

Hello

I am pleased to provide this response to Ofgem's call for input on 'The Future of Distributed Flexibility' on behalf of PA Consulting.

We have read the documents provided and attended the associated briefing session. As this is a Call For Input rather than a consultation, we provide a written response that places specific observations into context, rather than as a set of answers to specific questions.

Distributed Flexibility is a topic we believe is of vital importance to unlock the full benefits of the technology revolution by empowering consumers of all sizes to take control of their energy, reducing bills and grid dependency substantially while enhancing their sustainability. In addition, distributed energy technologies empower electric mobility and heating while enabling consumers to benefit financially from their electricity export or flexibility in supporting the grid. In future, these benefits will continue to expand, for example into Vehicle To Grid/Everything so that the full value of electricity stored in vehicle batteries is usable within the premise it connects to at the higher demand tariff rather than a lower export rates. Vehicle To Grid has huge potential to contribute for distributed flexibility but is still at the trial/pilot stage in UK (I am registered with the largest commercial trial in UK and waiting for the install to commence).

This revolution in distributed energy technology is accelerating as technologies mature, scale in adoption, and commercialise while service providers create compelling packages of finance, installation, continual usage optimisation and support to encourage consumer adoption.

In addition to PA Consulting, this is an area of personal experience with my home having an airtsource heat pump, solar PV, storage, smart plugs, EV charging and many software applications in use. Both as PA Consulting and in my own personal experience, it is clear the topic of distributed energy and its flexibility is of intense market interest as we described in our first article within a new series recently at: <https://www.paconsulting.com/newsroom/utility-week-distributed-energy-press-accelerate-to-win-the-smart-energy-race-24-february-2023>

While this new sector is commercialising quickly and of growing market awareness, it is still at early stages of mass-market adoption. However, as consumers seek to protect themselves from energy price rises or empower their electric mobility, the triggers for adoption are now evident and pathways forming as one technology choice leads to others (heat pumps to solar, EV charger to solar, solar to heatpump and/or EV charger).

The area of distributed flexibility and its use by energy network companies is the focus of your Call For Input. While the business sector has years of experience and maturity of requirement by the network companies, for domestic and small businesses this is still a largely nascent sector. National Grid's scheme in Winter 22/23 was welcome and provided real system benefit but was at an aggregate level and untargeted. It also related to manually delivered usage reduction rather than the automated technology-oriented flexibility. The scheme did catalyse the emergence of aggregating providers to the National Grid scheme but is unlikely to provide the full, enduring benefit of energy flexibility possible in UK.

In addition to National Grid's scheme, Distribution Network companies in their System Operator roles have been establishing their approaches to procure energy flexibility, initially stimulated by Ofgem's innovation programmes, and subsequently evolving into operational services. There have

been some early, notable examples of aggregating flexibility from residential batteries and EVs into distribution level flexibility requirements, but these are rare rather than the norm at present.

Our engagement as PA Consulting and in personal advocacy indicates that the technology, service offers and customer understanding of distributed energy is still evolving. Technology providers are still in the 'innovate and iterate' stage of their business cycles, introducing solutions to sell at scale and iterate through each generation of production and software application updates for the users. These companies are a combination of UK originated and international, focusing primarily on their businesses and technologies in the initial stages while of course ensuring full legal compliance.

In parallel, the UK government energy department (BEIS now DESNZ) has been exploring the required standards through the British Standards Institute leading to the development of PAS1878 and 1879. These are helpful in bringing consistency to the technologies but have not yet been promoted or adopted widely in support of a common, regulated distributed energy system model. Your Call For Input is a precursor step to the creation of such a UK system model.

We believe the view of the electricity network companies, both at Transmission and Distribution level are profoundly important as it is they who will deliver flexibility into the system and be regulated in how they do so. We believe they should have a range of approaches and market mechanisms available to them reflecting the diverse, evolving nature of distributed energy technology and its benefit.

We observe the system archetypes Ofgem provides in the Call For Input and their confirmation in follow-up communications that these are examples rather than recommendations. These archetypes help to provide an illustrative range that stimulate input in this response. Whereas smart metering has assets with long lives, that are entirely consistent in their specification, distributed energy technologies are more diverse, faster in their innovation, competitive in their provision and serve a range of consumer needs. The technology and service models are not yet stabilised or consistent with far more innovation to come. This is wonderful in the accelerating range of benefit, user control and simplified experience that will be provided for consumers through time. It is vital though that this innovation while harnessed to offer flexibility in a consistent way, is not disrupted or slowed down.

Due to the characteristics of smart meters, they lend themselves to such as a central system model, as in the DCC created and operated for them (and wider smart energy benefits). They are the boundary of the grid, whereas distributed energy technologies have different characteristics and continued innovation which may need a framework that facilitates innovation with a lighter approach. There is clear benefit to such as common data structures, interfacing into energy network services, ability to integrate into energy tariffs that enable benefit consistently. But as both these technologies and the approaches of energy network system operators are still evolving, it may not be the time to create the kind of central system described in one of the archetypes. As one illustration, BSI PAS1879 describes a role of Demand Side Service Operation in complement to the technology focus of PAS1878, but we do not observe companies operating to PAS1879 or many being aware of it at this stage (even many of those exploring their future in such as role).

