



**Ofgem's
Future Insights Series**

Flexibility Platforms
in electricity markets

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**future
insights**



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Executive summary

In future, Great Britain's electricity system will be more decentralised, smarter, and lower carbon. This transition is already underway. To support this, the system will need to become more flexible and more responsive to changing demand and more accommodating of variable renewable generation.

The assets to provide a significant proportion of the flexibility that the current electricity system requires already exist and are connected to distribution and transmission networks. Flexibility Platforms are one of the mechanisms that can unlock this flexibility to address the constraints the current electricity system is facing and those it will have to overcome in the future.

In this paper, we consider the conditions that would assist innovation and the development of competitive markets for flexibility. The conclusions of this paper are drawn from the existing literature on flexibility and platforms and from significant engagement with industry stakeholders. It sets out the possible initial paths that the development of Flexibility Platforms might take with respect to structures, common standards and innovation – focussing on the benefits of the end state rather than the technical characteristics themselves.

Our findings show that despite the involvement of key stakeholders such as government, Platform Operators and UK distribution network operators as well as a significant amount of engagement and discussion between the parties, such as through the Energy Networks Association Open Networks Project, the current environment is one where different proprietary technologies are being simultaneously developed. There is duplication in activity and a risk of locking in a future world which doesn't achieve some of the key benefits that flexibility and a mature Flexibility Platform sector could deliver.

In this quickly developing area, there could be significant benefits from a coordinated approach, focussed on the beneficial outcomes to consumers, the grid and the companies who operate in this space. Stakeholders strongly believe there is a need to consider operational standards for data, processes and interoperability. The setting of principles which can help to define these standards would be a good start.

Background: the importance of a flexible energy system

The electricity system in Great Britain (GB) is becoming more decentralised, smarter, and lower carbon. To adapt and realise system efficiencies, the GB electricity system needs to become more responsive to changes in demand and supply and more accepting of variable renewable generation assets – that is to say, more flexible. Ofgem’s definition of flexibility is: ‘modifying generation and/or consumption patterns in reaction to an external signal such as a change in price, to provide a service within the energy system’.¹

Ofgem believes that flexibility is key to a smart energy system effectively and efficiently meeting the needs of energy consumers. We recently published a position paper on Distribution System Operation (DSO)¹, setting out the importance and value of flexibility in the energy system, and committing to progress policy development and drive industry to enable smarter, more flexible networks.

Ofgem and the UK Department for Business, Energy & Industrial Strategy (BEIS) published a joint document in 2017,² updated in 2018,³ on enabling a smarter, more flexible energy system. This placed an action on network and system operators to “open up new markets for flexibility, including as alternatives to network reinforcement” and to “improve coordination across the system” in order to improve access to markets as well as to “reduce the costs of the energy system and work to keep energy bills as low as possible for consumers”. Work has started across industry, taken forward collectively by the Energy Networks Association’s (ENA) Open Networks Project (ONP).⁴ The Electricity System Operator (ESO) has set out its forward plan ‘Towards 2030’,⁵ and individual Distribution Network Operators (DNOs) have also articulated how they intend to incorporate this transition.

The Smart Systems and Flexibility Plan discussed two types of flexibility:

Price flexibility, in which energy demand or generation responds to the price of energy and network use; and **contracted flexibility**, in which different entities exchange flexibility with each other and set up procurement contracts for that purpose. Whilst contracted flexibility could happen through bilateral contracts, Flexibility Platforms will be an important tool to improve transparency and facilitate the development of these markets.

¹ <https://www.ofgem.gov.uk/publications-and-updates/ofgem-position-paper-distribution-system-operation-our-approach-and-regulatory-priorities>

² <https://www.ofgem.gov.uk/publications-and-updates/upgrading-our-energy-system-smart-systems-and-flexibility-plan> - Initial Plan (2017)

³ <https://www.ofgem.gov.uk/publications-and-updates/upgrading-our-energy-system-smart-systems-and-flexibility-plan-progress-update> - Update (2018)

⁴ www.energynetworks.org/electricity/futures/open-networks-project/open-networks-project-overview

⁵ www.nationalgrideso.com/news/towards-2030-system-operator-gbs-energy-future

The purpose of this paper

This paper, the sixth in our Future Insights series, aims to shed light on the issues surrounding Flexibility Platforms. It draws on existing academic and industry literature on the ongoing transition in electricity markets around the world as well as interviews and roundtable discussions with stakeholders in the electricity sector. These include DNOs, developers and operators of Flexibility Platforms, aggregators, flexibility providers, government, academics and local energy organisations.

The purpose of this paper is to explore the opportunities and risks that come with the development of Flexibility Platforms. It does not support one view of the future over another or define policy but seeks to identify steps that stakeholders in the GB energy system can take to secure the most beneficial outcome for consumers and for the future stability of the electricity system.

The paper examines three sets of issues:

- What are Flexibility Platforms and what role can they play in the GB electricity system?
- What is the spectrum of options that Flexibility Platforms could take in future and how should we assess the benefits and risks to consumers?
- What are the regulatory challenges to the development of Flexibility Platforms?

Flexibility Platforms

The assets to provide a significant proportion of the flexibility that the current electricity system requires already exist and are connected to distribution and transmission networks. One way to unlock this flexibility and help address the constraints the network is facing, is to create markets to allow contracted flexibility services to be traded as products, generating a monetary value for flexibility products.

