbon technologies:

- Those who have annual household incomes of £52,000 up to £99,999 (21% compared with the average of 18%), particularly those on £100,000 and above (30%); those who do not have trouble keeping up with energy bills (20%); least deprived areas according to IMD deprivation index: IMD 4 (21%) and IMD 5 "least deprived" (23%).
- Those aged 35-44 (21%).
- Consumers based in rural locations (28% compared to 15% of urban); East Midlands (23%), followed by East of England (20%) and South (21%), compared to 12% London.
- Owner-occupiers (20%), compared to 9% of renters (any type).

2.1.5 Barriers to uptake

Respondents who indicated that they did not use a particular technology at home were asked reasons for not using it, to understand perceptions and identify barriers to uptake.

EVs

Cost is the leading barrier to adoption for EVs; 47% of those likely to get an EV in the next two years say that the purchase price has prevented them from getting one yet, and a similar proportion of those unlikely to get one (55%) said that this was because of perceived purchase price. For both groups, perceptions about functionality such as not long enough range (21% of those who are likely to get one in the next 2 years) or insufficient charge points (17% among those likely to get an EV in the next 2 years) also act as barriers (Figure 2.5). Among those unlikely to get an EV in the next two years, preference for non-EV or hybrid vehicles is mentioned by nearly a third (32%).

Figure 2.5: Barriers preventing or delaying electric vehicle adoption

EVs

Barriers preventing adoption *among those unlikely to get in 2 years*		**Barriers delaying adoption** *among those likely to get in 2 years*	
Purchase price	**55%**	Purchase price	**47%**
The range is not far enough	**33%**	Not needed to get a vehicle yet	**21%**
Prefer non-EV or hybrid	**32%**	The range is not far enough	**21%**
No/insufficient charge points	**24%**	No/insufficient grants or financial support	**20%**
Not looking to get a car/van at all	**24%**	No/insufficient charge points	**17%**
Takes too long to charge	**20%**	Concerns about reliability	**12%**
Concerns about reliability	**19%**	Takes too long to charge	**10%**

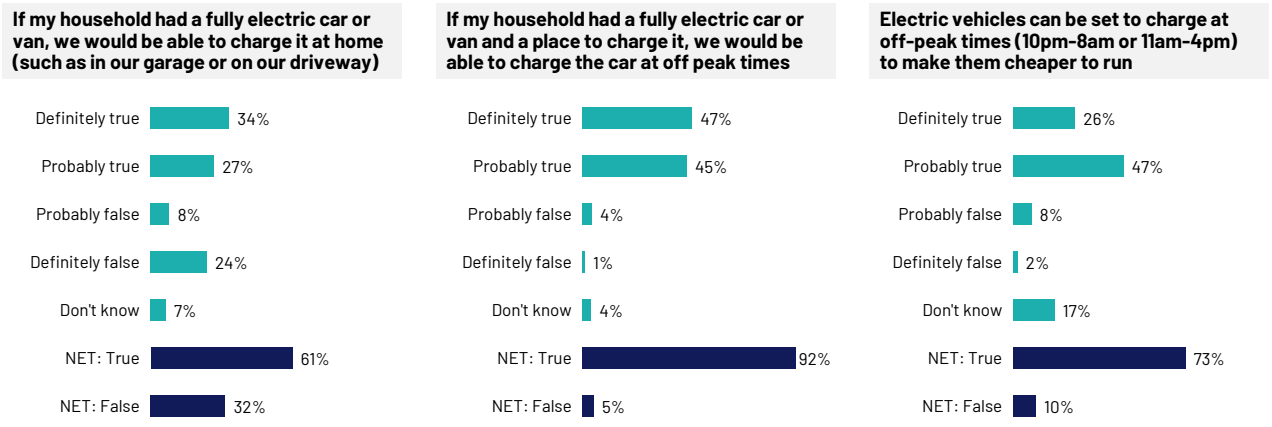
Barriers related to...

Cost | Functionality or convenience | Preferences | Relevance

Base: Those unlikely to get an EV in the next two years (n=2869); Those likely to get an EV in the next two years (n=380)
EV2. For which, if any, of the below reasons is your household unlikely to get an electric car or van in the next two years? Includes top 7 reasons given

While costs of charging or running costs weren't commonly identified as barriers to EV adoption, perceived accessibility of the charging network was mentioned as a key barrier. To understand perceptions, participants were asked a set of questions to gauge understanding of EV charging and perceptions around savings (Figure 2.6). Questions were tailored to their individual circumstances. Three fifths (61%) of those who do not have an EV think they could charge an EV at home if they had one, although a third (32%) think they could not. That said, most (92%) of those who say they would have a space to charge a future EV at home think they would be able to charge off-peak. This bodes well for future flexibility around EV charging if households have the infrastructure to enable them to do so.

Figure 2.6: Perceptions towards home-charging of fully electric vehicles



Bases from left to right: All respondents who do not have an EV (n=3987); All respondents who do not have an EV and said in previous statement they would be able to charge it at home (n=2493); All respondents (n=4385)

EV3. To what extent do you do you think each of these statements are true or false?

Awareness that cost savings can be made by charging EVs off peak is also relatively high. Three quarters (73%) of all participants, including both those who have or do not currently have an EV, said it is true that off-peak charging makes EVs cheaper to run. Unsurprisingly, awareness is higher amongst current EV users (95% vs 71% non-EV users). Once again, this implies that lack of knowledge is not necessarily a barrier to future flexibility around EV charging.

Heat pumps

Perceived costs of purchase, installation and use are the key barriers for heat pump adoption (Figure 2.7). Amongst those who do not already have a heat pump, cost is reported as the primary barrier by both those who are unlikely to get a heat pump in the next 2 years and those who are likely to get one (43% and 27% respectively). In addition, barriers related to perceived needs for home improvements for heat pump adoption are preventing and delaying adoption. A quarter (25%) of those likely to get a heat pump mention this as a reason for delaying adoption, and a third of those who see themselves as unlikely to get one (33%).[11]

Figure 2.7: Barriers preventing or delaying heat pump adoption

Heat pumps

Barriers preventing adoption *among those unlikely to get in 2 years*		Barriers delaying adoption *among those likely to get in 2 years*	
Cost of purchase/installation/use	43%	Cost of purchase/installation/use	27%
Home improvements needed	33%	Home improvements needed	25%
Hassle/disruption of installation	29%	No/insufficient grants or financial support	19%
Prefer current/other heating system	27%	Hassle/disruption of installation	14%
No/insufficient grants or financial support	22%	Home is unsuitable	13%
Home is unsuitable	16%	Lack of knowledge	12%
Temperature concerns	16%	Too noisy	11%

Barriers related to...

Cost | Functionality or convenience | Preferences | Suitability | Lack of knowledge

Base: Do not have a heat pump: Those unlikely to get a heat pump in the next two years (n=3514); Those likely to get a heat pump in the next two years (n=157)

HP2. For which, if any, of the below reasons is your household unlikely to get a heat pump in the next two years?

[11] Similar types of barriers are noted across various other publications, including National Energy System Operator's (NESO's) Future Energy Scenarios 2025 as well as NESO's Decarbonising Heat Consumer Choice and Affordability survey.

Other low carbon technologies

As shown in Figure 2.8, perceived purchase cost is one of the key barriers to uptake across solar panels, home battery storage and smart heating controls, indicating that affordability will be key in increasing take-up. In addition, lack of knowledge is a considerable obstacle for adoption for many, especially for newer technologies such as home battery storage.

Figure 2.8: Top 6 reasons for why household does not have solar panels, home battery storage or smart heating controls

	Cost of purchase/ installation/use	Don't know enough about it	Not suitable for home	Haven't got round to it yet	Difficult to install/adopt	Not suitable for lifestyle
Solar panels	48%	11%	24%	6%	6%	3%
Home battery storage	29%	38%	17%	5%	5%	5%
Smart heating controls or TRVs	19%	25%	11%	16%	4%	7%

Base: Those who do not have solar panels (n=3866), home battery storage for electricity (n=4165), smart heating controls (n=3259). Horizontal percentages are shown.
Q7. For which of the following reasons does your household not have: Solar panels/home battery storage for electricity/smart heating controls?

Other data sources, such as DESNZ Public Attitudes Tracker on heat and energy use in the home,[12] have identified similar barriers, including the cost of installation as the main common barrier. This stresses the imperative to tackle affordability and suitability issues to increase take-up.

This question also revealed that 16% said they intend to install smart heating controls or TRVs but had not got round to it yet. Approximately one in twenty said this about solar panels (6%) and home battery storage (5%) too.

2.1.6 Smart meter adoption

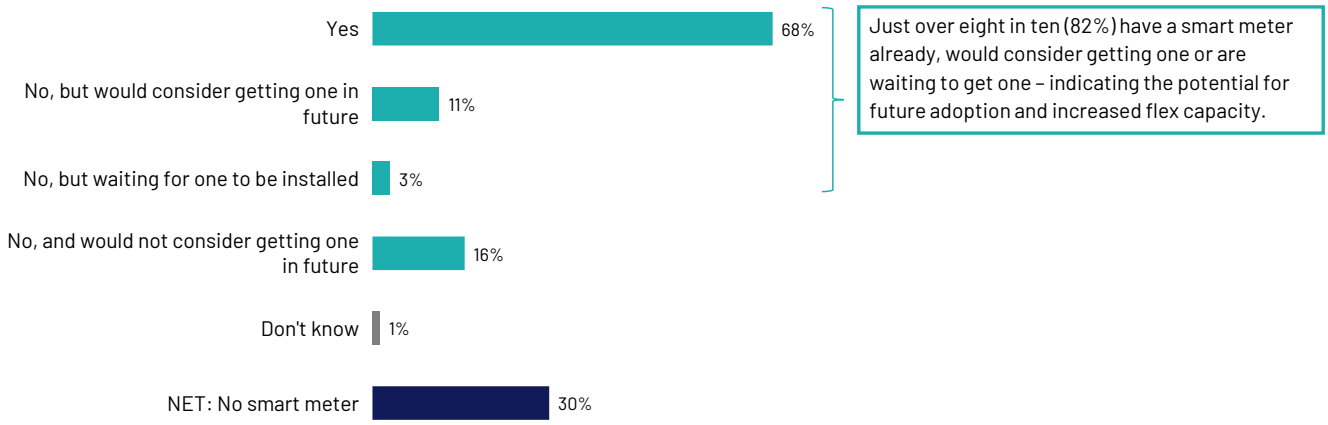
All energy suppliers must aim to install smart meters in every home in Great Britain.[13] Smart meters can put consumers in control of their energy use, allowing them to adopt energy efficiency behaviours that can help save money on consumer energy bills and offset price increases.

The proportion of households who say they have smart meters continues to grow. Two-thirds of survey respondents (68%) say they have a smart meter, in line with government's official

[12] DESNZ Public Attitudes Tracker 2024 on heat and energy use in the home https://www.gov.uk/government/statistics/desnz-public-attitudes-tracker-winter-2024/desnz-public-attitudes-tracker-heat-and-energy-use-in-the-home-winter-2024-uk
[13] Ofgem, Get a smart meter Get a smart meter | Ofgem, accessed 25 March 2026.

estimates[14] . A further 14% say they would consider getting one or are waiting for one to be installed, indicating possible future adoption and increased flex potential (Figure 2.9). In total, 82% either have a smart meter, would consider one, or are awaiting installation, indicating continued growth potential.

Figure 2.9: Whether household has a smart meter



Base: All respondents (n=4385)
Q9. Does your household have a smart meter?

Homeowners, whether owning outright or with a mortgage, were more likely to say they have a smart meter (71%) compared to the average (68%).

One in five (16%) say they do not have a smart meter and would not consider getting one in the future. The following demographic groups were more likely than average to say they would not get one in the future:

- Those aged 45 and over: 45-54 (19%), 65-74 (21%), and particularly those 75+ (22%).
- Lowest household income groups (up to £25,999 annually) (18%).
- Those less likely to use low carbon technologies in the future: 19% of those unlikely to get an EV in the next two years, 18% of those unlikely to get a heat pump in the next two years, and 26% of those unlikely to switch to a Time of Use tariff in the next two years.

