Sent by email to flexibility@ofgem.gov.uk

9 May 2023

Dear Ofgem

Future of distributed flexibility call for input - Thermal Storage UK response

We welcome Ofgem's call for input on distributed flexibility. The success of the energy transformation depends strongly on the electricity system providing (1) the investment signals for people and businesses to buy flexible demand assets and (2) the operational signals for people and businesses to use those assets flexibly. This means valuing the flexibility of those assets.

We welcome Ofgem's focus on distributed flexibility and the localised differences across the electricity system in the UK. In our view, there is a disproportionate focus on GB-wide and transmission-level systems, for instance constraints, with insufficient focus on the distribution network. In practice, electricity grid constraints are also likely to develop at local level, for instance in areas where there is concentrated uptake of electrified heating and transport combined with limited network capacity. Ofgem's call for input helps to redress this imbalance.

There is a need to act sooner rather than later. The business plans for the ED2 price control for Distribution Network Operators (DNOs) suggest that, by the end of 2028, there could be 3 million heat pumps operating with thermal stores in Britain. However, the electrical heating systems being installed today often entirely focus on heat provision within the building. These heating systems are installed with very limited consideration of the potential to provide flexibility to the wider electricity system. This is a missed opportunity.

Our own analysis with LCP Delta (shared with Ofgem separately and available on our website) suggests that 2.4 million smart thermal stores could operate with or instead of heat pumps by 2030, providing up to 4.1GW of flexibility on the coldest day of the year. To make the most of this opportunity requires encouraging people and installers to see the financial benefits of heat flexibility. This shows the urgency and importance of Ofgem's work on local energy governance and distributed flexibility, as well as the UK government's work to develop standards for Energy Smart Appliances and reform Energy Performance Certificates.

The comments in this response to the call for input are made through the lens of encouraging heat flexibility. Heat flexibility represents the potential of low carbon electric heating products to provide flexibility from hot water and space heating to the electricity system. These products include smart thermal storage working with or instead of heat pumps, as well as heat pumps preheating buildings. While our focus is on using heat flexibility to make the most of renewable energy, we recognise that much of our feedback is relevant to other flexibility technologies.

Part 1 - the case for change

We agree with Ofgem that there is a need for flexibility markets. At the heart of this transformation is people's control over any assets in their home or business. As people adopt technologies such as electric vehicles, heat pumps and smart thermal storage, the benefits of distributed flexibility to the electricity system should increase. As Ofgem sets out in the call for input, this means coordinating additional renewable generation, network investment and increasing electricity demand.

We agree that "flexibility is not optional, it is essential". It is equally essential that the distribution networks value flexibility and that people benefit from those flexible assets. It would be suboptimal if DNOs benefitted from people installing flexible technologies (e.g. through lower network investment) without passing on those benefits to people and businesses.

We can see the overall rationale for Ofgem's vision that "CER should be actively engaged in all GB energy markets via a common digital energy infrastructure, assisted by a wide variety of enabling market changes and standards that would enable their active participation." We think Ofgem could improve upon the vision and case for change set out within the call for input.

We encourage Ofgem to adopt a broad consideration of what constitutes a "Consumer Energy Resource". The call for input mentions some specific technologies that can provide flexibility, such as electric vehicles and heat pumps. Other technologies include smart thermal storage, working with or instead of heat pumps, as well as hot water tanks and storage heaters. Heat pumps can offer weak flexibility through preheating the building or firm flexibility through storing heat in dedicated thermal storage.

We recommend that Ofgem recalibrates this work to focus as much on people as the energy system. There are hints in Ofgem's call for input, for instance the use of the pejorative term "parasitic", that consumers should adapt to the demands of the electricity system. We note that the optimal solution for the energy system may not be feasible, for instance, if consumers want more control over their assets. We recommend that Ofgem avoids focusing on the perfect solution for the energy system. For instance, people are unlikely to offer the full flexibility of products such as electric vehicles to the system, instead reserving some of the charge as a back-up in case they want to drive.

To reflect this focus on people and businesses, we recommend that Ofgem redefines its conception of flexibility to:

> "the ability to shift in time or location the consumption or generation of energy, to meet the demands of households and businesses and to meet system and network physical requirements"

Similarly, it seems improbable to us that many people would value the choice to "participate in both individual and stacked markets relative to

consumers' risk appetites". It is the role of aggregators, energy suppliers and the DSOs to offer tariffs or financing arrangements that mean owners of electric vehicles or electric heating systems do not need to engage in such markets. Evidence over a number of years suggests that most people and businesses do not want to spend significant time on energy management.