What is a flexibility platform?

Flexibility Platforms can effectively facilitate flexibility markets through providing signals for investment, the incentives for asset owners to make them available on the network and a venue for buyers of flexibility to signal their needs and to contract for services.

Flexibility Platforms can enable these incentives by facilitating trading and dispatch of flexibility products. Our definition, that *a flexibility platform is an IT platform where the coordination, trading, dispatch or support services for flexibility markets take place*, is derived from work published by the Universal Smart Energy Framework (USEF) in 2018.⁶

Our focus is on new platforms for distributed energy which will need to coordinate with other markets, including existing balancing markets and ancillary services markets. We can begin by discussing two principal types of Flexibility Platform:

- Peer-to-peer platforms - those which facilitate energy trading between individual businesses or prosumers,⁷ operating at local levels.
- Grid services platforms - those which provide a wide range of grid services, often involving greater DNO and ESO coordination and involving either large assets, or smaller assets that have been aggregated together to meet grid requirements.

First, we consider the differences between the two categories of platforms, and then set out how they fit into the future flexibility ecosystem. Although both are important, we will go onto focus on grid services platforms in this paper.

⁶ Universal Smart Energy Framework (USEF) – Flexibility Platforms White Paper (2018)

⁷ Domestic or commercial consumers who have energy generation or storage facilities.

Peer-to-peer platforms

Peer-to-peer (P2P) platforms are rapidly developing as start-up energy solutions in several countries worldwide.⁸ They facilitate direct energy transactions between two or more parties, without the need for centralised coordination or a supplier intermediary. They can involve any party buying or selling energy, from large businesses to individual prosumers. We have seen first-hand the growing interest in P2P platforms; a high proportion of the applications to Ofgem's Innovation Link Regulatory Sandbox process contain an element of P2P activity.

A key characteristic of these networks is that although the individual users transact directly with each other without centralised control, the entire network could act as a single asset to interact with other platforms – such as interacting directly with Flexibility Platforms providing grid services.

P2P platforms are suitable for trading energy directly between participants. However, in order to provide grid services to network operating companies, more robust structures are required, with increased transparency, greater control and accountability to deliver products to manage grid constraints.

Grid services Flexibility Platforms

The GB energy system requires a wider range of services than P2P platforms can provide. Therefore, we need a Flexibility Platform model that can enable a wider flexibility ecosystem, and can meet the more robust monitoring and system requirements of network operators.

The current GB environment is a mix of trials, pilots and early-stage functioning Flexibility Platforms, which are forming working relationships with DNOs, the ESO, the transmission owner (TO), aggregators and asset operators. This paper sets out broad options for future direction and structures, considering the tasks that mature, fully functioning platforms could deliver and who is best placed to carry out these roles.

⁸Park and Yong (2017) - Comparative review and discussion on P2P electricity trading and Zhang et al (2017) - Review of Existing Peer-to-Peer Energy Trading Projects summarise a number of P2P platforms operating in the UK, Germany, the Netherlands and the US.

Flexibility Platform Tasks



Figure 1 - Flexibility Platform tasks

Coordination	<ul style="list-style-type: none"> Coordinating platform tasks Facilitating data flows Harmonisation of standards and principles Alignment with external platforms and markets Conflict avoidance
Flexibility Procurement	<ul style="list-style-type: none"> Attracting flexibility providers and purchasers to the market Communicating requirements and availability Matching providers and purchasers
Dispatch and Control	<ul style="list-style-type: none"> Sending signals to dispatch assets Notification of asset dispatch Verification of asset dispatch
Platform Transaction Settlement	<ul style="list-style-type: none"> Verification of service against transaction Settlement of transactions
Platforms Market Services	<ul style="list-style-type: none"> Credit checking Asset pre-qualification
Analytics and Feedback	<ul style="list-style-type: none"> Network analytics, response times etc. Counterparty scoring and review Identification of market faults

Figure 1 sets out the six primary tasks envisaged of Flexibility Platforms providing grid services. All are important but Coordination, Flexibility Procurement and Dispatch & Control are crucial to delivering flexibility products to the electricity system and are likely to act as anchor tasks for the development of platforms.

The other three tasks, Platform Transaction Settlement, Platform Market Services and Analytics & Feedback can be considered support services to delivering flexibility into the system.

Table 1 - Platform Task Characteristics sets out the hierarchy that is reflected across many of the current examples of platforms that operate in the GB market and across Europe. There is reliance on network and system operators for the delivery of the Dispatch and Control tasks at present. However, the introduction of 3rd party providers into the delivery of individual tasks could include the Dispatch and Control function in the future.

Table 1 - platform task characteristics

Task	Importance*	Link to network and system operators
Coordination	High	Medium
Procurement	High	Medium
Dispatch and Control	High	High
Platform Transaction Settlement	High	Low
Platform Market services	Low	Low
Analytics and Feedback	Low	Low

*to platform operation

The dispatch and control task in platforms

The future of dispatch and control functions is a particularly complex issue which will require separate consideration beyond the scope of this paper. As described, asset dispatch and control is distinguished by its technical and engineering grounds, outside of commercial roles. Dispatch and Control platforms are the critical infrastructure element of flexibility delivery, and must be capable of ensuring security of supply.

