Empowering Flexibility: Unlocking Consumer Engagement in Demand Flexibility

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"Demand flexibility" (or "demand side response" or "consumer-led flexibility"): *the practice among consumers of flexing energy consumption: either increasing, decreasing, or shifting their energy use to a different time.*

Participating in demand flexibility offers benefits to individuals (reduced bills), to the country (system efficiency and reliability) and to the environment (greater use of low-carbon generation).[1] And as we decarbonise Great Britain's electricity supply, the system will become increasingly reliant on this kind of consumer flexibility.

The extent of consumer flexibility we need to unlock, and by whom and when, depends on the exact goal and the types of energy infrastructure we choose to prioritise as a country. But one thing is clear: all plausible future energy scenarios in GB will require many more consumers than present to participate. This participation (or indeed an informed decision not to participate) needs to be built on a foundation of good consumer understanding, and confidence in the future energy system. Moreover, the way that consumers participate will likely evolve over time, from manual and deliberate behaviours, to more automated ones.[2] This has the power to hugely simplify participation and maximise benefits, but may also mean uninformed consumers get left behind, make poor tariff choices for their lifestyle,[3] or feel less in control of their energy use.

This is the context, and this is why we want to understand how to increase sustained consumer engagement with demand flexibility. We want consumers to have the necessary knowledge to make informed choices, and to make demand flexibility behaviours a norm rather than a novelty.

This journey is only just beginning, but has indeed begun: Time of Use (ToU) tariffs and demand flexibility services, such as the National Grid ESO's Demand Flexibility Service, already exist. Smart Energy GB (SEGB), with a government remit to increase

[1] Cornwall Insight. (2023). *The power of flex: Rewarding smarter energy usage*. Retrieved from https://www.cornwall-insight.com/wp-content/uploads/2023/08/The-power-of-flex-Rewarding-smarter-energy-usage-1.pdf

[2] Capper, T., & Oxby, J. (2024). Demand side response: A tool for lowering household energy bills (POSTnote 715). UK Parliament POST. https://researchbriefings.files.parliament.uk/documents/POST-PN-0715/POST-PN-0715.pdf

[3] As Ofgem recognised in a recent consultation on the future of default tariffs, Time of Use tariffs (ToU) may not be suitable for everyone, and as tariff options become increasingly complex there is a risk that consumers may make poor choices for their lifestyle, or believe they are benefitting when they are not.

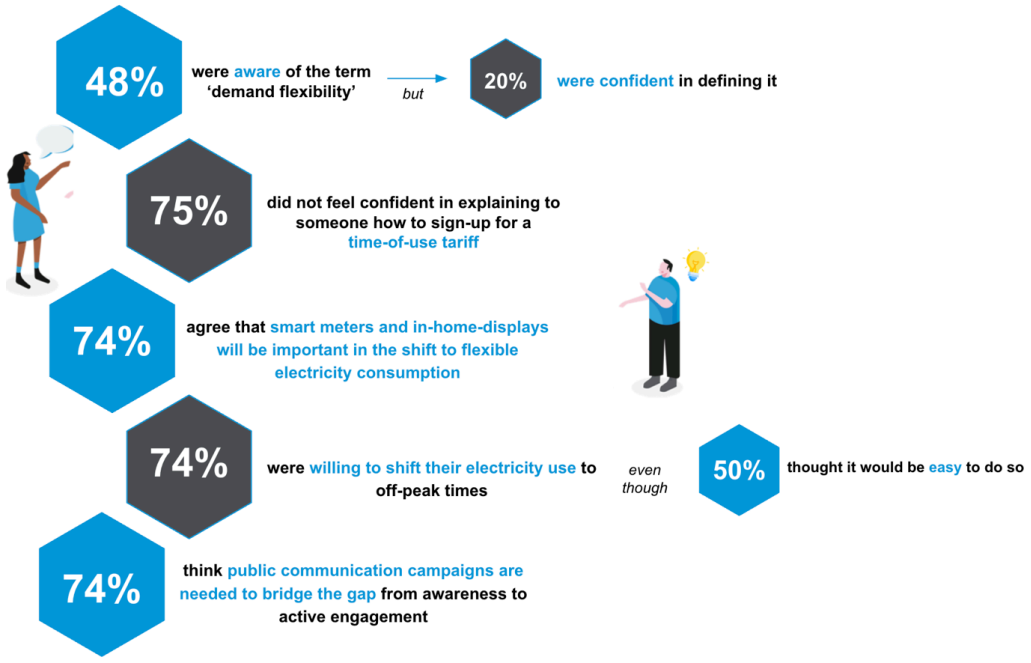
smart meter adoption, has launched a mass communications campaign highlighting the benefits of flexibility to encourage smart meter take-up.

Government has recognised the importance of consumer engagement, and has committed to publish a consultation on the topic, including on the potential to better coordinate and amplify accurate messaging on consumer-led flexibility. With that in mind, we hope this report will help inform any future decisions.

Smart meters – already adopted by over 66% of homes in Britain – are central to this ambition. Not only because they are technically essential for demand flexibility, but also because (as our research here shows) smart meter users are more likely to understand their energy use and the ways in which they can change their energy behaviours. This makes the smart meter installation and usage journey an important stepping stone to making energy flexibility a normal part of energy management for many consumers.

This report builds on the limited existing evidence from the published literature on this issue and introduces new evidence from a household survey (n=3,416), household focus groups (n=22), and interviews with small businesses (n=5). We analyse this evidence through a behavioural science lens, reflecting the fact that this is ultimately an issue of consumer habits and choices. In addition to assessing the current state of consumer understanding and attitudes, this report also considers how more domestic and business consumers might be encouraged to change how and when they use energy.

Research Findings



Consumer understanding of demand flexibility is currently lacking. Consumers don't need an in-depth technical understanding of demand flexibility, particularly as it becomes more automated. But those who do understand the basics and the opportunities to benefit from it are more likely to participate in it.[4] Our data show that consumer knowledge is mixed, but generally quite poor.

- **Smart meter owners had a better understanding of demand flexibility than non-owners:** Roughly half (48%) were aware of the term "demand flexibility," with smart meter owners reporting both higher awareness than non-smart meter owners (53% vs 38%), and higher confidence in defining it (24%% vs 10%).
- **The public's understanding of the benefits of demand flexibility other than cost-savings, was low:** Only 10% were able to correctly identify all of the benefits of engaging with off-peak electricity use, though awareness of personal benefits (cost savings - 70%) was higher than of national benefits (22%).
- **Falsehoods were believed by a sizeable minority:** 29% believed that all energy used during off-peak hours was renewable, and 22% thought that less energy was needed to power appliances at off-peak times.
- **Awareness of peak and off-peak times was low:** Under half of the survey participants felt confident defining 'peak and off-peak times' (44% – though actual awareness may be even lower, as self-reported confidence can be affected by overclaiming and social desirability bias), and even fewer could identify common off-peak windows: only 23% correctly identified all off-peak days and 13% correctly identified all the common off-peak hours. Smart meter owners were slightly more knowledgeable (24% and 19% respectively).

A third of the public report 'doing' demand flexibility in some way, yet knowledge of what to do, and how to do it remains very low. Moreover, given knowledge of 'demand flex' is quite low, we should take self-reported participation with some scepticism. There are gaps in knowledge about what behaviours and actions consumers need to take in order to be flexible, and this echoes much previous BIT research showing that most people have a flawed understanding of which household actions save energy (e.g. putting more attention on salient actions such as turning off lights, and less attention on higher-impact but technical actions like reducing boiler flow temperature). Despite this, a third of our participants reported shifting their electricity use to off-peak times to some degree.

[4] National Grid ESO. (2023). *Household engagement with the Demand Flexibility Service 2022/23*. Retrieved from https://www.nationalgrideso.com/document/282981/download

Smart meters are likely to be a gateway to improved understanding: In most of our survey measures, smart meter owners consistently had greater energy literacy and a greater understanding of demand flexibility than non-owners. However, consumers lacked the awareness that having smart meters is essential to be able to engage in demand flexibility:

- **Smart meter owners had a better understanding of their energy use than non-owners:** Smart meter owners were more confident about their monthly electricity expenditure (71% vs 61%), more aware of demand flexibility (53% vs 38%), more confident in defining demand flexibility (46% vs 27%), more accurate at identifying off-peak times (24% vs 19%), and more aware of ToU tariffs (63% vs 52%). Some of these differences may be due to the educative effect of having a smart meter with an in-home display (IHD), while some may be because more energy-literate people have adopted smart meters earlier.
- **Most consumers see the value of smart meters for flexible energy use:** Most participants (74%) think that smart meters and IHDs will be important in the shift to flexible electricity consumption. Those with IHDs and corresponding mobile applications already think it makes them more conscious of their energy use (78% and 74% respectively).
- **However, consumers still lack an awareness that smart meters are technically essential to be able to engage in demand flexibility and reap its benefits:** 53% of all respondents thought smart meters would be 'moderately' to 'very' helpful in encouraging demand flexibility participation. Among non-smart meter owners, awareness of this link was even poorer: 58% thought smart meters would either be 'not helpful' at all or only 'slightly helpful' in encouraging and enabling demand flexibility.

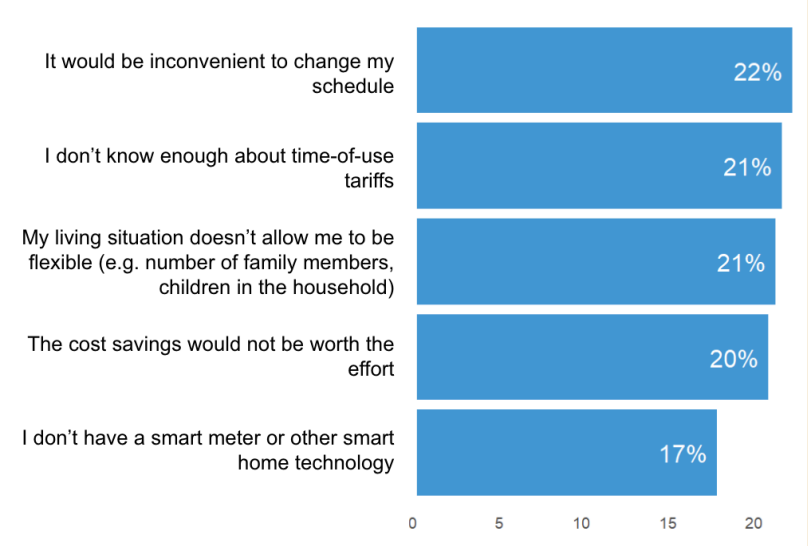
There are many behavioural barriers to engagement with demand flexibility: If we want demand flexibility schemes to move from a novelty to a mainstream habit, these are factors to consider to ensure that engaging is not only easy, but also aligns with realistic public expectations about the benefits.

- **Myriad barriers were reported:** Convenience issues, low awareness, practicality constraints, cost concerns, and current smart meter non-ownership were voted as the biggest barriers to engagement with demand flexibility (from a longlist) – see Figure 1 below.
    - Small business owners report similar concerns, with the added barrier of operational business constraints limiting engagement, as evidenced in the interviews: "My shop is in a small town – people come in when they

want to and that's always between 9 and 5. I just can't see it working for me." (Gift shop business - smart-meter owner)

- **Cost sensitivity:** When asked, participants expected or wanted savings from consumer-led flexibility that were higher than realistic estimates. This highlights the importance of emphasising other benefits, but also of making participation as easy as possible, particularly for appliances with high flexibility capacity such as electric vehicles (EVs) and heat pumps.

Figure 1: Top 5 barriers to consumer engagement with demand flexibility



***Note**: Sample size = 3416. The percentage of people who selected these barriers as most important from a longlist.*

Consumers value convenience, reduced cost, and control. When asked to reflect on a range of future energy scenarios (greater demand flexibility, heat-as-a-service, and automated smart home energy technologies) 64% approved of home energy automation, and participants also emphasised the need to maintain convenience (28%), save money (24%), and allow them to control their electricity use (20%). However, the transition to this future raises concerns for many:

- **Consumers need more support to adapt to an increasingly automated energy landscape**: Only a small percentage of EV and heat pump owners (6% and 5% respectively) were comfortable automating the use of these appliances in the future. Preparing consumers for this shift will require not just trust and confidence, but also clear engagement to address practical concerns and ensure people feel in control.
- **Penalties and rewards are not the same:** Participants showed a preference for schemes that are framed positively and promote gains rather than restriction

('turn electricity up' versus 'down' schemes), and are simple to understand (e.g. basic dual-rate tariffs).

Our conclusions

This combination of low awareness, behavioural barriers, high expectations on cost savings, and low tolerance for automation presents a challenge, but is not insurmountable. Public understanding and attitudes can change quickly as we become accustomed to new technologies. It's worth remembering how public attitudes to technology can change: for instance, in a pre-smartphone world, the idea of companies tracking our whereabouts or learning our preferences would have seemed alarming, yet many accepted this in exchange for convenience. To be clear, demand flexibility technologies do not involve this kind of data collection, but the comparison illustrates how initial scepticism about new technologies can shift over time as the benefits become clearer and the unfamiliar becomes normal. So, we should take all of this data as a 'slice in time' and not discount the potential for the public to rapidly warm-up to a smarter energy system as it becomes normalised, easier to use, and the benefits become more real.

