

MCS Foundation response to Ofgem's Call for Input: The Future of Distributed Flexibility

Introduction:

Our vision is a world where everyone has access to affordable and reliable renewable energy and zero carbon technologies – for the benefit of our environment, our communities and the general public. As a Foundation we work to increase public confidence, awareness and access to renewable energy and zero carbon solutions across the UK. We support education and engagement programmes, fund research and facilitate innovative solutions to drive widespread adoption.

In addition, the Foundation oversees the [Microgeneration Certification Scheme \(MCS CHARITABLE FOUNDATION\)](#) which defines, maintains and improves quality standards for renewable energy at buildings scale.

Summary:

MCS Charitable Foundation strongly believe that to achieve our vision for a net zero future, there needs to be a rapid rethinking of how we approach energy system management. Our vision is a future where every public building, business, and home in the UK is equipped with a combination of distributed energy resources, including solar PV, solar thermal, heat pumps, battery storage, EV chargers, and small-scale wind.

The benefits of distributed energy resources (DER) are abundant, such as lower operational costs, reduced transmission losses, and ultimately smaller environmental footprints.¹ However, we are aware that a greater proportion of DER also brings about many challenges at a distribution level, including greater congestion and voltage deviations in future distribution networks.² It is key that we find a way to address these challenges from now until 2050, as DER will play a key role in the UK's decarbonisation efforts. For example:

- Emissions from heating makes up around 37% of the UK's emissions when including industrial processes,³ and the Climate Change Committee model that we need approximately 19 million heat pumps by 2050 in order to reach net zero.⁴
- Solar Energy UK have set a target of 54MW of solar energy in the UK by 2035, much of which is likely to be distributed energy generation.⁵
- National Grid ESO predict that we will have 37.4 million EV's on the roads in the UK by 2050.⁶

¹ <https://link.springer.com/article/10.1007/s00202-021-01248-y>

² <https://link.springer.com/article/10.1007/s00202-021-01248-y>

³ <https://es.catapult.org.uk/guide/decarbonisation-heat/>

⁴ <https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-Technical-report-CCC.pdf>

⁵ <https://solarenergyuk.org/resource/solars-role-in-addressing-the-energy-crisis-path-to-2023-2030-2050/>

⁶ <https://www.nationalgrideso.com/future-energy/our-progress-towards-net-zero/net-zero-explained/electric-vehicles/evs-and#:~:text=We%20estimate%20that%20up%20to,are%20fewer%20than%201%20million.>

Ultimately, the UK's chance of achieving its net zero target is contingent on our success in deploying heat pumps to decarbonise heating, EV's to decarbonise transport, and the deployment solar to decarbonise generation. We would therefore strongly challenge the use of the word 'parasitic' to describe the technologies that will ultimately be responsible for decarbonising homes, heat, energy, and transport. In other words, the deployment of these technologies must not be hindered by the grids inability to support them.

It thus becomes clear that reaching net zero relies not only on our success to generate an increased amount of renewable energy, but also on the energy system's capacity to transport this electricity across the system efficiently and reliably. Whilst flexibility will play a key role in this, this must not negate the importance of grid development at distribution and transmission levels. The development of distributed flexibility must go hand in hand with grid development and this must be founded on the principle of 'build in anticipation'. By this we mean that grid infrastructure must be built ahead of time to support the increased number of distributed energy resources, instead of the current demand-supply model. Anecdotally, we have heard of housing developers being forced to install gas boilers instead of heat pumps, simply on the basis that the distribution network cannot support them. We have heard similar stories regarding EV charging rations. If the distribution network in some areas is already strained, network challenges could have a catastrophic impact on the UK's decarbonisation goals, unless addressed promptly. One way of ensuring sufficient grid development could be to mandate all DNO's to factor in the government's national decarbonisation ambitions into their distribution development plans, for example the 600,000 heat pumps per year by 2028 target. At the very least, Ofgem must take responsibility and accountability for ensuring that the transmission and distribution infrastructure all over the UK is developed at the pace and scale required to support increased electrification in the next three decades.

