

## ESO Response to Call for Input on the future of Distributed Flexibility

### Who we are

As the Electricity System Operator (ESO) for Great Britain, we are in a privileged position at the heart of the energy system, balancing electricity supply and demand second by second.

As the UK moves towards its 2050 net zero target, our mission is to drive the transformation to a fully decarbonised electricity system by 2035, one which is reliable, affordable, and fair for all. We play a central role in driving Great Britain's path to net zero and use our unique perspective and independent position to facilitate market-based solutions to the challenges posed by the trilemma.

Our transformation to a Future System Operator (FSO) is set to build on the ESO's position at the heart of the energy industry, acting as an enabler for greater industry collaboration and alignment. This will unlock value for current and future consumers through more effective strategic planning, management, and coordination across the whole energy system.

### About this response

This response sets out a summary view of our proposals relating to Ofgem's call for input on the future of distributed flexibility and is in addition to the points made in the covering letter. A detailed response to the specific consultation questions asked can be found in Appendix 1.

We look forward to engaging with Ofgem further as these proposals develop. In the interim, should you require further information on any of the points raised in our response please contact Yujia Du, Distributed Flexibility Strategy Manager, at [Yujia.du@nationalgrideso.com](mailto:Yujia.du@nationalgrideso.com). Our response is not confidential.

### Our overall views on the proposals

The scale of change needed to deliver a decarbonised energy system, demands urgent and collaborative action. This action includes a need for a shared, industry-wide vision of what is required both in terms of networks and markets to deliver net zero. We very much welcome, therefore, Ofgem sharing proposals how best to facilitate distributed flexibility, alongside other key consultations in this space. This consultation in particular demonstrates the importance of creating alignment across markets to remove barriers, particularly relating to market design, access rules and complexity, to ensure that consumer value is maximised.

Flexibility, and especially distributed flexibility, is critical to the operation of a clean, reliable and affordable electricity system. It is a cost-effective solution to balancing an increasingly intermittent generation mix, increasing integration and utilisation of renewables, enhancing the efficiency of networks by mitigating congestion, and delivering value to consumers

The ESO headline vision for distributed flexibility is that any consumer energy resources (CER) or distributed energy resources (DER) that can provide cost-effective flexibility to the system, should be able to do so, whether at transmission or distribution level, that their flexibility should be appropriately rewarded, and they should be able to stack revenues across different markets. However, we believe that the value and growth of distributed flexibility is being held back due to:

- The current market design, especially the lack of accurate and granular locational and temporal signals delivered to assets through wholesale and retail markets
- The lack of coordination of technology, policy, regulation and markets across the whole electricity system making it complicated, time-consuming and expensive for distributed flexibility to access and stack revenues across different markets, hence damaging the investment case for DER and CER.

An industry-wide vision for distributed flexibility is important to set a really clear end-state for the design of markets, policies, regulation and enabling infrastructure. There is also the need for a clear pathway to this vision. This vision and pathway will facilitate the coordination of activity and reform needed, as well as give investors confidence in future revenue streams.

We believe that Ofgem's proposal to create a neutral market facilitator is an important piece of this vision and coordination strategy. A single point of accountability is needed to drive alignment at pace across transmission and distribution flexibility markets, to achieve coherency with wider markets, and to remove the barriers to scalability of markets in a timely manner. While standardisation of DSO markets will contribute towards the business case of distributed flexibility, this alone will not unlock the level of distributed flexibility required to meet our Net Zero targets. We believe the Market Facilitator will also have a role in facilitating wider market and policy alignment.

As set out in our response to the parallel consultation on the future of local energy institutions and governance, we believe that a single, neutral entity should take on this central market facilitation role and that the ESO is the only entity able to undertake this.