However, we should equally pause and question the conventional narrative that demand flexibility will be a straightforward part of the solution to manage increasingly inflexible electricity generation. As the data in this report show, there is a combination of challenges we must recognise: i) The public have poor understanding of what demand flexibility is, how they should participate, and what it is for. ii) There are real barriers to engagement, including inconvenience, inflexibility of energy demand for many (including businesses), and slow adoption of the necessary technologies. iii) When probed in more detail, we find that the public have unrealistic expectations about the level of incentives they would expect in order to make the effort, iv) levels of trust are low, and v), while automation could solve many of these barriers, a significant majority are not yet comfortable with this, including for EVs and heat pumps which will likely become the backbone of demand flexibility.[5]

More positively, we see trends moving in the right direction, on four counts:

First, smart meter owners show more positive results on almost every metric: knowledge, understanding, willingness to participate, acceptance of automation, knowledge of which actions to take, confidence in using a ToU tariff, and more.

[5] Cornwall Insight. (2023). *The power of flex: Rewarding smarter energy usage*. Retrieved from https://www.cornwall-insight.com/wp-content/uploads/2023/08/The-power-of-flex-Rewarding-smarter-energy-usage-1.pdf

While this may in-part be due to smart meter owners being inherently more energy-literate and engaged, we also know that they perform an important learning function and the information they provide can be motivating. So we expect that as the rollout continues, consumers will become increasingly more comfortable with consumer-led flexibility. And vice-versa, as ToU tariffs become more available and widely known, the incentive to accept a smart meter increases.

Second, this data is a slice in time, and the context is one of unfamiliarity. But this won't always be the case. We would expect technologies and service offerings to improve, trust, comfort and acceptance to increase, and automation to become more commonplace once the benefits are real, and concerns are found to be largely unfounded.

Third, the data herein provides valuable insights on the kinds of tariffs and options that people want: simple pricing structures; a bias towards positive incentives over disincentives; the option to trial new tariffs; and a greater willingness to participate in some activities more than others.

Fourth, we know from substantial wider research that public engagement and communications can make a real difference. Many of the barriers and concerns we observe are issues that effective engagement can help with: building trust, awareness, know-how, familiarity, and knowledge of the benefits. **We also find that the public want greater engagement and communications on this issue**, and this support needs to come from a trusted messenger.

1. Introduction

The Behavioural Insights Team (BIT) was commissioned by Smart Energy GB to explore understanding and perceptions of energy demand flexibility amongst consumers in Britain. The overarching aim of the project was to understand the public appetite for engaging in demand flexibility now and in the future, and how levels of engagement and understanding might be improved.

"Demand flexibility" (or "demand side response", or "consumer-led flexibility"): *the practice among consumers of flexing energy consumption: either increasing, decreasing, or shifting their energy use to a different time.*

It is critical that consumers make choices that are right for them – including the choice not to participate in consumer-led flexibility if it does not suit their lifestyle. But compared to the very nascent levels of engagement we currently have, it will be critical to get more consumers flexing their demand over the coming years if Britain is to efficiently reach its decarbonisation commitments.[6] Consumer-led flexibility can benefit national energy infrastructure costs and security by balancing demand with supply and can also benefit consumers (households and businesses). These benefits come both, through these whole-system efficiencies (which save all of us money), and through direct bill-savings achieved through individual participation.[7,8]

However, previous research[9] has highlighted significant gaps in public knowledge and understanding when it comes to home and business energy use. This includes a lack of knowledge of which energy-saving behaviours to take, how to take them, where to find advice, and what government support exists.[10] This is despite public knowledge and engagement in energy having improved in recent years, both a result of the '22-24 energy crisis and the widespread rollout of smart meters and IHDs (66% of homes in Britain now having one).

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[6] Ofgem. (2023, August 17). *Engaging consumers on the journey to a decarbonised and flexible future energy system*. Retrieved from https://www.ofgem.gov.uk/press-release/engaging-consumers-journey-decarbonised-and-flexible-future-energy-system

[7] Cornwall Insight. (2023). *The power of flex: Rewarding smarter energy usage*. Retrieved from https://www.cornwall-insight.com/wp-content/uploads/2023/08/The-power-of-flex-Rewarding-smarter-energy-usage-1.pdf

[8] Ofgem. (2023). *Smoothing the journey: Engaging domestic consumers in energy flexibility*. Retrieved from https://www.ofgem.gov.uk/call-for-input/engaging-domestic-consumers-energy-flexibility

[9] Londakova, K., Human, S., Chan, E., Gross, M., & Park, T. (2023). New survey shows a UK energy-saving campaign is much needed. The Behavioural Insights Team. https://www.bi.team/blogs/new-survey-shows-a-uk-energy-saving-campaign-is-much-needed/

[10] BIT (2024) Net Zero Communications, Marketing and Public Engagement. https://www.bi.team/publications/net-zero-communications-marketing-and-public-engagement-2/

We also know that public engagement and marcoms can help – proven by SEGB's own work on smart meter adoption and usage,[11] and much of BIT's research testing behaviour-change communications in the energy domain and beyond.[12,13]

The journey to consumer-led flexibility is nascent – we are only at the beginning of a shift from a world where domestic consumers are largely 'passive receivers' of energy to being more actively involved in the management of their energy use. While the public is becoming slightly more energy literate, it's certainly not a given that this knowledge extends to more sophisticated know-how of demand flexibility: knowledge of what it is, how to engage in it, what the benefits are to the consumer, how individual consumption impacts the wider energy system, and the impact of this on all of our bills and our journey to Net Zero.

This is the context of this research. It aims to help fill this evidence gap, by exploring awareness, understanding, and perceptions of consumer-led flexibility, both now and in possible future scenarios. Specifically, this work sought to achieve the following research objectives:

1. Understanding **current levels of consumer awareness and understanding of energy demand flexibility**, how to take part, and overall household energy use.
2. Exploring the **barriers and enablers to engagement with energy demand flexibility** across all consumer groups.
3. Assessing future **consumer willingness to take part in energy demand flexibility and related energy scenarios.**
4. Assessing the potential role of **greater consumer engagement** to address barriers to participation.

[11] UsersTCP. (2023). *United Kingdom: It all adds up*. Retrieved from https://userstcp.org/case-studies/campaignxchange/united-kingdom-it-all-adds-up/

[12] BIT (2023) How to Build a Net Zero Society

[13] BIT (2024) Net Zero Communications, Marketing and Public Engagement. https://www.bi.team/publications/net-zero-communications-marketing-and-public-engagement-2/

2. Research methodology

The box below expands on the four key research objectives listed above.

Box 1. Research objectives and questions

The main research questions explored under each objective were:

Objective 1: Understanding current levels of consumer awareness and understanding of energy demand flexibility, and overall household energy use.

a. What are the levels of understanding and awareness about household electricity use?
b. What are the levels of understanding and awareness about the concept of demand flexibility, and related terms?
c. What is the role of smart meters in influencing household energy consumption behaviours?

Objective 2: Exploring the barriers and enablers to engagement with energy demand flexibility?

a. What are the perceived barriers or challenges to engaging in demand flexibility?
b. What are the perceived enablers or benefits to engaging in demand flexibility?

Objective 3: Assessing consumer willingness to engage and participate in energy demand flexibility behaviours and related future energy scenarios

a. How willing are household consumers to change their electricity use behaviours, and how easy do they expect a change to be?
b. What are the financial benefits that households expect to gain if they engage in demand flexibility?
c. What are consumers' thoughts and perceptions of future electricity use scenarios like automation and manual engagement?

Objective 4: Assessing the public's views on public engagement, communications and support for energy demand flexibility

a. Would proactive consumer engagement overcome some of the barriers?
b. If so, what are the characteristics that consumers would want a public communication campaign about demand flexibility to have (e.g. types of information, type of messenger and their characteristics)?

We addressed these research questions through the following four research activities:

1. **Rapid evidence review:** Spanning academic and grey literature from the energy sector, we collated existing evidence on the key questions above. We used this to i) inform our understanding of barriers to adoption (which we built upon in the survey and focus groups), ii) ensure we had up-to-date knowledge of demand flexibility initiatives in the UK and Europe, and iii) to help shape our understanding of future energy scenarios (which we also explored in the focus groups and interviews).
2. **Focus groups:** Three 1-hour focus groups with household consumers in Britain (n=22 total). These primarily explored understanding, awareness, and appetite for demand flex. Participants included smart meter owners and non-owners. Appendix 1 has further details.
3. **Interviews:** Five 1-hour interviews with small business owners in Britain, with varied energy needs: retail, hairdressing salon, delicatessen, farm, and an office-based small business. See Appendix 2 for more detail.
4. **Survey:** We recruited 3,416 participants from the British general population for an online survey, which aimed to quantitatively explore both, current levels of awareness of, and engagement with, demand flexibility, as well as gauge future willingness to engage under a range of scenarios. The sample was nationally representative on age, gender, education levels, income, region, and ethnicity, and we captured diversity in living situations (renting versus owning, number of residents and children at home) and disability status. We also conducted subgroup analyses for smart meter owners (N = 2388), non-smart meter owners (N = 1028) and vulnerable populations (those with a reported annual income of under £24,000; N = 1161). Detailed sample characteristics can be found in Appendix 3 (Tables 1-12).

3. Findings Part 1: Knowledge, understanding, and trust

3.1. Most but not all consumers feel confident in knowing their electricity spend, and smart meter owners have an advantage

For the public to engage with consumer-led flexibility *well* (reaping the individual benefits, contributing to the collective benefits, feeling confident in their ability to choose the right tariff for them, and still maintaining day-to-day convenience) – they need to understand the basics.[14]

Our survey therefore started by measuring **i)** awareness of spending on electricity, **ii)** frequency and means of tracking spending on electricity, and **iii)** awareness of the electricity consumption associated with different daily household appliances.

- **68% reported being confident that they knew how much they spend on electricity**.
- **Smart meter owners reported a higher level of confidence** (71%) than non-smart meter owners (61%).
- While some used pre-payment meters or paper bills, **most (60%) used digital means to track their spend** – including in home displays (IHDs), and online accounts (Table 1).

Table 1. Frequency and means of tracking spending on electricity

	IHD *(n = 708)* **only asked to those who do not use a prepayment meter*	**App** *(n = 626)*	**Online Account** *(n = 706)*	**Bills** *(n = 547)*	**Prepayment meter** *(n = 546)*
Daily	29%	18%	5%	4%	29%
Weekly	32%	37%	17%	11%	46%
Monthly	32%	40%	61%	56%	23%

[14] Andolfi, L., Akkouch, R., & Pavić, I. (2023). From awareness to action: energy literacy and household energy use. In *18th IAEE European conference. The Global Energy Transition Toward Decarbonization*.

Quarterly	6%	5%	16%	26%	2%
Yearly	1%	0%	2%	3%	0%

These findings are also in-line with our focus groups with household consumers. Smart meter owners were more inclined to track daily spending through apps or the IHD and expressed that the presence of the IHD heightens awareness of electricity spend, while those without smart meters relied mainly on monthly bills.

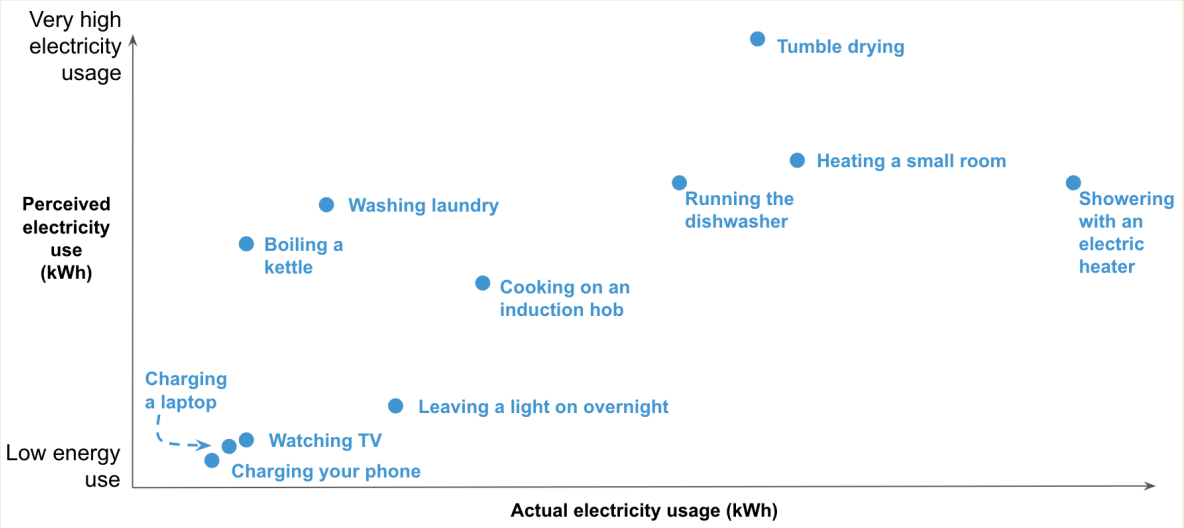
"My display is in the kitchen. I can't help but look at it all the time." (Smart meter owner)

3.2. Knowledge of which activities use more/less electricity is mostly good, with some minor misconceptions. These errors relate to activities *most* suitable for demand flexibility.

Previous work by BIT has highlighted a poor public understanding of which actions save most energy, or are best for the climate – both between categories (e.g. thinking recycling is more carbon-saving than giving up flights), and within categories (e.g. thinking that food miles and packaging is more important for carbon emissions than diet choice). In some cases, public knowledge was even worse than random guessing – i.e. we observe a negative correlation between real and believed carbon impacts of a range of green behaviours. In past work this has also extended to home energy use, particularly when gas and electricity consumption were included side by side – for example salient but low-consuming electrical appliances (such as lighting) were often over-estimated in their consumption, while more technical and often gas-related actions (such as optimising the boiler flow temperature or insulating pipework) were often underestimated.

