Dear Ofgem,

It was good to see your recent Call for Input on the future of Distributed Flexibility, it is an area which needs more focus to address the barriers and challenges it faces if its potential contribution to the decarbonisation of the electricity system is to be fully realised. The response below is my own personal thoughts and opinions on the topic, as an engineer that previously worked for several years in a role directly supporting the engagement of customers with DERs and their entry and participation of into flexibility markets and I maintain a technical interest in the topic because it's a very interesting topic.

The Call for Input stated the aim of stimulating debate and discussion around distributed flexibility at a strategic level, so in that spirit before turning to the specific Call for Input questions, I would first like to raise what I would argue is one of the most significant strategic topics which needs to be considered as part of any plan for distributed flexibility involving domestic customers and CERs, the distinction between implicit demand-side flexibility and explicit demand-side flexibility and the role for each within any plan.

I raise this topic because it was not addressed within the Call for Input, indeed the document was largely focussed on explicit demand-side flexibility services, which was surprising given that within the UK historically, currently, and in other countries around the world, flexibility from domestic consumers and CERs has largely been mobilised via implicit demand-side flexibility, which would therefore be the natural starting point for any plan or vision for distributed flexibility.

Implicit and explicit demand-side flexibility:

The distinction between explicit and implicit demand side flexibility is well established, though it tends to be more prominent in European flexibility literature than within the UK, broadly the definitions are:

Explicit demand-side flexibility being where the consumer contracts their DER or CER, normally being paid a fee, to participate in a contracted, dispatchable flexibility service, typically through a flexibility service provider (FSP) or aggregator, which trades that flexibility into different markets, controlling and dispatching the DER/CER.

Implicit demand-side flexibility being where the consumer receives price signals, typically via time of use tariffs of some type or design (static or dynamic, peak pricing, peak rebates etc), using those price signals to determine when and how to operate their DER/CER to minimise their electricity costs, shifting demand through either behavioural action, scheduling or automatic control.

Both types of flexibility can provide a range of benefits to the electricity system and support the transition to a decarbonised system, but a distinction is vital because the two types of flexibility have key points of difference as shown in the table below.

One key point is that the suitability of DERs and CERs for participating in these types of flexibility differs; any CER or DER with some flexibility to shift consumption over time can participate in implicit flexibility given a suitable tariff structure and a willing consumer or business; with the right tariff it's an inherently open and inclusive form of flexibility, this places limits on the kind and complexity of flexibility services and benefits it can provide to the electricity system but it opens participation up to a wider range of CERs and DERs particularly those smaller assets with limited flexible capacity. Whereas explicit flexibility with requirements for assets being more firmly committed to be available for the service, the need for asset connection, real-time control and metering and the sale of the service to the consumer as a product separate from their electricity supply, results in considerably

greater technical and financial barriers to asset participation, resulting in this being more suitable for DERS with greater flexible capacity.

This is reflected in what we see in the market today, with domestic consumers and CERs already participating in implicit demand-side flexibility but not through explicit demand-side flexibility.

Some of the features of the two types of flexibility are shown below:

Domestic Consumers & CERs	Implicit Demand-side Flexibility	Explicit Demand-side Flexibility
Consumer's route to access the value of their flexibility:	**Suitable** Electricity Supply Tariff with **appropriate** tariff structure – Static or Dynamic Time of use, Critical Peak Pricing or rebates. Or for DERs, tariffs which 'pass-through' non-energy costs and wholesale prices.	Flexibility contract for their DER/CER.
Party providing the consumer with access to the value from their flexibility:	Electricity supplier	Flexibility Service Provider (FSP) / Aggregator. (either stand-alone FSP or a bolt-on from electricity supplier).
Consumer benefit from engaging in flexibility:	Electricity bill savings & bill rebates.	Payments for participation - availability & utilisation.
Typical markets / sources-of-benefit for the consumer's flexibility:	• Wholesale markets – pricing differences from time of day, day of week etc. • Static or dynamic TOU network charges. • Implicit price signals from TOU levies (i.e. implicit signal from Capacity Market levy) • Peak-time rebates or peak-time surcharges. (i.e. A scaled up, revised version of NGC ESO Demand Flexibility Service) • Consumer's network connection capacity charges (outside UK).	• Network operator's flexibility services & markets. • Balancing Mechanism • Capacity Markets • System Operator frequency and reserve services.
Consumer clarity and confidence in the benefits from participation in flexibility:	Reasonably High – tariff pricing structures, prices or price formulas are stated in advance, may be fixed for long periods based on durable wholesale electricity pricing patterns, stable TOU network charging and TOU levy regime.	Low – CER's marketable flexible capacity can be uncertain, dependent on individual consumer behaviour. Revenues come from flexibility contracts with short durations, frequent auctions resulting in uncertainty of success in securing contracts and volatility in availability and utilisation prices.
Maturity of flexibility products for domestic consumers & CERs:	**Storage heating:** Very mature, simple off-peak TOU heating tariffs offered commercially for	**All CERs:** Immature – trial stage/proof of concept.

	30+ years (Economy 7, Economy 10 etc) **Electric vehicles:** Developing – range of EV off-peak TOU tariff structures now available. E7 is also suitable. **Heat pumps:** Immature –absence of TOU tariffs suitable for heat-pumps. **BESS:** Immature. **Multi-CER / General Flexibility tariffs:** Immature, lack of general purpose TOU tariffs which neutrally pass through price signals, suitable for all CERs, consumer loads and consumer lifestyles. UK market has a notable lack of tariffs which pass through the peak-time costs. Many countries use 3 tier off-peak/mid-peak/peak structures.	Face challenges and uncertainty around: • Actual flexible capacity from CERs after de-rating for availability, baseline calculations, interaction with implicit flexibility. • Viability of the business model; identifying, marketing to and contracting domestic customers with individual flexible capacities in low kW range. • Market access, technical & commercial requirements.

Solving the distributed flexibility challenge will depend on both implicit and explicit flexibility, but they are quite different so any vision and plan for Distributed Flexibility and the associated digital infrastructure needs to consider both distinct types of flexibility and analyse the respective situation for each, to determine the policy and regulatory interventions necessary to support their growth. A plan also needs to consider the interactions between the two types.

Are CERs providing services to the electricity system?

Having a clear distinction between implicit flexibility and explicit flexibility allows a more accurate assessment of the current situation for CER participation in Distributed Flexibility in the UK. The Call for Input asks what CER services are worth, making the point that while CERs have the characteristics capable of participating in a wide variety of energy market services they are not currently doing so. Taking a narrow view, purely of explicit flexibility services, this is correct but it rather misses the situation that most CER participation is through implicit flexibility and that within the UK CERs are already providing valuable benefits to the electricity system via this route and have done for decades.

The UK had extensive historical experience of CERs providing implicit flexibility, when significant efforts were made post-war through to the 1970s on promoting adoption of storage heating as a means of managing peak loads and load factors at a time before gas central heating was dominant, when instantaneous electric space and water heating were much more common and had a greater impact on electricity system operation. Adoption of storage heating was promoted by the TOU heating tariffs (Economy 7, the Ratio Teleswitch heating tariffs, Economy 10), passing the financial benefits of their implicit flexibility through to consumers as reduced off-peak tariff rates, which made electric storage heating financially viable for consumers and aided its competitiveness against gas heating. These storage heater CERs were, and in many cases still are, typically controlled by the meter being automated to follow the TOU tariff off-peak periods, delivering system cost savings by

reducing peak-demand and increasing off-peak demand, using network and generating capacity more efficiently.

