Ofgem call for input

Engaging domestic consumers in energy flexibility

Response from Regen

September 2023

About Regen

Regen is an independent centre of energy expertise with a mission to accelerate the transition to a zero-carbon energy system. We have nearly 20 years' experience in transforming the energy system for net zero and delivering expert advice and market insight on the systemic challenges of decarbonising power, heat, and transport.

Regen is also a membership organisation and manages the Electricity Storage Network (ESN), the voice of the UK storage industry. We have over 150 members who share our mission, including clean energy developers, businesses, local authorities, community energy groups, academic institutions, and research organisations across the energy sector.

Authors

Rebecca Ford, Head of Demand and Flexibility, Regen
rford@regen.co.uk

Tamar Bourne, Head of Innovation, Regen
tbourne@regen.co.uk

Fraser Stewart, Just Transition Lead, Regen
fstewart@regen.co.uk

Tamsyn Lonsdale-Smith, Senior Energy Analyst, Regen
tlonsdalesmith@regen.co.uk

Ellie Brundrett, Markets Lead, Regen
ebrundrett@regen.co.uk

With input from Duncan Law at Community Energy England, and insights and examples sourced through consultation with their members
d.law@communityenergyengland.org

Response summary

Domestic Demand Side Response (DSR) is an important element of future energy systems. It is critical to support the roll out of electric vehicles and heat pumps on low voltage networks. It can also deliver benefits direct to households participating, as well as unlock significant system-wide cost savings compared to deploying centralised flexibility assets.

To support the successful delivery of demand side DSR we recommend:

- Ensuring interoperability across flexibility assets, for example, through developing a common 'plug and play' data ontology.
- Undertaking thoughtful, early, and participatory engagement with consumers.
- Commissioning research to fully explore consumers' motivations, barriers and prompts to participation, and testing and iterating in real world contexts.
- Embedding fairness in DSR design, in terms of inclusive participation and fair distribution of benefits.
- Mapping different DSR journeys for different consumer archetypes to uncover areas where greater support is needed, and empowering trusted local and community stakeholders to provide this.
- Accounting for (1) norms, (2) compatibility with values, experiences and needs, (3) observability of impacts; (4) perceived ease of use, (5) trialability, and (6) credible and trustworthy communication channels *in addition to* clarity, confidence and a compelling provision.
- Addressing barriers such as (1) a lack of trust in the energy industry and DSR technologies, (2) a lack of interoperability between platforms and providers, (3) insufficient value propositions, (4) missing hardware, and (5) perceptions of unfair DSR solutions.

Government, Ofgem, DNOs and local stakeholders all have important roles to play, and must work together to ensure alignment of priorities throughout any process of reform.

Government should: (1) deliver a widespread roll out of smart meters, (2) support high levels and equitable uptake of low carbon technologies through more inclusive policy design, (3) adequately resource local authorities and community organisations to provide non-financial support to consumers along the entire DSR journey, and (4) recognise and resource community organisations, the third sector and local authorities to act as the energy system's 'social conscience' and ensure equitable participation.

Ofgem should: (1) ensure the development of market structures that value flexibility, for example, by valuing avoided carbon, as well as avoided reinforcement, (2) incentivise the growth of local flexibility markets, support interoperability across flexibility assets, and place obligations on DNOs to enable DSR, (3) evolve consumer protection with stronger and more targeted cybersecurity strategies, and (4) ensure learnings from existing projects are shared widely.

DNOs should: (1) enable flexibility and ensure there is adequate capacity to support the uptake of low carbon technologies that underpin DSR, (2) coordinate with local authorities around future system planning, and (3) provide open data to support and drive innovation.

Responses to consultation questions

Q1 – To what extent do you think we are reliant on domestic DSR emerging at scale in the transition to a net zero energy system?

Regen's "A day in the life of 2035" project with National Grid ESO[1] highlights the need for demand side flexibility in net zero energy systems. 80 GW of flexibility is needed to manage variable generation, meet peak demand, ensure security of supply, manage network constraints, and maximise the economic value of renewables when they are available. Demand side flexibility is expected to deliver 20-30 GW of the total flexibility capacity needed in 2035, and over 40GW by 2050[2].

The government estimates that an electricity system that operates flexibly in response to renewable output could reduce costs by up to £10bn a year by reducing the amount of generation and network infrastructure that needs to be built to meet peak demand. Delivering flexibility on the demand side rather than centrally offers the potential for further cost reductions. Whole systems modelling of the impact of smart local energy systems[3] that couple together DSR with low carbon technologies like EVs and heat pumps, shows that system cost savings of £1.1-2.5bn/year depending on levels of uptake across the population.

In addition, without substantial demand side flexibility, capacity on the low voltage networks may prove to be a blocker for the uptake of electric vehicles and heat pumps, which are a core component of the UK's net zero strategy.