Currently, new entrants are not performing this role; instead, the ESO undertakes this role within national markets, and to a lesser degree, DNOs are undertaking this role through nascent distribution-level flexibility markets. This does not preclude other parties undertaking this role in the future, but establishes this task as requiring a secure and reliable entity capable of managing associated communications, technical visibility, modelling, and power and grid safety analysis.

Evolution of this function would require fundamental change to the way the electricity system operates. Of the six tasks identified, this is the most closely linked to network operators and therefore one where particular consideration must be given to the scope for competition in its delivery. We discuss roles and responsibilities further in section 4.

Where do Flexibility Platforms fit into the electricity system?

The Flexibility Platform is part of a complex wider electricity ecosystem. Figure 2 shows how participants in the system could interact with Flexibility Platforms, and highlights the potentially central role that Platforms could play.

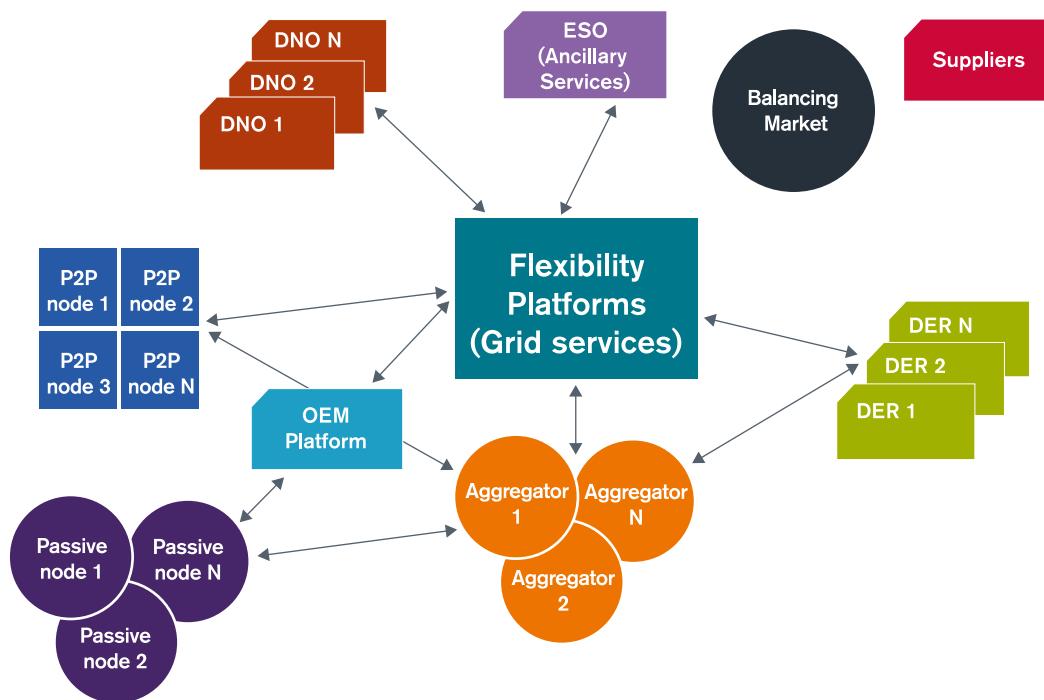


Figure 2 - participants in the Flexibility Platform ecosystem

The participants are described below.

P2P platforms - can act as a network of P2P nodes, trading energy between each other. A P2P network can also act as a single entity providing flexibility services to a Flexibility Platform.

Distribution Network Operators (DNOs) - each could transact on one or more Flexibility Platform. A Platform would provide a DNO access to flexibility services from various asset classes ranging from large industrial distributed energy resource (DER) assets to aggregated domestic assets and P2P platforms.⁹

The Electricity System Operator (ESO) - can also transact with the same platforms as the DNOs. However, they may compete for the same units of flexibility. When this occurs, DNO and ESO would need to coordinate closely.¹⁰ This coordination would be required to ensure that flexibility market rules serve to achieve more efficient overall outcomes such as lower overall system costs and reduced system losses.¹¹

⁹ Council of European Energy Regulators (2018) Flexibility Use at Distribution Level

¹⁰ The common objectives of congestion management (on the DNO side) and system balancing (for ESOs) give rise to complementary benefits on both sides. The 2015 National Infrastructure Commission (NIC) Smart Power report sets out the need for greater coordination between transmission and distribution level as we transition to a smart more flexible electricity system. The Smart System and Flexibility plan, jointly published by Ofgem and BEIS, also highlighted the importance of co-ordination, and network and system operators have been tasked with delivering this. Joint involvement in the creation and development of broader principles and defined and accepted standards will be crucial to ensure that the priorities of both parties, which are often but not always aligned, can be accommodated.

¹¹ Hadush and Meeus (2018) - DSO-TSO cooperation issues and solutions for distribution grid congestion management

Aggregators - can bring together numerous small assets to allow them to transact collectively in larger markets than they would otherwise have been able to. Aggregation also provides a route into flexibility markets for end users who may not have dedicated DER assets and wish to benefit from providing flexibility through demand-side response. There is potential for community and third sector involvement in delivering aggregation¹² through localised flexibility tariffs and shared DER equipment.

Prosumers - domestic or commercial consumers who have energy generation or storage facilities - such as rooftop solar panels. They engage in 'explicit' demand response, trading flexibility for financial remuneration.¹³

Consumers - contribute to flexible energy systems by responding to price or tariff signals (e.g. time-of-use tariffs). Their interaction with flexibility markets may be directly, through an aggregator or through their supplier.