Ofgem, in your recent Call for Input on Typical Domestic Consumption Values estimated the number of Class 2 meter points in service, these being meter points which might have a Non-Half-Hourly (NHH) time of use tariff applied to them, finding as of Nov 2022: 3.25M Economy 7 meters, 122k Economy 10 meters, 279k Teleswitch meters. A 2015 Ofgem paper on insights into electric heating, estimated the number of households using storage heating at around 1.7 Million with these households operating the storage heaters with TOU heating tariffs. As a very rough order of magnitude estimate, if we assume these households each have around 6kW of storage load. [2x 1.5kW room heaters + 3kW immersion water heater = 6kW of storage load]. Neglecting diversity and de-rating factors, the simple installed capacity of the storage heating CERs participating in implicit flexibility today could be in the order of 10 GW of load, a substantial amount of implicit demand-side flexibility.

The growth of Electric Vehicle (EV) ownership has renewed interest in TOU tariffs, many suppliers launching new or rebranded TOU tariff structures to target EV owners. Recent estimates for Battery Electric Vehicle (BEV) ownership are around 711,000 BEV cars on UK roads, with a further 485,000 Plug-in Hybrids (PHEVs). A recent BEIS EV Smart Charging Survey found 30% of BEV & PHEV drivers in their survey had a TOU tariff, with somewhat more at 40% of all drivers, routinely scheduling their charging.

Extrapolating those survey results to the UK EV fleet, a very rough estimate of the order of magnitude of the implicit demand-side flexibility from BEV and PHEV drivers, purely from their engagement with TOU tariffs, would be in the order of over 300,000 EV drivers with around 1.4 GW of EV charging capacity (before derating or adjustment) engaged in implicit flexibility; shifting consumption to off-peak periods, reducing peak demand, increasing load during off-peak periods and using network capacity more efficiently, all very real benefits to the system.

EV Type	**Total Vehicles**	**% on TOU Tariff**	**% With Dedicated Charge Point**	**% With 3-pin Charging Cable**	**Simple estimated total of installed EV Charging Capacity on TOU tariffs:** Assumes: 3 pin charging @ 2.3kW Dedicated charge point @ 6.6kW for EV, 3.6kW for PHEV.
BEV	712,000	30%	66%	26%	712,000 x 30% x ((66% x 6.6kW) + (26% x 2.3kW)) = ***1.06 GW***
PHEV	486,000		41%	49%	486,000 x 30% x ((41% x 3.6kW) + (49% x 2.3kW) = ***380 MW***

The examples above illustrate that with somewhere around 2 Million UK domestic consumers already using their CERs to provide implicit flexibility to the electricity system, for this sector it is implicit flexibility rewarded through the tariff which is the primary route for mobilising their CER flexibility, but unlike explicit flexibility where volumes are visible and regularly reported, the contribution from implicit flexibility is much less visible. For residential flexibility and CERs there is something of a 'flexibility iceberg' with a small quantity of explicit flexibility above the water line, measured, visible and reported, while the bulk of the flexibility is implicit and hidden, difficult to precisely estimate and quantify but an order of magnitude greater than the explicit flexibility.

The starting point for any vision or plan for distributed flexibility encompassing domestic consumers and their CERs therefore starts with implicit flexibility; in the market for tariffs, the design of those

tariffs, how well that market works for the consumer and how easy it is for a consumer to navigate and engage with the products on offer.

Implicit flexibility & TOU Tariffs as an enabler for decarbonisation:

The wider context surrounding this Call for Input is the growth of low carbon technologies (LCTs) and the wider policy goals of encouraging decarbonisation through electrification. The rate of adoption of LCTs rests on consumer decisions on whether to purchase LCTs and switch from fossil fuelled alternatives, decisions which are strongly influenced by the running costs of LCTs, cost which are determined by the consumer's electricity tariff and in particular, the tariff rate which applies the electricity used by the LCT.

Implicit demand-side flexibility, rewarded through suitable TOU tariff structures which pass through savings, directly reduces the running costs of the LCT and this pricing and cost information made available from supplier's published tariff rates, shapes analysis and discussion on the attractiveness of LCTs by the media and consumers, directly affecting purchasing decisions. Implicit flexibility through TOU tariffs therefore has an important signalling role to the consumer and it supports the wider policy goals of encouraging decarbonisation.