We firmly agree that distributed energy resources (DER) technologies have the potential to contribute to a more stable and secure energy system and that this relies heavily on the success of deploying flexibility. For this reason, we warmly welcome this consultation from Ofgem acknowledging the critical role of distributed flexibility in the future energy system, as well as the outstanding market barriers to distributed flexibility in the UK. We agree that creating a standardised digital energy infrastructure is an important step to addressing the overarching barriers to distributed flexibility participation. However, we believe that as with many issues relating to decarbonisation, a holistic approach must be taken to fully unlock distributed flexibility potential. There are some fundamental problems with the design of energy markets that create barriers for distributed flexibility participation. For example, distributed flexibility is undervalued in the energy system, which leads to little incentive for participation.⁷ A standardised digital energy infrastructure may help to address certain barriers, but ultimately change is also needed in the capacity market, ancillary markets, and wholesale markets. Therefore, any system that is created must be able to incorporate these market reforms, for example, in the Review of Electricity Markets. If this is neglected, any system created now could become outdated and not fit for purpose very quickly.

We also find the plan to be lacking some clarity and detail. We are already behind where we should be in terms of distributed flexibility deployment,⁸ thus it is critical for Ofgem to carry out this process as quickly as possible. For this reason, we would call on Ofgem to take a strong leadership role in this process. We also wish to raise the importance of taking a consumer driven approach. By this we

⁷ <https://www.ukri.org/wp-content/uploads/2022/11/IUK-011122-SmartLocalEnergySystemsPolicyAndRegulationNov22.pdf>

⁸ https://www.theade.co.uk/assets/docs/resources/Delivering_the_potential_of_Flexibility_Report_FINAL_Feb_2020_compressed.pdf

mean that any steps taken to accelerate the deployment of flexibility, should not be to the detriment of the consumers or the UK's wider net zero goals. We believe that this is an entirely achievable goal and that flexibility can ultimately benefit the consumer, through increased grid efficiency and low energy bills. However, the process must be undertaken with care and with consumer well-being at the centre of decision making. From our perspective, we would support mandating the interoperability of smart devices to support increased flexibility opportunity, but only if this did not have high-cost consequences. For example, we do not want an interoperability mandate to significantly increase the cost of heat pumps for consumers, which could ultimately hamper deployment. Equally, consumers should not be burdened with providing distributed flexibility. For certain vulnerable groups, such as those with disabilities, there is not the capacity to provide flexibility. Whilst we are sure that Ofgem is already aware of this, we thought it important to voice our concern at an early stage of the process, nonetheless. Consumer participation should be encouraged, but on a voluntary basis, through increased awareness campaigns and local engagement. We believe that a more local energy approach, in which consumers are more engaged with their local energy system, could help bring about this.

Overall, we support the case for change and will express our views on the proposals in more detail in the responses to the questions.

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

Flexibility has always been a vital component of the energy system in the UK, and it can be broadly described as the management of an asset to match energy supply with energy demand.⁹ Flexibility has historically been provided by thermal power stations that have the ability to 'ramp up' or 'ramp down' capacity based on the demand, leading to greater overall efficiency. As more variable renewable energy has entered the grid, the need for innovative flexibility techniques has increased. As we move away from thermal power stations altogether (or to a limited amount), distributed flexibility will be essential for the efficient management of the energy system. The definition from the European University Institute¹⁰ is:

"Flexibility could be defined as the ability of a market participant to deviate from its set injection or consumption profile in response to market incentives or price signals in order to provide a service to the system operator. When used by network operators, this could be for different use cases such as network planning or network operation."

Some of the main services provided by flexibility services include¹¹:

1. Electricity balancing from Frequency Restoration Reserves (FRR) and Replacement Reserves (RR),
2. Addressing internal or cross-border congestion management in the transmission network and

⁹ https://eepublicdownloads.entsoe.eu/clean-documents/Publications/Position%20papers%20and%20reports/170809_Distributed_Flexibility_working-paper_final.pdf?Web=1

¹⁰ [Distributed resources and flexibility \(eui.eu\)](https://eepublicdownloads.entsoe.eu/clean-documents/Publications/Position%20papers%20and%20reports/170809_Distributed_Flexibility_working-paper_final.pdf?Web=1)

¹¹ https://eepublicdownloads.entsoe.eu/clean-documents/Publications/Position%20papers%20and%20reports/170809_Distributed_Flexibility_working-paper_final.pdf?Web=1

3. For congestion management in the distribution network.

In essence, distributed flexibility is a critical component of an efficient decarbonised energy system; a balancing tool to complement fluctuating renewable energy. As carbon capture and storage is an underperforming technology globally, with recent research demonstrating a 98.5% capacity shortfall between current and required deployment by 2040 to meet sequestration targets,¹² and as green hydrogen could take a decade to become commercially viable, distributed flexibility is a vital tool that is available now to contribute to power grid management.