Distributed Energy Resources (DER) - generation or storage resources connected to the distribution system.

¹² [Regen – Local Flexibility Markets \(2019\)](#)

¹³ Domestic or commercial consumers who have energy generation or storage facilities.

Other Players - smart appliances and equipment manufacturers

Manufacturers of smart appliances and EVs are taking steps to provide flexibility from specific asset classes. Often this includes a passive provider of flexibility being compensated for the flexibility that their appliance can offer.

There are two primary routes to this:

1. The Original Equipment Manufacturer (OEM) may provide aggregated flexibility that can be bundled to provide a product to a procuring party, and traded through an existing Flexibility Platform.
2. The OEM may consider developing a dedicated platform for trading flexibility directly. In this scenario, the OEM could host bids and offers, but trade only flexibility from their equipment. In this sense, they act as an aggregator that can trade with multiple procuring parties.

Although OEM 'platforms' may offer a limited range of products due to a narrow range of flexibility assets, the increased degree of control and certainty on such a 'platform' may be attractive to purchasers.

The future of Flexibility Platforms

How might Flexibility Platforms evolve? Will the GB market have one national platform, several small co-ordinated local platforms, or numerous platforms operating independently? The ONP has developed five different 'future worlds', routes for development of the electricity system based upon a transition towards industry structures which support a smarter, more flexible grid.¹⁴ We have taken a narrower approach than these five future industry structures with a focus on future models for Flexibility Platforms based on a desired future outcome.

Spectrum of Flexibility Platforms

Through discussion with platform operators, DNOs, interested stakeholders and academics, we have developed four platform typologies. These do not cover every eventuality but identify four key stages from the present 'do-nothing' scenario (uncoordinated platforms developing independently on proprietary systems) to the most centralised solution of a single GB platform and market.



Figure 3 - future platform models in order of ascending coordination

¹⁴Energy Networks Association - Open Networks Project - Future Worlds

The table below sets out some key characteristics of these four scenarios. We compare these scenarios across four different functional layers:

Platform Level: this is the level at which the different tasks of a platform interact. This is also the level at which counterparties such as flexibility assets, providers and purchasers will sign up and likely the stage at which prequalification takes place. The rationale for this is that once a counterparty is qualified to access the Flexibility Platform they are able to access the relevant markets hosted by that platform. The platform administers the rules for each market (described below) that is active on the platform.

Market Level: this is the set of rules that define the terms of trade and transactions. Having multiple markets can allow for greater variation and specialisation where required. We don't envisage a limit on the number of different products being traded in a market, however, at the same time, a market could also be defined just by being the trading place for a single product. Crucially, the market is the arena in which the bid-offer matching process takes place.

Common Standards: here we are referring to three primary elements: interoperable systems, a common data model and shared minimum transaction specifications to complete a Flexibility Platform transaction.

Governance: is closely related to the common standards element and can be described as the framework within which the common standards would be agreed, defined and updated over time. This does not define the mode of regulation or who will carry out the regulatory role, rather the organisation of these processes.

Table 2: future platform characteristics

	Uncoordinated	Coordinated	Super - platform	Single Market
Platforms	Many	Many	Single	Single
Markets	Many	Many	Many	Single
Common Standards	No	Yes	Yes	Yes
Governance	Independent	Negotiated	Centralised	Centralised

Taking each of these models in turn, we can set out some of the specific characteristics of each.

Model	Description	Advantages	Disadvantages
Uncoordinated	<p>Numerous platforms develop and operate across GB. Some will function at DNO region level, some across multiple DNO regions and others at a more local level. Many of these will develop independently. There will be limited cooperation or coordination between platforms and proprietary standards will develop. Some individual tasks may see some coordination. Incumbents may develop in certain tasks.</p>	<p>No restrictions on innovation. Low regulatory barriers to entry. Allows market forces to shape future Flexibility Platforms market.</p>	<p>Higher search and transactions costs for participants in more than one platform. Reduced ability to coordinate flexibility at a national level. Technology lock-in could result in reduced future innovation.</p>
Coordinated	<p>Under this model, numerous platforms develop independently and operate at various geographic levels (such as regional network operator level) but will align with agreed principles around interoperable systems, common data models, product definitions and agreed minimum transaction requirements. These principles may be set centrally or negotiated with industry leadership groups. In principle, each flexibility provider or purchaser could operate across multiple platforms with the same standards.</p>	<p>Reduced search and transaction costs for participants operating across more than one platform. Stronger ability to coordinate flexibility at a national level. Mitigated risk of technology lock-in. Allows market forces to shape future Flexibility Platforms market.</p>	<p>Some restrictions on innovation. Some regulatory barriers to entry. Flexibility coordination at national level still requires complex management.</p>