Explicit demand-side flexibility also rewards the flexible operation of LCTs, but the valuation of those rewards is far less clear and subject to greater variation and uncertainty, influenced by individual consumer behaviours and utilisation of the CER, location and prevailing prices within flexibility markets. Hence it is unlikely that a consumer or the media can use explicit flexibility revenues when analysing the costs of LCTs, resorting to using single-rate tariffs which worsen the competitiveness of LCTs, which influences consumer decisions making the purchase of the LCT less attractive and slowing decarbonisation.

We see this situation today with the two major domestic LCTs. EV owners accessing savings from implicit flexibility via E7 and EV TOU tariffs, charging over-night at off-peak tariff rates typically under 15p/kWh, EV owners benefitting from fuel costs of under 5p/mile, substantially better than fossil fuel vehicles and providing a major selling point to promote the sale and adoption of EVs. Take away the value of that implicit flexibility and on a single-rate tariff where current prices are ~33p/kWh those mileage costs are doubled, now much closer to an efficient petrol HEV or efficient diesel; the selling point of significantly lower running costs of an EV which offset the added purchase costs is greatly weakened.

By contrast, heat-pump owners are unable to access the value from their implicit flexibility in the UK due to a lack of suitable TOU tariff structures that provide access to the mid-peak within daytime hours and savings from avoiding the evening peak. On a single-rate tariff the comparative running costs of a heat-pump means there is no significant running cost savings to offset the greater purchase cost, so there is no financial selling point for heat-pumps in the UK today, only the carbon saving, this contributes to the lack of consumer uptake and the UK's lagging performance in encouraging heat-pump adoption.

Getting the framework for distributed flexibility correct to ensure consumers can easily see and have a degree of certainty over the value of their flexibility, with that flexibility providing them with access to periods of lower cost electricity is a vital tool for supporting and accelerating the adoption of LCTs.

Call for Input Questions:

Section 1

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

There is already a very considerable amount of publicly available, highly detailed reports, literature and analysis on the contribution from demand-side flexibility, however I would argue that the starting point for any analysis should be a clear distinction between implicit demand-side flexibility and explicit demand-side flexibility, analysing their respective contributions and suitability for domestic consumers and CERs. The interaction between the two should also be considered because of the potentially complex interactions between CER availability for participation in the respective services and impacts on consumer's tariff costs and flexibility service earnings.

For implicit demand-side flexibility, that analysis should include UK historical experience with storage heating and more recently EV charging, but the analysis should look outward, including the experience of those countries which are ahead of the UK, already having mass-market adoption of TOU and critical peak tariffs, such as:

- Italy, time of use tariffs are the default for all residential consumers since 2010.
- Ontario, Canada, time of use tariffs the default for residential consumers.
- Spain, around 9 Million consumers (35%) on regulated, dynamic tariff priced based on day-ahead hourly prices.
- Various US utilities offering peak-time rebate tariffs.

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

Overall if it encourages the development of a wider range of flexible tariffs and flexibility services which are suitable for smaller energy users and CERs/DERs with lower flexible capacities, broadening the market then it can only help other forms distributed flexibility.

Similarly if it creates a digital energy infrastructure which reduces the frictions and costs of CERs participating in flexibility then that would also be expected to have benefits for smaller DERs.

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

I would argue there is because the market for flexibility services and products features network effects; the growth of ownership of CERs with smart capabilities and the use of those capabilities depends on the availability of compatible tariffs and flexibility services that can maximise the value of those capabilities. The launch of new tariffs and flexibility services depends on their being a customer base of sufficient size with sufficient suitable CERs to make those products viable. Ensuring CERs, tariffs and flexibility services are compatible requires standards to ensure interoperability and avoid fragmentation of markets caused by incompatibility issues.