2.1.7 Time of Use tariffs

Time of Use tariffs are envisaged to play a role in the energy transition by encouraging consumers to use electricity when grid demand is lower, or generation from renewable sources

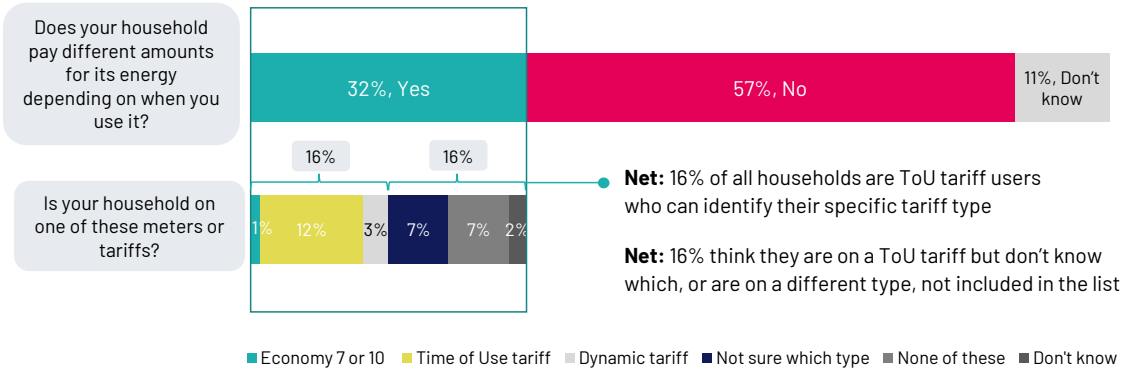
[14] DESNZ, Smart Meter Statistics in Great Britain: Quarterly Report to end December 2025: Q4_2025_Smart_Meters_Statistics_Report.pdf. Accessed 25 March 2026

is higher. They do this by sending a price incentive to consumers, with lower prices at off-peak times.

However, the survey results clearly indicate that understanding and use of Time of Use tariffs is mixed. Almost a third (32%) said they thought that the cost of their energy varies depending on when they use it (Figure 2.10). However, only half of these (16% of the total sample) could identify a specific Time of Use product that they think their household is on, when shown a list (Economy 7/10, Time of Use, or Dynamic tariff). The other half (another 16% of the total) could not name a specific type (selecting "none of these") or did not know which one. This could indicate a lack of understanding around Time of Use tariffs, while it is also possible some of these consumers engage with novel tariff propositions such as energy saving sessions which some energy providers offer.[15]

It is likely that the 16% of the survey respondents who say that they are on a Time of Use tariff and can identify their specific tariff type is a more accurate estimate of the proportion who are on a Time of Use tariff. Among electric vehicle users, this rises to 53%.

Figure 2.10: Households reporting time-variable energy pricing



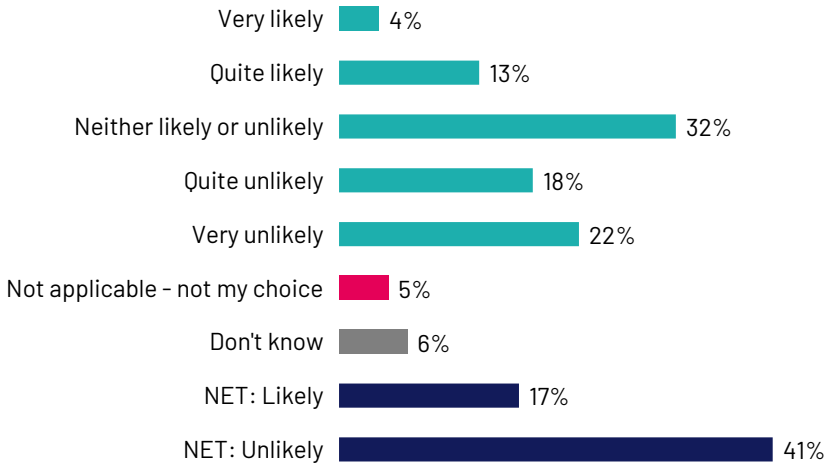
Q10a. Does your household pay different amounts for its energy depending on when you use it? Base: All respondents (n=4385)

Q10b. Is your household on one of these meters or tariffs? Shown to those who pay different amounts for energy depending on time of day/week (n=1369), but based on all respondents (n=4385)

There is still work to be done to increase the uptake of Time of Use tariffs. Although around half of households (49%) agree that using a tariff with off peak and peak rates would save them money (Figure 2.12), only 17% of those not currently on a Time of Use tariff say they are likely to switch in the next two years (Figure 2.11).

[15] Some energy suppliers are now offering novel tariff propositions where consumers are rewarded for shifting their electricity consumption to different times of day, or different days of the week, without changing their underlying tariffs. In some cases, these are linked to the National Energy System Operator's Demand Flexibility Service: https://www.neso.energy/industry-information/balancing-services/demand-flexibility-service-dfs. For more information on these novel tariff propositions, refer to LCP Delta's Beyond Tariffs report: https://www.lcp.com/en/insights/publications/beyond-tariffs-gb-household-flexibility-market-monitor.

Figure 2.11: How likely household would be to change their energy tariff to a Time of Use tariff in the next two years

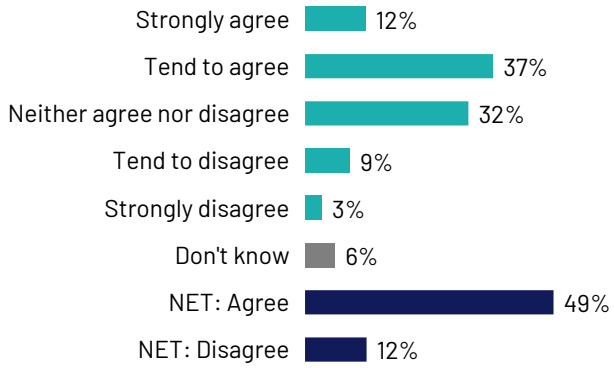


Base: Those who are not on Time of Use tariffs (n=3713)
TOU1. How likely is your household to change your energy tariff to a Time of Use tariff in the next two years?

Around two fifths are unsure of whether switching to a Time of Use tariff would save them money (32% neither agreed nor disagreed and 6% did not know), and 41% see switching to Time of Use in the next two years as unlikely. Taken together these suggest the need for clearer information and reassurance on the benefits of switching to Time of Use tariffs. Those already on Time of Use tariffs are much more likely to agree they save money (76% v 49% on average), as are existing users of low carbon technologies such as EVs (72%), batteries (71%), heat pumps (59%), solar panels (58%), and smart heating controls (55%). Those unlikely to switch to Time of Use tariffs (22% v 12% on average), those unlikely to get an EV (13% v 12% on average) or those unlikely to adopt a heat pump (13%) are more likely to disagree that a Time of Use tariff would save money.

Figure 2.12: To what extent agree that using a Time of Use tariff would save/saves money

"Using a tariff with off peak rates when energy is cheaper and peak rates when energy is more expensive at certain times or days of the week would save/saves my household money."



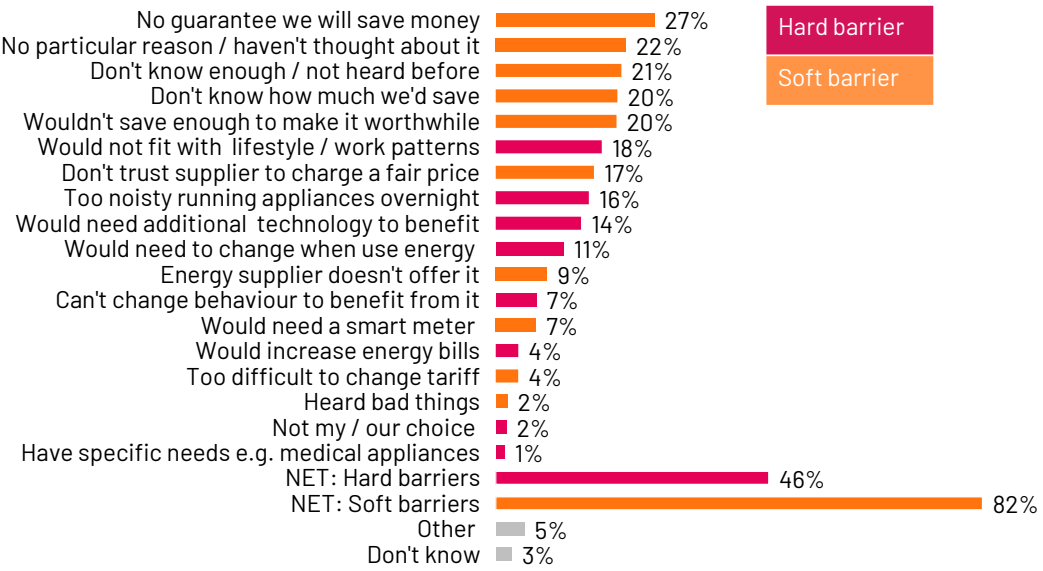
Base: All respondents (n=4385)
TOU3. Using a tariff with off-peak rates when energy is cheaper and peak rates when energy is more expensive at certain times or days of the week would save/saves my household money.

Barriers to switching to a Time of Use tariff

Among the 41% of households unlikely to switch to a Time of Use tariff, the main barriers are uncertainty about guaranteed savings (27%), inertia (no particular reason or have not thought about it before, mentioned by 22%), lack of awareness and understanding (21%), and perceived insufficient savings to make it worthwhile (20%) (Figure 2.13). Lifestyle and work pattern fit (18%), lack of trust in supplier charging a fair price (17%), concerns about overnight noise if running appliances then (16%), and the need for additional technology or behaviour change also play a role (14%). Overall, nearly half of those (46%) unlikely to switch cite what can be considered 'hard' barriers. Even among those likely to switch, inertia is evident, with "no particular reason" (31%) and uncertainty about potential savings (26%) commonly mentioned as reasons for not having done so yet.

Given the range of barriers mentioned to switching to Time of Use tariffs, it is important to ensure there are attractive Time of Use offers available to consumers who may be interested to switch to one.

Figure 2.13: Reasons for why a household is unlikely to switch to a Time of Use tariff in the next two years



Base: All those unlikely to switch to a Time of Use tariff (n=2770)

TOU2. For which, if any, of the below reasons is your household unlikely to switch to a Time of Use tariff in the next two years?

2.1.8 Role of automation

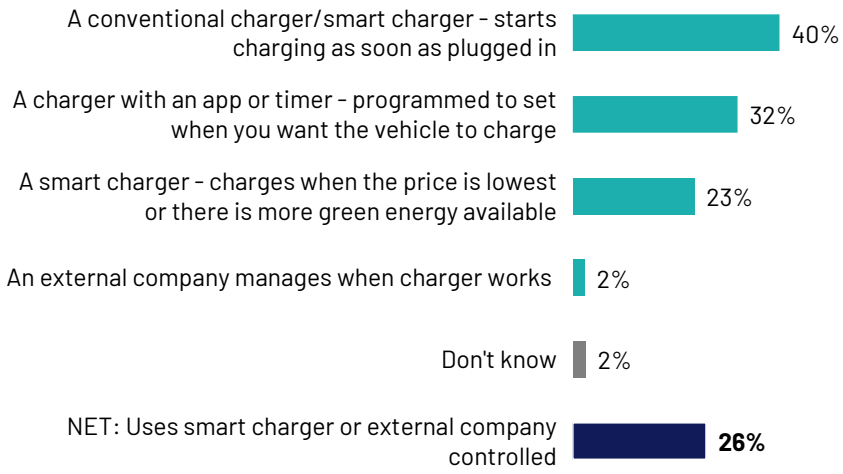
Harnessing the power of automation can help consumers overcome lifestyle barriers to shift consumption patterns from peak time to off-peak. However, survey findings suggest that many consumers are not yet ready for external management of EV charging, or their home heating where the supplier could manage heating times and/or adjust the thermostat by one or two degrees.

Current role of automation

An electric vehicle smart charger connects to the internet and allows the user to charge their car depending on the cheapest time to use energy. Based on the survey, EV charging infrastructure at home already supports automation given how widespread smart chargers are, but behaviours are mixed. Around three in five EV users (63%) say they use a smart charger at home, while around three in ten (29%) use a conventional charger without internet connectivity. Despite many having the opportunity to schedule their charging activity based on when the energy is the cheapest, 40% of EV users say their main approach is to start charging as soon as they plug in, rather than scheduling for cheaper or greener off-peak periods. About a third (32%) say they programme charging with a timer, and nearly a quarter (23%) say they use a smart

charger mode that automatically charges when prices are lowest or when more renewable electricity is available (Figure 2.14).[16]

Figure 2.14: Main method of charging household's electric vehicle



Base: Those with an EV (n=398)
EV5b. Which of these best describes your household's main method for charging your (main) electric vehicle?

External company management of charging is still uncommon with just 2% of those with an EV saying that an external company manages when their charger works. Among those mainly using smart chargers, most say they rarely override their settings (41% do so once a month or less) and two in five (39%) say they never override them, suggesting that, when set up, automated charging can run with minimal friction.

In addition to investigating views on automation for EVs, we also considered automation in home heating.

Potential future role of automation

All respondents were asked about how comfortable or uncomfortable they would feel about a company managing when their home heating switches on and off, or when their electric vehicle charges (if their household would get one in the future, in the case of current non-users). The question was preceded by an explanation of how this would work (captured in Table 2.1).

[16] There are no official statistics available for how many EV owners engage in smart charging, but NESO estimates that around 25% of EV users do so which aligns with the FANZ estimate. https://www.neso.energy/document/364541/download

Table 2.1: Question framing used for capturing respondents' views on a company managing home heating or EV charging on household's behalf

"With your agreement, some home appliances could be linked to a company like your energy supplier in the next few years. The company would remotely manage when these appliances run, within the conditions you set. Allowing them to do this automatically could lower your energy costs and help reduce carbon emissions by shifting your energy use to off-peak times.