We agree that the focus on removing barriers for CER could help unlock many market barriers for distributed flexibility and understand that CER will begin to represent a significant part of the distributed flexibility mix from the late 2020s. However, we believe that it is important to also maintain current efforts to remove market barriers for all distributed flexibility, which will deliver significant value to the system and to consumers over the years to come. We need to enable a level playing field for all, helping CER whilst not discouraging DER, as all parties are affected by costs, time and complexity.

### Creating a common digital energy infrastructure

We agree with the need to develop a common digital energy infrastructure across transmission and distribution to facilitate the interaction between flexibility providers and market operators in a standardised, simplified and coordinated way. This would encourage providers to participate in a wider range of markets and therefore increase revenue stacking potential by reducing complexity and associated administrative costs. Ultimately, more liquid and competitive flexibility markets will lower costs, delivering value to consumers.

Our preference, out of the archetypes proposed by Ofgem, would be the medium archetype, including user and asset registration, prequalification and asset performance data, in line with the technical guidance provided by Ofgem.

We believe that the FSO is uniquely placed to deliver this common digital infrastructure. We are able to take an independent view of what is best for the entire system and for GB consumers as a whole, which will develop alongside clarity on our roles as an FSO. We are also already developing a digital ecosystem for all ESO markets that provides a common platform for registration, prequalification, onboarding, contract management and data collection. The ESO Digitalisation strategy also covers other ongoing innovations; Virtual Energy Systems and Digital Spine which have some overlap with this Call for Input.

To take forward a medium archetype, we would propose extending our current ESO digital infrastructure to deliver digital asset and data sharing capabilities, whilst also collaborating with industry stakeholders to understand their own asset and data systems. The extensions should utilise our existing design templates to create consistent customer experience, engagement, registration, contract management and market participation for ESO market participants.

Our recommendation would be a staged MVP (minimum viable product) development, ensuring that it is modular and scalable to enable growth to a "medium plus" (incorporating some of the features of the thick model, e.g. auction capability) or thick model if a further detailed feasibility and cost benefit analysis shows that there is value from moving to these models.

## Appendix 1 – Consultation Question Responses

### Q1. What do you think distributed flexibility could contribute to the energy system?

Flexibility is critical to the operation of a clean, reliable and affordable electricity system. It is a cost-effective solution to balancing an increasingly intermittent generation mix, increasing integration and utilisation of renewables, enhancing the efficiency of networks by mitigating congestion, and delivering value to consumers. As transport and heat continue to electrify, distributed flexibility will play an ever more important role in the overall flexibility mix.

Distributed flexibility can contribute to a wide range of system needs across both transmission and distribution. Faster responding technologies, such as battery storage, play a key role in ESO's frequency response services such as Dynamic Containment. Storage, along with distributed thermal generation, and demand-side response (DSR) participate in our reserve services such as Short-Term Operating Reserve (STOR) and in the Balancing Mechanism (BM). The recent Demand Flexibility Service (DFS) opens a new route for demand response across from consumers as well as industry to help the ESO keep the lights on at times of very tight margins. Distributed flexibility resources are spread out geographically and have a key role to play in managing locational constraints, both at transmission and distribution level. Aggregated distributed flexibility can participate in the Balancing Mechanism, and smaller units behind B6 boundary will be able to join the new Local Constraint Market in 2023.

As the electricity system continues to become more decentralised due to the electrification of heating and transport, local system needs will grow significantly, and DSOs are responding to these emerging challenges by procuring distributed flexibility through a range of DSO products. It is vital that the growth of distributed flexibility is supported and enabled to address the growing needs at distribution level.

In addition to distributed flexibility positively contributing to the energy system, flexibility-enabled consumers are able to benefit by taking advantage of cheap and clean energy by responding to price signals. These consumer benefits also need to be taken into consideration when evaluating the value of distributed flexibility.

### Q2. Will a focus on CER flexibility also help enable other forms of flexibility, especially distributed flexibility?

While we agree that CER currently face more challenges to develop and contribute towards system security, we want to emphasise on the importance of taking a holistic approach to accelerate all types of flexibility at distributional level, including DER that still face significant market barriers that are shared with CER.