Summary: Domestic DSR will be an important element of future energy systems that include high levels of electrified heating and transport, and can offer significant system-wide cost savings compared to centralised deployment of storage. Substantial demand side flexibility will also be key to support roll out of electric vehicles and heat pumps on low voltage networks.

Q2 - Do you think consumers and the system will have greater benefits if DSR is provided as a household proposition or as a service through individual assets (EVs, Heat Pumps)?

In addition to the system wide economic savings that SLES can bring, EnergyREV's modelling shows that consumers who participate will see further benefits. These accrue from different sources: those who provide DSR services could see their cost of electricity drop by about 7%-8%; those who have rooftop PV installed could see a further 30% reduction in bills, while implementing energy efficiency measures in heating would bring another 5%-7% in energy bill reductions.

---

[1] https://reports.nationalgrideso.com/bridgingthegapdayinthelife

[2] Regen (2023) Building a GB electricity network ready for net zero. https://www.regen.co.uk/publications/prepare-britains-electricity-network-for-net-zero/

[3] Aunedi, M., Ortega, J.E.C. and Green, T.C. 2022. Benefits of flexibility of Smart Local Energy Systems in supporting national decarbonisation. Energy Revolution Research Centre, Strathclyde, UK. University of Strathclyde Publishing. ISBN: 978-1-914241-07-9.

While focusing on the full household proposition may provide greater benefits to end users through enabling benefits to be aggregated across measures, it may be harder to deliver in practice. This is particularly true when looking at automated rather than manual operation, for example, due to device and data interoperability.

To enable household propositions to work in practice, each appliance must be integrated into a household system that manages demand on a hyper-local scale. Devices will need to be compatible with each other, meaning service providers will need to ensure interoperability across all appliances included in any service. For true seamless interoperability, plug and play operation must be facilitated through a common data ontology[4], so that new devices, types of device, and functions can be introduced without disrupting the functionality of existing systems.

However, the success of any DSR system, whether provided as a household service or through individual assets, is heavily dependent on successful smart meter rollout to enable aggregation of energy asset consumption data. In addition to reading accurate consumption signals, systems need to have the functionality to send signals to appliances and integrated systems when local constraints need to be managed.

Summary: The financial benefits of DSR are likely to be greater when provided as a household proposition. Interoperability is crucial for ensuring that interactions between energy smart appliances and the energy system are safe, secure, and efficient. Government, working with Ofgem, must ensure widespread and equitable smart meter roll out, and support the development of a common 'plug and play' data ontology for a fully integrated DSR model.

Q3 – How do you envision consumer relationships and engagement will change through the introduction of DSR?

As highlighted in the call for input, in the future domestic consumers could enter into relationships with multiple providers in order to service their energy needs, such as a traditional supplier managing their 'static' demand and a separate market participant managing their flexible demand.

This is already beginning to happen, with new market entrants such as battery storage operators/aggregators and EV providers engaging directly with consumers to manage their flexible load. Examples include Tesla, who aggregate their batteries installed in customers' homes into a single portfolio which is used to provide flexible services directly to the grid, bypassing the supplier entirely. Customers can link this service to their energy tariff via the Tesla app[5], but the onus is on the consumer to manage these one-to-many relationships, which can lead to issues of inefficiency, poor communication or, crucially, interoperability.

The challenge this can present for consumers is evidenced by the lived experience of Community Energy England members, one of whom highlights: "*I've just signed up to Octopus Flux, which is essentially a ToU tariff allowing me to benefit from a cheaper off peak rate to charge may battery, and a higher peak export rate to export to grid. The problem I'm having is one of interoperability.*

---

[4] Morris, E. and McArthur, S. 2023. Data ontologies: A key tool for plug and play in smart-energy places. Energy Revolution Research Centre, Strathclyde, UK. University of Strathclyde Publishing. ISBN: 978-1-914241-40-6
[5] https://www.tesla.com/en_gb/support/energy/powerwall/mobile-app/electricity-tariffs

Huawei (through the Fusion Solar app) lets me program the time of charge and discharge of the battery, but it won't 'talk to' the smart mater to allow the battery to export to grid during the discharge time - I can self consume from the battery at this time, but it won't push the battery's charge onto the grid independently at the time I specify in the Fusion Solar App. My installer said that they'll work it out in time... not great for the consumer when signing up to a tariff that then proves unworkable with the tech you may have. A bit like the issues with SMETS1 and SMETS2 smart meters, lots of wasted investment due to a lack of common standards for interoperability."

The decentralised, innovative nature of our electricity system means that consumers may increasingly find themselves managing these one-to-many relationships. As such, it is vital that propositions are developed with interoperability in mind, requiring strong alignment and collaboration from all stakeholders in industry to ensure integration across platforms and providers – Ofgem also has an important role to play in supporting this.