In this latest study we find that **overall, participants were broadly correct in their estimates for the electricity consumption of different daily actions**. This is demonstrated by the clear positive correlation between real and perceived energy use, in Figure 2 below.

Figure 2. A scatter plot comparing the actual and perceived electricity use of different daily household behaviours



***Note**: Sample size 3416. Response options for each behaviour range from "Very low electricity" to "Very high electricity"*

We have seen over the course of many similar surveys that this kind of knowledge has improved in recent years, potentially as a result of the energy crisis of '22-'24 and the significant public awareness efforts made at that time, through the increasing uptake of smart meters, and the recent cost of living crisis increasing households' motivation to find ways to save money. [15]

Certain misconceptions persist, but the errors are quite small – participants thought that boiling a kettle, washing a load of laundry, and tumble-drying were *slightly* higher in their energy consumption than they actually are. These are certainly high-intensity activities, and the rule-of thumb that creating heat with electricity uses lots of it (broadly true) seems to have landed – however, they are also short-lasting actions, that don't use all that much hot water. In contrast, a shower (electric) was slightly underestimated.

For our interests, it's worth noting that these are exactly the actions from this list which are the best candidates for demand flexibility: reasonably energy-intensive, but discrete 'actions' (rather than ongoing), and much more flexible than many other activities (lighting, watching TV, heating a room) in terms of when they

[15] Huebner, G. M., Hanmer, C., Zapata-Webborn, E., Pullinger, M., McKenna, E. J., Few, J., ... & Oreszczyn, T. (2023). Self-reported energy use behaviour changed significantly during the cost-of-living crisis in winter 2022/23: insights from cross-sectional and longitudinal surveys in Great Britain. *Scientific Reports*, *13*(1), 21683.

happen. Good knowledge of how much electricity these activities require, and thus how much people may stand to save by flexing them, is therefore important. Since consumers slightly *over*-estimate the electricity demand of these activities, that may tend to *over*-motivate rather than under-motivate the decision to flex them, which is perhaps preferable to the opposite error, though less desirable than having perfectly informed consumers.

3.3. Some are aware of the term 'demand flexibility', but most aren't – and deeper knowledge and understanding is lacking.

Our evidence review revealed that the concept of energy demand flexibility (increasingly known in a policy context as consumer-led flexibility) is currently not widely known or understood across the general population.[16] To unpick this further, our research took a broad view and explored participants' awareness of the specific term, *and* the wider concept. Both are important, as it is instructive to know whether it's a good term to use in communications, but also not to get hung up on specific technical terminology when measuring underlying consumer knowledge.

- **48% reported that they were aware of the term 'demand flexibility' and 20% said they were confident in their ability to define the term**. The latter 20% figure is arguably the more meaningful one, as we need to get consumers beyond just vague familiarity with the words.[17]
- **Smart meter owners reported a higher awareness of the term (53%)** compared to non-smart meter owners (38%).

Awareness of the term 'demand flexibility' was low among focus group and interview participants.[18] **Participants were unaware of its meaning initially but when prompted, some domestic and small business consumers were able to make guesses** based on related concepts that they were familiar with, such as Economy 7 meters and supplier schemes like British Gas' Peak Save Sundays. This highlights the difference between knowledge of technical terminology versus intuitive or pre-existing knowledge of underlying concepts – and this will be an important challenge for communicators going forward.

"Is it [demand flexibility] like the Economy 7 meter? We have that. We run the dishwasher at night so that everything is cleaned and ready in the morning." (Office

[16] National Grid ESO. (2023). *Household engagement with the Demand Flexibility Service 2022/23*. Retrieved from https://www.nationalgrideso.com/document/282981/download

[17] Also, *'I've heard of it, but I'm not too sure what it means'* is likely to be more susceptible to self-report bias

[18] We would typically expect less self-report bias / over-statement in focus groups, given the assumption that if you say 'yes I've heard of it' you're about to get tested on that claim, in public.

business - non-smart meter owner)

"Is it where you get incentives from your provider to not use electricity at certain times of the day, say between 5 to 7? (Non-smart meter owner)

Vulnerable consumers expressed that **they were already trying to use less energy** – for them, **'flexibility' meant simply trying to use less energy generally rather than changing when they used electricity**. They expressed that smart meters increased awareness and willingness to be more efficient by instilling a better understanding of daily electricity consumption.

"The first thing I did when I got the new smart meter was change my lights because I realised how expensive the older lights were." (Smart meter owner)

3.4. Many had heard of a range of terms and concepts relating to demand flexibility, but had lower confidence in defining them

We also explored participants' awareness of various concepts related to demand flexibility, and their understanding of what the terms mean. As in Table 2, we explored levels of awareness and understanding of terms such as 'smart meters,' 'fixed tariff,' 'the electricity grid' and more. While awareness of terms was generally high, participants were not as confident in defining the concepts, highlighting a gap between awareness and understanding. For instance:

- **93% of participants reported knowing what 'peak and off-peak times' meant, but only 55% reported feeling confident in defining them**.
- This echoes other findings in the survey that **most people struggle to correctly identify peak and off-peak hours**: only 23% correctly identifying all off-peak days and 13% correctly identifying all off-peak hours.[19]
- Overall we found that **smart meter users reported a higher awareness of and confidence in describing the terms presented** (see Table 2).

Table 2. Reported awareness of terms related to demand flexibility, and confidence in defining them

	State they know what the term means (%)			Feel confident in defining the term (%)		
Term	Overall	Smart meter owners	Non-smart meter	Overall	Smart meter owners	Non-smart meter

[19] The survey response options to identify off-peak days were: i) Weekdays, ii) Weekends, iii) Both, and iv) I don't know. The survey response options to identify off-peak hours in the day were: i) Midnight to 4 am, ii) 4 am - 8 am, iii) 8 am - noon, iv) Noon - 4 pm, v) 4 pm - 8 pm, and vi) 8 pm - midnight.

			owners			owners
Smart meter	97%	98%	96%	67%	72%	57%
Fixed tariff	**94%**	94%	92%	**56%**	57%	53%
Peak and off-peak times	**93%**	94%	91%	**55%**	57%	50%
Standard variable tariff	88%	89%	86%	43%	46%	37%
The electricity grid	87%	88%	86%	44%	47%	40%
Time-of-use tariffs	**60%**	63%	52%	**26%**	29%	19%
Surge pricing	55%	59%	48%	21%	25%	15%
Demand flexibility	48%	53%	38%	20%	24%	10%
Demand flexibility service	44%	49%	34%	17%	20%	10%
Demand side response	33%	38%	23%	15%	18%	8%

Additionally, our focus group participants were also **confused about what times were peak and off-peak**, and some even **mistook peak times as off-peak.**

"I've never really known what time – I just presume that after 5pm would probably be a good time to use it (washing machine), but now, I know this is the worst time." (Smart meter owner)

Awareness of peak and off-peak times was low and often incorrect among small business owners too. A farm owner we interviewed saw merit in engaging in demand flexibility but did not know how to start because they found the information about related concepts like peak and off-peak times too complicated.

"I think sustainability is important, I just have NO idea how to do it… I just don't know enough about it… how much goes into the grid, it's a minefield of not really knowing or understanding much about it, and there's a busy fog of conflicting information online." [Farm business - non-smart meter owner]

3.5. Most domestic and business consumers aren't aware of the myriad benefits of demand flexibility

While almost half of the survey participants claimed awareness of the term, **consumer understanding of the benefits of demand flexibility, other than cost-savings, was low**.

- When asked to identify the benefits of using electricity at off-peak times from a list of correct and incorrect statements (as in Table 3), **86% of participants identified at least one benefit correctly** (in most cases, the cost-savings benefit).
- **Only 10% identified all three benefits correctly** (9% among smart-meter owners, and 11% among non-owners)

These data may highlight a lot of untapped potential to motivate participation. We would generally expect individual benefits to be the strongest motivators for individual effort (while societal benefits tend to be quite important for building support for national policy or investment). Nonetheless, there is a wide range of benefits that people are not aware of, and it would be valuable to test the appeal of these benefits in communications materials to boost engagement. Ultimately, we need to understand what the most attractive proposition is, and how best to communicate this.[20],[21] This may especially be the case if the financial benefits don't meet expectations over time (see later survey data on this point).

Table 3. Percentage of participants who correctly identified the benefits of demand flexibility

Benefits of demand flexibility	% who identified this as a benefit
[Correct] Electricity is cheaper, so it's an opportunity for consumers to save money if they're taking part in a flexible energy use project or on a time-of-use tariff	70%
[Correct] The UK could be more self-reliant in its electricity production, i.e. produce more electricity internally	30%
[Incorrect] It's more sustainable because all electricity used in off-peak times is produced by renewable sources	29%

[20] Ofgem. (2023). *Engaging domestic consumers in energy flexibility*. Retrieved from https://www.ofgem.gov.uk/call-for-input/engaging-domestic-consumers-energy-flexibility

[21] National Grid ESO. (2023). *Household engagement with the Demand Flexibility Service 2022/23*. Retrieved from https://www.nationalgrideso.com/document/282981/download

[Correct] Lowered chances of blackouts	27%
[Incorrect] Less electricity is needed to power your appliances	22%
None of the above	5%

As with the survey participants, among our interview and focus group participants, we found that **cost-savings were the most frequently cited benefit for domestic consumers and small-business owners. When probed, there was low understanding of system-wide benefits** like grid stability and reduced need for expensive infrastructure, and benefits related to national commitments were not thought of naturally.

Overall, through our focus groups and interviews, we found that (unprompted) benefits to individuals (with the exception of cost-savings) were perceived as low by domestic consumers and small business owners. There was a general belief that demand flexibility would be mainly beneficial to the government and suppliers. This indicates the need to increase consumers' understanding about how individuals will be beneficiaries of the national and collective benefits of demand flex, [22] largely to build trust.

"There would be benefits for the government vis-a-vis the grid, and it seems like they're asking us to go off-peak for the supply network. We are doing their work for them in a way." (Smart meter owner)

3.6. Many reported already 'doing demand flex' in some form – but this engagement may be somewhat misunderstood, nor realising the full consumer benefits.

- **A third (33%) of the participants reported intentionally changing when they use electricity to off-peak times.**

[22] We wouldn't wish to overstate this point, as there is a 'collective action problem' here – one individual making the effort to flex their demand = a *tiny* contribution to the national benefits, and thus an *infinitesimally small* share of that benefit coming back to the individual in question. However, we still believe it is worthwhile to emphasise national benefits because 1) doing something '*just* for the collective good' is still a realistic ambition when the action is very low effort (e.g. signing on to a ToU tariff with mostly automated flexibility takes very little effort), 2) doing something for societal benefit is doubly appealing when it also saves you money – it provides a feel-good overlay to one's otherwise self-interested actions, and 3) even if the direct motivation for the individual is weak, it's important that we build trust in the wider agenda: it's ultimately for consumers'/bill-payers/tax-payers benefit, not just to boost suppliers' profits.

This is higher than previous (and quite recent) data from NESO (20%),[23] but there are some important points of distinction. NESO's data related to participation in specific demand flexibility schemes. Our data will have captured broader examples of demand flex, including use of Economy 7. We would also expect significant noise in these data, considering most of our sample don't confidently know what demand flexibility is.

- **38% of those who claim to be participating in some kind of demand flexibility (i.e. 12.5% of the population) report doing so by joining supplier schemes.**
- **30% (10% of the population) have changed their energy use in response to emails from their supplier.** Our evidence review also revealed that supplier schemes tend to be the most common source of information on demand flexibility.[24]
- **A greater proportion of smart meter owners (38%) reported intentionally changing their electricity use** as opposed to non-smart meter owners (22%).

Outside of these more engagements with new ToU tariffs and schemes, the second-most common form of engagement with demand flexibility was simply 'switching electricity use times without any prompts by suppliers or third parties', (36% of the 33%, i.e. 12% of the population). (Table 4). This is likely to be people using Economy 7 meters – a good example of shifting consumption from peak to off-peak hours, but not sophisticated demand flexibility as we expect it in the future.

Table 4. Ways of engagement with demand flexibility among those who reported already having engaged with it (which was 33% of survey respondents; N = 1142)

"Which of the following have you ever done"	%
Joined a scheme run by your energy supplier that rewards you for changing your electricity use to off-peak times (e.g. Ovo Power Move, Octopus Energy Savings Sessions, British Gas PeakSave Sundays)	38%
Changed your electricity use to off-peak times without any prompts by suppliers/third parties	36%
Changed your electricity use to off-peak times after being prompted by an email from your energy supplier	30%
Changed your electricity use after hearing about it on social media	21%
Changed your electricity use to off-peak times after receiving an in-app	21%

[23] National Grid ESO. (2023, July 6). *Demand Flexibility Service: Consumers have their say*. Retrieved from https://www.nationalgrideso.com/news/demand-flexibility-service-consumers-have-their-say
[24] National Grid ESO. (2023, July 6). *Demand Flexibility Service: Consumers have their say*. Retrieved from https://www.nationalgrideso.com/news/demand-flexibility-service-consumers-have-their-say

notification	
Changed your electricity use to off-peak times after being prompted by a SMS message from your energy supplier	20%
Signed up for Demand Flexibility Schemes run by third-party providers (e.g. NESO)	12%
Other	1%

3.7. Low levels of understanding and trust are undermining engagement with Time of Use tariffs.

The primary way to engage consumers in demand flexibility is to offer ToU tariffs, through which electricity prices vary at different times. Past research has shown that being on a ToU tariff facilitates greater engagement with energy use, as well as increased cognisance of costs and environmental issues.[25] But they are more complex and novel than the tariffs most people are currently on and thus require greater levels of knowledge and engagement.