For example, this could include:

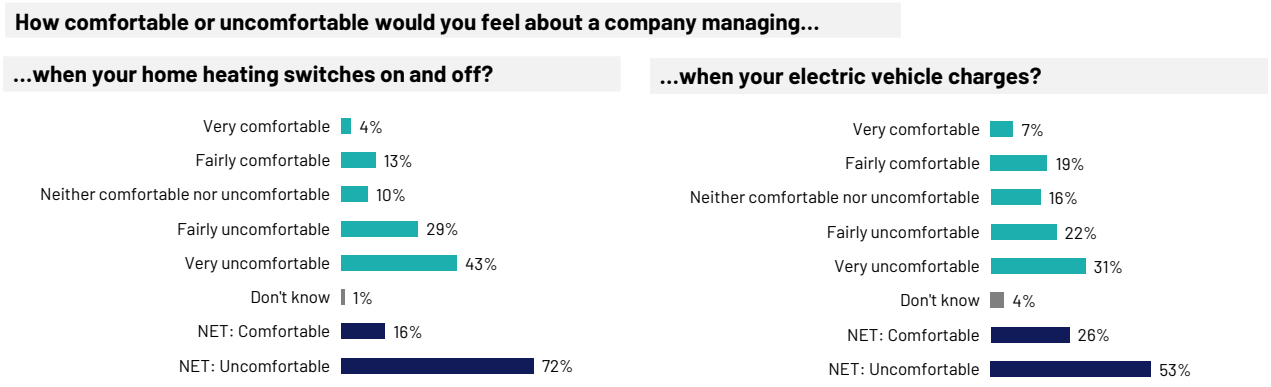
- Heating: The supplier could manage heating times and/or adjust the thermostat by one or two degrees. For example, they could turn the customer's heating on when the cost of energy falls. The customer could still control it manually through their heating controls.
- Electric Vehicles: If a customer has an electric vehicle, the supplier could manage charging times to when energy is cheaper. The customer could still charge manually or set it to charge through their own timer or app.

This could reduce the customer's energy bills by helping them to use energy at times when it is cheaper, and could reduce the carbon emissions produced by the UK energy system.

How comfortable or uncomfortable would you feel about a company managing each of the following on your household's behalf within the conditions you set?"

Consumers are generally uneasy about third parties automatically controlling household energy use, even within parameters they set. Comfort is higher for EV charging than home heating but still far from universal: 26% would feel comfortable and 53% would feel uncomfortable. At the same time, only 16% say they would feel comfortable with a company managing when their home heating switches on and off, while 72% would feel uncomfortable (Figure 2.15).

Figure 2.15: How comfortable would feel about a company managing when home heating switches on and off or when electric vehicle charges



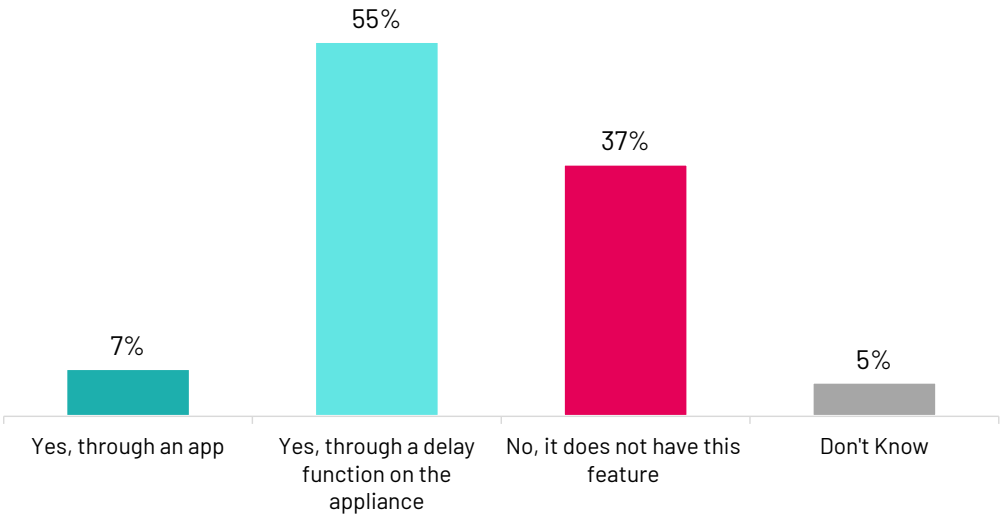
Base: All respondents (n=4385)
Q12. How comfortable or uncomfortable would you feel about a company managing each of the following on your household's behalf within the conditions you set?
S1. When your home heating switches on and off
S2. [IF EV USER = 1] When your electric vehicle charges [IF NON-EV USER] When an electric vehicle your household uses charges, if your household got an electric vehicle in the future

Existing engagement with digital appliances measuring energy consumption appears to increase openness to automation: smart meter users (18% compared with 16% on average) and those who say that they are on Time of Use tariffs (26%) are more likely to express comfort with external heating management. In addition, a majority of EV users (55%) say they would feel comfortable with a company managing when their vehicle charges, compared with 24% who do not use one.

Current ability to delay washing cycles

There is meaningful, practical headroom for automated or scheduled load shifting in everyday appliances. A majority of washing machine users report they can already delay a wash, either through a built-in delay function (55%) or via an app (7%) (Figure 2.16). However, 37% say they do not have this feature and a further 5% are unsure whether their appliance has it.[17]

Figure 2.16: Whether household's washing machine or combined washer/dryer have a way to delay running it after loading



Base: Those who have a washing machine/combined washer/dryer (n=3874)
APP2. Does your household's washing machine or combined washer/dryer have a way to delay running it after loading (e.g. through an app or delay function)?

Perceived access to the capability to delay a wash is uneven. The following groups are more likely to say their washing machine does not have a delay feature: older adults aged 65-74 (39%) and 75+ (51%), renters (private (45%) or council (46%)), lower income households (those with annual income up to £25,999 (47%) or £26,000-£51,999 (41%)), those claiming housing benefit (58%), those not in fulltime work (42%), and those who are digitally excluded (62%). This points

[17] It is likely that many of these having washing machines with a delay start function but are unaware of it.

to a risk that automation enabled flexibility could widen disparities unless enabling features are widely available or known about and easy to use.

Overall, the building blocks for automation enabled flexibility are present but not yet fully activated. Comfort with automation is higher among consumers already engaged with smart technologies and time based tariffs, and many households are aware of practical means to schedule usage. However, broad discomfort with external control and uneven access to enabling features among different consumer groups point to uncertainty on the potential role of automation in the short-medium term.

2.2 What is the likely willingness and ability to flex energy consumption?

2.2.1 Overview of findings

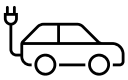
- Most EV users report that they are already charging off-peak, and the majority of those who are not report willingness to do so. As the market grows, it will be important that all EV users are able to take advantage of off-peak charging.
- Amongst those who have a heat pump, pre-heating is not standard practice at present, so there is a large opportunity to encourage flexibility among early adopters.
- Washing machines offer immediate flexibility potential, and Time of Use tariffs have potential to further support flexibility. Wider consumer engagement could be activated by simplifying Time of Use tariff structures to be easily understood and acted upon alongside wider awareness and adoption of smart technology (or delay functionality). This could help overcome consumers' key barriers to flexible laundry behaviours.
- Those most at risk of being left behind are low-income households who face cost, property or tenure barriers that limit uptake of low carbon tech, smart tariffs and automation. Yet many low-income households in the smart meter sample report some flexible behaviours which may be driven by circumstances or (perceived) cost savings. These could be built on amongst their counterparts to further drive behaviour change.
- These findings point to some key learnings on enabling consumer led flexibility:
    - There is an opportunity to activate further flexibility with existing technologies though communication and promotion of flexible use practices and their benefits, particularly washing machines which are common-place, and
    - There is also a significant role for market facilitation to enable easy and convenient engagement with flexibility. This includes providing supporting infrastructure and market conditions.

2.2.2 Key definitions

Technologies of interest

The survey explored consumers' current reported energy-consuming behaviours and their potential to shift electricity use to off-peak periods across three technologies: heat pumps, fully electric vehicles (EVs) and washing machines. Given constraints on survey length, these three technologies were selected to represent distinct flexibility opportunities across the domestic sector at different stages of market maturity and energy intensity:

Washing machines are widely used (88% use one in their home). While they consume less energy per use, their widespread adoption makes them significant for system-wide flexibility.



EVs are considered an emerging technology with 8% usage at home according to this survey, consuming high amounts of energy per household.

Heat pumps are a nascent technology, with just 3% saying they use one in this survey. They represent medium energy consumption, primarily for space heating.

Peak and off-peak energy consumption

Peak times are when energy demand is at its highest. For example, there is an evening peak when many people are getting home from work, cooking dinner, or watching TV. Off-peak times are when there is less demand for energy. In this study, peak times are defined as between 8am and 11am or between 4pm and 10pm, while off-peak times are defined as between 10pm and 8am or 11am and 4pm. This definition follows the Electric Vehicles (Smart Charge Points) Regulations 2021. Note that definitions of peak-time tariffs can vary in the retail market. The survey asked respondents what time of the day their household usually (as relevant) charges their EV, runs their heat pump during winter or runs the washing machine. This was used to determine whether their use falls on peak or off-peak times.

Willingness to shift energy use to off-peak

Following this, respondents were asked what proportion of this energy use they would be willing and able to move to 'off-peak' times, either to save money or to reduce grid demand.[18] An example of the question wording can be seen below (Table 2.1).

[18] As explained in a later section, questions in relation to willingness to save money were asked in relation to all three technologies (washing machines, EVs and heat pumps) while willingness to reduce grid demand was only asked in relation to washing machines.

Table 2.1: Question framing used to ask about willingness to shift energy use to off-peak

The typical cost of charging an electric vehicle at home for one hour is £1.80. Imagine the cost was reduced by 80% to 35p during 'off-peak' times (between 10pm – 8am or 11am – 4pm). For a household that charges their electric vehicle for 8 hours twice a month during off-peak times, they would save £300 a year.

What proportion of energy you currently use to charge your electric vehicle at peak times would your household be willing and able to move to 'off-peak' times?

1. All of it (100%)
2. Almost all of it (more than 75%)
3. Most of it (about 50-75%)
4. Some of it (more than 25%, but less than 50%)
5. A bit of it (less than 25%)

Barriers to adoption

As already discussed in section 2.1.3 (Barriers to uptake), respondents were also asked about reasons for why they have not adopted each technology. For the consumer typology introduced in the next section, these reasons were classed as:

- **Hard barriers:** broadly defined as structural, material constraints such as cost, infrastructure, and property limitations, as well as factors that may feel hard to consumers (such as their routines and needs) or
- **Soft barriers:** defined as more attitudinal knowledge barriers such as lack of awareness, preferences, and perceptions.

This classification is inspired by the Individual, Social and Material approach[19] to influencing behaviours, originally developed by the University of Manchester for the Scottish Government. Soft barriers are not necessarily easier to overcome than hard barriers, and they can work together to reinforce the hard barriers to behaviour change. However, where consumers only identify soft barriers to behaviour change they may find it easier to adopt the technology into their existing lifestyles.

2.2.3 Classification framework: Consumer typology

To understand different types of consumers across these three technologies, a classification framework was applied to categorise each survey respondent based on two key dimensions:

[19] https://www.gov.scot/publications/influencing-behaviours-technical-guide-ism-tool/ Accessed on 18 November 2025

- Their current use/ behaviours for the three key technologies; and their willingness to shift use to off-peak, and
- Barriers to adoption of these key technologies for those who do not have these technologies

Together these created the following typology groups[20].

Core typology segments:

1 **Have technology and able and willing to flex** Households that have the relevant technology, and either already use/charge during off-peak times only or would be willing/ able to shift more than 25% of their usage to off-peak periods.

2 **Have technology but not able or willing to flex** Households that have the relevant technology who use/charge technology during peak times and said they are unable or unwilling to shift their usage patterns or would only consider minimal adjustments (25% or less).

3 **Do not have technology due to hard barriers** Households without the technology who face any 'hard' barriers to future adoption.

4 **Do not have technology due to soft barriers** Households without the technology who report only 'soft' barriers to future adoption or have answered 'don't know' without mentioning any hard barriers.

Residual groups:

5 **Have technology but willingness to flex unknown** Households that have the relevant technology but whose flexibility potential cannot be determined. Their usage patterns vary, are unknown, or they are unable/unwilling to say whether they are willing/able to shift energy use.