We encourage Ofgem to consider the flexible assets installed and operated by businesses, as well as households. We recommend that the definition of "Consumer Energy Resource" includes low carbon heating and transport solutions installed by businesses. This would avoid Ofgem falling into the trap of thinking that "only affluent consumers…purchase CER". In reality, domestic customers, social housing providers, businesses and parts of the public sector will invest in CER. It is a category mistake to limit the focus to CERs purchased by a subset of homeowners.

We encourage Ofgem to consider the benefits from CERs for both asset owners and the wider energy system. It is incorrect to simplistically state that the high capital cost of CERs means that "only those affluent consumers can benefit from the value of flexibility, and those without smart CER are unable to receive the value of flexibility". CERs are able to reduce the total system cost by making better use of renewable generation (smart thermal storage), improving energy efficiency (heat pumps) and reducing the need for back-up generation (solar panels and batteries). Heat flexibility products reduce peak demand in winter in a consistent, predictable and smart way and provide a long-term, permanent reduction in the need for building and maintaining network infrastructure.

We encourage Ofgem to consider the value to the system of different types of distributed flexibility. Flexibility may be very short or long duration, widely distributed or a single source, and firm or weak. Flexibility from a dedicated source is more certain and therefore more valuable to the system. For instance, heat flexibility could come from a dedicated thermal store (firm) or a heat pump pre-heating a building (weak). Similarly, electro-chemical flexibility could come from a

dedicated battery (firm) or flexible use of an EV (weak). In addition, heat flexibility products have value in reducing peak demand in winter in a consistent, predictable and smart way. This value partly stems from a long-term, permanent reduction in the need for building and maintaining network infrastructure.

Part 2 - the proposed solution

While the case for change may exist, we would like to see more detail on Ofgem's proposed solution.

We are not convinced that CER needs to be engaged in "all" energy markets. This will vary with the product and the degree of automation that people are willing to cede to third parties. For instance, people are more likely to allow their heating systems to operate flexibly if they have dedicated thermal storage or energy efficient homes that can be preheated comfortably.

We encourage Ofgem to consider the market structure that their proposals would facilitate. We recommend that the proposals actively consider the participation of a wide range of actors. This could include aggregators, manufacturers, suppliers and consumers directly. We recommend that Ofgem actively considers how to avoid concentrating power in a small number of market participants.

We agree that transparency is important. Transparency will improve people's confidence that they are receiving fair value for their flexibility and improve the system's confidence in the reliability of that flexibility. Any software solution will need to integrate with software already in place from flexibility providers and aggregators.

We recommend that Ofgem applies a similar degree of separation for the flexibility software and flexibility assets as they have applied to the distribution network operators (DNOs) and the distribution system operators (DSOs). To avoid conflicts of interest, we recommend that the software developer cannot have flexibility assets in the field.

On market design, we are confused as to why Ofgem states that “developing dynamic new markets that engage millions of CER is not a DNO core competency”. As we understand it, this is an approach that Ofgem has pursued in the DNO price controls for 2023 - 2028. We welcome clarification from Ofgem on whether this means that we should expect a slower transition to DSOs during the next 5 years or an alternative approach such as RSPs.

We are unsure about what role Ofgem should play in creating and managing the central platform. While Ofgem could provide the strategic direction, Ofgem has historically lacked expertise and may not be well-placed to manage the digital work required. If Ofgem is going to take this work forward, they will need the right resources with the right skillset.

Next steps

It is difficult to understand how the proposals interact with other market participants in the energy sector. We encourage Ofgem to publish a schematic showing the governance of the system and the likely interaction between CER, flexibility providers, the FSO, DNO and energy supplier.

We encourage Ofgem to join up this work with other activities. This includes consultations on the future of price controls, requirements in the current price controls for DSOs, the creation of the Future System Operator (FSO) and activities such as the Review of Electricity Market Arrangements (REMA). There is already significant focus on ensuring that high load electrical products such as EVs, heat pumps and heat batteries are cybersecure, interoperable and flexible. The Energy Security Bill introduces requirements for Energy Smart Appliances and the UK government is working on standards for these Energy Smart Appliances.

Finally, if Ofgem wants to support distributed flexibility, then there are reforms it can pursue at pace, including:

- Introducing market-wide half-hourly settlement as soon as possible
- Requiring suppliers to offer at least one time of use tariff for low carbon heating
- Requiring DNOs to establish, monitor and publish the capacity of its low voltage network

We strongly recommend that Ofgem pursues the above at pace alongside the development of any other proposals in this call for input.