- **54% knew they were *not* using a ToU tariff, while a further 29% didn't know what they were.**
- **75% said they wouldn't be confident explaining to someone how to sign-up for a ToU tariff.** Among those who are on a ToU tariff, this figure was 38%, while among the majority who were not on a ToU tariff, this figure was 80%.

Trust is equally as important as knowledge and understanding. We found that participants did not trust suppliers to prioritise customer benefits. With full results in Table 5, some key figures show that:

- **More than half of the participants reported not trusting suppliers** to give them the best deals on time-of-use tariffs
- Nearly half of the participants believed that **ToU tariffs are only for the financial benefit of suppliers**, and that **ToU tariffs will lead to unfair pricing** (e.g. being charged more during peak times).

These data indicate the value of providing more information about the benefits of ToU tariffs, and demand flexibility more generally, from a trusted, non-commercial/independent source.

[25]Ofgem. (2020). *Experiences and perceptions of smart time of use tariffs*. Retrieved from https://www.ofgem.gov.uk/sites/default/files/docs/2020/09/experiences_and_perceptions_of_smart_time_of_use_tariffs_0.pdf.

Table 5. Perceptions of ToU tariffs

	Completely agree	Somewhat agree	Somewhat disagree	Completely disagree	I don't know
During certain times of day, more electricity is used nationwide, putting the electricity grid under more pressure	51%	31%	6%	3%	9%
Some electricity providers offer incentives to use electricity in off-peak times	29%	41%	7%	2%	21%
You need to own a smart meter to have a time-of-use tariff[26]	19%	24%	12%	6%	40%
I do not trust electricity providers to give me a good deal on a time-of-use tariff	19%	34%	22%	6%	20%
I think suppliers only offer time-of-use tariffs to make money themselves	16%	33%	20%	5%	26%
On a time-of-use tariff, I will be over-charged for using electricity during peak times	15%	33%	16%	4%	31%
The cost savings of using electricity at off-peak times are not worth it	11%	25%	31%	11%	22%

***Note**: Sample size 3416. Question: To what extent do you agree or disagree with the following statements?*

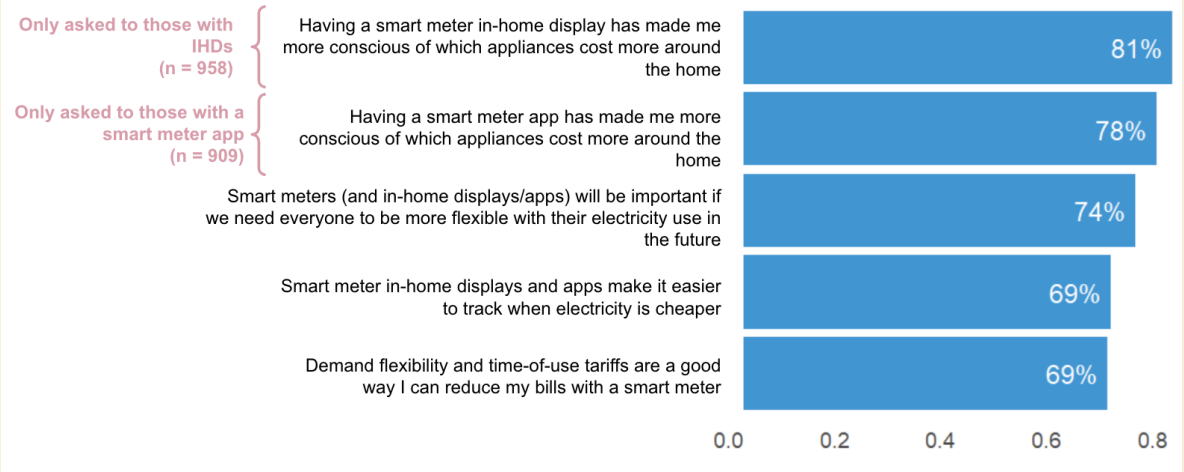
[26]Dynamic time-of-use tariffs require half-hourly readings from a smart meter as they offer pricing that varies frequently and can be dependent on real-time conditions. Static time-of-use tariffs, like economy 7 or 10, usually set rates for specific times far in advance and are available with smart and traditional meters. In future, flexible products and services may be available to customers through aggregators and may not require the customer to have a smart meter.

3.8. Consumers lack the understanding that smart meters are essential to engage in demand flexibility.

We also observe generally low levels of understanding about how ToU tariffs operate – for instance, in our survey, 40% of participants did not know whether or not they needed a smart meter to have a ToU tariff (Table 5 above), and almost a third either disagreed (or simply don't know) that suppliers incentivise consumers for using electricity at off-peak times.

Nonetheless, as Figure 3 below shows, many people did recognise the wider value of smart meters.

Figure 3. Participants' views on the role of smart meters in enabling demand flexibility



***Note**: Sample size = 3416. To what extent do you agree or disagree with the following statements?*

Smart meters are a prerequisite to engagement with modern-day demand flexibility programmes (i.e. excluding Economy 7). But equally, the opportunity to benefit from consumer-led flexibility incentives provided through ToU tariffs could be a good motivator to get a smart meter, particularly as such tariffs become increasingly commonplace and widely known about.

This is why SEGB's recent campaign efforts have included messages about demand flexibility as a motivator to adopt a smart meter. However, it is beyond SEGB's remit to explain and promote ToU tariffs or demand flexibility per se.

We explored participants' understanding of how smart meters enable demand flexibility (see Table 6 below):

- 53% of respondents think smart meters would be moderately to very helpful in encouraging demand flex. While the question measured perceived helpfulness rather than understanding directly, the findings — when considered alongside other evidence, such as the 40% of participants who were unsure whether a smart meter is required for a Time of Use tariff — suggest that understanding is likely to be relatively weak overall.
- However, **for non-smart meter owners, the perceived value of smart meters in enabling demand flexibility was quite low** – 58% of non-smart meter owners thought smart meters would either not be helpful at all or be slightly helpful in encouraging demand flexibility – showing a fundamental lack of understanding about how the two relate.

This implies that greater effort is needed to provide a more holistic understanding of the future energy system – including the connection between the smart meter roll-out, the future of ToU tariffs, and the consumer benefits that both sides of this coin bring.

Table 6. Participants' perceptions of how helpful smart meters would be in encouraging them to use electricity during off-peak times

	Not at all helpful	Slightly helpful	Moderately helpful	Very helpful
Overall	**24%**	**23%**	**32%**	**21%**
Non Smart Meter owner	30%	28%	29%	14%
Smart Meter owner	21%	21%	34%	24%
Non-vulnerable	24%	22%	33%	21%
Vulnerable	23%	25%	31%	21%

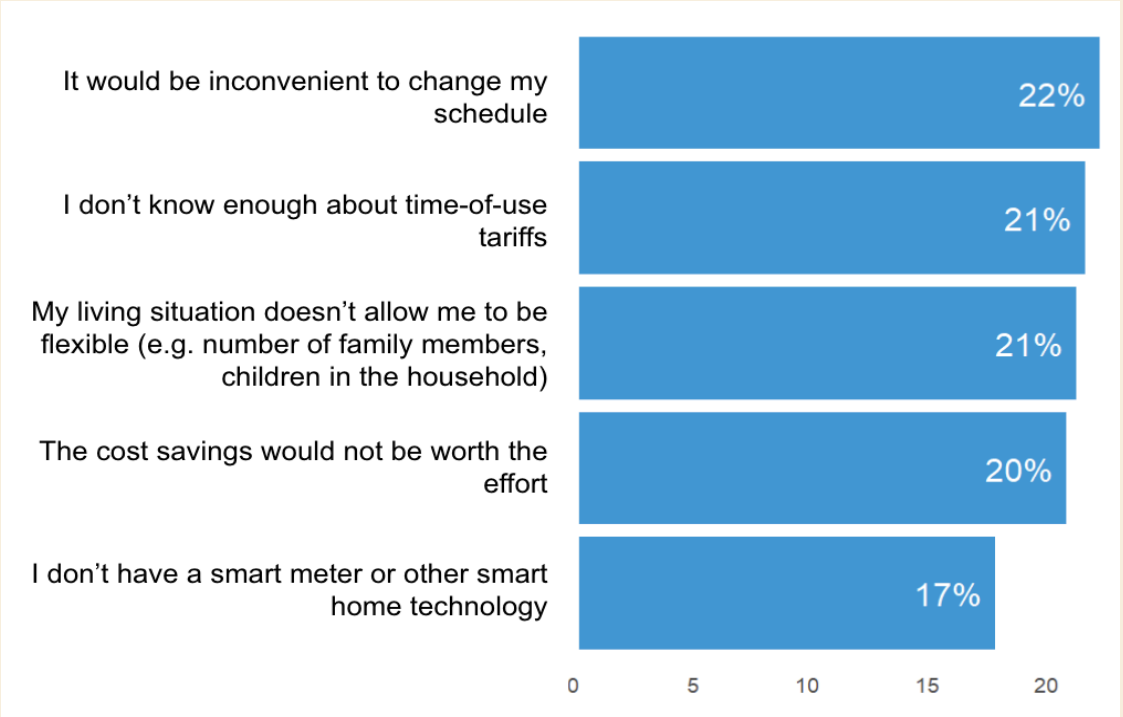
4. Findings Part 2: Behavioural barriers and drivers to engaging with demand flexibility

4.1. Key barriers include perceived inconvenience, sensitivity to costs and rewards, and incompatible lifestyles

Awareness and understanding are requisites for initial engagement with demand flexibility. However, once the schemes become more familiar and widely understood, it is important to consider other barriers to participation.

- **87% felt there were barriers to participating in demand flexibility.**[27] Figure 4 shows the top 5 barriers – relating to inconvenience / inability to flex, inadequate incentives to do so, and not having a smart meter.

Figure 4. Top 5 barriers to consumer engagement with demand flexibility



***Note**: Sample size = 3416. Question: There are also a variety of barriers that might make someone choose not to use electricity at off-peak times. Which of the following statements do you agree with? Please select all that apply.*

[27] This finding relates to the percentage of people who selected at least one barrier in response to the question: *There are also a variety of barriers that might make someone choose not to use electricity at off-peak times. Which of the following statements do you agree with?"*

Our qualitative findings also indicate that households feel constrained by conflicting and inflexible routines, work and family demands (e.g. having young or newborn children at home) and operational requirements.

"We are a household of 5 with a newborn and the rest of the kids are under 18. So to achieve this is virtually impossible with the washing going on all day and the mess that they generate and the amount of food…I find that a massive task." (Smart meter owner)

For small business owners, inconvenience and unsuitable business conditions were the most common unprompted barriers. This was mentioned by businesses operating within set opening hours (e.g. retail) and those for whom energy use was essential for operational needs. Some small business owners also mentioned that ToU tariffs don't suit regular business hours.

"My shop is in a small town – people come in when they want to and that's always between 9 and 5. I just can't see it working for me." (Gift shop business - smart-meter owner)

The perception that the cost savings would not be worth the effort required to engage in demand flexibility was another important barrier to engagement with demand flexibility – while prevalent amongst 20% of survey participants, this was frequently mentioned within our qualitative research. Focus group participants believed that the money saved from engaging in demand flexibility would currently not be substantial enough to motivate them to do it. They also expressed the need for additional incentives like free heat pumps or solar panels.

"At the moment I won't save much. You know it's successful when you save like 21p an hour. The savings need to be big enough for it to be worthwhile. I've got too many other things to do." (Vulnerable consumer)

Small business owners also believed that savings would be insignificant, either because the business already had low bills or that the bills were so high that the savings from switching to ToU tariffs would have to be very large to justify the effort.

"I'd like to save at least 20-30% because there would be quite a lot to change and I might not get much out of it." (Deli business - non-smart meter owner)

Low-income households often face additional barriers to engaging in energy efficient behaviours, such as a lack of information or sufficient funds and resources.[28]

[28]Ugarte, S., van der Ree, B., Voogt, M., Eichhammer, W., Ordoñez, J. A., Reuter, M., ... & Villafafila Robles, R. (2016). Energy efficiency for low-income households.

However our research showed that for demand flexibility, there were minimal or no differences in the reported percentages for barrier perception between vulnerable and non-vulnerable groups. Responses to the full list of barriers explored can be found in Appendix 5.

4.2. Personal cost savings were the strongest motivator

Consistent with previous findings in the literature,[29] and with conventional wisdom in the energy sector, cost savings on electricity bills were the top driver to engagement with demand flexibility within our research - albeit noting the above points that these savings may have to be significant to be an effective motivator. Currently estimates are that £10 per month savings are realistic,[30] but when asked to quantify the amount they would expect or want to receive to participate, values varied by were generally higher than this figure.[31] We take this insight with a pinch of salt – people often overstate what they should be rewarded when asked such questions, and this is also in the context of having minimal real-world experience with consumer-led flex.