Table 3: characteristics of future platform structures

Model	Description	Advantages	Disadvantages
Super platform	Single platform hosting multiple markets. This one platform would see all providers and purchasers of flexibility signed up, registered and prequalified. All actors could participate in any market hosted upon the platform as long as they met the specific criteria set. These could be defined by location, by specific asset class or by other characteristics such as carbon emissions. The single platform operator would operate a GB-wide monopoly and would require regulation – the operator could be a private regulated company, publicly owned or run in the public interest.	<p>Very low search and transaction costs for flexibility providers and purchasers.</p> <p>Facilitated cooperation and coordination across all GB platforms.</p> <p>Ease of switching between markets.</p> <p>Ability to transact across multiple markets, making value-stacking easier.</p>	<p>No independent innovation at platform level.</p> <p>Capacity to differentiate at market level reduced.</p> <p>Direct regulation of platform operator required.</p>
Single market	Single platform with one single market. The participants will join the platform in the same way but without the choice of specific markets to enter. The single market will have the capacity to define geographic zones and allocate assets and purchasers based on locational data and current constraints. Assets that are mobile such as V2G electric cars will be automatically assigned to a zone rather than being limited to a single location. This platform and market would operate a GB-wide monopoly and would require regulation.	<p>Eliminated search costs for flexibility providers and purchasers.</p> <p>Cooperation and coordination across GB by default.</p> <p>Automatic allocation to geographic best-fit market.</p>	<p>Direct regulation of platform operator required.</p> <p>Removes platform and market choice from participants.</p> <p>Requires automation of processes to ensure relevant counterparties made available.</p> <p>Limited scope for innovation.</p>

With these four potential models, a significant driver of development will fall to the potential for revenue generation for platform operators, innovators and service providers.

Revenue streams in Flexibility Platforms

There are opportunities for all parties involved in the delivery of Flexibility Platform tasks to develop ongoing revenue streams. Revenue can come from user fees for access to platforms and markets or from the delivery of individual tasks. Flexibility providers and purchasers may both be willing to pay for access to platforms and for the services they provide. However, whilst the usage of Flexibility Platforms is still low, operators may not wish to charge fees to avoid dissuading users from their platform.

For some of the tasks such as the **procurement, settlement or dispatch and control functions**, revenue can come from transaction fees, while for others such as **coordination, market services or analytics and feedback**, a contract or per-use charge could apply.

The delivery of multiple tasks by one provider could lead to efficiencies but could also assist in developing financially viable platforms. Interlinkages between tasks such as between procurement and settlement (where the output of the procurement process is an essential input to the settlement process) can allow for vertical integration and the vertical stacking of revenue – from multiple tasks within a single platform.

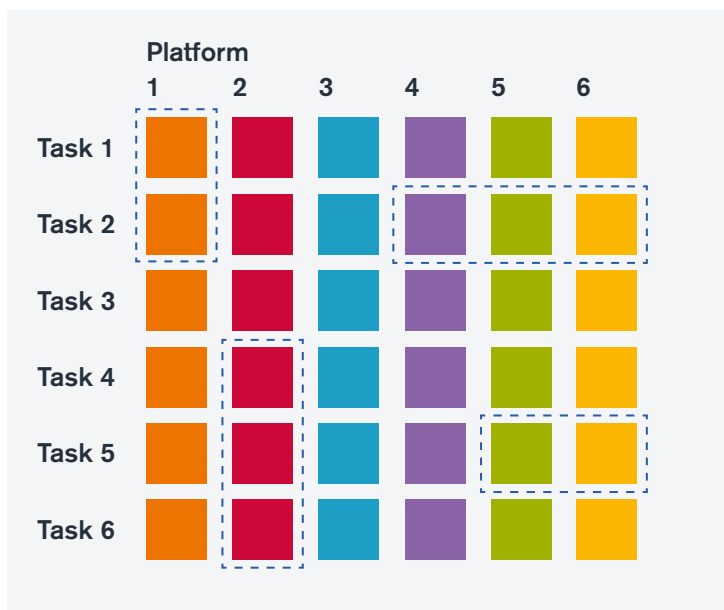


Figure 4 - horizontal and vertical revenue stacking

Revenues could also be stacked horizontally. A simple example could be the settlement function of platforms. A single party could deliver it for multiple platforms, which could reduce the costs to each from having a dedicated function. Additionally, this approach could work for low-value services that alone wouldn't be attractive to a commercial provider but could be bundled to deliver a more attractive proposition.

There is a risk that not all tasks will be equally attractive to commercial providers, and a competitive market may not develop. So there may be a role for the platform operator, regulated monopoly or regulator to ensure all tasks are delivered.

Regulation and Flexibility Platforms

Potential regulatory issues

Flexibility Platforms operating in a non-regulated space bring significant challenges and risks to consumer outcomes such as:

- A lack of coordination among the stakeholders involved leading to duplication and a lack of interoperability.
- A lack of an independent arbiter or code of conduct leading to poorer consumer protection outcomes.

The absence of regulatory clarity could leave a vacuum in which participants achieve their own short-run interest at the expense of more efficient outcomes. In theory, self-regulation of Flexibility Platforms and market participants through voluntary codes of conduct is an alternative, but the wider literature identifies that unless well-defined, self-regulating platforms (from the example of financial market platforms) may experience rent-seeking and price manipulation problems.¹⁵ Some participants may be part of current Ofgem licensing regimes and some behaviour may be mitigated by existing consumer protection powers. However, the evidence so far in the development of this market suggests that a large proportion of activity will be carried out by or involve currently unregulated or unlicensed companies.¹⁶

On the other hand, given the early stage of development, there are also risks about locking in a specific regulatory approach too early. This could affect choices of technology and innovation opportunities. We discuss below some of the options around harmonisation and the setting of general principles to manage some of these regulatory issues.