Summary: It is possible that in the future consumers will engage with multiple stakeholders to manage their energy needs. Ensuring the interoperability of energy propositions provided by stakeholders across the industry will require strong alignment and collaboration from Ofgem and industry and is vital to ensure that consumers are able to manage these one-to-many relationships successfully.

Q4 – How do you think consumers should be engaged on the nature and value of DSR? Do you think different consumer archetypes need to be engaged in specific ways, if so, which archetypes and how?

Public consent is critical to unlocking the value of DSR, particularly as it involves changes within their homes and has the potential to impact on their day-to-day activities. Early and ongoing engagement is important to build trust and enhance outcomes.

Participatory approaches to engagement is also important as it will help ensure consumers' needs and values are understood, and embedded into solutions. This will ultimately drive greater support for DSR, and more widespread uptake. Meaningful and well-designed engagement strategies can help enhance awareness, support, trust, and adoption of DSR. This is important for the energy sector, where public trust in energy utilities is generally low, and awareness of flexibility (and how to deliver this) is not well understood.

Innovation designed to be adopted by customers, such as DSR, often fails because the resulting products or services do not align with customers' needs or values, or because innovation fails to account for challenges beyond the technical. This is typically seen when innovation is done 'to' people and communities, rather than with them (see Figure 1), taking an approach to engagement that is limited, and relies on informing and educating[6]. These practices are non-inclusive, one-way, linear information exchange, and are not particularly empowering. They also come too late in the process, and focus on teaching people how to engage with solutions that are already developed.

---

[6] Roberts JJ, Gooding L, Ford R and Dickie J (2023). Moving From "Doing to" to "Doing With": Community Participation in Geoenergy Solutions for Net Zero—The Case of Minewater Geothermal. Earth Sci. Syst. Soc. 3:10071.

Figure 1: Ladder of participation

While a 'develop and inform' approach may work for early adopters, different approaches will be needed to support the uptake of DSR more widely. This is particularly true for those groups of people who are typically excluded or underserved in the energy system, or at risk of exclusion from future smart energy products or offerings[7]. By engaging with these groups and bringing them into the process earlier, it is possible to better understand what different consumers and communities value, where key challenges lie, and what DSR approaches and solutions better suit their needs.

Community energy organisations and local authorities have a key role to play as the interface between the energy sector and consumers[8]. They are widely recognised as being more trusted than energy suppliers, and they also know their communities better, including how to engage with different – and sometimes hard to reach – segments. While not everyone may want to or be able to participate, it is important that those people who will be impacted by the changes that DSR brings have the opportunity to voice concerns.

Effective engagement needs to be adequately budgeted for, ensuring that there are dedicated engagement staff with the right skills as well as resources to pay for stakeholder time and/or incentives. This includes supporting activities such as:

- Listening to what people care about. This gives insights into what people value and what messages will resonate with different people. Subsequent engagement can be framed around this and tailored as needed for different groups.
- Translating complex energy system and DSR topics into clear and plain English terms. People need simple information in formats they use to ensure they understand technical information.
- Tailoring engagement approaches for different groups. One size doesn't fit all, for example, digital engagement won't work for those not online.

---

[7] Centre for Sustainable Energy (September, 2020). Smart and fair: Exploring social justice in the future energy system. Phase one report and recommendations. https://www.cse.org.uk/resource/smart-fair

[8] InnovateUK and ESPRC (July, 2023). Prospering together: engaging communities in the energy revolution. https://iuk.ktn-uk.org/perspectives/prospering-together-engaging-communities-in-the-energy-revolution/

Summary: We suggest thoughtful and early public engagement is undertaken, tailored to meet the needs, values and context of different groups. Consumers should be engaged through participatory approaches to support the development of DSR products and services that better meet their needs and values.

Q5 – What will the primary motivators be that will encourage consumers to engage with DSR? Do you think these motivators will differ depending on consumer archetype?

Consumers are likely to be motivated by a variety of factors when engaging with DSR. Some consumer archetypes will be ready to assume a small financial risk, as long as medium-to-large risks are guaranteed to be absorbed by the service proposition, to feel that they have contributed to a greater cause. Others will be more concerned with home comfort and modernisation / digitalisation to show that they are ahead of the trend and living a 'good life' through the modern, digital home.

Motivation will also depend on the features of the service offering; for example, motivations (and barriers) to engage with behavioural DSR is likely to be different to those supporting adoption of automated DSR and the technologies that underpin this.

Typically, financial motivations predominate in marketing and rewards around flexibility services or programmes. However, decades of research[9] shows us that motivating people by paying them to reward 'good' behaviour is less effective in the long run. We'd be much better off tapping into more intrinsic forms of motivation that align with people's wider values and norms, such as being a good citizen, acting in line with their peers, supporting their community, or helping address societal or environmental issues.