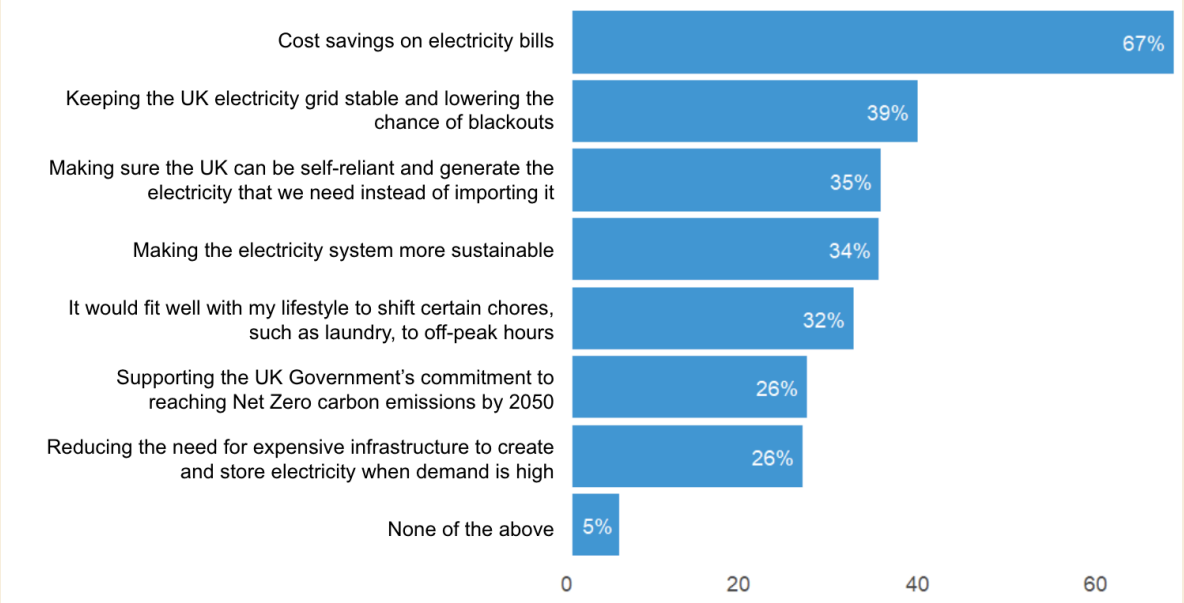
Most people who have engaged previously have done so manually and with some effort. Our takeaway from this data is that we should not be complacent about the likelihood of consumers participating in return for very small incentives, if effort is required. Therefore, it is important to make participation as easy as possible. This likely means automating, and/or prioritising so that consumers can save the greatest amount with the least effort/fewest actions possible (e.g. focussing primarily on EV charging and automatic thermostatic control of heat pumps). Based on our data, it seems unrealistic to expect a majority of consumers to arbitrage energy prices by manually, and routinely shifting when they wash their dishes, do their laundry, watch TV or cook their meals, for a few pounds per month.

[29] National Grid ESO. (2023). *Household engagement with the Demand Flexibility Service 2022/23*. Retrieved from https://www.nationalgrideso.com/document/282981/download

[30] National Grid ESO. (2023). *Household engagement with the Demand Flexibility Service 2022/23*. Retrieved from https://www.nationalgrideso.com/document/282981/download

[31] Survey participants were asked to answer in an open-text format the amount they want to save on monthly electricity bills, through questions like: "*Approximately how much money would you want to save on your electricity bill every month for shifting your electricity use to off-peak times? Please give an answer in £.*". We then calculated the median amount across participants to; mean was not calculated as the risk of outliers skewing the mean would reduce validity of the outcome.

Figure 5. Drivers to engagement with demand flexibility



***Note**: Sample size = 3416; Question: There are a variety of reasons that might encourage someone to use electricity at off-peak times. Which of the following reasons are important to you? Please select all that apply.*

This perspective was shared by household consumers and small business owners in our focus groups and interviews.

"The cost savings would obviously be key. If they added up to a fair amount over the month, and were a larger proportion of my bills instead of just pennies, I would be motivated to [engage in demand flexibility]." (Non-smart meter owner)

"It takes pressure off the grid to avoid peaks and troughs so suppliers can provide consistent energy. It's also good for the environment, but first and foremost is the money saving benefit." (Office business - non-smart meter owner)

4.3. National benefits like energy security and sustainability are also seen as important.

Previous research by the NESO suggests that contributing to the national collective effort is considered an important benefit to engaging in demand flexibility.[32] In our research too, we found that while consumers were mostly unaware of the national benefits, when prompted, they agreed it was also important to contribute to a more secure and self-reliant national energy system. These data can be seen in Figure 5 above – avoiding blackouts, and helping to make the UK energy system

[32] National Grid ESO. (2023). *Household engagement with the Demand Flexibility Service 2022/23*. Retrieved from https://www.nationalgrideso.com/document/282981/download

self-sufficient and more sustainable are all in the top 5 motivators to engage. Though, some way behind individual cost savings.

Also notable, is that simply supporting Net Zero targets (which themselves are not that well understood) was less meaningful to people. The implication from one focus group participant was that efforts were being made to 'hit targets' regardless of (or in spite of) delivering real consumer benefits.

"The government has just got these targets to meet for these smart meters to be in place and to reduce carbon footprint, I wouldn't trust them." (Smart meter owner)

4.4. Many are willing in principle to engage in demand flexibility with several actions, though not all actions are perceived as easy

We measured both willingness to shift electricity use, and perceived ease of doing so, for a range of different activities. Looking at both the specific actions and the aggregates reveals a number of interesting points.

- **32% reported that demand flexibility would fit well with their lifestyle**.
- **Half (50%) thought it would be *easy* to shift their electricity use to off-peak times (Appendix 6),** but this varies greatly across different actions (Figure 6 below) – EV charging, dishes, and laundry were the top actions.
- **Overall willingness to shift was 74% - higher than perceived ease**, either suggesting that people are willing to do it *despite* some hassle, *or* that they are 'willing in principle…*but* it might be difficult in practice'

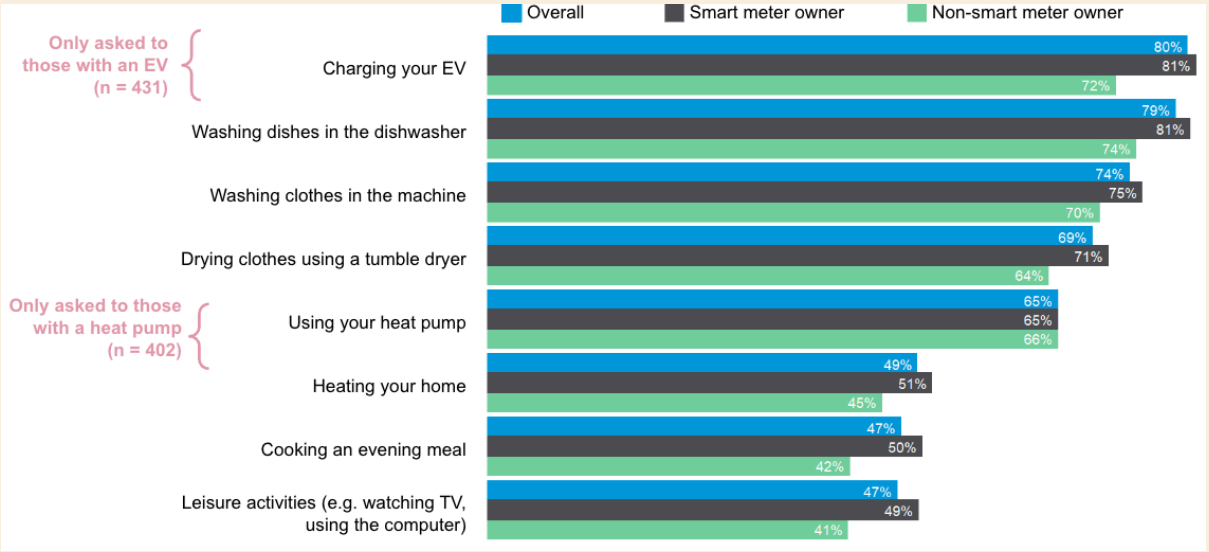
Participants reported that they would find it more difficult to shift behaviours that were seen as either essential and typically more rigidly time-tabled (such as cooking an evening meal) or ongoing (such as heating their home), or those that were for leisure and entertainment such as watching TV or using the computer. These data are broadly intuitive – it is typically more inconvenient to give up planned leisure, allow an occupied room to go unheated, or change meal plans, than it is to do the laundry at a different hour.

We also found on average that **smart meter owners would find it easier** to shift all of the listed daily household behaviours compared with non-smart meter owners. This may be because smart meter owners are more energy literate, though we can't confidently claim causality here since smart meter adoption is self-selected.

We might also expect smart meters to increase the motivation to demand flex, and indeed we find **that willingness is also higher across all actions among smart meter owners**.

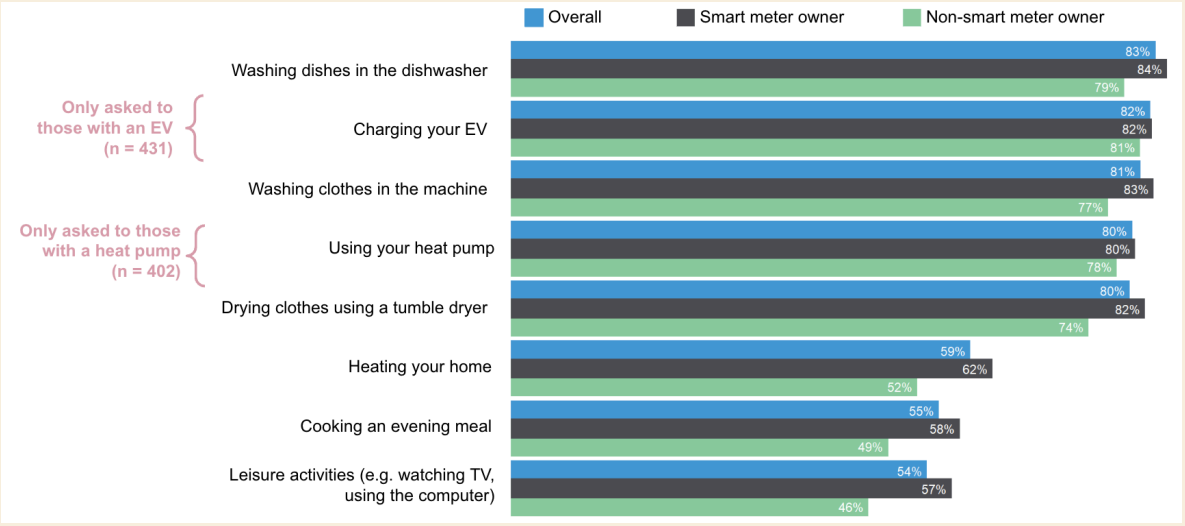
"I've got a number of letters come in asking if I can be flexible during peak times… it is pretty clear what they mean and I'm fairly frugal and careful anyway especially since having a smart meter installed." (Smart meter user)

Figure 6. Perceived ease of changing daily household behaviours to engage in demand flexibility



***Note**: Sample size = 3416; Question: Please rate each of the following behaviours according to how easy or difficult you would find them to shift to off-peak times.*

Figure 7. Participants' willingness to shift their daily electricity use to off-peak times



***Note**: Sample size = 3416; Question: Please rate your willingness to adjust each of the following behaviours according to off-peak times.*

Within focus groups and interviews, we were able to understand more about the conditions under which people were willing to engage in demand flexibility. For domestic consumers, apart from significant cost savings, suppliers would have to offer options that were seen as **fairer and flexible** (e.g. trial demand flexibility schemes which allow them to retain control over their electricity use while trying new behaviours). This is a logical way to address perceived risk and uncertainty, closely related to trust.

"They should run something on a trial basis for 3 months or so with no commitment required. Like what water companies do. So you can see for yourself how much you might save with the ability to switch back too." (Non-smart meter owner)

Small business owners were willing to engage in demand flexibility in the future, but some didn't see how it would be possible within their business constraints; for them, **tariff offerings and communications needed to be tailored to business hours and operations.**

We also found no notable differences in reported ease and willingness to flex, between vulnerable and non-vulnerable groups.

5. Findings Part 3: The future of energy

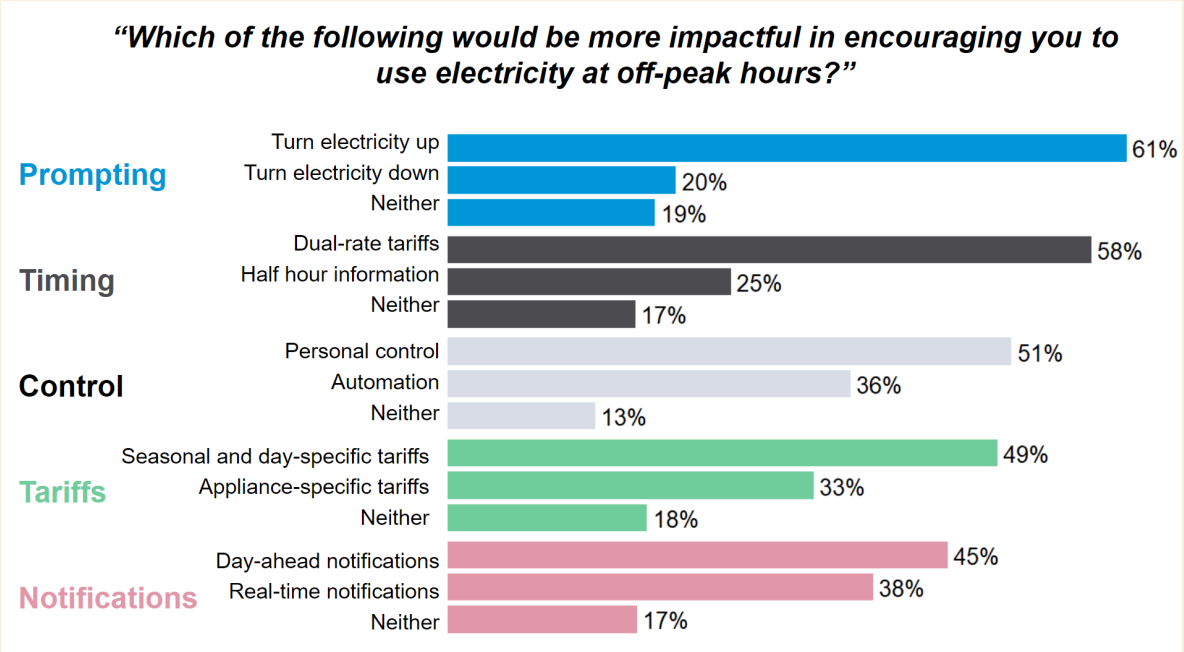
The future of electricity consumption will look quite different. Through our research we explored people's perceptions of potential futures, spanning **i)** perceptions about what may facilitate future engagement with demand flexibility, **ii)** perceptions of automation in the home, and **iii)** the role that smart meters may play in future home energy practices.