¹⁵ See for instance Pirrong (1995) - The self-regulation of commodity exchanges: the case of market manipulation.

¹⁶ See for instance <https://www.ofgem.gov.uk/electricity/distribution-networks/gb-electricity-distribution-network>

Flexibility Platform roles

Where roles in Flexibility Platforms are contestable, we should consider which are appropriate for different stakeholders to undertake. The most common approach so far has been for platforms to be initiated and managed by 3rd parties. Maximising the contestability of the various tasks could help to ensure that consumers can benefit from the growth of the Flexibility Platform sector.

However, in some cases, synergies with the DNOs' core monopoly role, such as access to network information, may mean that DNOs are uniquely well placed to perform some of the tasks that are needed by a Flexibility Platform. However, the DNO's monopoly position¹⁷ presents some risks.¹⁸ Conflicts of interest could arise, in the absence of correct incentives, where the DNO (or another party), is carrying out platform tasks and at the same time is a purchaser of flexibility or owner of flexibility assets. A DNO, or any participant who finds themselves in this position, may have the incentive to apply procedures or rules which are more favourable - either towards assets that they own or towards their own flexibility requirements.

The DNO is not the only party that may face conflicting incentives in the operation of Flexibility Platform tasks. An uneven playing field may present itself when any purchaser or provider of a flexibility product undertakes any platform task where qualified safeguards and appropriate separation are not in place.

Therefore, it will be important to consider how best to protect consumers from the potential effects of:

- development of undue market power
- partiality in dealing with own assets and requirements
- non-competitive use of network knowledge i.e. outages etc.
- conflicts of interest

In some cases, there will be trade-offs between the risks to competition in provision of a platform role and efficiency losses from fragmenting the delivery of interdependent tasks. The balance of this trade-off will fluctuate as markets evolve, as new technologies and business models emerge, and as greater data sharing and interoperability are implemented. Roles and responsibilities may change through time and the best or most pragmatic option now is not necessarily the enduring option.

Ultimately, the goals of consumer protection and long run system stability will determine whether a Flexibility Platform task should or could be carried out by a DNO or a third party.

¹⁷ <https://www.ofgem.gov.uk/electricity/distribution-networks/gb-electricity-distribution-network>

¹⁸ Ofgem (2019) - Ofgem position paper on Distribution System Operation: our approach and regulatory priorities

Examples of competition distortion

Example 1: Conflicts of interest in procurement. Where a purchaser of flexibility is competing with other buyers on a platform for the same resources and is also responsible for organising how bids and offers are matched as part of a procurement role, it will (at least be perceived to) have the ability and incentive to discriminate against other buyers. A similar risk applies when the procurement role is managed by the owner of flexibility assets who has the incentive to promote their own assets.

Example 2: The DNO uses privileged access to resources from its monopoly role to benefit a commercial platform proposition. Third party providers of platform tasks may consider the ability or perceived ability of the DNO to use its privileged access to information, assets and relationships in providing platform tasks as a barrier to entry. For example, the DNO may not share all the information it has about where DERs are located, providing a relative advantage in recruiting flexibility assets for participation.

Example 3: Use of price control funded assets to deliver Flexibility Platform tasks. Another example could be the DNO delivering a Flexibility Platform task using price control funded assets. Unlike the DNO, all other providers of the task would have to consider the cost of the asset in its pricing of the Flexibility Platform task. Therefore, the DNO could provide the service at lower cost which may reduce the likelihood of dynamic competition.

What can we learn from European power exchange markets?

There are similarities between Flexibility Platforms and European power exchange (PX) markets. These include the tendency towards monopoly and market power development, the presence of strong network effects and the need to balance defined areas of activity alongside the value of cross-geography cooperation. The experience in these markets provides a useful comparison to anticipate potential risks and regulatory issues.

As more flexibility is traded in a market, it becomes more attractive for others who want to trade, to then join, as they know they will have access to a larger pool of supply and demand. These network effects are present in Flexibility Platforms as well as in power exchanges. One example of this is the Belgian regulator's concerns, specifically the risk of the sector becoming more concentrated and monopoly power developing.^{19,20}

Flexibility providers may want to trade on the same platform as other providers they know - for example, because they trust the judgement of those in their network. Moreover, buyers of flexibility may end up forming business relationships with certain sellers on a platform that they want to maintain because of convenience or because they have compatible processes in place. However, these network effects can lead to inefficient decisions by users in some cases.

Network effects could also become a barrier to entry for new platform operators. Over time, network effects are likely to contribute to a tendency towards a more concentrated market structure and monopoly power. This could develop into a concern if the GB Flexibility Platform sector becomes dominated by one platform operated on an unregulated basis.

Even if DNOs are not engaging in anticompetitive behaviour, the perception of them having a conflict of interest may dissuade other market participants from using DNO-run platforms. This could engender distrust in the market and reduce participation in it, especially as it may take time for rival platforms to emerge.

¹⁹ Meeus (2011) - Why (and how) to regulate power exchanges in the EU market integration context?

²⁰ Frontier (2005) - Regulation of power exchanges. Frontier Economics for the Dutch energy regulator (DTe)

Standards and harmonisation

As the Flexibility Platforms sector develops, it will become increasingly important to have appropriate standards and harmonisation in place. This will ensure that participants use the same set of rules, fostering innovation and reducing risks to providers and consumers.