This is evidenced by more recent work[10] looking at how people make decisions. Decision making happens in one of three ways. Calculation-based decision making means weighing up costs and benefits. Affect-based decision making happens when you follow your gut feeling. And role or rule-based decision making happens when you rely on learned habits or rules of professional, ethical, and social conduct.

Most DSR programmes (most energy programmes for that matter) assume that people follow calculation-based decision making based on costs and financial gain. But gut feelings and social and moral norms are often more powerful, which suggests we need to restructure programmes to support role-based or affective decision making. This is likely to drive better engagement and stronger outcomes, which is especially important if we want to see more active and sustained consumer engagement with DSR.

DSR products and offerings are in their infancy. Understanding what consumers want from a product or service with which they may be unfamiliar, such as DSR, can pose a challenge. Further research, particularly in real world contexts, would be valuable.

---

[9] https://selfdeterminationtheory.org/theory/
[10] Forster, H. A., Bottesini, J. G., Reeck, C., & Weber, E. U. (2021, December 27). Assessing how we decide: Psychometric development of a decision modes scale. https://doi.org/10.31234/osf.io/cd9ak

An approach frequently used is to ask consumers what would motivate them to engage. This captures their stated preferences – what people think they want, and is often related to financial benefits. However, people are not always able to identify (or can misidentify) what they want. There are often underlying factors such as social norms, which people are unaware of, that influence their decisions. These are often more powerful in shaping decisions than stated preferences, but cannot be captured by simply asking people what they want. Instead, they must be uncovered by exploring underlying decision-making psychology.

Past research on smart home technology adoption[11] shows that people tended to report that saving energy or money, and increasing convenience, were their prime motivators. They also reported that the main barriers to adoption were concerns over data privacy as well as an insufficient value proposition from smart home technology. However, analysis of the data showed that their revealed primary motivator was protecting and nurturing their household, and their primary barrier was related to lack of knowledge, complexity of the solution, and costs.
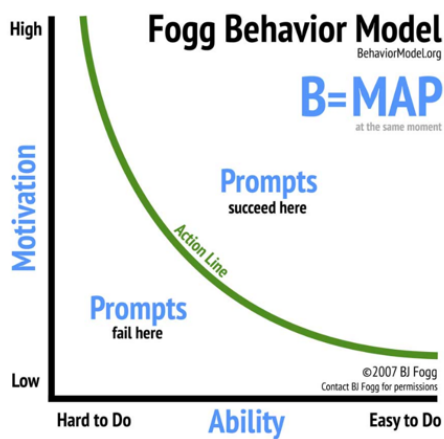
This work, along with longstanding psychological research, shows us the importance of considering barriers (both structural and psychological) and prompts, in addition to motivation.

Work by psychologist BJ Fogg shows how the level of motivation needed for action varies with how easy or difficult the action is. Addressing barriers to participation, such as cost or complexity, can be just as important as motivating consumers. Similarly, action may not happen at all without a prompt, reminding people (and stimulating motivation) to engage in desired behaviours.

Summary: Motivations are complex, dependent on consumer archetype, as well as DSR product and service characteristics. We recommend further research is undertaken to explore stated and revealed preferences of different DSR offerings for different consumer archetypes. We also suggest further research on barriers to participation and prompts to action. Solutions should be tested and iterated experimentally in real world contexts.

Q6 – To what extent should the system wide benefits provided by DSR be shared amongst all consumers, even those who are less engaged or do not participate in DSR?

Past work in related fields suggests that policies that are perceived to be fair are more likely to be supported and adopted[12]. There may be a variety of reasons why people do not participate in DSR, and it is important that fair policy and programme design understands and accounts for structural barriers that may exclude certain groups[13].

---

[11] Sanguinetti, A., Karlin, B., & Ford, R. (2017). Smart home consumers: Comparing self-reported and observed attitudes. In Proceedings of Energy Efficiency in Domestic Appliances and Lighting (EEDAL)
[12] https://www.institute.global/insights/climate-and-energy/polls-apart-mapping-politics-net-zero
[13] Knox, S., Hannon, M., Stewart, F., and Ford, R (2022). The (in)justices of smart local energy systems: A systematic review, integrated framework, and future research agenda. Energy Research and Social Science, Vol. 38

For example, research[14,15] has shown that the Feed-in-Tariff (FiT) scheme, which was successful in supporting the uptake of small-scale renewables, was overwhelmingly adopted by those in higher socio-economic groupings. The social mechanisms of ongoing adoption over the 10-year FiT time period also led to a continual widening of this inequality. This was due to a variety of reasons. Some were financial, but they also related to lack of capacity, resource, understanding, or agency. There is a risk that a similar outcome will be seen with the financial incentives to support the adoption of the low carbon technologies, on which the ability to participate in DSR depends.