Distributed flexibility allows for the connection of more renewable electricity in the distribution system, without having to invest as much in the distribution grids, making the transition more cost-effective for consumers.¹³ It also limits the extra renewable generation needed, by making use of surplus electricity generation, reducing the operating cost of low-carbon generation.¹⁴ It is worth noting however, that as electrification increases over the next decade, grid development will be necessary and OFGEM must ensure that this happens quickly enough to support greater renewable generation and more DER.

From a consumer perspective, we also believe that participation in distributed flexibility contributes to local benefits, such as increased local jobs, contributing to the local economy, supporting local communities. If executed well, consumer participation in flexibility markets could engender an increased awareness and understanding of the energy system and decarbonisation. But as stated previously, this should be a voluntary process.

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

We agree that the information barriers to flexibility participation could be more prevalent for Consumer Energy Resources (CER) than other types of Distributed Flexibility resources, such as small-scale wind farms. This is because CER requires a certain level of consumer engagement, as local flexibility schemes are only likely to be effective if they can offer larger automated loads for control.¹⁵ Thus, reaching this market could be more challenging, especially if consumers do not have access to data or information, or in many cases do not know that they can, or how to participate in flexibility markets. A system that is created to aid the participation of CER, for example, a user-friendly, coordinated, fair, transparent, and simple system, is likely to benefit the wider market participants. However, it is important here to distinguish between the informational barriers and other more barriers to market access and participation that different forms of flexibility encounter. In terms of the wider needs and challenges, these can be very different depending on the type of DER. On engagement, the opportunity cost for industrial and commercial entities hoping to engage in flexibility is fundamentally different than domestic customers and is secondary to their core business purpose. This can impact lead times, need for revenue certainty, how performance is monitored for variable loads and ability for remote load controllers to intervene. Conversely, there is a more

¹² <https://www.sciencedirect.com/science/article/abs/pii/S030142152100416X>

¹³ <https://www.nordicenergy.org/publications/distributed-flexibility-lessons-learned-in-the-nordics/#:~:text=Distributed%20Flexibility%20is%20a%20key,costly%20investment%20in%20distribution%20grids.>

¹⁴ <https://www.ukri.org/wp-content/uploads/2022/11/IUK-011122-SmartLocalEnergySystemsPolicyAndRegulationNov22.pdf>

¹⁵ https://www.regen.co.uk/wp-content/uploads/Regen_Local-flexibility-guide.pdf

advanced level of understanding of energy strategy for many Industrial & Commercial (I&C) entities given historical involvement in TRIAD avoidance,¹⁶ the CM, and ESO balancing services. Therefore, it is important not to assume that simply because the informational challenges are in sync, the solutions to other problems are equivalent.

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

Our current energy system was designed to manage a fossil fuel power sector, where a few large power plants provided electricity to the whole system, alongside a gas grid that provided the majority of heat. Clearly, this design and management approach is outdated and inefficient for the new, decarbonised power sector of the future, which ultimately will contain several million CERs. A 'case for change' and the need for increased distributed flexibility is not a new concept. The National Infrastructure Commission presented a case for change as early as 2016.¹⁷ Seven years later, the question should no longer be 'is there a case for change', but instead 'how can we best implement necessary change'. With millions of CER predicted to be online by 2030, the need for pace of delivery is now indisputable.

As outlined in our response to **Q1**, distributed flexibility has the potential to contribute significantly to the UK's decarbonised energy system. However, to achieve this, significant value must be placed on flexibility, which ultimately requires a change in how the system and markets are designed. We agree that it is vital to establish a common vision for distributed flexibility that industry can get behind, to ensure whole system coordination for optimal outcomes.¹⁸ This must be supported by clarity from government of the significant role and value that will be placed on distributed flexibility, to support increased investment and participation in the following decades.¹⁹ A marketplace with clearly defined rules is expected to increase the awareness of potential participants concerning flexibility use.²⁰ Flexibility is currently undervalued in the market, and this must be addressed in order to spur greater investment.²¹ Businesses and community energy projects often use

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

We are conscious that delivering accessible, coordinated and trusted markets for distributed flexibility is a significant challenge and therefore we do not have a clear vision of how this will be achieved. However, we do have some recommendations based on the current barriers to distributed flexibility :

¹⁶ The 'Triad season' is a four-month winter period, during which the National Grid looks back to find the three half-hour periods when electricity demand was highest in the UK.