6 **Do not have technology and barriers unassessed** Households whose barriers to adoption could not be evaluated because they indicated the decision was not

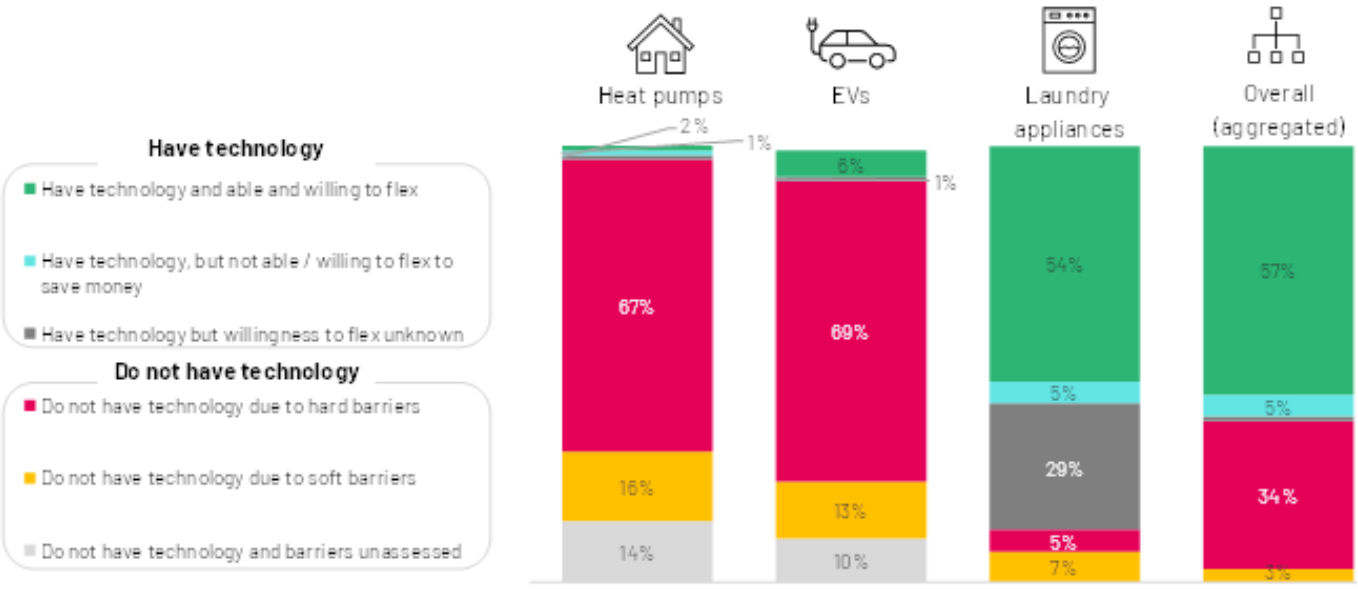
[20] This typology employs a hierarchical, rule-based classification system where each respondent is assigned to one mutually exclusive category per technology based on their survey responses. The classification prioritises current behaviour over stated intentions, and hard barriers over soft barriers. Unknown or ambiguous responses result in classification to "unassessed" categories to maintain analytical integrity.

theirs to make (e.g. renters) or they did not know their likelihood of adoption. This category only applies to heat pumps and EVs.

Groups 1-4 represent the core typology segments, capturing respondents with clearly defined relationships to each technology – either as current users with known flexibility attitudes or non-users with identifiable barriers. Groups 5 and 6 serve as residual categories for respondents whose flexibility potential or barriers could not be fully assessed because of variable usage patterns, 'don't know' responses, or survey routing logic. Further details on how respondents were classified is included in the annex (Table 3.1: Classification of typology segments by technology).

Respondents were classified in each of the six groups based on their use of each technology. In addition, an overall, aggregated category was created which brought together segments across all technologies. Differences in usage largely drive the typology distribution across the groups (Figure 2.17). The proportion of all households who both use the technology at home and are able and willing to flex their energy use is 54% for washing machines, 6% for EVs, and 2% for heat pumps which mirrors their relative reported prevalence in the survey.

Figure 2.17: Typology overview by technology and overall, by proportion of all households



Base: All respondents (n=4385)

Note on typology groups: The segments shown are composite groups created by combining respondents' answers to a variety of survey questions and specific answer responses to build a picture of their relationship with each technology. Each taxonomy draws on current usage, usage patterns, willingness to flex and barriers to adoption. The aggregate was compiled by assigning each respondent to the category in which they were most likely to be able and willing to flex.

2.2.4 Current users: Willing and able to flex

The next sections will look at the current technology users' willingness and ability to flex.

2.2.5 Washing machines: most immediate potential

As a mature technology, washing machines unsurprisingly form the largest flexible segment in the typology classification: 54% of all respondents say they have a washing machine or combined washer/dryer are able and willing to flex their energy use (Figure 2.17). Washing machines therefore demonstrate the highest potential for widespread participation at present, across all technologies examined.

This group of flexible users divides into two distinct behavioural patterns:

- **Those who already only run their washing machine off-peak**: 21% of those who use a washing machine at home report exclusively running them during off-peak times (10pm-8am or 11am-4pm).

Those who currently run their washing machine at peak times but are willing to shift: 40% of those who have a washing machine at home said they run it during peak times but express willingness to shift more than 25% of their usage to off-peak periods based on estimated annual savings of £10.40 and/or to reduce grid demand.

As this and the later flexibility potential analysis draw on consumers' stated willingness and ability to shift usage, the findings should be interpreted with caution. The difference between the share who say they already run wash loads exclusively off-peak and the larger share who say they could shift more than 25% of their washing highlights an intention–behaviour gap.[21] As a result, stated willingness may overstate how much load-shifting would be realised in practice. Willingness to shift washing machine use to off-peak periods was assessed through two survey questions exploring different motivational framings. One framing of the question asked peak time washing machine users about their willingness to shift more of their usage for an estimated annual saving of £10.40 (shown in Table 2.2).

Table 2.2: Question framing used to ask about willingness to shift wash loads to off-peak to save money

"The average cost of electricity for a wash cycle is 40p. Imagine the cost was reduced by half to 20p during 'off-peak' times (between 10pm – 8am or 11am – 4pm). For a household that does one wash load per week off-peak, they would save £10.40 a year. What proportion of your wash loads that you currently do at peak times would your household be willing and able to move to 'off-peak' times to make these savings?"

The second framing asked about their willingness to shift the same proportion to reduce peak energy demand in a hypothetical high-demand scenario. This framing represents a more

[21] The intention-behaviour gap is the difference between what people intend to do and what they actually do.

altruistic, system-benefit motivation. This dual-question framing was unique to washing machines in the survey questionnaire.

Table 2.3: Question framing used to ask about willingness to shift wash loads to off-peak to reduce grid demand

"Imagine a scenario when there would not be enough energy being produced to meet everyone's energy needs at peak times without turning on additional power stations (e.g. gas fired stations).

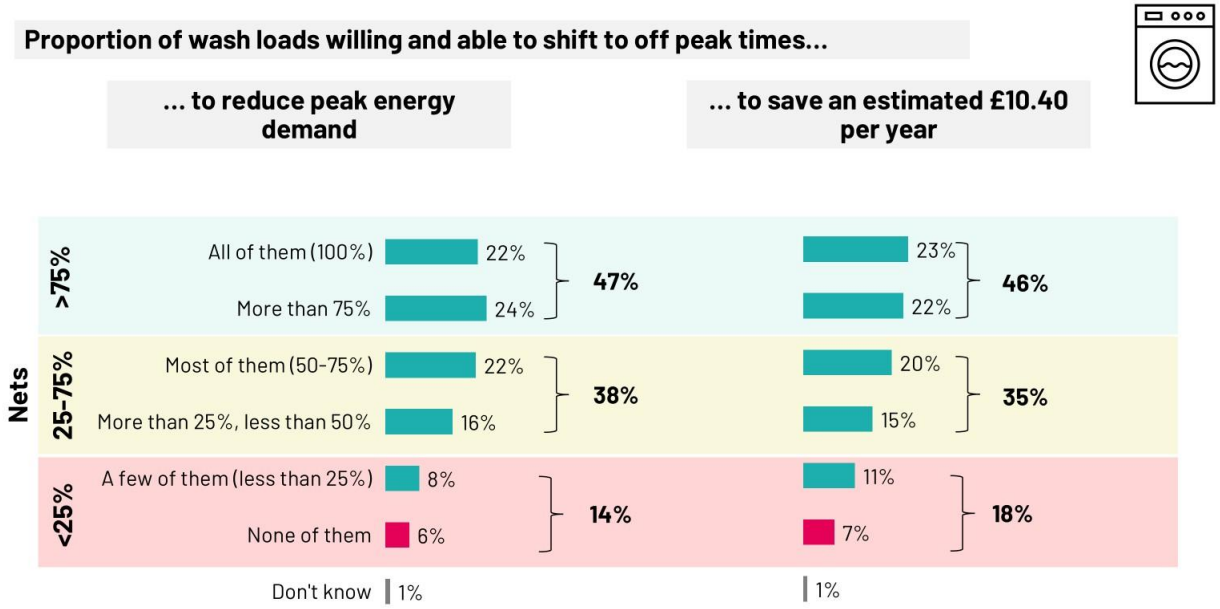
If households reduced their energy usage during days with the biggest shortages (up to 9 different days across the year), it could mean that these do not need to be turned on at all to meet energy needs.

One way in which your household could reduce its energy use during peak times would be to use your washing machine 'off-peak' (between 10pm – 8am or 11am – 4pm) rather than at peak times.

If you were asked to, what proportion of your wash loads over a year would your household be willing and able to move to 'off-peak' times on these days?"

While actual money savings could be higher depending on household washing frequency, they would likely remain modest even at maximum shift potential. Among peak time users, 85% were willing to shift more than 25% of usage to reduce peak grid demand, while 81% were willing to do so for the £10.40 annual saving (Figure 2.18 below). This marginal difference in the results by framing suggests that current willingness may be driven by factors beyond the specific framing such as practical constraints or existing predisposition to flexibility. In addition, the level of incentive is likely to influence respondent's views heavily, as the annual £10.40 saving mentioned is quite modest. Nonetheless, these findings suggest that the potential to avoid the use of additional power stations (such as gas fired stations) could be a powerful intrinsic motivation for consumers to shift their energy consumption to off-peak times.

Figure 2.18: Proportion of wash loads willing and able to shift to off-peak times



Base: Those who run washing machine/combined washer/dryer at peak times (n=1755)
APP4. If you were asked to, what proportion of your wash loads over a year would your household be willing and able to move to 'off-peak' times on these days?
APP3. What proportion of your wash loads that you currently do at peak times would your household be willing and able to move to 'off-peak' times to make these savings?

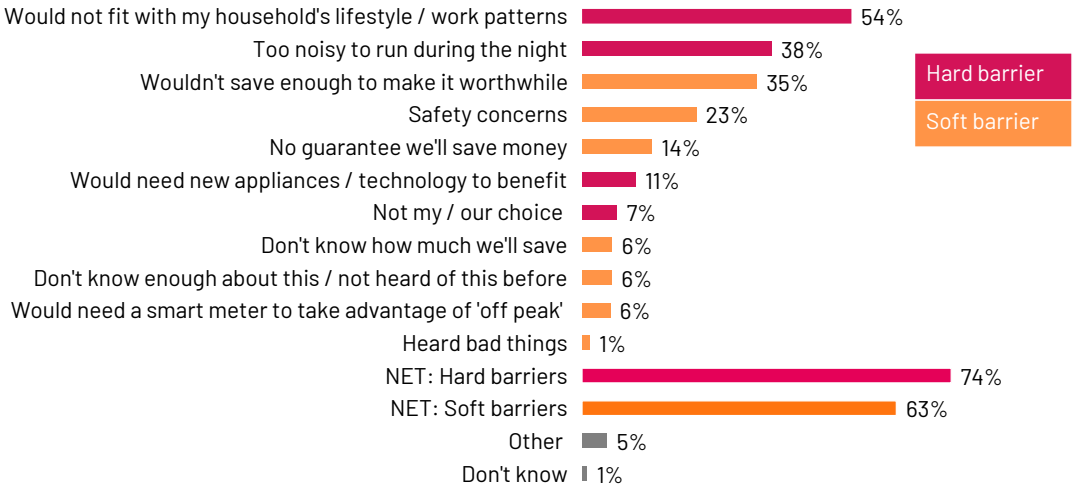
The following groups were more likely to indicate that they are willing/able to flex: older adults aged 65-74 (60% compared with 54% on average), women (58%), those not working full-time (57%), and smart meter users (56%). There are no clear differences in profiles for the 5% who are not willing or able to flex or the 29% for whom willingness to flex is unknown.

Implications for flex potential

As discussed in section 2.1.6 (Role of automation), the infrastructure for greater flexibility already exists in more than half of homes with 58% of washing machine users reporting to have delay functionality built into their appliances (55% via delay buttons, 7% via apps). This suggests that many of those willing to shift their washing appliance use to off-peak times could readily do so using existing delay functions or technology if safe and practical to do so.

Resistance to laundry flexibility is minimal with only 5% of those who have a washing machine stating that they are unable or not willing to shift 25% or more off peak. Barriers to shifting off-peak are predominantly practical: incompatibility with household routines and work patterns (mentioned by 56%), perceptions that financial savings are insufficient to justify change in habits (38%) and noise concerns affecting neighbours or sleep (Figure 2.19).