5.1. People want to see more support with demand flexibility, and options which more clearly benefit the consumer over suppliers

In our survey and interviews we explored people's expectations about what would encourage them to use electricity flexibly by presenting a range of potential future scenarios. We explored different types of prompts, flexibility timings, levels of control/automation, tariff options, and notifications (Figure 8).

- **Across all scenarios explored, 80% said they would want support with demand flexibility**
- Preferences were mixed when it came to automation, timing of prompts, and different tariff types (e.g. appliance vs time-specific tariffs) (Figure 8). For instance:
    - **Positive framing:** 6 in 10 people prefer prompts for when you can use more energy rather than being told to turn electricity down, i.e. positive incentives/savings, rather than disincentives/price peaks.
    - **Simple pricing information**: 6 in 10 prefer being given 2 different prices in a given day (on and off-peak), rather than continuous or ad-hoc variation.
    - **Control over energy use vs. automation:** Half of the participants preferred the idea of remaining in control of shifting electricity during on- and off-peak windows and a third of them preferred automation.
    - **Temporal vs appliance-based tariffs:** 1 in 2 prefer seasonal and day-specific tariffs, and 1 in 3 prefer appliance-specific tariffs.
    - **Timing of notifications:** 1 in 2 would prefer day-ahead notifications, and 2 in 5 would prefer real-time notifications.

Figure 8. Participant perceptions about which solutions would best encourage them to engage with demand flexibility in the future.



Note: *Sample size 3416. Descriptions of the various interventions are provided below:*

- ***Prompting you to turn electricity down:*** *Your energy supplier incentivises you to use* ***less*** *electricity at a certain times (e.g. free energy if you use less than a certain amount)*
- ***Prompting you to turn electricity up:*** *Your energy supplier incentivises you to use more electricity at a certain time to unlock cost benefits (e.g. free energy if you use more than a certain amount)*
- ***Half hour info:*** *Your energy supplier gives information about electricity prices that are different every half hour.*
- ***Dual-rate tariffs:*** *Your energy supplier gives just 2 different electricity prices in a given day (peak, and off-peak), rather than the price changing every half an hour.*
- ***Automation:*** *Based on your needs, your home automatically reduces electricity use during peak times, and increases use during off-peak times (e.g. EVs, washing machines charge and run after 7pm)*[33]
- ***Personal control:*** *You monitor when peak and off-peak times are and adjust electricity use to fit them.*
- ***Seasonal and day-specific tariffs:*** *Suppliers offer you special rates for shifting electricity use to off-peak times during certain seasons or days. For e.g. cheaper electricity during winter nights or Sundays).*
- ***Appliance-specific tariffs:*** *Suppliers offer you special rates for using specific appliances during off-peak times, e.g. lower electricity rates for charging your EV/running your dishwasher overnight).*
- ***Day-ahead notifications:*** *A day in advance, your energy supplier sends you information about the price of electricity at different points throughout the next day via text, email, push-notifications. Prices might be different every half hour.*
- ***Real-time notifications:*** *In real-time (e.g. half an hour in advance), your energy supplier sends you information about the price of electricity as it changes throughout the day via text, email,*

[33]Participants were not explicitly told that automation would operate as a default that could be overridden at any time, which may have influenced concerns about loss of control.

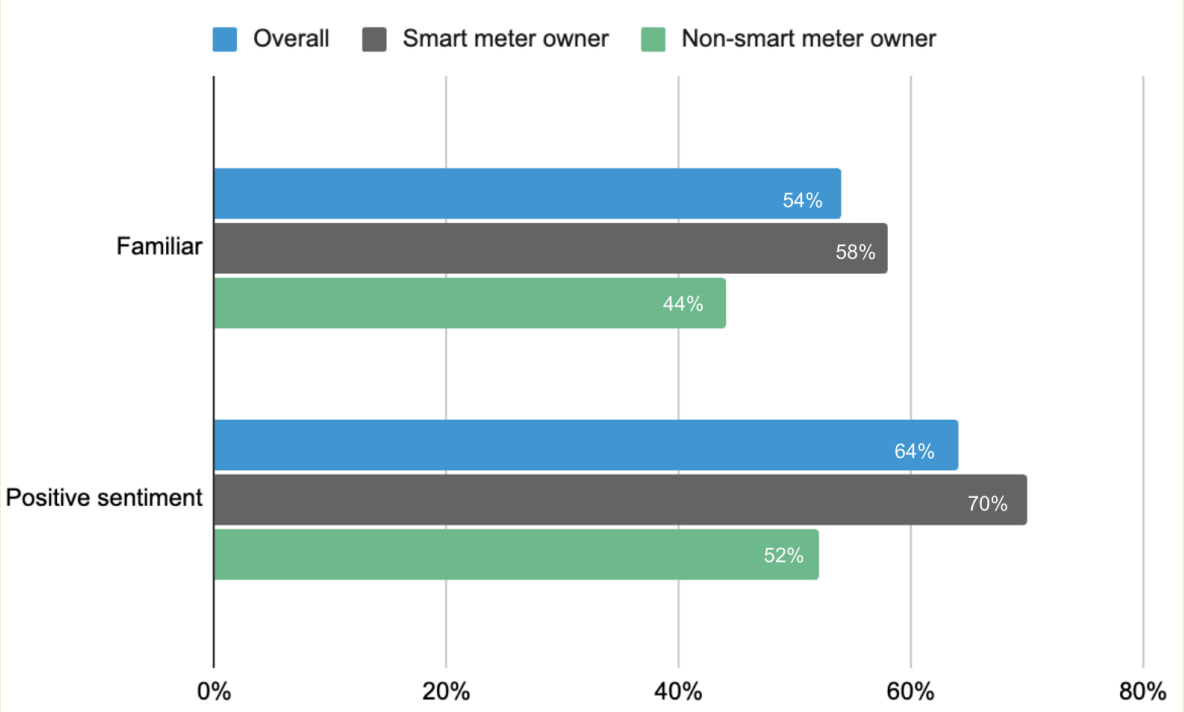
push-notifications. Prices might be different every half hour.

In addition to enquiring about the types of demand flexibility people would prefer in the long term, we also asked participants to rank the most important characteristics of future demand flexibility initiatives.[34] Participants wanted future energy schemes to **maintain convenience (28%), save them sufficient money (24%), and also allow them to retain control over their electricity use (20%).** The need for convenience alongside some dislike of automation highlights the difficult balance that will need to be struck to maintain trust whilst maximising engagement.

5.2. Automation is broadly unpopular, and least popular for the biggest loads: EVs and heat pumps

We included more detailed questions on automation in the survey. Just over half claimed they were familiar with the idea, and two-thirds viewed it positively in the context of it being beneficial for the grid / system / future overall. Again, these figures are higher for smart meter owners.

Figure 9. Familiarity and sentiment towards home energy automation



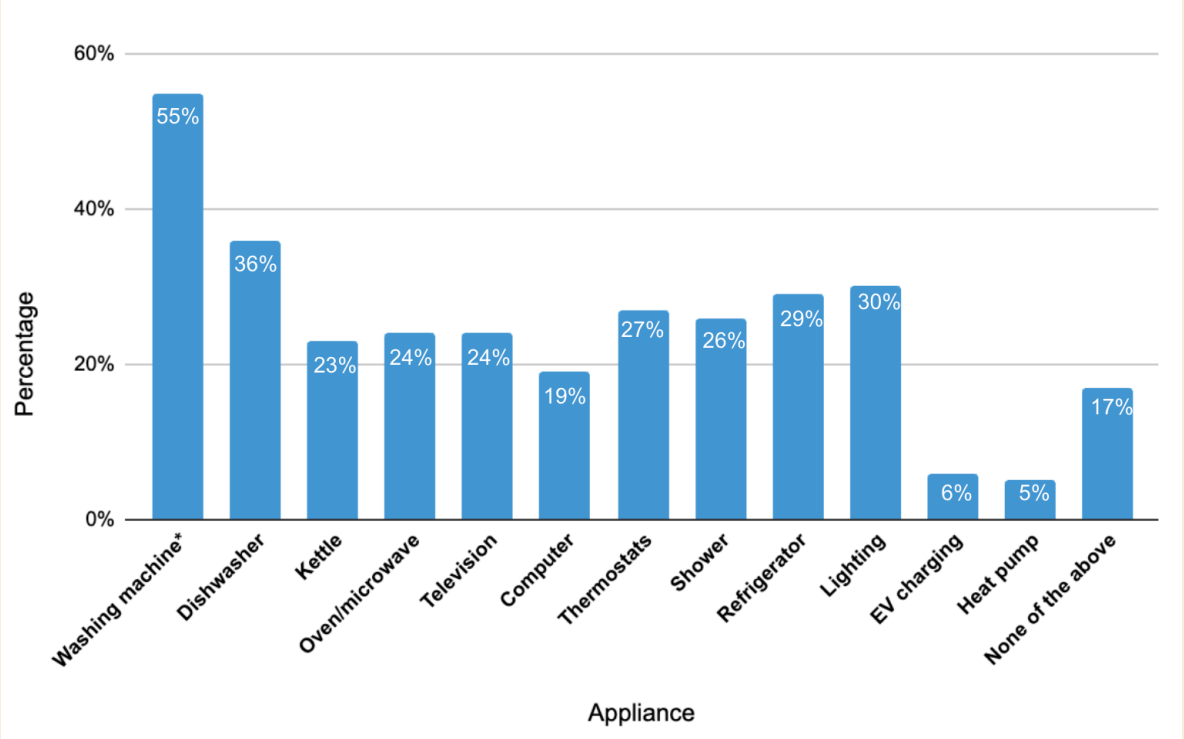
Note: *Sample size = 3416. Graph shows the % of total participants who self-reported familiarity and positive*

[34] The following characteristics of future demand flexibility initiatives were given as options: (Simple) Be simple to use (e.g. making the peak and off-peak time slots easy to understand), (Automated) Be automated where possible, (Control) Allow me to retain control over how and when I use energy, (Cost) Maximise cost savings, even if the process is more complex, (Quality) Allow me to maintain my quality of life or current ways of living.

sentiments towards automation in home energy technologies. Participants were asked: (Familiar) How familiar are you with the concept of automation in the electricity sector and smart appliances?; (Positive sentiment) How do you feel about the increased ***automation of the electricity sector and the use of smart appliances in your home?***

But as seen in Figure 10, levels of acceptance for automation were more varied and significantly lower overall when prompted to think about how it might apply to specific activities and appliances. In all cases except washing machines, a clear *minority* were comfortable with it. Moreover, **EV charging and heat pump use were particularly unpopular**. Moreover, this isn't just a case of people without EVs and heat pumps being uncomfortable with unfamiliar scenarios: **even among those who have these technologies (13% and 12% of our survey sample for EVs and heat pumps respectively), only a small percentage were comfortable with automation for those technologies**.