We share Ofgem's view that markets and the associated common digital infrastructure should be designed with the end state in mind. Our Future Energy Scenarios forecast that by 2035, the electricity system will require 90-150GW of flexibility, of which 20-40GW will come from the demand side (including CER, Vehicle to Grid and all other types demand side response). While CER flexibility will be hugely important, it is one part of a larger flexibility portfolio of flexibility.

It is critical that we create a level playing field for all flexibility, but we want to emphasise the importance of maintaining momentum in removing market barriers for larger DER such as distributed storage, behind-the-meter generation and commercial & industrial DSR. Unlocking flexibility from these existing assets can contribute to system needs and reduce balancing costs immediately. The growth of DER will provide an important foundation for new CER assets to access and participate in flexibility markets. Where CER face unique challenges, we agree with Ofgem that we need to prioritise and deliver the necessary market and regulatory changes today to enable the market to grow over the coming years. Many challenges are common to both CER and DER, including the lack of a common platform to access market data, to register and to pre-qualify for flexibility markets; or minimum volume requirements to participate in flexibility markets.

The ESO in partnership with strategic flexibility partners is looking to build and aggregate demand models to develop an ESO flexibility model as part of the Crowdflex beta (funded through Ofgem's Strategic Innovation Fund) project. This project will enable greater understanding, and hence support potentially increased utilisation of, domestic flexibility by the ESO.

### Q3. Is there a 'case for change' and a need for a common vision for distributed flexibility?

We agree that there is a case for change to unlock the full potential of distributed flexibility to deliver greater consumer benefits. We strongly believe that a common vision is vital to drive and coordinate the necessary market, policy and regulatory reforms, as well as the digital infrastructure development, required to enable significant growth in distributed flexibility.

Distributed flexibility faces a range of challenges preventing barriers to development at scale. The overall business case for distributed flexibility relies on the stacking of multiple revenue streams, including wholesale market arbitrage, ESO services and DSO services. This is even more complicated for behind-the-meter assets that are also concerned with energy cost optimisation. These markets have not always been developed or reformed in coordination, making it difficult for providers to effectively participate across markets which ultimately prevents projects to be invested at scale.

To unlock these cross-markets issues, and offer the regulatory stability needed for to build investor confidence, it is important that we define a clear vision for the future market environment for DER and CER. To achieve the most efficient outcomes, distributed flexibility will need to be appropriately rewarded by price signals from wholesale, retail, network and SO services. These markets and signals should be coordinated, and providers should be able to stack revenues across different markets without unnecessary blockers. The digital infrastructure will be an important enabler to help align some of these markets, but will not resolve all the issues. This is why we strongly believe the vision should go beyond the digital infrastructure, and include how future markets, policies and regulations will work in coordination to unlock large volumes of distributed flexibility.

We also need to ensure that this vision is created with consumers' interest at its core. We cannot deliver the distributed flexibility transition without involving consumers and businesses. Their needs and motivations will need to be understood upfront to ensure the vision is deliverable and ultimately beneficial for them.

We believe such a vision can act as the north star to align future reform activities. For example, wholesale market reform should be coordinated and coherent with SO market reform, as well as with wider industry frameworks such as the market-wide half hourly settlement programme, which will be able to incentivise suppliers to offer time-of-use tariffs to consumers. This vision will also help us unsure wider regulations and standards being put in place, such as the regulation of smart devices, do not limit potential market participation from these assets.

### Q4. What is your vision for how to accelerate the delivery of accessible, coordinated and trusted markets for distributed flexibility?

It is vital that markets, policy and regulation are designed and coordinated in a way that send efficient investment signals to distributed flexibility projects, and we are mindful that the proposals in this consultation sit alongside a suite of proposed policy and market reform actions.

An industry-wide end vision for distributed flexibility, supported by interim milestones and clear actions, will act as the guide for wider policy and market reform actions, and help increase investor confidence in distributed flexibility projects.