Figure 2.19: Reasons limiting household's ability to shift washing machine use to off-peak times



Base: Those who could shift less than 25% of washing machine / combined washer/dryer use to off-peak times to save money or to reduce peak demand (n=365)

APP5. It sounds like your household may find it difficult to shift when you run your washing machine/wash cycle to 'off-peak' times. Which, if any, of the following reasons limits your household's ability to switch some or all of your energy consumption for running your washing machine/wash cycles to 'off-peak' times?

NB. This question was asked both in relation to financial savings and for reducing grid demand. This chart is presenting the findings for the former version. However, patterns of responses are very similar across both questions.

In addition, 23% have noted safety concerns. There may be legitimate safety concerns with leaving washing appliances to run unsupervised. It is therefore important for consumers to consult their product's safety guidelines and only consider shifting consumption to off-peak times when it is safe to do so.

2.2.6 Fully electric vehicles: good existing practice with further potential

While EV users represent a smaller share of respondents (8% currently say they have an EV in their household), the majority of them are already flexing or are willing to do so. Taken together, the survey estimates that 6% of all respondents have an EV and are classified as willing to flex (Figure 2.17).

The current charging behaviour already aligns with off-peak times and where it does not, there appears to be willingness to shift:[22]

- **Off-peak only chargers**: 63% of EV users say they charge their car exclusively during off-peak times.

[22] Note that this analysis includes a minority of EV users who say they mainly charge their vehicle away from home.

- **Peak chargers willing to shift**: Out of those who charge at peak time, 31% said they are willing to shift between 25% to 75% of their charging to off-peak, and over half (56%) said they could shift most of their charging (75% or more).[23]

EV users who charge their EV during peak times and said they could not shift to off-peak were asked about the barriers to shifting, but small sample size (n=5) limits the analysis of findings.

Looking at the overall proportion of EV users who currently charge at peak times but are willing to flex their energy consumption (6% of all surveyed respondents fall into the segment), high-income households have higher than average representation in this group (with 17% of those with an annual household income of £100k+ falling into this group - nearly three times the average of 6%), 8% with an income of £52,000 -£99,999. Other groups more likely to fall into this group include those reporting they are already on Time of Use tariffs (23% of those on standard Time of Use tariffs and 26% of those on dynamic tariffs), middle-age groups (9% of 35–44-year-olds, 8% of 45–54-year-olds) and those located in the South East of England (9%). This suggests that flexible EV use is concentrated among affluent early adopters, (mirroring uptake as discussed in section 2.1.2).

Implications for flex potential

Most EV users already report charging off-peak. However, given the significant power load required to charge EVs, there remain significant gains from engaging early adopters who are not yet routinely charging their EVs at off peak times.

As noted in section 2.1.2, 14% of current non-EV users stated they are likely to purchase an EV in the next two years. This projected growth suggests EVs are transitioning from a market of early adopters to an emerging market which may be realised or accelerated as vehicles enter the secondary market and become more accessible to middle and lower-income households. While current adopters' self-reported charging behaviours are mostly already aligned with off-peak times, it is unclear if this pattern will be reflected amongst mainstream users.

2.2.7 Heat pumps: Nascent, optimisable use

Heat pump use is still limited: 3% of all survey respondents say they use one. Consequently just 2% of the survey respondents have a heat pump and fall into the able and willing to flex category. Only 1% of respondents report they have a heat pump but are not able or willing to flex their use (Figure 2.17).

Current energy use behaviours are mixed: 16% of heat pump users said they run their heat pump at off-peak times only. A third (33%) say they use their heat pump at peak times or pre-heat.

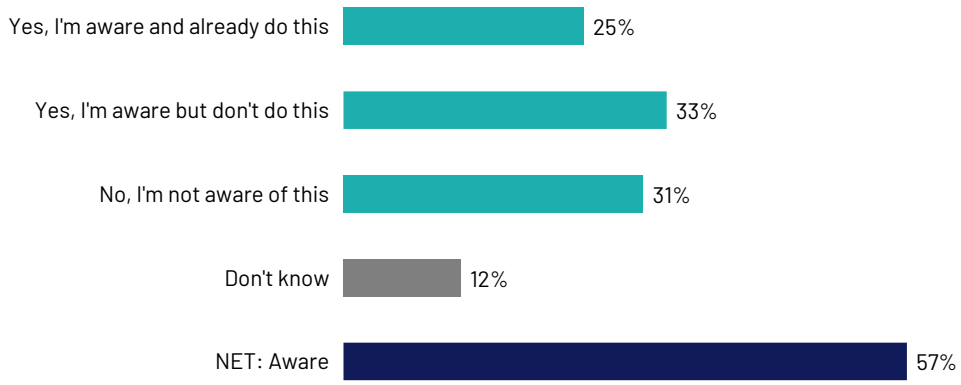
[23] This includes 14% of EV users who say they mainly charge their EV away from home (e.g. at work, place of education or on the public network)

Further to this, just over half (52%) use their heat pump at peak times or constantly but would be willing to shift their energy use to off-peak times. Out of peak time or constant heat pump users, 38% say they would be willing to shift their use to off-peak times.

Due to the low prevalence of heat pump usage, these estimates should be treated with caution and be interpreted as indicative only. Because of the small sample size, reliable demographic profiling of this group cannot be carried out. This may change for the future waves of this survey as levels of usage increase.

Over half of heat pump users (57%) are aware of pre-heating. However, of these, only a quarter (25%) do it at present. Further, 43% are not aware/don't know about pre-heating (Figure 2.20).

Figure 2.20: Whether aware of pre-heating using heat pump and does it



Base: Those who use a heat pump (n=196)
HP7. Are you aware that you can pre-heat your home using your heat pump during off-peak times and pay less (e.g. run your heat pump at 4 – 5am so the house is warm during morning peak times)?

Implications for flex potential

Heat pumps currently show the smallest amount of potential for flexible use though notably, existing users demonstrate mixed flexibility engagement. As discussed in section 2.1.2, growth potential remains more modest for heat pumps with 5% saying that they are likely to adopt a heat pump within two years, suggesting a longer-term flexibility opportunity which may require more substantial policy intervention and awareness-raising to realise.

2.2.8 Non-users: Barriers to adoption

Following the analysis of current technology users and their flexibility patterns, this section examines households without these technologies (focusing primarily on typology classification groups 3 and 4) to identify what kinds of barriers hinder participation, who faces them and what support they may require.

2.2.9 Washing machines

The groups not using washing machines at home are overall small (12% of all respondents): this is made up of 5% who say they do not have a washing machine due to hard barriers (typology classification Group 3) and 7% due to soft barriers (Group 4).

2.2.10 EVs

Hard barriers

As discussed in section 2.1.5 (Barriers to uptake) and shown in Figure 2.5, the key hard barrier for EV adoption is the purchase price, mentioned by 55% of those without an EV. Charging infrastructure limitations and not needing a car in the first place are also frequently mentioned (both by 24%). Even among those likely to adopt in two years, the top reason for not having an EV yet remains purchase price (47%). A fifth (21%) mentioned they don't need a vehicle just yet and 17% cited lack of charge points.

Those in the typology Group 3 who do not use an EV due to hard barriers to future uptake (69% on average) tend to be from middle-income households (74% among those with an annual income between £26k-£52k) and owner-occupiers (71%).

Soft barriers

The most commonly mentioned soft barriers to future uptake among those unlikely to get an EV in the next two years are concerns around range not being far enough (33%), preference for petrol/diesel-powered cars or hybrid vehicles (32%), worries about charging duration (20%) and reliability concerns (19%). Even those likely to purchase an EV in two years cited similar barriers: concerns about range (21%), reliability (12%), and charging time (10%). As costs for EVs fall, it will be important to track the persistent barriers among different groups. No demographic groups were more likely than average to mention these barriers, which shows that they are mainstream in nature and could usefully be addressed across the whole population.

Barriers unassessed

There are certain vulnerability patterns which emerge for those 10% who do not have an EV and whose barriers to adoption are unassessed. Those without an EV and whose barriers are unassessed tend to be low-income households with income under £26k annually (17% compared with 10% on average), prepayment meter users (28%), benefit recipients (19%, with 25% on Universal Credit), those with limiting health conditions (18%), bill payment difficulties (19%), and the digitally excluded (17%). Women also show slightly higher than average representation in this group (12% do not have an EV and their barriers to adoption are unassessed).

2.2.11 Heat pumps

Altogether 67% of all energy users fell into the typology category Group 3, who do not have a heat pump due to hard barriers (Figure 2.17). Further, 16% did not have a heat pump but mentioned soft barriers preventing adoption (Group 4).

Hard barriers

For heat pumps, cost is the key hard barrier, mentioned by 43% of those who do not have a heat pump. The need for additional home improvements (mentioned by 33%) and disruption associated with installation (29%) were also significant hard barriers.

The typology group facing hard barriers to heat pump adoption (Group 3) present a paradoxical profile. They are more likely to be older adults (73% among those aged 55+ compared with 67% on average) and owner-occupiers (74%).

Soft barriers

The most commonly mentioned soft barriers to future adoption of heat pumps among those *unlikely* to get one in the next two years is a preference for their current heating system (mentioned by 27%), followed by not knowing enough about them or having not heard of them before (16%) and having heard 'bad things' (14%). Among those *likely* to get a heat pump in two years, the most mentioned soft barrier to future adoption was the perceived hassle or disruption of installing one (14%).

The typology group who do not use a heat pump due to soft barriers (Group 4) are more likely than average to be owner-occupiers of their accommodation (18% are owner-occupiers v 16% on average), women (18%), households with children (20%), and those in the least deprived areas (20% in IMD quintile 5).

Barriers unassessed

Among heat pump non-users whose barriers could not be assessed (Group 6 in the typology classification), there are some clear signs of reduced agency over heating decisions. This group has disproportionately higher than average share of renters: 43% rent their home (46% in social housing and 40% renting privately compared with 14% on average in this group), whereas only 5% are owner-occupiers. They also show multiple vulnerability markers, with above-average shares of those who receive benefits or tax credits (28%), use prepayment meters (38%), are struggling to pay energy bills (17% struggling, 30% falling behind), and have a health condition that limits daily activities a lot (28%). They also tend to be younger than average; 25% of respondents in this group are aged 25-34 compared with 16% on average.

2.2.12 Implications and actions

Taken together, the evidence in this section shows that willingness and ability to flex are already present in many households, but they are unevenly distributed across technologies and consumer groups. Flexibility is strongest where technologies are mature and familiar.

2.2.13 Near-term

Laundry provides the most widespread near-term opportunity. A sizeable share of households say they already wash off-peak and many peak-time users say they could shift a substantial portion of their use, particularly where delay/timer functions are available. Activation could be supported through raising awareness of the benefits for reducing carbon emissions, and making it easier for willing consumers to engage with flexible use.

Among most electric vehicle users, charging behaviours are broadly aligned with consumer-led flexibility behaviours. However, there remains significant untapped potential, as approximately a third of EV users say they do not charge off-peak, and many are willing to shift. It will also be important to ensure new adopters are enabled to follow these good practices from the outset. To achieve this it could be effective to combine clear time of use price incentives with accessible smart-charging options and straightforward "set-and-forget" defaults (with easy override).

2.2.14 Medium/long term

Heat pumps represent a longer-term flexibility opportunity. Usage remains low and current use is mixed, with some users pre-heating effectively but many running at peak or constantly. Per-home shift potential is higher than for laundry, but system-wide impact will only grow as adoption increases. Realising this will require better integration with Time of Use propositions.

2.3 Flexibility potential

2.3.1 Overview of findings

This section discusses the findings from the flexibility potential analysis. This analysis estimates and scores households' flexibility potential in order to identify which consumer groups have the greatest potential to provide flexible behavioural demand to the electricity system. The findings are intended to help Ofgem understand where flexible demand is most likely to come from and how best to target engagement, incentives and future policy. Specifically, it addresses the research question "**which consumer groups have the greatest potential to reduce or shift their electricity use at peak times?**"

In this study flexibility potential is defined as a household's ability to reduce or shift electricity demand during peak periods in future:

- **High flexibility potential**: household can and is willing to shift substantial kWh by changing the time of the day they choose to use appliances from peak to off-peak.
- **Low flexibility potential**: household has limited amount of kWh that it can shift (due to low or no usage of relevant high demand appliances or because they are already using high demand appliances off-peak already) and/or is unwilling to change the time of the day they choose to use appliances.

It does not take into account any flexible energy usage that the household is already engaged in.