We answer some of the questions in the call for input below. This response is not confidential and may be published by Ofgem.

Best wishes

Tom Lowe

Founding Director
Thermal Storage UK

More about Thermal Storage UK

Thermal Storage UK represents companies who have developed modern thermal storage products. We promote the use of smart thermal storage in buildings in the United Kingdom and other countries to achieve net zero. Our mission is to take the carbon out of heating buildings.

You can find out more about Thermal Storage UK at www.thermalstorage.org.uk

Questions

1. **What do you think distributed flexibility could contribute to the energy system?**

   Distributed flexibility assets such as smart thermal storage will improve the operation of the network and make the most of renewable energy. Thermal Storage UK research with LCP Delta in October 2022 indicates that smart thermal storage, working with or instead of heat pumps, could reduce peak electricity demand on the coldest day by 1.6GW by 2030 through shifting when we produce heat and storing that heat for later use. This peak demand reduction from smart thermal storage could increase to 4.1GW if the benefits of flexibility to electricity networks were reflected in pricing. The benefits would be higher still if we achieve a net zero-emission electricity system by 2030. This is based on 2.4 million homes installing smart thermal storage, working with or instead of heat pumps, by 2030.

   Heat flexibility products reduce peak demand in winter in a consistent, predictable and smart way. These products provide a long-term, permanent reduction in the need for building and maintaining network infrastructure. This reduced need for network investment reduces the cost of electricity for everyone.

   CERs are able to reduce the total system cost by making better use of renewable generation (smart thermal storage), improving energy efficiency (heat pumps) and reducing the need for back-up generation (solar panels and batteries).

2. **Will a focus on CER flexibility also help enable other forms of flexibility, especially distributed flexibility?**

   No comment.

3. **Is there a 'case for change' and a need for a common vision for distributed flexibility?**

We agree with Ofgem that there is a need for flexibility markets. At the heart of this transition is people's control over any assets in their home or business. As people adopt technologies such as electric vehicles, heat pumps and smart thermal storage, the benefits of flexibility should increase. As Ofgem sets out in the call for input, this means coordinating additional renewable generation, network investment and increasing electricity demand. We agree that "flexibility is not optional, it is essential".

It is equally essential that the distribution networks value flexibility and that people benefit from those flexible assets. It would be suboptimal if DNOs benefitted from people installing flexible technologies (e.g. through lower network investment) without passing on those benefits to people and businesses.

We agree with Ofgem that it is unlikely that "a consistent, low-friction environment for decentralised flexibility will emerge either organically or in time".

We can see the overall rationale for Ofgem's vision that "CER should be actively engaged in all GB energy markets via a common digital energy infrastructure, assisted by a wide variety of enabling market changes and standards that would enable their active participation." We think Ofgem could improve upon the vision and case for change set out within the call for input.

We encourage Ofgem to consider the flexible assets installed and operated by businesses, as well as households. The definition of "Consumer Energy Resource" should include low carbon heating and transport solutions installed and operated by businesses. This would avoid Ofgem falling into the trap of thinking that "only affluent consumers being able to purchase CER". In reality, domestic customers, social housing providers, businesses and parts of the public sector will invest in CER. It is a category mistake to limit the focus to CERs purchased by a subset of homeowners.

We encourage Ofgem to consider the benefits from CERs for both asset owners and the wider energy system. It is incorrect to simplistically state that the high capital cost of CERs means that "only those affluent consumers can benefit from the value of flexibility, and those without smart CER are unable to receive the value of flexibility". CERs are able to reduce the total system cost by making better use of renewable generation (smart thermal storage), improving energy efficiency (heat pumps) and reducing the need for back-up generation (solar panels and batteries).

We encourage Ofgem to join up this work with other activities. There is already significant focus on ensuring that high load electrical products such as EVs, heat pumps and heat batteries are cybersecure, interoperable and flexible. The Energy Security Bill introduces requirements for Energy Smart Appliances and the UK government is working on standards for these Energy Smart Appliances. We recommend that all heating products are able to provide flexibility.

If Ofgem wants to support distributed flexibility, then there are reforms it can pursue at pace, including:

- Introducing market-wide half-hourly settlement as soon as possible
- Requiring suppliers to offer time of use tariffs
- Requiring DNOs to establish the capacity of its low voltage network

We strongly recommend that Ofgem pursues the above at pace alongside the development of any other proposals in this call for input.