For example the Review of Electricity Market Arrangements (REMA) should ensure the delivery of a wholesale market design that sends accurate and granular locational signals, which will be core to unlocking value for distributed flexibility. In parallel, we should maintain momentum in removing barriers for distributed flexibility in today's markets to stimulate market growth prior to the implementation of wider market reforms.

The ESO's Power Responsive programme is progressing a suite of activities to remove barriers for DER to access ESO's markets, as well as coordinating industry to resolve wider policy and regulation barriers. One key barrier to participation is the lack of alignment of DSO services across DNO regions and with ESO markets. Ofgem's future of local energy institutions and governance consultation highlights challenges in this space and proposes the creation of a Market Facilitator. We support this proposal of a neutral facilitator to drive service alignment and suggest that it should be backed up by a robust transition plan to avoid market development hiatus.

In addition to policy and regulation, the right digital infrastructure needs to be in place for the vision to be delivered. The ESO is quite far along the journey of creating a common digital infrastructure for ESO Markets, through our Digital Engagement, Single Market user and asset Registration, Access and Settlements and Revenue platforms. These platforms provide a consistent digital experience and point of entry for ESO customers looking to engage with the services provided by ESO, including user and asset registration, contract management and pre-qualification and access to open data. These platforms have been developed in close collaboration with market participants leading to customer alignment, enabling regular deployments, delivering value to consumers in a timely manner. These platforms and approaches provide a template for extension for how industry-wide systems could evolve and engage in an interoperable way.

#### Q5. Will certainty of an end vision help accelerate enabling work and make it cohesive?

As discussed in Q3, we agree that certainty of a sector-wide end vision for distributed flexibility will help accelerate a range of reforms required to remove challenges for CER and DER. We note that there are a number of ongoing consultations and workstreams which may impact on the whole vision including the parallel consultation relating to the future of local energy institutions and governance, the recent consultation on data best practice, and initiatives impacting wider market arrangements. These should be considered in the round to develop a single end vision for enabling distributed flexibility.

In addition to this, a key enabler of facilitating distributed flexibility will be having the correct digital infrastructure in place. Currently, there is no common platform where providers can find information on all SO markets, such as product requirements and stacking rules. This makes it very difficult for DER and CER providers to navigate the complex market environment and uncover potential revenues available to them. There are also unclear or incompatible designs and rules across different products and markets, which makes revenue stacking difficult or impossible in some cases. Enabling platforms (e.g., registration, auctions) are numerous, non-standardised and involve significant effort from providers to engage with and access.

Through the Virtual Energy System innovation programme, we are developing a future vision for how models and data can be integrated across organisations in the whole energy system. The programme aligns to the recommendations of Energy Digitalisation Taskforce and the Cyber Physical Infrastructure proposals for common digital infrastructure. Our research and development to date shows that delivery can potentially be accelerated by sharing digital building blocks and agreeing on common standards and governance.

We believe clarity in this end digital infrastructure for distributed flexibility in GB could solve some of these challenges and provide:

- Increased trust and transparency through a clear and common vision for the future and the steps to getting there, as well as through coordination of market data and information for flexibility providers
- Simplified and lower cost of market access for flexibility providers through standardisation and consolidation of platforms and processes
- Easier stacking of revenues across markets through more coherent and compatible rules, processes and governance arrangements
- Reducing duplication of solutions and platforms hence reducing the overall whole system cost

#### Q6. When should a common digital energy infrastructure be in place? And therefore, when should development begin?

Given the need to accelerate the growth of distributed flexibility, and the fact that a common infrastructure for asset registration and pre-qualification would make it easier for distributed flexibility to participate in markets, we see no reason that an MVP (minimum viable product) shouldn't be progressed as quickly as possible.

Based on our understanding of the minimum viable product, we anticipate that it could be established in a 3-5yr time frame. However, this is predicated on agreed principles regarding governance, policy, data and regulation being in place as soon as possible.