This requires not only a common vision but also common standards to deliver those outcomes and to grow the market as a whole. It is beyond the capability of an individual company or individual sector (supplier, DNO, CER manufacturer) to create that environment.

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

My assessment of the situation for distributed flexibility from domestic consumers and CERs is considerably different to that outlined by Ofgem in you Call for Input, seeing a different set of problems and measures required, essentially focusing on making implicit flexibility work well to provide a base from which to build and progress into more complex services.

My vision starts with the consumer and making flexibility simple and accessible to all:

Before a consumer has even purchased a CER such as an EV or a heat-pump, they can access information on the range of simple, standardised TOU tariffs designed to work with their CER(s), allowing them see how their flexibility can minimise the running costs, assessing those running costs and supporting their decision to purchase a CER and decarbonise.

When they purchase the CER, the installation process and set-up includes automatic registration of the CER and within the same process, automatically connects the CER to the consumer's tariff pricing data and load control signalling from their electricity supplier (and in future, FSP) ensuring that by default, the flexible operation of CERs with consumer tariffs is plug-and-play, not just at installation but for the life of the CER and all future tariff changes and for future dynamic tariffs or services.

The registration details of the CER are visible to trusted parties for approved purposes, including Suppliers, Price Comparison Websites, the DNO and FSPs. On registration of new CERs, this automatically triggers their supplier to commence a marketing process, contacting the consumer to make them aware of potential savings from TOU tariffs and the choice of standardised tariffs and flexibility service bolt-ons available.

Tariff choice is easy for consumers because standardisation of tariffs allows a choice between a number of tariff types designed to cover common uses and CERs. Having chosen a tariff type, consumers can confidently compare tariffs from different suppliers to get a good deal because standardisation makes comparison of prices simple, with no complex spreadsheets or analysis of half-hourly consumption data necessary.

Consumers can customise their tariff further, choosing from a set of standardised, optional flexibility 'bolt-ons'; additional flexibility services they can participate in by allowing automated, dynamic direct control of their CER to reduce their costs even more or earn rebates. For example, agreeing to reduce their demand and turn-down their CERs to help manage demand on the distribution network (via new implicit DSO flex services), or to reduce demand during critical peak periods on the system (NGC ESO's DFS rolled out to all customers) and in reverse, to turn-up demand running CERs during periods of high renewable generation, supporting renewable generation and benefitting from reduced tariff rates on that demand turn-up. Because bolt-ons are optional, it ensures that even those consumers who do not want a time of use tariff can participate in flexibility services to the extent they are happy and comfortable with.

The overall goal being to make flexibility accessible to all consumers by simplification and standardisation, turning complex, opaque and confusing tariffs and flexibility services into simple consumer products and product options that work for them, with common trademarks for tariff types and bolt-on services, so that consumers can gain familiarity and awareness.

The logic behind this vision being that:

- In the UK and around the world, for domestic consumers and CERs, implicit demand-side flexibility is currently the most mature and proven method for mobilising their flexibility, therefore it has the primary role.
- Explicit flexibility from this sector, traded via flexibility markets, is unproven at scale for this market sector and therefore to give it a primary role is an inherently risky policy choice at this stage of market development. It will be needed in the future but it is inherently more complex and appears premature to use as the starting point when the UK has not yet managed to put in place the building blocks for simpler implicit flexibility.
- The interventions needed at this stage are those which make simple implicit flexibility products such as static TOU tariffs and simple dynamic elements like peak-time rebates work to the benefit of consumers, which means creating a market which allows consumers to easily understand flexibility, to identify the most suitable TOU tariff for them, to compare tariffs and suppliers, to easily sign up for the tariff, to ensure their CERs can operate with those tariffs and to monitor and understand their costs.
- Getting the basics in place for simple implicit flexibility then serves as a foundation on which to build, introducing more dynamic features into tariff design and participation in explicit flexibility services at a later stage.