Recognising the early stage but huge potential of distributed energy technology, service roles and how they deliver flexibility can inform the type of infrastructure that is helpful. Creating a consistent basis for data, interfacing, integration between the providers of flexibility and the service users of it (system operators) enables both parties to evolve and innovate in their role, without causing dependency and delayed delivery. Modern systems are often described more as a 'platform eco-system' with multiple value contributors integrating together via common Application Protocol

Interfaces (APIs) including common security, but not trying to standardise everything within each other's functionality. Distributed flexibility feels similarly like a modern technology platform ecosystem of diverse technologies, services and users operating together with a need to evolve and innovation alongside each other to achieve expanding shared benefits.

It may be helpful to think of the infrastructure needed in phases as the technology stabilises, adoption grows, and experience of its benefit matures in electricity network system operators. The needs at this stage of 'catalysing adoption and innovation' may be different from 'delivering system benefits at scale' in future years. As the way in which technologies evolves from mainframes to personal computers to phones and now into smart, distributed energy and home systems, new models of connecting together technologies and processes are emerging. We observe the emergence of distributed ledger technologies (as are starting to be adopted in small scale in some energy systems) and of course, the rapid development of AI in 2023. Further consideration may be helpful to think about the specific use cases that energy network system operators have the requirements to meet now and over time. Their view will then inform the kind of data, process, communications and technology infrastructure needed across them for flexibility.

We also note that the Call for Input covers many different types of Flexibility in its scenarios, from small local flexibility through to national system balancing requirements. It is unlikely that 'one size will fit all' across them. There are at least four types of flexibility we perceive:

1. Private consumer to service provider (such as an energy Supplier or EV charging company) (Consumer supports lower trading needs or peak requirements by Supplier or avoids public charging at peak as one example).
2. Local P2P/community flexibility – consumers using flexibility to support each other, rather than the grid.
3. Consumers supporting the distribution network, either directly or through aggregation. This could also have manual behavioural change or 'dispatchable' automated technology integration.
4. Consumers support the transmission network, either directly or through aggregation. In general, this is usually linked to grid connected assets such as storage battery sets but as with National Grid's scheme in Winter 22/23, aggregated residential options are viable (such as aggregated solar and storage).

Network system operators too will require flexibility in a number of forms against various system needs. These may include system balancing, peak load management, frequency and voltage management, unlocking constraints, outage management or network asset management. The way in which flexibility is procured may itself be diverse across procuring in 'lots', auctions, continuous markets, incentive signals that distributed technologies self-optimize against and many more as yet unknown before the needs emerge. This diversity of flexibility types, levels, methods and needs indicates different, multiple approaches may be required, while seeking to bring consistency and interoperability to flexibility provision.

We welcome the Call For Input and reflecting on our observations captured in this response, believe there is an equilibrium to be found between facilitating innovation, scaling and benefits delivery with consistency, security and interoperability. Open Banking is an example of defining the standards, interfaces and data without being prescriptive on 'how it is delivered' in a centralised way. Distributed Energy is not static, but will hopefully be a diverse, competitive, innovative basis that identifies new optimisations continually for the shared benefit of the consumer, market and grid. Any central infrastructure should reflect its dynamic basis and potential for accelerated, unforeseen basis evolution through such as machine learning and AI techniques. Central

infrastructure that is too rigid, slow or designed in a prior era may struggle to keep up with the pace of innovation and the needs of all stakeholders.

This is a new era of interconnected, but separate functionality combining to achieved shared beneficial outcomes. This feels as though it leans towards a 'thin – medium' end of the example archetypes provided in the Call For Input at this stage. The archetypes are themselves described in a specific way and may not be the appropriate basis to use in the future, as use cases become more defined. We think of Distributed Energy, its technologies and flexibility provision as an 'agile eco-system' rather than one central service model. It will evolve, innovate and disrupt itself continually as new flexibility sources arises, new optimisations are discovered, and network system operators identify new ways in which it can contribute. This seems important to place at the heart of the topic:

- that change and continuous innovation in the fast-evolving area of distributed flexibility is certain,
- that future distributed energy benefit grows through time with scale adoption of technologies and new forms of optimisation,
- that its future potential cannot be fully defined at the accelerating pace of technology change indicates ,
- that the subject interrelates with electric mobility and heating which have complementary but separate requirements to meet,
- that flexibility will likely be only one form of interaction between consumers, communities, service providers and electricity network system operators (for example calling for production export from batteries and V2G cars rather than just demand reduction or shifting), and
- that technologies from consumer to grid will likely be on a far different basis in less than ten years.

Ofgem asks for views on the role of Future System Operator in Distributed Flexibility. Their view and steerage is vital, but equally important are the network system operators who require the flexibility. These will bring the operational reality that will take the subject from concept to specific use cases and benefits to create. Additionally, the view of technology firms, consumer groups, future service providers and those such as PA Consulting working across this broad subject with those seeking to participate in it, will of course be helpful inputs. We welcome continuing to engage, supporting the work across Ofgem, government and other important stakeholders while empowering those who will help deliver the benefits of distributed flexibility.

Thank you for the opportunity to contribute to this Call For Input. We are happy for this response to be included in the list of respondents but welcome its content not being published.

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