Figure 10. Percentage of people who are comfortable with automating different household appliances for flexible electricity use



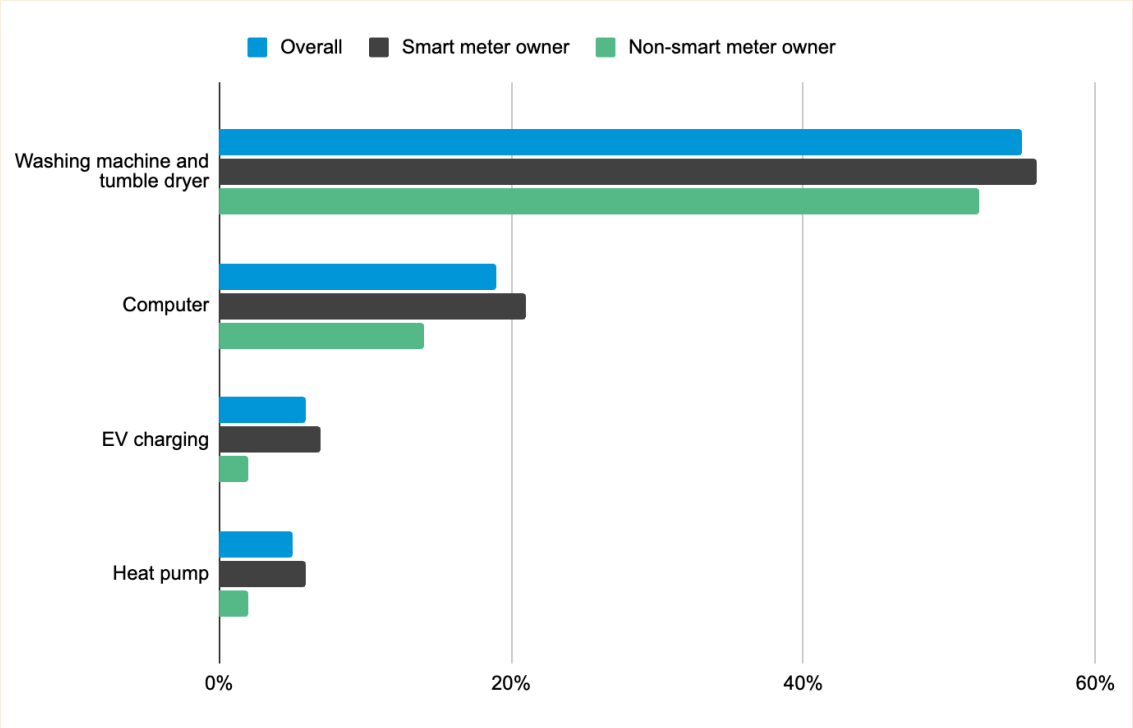
**** Washing machine and tumble dryer***

Note: *Sample size 3416. Sub-group data (smart meter owner vs. no smart meter) displayed in Appendix 7. Question: In the future, which of the following appliances, if any, do you feel comfortable automating in the future so that they use electricity efficiently as per time-of-use tariffs based on your convenience (e.g. you may want your dishwasher to run between 9 am-6 pm while you're at work)? Please select all that apply.*

This is cause for some concern: these two use-cases are likely to form the backbone of demand flexibility, accounting for a very significant portion of household electricity use in the future. They are also technologies which are highly suited to flexibility and automation in principle. Again, we believe this highlights the importance of building trust – but also, again, it is natural to be sceptical of unfamiliar technologies. These attitudes may change once information and familiarity increases, and benefits start to become more real for more consumers.

As Figure 11 shows, once again we see that smart meter owners are more comfortable with the future of automation.

Figure 11. Percentage of participants (overall, smart meter owners and non-smart meter owners) comfortable with automating different types of appliances for flexible electricity use in the future

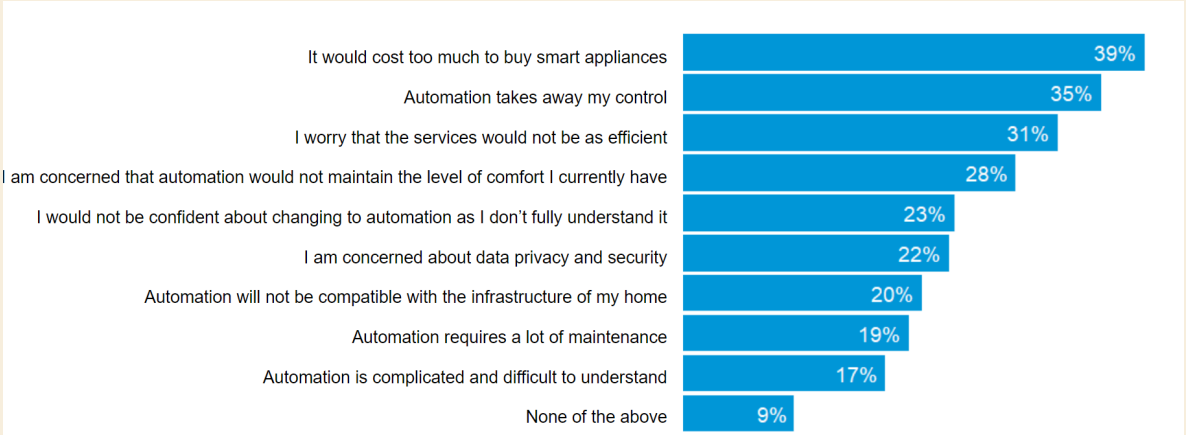


Note: *Sample size = 3416. Q: In the future, which of the following appliances, if any, do you feel comfortable automating in the future so that they use electricity efficiently as per time-of-use tariffs based on your convenience (e.g. you may want your dishwasher to run between 9 am-6 pm while you're at work)? Please select all that apply.*

5.3. Objections to automation include upfront cost, loss of control, and unfamiliarity with the technology

A range of barriers and objections to automation were revealed through the survey, summarised in Figure 12 below.

Figure 12. Percentage of participants who agreed with the following drawbacks of automation.



Note: *Sample size 3416. What would the drawbacks, if any, of an automated energy system be for you? Please select all that apply.*

A recurring concern was the perceived loss of control over appliance use. While some survey wording (e.g. "based on your convenience") may have implied flexibility, we did not explicitly state that automation would operate as a default that could be overridden at any time. This lack of clarity may have contributed to control concerns. The findings nonetheless highlight that control is a central theme in consumer responses to automation – and suggest that if automation is to be more widely accepted, it will be important to clearly communicate that users can override automated settings at any time.

6. Findings Part 4: The role of communications

6.1. There is a good case for a communications strategy for consumer-led flexibility

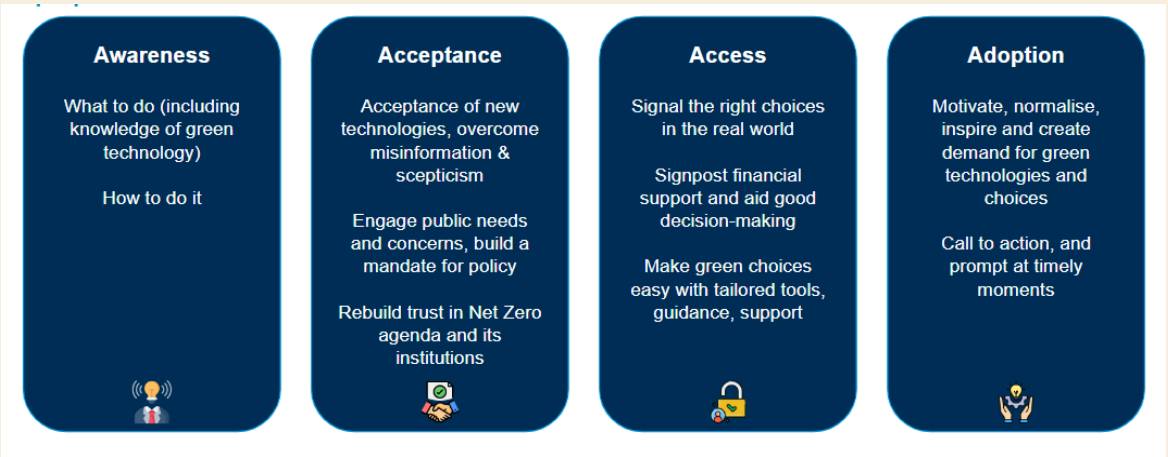
Consumer engagement is important for informing, educating and building trust for the significant behavioural changes, technology adoption, and policy delivery needed to achieve Clean Power 2030 and beyond. Demand or consumer-led flexibility is an important part of this journey, but as our data shows, one which the public are largely not yet familiar with, trusting of, or participating in.

In a recent paper produced by BIT and SEGB[35], we introduced the '4As' model of public engagement and communications for Net Zero. This highlights that communications and information provision can't solve everything (substantive policy, financial support, and technological advancement is necessary), but communications and more effective public engagement can still do a lot, and is a vital foundation for a transition which is effective and embraced by the public. Government has clearly recognised this in the Clean Power 2030 plan.

We can address many of the barriers identified in this research in this way – including fundamental knowledge and understanding of demand flexibility, how to participate well (including knowledge of smart meters, tariffs, and which behaviours to prioritise), trust in the schemes and in the technologies, access to support and advice (including whether or not ToU tariffs are the right choice), and increased motivation to participate through a better understanding of the individual and collective benefits.

[35] The Behavioural Insights Team. (2024). Net Zero communications, marketing and public engagement: Why we need it, and what we can learn from past case studies.

Figure 13. The 4 A's (Awareness, Acceptance, Access and Adoption) Model for effective communications for Net Zero behaviours



6.2. Consumers want information and support

Our evidence suggests that there is support for a campaign to engage the public with demand flexibility. This comes through much of the data already presented, through which many people express a lack of understanding, and a willingness in principle but concerns around trust, complexity, and convenience. But also, we asked directly:

- **74% of participants thought a public communication campaign would help them understand demand flexibility better and encourage them to engage in it**.

Participants reported wanting clear messages about how to make informed decisions about off-peak energy, and why. For instance, participants wanted to know:

- Which **times of the day are peak and off-peak (57%)**
- What the **pros and cons of engaging in demand flexibility would be for them (52%)**
- **How much money they would save** by shifting different daily household behaviours to off-peak times **(60%)**
- What the **overall monthly savings would be for them if they shifted household electricity use to off-peak times (51%)**.

These requirements from a communications campaign were reported consistently across smart meter owners and non-owners, as well as vulnerable and

non-vulnerable populations, emphasising again that different consumer groups are facing similar, foundational barriers to engaging with demand flexibility currently. This is quite unusual – most energy-saving or climate-related behaviours are deeply heterogeneous across the population, needing tailored advice relating to the type of property, heating system, lifestyle, means, access to financial support, etc. It is an indication of just how nascent we are in the journey to consumer-led flex, and the near-universal low knowledge and engagement, that the task at hand is to build the basic foundations of knowledge, trust, understanding, and desirability for *all*.

Moreover, it is particularly important that we get this right in the near-term, before consumers are exposed to an increasingly complex and potentially intimidating energy tariff landscape, and risk making poor tariff choices or taking suboptimal actions in the home that cost them money and further undermine trust.

In interviews, business owners expressed that they also wanted an information campaign that would clarify the best demand flexibility behaviours and their cost benefits (e.g. air conditioning use vs lighting), and personalised recommendations. Here, we would expect diversity to be greater than a typical household, emphasising the need for tailored guidance. One business owner said:

"I need it to work for me rather than me working for it. So regular check-ins from someone to provide advice like before holidays about peak/off peak times and sort of personalised guidance would be helpful." [Deli business - non-smart meter owner]

6.3. Consumers want to hear from their energy suppliers and consumer advice bodies – underpinned by credible expertise and trustworthiness

We also asked participants which messengers were most appealing for leading communication efforts to promote and support consumer-led flexibility. As shown in Figure 14 below, **energy suppliers and consumer awareness and advice bodies emerged as the most desired sources of information**. There was less support for communications from governments and regulators.

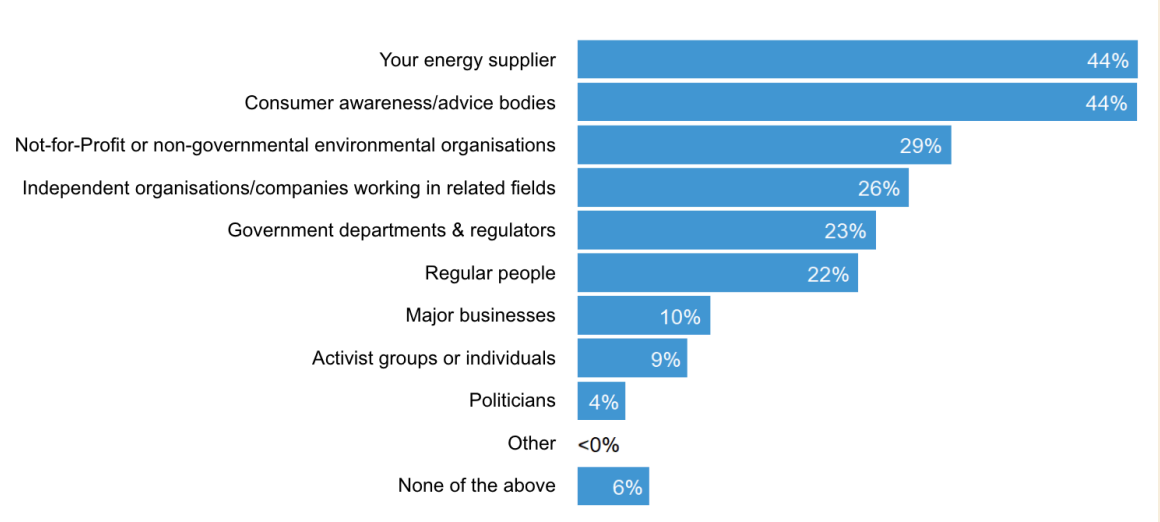
Ultimately, participants wanted **messengers of a campaign to be honest, reliable and trustworthy**, and a clear**, credible expert** (Figure 15). This is very aligned with other surveys we have run on preferred messengers for energy advice and public campaigns – expertise/credibility, and trust/independence from commercial

motives, routinely stand out as the two most important features of a campaign organisation.[36]

Within our qualitative research, we found that participants across groups had reservations about fully trusting Government and energy suppliers for all communications. While energy suppliers are seen to have the relevant expertise, and the direct relationship that matters most, some consumers thought that they may have had ulterior profit-making motives that do not align with public benefits. Trust towards these organisations was also seemingly impacted by their perceived roles in the increase in energy bills over winter 2022-2023. One participant said:

"Even if the government does something like this I would say nobody trusts the government and energy suppliers anymore because they put us in the hole these last few years. It would have to be someone independent." (Smart meter owner)