Given these challenges and potential for DSR to exclude certain groups from fully engaging, the distributional benefits of participating in DSR are worth analysing in greater depth to ensure fairer and more widely supported policies.

Recent research on smart local energy systems[16], which take a local and community approach to coupling demand side initiatives (including flexibility, energy efficiency and clean heat) with supply side (local renewable generation), demonstrate their potential to deliver wider community benefits beyond those directly participating in the initiative. This was achieved through the development of community benefit funds and local community development trusts.

DSR business models that operate at the local or community level are worth exploring further. This could also enhance participation from those impeded through the lack of appropriate metering technology, as impacts could be measured at the substation level rather than individuals' property level. This also aligns with social science research on motivations for participating, which emphasises the importance of social and moral factors over purely financial outcomes.

In addition, modelling of the benefits of smart local energy systems (SLES), in the form of DSR coupled with distributed low carbon technologies, suggest that significant system wide savings will be delivered in addition to financial benefits achieved by active participants[17]. Compared to delivering flexibility centrally, a high uptake of SLES could deliver total system cost savings of £2.5 bn/year. These system-wide benefits should be shared amongst all customers, and the particular mechanisms for doing this must be transparent and seen to be fair.

Summary: Ofgem must include fairness as a key element of DSR policies and offerings. We suggest the distributional benefits of different approaches are analysed to explore the impacts on those structurally exclude from participating. Local and community based DSR approaches may support more inclusive participation and fairer distribution of outcomes, and we recommend Ofgem examine these opportunities further. Mechanisms for distributing the system wide benefits of DSR must also be further explored.

---

[14] Stewart, F. (2022). Friends with benefits: How income and peer diffusion combine to create an inequality "trap" in the uptake of low-carbon technologies, Energy Policy, *163*, 112832.

[15] Stewart, F. (2021). All for sun, sun for all: Can community energy help to overcome socioeconomic inequalities in low-carbon technology subsidies? *Energy Policy*, *157*, 112512.

[16] Braunholtz-Speight, T., Sharmina, M., Pappas, D., Webb, J., Hannon, M. and Fuentes González, F. 2022. Beyond the pilots: Current local energy systems in the UK. Energy Revolution Research Centre, Strathclyde, UK. University of Strathclyde Publishing. ISBN: 978-1-914241-08-6

[17] Aunedi, M., Ortega, J.E.C. and Green, T.C. 2022. Benefits of flexibility of Smart Local Energy Systems in supporting national decarbonisation. Energy Revolution Research Centre, Strathclyde, UK. University of Strathclyde Publishing. ISBN: 978-1-914241-07-9

Q7 – How can the customer journey in domestic DSR be made simple and seamless?

To support a simplified and more seamless DSR journey, strong alignment is needed across the diversity of stakeholders who will interact with the customer. This alignment is important, not only in their messaging and communications, but also in the way in which new technologies are installed and set up to interact with the wider system.

Research to map different customer journeys and identify points where the process is disjointed is necessary. Evidence from a recent innovation trial highlighted challenges when trying to set up smart operation of heat pumps for social housing occupants on pre-payment meters. This is just one element of a customer journey in domestic DSR, and there are likely to be many other points of tension or challenge, which need to be better understood so they can be addressed in widescale rollout of different DSR solutions.

Past research on smart home adoption[18] has shown that different support is required across different elements of the customer journey. Those unfamiliar with the technologies did not believe information was readily available, they did not know where to buy products, and they were concerned that installation and setup might be too much of a hassle. Those who knew about the products but were not persuaded to adopt them were more sceptical of the benefits. And those who were interested but had not adopted faced structural or psychological barriers to adoption.

Ensuring consumers have choice over how to participate, for example, through the supplier versus a separate DSRSP is important. However, even in today's context it can be hard and confusing to navigate the different energy supply options and deals, especially when they come as a package. This will become increasingly challenging with multiple DSR suppliers as well as multiple energy suppliers offering multiple types of DSR. Better support for customers will be critical, and this support needs to come from trusted intermediaries.

In practice, this may require local or community approaches to engaging consumers with DSR. Local stakeholders tend to be more trusted by members of the community, which can support participation in and uptake of smart products and services. It can also help stimulate the underpinning supply chains in local areas, helping working processes to proceed more quickly and efficiently with coordination by a trusted local intermediary.

Summary: A simple and seamless DSR journey requires strong alignment across the entire supply chain, and tailored support across different stages of the customer journey. We suggest further research is undertaken to understand the different DSR journeys a customer may embark on. This will uncover areas that need to be addressed to support a smoother process. Local trusted intermediaries will have a key role to play in supporting consumers as well as stimulating and co-ordinating across different supply chain actors, and government must ensure they are adequately resourced to deliver this service.