## Q7. What should a common energy digital infrastructure look like, and why? Please consider the archetypes or develop your own proposition.

We believe the 'medium' archetype as described by Ofgem will be the most suitable model to achieve the objectives set out in this Call for Input. We have considered the proposed archetypes and are minded to recommend the 'Medium' model as it creates the greatest opportunity to deliver early consumer value from new central platforms and services, including Digital Asset (user, asset and product registration) and Data Sharing capabilities (historical data repository and insights). In our view, the 'medium' archetype meets the objectives of the Call for Input in the most feasible and timely manner (compared to the status quo, the 'thin' and 'thick' archetypes).

To successfully align the complex and numerous ranges of products across DNOs and ESO, we believe there is a need for a centralised digital asset infrastructure that provides transparency and coordination. Features that are working well through existing bilateral arrangements and platforms (settlement, auction, revenue) can continue until a cost benefit analysis proves the value of migrating to a central platform.

Separate to this consultation, the ESO has identified the need for simplification of the flexibility provider journey and has been working on solutions that are similar to the medium archetype. Some of the pain points can be addressed by moving to a central platform, for example product registrations and pre-qualification that were previously done through different platforms, are now moving to a single market platform (SMP) and information on different ESO products are also moving to a central digital engagement platform (DEP).

In line with our Digitalisation Strategy which in parallel is in discovery for Digital Spine and Virtual Energy Systems (VES) and through our current eco-system; i.e. Digital Engagement Platform (DEP) and Single Markets Platform (SMP), we are already simplifying the process to access ESO services, where providers can access a range of ESO services via a single user registration, asset registration and onboarding process. The ESO wider suite of systems under development supports our flexibility providers user journey. These systems are for ESO customers but provide a base for extension to meet industry wide requirements and an overview is shown in figure 1 below:

The high level user journey will be supported by a series of systems, and business processes, that are being developed throughout RIIO-2 and beyond.