2.3.2 Summary of analytical approach to estimating flexibility potential

A novel approach was developed to calculate an "energy flexibility potential score" for each household that consented to their smart meter data being linked to the survey data (see Figure 2.24 below). This was derived by combining survey responses with energy consumption data.[24]

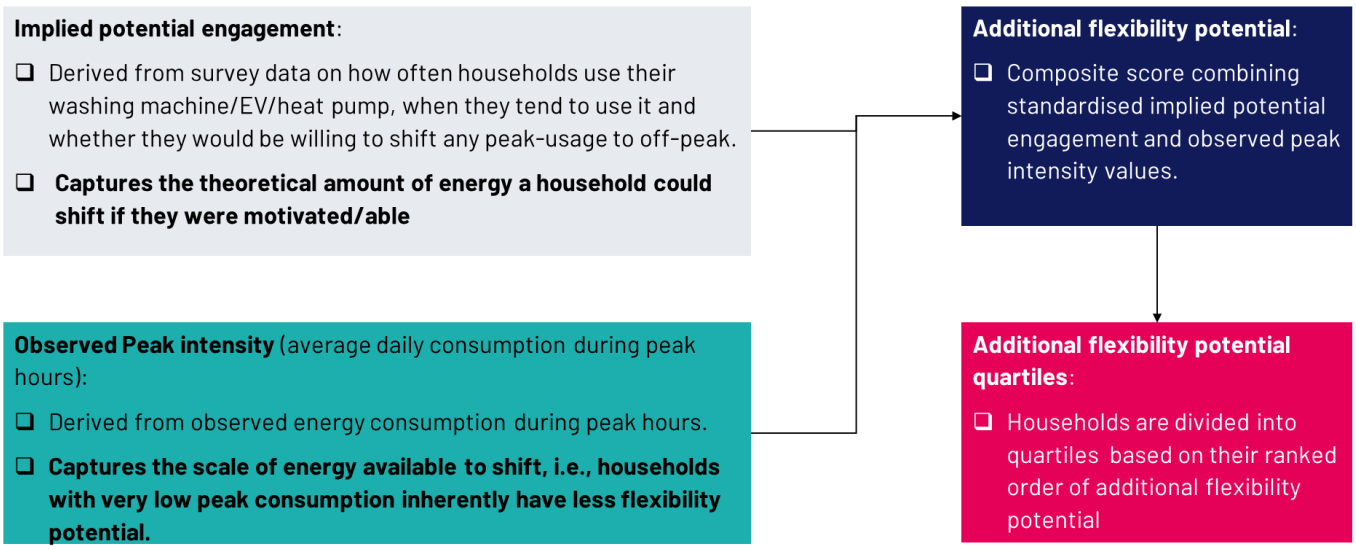
- **Implied potential engagement** (kWh): An estimate of the potential energy (in kWh) that each household could realistically shift to off-peak times in a year was calculated using self-reported appliance and Low Carbon Technology (LCT) usage; an estimate of the energy (in kWh) associated with that use; self-reported data on the share of usage occurring in peak hours; and how much respondents said they could shift to off-peak. The full set of assumptions used to translate usage into flexible potential energy are documented in the technical report.

[24] More detail is provided in the accompanying technical report.

- **Observed peak intensity**: Using half-hourly smart meter data, each household's average electricity consumed during peak hours per observed day (kWh/day) was calculated. By expressing peak consumption as a daily average rather than a total, this measure is robust to differences in data availability across households and allows fair comparison between households with shorter and longer observation periods. Higher peak intensity indicates a larger pool of potential flexibility if usage were shifted.

By including peak intensity alongside implied potential engagement, the measure takes into account consumers' willingness to shift consumption for specific technologies, and adjusts for how intensive their peak-time electricity usage is. Both measures were standardised to limit the influence of extreme values, then combined using weights of 75% (implied flexibility potential) and 25% (peak intensity) to produce a single flexibility potential score. This weighting methodology is justified by considering the relative significance and influence of the two factors in determining flexibility. The willingness to shift electricity use indicates a more actionable behaviour than mere high consumption rates, particularly if consumption is also driven by non-shiftable demands such as essential appliances (fridge/freezer, lights, etc.) or household size. By weighting the implied shiftable electricity consumption more heavily, the scoring emphasises proactive consumer engagement rather than current consumption patterns which may not necessarily translate into flexibility due to fixed or essential energy uses. Households were ranked by this score and survey weights were applied when dividing the population into population-based quartile bands for subsequent analysis.

Figure 2.21: Methodological approach



Although we linked data for 1,085 respondents, results here are based on a clean sample of 733 linked smart meter panellists, where "linked" means survey responses and smart meter data were matched for the same household. More information on the data cleaning protocol is outlined in the accompanying technical report. A comparison of the linked group with the full Smart Meter sample across core socio-demographic variables found it to be broadly representative overall. Two differences are worth noting: the linked sample contained a slightly

higher proportion of men (by six percentage points) and fewer lower-income households (up to £25,000 annual household income; lower by four percentage points, compared to the total sample). These differences should be kept in mind when interpreting the results.

2.3.3 Implied potential engagement

This section presents the analysis of the implied potential engagement which utilises survey data on how often households use their washing machine/EV/heat pump, when they intend to use it and whether they would be willing to shift any peak usage to off-peak to achieve bill savings. Together with estimates taken from recent research[25] on how much energy is consumed by these technologies when used, a measure of flexibility potential energy is estimated. As this is based

Of the three technologies used in this analysis, the greatest total implied flexibility potential when scaled up to the national level currently comes from shifting washing machine use from peak to off-peak periods (see Table 2.4). This is primarily because washing machines are the most widely used technology in the sample and which are often used in peak periods. While the median amount of energy that could be shifted per household is the lowest compared to other technologies covered in this survey (50 kWh), the total estimated amount that could be shifted per year for washing machines for the full GB population is the highest (1400-1500 GWh) because a high proportion of consumers use a washing machine at home. Widespread usage at home means small, easy shifts add up: a median of 50 kWh per household per year is roughly equivalent to moving about one laundry cycle every two weeks from peak-time to off-peak. By contrast, the maximum amount of energy which could be shifted per household per year is associated with electric vehicles, which are the most energy-intensive of the three technologies.

The flexibility potential estimates presented here should be interpreted as indicative of the scale of domestic flexibility, rather than as precise forecasts. They are derived from a combination of observed consumption data and survey responses to hypothetical questions, and necessarily rely on assumptions about how consumers might behave in practice.

Table 2.4: Estimated implied flexibility potential per technology

	Washing machines	Electric vehicles	Heat pumps
Proportion of sample that say they use this technology*	88%	8%	3%

[25] Full details of the assumptions used and the sources where these were derived are provided in the accompanying technical report.

Proportion of sample who have the technology and report they are already using at off-peak times**	21%	63%	16%
Median amount of energy which could be shifted from peak to off-peak (per household / year)***	50 kWh	0 kWh	200 kWh
(Absolute) Maximum amount of energy which could be shifted from peak to off-peak (per household / year) found across the survey of participants***	550 kWh	1450 kWh	650 kWh
Total amount of energy which could be shifted from peak to off-peak per year – full GB population*[26]**	1400-1500 GWh	175-225 GWh	125-175 GWh

* Base: All respondents (n=4385)
** Base: Washing machines: Those with a washing machine (n=3523). Electric vehicles: Those with an electric vehicle (n=305). Heat pumps: Those with a heat pump (n=138).
*** Base: Washing machines: Those with a washing machine, who know how many washes they complete a week, who know when they use their washing machine, and who know how much they would be willing to shift (n=2615). Electric vehicles: Those with an electric vehicle, who know how many times they charge a week, who know when they charge their electric vehicle, and who know how much they would be willing to shift (n=240). Heat pumps: Those with a heat pump, who know how often they use their heat pump, when they use it, and who know how much they would be willing to shift (n=95).

Among those who already have an EV and charge at home, there is limited additional flexibility potential, as most charging already occurs during off-peak hours. The median of 0 kWh is due to the fact that more than half of those with an EV are already charging off-peak. This suggests little further shifting potential from home EV charging, likely reflecting existing Time of Use tariffs and overnight habits. That said, there is flexibility potential for a minority (19%) still charging at peak times. As EVs are more widely adopted, Ofgem will monitor how the flexibility potential among EV users changes.

Among existing heat pump users, heat pumps offer greater additional flexibility potential per household than washing machines or EVs, although this is in part because of EV users self-reported already charging their vehicles off-peak. The low uptake rate of heat pumps at present means their possible overall contribution to system-wide flexibility is small at the moment. As heat pump uptake grows, this could become a major flexibility source. Given the seasonal

[26] The estimation process is explained through the use of census household population data from the England and Wales Census 2021, which estimates for 23.4 million and 1.3 million households for England and Wales respectively, alongside Scotland's 2022 Census estimate of 2.5 million Scottish households. These figures are used under the assumption that our weighted sample is indicative of the total Great Britain population. This allows for extrapolating survey findings to the entire GB population. For example, for washing machines, within a final analysis sample involving 3080 survey respondents (after removing don't knows/missing responses), the survey predicted a total flexibility potential of around 160,000 kWh. This figure was then scaled using a factor of 8831, which derives from the Great Britain population estimate (approximately 27 million) divided by the sample size (3080). Consequently, by applying the scaling factor, the potential energy savings could be projected to 1400 GWh (assuming a survey-based estimate of 160,000 kWh multiplied by 8831). Additionally, final results are presented with ranges to acknowledge standard errors in computing these estimates.

variation in heat pump usage, this potential flexibility source may be especially valuable where winter evening constraints on the grid are tight.

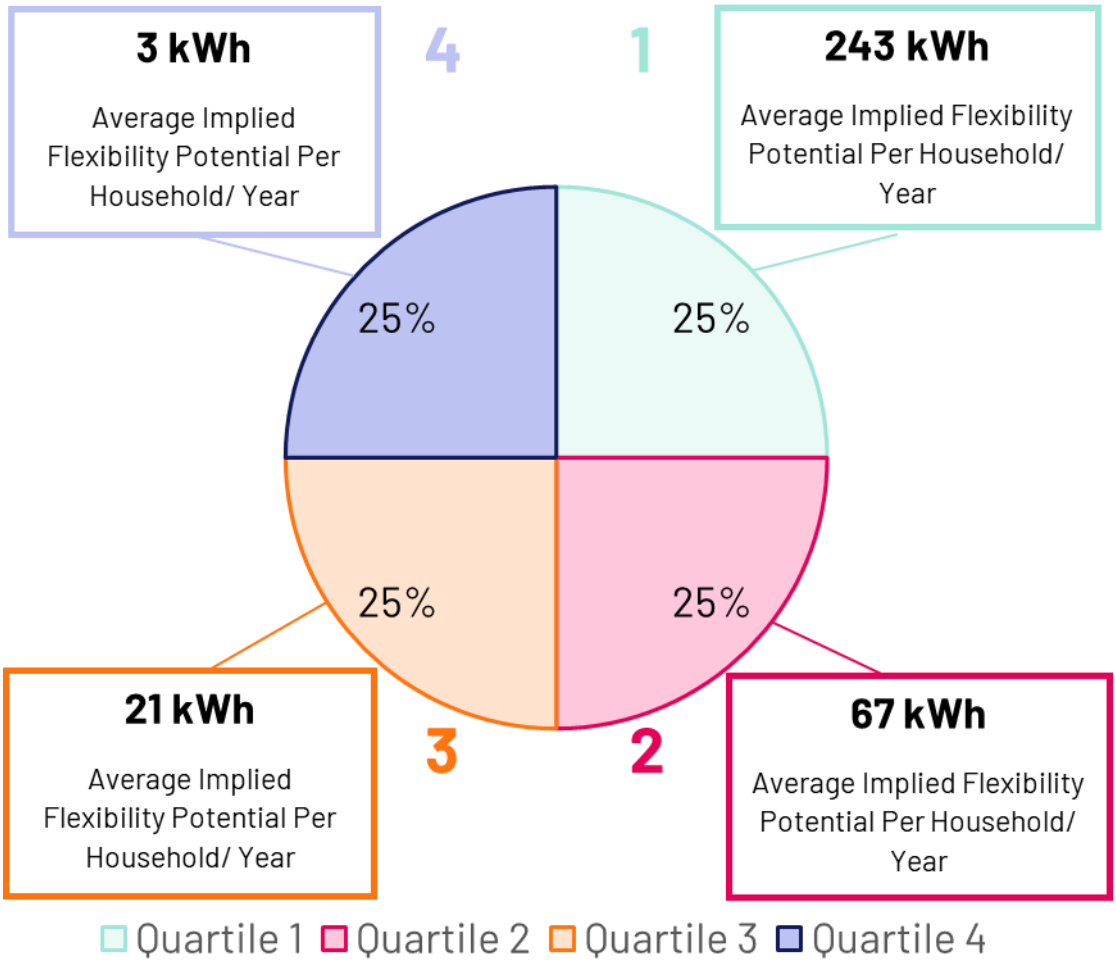
2.3.4 Additional flexibility potential segmentation

The linked smart meter sample was segmented into four quartiles, ranked by their additional flexibility potential score. The purpose of this is to identify which groups of consumers demonstrate the highest and lowest flexibility potential, given their current uptake of technologies. Quartile 1 consists of the top 25% of the sample with the highest flexibility potential, while Quartile 4 includes the bottom 25% with the lowest flexibility potential.

This enabled an assessment of the relative contribution of each quartile in providing consumer-led flexibility, while also providing a better understanding of the profile of each of the groups.

As can be seen from Figure 2.25, there is a strong concentration of flexibility potential. Quartile 1 stands out with an average flexibility potential of 243 kWh per household per year, significantly exceeding that of Quartile 2 (67 kWh), Quartile 3 (21 kWh), and Quartile 4 (3 kWh).