Some broad examples of the type of standards which could prove beneficial are:

- **A common protocol for sharing data on Flexibility Platform transactions**
 - Open data principles to keep barriers to entry low for new participants, drive innovation and reduce data asymmetry between participants.
 - Ongoing development of standards to ensure they remain open, dynamic and accessible to keep search and transaction costs down.
 - Increasing the ability for platforms to cooperate and facilitate conflict management.
- **Universal definitions of asset and product characteristics to facilitate interoperability**
 - Whether a platform offers standardised products or allows flexibility purchasers to filter the available assets based on their requirements, clarity on common descriptions should facilitate product search, simplifying purchaser requirements and improving the assessment process.²¹
- **Standards for the format and content of flexibility bids and offers**
 - An agreed format for the categories of information that need to be shared to achieve a successful transaction can lower barriers to entry for new participants. It can also help flexibility providers and purchasers to participate across multiple platforms.

²¹ <https://www.nationalgrideso.com/document/84261/download>

Nevertheless, given the early and fluid nature of the sector, it is important to keep in mind that there are risks with the development of standards in this area. For instance:

- Where they are determined by the regulator, there is the risk that the standards or principles identified may not prove to be appropriate as the sector rapidly develops and changes.
- Where left to the markets or for incumbents to develop, there is the risk that competing systems and standards will arise and monopoly power may develop.

There is a risk that requiring cooperation itself could create a barrier to entry for new platform operators, by making it difficult to forge business relationships with incumbents or encouraging cartels to develop. However, in the case of Flexibility Platforms, clearly defined technical and process standards should reduce the technical barriers to entry for new operators.

Keeping open multiple paths for future development but with common principles in place should reduce barriers to innovation and potentially avoid costs of path correction at a later date in wider roll-out. This is only one element as common principles could provide additional benefits such as bolstering investor confidence and easing wider participation. The development of these principles into standards should form the basis on which the competitive provision of Flexibility Platforms can build, with the value-added proposition of those platforms coming from additional innovation and development in systems, products and efficiencies.

Implementation of standards or principles may narrow potential technology, process or organisational innovation yet, conversely as the sector matures, the confidence provided by relevant standards can support innovation from new entrants into the market by providing certainty of requirements.

There will likely be an ongoing cost to complying with standards and keeping up to date with changes. However, in a sector with multiple platforms and operators, common standards and shared processes can reduce the effort, time and financial cost to users of finding the correct platforms, counterparties and products (search costs). The setting of standards should be independent of specific technologies or market participants and instead focused on the desired market outcome noting the need for a balance of the risks above.

Flexibility products

A range of products can be used to deliver flexibility services. At the transmission level, **ESO grid services** have been simplified. At the distribution level, products include **ancillary services to the DNO**, including voltage and thermal constraint management. DNOs may also procure **security of supply services**, where network reinforcement can be deferred or replaced through the provision of flexibility services.

Customers under constrained networks with flexible connections provide network flexibility through **Active Network Management**. These customers may not be able to offer flexibility services as freely as those on unconstrained networks. Schemes proposing **curtailment liability trading** under constrained networks can allow customers under the constraint to trade queue positions, providing another route to flexibility product provision. As discussed, **supplier-procured flexibility** may be sought for suppliers to manage their balance position on energy markets.

Product harmonisation

The clear definition of flexibility products, meaning the service requests that flexibility providers meet, is key to a properly functioning and coordinated Flexibility Platform. For multiple Flexibility Platforms to co-exist and integrate into existing markets, not only is data harmonisation important, but a clear framework for defining and harmonising products would be beneficial.

Conflict avoidance, value-stacking and the optimisation of available services are dependent on a consistent understanding of the services being undertaken and of the products on which the markets are based. The ESO undertook a review of its ancillary services products through its System Needs and Product Strategy (SNAPS)²², finding that several products could be consolidated. Lessons for grid service Flexibility Platforms can be learnt here, to ensure coordination and timely management of services offered. The ONP is examining flexibility services, and should consider product types thoroughly.

Product standardisation

Beyond developing agreed frameworks for definitions of the characteristics that make up products, there will be decisions for platforms to take around the degree to which products are standardised. Similar to the benefits of standardisation of the platforms themselves, greater standardisation of products can be beneficial in reducing search cost for users and improving the ability of a platform to set prices accurately.

However, a standardised set of products is a limited set of products. In the absence of standardisation, a greater degree of product specialisation is likely, albeit at the expense of more difficult price discovery and greater search costs for purchasers. Through a 'catalogue'²³ approach, purchasers of flexibility may be able to choose products which more closely match their requirements. An argument could be made for hybrid approaches which either entail operating dual markets, standardised and catalogue, simultaneously, or an approach which sets broader categories, with each retaining a smaller level of specialisation to meet flexibility purchaser requirements.

²² SNAPS, National Grid, www.nationalgrideso.com/document/84261/download

²³ Schittekatte and Meeus (2019) - Flexibility markets: Q&A with project pioneers

Data and transparency

Transparency over platform operations and the behaviour of platform users and operators, as well as the trades that occur and the underlying data they produce, will be important for well-functioning Flexibility Platforms. This will support market competition, aid governance, and build users' trust in the platform.