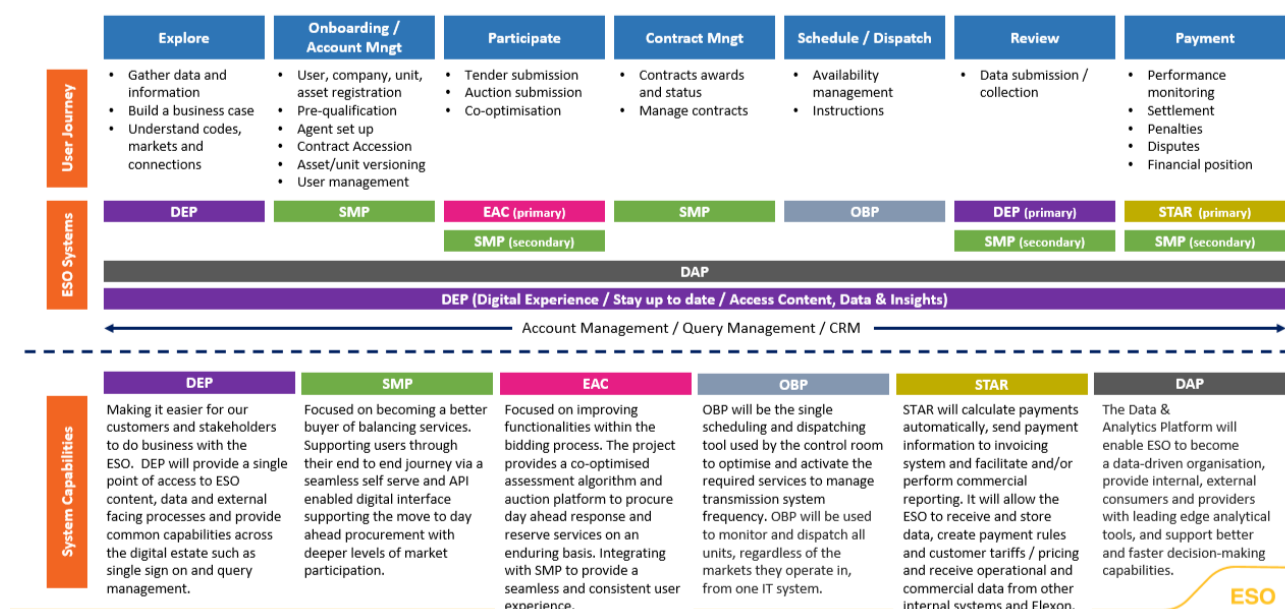


Figure 1: Systems in development by ESO to support the flexibility provider user journey. DEP is Digital Engagement Platform, SMP is Single Market Platform, EAC is Enduring Auction Capability, OBP is Open Balancing Platform, STAR is Settlements and Revenue, DAP is Data and Analytics Platform.

Our solution proposes a facilitated eco-system extending our current ESO ecosystem to deliver Digital Asset and Data sharing capabilities, whilst leveraging other network operators' and third parties' asset and data systems.

We believe this work progresses towards what Ofgem describes a 'medium' archetype. We anticipate that the 'Medium' model could be modular and scalable to potentially expand to a 'Medium plus' archetype, which could include elements of the 'thick' model (e.g. common auction platform), if this was deemed to add sufficient value to the whole system (a feasibility and cost benefit assessment would need to be undertaken to determine the value).

A "Digital First" approach should be taken to design the common digital infrastructure, consisting of customer engaged design, secure cloud open technology platforms, AI adoption, open data and interoperability standards. These concepts create modular, scalable, flexible, automated, self-service and cost-effective solutions aligned to IT industry good practice.

#### Q8. What is your view on the desirability and feasibility of the archetypes or your own alternative proposition?

Against the status quo (archetype 1) we believe all of the proposed options have potential benefits. However, as set out in our response to question 7, our view is that the 'medium' archetype would realise the fastest value and is the most feasible to deliver. It is desirable as it removes barriers for DER and CER to provide flexibility by simplifying access to information, registration and pre-qualification. The 'medium' archetype can be developed in staged releases, utilising a Minimum Viable Product (MVP) approach, which will ensure that we release and realise consumer benefit and value at the earliest opportunities.

We observe that the 'thin' archetype alone does not meet the objectives set out in this CFI as it does not simplify the user journey or remove any of the barriers mentioned in this CFI. However, the 'Thin' archetype will be encompassed in the Medium Model deliverables.

The 'thick' model is not feasible to deliver as processes for dispatch, settlement and billing are so different/bespoke across different network companies and system operators and would need to be standardised for a common platform to be feasible. A common, co-optimised auction platform would also be highly complex given the different nature and design of the DNO and ESO markets. However, we recommend that a common auction platform be evaluated further to understand its feasibility and value. A thick model is not only complex due to differing governance and systems but would also be very costly (capex and opex) and it is not yet clear if the consumer benefits would stack up against these costs.

We believe that the common digital infrastructure should be developed in close collaboration with the ESO/FSO, DNOs, relevant government departments, platform operators as well as flexibility providers. We would recommend that Ofgem set up a working group to facilitate technical information sharing from network companies to help inform decisions on the digital infrastructure, eco-system interoperability and implementation timelines.

#### Q9. Should a common digital energy infrastructure be new-build, or should it build out from existing infrastructure?

Common digital energy infrastructure should build on capabilities and learnings from infrastructure that exists currently. We propose that new functionality required to meet the use cases of the 'medium' model, across Digital Asset and Data sharing capabilities, can be delivered by enhancement of the ESO's current solution infrastructure. New functionality design will utilise our existing design templates to create consistent customer experience, engagement, registration, contract management and market participation. The design should also adopt a hub and spoke arrangement, working with industry networks to ensure interoperability with their current data and asset eco-systems.