Consumers face a range of problems, many of which are present in other markets for potentially complex technology products but those technology markets have generally solved these problem through processes of standardisation which simplifies the choices and decision making process for the consumer, creating larger more competitive markets which work better for the consumer. That same approach should be applied to electricity supply and flexibility.

Existing Consumer Problems:	**Potential Solutions:**
Complexity for consumers: Currently every electricity supplier invents their own TOU tariff structures, which results in most TOU tariffs being unique and not directly comparable, requiring consumers to familiarise themselves with the details of each tariff product and makes simple comparison of pricing impossible without detailed and potentially complex numerical analysis by the consumer. From the consumer perspective, it provides an overload of choice increasing the effort needed to select a product and reduces price competition because the different structures make accurate price comparison difficult or impossible.	**Tariff Standardisation:** Creation of a committee or body, supported by a suitably resourced consumer engagement and R&D programme, tasked with designing a standardised set of simple TOU tariff structures suitable for the majority of domestic consumer & CER uses. The tariff structures would be designed to ensure that consumers can easily identify the type of tariff structure that best meets their needs. Having identified the type, being able to make life-for-like comparisons of offers from a number of suppliers, who will all offer the standardised set of tariffs by default. Consumers on existing TOU tariffs will benefit from consolidation of numerous small, unique and difficult to compare tariffs into deeper, more competitive markets with the same tariff available from many potential suppliers. Changing supplier will be possible without needing to switch to a different a tariff structure.

	The body to oversee the introduction of new tariff structures with dynamic pricing and flexibility service bolt-ons, ensuring the design of potentially complex pricing structures and treatment of dynamic pricing is fair, understandable by consumers and incorporates suitable consumer protections.
Lack of consumer awareness: Getting consumers to engage with flexibility requires building awareness of the benefits and features of tariff types and flexibility services, but building consumer awareness is difficult when tariffs and tariff structures lack a consistent identity and trademark. The marketing efforts by individual suppliers is spread across numerous unique product trademarks, each with a limited number of customers, so never achieves widespread consumer awareness. For example, 'Economy 7' was a registered rademark with joint ownership, it is still well known today. There are at least 10 separate EV tariffs, each with a different product name, none having that same level of consumer recognition or awareness.	**Common tariff trademarks & promotion at industry level:** In conjunction with standardisation of tariff structures, give each tariff type a registered trademark that can be used by all suppliers offering that tariff type and can be advertised at an industry level, to build widespread consumer awareness. Smart Energy GB runs advertising campaigns on the benefits of smart meters, build on that to include the range of standardised tariffs that consumers can access from their energy supplier and the benefits they provide. We need standardised flexibility tariffs and bolt-on services to have the same consumer recognition as technology standards like 'WiFi', 'Bluetooth', 'USB'.
Interaction between tariffs & CERs: Currently for most CERs to interact with a TOU tariff requires the consumer to configure the CER with the time schedule of the tariff. This creates a technical barrier for some less tech-savy consumers and adds difficulty and potential for configuration errors when consumers change tariff types and during clock changes, or if clock errors are present. The lack of automation and load control becomes a significant blocker to uptake of dynamic TOU tariffs because automation is essential to allow interaction with the tariff. The lack of a standardised system for providing tariff information and load control signalling to consumer CERs has implications on interoperability and competition, restricting which make/model of CERs can operate with certain tariffs, depending on the particular supplier's controls platform.	**Plug and Play Automation & Load Control:** The digital energy infrastructure should be designed to address this problem, providing a common, standardised platform to provide tariff pricing data and load control signals to CERs, via their manufacturer's control platforms. The CER manufacturer being able to register the CER against the consumer's address and account, accessing the tariff and load control data through this platform. The CER providing data and asset sub-metering data back to the platform. If the consumer changes tariff, supplier, or if opt in to participate in flexibility services via bolt-ons, this signalling and communication being provided to the CER via the common digital energy infrastructure.