4. **What is your vision for how to accelerate the delivery of accessible, coordinated and trusted markets for distributed flexibility?**

We understand that Ofgem's vision for distributed flexibility involves a common digital energy infrastructure and 'enablers', including market changes and standards. We encourage Ofgem to work with government and stakeholders to accelerate various changes to energy markets and regulation that support distributed flexibility, including:

- Reforming network charges to value the flexibility available from Energy Smart Appliances such as electric vehicles, heat pumps and smart thermal storage.
- Delivering market-wide half-hourly settlement from all domestic and non-domestic customers.
- Requiring suppliers or aggregators to provide flexibility to the grid through smart time of use tariffs.
- Rebalancing policy costs between electricity and gas.
- Reforming rdSAP and Energy Performance Certificates to reflect the fuel mix of electricity generation today and incorporate the flexibility of products.
- Zero-rating VAT for energy saving measures such as smart thermal storage and EV chargers in all circumstances until 2030.

5. **Will certainty of an end vision help accelerate enabling work and make it cohesive?**

   An end vision is useful to the extent that it brings together and works with the various regulatory and technological changes. Creating a digital energy infrastructure is not helpful if it delays work to deploy low carbon assets. We encourage Ofgem to work with government and stakeholders to accelerate various changes to energy markets and regulation that support distributed flexibility, including:

- Reforming network charges to value the flexibility available from Energy Smart Appliances such as electric vehicles and electric heating.
- Delivering market-wide half-hourly settlement from all domestic and non-domestic customers.
- Requiring suppliers or aggregators to provide flexibility to the grid through smart time of use tariffs.
- Rebalancing policy costs between electricity and gas.
- Reforming rdSAP and Energy Performance Certificates to reflect the fuel mix of electricity generation today and incorporate the flexibility of products.
- Zero-rating VAT for energy saving measures such as smart thermal storage and EV chargers in all circumstances until 2030.

To improve understanding of the vision, we encourage Ofgem to publish a schematic showing the governance of the system. We encourage Ofgem to publish a view of the likely interaction between CER, flexibility providers, the FSO, DNOd and energy suppliers.

6. **When should a common digital energy infrastructure be in place? And therefore, when should development begin?**

   Ofgem needs to move quickly. There is a real risk that electrification of transport and heat demand will outstrip the capacity of parts of the low voltage network during the ED2 price control. If Ofgem proceeds, we recommend that Ofgem adopts an ambitious deadline for these reforms to be in place. As with DESNZ's work on REMA, Ofgem needs to juggle reform with encouraging (or not dissuading) ongoing investment.

7. **What should a common energy digital infrastructure look like, and why? Please consider the archetypes or develop your own proposition.**

   The digital registration of actors, assets and markets could be based on the MCS installations database. This would need to expand to cover a range of Energy Smart Appliances, including smart thermal storage.

8. **What is your view on the desirability and feasibility of the archetypes or your own alternative proposition?**

   We see a case for the thin or medium approach.

9. **Should a common digital energy infrastructure be new-build, or should it buildout from existing infrastructure?**

   If Ofgem proceeds, then it needs to move quickly. There is a real risk that electrification of transport and heat demand will outstrip the capacity of parts of the low voltage network during the ED2 price control. If Ofgem proceeds, we recommend that Ofgem adopts an ambitious deadline for these reforms to be in place. As with DESNZ's work on REMA, Ofgem

needs to juggle reform with encouraging (or not dissuading) ongoing investment.

10. What are the important areas for consideration when designing institutional delivery models for a common digital energy infrastructure?

We agree that transparency is important. Transparency will improve people's confidence that they are receiving fair value for their flexibility and improve the system's confidence in the reliability of that flexibility.

Any software solution will need to integrate with software already in place from flexibility providers and aggregators.

We recommend that Ofgem applies a similar degree of separation for the flexibility software and flexibility assets as they have applied to the distribution network operators (DNOs) and the distribution system operators (DSOs). To avoid conflicts of interest, we recommend that the software developer cannot have flexibility assets in the field..

11. What are the important areas for consideration when designing financial delivery models for a common digital energy infrastructure?

As all consumers will benefit from distributed flexibility, we recommend that any financing of the common digital energy infrastructure is met by all consumers. We note that this funding approach requires that distributional impacts are considered when designing social tariffs or adjusting the price cap.