#### Q10. What are the important areas for consideration when designing institutional delivery models for a common digital energy infrastructure?

Digital energy infrastructure should be delivered in the way that best ensures consumer value. Areas we believe that are key factors to be considered are set out below. This is also considered within the Common Framework of the Virtual Energy System programme. We will be exploring future delivery models as we solidify the role for FSO in terms of common digital infrastructure and in collaboration with the Digital Spine.

Our key factors are aligned to Data Best Practice and the recommendations for a core data sharing architecture described in Energy Digitalisation Taskforce. They have also been designed to reflect the decentralised nature of the system and recognise that adopting such an architecture is both a social and a technical challenge.

Across the infrastructure there is a need for clearly defined roles and responsibilities offering opportunity for organisations to participate and defining who is responsible for essential activities such as operation or maintenance. These roles and responsibilities will include defined roles in data, for example data owners and stewards.

Shared infrastructure needs to be underpinned by a common culture. The Virtual Energy System programme will shortly be sharing our thoughts on the principles that this culture could include.

The energy system is made up of a diverse range of participants and each will have their own needs and will need effective communications and opportunities for engagement. Systems need to be built and developed with these participants. There are also stakeholders beyond the energy sector that need to be engaged, in particular in related sectors such as transport or other utilities.

It is also critical to recognise and promote the range of skills and capabilities that are required including both technical and business skills to develop and implement effective tools and processes.

Energy industry codes and standards need to evolve and be agile to changing requirements. This has been identified in other consultations around code management and consolidation.

The Energy Digitalisation Taskforce recommendations and the Virtual Energy System have identified the need to establish a governance framework. The Energy Digitalisation Taskforce report took this further proposing that orchestrator and operator roles would be required for this core data sharing architecture. This needs to be supported by a suitable operating environment that supports the commercial case for integration and shared objectives.

Ensuring that any system is designed with security requirements in mind is essential. This includes all aspects of physical and cyber security.

To effectively exchange information between organisations there is a need to align to standardised models and taxonomies. This has also been identified in the Energy Digitalisation Taskforce recommendations and through Data Best Practice. These agreed models and taxonomies need governance and maintenance. Applying Data Best Practice (such as data triage and presumed open data) will also unlock further value of the data, for example for enhancing wider forecasting and modelling capability across the industry, ensuring the right data is available to the right parties at the right time.

Systems need to have the capabilities to connect through defined and agreed interfaces. Consideration also needs to be given to the technological requirements and ensuring that these are designed in a way that all entities that need to implement them can deliver. This needs to recognise that each organisation is likely to have their own internal requirements of technology or providers. The technical requirements therefore need to be transparent with a focus on interoperability rather than single supplier options.

Any centralised infrastructure must comply with all regulatory and financial standards, e.g. Sarbanes Oxley Act (SOX). Fairness, equitability, ease of use, data usage, pricing structure and ability to generate settlement and revenue with accurate metering must be taken into consideration.



**Q11. What are the important areas for consideration when designing financial delivery models for a common digital energy infrastructure?**

It is important that the common digital infrastructure is delivered at pace, to ensure consumer value is maximised as soon as possible.

Ofgem consider within their parallel consultation on Future Systems and Network Regulation, a number of regulatory archetypes that might be utilised to support investment across the sector. One of these is a “freedom and accountability” archetype. Across networks, the types of circumstances where Ofgem may wish to consider the use of this archetype may be in areas of work where costs are unknown or timescales are uncertain, where ‘learning by doing is required’, where urgent delivery is the primary consideration, or where technology is developing quicker than regulatory models may allow. Due to the pace of change in the digitalisation space, this regulatory model might be appropriate for investments such as creating a digital infrastructure to support distributed flexibility.

A regulatory pass through model that aligns to archetype 3 arrangements, such as that which is currently used within ESO, could be used to deliver the necessary capex, opex and RTB investment required to facilitate digital infrastructure.