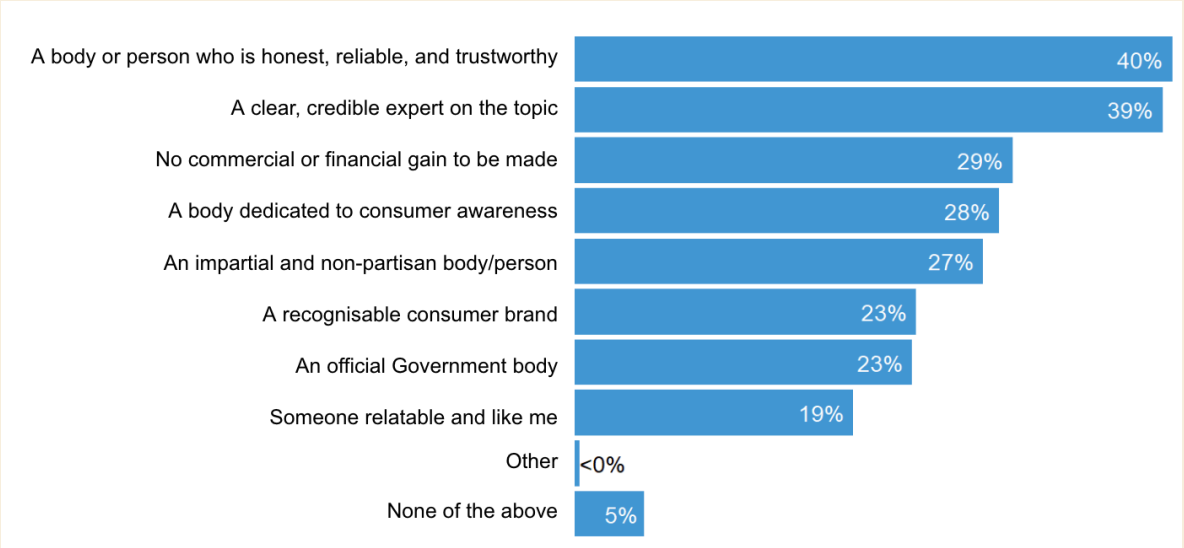
Figure 14. Participants' views on who they want to hear information about demand flexibility from



***Note**: Sample size = 3416. Question: There are multiple different organisations or people who could run an informative and motivational media campaign to help to support demand flexibility. Which of the following characteristics are most important to you when thinking about the kind of organisation or people you'd like to hear from about demand flexibility? Please select up to 3 options.*

[36] The Behavioural Insights Team. (2024). Net Zero communications, marketing and public engagement: Why we need it, and what we can learn from past case studies.

Figure 15. Desired qualities of messengers to lead a public communication campaign about demand flexibility



***Note**: Sample size = 3416; Question: Which of the following groups/people would you be most comfortable with communicating to you about electricity demand flexibility? Please select up to 3 options.*

7. Conclusion and reflections

This research provides valuable insight into the GB public's understanding of and attitudes towards consumer-led flexibility, and highlights some of the many challenges ahead.

The broad picture is that awareness and understanding of demand flexibility is very limited. Where people are familiar with the basic terminology, the know-how required to make good choices and participate effectively is often still lacking. There are of course exceptions to this – some early adopters are already engaging with new schemes, and many others claim to be flexing their demand at least in some capacity, but often not in ways which meet the demands of more sophisticated ToU tariffs of the future.

Alongside this patchy awareness, public willingness to flex, and the perceived ease of doing so, is mixed and highly variable across different activities. Underlying this hesitancy, we observe a range of barriers to participation, including slightly unrealistic expectations about the magnitude of current cost savings, inconvenience, and a desire to maintain control – i.e. a dislike for automation. While these attitudes may shift as the concept becomes more familiar to people, it's nonetheless an important reminder to avoid complacency around common assumptions: assumptions that automated flexibility (for EVs and heat pumps in particular) will provide the backbone of demand flexibility in GB, and that people will be comfortable with this, and engage for quite small rewards. More therefore needs to be done to build trust and acceptance, as well as to make participation worthwhile for people, but also as easy as possible. In particular, this may need a more compelling narrative around the individual and collective benefits.

Small businesses face similar but also additional challenges, particularly in relation to the inflexibility of many of their energy needs, for example when operating to typical business hours, or when production requires energy throughout the day.

More positively, we see two key themes that give us optimism for making demand flexibility a norm rather than a novelty.

First, in almost all cases, smart meter owners are ahead of non-smart meters owners – on awareness, understanding, trust, willingness to participate, perceived ease, acceptance of automation, and more. We can't claim causality here, as it's possible that the early adopters of smart meters were simply the more energy-literate and energy-engaged portion of the population. Nonetheless, it's well established

that smart meters do provide a learning benefit, and being able to observe and engage with one's energy costs in detail, and by the minute, the hour, and the appliance, is clearly an important step towards familiarity with demand flexibility. We therefore expect the continued roll-out of smart meters, and the increasing availability of ToU tariffs, to be two aspects of the transition which help to reinforce and enable each other.

Second, we know from our past work on Net Zero communications, and the data here, that effective communications and public engagement can make a real difference – and is very much welcomed by the public. We see a critical role for communications, from a trusted and credible voice, to help overcome barriers of awareness, understanding, know-how, trust, desirability, knowledge of the benefits, and more. This is why it's so positive that Government plans to consult on consumer engagement with consumer-led flexibility, and we hope that this report provides valuable insight for this process.

Appendices

Appendix 1. Focus groups sample characteristics

Category	Total	Percentage
Total participants = 22		
Male	12	55
Female	10	45
Income brackets		
Less than £24,000	7	328
£24,000 - £50,000	8	36
£50,001 - £80,000	1	5
More than £80,000	6	27
Location		
London	4	18
North-West England	4	18
South-East England	3	14
North-East England	3	14
East Midlands	3	14
West Midlands	2	9.
Scotland	1	5
West Yorkshire	1	5
Wales	1	5
Employment type		
Working full-time	12	54
Working part-time	8	36
Retired	2	9
Smart meter ownership		
Smart meter owners	14	64
Non-smart meter owners	8	36

Modes of bill payment		
Direct debit	17	77
Pre-paid/pay-as-you-go meter	4	18
Payment on receipt of bill	2	9
Digital literacy		
Confident online	21	95
Comfortable online for specific tasks	1	5

Appendix 2. Interview sample characteristics

Category	Total	Percentage
Total participants = 5		
Female	5	100
Male	-	-
Nature of business/industry		
Gift shop/retail	1	20
Hairdressing salon	1	20
Farm	1	20
Delicatessen	1	20
Office	1	20
Location		
East Sussex	2	40
North Yorkshire	1	20
Scotland	1	20
Wales	1	20
Energy supply at work premise		
Electricity only	5	100
Gas only	-	-
Gas and electricity	-	-
Smart meter ownership		

Smart meter owners (for electric only)	2	40
Non-smart meter owners	3	60

Appendix 3. Survey sample characteristics

Table 1. Regions

Region	Percentage
East Midlands (England)	9%
East of England	10%
London	14%
North East (England)	5%
North West (England)	12%
Scotland	7%
South East (England)	14%
South West (England)	7%
Wales	5%
West Midlands (England)	10%
Yorkshire and the Humber	8%

Table 2. Number of child residents per household

Child residents	Percentage
0	57%
1	19%
2	17%
3+	6%

Table 3. Living situation

Living situation	Percentage
Own	53%
Rent	43%
Neither own nor pay rent	4%

Table 4. Education levels

Education	Percentage
Degree	30%
No Degree	67%
None of the above	3%

Table 5. Age

Age	Percentage
18-24	11%
25-54	57%
55+	32%

Table 6. Type of settlement

Urban	Percentage
Rural	21%
Urban	48%
Suburban	31%

Table 7. Disability status

Health	Percentage
Disabled	16%
Not disabled	84%

Table 8. Ethnicity

Ethnicity	Percentage
White	84%
Ethnic minorities	16%

Table 9. Income levels

Income	Percentage
< £25k	34%
> £25k	66%

Table 10. Gender

Gender	Percentage
Female	53%
Male	46%
Other	<1%

Table 11. Number of residents in the household

Total Residents	Percentage
1	17%
2	32%
3	22%
4+	29%

Table 12. Employment status

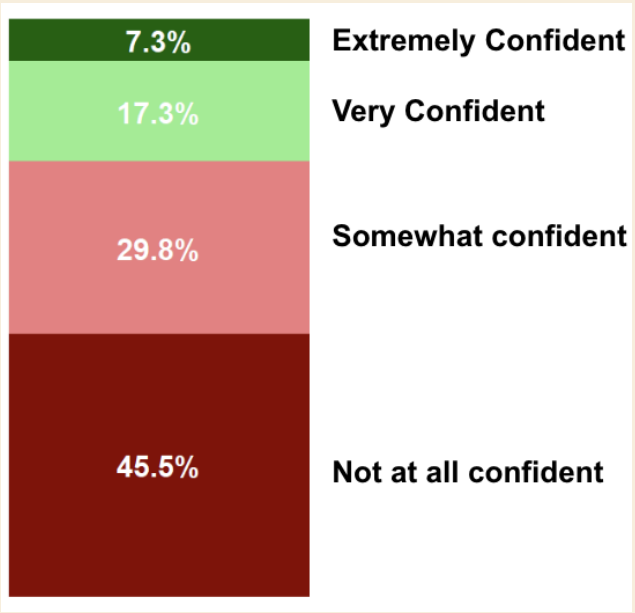
Employment	Percentage
Employed	66%
Unemployed	34%

Appendix 4. Awareness and understanding of demand flexibility

Table 1. Percentage of people who identified all the benefits of demand flexibility correctly

Group	% who identified all correct responses
Overall	10%
SM owners	9%
Non-SM owners	11%

Figure 1. Participants' overall levels of confidence in explaining to someone how to sign up for a ToU tariff



Sample size 3416; Question: How confident would you feel in explaining to someone how to sign up for a time-of-use tariff?

Appendix 5. Barriers to engagement with demand flexibility

Table 1. Differences in barrier perception between smart meter owners and non-owners, and vulnerable and non-vulnerable groups

		Smart meter ownership		Income group	
Barrier	Overall	Smart meter owner	Non-smart meter owner	Less than £25,000	£25,000 and over
It would be inconvenient to change my schedule	22%	21%	23%	17%	24%

I don't know enough about time-of-use tariffs	21%	21%	22%	24%	20%
My living situation doesn't allow me to be flexible (e.g. number of family members, children in the household)	21%	21%	21%	19%	22%
The cost savings would not be worth the effort	20%	20%	21%	17%	22%
The cost savings would not be worth the effort	17%	7%	41%	17%	17%
The impact of my actions alone will not make a difference	15%	15%	13%	13%	16%
I'm already flexible enough	14%	14%	14%	15%	14%
I am not confident about making big changes to my routine for a concept I don't fully understand	14%	14%	14%	14%	13%
I think there would be unknown and potentially negative consequences (e.g higher bills)	12%	12%	12%	13%	12%
I can't be flexible due to health conditions (of myself or my household)	11%	11%	11%	14%	10%
I'm concerned about data security if my supplier knows when I'm using electricity	10%	10%	11%	9%	11%
I don't understand how it would help me	9%	9%	10%	11%	8%
I don't understand how it would help the electricity network or the country in general	9%	10%	8%	9%	9%
None of the above	14%	15%	11%	14%	13%

Sample size 3416. Question: There are also a variety of barriers that might make someone choose not to use electricity at off-peak times. Which of the following statements do you agree with? Please select all that apply.

Appendix 6. Perceived ease and willingness to change behaviours to engage in demand flexibility

Table 1. Perceived ease of and reported willingness to shift electricity use to off-peak times

Measure	Percentage (overall)
Perceived ease of shifting electricity use to off-peak times	50%
Willingness to shift electricity use to off-peak times	74%

Appendix 7. Perceptions of future energy scenarios

Table 1. Table showing the percentage of people who are comfortable automating different household appliances.

	Overall	Smart Meter Owner	No Smart Meter
Washing machine and tumble dryer	55%	56%	52%
Dishwasher	36%	37%	34%
Kettle	23%	25%	19%
Oven/microwave	24%	26%	20%
Television	24%	26%	21%
Computer	19%	21%	14%
Thermostats	27%	27%	25%
Shower	26%	28%	20%
Refrigerator	29%	31%	23%
Lighting	30%	32%	26%
EV charging	6%	7%	2%
Heat pump	5%	6%	2%
None of the above	17%	14%	25%

Sample size 3416. Question: In the future, which of the following appliances, if any, do you feel comfortable automating in the future so that they use electricity efficiently as per time-of-use tariffs based on your convenience (e.g. you may want your dishwasher to run between 9 am-6 pm while you're at work)? Please select all that apply.

Table 2. Financial savings expected in different future energy scenarios

	Saving on monthly bill they would need to justify effort	Minimum monthly saving they would accept	Monthly savings expected from newer appliances (EV & HP)	Savings from future technologies expected when with demand flexibility (EV and HP)
Overall	£25	£20	£25	£25
No Smart Meter	£25	£20	£25	£30
Smart Meter owner	£25	£20	£25	£25
Non-vulnerable	£25	£20	£25	£30
Vulnerable	£25	£20	£25	£25

Note: Values = median. Question: Approximately how much money would you want to save on your electricity bill every month for shifting your electricity use to off-peak times? Please give an answer in £

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