There may be a role for the regulator in creating this transparency alongside the standardisation work to ensure it occurs and is consistent. The risk otherwise is that platforms may provide only the level of transparency needed for trading to be carried out, protecting their platforms from competition whilst retaining and attracting users drawn by the lack of transparency. These issues were faced in the development of the European power exchange market.²⁴

There are other helpful examples of building transparency from power exchange markets. These include independent and autonomous market surveillance of trades and settlement to ensure compliance. If a platform performs this role, then the part of the platform responsible for market monitoring should be sufficiently independent from the rest of the organisation. Otherwise it may face a conflict between identifying non-compliance and losing a customer.

This separation would also be needed if a DNO operates and trades on the same platform. Lessons can be learned from difficulties faced by the French power exchange operator, in penalising participants for non-compliance. As a result, significant changes to EU financial regulation and the introduction of REMIT (Regulation on Wholesale Energy Market Integrity and Transparency)²⁵ have strengthened regulatory powers to address this issue. However, the presence of new market entrants in Flexibility Platforms who are not existing regulated companies may require consideration of how Flexibility Platform participants are registered.

²⁴(CEER, 2011) - final advice on the regulatory oversight of energy exchanges

²⁵<https://www.ofgem.gov.uk/gas/wholesale-market/european-market/remit>

The importance of data principles

In order for the way Flexibility Platforms operate to be representative of the needs and requirements of diverse actors in the Flexibility Platform sector, any standards that are implemented should be developed through consultation with a wide range of stakeholders. Regardless of which possible Flexibility Platform future evolves, the principles that guide the development of data and process standards need to be transparent and robust. There are various sets of data principles to build upon, such as the UK Government Open Standards, developed to support the selection of standards for interoperability and data formats in Government; the work developed by the ENA ONP; and the Energy Data Taskforce (EDTF). The EDTF supports our view that data will have an essential role in the changing GB energy system and will be key to the development of standards to support the growth of Flexibility Platforms.²⁶

The EDTF also identified five areas where greater data availability and transparency can benefit the energy system and we have adapted those specifically to the development of Flexibility Platforms:

- Enable smarter networks and greater visibility and management of electricity system supply and demand.
- Create new revenue streams by improving price discovery and leveraging existing data to create new products.
- Level the playing field for those in the industry and open up opportunities for innovative new services and business models.
- Address engagement barriers and significantly enhance consumers' ability to make informed choices.
- Link the energy sector into other data-enabled sectors to enable 3rd party provision of services resulting from data interoperability.

Consequently, we expect there could be an ongoing role for Ofgem to engage with DNOs, industry leadership groups, government and innovators in developing these standards.

²⁶ www.gov.uk/government/groups/energy-data-taskforce

Where do we go next?

This part of the electricity sector is going through a significant period of innovation and consequently the landscape and participants will continue to change rapidly for the foreseeable future. Many of the issues raised in this paper such as standardisation and harmonisation require further evaluation of how they might be achieved alongside quantification of the actual benefits to the parties involved in the Flexibility Platform sector and the long term impact to the electricity system and consumers.

However, we have found even at this early stage that in this new and growing area, significant benefits can be secured through a more coordinated approach, focussed on the beneficial outcomes to the grid, consumers and the companies. There is a clear need to begin agreeing operational standards for data, processes and interoperability - setting clear principles will help to define these standards. Lowering barriers to entry will help to drive innovation and together with collaboratively defined principles and standards, will support a more coordinated, interoperable future for Flexibility Platforms.

This paper sets out the following conclusions:

- i. Flexibility Platforms would benefit from cross-industry development and agreement of principles for setting common standards and processes to promote interoperability, reduce barriers to entry and lower costs.**

The vision of a more flexible electricity future with numerous platforms providing geographically specific or technically differentiated services whilst sharing data and supporting a wider national framework may involve some degree of planning, on the part of all stakeholders, to ensure that systems and processes develop with future cooperation and data-sharing in mind.

- ii. To encourage competition for a range of Flexibility Platform tasks, data-sharing frameworks should be implemented to allow access to network data.**

If sufficient data-sharing arrangements are in place within Flexibility Platform frameworks, then 3rd parties, including commercial providers, could be enabled to carry out the full range of Flexibility Platform Tasks.

- iii. The development of monopoly power is a risk for Flexibility Platforms.**

If a single party, such as a DNO, were to carry out the full range, or certain combinations of Flexibility Platform Tasks, then safeguards may be needed to prevent undue market power or market distortions developing.

- iv. Cross-industry leadership groups should build on existing work such as that of the ENA ONP, the Energy Data Task Force and Regen, to refine a shared vocabulary around flexibility market services, platforms and related issues.**

There is a majority view of a level of uncertainty or a lack of clarity around the terminology being used when discussing Flexibility Platforms. A clear set of definitions could assist innovation and engagement as well as set a basis for principles, standards and regulatory structures.

- v. For the development of a mature Flexibility Platform sector, work will be required to define and communicate the socialised and community benefits it can deliver beyond immediate financial benefits to market participants. This should help to drive the required engagement and behaviour change across the electricity system.**

Benefits to participants - both financial and otherwise – will need to be properly quantified if they are to be fully valued. In the short to medium term, the non-financial benefits will need to be properly understood both by the electricity sector and consumers if persuasive arguments are to be made for the wider roll-out of Flexibility Platform services in the absence of short term financial gains for small participants.