---

[18] Sanguinetti, A., Karlin, B., & Ford, R. (2018). Understanding the path to smart home adoption: Segmenting and describing consumers across the innovation-decision process. Energy research & social science, 46, 274-283.

Q8 – Do you agree that these factors are important in ensuring an attractive and simple domestic customer journey in DSR is realised? Are there any other factors that should be considered?

We agree that clarity, confidence, and a compelling proposition are important factors in the DSR journey for customers. However, past research on adoption (e.g., Diffusion of Innovation theory) and acceptance (e.g., Technology Acceptance Models) of new technologies highlights other important factors to consider.

Norms: Decades of social science research has shown the power of social norms in stimulating and supporting behaviour change, including in the energy sector. Although consumers may not recognise or report norms as being a key factor to incentivise engagement, analysis of experimental data show that it can be more powerful than financial incentives.

Compatibility: Another key element of the value proposition related to how consistent DSR is with the values, experiences, and needs of the potential adopters.

Observability: This related to the degree to which DSR customers can see the impact of their actions. Like compatibility, this needs to align with their values and needs, and may not only relate to financial benefit.

Perceived ease of use: in addition to ease of use, consumers must also *perceive* DSR as being easy to use and engage with. This relates not only to the operational phase, but also to installing and setting up any underpinning technologies or processes.

Trialability / Past experiences: Having the ability to explore or experiment with DSR, or seeing how it is used by others, before a commitment needs to be made (e.g., to a particular service provider or operational paradigm) can influence adoption.

Communication channels: This includes a variety of options from national messaging strategies to peer-peer communication. To be effective they must be credible and trustworthy sources. Customers may need to be engaged through different channels along the journey, and the most appropriate channel needs to be selected to reach different target audiences.

Summary: We agree that clarity, confidence and a compelling provision are all important, along with the subfactors outlined in the call for input. However, we recommend Ofgem also include the following factors, which are important to support widespread acceptance and adoption through an attractive and engaging customer journey: (1) norms, (2) compatibility with values, experiences and needs, (3) observability of impacts, (4) perceived ease of use, (5) trialability, and (6) credible and trustworthy communication channels.

Q9 – What barriers do you see to these factors in the domestic DSR customer journey being realised in practice?

A variety of barriers exist today that limit the domestic DSR journey being realised. In this response we highlight some of these, relying on anecdotal or theory-based evidence. This is supplemented with examples from Community Energy England members.

However, further research is needed to explore these barriers in more depth, particularly as they relate to the different types of consumer engagement (across individually driven, ESA driven, and DSRSP driven) that may not yet have been delivered in practice.

Lack of trust. There is a pervasive lack of trust in energy supply companies. A recent survey[19] highlighted that 49% of respondents indicated they no longer trusted energy companies, up from 34% the year before. This could limit engagement with DSR, as trust is a key component underpinning adoption of new technologies and services.

In addition to mistrust in the sector, there is also a risk that poor performance may lead to a lack of trust in the technology itself, leading to disengagement and even rejection of the new technology or service offering. One CEE member illustrates this, by highlighting challenges with the use of smart charging of electric vehicles.

"I have some experience of using Intelligent Octopus to enable demand side balancing. The idea in this case being that when there is surplus energy during the day and your EV is connected to charger it will charge it at the cheap overnight tariff 7.19p/kWh, even during the peak day rate. Unfortunately it only works if you have one connected EV. I have two and Intelligent Octopus can't handle it, often it doesn't even detect that a vehicle is connected. A couple of times it charged the car at peak rate [35p] which I didn't want or need. Now I never leave either EV attached during the day as I can't tell what rate I am being charged."

Missing value proposition. The value of DSR to the grid is clear, but the value to customers is less well understood. This needs further research to fully understand how to design offerings that really meet customer needs and values.

One CEE member highlights their experience with the ESO Demand Flexibility Service trail over winter 22/23, and identifies three areas for amplifying value:

1) Financial incentives. *"One of the main policy interventions would be getting the reward scheme right. We got about £70 off our electricity bill over the winter, probably not enough to cause a long-term change in behaviour. So it may be necessary to have a significantly more attractive offer to encourage the take up of demand modulation and the technical development needed to support it."*

2) Observability. *"Seeing live home electricity usage I think makes a huge difference, being able to see the peaks when individual devices are turned on, such as the dishwasher or cooker. Once you know what equipment causes the large peaks, then you have the information to decide when to turn it on, or rather when NOT to turn it on. Most smart meter IHDs don't provide live usage graphs although they do provide instantaneous readings, and the 30 minute data doesn't give sufficient resolution. Most PV and battery systems now come apps that provide live-usage graphs, but for others wanting to participate in demand management, maybe some very low-cost real-time electricity monitors could be made available."*