¹⁷ <https://nic.org.uk/news/a-smart-power-revolution-could-save-consumers-8-billion-a-year-adonis/>

¹⁸ https://www.theade.co.uk/assets/docs/resources/Delivering_the_potential_of_Flexibility_Report_FINAL_Feb2020_compressed.pdf

¹⁹ https://www.theade.co.uk/assets/docs/resources/Delivering_the_potential_of_Flexibility_Report_FINAL_Feb2020_compressed.pdf

²⁰ <https://link.springer.com/article/10.1007/s00202-021-01248-y>

²¹ <https://www.ukri.org/wp-content/uploads/2022/11/IUK-011122-SmartLocalEnergySystemsPolicyAndRegulationNov22.pdf>

- The UK electricity markets must be reformed to allow for increased participation of distributed flexibility. Distributed flexibility suppliers should have access to multiple revenue streams, through stacking, to sustain a viable business model.
- There must be further cooperation between Transmission System Operators (TSOs) and Distribution System Operators (DSOs) to achieve the optimal value of distributed flexibility throughout the energy system.²²
- Market design should be user-friendly to encourage new entrants, new flexibility services, and aggregator pooling resources. The digitalisation of the application process is likely to help facilitate this process.
- Due to the oligopsony of the ancillary markets at a distribution levels, there is a strong possibility that flexibility is being undervalued. This must be addressed through more transparency and data sharing from the DSO's and TSO's so that there is confidence in the market. Ofgem should consider a standardised approach to valuing flexibility across different time periods.
- DSO's should not be able to participate in flexibility markets. As DSO's are one of the main procurers and users of distributed flexibility, they have better access to grid data, which gives them an unfair advantage compared to other sellers of²³ At the very least, they should be heavily regulated.
- There must be capacity market reform to allow for more participation of distributed flexibility, namely battery storage and demand-side response.
- Government must mandate open standards and interoperability in order to ensure that appliances and DERs can interoperate with other systems.²⁴ This should be at a manufacturing level, so that extra cost is not overly felt by the installer or consumer. In the case of heat pumps, solar PV and battery storage, we do not want digitalisation costs to become a barrier to wider deployment.
- To unlock the maximum potential of DFR, the system must be considered from both a local view to a wider system scale.²⁵

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

Certainty of an end vision is a key component to accelerate distributed flexibility. If the end vision is clear and places distributed flexibility at the heart of energy system management, it will help to de-risk investment. However, the design and the delivery are equally important components. At present, local flexibility is undervalued within energy markets, with little incentive for local balancing of generation and demand to alleviate network constraints.²⁶ Markets must be designed in a way that encourages the participation of a wider range of suppliers, including consumers. It is important that

²² https://eepublicdownloads.entsoe.eu/clean-documents/Publications/Position%20papers%20and%20reports/170809_Distributed_Flexibility_working-paper_final.pdf?Web=1

²³ https://www.theade.co.uk/assets/docs/resources/Delivering_the_potential_of_Flexibility_Report_FINAL_Feb_2020_compressed.pdf

²⁴ https://www.regen.co.uk/wp-content/uploads/Regen_Local-flexibility-guide.pdf

²⁵ https://eepublicdownloads.entsoe.eu/clean-documents/Publications/Position%20papers%20and%20reports/170809_Distributed_Flexibility_working-paper_final.pdf?Web=1

²⁶ <https://www.ukri.org/wp-content/uploads/2022/11/IUK-011122-SmartLocalEnergySystemsPolicyAndRegulationNov22.pdf>

there is clear communication and engagement with consumers, so they understand the benefits of participating in distributed flexibility, as well as how they can get involved. It is also worth giving attention to the demand side in market reform discussions such as the Review of Electricity Market Arrangements (REMA). Another factor is delivering these changes at pace. The government target aims for 600,000 heat pumps to be deployed per year by 2028 and it is important that a reliable system is already in place to anticipate this.

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

Common digital energy infrastructure development should take place straight away. The potential benefits go beyond the promotion of distributed flexibility and extend to the management of the energy system more widely. For example, digital energy infrastructure could provide better coordination between the TSOs and DSOs, help better forecast renewable energy production, and maintain better grid and network stability.²⁷ In terms of distributed flexibility, open data could encourage the participation of more DER actors. This would act to equalise the current advantage held by networks, including DSO's and TSO's, who currently have unequal access to information collected using public funding.²⁸ With open, granular data available, actors will be able to make investment choices based on accurate data, lowering the risk of investment.