Figure 2.22: Average implied flexibility by flexibility potential quartile



Base: Quartile 1 n=170, Quartile 2 n=172, Quartile 3 n=183, Quartile 4 n=208.

Below are the profiles for each of our quartiles, focusing on attitudes and behaviours in relation to technology usage at home, willingness to shift and automation. These are based on descriptive analysis and have not been tested for statistical significance, and should therefore be interpreted with caution.

Quartile 1: High flex households - high LCT usage, strong shift potential

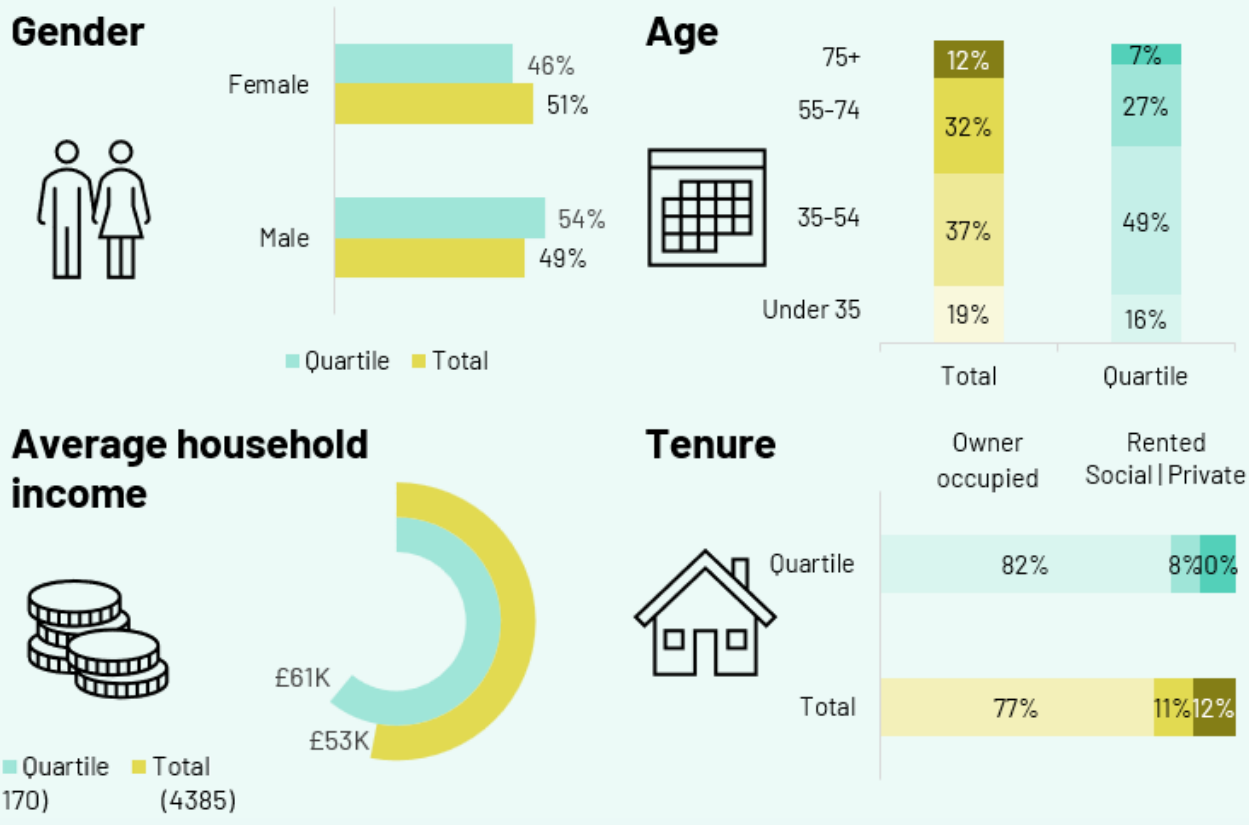
Average implied flexibility potential per household/year: 243 kWh

This group includes the highest proportions reporting use of low carbon technologies (EVs, solar, battery, heat pump): 32% linked sample versus an 18% GB total average. They are no more likely than other quartiles to be on a Time of Use tariff today but are the most likely to say they will switch in the next two years (28% versus 17% GB total average).

Likely future uptake of EVs is high: among those without an EV, 24% say they are likely to get one (versus 14% GB total average). However, they are no more likely to get a heat pump (4%).

They are one of the least likely to say cost is a barrier to future uptake of low carbon technologies, though cost remains among the most commonly mentioned barriers, alongside hassle / disruption of installation and needing to make additional home improvements (heat pumps) and concerns around range (EVs).

Their main flexibility opportunities are laundry and EV charging. For laundry, 88% are washing at peak times but are willing to shift more than 25% of use (compared to 36% GB total average). For EVs, 9% are currently charging at peak times but are willing to shift (versus 1% GB total average).



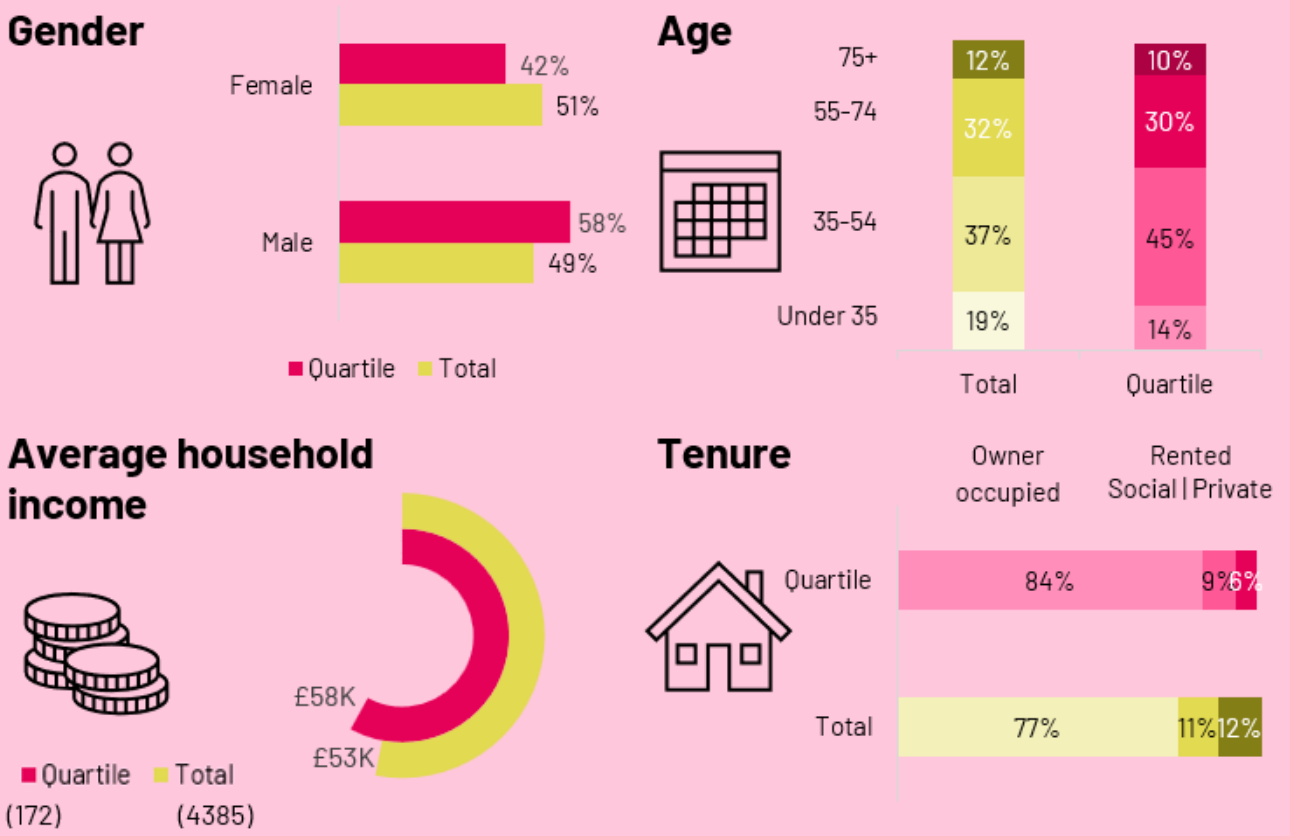
Quartile 2: Strong laundry flexibility and modest LCT uptake

Average implied flexibility potential per household/year: 67 kWh

This group has lower low carbon technology usage and intent than Quartile 1: EV usage is 10% (versus 20% in Quartile 1) and heat pumps 1% (versus 9%). Among non-users, 13% say they are likely to get an EV in the next two years (versus 24% in Quartile 1). Barriers are similar to Quartile 1 overall, though costs appear to be a more pronounced barrier with this group compared to Quartile 1. They are also more likely to avoid EVs because they do not want a car at all (27% versus 18% in Quartile 1).

Their strongest opportunity for flexibility is through laundry. Three in four say they have a delay function available on their appliances (76% versus a 62% GB total average) and three-quarters who have a washing machine and are using it at peak times are willing to shift their use to off-peak (74% versus a 36% average). They have both the appliance features and the willingness—so activation should be low-friction.

EV-related flexibility is naturally lower here due to fewer current and prospective EV users. Most of those who use an EV are solely charging their vehicle at off-peak times only.



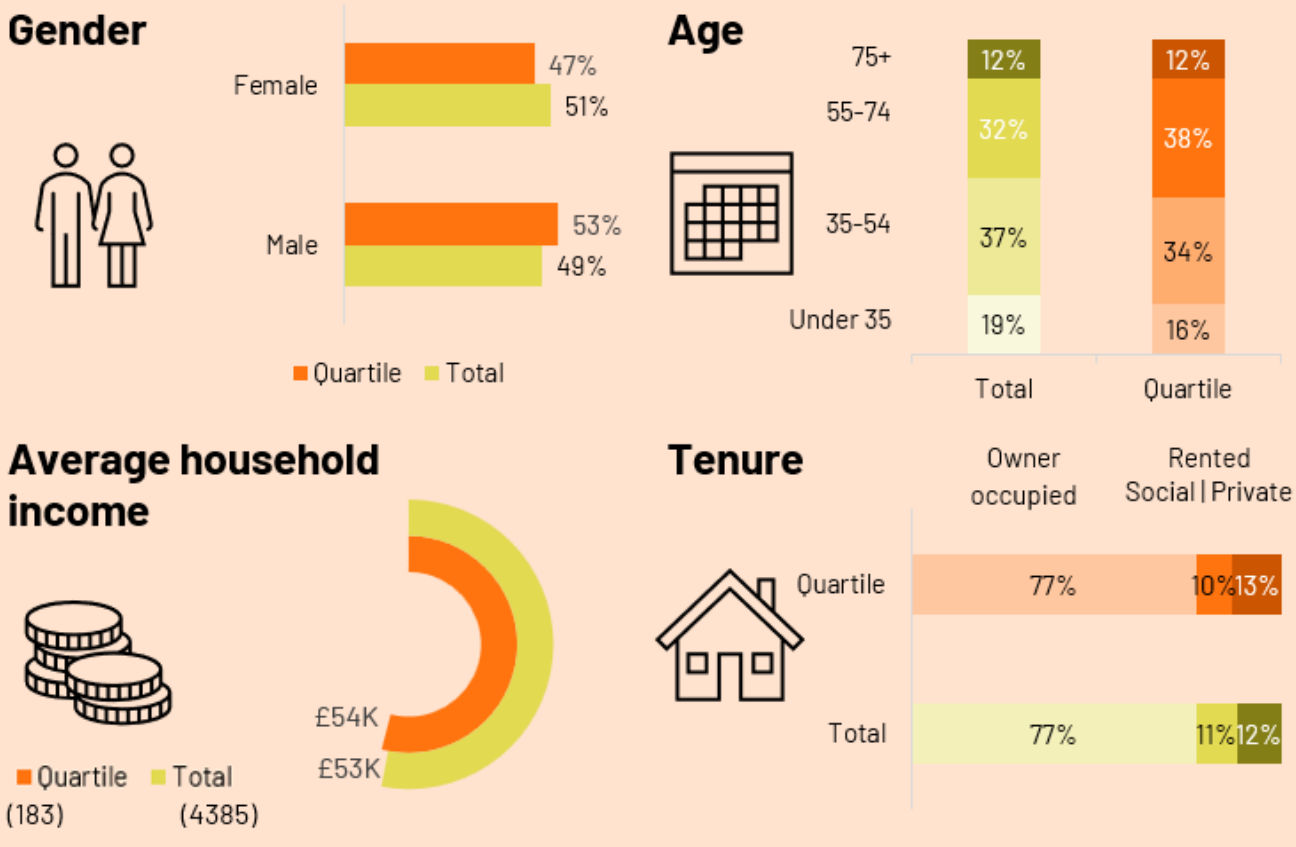
Quartile 3: Off-peak washing machine users, storage heater users; cautious about automation

Average implied flexibility potential per household/year: 21 kWh

No members of this group reported that they have a heat pump. Likelihood to adopt EVs or heat pumps, or to switch to a Time of Use tariff in the next two years, is similar to the population average.