3) Automation that works. *"On the tech side, I could have partially automated the process … but there was no API providing the demand response signal, and interfacing that to my battery & ASHP would have required some electronics & software. What we don't want is each utility company*

---

[19] https://www.theecoexperts.co.uk/blog/trust-in-energy-companies

doing their own attempt at mechanisms for automation. The way the tech industry typically solves this kind of problem is through 'special interest groups' which collectively define a set of standards or APIs, for example the Bluetooth SIG. So a SIG could be established from key stakeholders, importantly including API users, that defines a set of APIs providing demand side response data. Once this is in place, then over time batteries, EV chargers, heat-pumps, controllable immersion heaters etc will hopefully start to use it. It could also encourage a small eco-system of third party device developers which use these APIs to control pre-existing kit. The key though is to have open, stable and used APIs."

While anecdotal evidence like this is useful, the customers participating in the demand flexibility trial are not representative of the wider UK population, who will need to engage with DFS in the future. More evidence that helps to better develop attractive customer propositions for a range of consumer archetypes would be beneficial here.

Missing hardware. Some customers may be excluded from participating due to a lack of underpinning technology. As noted by one CEE member *"the single biggest hardware barrier-to-entry at present is not having an electricity smart meter, without which you can't participate in many DSR propositions. There has been a lot of consumer feedback expressing annoyance at being told they can't participate in PeakSave due to not having a smart meter."*

Perceived unfairness. The financial benefits of participating in DSR are likely to be greater for those who have the underpinning technologies, such as EVs, heat pumps and microgeneration with storage. If the reward potential is higher for these people, it might cause disengagement amongst those who don't fall into this demographic (e.g., a single person in a small studio, a family in fuel poverty who are already curtailing demand). Similarly, they could exclude those with limited ability to shift electricity consumption for reasons beyond their control, for example consumers with essential medical equipment at home. If the goal is to generate engagement across the entire population and achieve some equity of reward, greater consideration to fairness is important in DSR programme design.

Summary: Key barriers to realising an attractive and seamless customer journey include: (1) lack of trust in energy industry and DSR technologies, (2) insufficient value proposition, (3) missing hardware, and (4) perceptions of unfair DSR solutions. Ofgem should address the pervasive lack of trust by mandating early engagement with consumers, involving trusted intermediaries, and ensuring technologies are well tested before deployment. This early engagement can also support the development of a more attractive value proposition, and identify mechanisms for embedding fairness in DSR design. Government, working with Ofgem, must address the missing hardware issue through widespread roll out of smart meters and other key underpinning technologies.

Q10 – What do you think is the role of government, Ofgem, industry and stakeholders in enabling an attractive and simple customer journey in domestic DSR?

DSR has a clear and important role to play in the future energy system. Government, Ofgem, and the wider industry have an important role to play in ensuring the appropriate conditions are in place that allow DRS, and an attractive and seamless customer journey, to be unlocked.

There has already been a lot of good work done, for example, the 2021 Smart Systems and Flexibility Plan, however, there is still much to implement, and augment, if the uptake of demand side DSR is to happen at pace, at scale, and equitably.

Government must deliver a widespread roll out of smart meters, high levels and equitable uptake of low carbon technologies (i.e., heat pumps, EVs) on which the ability to fully participate in DSR depends. Better support – both financial and non-financial – is needed. Financial support must be provided for those least able to transition.

However, much of the non-financial support – critical for understanding and addressing public perspectives, motivations, challenges, and barriers to participating in DSR – will need to come from trusted intermediaries such as local authorities and community groups. Government must ensure appropriate levels of capacity, skills and resourcing within local authorities to enable them to deliver this support.

Ofgem, working with DESNZ, must develop the appropriate market structures that value flexibility and incentivise businesses to develop attractive customer propositions. Flexibility markets, particularly at the local level, will be critical to realising the value of demand side DSR. However, there is currently no direct incentive for DSOs to help flexibility markets grow (increase liquidity) or to support new providers enter the market. SSEN included a Consumer Value Proposition to provide 'Local and Community Flexibility Market Stimulation' in their ED2 Business Plan, but this was rejected by Ofgem, saying it didn't provide value for money for consumers.

There is an increasing recognition of the need for this local flexibility to unlock DSR as part of smarter and more localised energy system operation[20] and Ofgem must enable this, for example, through: changing sandbox arrangements to allow local flexibility market and business models innovation; reforming the supplier hub model to enable smarter and more local energy solutions embedding demand side DSR to emerge, delivering market reform to ensure the value of local and national energy and flexibility can be realised, and supporting the development of a common 'plug and play' data ontology across flexibility assets.