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

Potentially, if that certain end vision can be arrived at, but what is likely to be equally important is the establishment of technical committees and bodies to deliver the common standards and standardisation necessary to support adoption of flexibility by consumers and CERs and to support the evolution and development of the market.

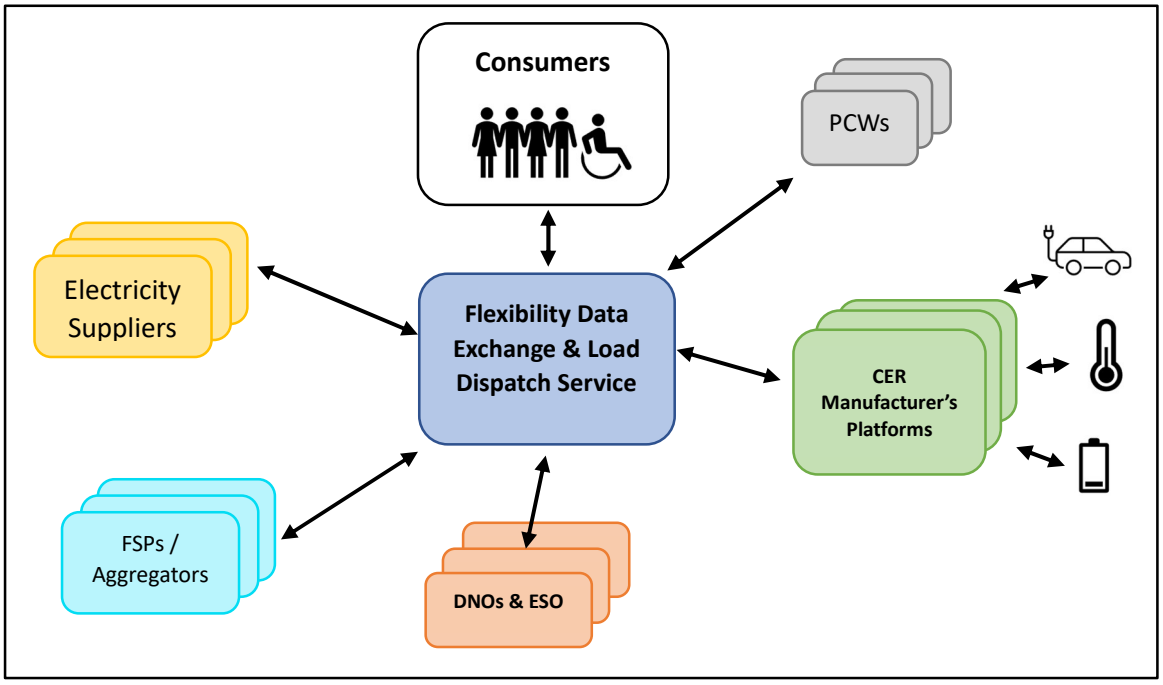
6. When should a common digital energy infrastructure be in place? And therefore, when should development begin?

Once the end vision is determined, the design and development should begin with the aim of coordinating the system to go live with basic core functions and features to be available when MHHS launches in 2025 or 2026.

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

As outlined above, my assessment of the situation for distributed flexibility from domestic consumers and CERs is different to that outlined by Ofgem in your Call for Input. At this stage of market development I would focus the common energy digital infrastructure on supporting the mobilisation of implicit flexibility from domestic consumers and CERs, rather than the development of flexibility markets and trading mechanisms.

This digital infrastructure would sit at the centre, acting as a data exchange and load dispatch service between the following users: Electricity suppliers, DNOs, CER manufacturers and their control platform operators, FSPs, Price Comparison Websites and the Consumer who would have visibility and control over their data and the use of their CER(s).



It would be a database holding the data of every consumer address and meter point, act as a registry for the details of the individual CERs installed at the property, the supplier and tariff structure details for that address. It would also record participation in any bolt-on flexibility services and the provider of those services, giving those providers access rights to control the CER.