Barriers to adoption of low carbon technologies are broadly in line with the population average, but they are more likely to cite a lack of grants as a barrier to getting a heat pump (35% versus 22% GB total average). Barriers to shifting washing machine usage to off-peak is largely dominated by insufficient savings generated (62% versus 35%). This group is also typically the least comfortable with automation within the smart meter sample (72% uncomfortable with the idea of a company managing when their home heating turns on and off compared to 67% quartile average), and 47% uncomfortable with a company managing when their EV charges (compared to 42% quartile average).

In terms of flexibility opportunities, this quartile has the highest share already doing laundry off-peak only (48% versus 21% GB total average). With lower washing machine usage, the overall reach of laundry-based actions is smaller than in other groups. Heat pump related flexibility is limited by the absence of heat pumps, while EV-related flexibility is constrained by the fact that all EV users are already charging their vehicle at off-peak times only.



Quartile 4: Lowest flexibility potential group

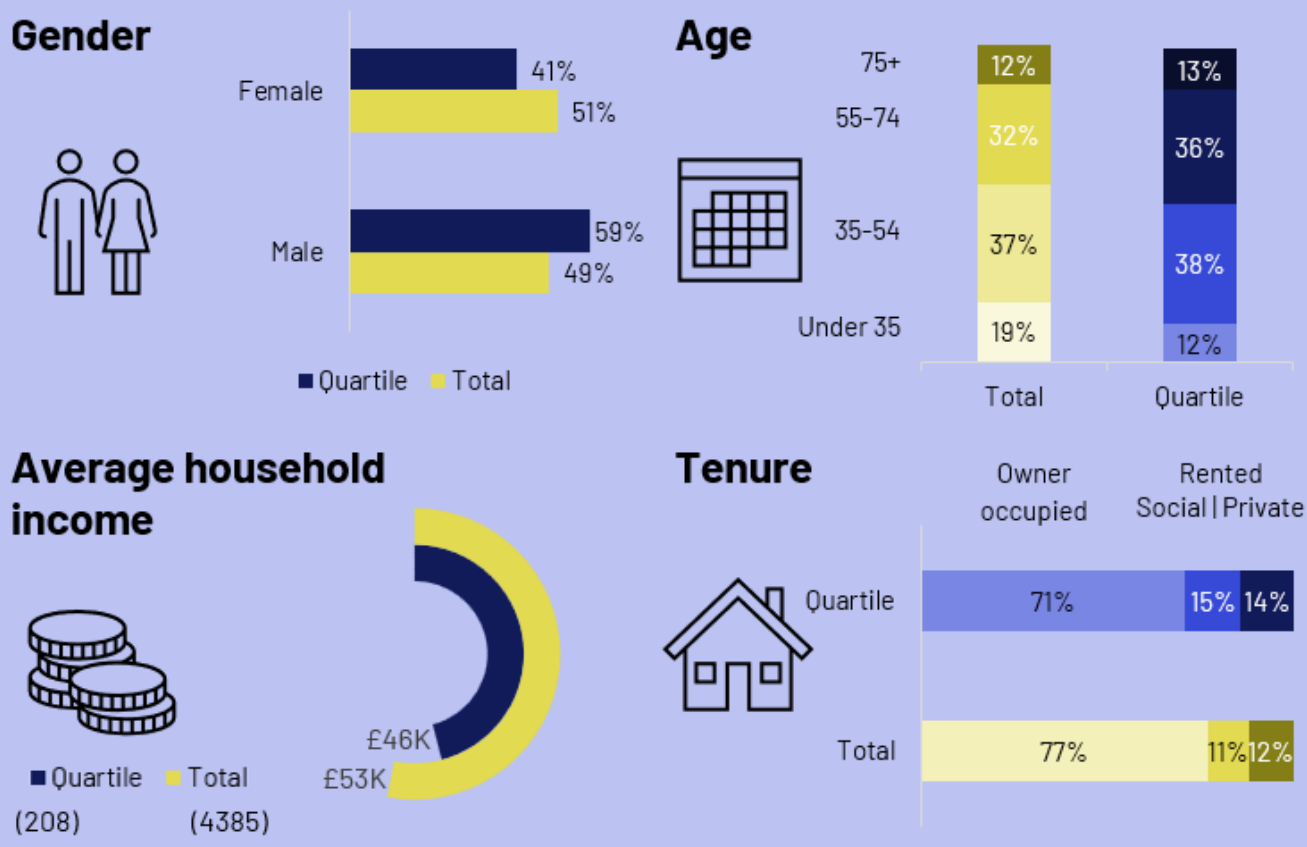
Average implied flexibility potential per household/year: 3 kWh

This group has the lowest washing machine usage at home (69% versus 88% GB total average) and low EV use (6% linked smart meter sample versus 8% GB total average).

Adoption outlook is low for this group; for EVs, 67% are unlikely to get one - most commonly because they are not planning to get a car (33%) or are unable to install a home charger (25%). For heat pumps, 73% are unlikely to get one – barriers most often cited for not adopting in the future are as in other quartiles, i.e. costs and needing to make additional improvements. This group however was most likely to cite "not my choice"/home unsuitable/landlord decision as a barrier (15% compared to 8% GB total average).

This group already shows strong off-peak behaviour: 48% do laundry off-peak only (versus 19% GB total average). However, lower washing machine usage reduces the overall reach of laundry-based actions, and EV-related flexibility is limited by low levels of usage (6% linked smart meter sample compared to 11% GB total average) and installation constraints.

If landlords provide more flex-enabled technology, their established off-peak behaviours could extend further.



3 Conclusions

This section brings together conclusions against the original research questions this research set out to answer.

What are consumers' current perceptions and attitudes towards low carbon and flexibility products and services?

While there is a widespread desire among domestic energy consumers to adopt low carbon products and services, low carbon and flexible products and services are clearly at different stages of adoption. Costs appear to be the primary barrier for the adoption of electric vehicles, heat pumps, and solar panels in the short-term. A lack of knowledge around home battery storage emerges as a barrier to their adoption at present, while uncertainty around savings and inertia are holding back wider engagement with Time of Use tariffs. Stated intentions to adopt a fully electric vehicle in the next two years suggest a considerable increase is possible in the short-term. Young, high-earning consumers are the groups most likely to report they will adopt EVs and heat pumps in the next two years.

Most at risk of being left behind are low-income households who face cost, property or tenure barriers that limit uptake of low carbon and flexibility products and services. Yet those in the smart meter sample report some flexible behaviours which may be driven by circumstances or cost savings.

It will be important to monitor uptake of these products and services against the backdrop of the conflict in the Middle East, and new government announcements around technologies such as plug-in solar panels.

Automation already appears to be playing a significant role in enabling current EV users to charge off-peak, as most say they use a smart charger at home and rarely/never over-ride it. However, it is unclear to what extent this engagement with automation can/will be extended to other groups of consumers, and other technologies in the home. For example, among current EV drivers, the majority say they are comfortable with external control of EV charging, whereas only a minority of all consumers say they would be comfortable with an external company managing either their EV charging or their home heating schedule. This could either reflect something unique about current EV users' characteristics as many self-identify as early adopters, or alternatively that some consumers' attitudes have changed since adopting an EV. As automation can have a powerful role to play in unlocking a shift towards off-peak energy consumption, it will be important to monitor consumers' attitudes towards automation, and how they engage with such technology. This, alongside limited levels of self-reported awareness of delay-start functions on washing machines, suggests that a step-change is needed if automation is to be widely used by domestic consumers to facilitate load-shifting to off-peak times.

To what extent are consumers willing and able to use their EV chargers, washing machines, and heat pumps at off-peak times (where they have each technology)?

The survey reveals that among most EV users off-peak charging is relatively normalised, with many peak-time chargers willing to shift to off-peak. However, nearly half say their vehicle charges immediately on plug-in, pointing to further potential for engagement with flexibility among current EV users.

While few report that they do their laundry at off-peak times only, the survey revealed that many consumers claim to be willing and able to shift the time of their washing machine use for little or no financial savings. Notably, the groups most likely to say they are willing to flex their laundry loads are those aged 65-74, women, and those not working full-time.

This suggests there can be a role played by all types of consumers in adopting flexibility, not just early adopters. In contrast, off-peak use of heat pumps and pre-heating are not yet reported as commonly adopted behaviours among heat pump users, although most say they would be willing to shift their consumption to off-peak times.

How much potential flexible energy are consumers willing and able to contribute at present?

Analysis of linked consumption data confirms the findings above that there is, at present, significant untapped potential for domestic energy consumers in Great Britain to shift their electricity consumption to off-peak times. This potential stems from a widespread stated willingness and ability to shift washing loads to off-peak times, as well as some further potential for shifting EV charging to off-peak times where this is not happening already. At present, most of this potential is concentrated among early adopters who claim to have one or more low carbon technologies in their home. By contrast, the quartile with the lowest calculated flexibility potential appear to be constrained by lower levels of adoption of washing machines and EVs. Many of these participants are on a lower income and are more likely to rent compared to all other quartiles, suggesting it would be more challenging for these groups to engage in flexibility in the short term.

Annexes

A. A demographic profile of the sample

Gender	**%**
Male	48
Female	51
Age	
16-24	3
25-34	16
35-44	18
45-54	19
55-64	17
65-74	15
75+	12
Working status	
Working full-time	47
Not working full-time	53
Tenure	
Owned outright/ buying on mortgage	74
Rent from private landlord	11
Rent from council/ housing association	11
Annual household income	
Up to £25,999	19
£26,000 up to £51,999	28
£52,000 up to £99,999	23
£100,000 and above	11
Country	
England	86
Scotland	9
Wales	5
Urbanity	
Urban	80
Rural	20
Children in household (aged 0-15)	
Yes	24
No	76
Health condition limits activities	
No, no condition	66
Yes, reducing ability a lot	8

Yes, reducing ability a little	15
Yes, not reducing ability	9
Yes, unspecified	0

B. Typology segments

Table 3.1 below provides more detailed specifications for how each segment is defined across the three technologies, including specific barriers identified as "hard" or "soft" and the financial incentives presented in survey questions.

Table 3.1: Classification of typology segments by technology

	Heat pumps	Electric vehicles	Washing machines
Group 1: Have technology and able/willing to flex	Heat pump users who either: run exclusively at off-peak times (10pm-8am, 11am-4pm); or at peak times/constantly but pre-heat during off-peak times; or who run at peak times/constantly, and don't pre-heat but are willing to shift >25% of usage (for estimated cost savings of £255 per year if moving 4 hours of usage to off-peak in winter)	EV users who either: charge exclusively at off-peak times or those who charge at peak times but willing to shift >25% of charging to off-peak (for estimated cost savings of £300 per year if charging 8 hours twice monthly at off-peak times)	Washing machine users who either: use exclusively at off-peak times already or use at peak times but willing to shift >25% of usage (for estimated cost savings of £10.40 per year if one wash load per week is at off-peak times, or to reduce grid demand / avoid energy shortages)
Group 2: Have technology but not able/willing to flex	Heat pump users who run at peak times or constantly and either do not pre-heat or unaware of pre-heating and not willing or able to shift	EV users who charge at peak times and not willing or able to shift charging or only willing to shift ≤25%	Washing machine users who use at peak times and not willing or able to shift usage or only willing to shift ≤25%

	usage or only willing to shift ≤25%		
Group 3: Does not have technology due to hard barriers	Non-users who cite at least one hard barrier such as: cost of purchase/installation, insufficient grants, noise, concerns about heating capacity, suitability of home, or lack of authority (e.g. renting or freeholder)	Non-users who cite at least one hard barrier such as: purchase price, running costs, insufficient grants, lack of charging points, not in the market for a car	Non-users who cite at least one hard barrier such as: purchase price or not suitable for home
Group 4: Does not have technology due to soft barriers	Non-users who only reported soft barriers to future adoption such as lack of knowledge, reliability/safety concerns, negative perceptions, preference for existing systems or "Other" or "Don't know" responses	Non-users who only reported soft barriers to future adoption such as: concerns regarding, range, reliability or charging duration, preference for non-electric or hybrid vehicles, insufficient knowledge or "Other" or "Don't know" responses	Non-users who only reported soft barriers to future adoption such as in the process of getting one or "Other" or "Don't know" responses
Group 5: Have technology but willingness to flex unknown	Heat pump users who said their Time of Use “varies” or they “don’t know” or who run their heat pump at peak times or constantly but said don’t know if they are able or willing to shift use	EV users who said their charging times vary or they “don’t know” the charging times or those who charge at peak times but said they don’t know if they are able or willing to shift use	Respondents said the time when they use their washing machine “varies” or “don’t know” or those who said they don’t know if they are able or willing to shift use for both cost savings

			and energy shortage scenarios
Group 6: Does not have technology and barriers unassessed	Non-users whose barriers to adoption were not captured because they responded "not applicable - not my choice" or "don't know" when asked likelihood to adopt passing the barriers assessment survey question	Non-users whose barriers to adoption were not captured because they responded "not applicable - not my choice" or "don't know" when asked likelihood to adopt passing the barriers assessment survey question	N/A

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