Little has been possible under the developing local flexibility markets because the reward is not high enough to justify any flex projects. Where activity has happened, it has been with innovation/sandbox funding. Currently only avoided reinforcement is valued, but additionally valuing avoided carbon might increase the value of flexibility and enable local community flexibility projects.

Furthermore, while it is promising that DESNZ has recognised the importance of distributed flexibility as part of the REMA programme[21], creating an additional workstream to address the barriers to development, it is vital that there is coordination between different organisations throughout this process. Any reforms enacted as a result of this call for input must be undertaken in a manner that is consistent with the REMA programme of reform, to ensure that reforms are complimentary, rather than work against, one another.

---

[20] Hardy, J. and Morris, M. 2022. The most important decisions to enable the implementation of smart local energy systems. Energy Revolution Research Centre, Strathclyde, UK. University of Strathclyde Publishing.
[21] https://www.gov.uk/government/consultations/review-of-electricity-market-arrangements

This is also the case for the recent DESNZ call for evidence[22] on possible retail market reform – any government-led programme of retail reform must consider the importance of distributed flexibility and work closely with Ofgem to ensure alignment of priorities and not create unnecessary uncertainty for industry stakeholders.

Ofgem must also place obligations on DNOs to ensure they enable (rather than constrain) demand side DSR. DNOs need to enable flexibility to be delivered, and ensure there is sufficient capacity to support the uptake of associated low carbon technologies required. This may mean coordinating with local authorities around system planning on the low voltage networks. In addition, DNOs must provide open data to support and drive innovation around DSR.

Consumer consent and protection is also a key element to ensure a seamless and supportive customer journey. For DSR to have a real impact, consumers will need to agree to have loads in their homes managed by DSRSPs. Ofgem must evolve consumer protection in this new landscape. Working with DESNZ, clearer definitions and guidelines for DSR beyond Energy Smart Appliances in needed. White the Energy Security Bill is a good start, a stronger cybersecurity management strategy needs to be based on a good understanding of the system setup, operation, and governance underpinning DSRSP.

Baseline standards are needed to address the system's minimum-security requirements, so that relevant components or technologies can be adopted to meet minimum function and security requirements. Compliance testing and certifications have an important role to support consistency across providers. To achieve this, it is necessary to conduct testing and certification by an independent party, which can assure regulators that a satisfactory security level is provided in key ecosystem actors.

Ofgem, working with innovation funders in DESNZ and InnovateUK, must support the sharing and learning from existing projects testing different aspects of DSR and local flexibility.

For example, Energy Local is supplying cheap local electricity to communities under the Complex Site derogation. In Bethesda it is doing local balancing, flexibility alongside local low carbon power. In Blaenau Ffestiniog it is using local low carbon electricity to power a local heat network which can deliver flexibility at scale. It is reducing power system volatility, smoothing peaks, managing intermittent renewable resources as well as connecting this local system with the customer and managing their (unwitting) participation in all those markets. This sort of project can provide "ex post" data now and should be enabled far and wide to pioneer how local real-time operations can be created linking DER creatively with DSR and thereby reducing the need to actively manage extremes of supply and demand. This sort of joined up operation has the ability to *alleviate rather than cause network constraints*.

Finally, community energy organisations, the third sector and local authorities often act as the energy system's 'social conscience'; they highlighting the plight of those in fuel poverty, and considering how to address social hardship caused by inadequate housing and the high cost of

---

[22]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1173051/towards-more-innovative-energy-retail-market-call-for-evidence.pdf

energy[23]. In the context of DSR, they will be critical to supporting equitable participation, and ensuring no-one gets left behind or penalised in this customer facing transition. This vital role needs to be recognised and resourced.

Summary: Government, Ofgem, DNOs and local stakeholders all have important roles to play, and must work together to ensure alignment of priorities throughout any process of reform.

Government should: (1) deliver a widespread roll out of smart meters, (2) support high levels and equitable uptake of low carbon technologies through more inclusive policy design, (3) adequately resource local authorities and community organisations to provide non-financial support to consumers along the entire DSR journey, and (4) recognise and resource community organisations, the third sector and local authorities to act as the energy system's 'social conscience' and ensure equitable participation.

Ofgem should: (1) ensure the development of market structures that value flexibility, for example, by valuing avoided carbon, as well as avoided reinforcement, (2) incentivise the growth of local flexibility markets, support interoperability across flexibility assets, and place obligations on DNOs to enable DSR, (3) evolve consumer protection with stronger and more targeted cybersecurity strategies, and (4) ensure learnings from existing projects are shared widely.

DNOs should: (1) enable flexibility and ensure there is adequate capacity to support the uptake of low carbon technologies that underpin DSR, (2) coordinate with Local Authorities around future system planning, and (3) provide open data to support and drive innovation.

---

[23] InnovateUK and ESPRC (July, 2023). Prospering together: engaging communities in the energy revolution.