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

It is difficult at this point to place full support behind any individual model. However, overall MCS Charitable Foundation advocates for the implication of the 'central' archetype or 'exchange'. We feel that the Business-as-Usual and thin archetypes do not address some of the important market failures and barriers outlined in section one. For example, for both scenarios, the registration process is not consistent across markets, which could act as a barrier for smaller actors, especially if the process is administratively burdensome. To maximise stable revenues flexibility providers are likely to want to participate in numerous markets,²⁹ so this should be streamlined and better facilitated. This is especially the case if more aggregators and community energy initiatives are to get involved representing consumers.

It is also important that the archetype chosen supports better collaboration and information sharing between TSO's and DSOs, which we feel the Business-as-Usual and thin archetypes do not support fully.

In any case, for any common digital infrastructure to function effectively, it relies on the obligatory participation of all system operators. As they are the predominant procurers of flexibility, standardisation relies on their universal participation. Furthermore, if the underpinning visions are for transparency, coordination and standardisation, it is critical that when a conflict arises as to process, the presumption goes to the market participants offering the flexibility, as per the IBM recommendation. A landscape with more and more CER is an important opportunity for flexibility in the UK, but when considering consumer role and involvement, the approach must be widely

²⁷ <https://aseanenergy.org/benefits-of-digitalising-the-power-system/>

²⁸ https://www.theade.co.uk/assets/docs/resources/Delivering_the_potential_of_Flexibility_Report_FINAL_Feb_2020_compressed.pdf

²⁹ <https://www.regen.co.uk/publications/power-to-participate-a-specification-for-community-energy-to-participate-in-a-flexible-energy-system/>

different. If consumers are to be encouraged to participate, then it needs to be extremely user-friendly and easy to comprehend. Equally as important, it is important to de-risk the process for aggregators and other commercial and industry participants so that flexibility is a reliable source of revenue. Equity of access and equity of participation, though seemingly the same, are quite different. The digital energy infrastructure must create a level playing field for all participants.

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

Regarding the 'exchange' and 'central' archetypes, we are aware that there is a trade-off between feasibility of implementation and better coordination. We are also aware of the risk of duplicating existing functions. We believe that the 'central' archetype could be the best scenario to address the wider barriers facing Distributed Flexibility Resources. It would essentially facilitate the development of a single, coordinated market for DFR which could help ensure continued liquidity, building a level playing field for all different service providers, as well as helping coordinate the different market processes such as balancing and congestion management.³⁰ However, taking into consideration the risk of duplication and the complexity of implementation, we agree that the exchange archetype would be a valid compromise. Significantly, whatever the archetype chosen, the digital energy infrastructure must be able to reflect the possible changes to the market, such as REMA, otherwise it could become outdated very soon after being launched.

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

Once again, MCS Charitable Foundation understands the trade-offs between both approaches. New-build has clear advantages in that the digital energy infrastructure can be designed from scratch in order to better address the barriers that have been facing the wider participation and deployment of distributed flexibility. However, we understand that this can be both costly and timely to enact, as well as confusing for industry members who are familiar with the current infrastructure and process. The one concern we have about using existing infrastructure, for example ESO's Enduring Auction Capability, is whether or not its design favours or contradicts certain aspects of distributed flexibility. For example, whether or not it could allow certain assets to participate in numerous markets. Disallowing stacking has been a consistent issue with current flexibility markets and essentially silos capacity so that it is not used most effectively. Thus, we would advocate for new-build energy infrastructure, unless there is suitable existing infrastructure that can be well adapted to support distributed flexibility markets.

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

³⁰ https://eepublicdownloads.entsoe.eu/clean-documents/Publications/Position%20papers%20and%20reports/170809_Distributed_Flexibility_working-paper_final.pdf?Web=1
https://docstore.entsoe.eu/Documents/Publications/Position%20papers%20and%20reports/entsoe_pp_DF_1712_web.pdf

We broadly agree with the areas for consideration highlighted in the consultation. However, we would add to this the importance of pace and transparency. As established, there has been a case for change for distributed flexibility deployment since 2016 and we are already in the mid-2020s.³¹ In just 5 years-time the government have a target to be installing 600,000 heat pumps per year and in 2030 the UK will no longer be selling fossil fuel vehicles. As more Consumer Energy Resources come online in the UK, it is essential that this infrastructure is developed and that practices are in place to increase the participation of CER in flexibility markets. As above there are already various private and ESO projects that resemble to a certain extent what's under consideration here. Consolidating projects where possible is a sensible approach, as is ensuring that market power is not overly concentrated.

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

N/A

³¹ <https://nic.org.uk/news/a-smart-power-revolution-could-save-consumers-8-billion-a-year-adonis/>