It would serve as a platform for exchanging the tariff pricing data that applies to that meter point, exchanging load scheduling and control signals between the supplier, the FSP and the CER manufacturer's controls platform, these signals specific to each CER and meter point. Allowing the CER(s) to receive tariff prices and control signals from suppliers and FSPs over a common, secure platform, ensuring compatibility between suppliers, tariffs, FSPs and CERs. This pricing data and load control signalling could initially be simple schedules, being either fixed or updated on a daily basis, so allowing both simple static TOU tariffs, through to dynamic tariffs based on day-ahead pricing and participation in specific network and peak demand flexibility services. Advanced real-time metering and control may be more appropriate at a later stage of development. DNOs and the ESO would be able to access reports on aggregated load control schedules to have visibility of CER operation to allow planning and monitoring of their impact on the system, allowing them to identify what implicit and explicit flexibility is available and opportunities to manage system issues via flexibility.

In addition, where CERs are equipped with sub-metering within the CER, the platform would receive and store the sub-metering data to allow its use by the supplier, FSPs, Price Comparison Websites and the DNO/ESO. Having a common platform for asset sub-metering data unlocks a range of possible tariffs and flexibility services which ring-fence the specific CERs from other household loads. It also provides data on CER consumption to support accurate calculation and comparison of tariff types by PCWs when the consumer is performing price comparison and supports the calculation of flexibility service benefits and monitoring of delivery by suppliers, FSOs, DNO & ESI. It also provides greater visibility for the DNO & ESO and makes implicit flexibility from CERs more visible.

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

Ofgem's architypes focus on flexibility market operation, I would argue this is premature given the state of the market for domestic flexibility currently. Rather than focusing on markets, the more pressing concern should be the common systems for CER connection, control and metering because these are a precondition for a market to exist and are not yet in place, so focus on this first, get this functioning for basic implicit flexibility services like TOU tariffs and simple dynamic services for network and peak demand management.

Once these foundations are in place, then consider developing more complex solutions on top for managing the trading of flexibility.

It needs an Agile approach, start with core functions, get these working then develop the system further.

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

For the architecture I propose above, there is a strong overlap with the existing Electricity Enquiry Service (EES) / Electricity Central Online Enquiry Service (ECOES), though it would involve a significant widening of the number of users and range of uses of the system.

10.What are the important areas for consideration when designing institutional

delivery models for a common digital energy infrastructure?

The design needs to ensure that all stakeholders are engaged, and this must include both consumers and the manufacturers of the CERs and their control platforms, not just existing electricity industry participants (suppliers, DNOs, FSPs).

11.What are the important areas for consideration when designing financial delivery

models for a common digital energy infrastructure?

One specific topic, related to the common infrastructure, that I would raise is for CERs, these are likely to be monitored and controlled via the smart platform provided by the manufacturer which is integral and forms part of the product.

Assuming the market design is open and competitive to ensure consumers can use their CERs with any supplier or FSP, then it is not clear what on-going revenues would be earned by the CER manufacturer from keeping the smart functionality of a CER active and available.

Most stakeholders of the digital energy infrastructure have some form of on-going income from their participation in these markets (supplier via tariffs, DNO via network charges, FSO via flexibility service revenues, PCW via commissions etc) but the CER manufacturer receives a one-time payment at the point of sale of the CER.

In the absence of any on-going revenue stream or financial incentives, how long is that manufacturer of a CER expected to keep that device connected to the digital infrastructure, covering IT and infrastructure costs and providing on-going technical support, and firmware and platform updates? Would they be able to fund development of new platform capabilities to connect CERs to the common infrastructure?

There is a risk that without a mechanism to reward CER manufacturers for maintaining the smart functionality and connection to the digital energy infrastructure, then over time the connectivity of these devices will stop working or be withdrawn, creating a pool of CERs which are no longer able to participate. It needs some consideration because with CERs lasting upto 10 years or more, this is likely to become a problem in future.