Evolution of Distribution Flexibility Services

Improving access to DSO Flexibility Markets

November 2022

Electricity Distribution

nationalgrid

Contents

Executive summary

We published our first Evolution of Distribution Flexibility Services document last year, opening discussions on an ambitious plan for the delivering new Flexibility products alongside new digital systems to support them.

Since then, we've been busy developing capability and systems and a year later these changes are nearing deployment, with our longer term and Sustain products due to be released in the New Year.

Building on this work, the document focusses on a number of core questions that have emerged in the last year. These range from detailed implementation questions such as grouping and pricing of sustain zones, too much broader questions on how we see the context of platforms and ESO coordination developing.

This reflects the challenge of an emerging sector with a number of important high level questions still in play, set against the need to progress and learn by doing. Delaying until all these questions are settled is not an option, and so within National Grid Electricity Distribution, we are looking to continue to deliver incremental benefit to FSPs whilst feeding in learning that can help shape the wider discussions.

We believe that the changes we are delivering, through a more flexible procurement methodology, the ability to tailor the timing of our products to our needs, and the development of key digital platforms, should deliver significant benefit, and lay the foundations for a range of future products to support more use cases.

The aim of this document is to help discussion on these topics, and allow us to co-create systems that have real value. We will be arranging a number of webinars to support this work and please do not hesitate to contact us directly.

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1. Introduction

1.1. Our Business

National Grid Electricity Distribution is the regional electricity distribution division of National Grid.

Formerly known as Western Power Distribution, the UK's largest electricity distribution network serves nearly 8 million customers in the East and West Midlands, South West and Wales, delivering essential power to millions of homes and businesses across its regions.

With a distribution area of 550,000 square kilometres, it's 6,500 colleagues are committed to providing a safe, stable and reliable electricity supply and ensuring the highest quality of customer service.

At National Grid, our vision is to be at the heart of a **clean, fair and affordable** energy future.

We have a responsibility to demonstrate our contribution to society, whether that's helping the young people of today to become the energy problem-solvers of tomorrow, supporting our customers to use energy more efficiently or tackling climate change by targeting net zero for our own emissions by 2050.

Creating a clean, fair and affordable energy future is what society demands and what we demand of ourselves. It's the right thing to do for our people and business, our customers and the future of the planet. What could be more important?

- **Clean**, because we have a critical role to play in tackling climate change, leading the way to net zero
- **Fair**, because we want to enable the energy transition for all, making sure that no one gets left behind
- **Affordable**, because everyone should be able to pay for all their essential energy needs

1.2. Why we procure Flexibility Services

National Grid Electricity Distribution operates a "Flexibility First" approach to all load related reinforcement decisions. This means that where constraints on our network are identified we consider whether Flexibility Services are a credible and economic option to address the network issue and avoid and/or defer reinforcement.

We detail how we make these decisions and how we procure these services in our Distribution Flexibility Services Procurement Statement. This document is updated annually and approved by Ofgem.

1.3. Purpose of this document

This document forms a key part of our ongoing commitment to developing accessible and liquid markets for Flexibility Services. Embedded in our development, and highlighted in our Flexibility Services Procurement Statement, we aim to engage with potential providers and wider stakeholders on a regular basis. This ensures that we continue to offer products and processes that are fit for purpose and encourage the levels of market liquidity and competition needed to drive efficient outcomes. It also allows us to clearly articulate our vision for wider market development and support the necessary debate around them. There is a need for real leadership in this space and we feel we can contribute, given our work over the last decade across Innovation and Business as Usual to build these emerging markets.

This document supports our informal engagement process and sets out our view of how our services and processes will develop into the future. Following the range of ambitious product changes discussed in last year's engagement, this iteration discusses their delivery, highlighting

questions that are arising in their implementation, and thinking about how these are made available to the market. It then leads into broader questions on market and system structure.

The aim of this document is to gather stakeholder views on these proposals so we can understand where the value lies and refine our thinking. Please review and provide feedback where possible. This can be done through the online form, emailing us directly at nged.flexiblepower@nationalgrid.co.uk or attending the engagement events that will accompany the release of this document. **Please respond by the 9th of December**.

Alongside the questions on how we procure services, we wanted to also take the opportunity to review how we engage with our Stakeholders. We are conscious of the resource it takes to respond to our questions and want to maximise the value of the feedback we collect whilst reducing the burden on Stakeholders. In our Procurement Statement last year, we set out the following engagement timeline. It repeats the two staged process conducted last year, with broader, more vision setting engagement conducted in November/December, with then details then formally consulted on in the New Year.

Figure 1: Flexibility Procurement Engagement Timeline Set out in procurement statement

Given the launch of the new Flexibility products, we will already be engaging heavily with FSPs on how to participate in the New Year. As we are evolving from the engagement last year, our engagement in November/December is more targeted. As such we are minded **to drop the formal consultation in the New Year** to reduce burden on all sides. We remain open to discussion on these topics at any point in the year, and would be happy to reinstate it if stakeholders are keen for us to do so.

Questions

1. **Do you agree with our proposal to remove the formal consultation in the New Year?**
2. **Do you have any suggestions on how we can best engage with our stakeholders? Would there be value in a regular forum for engagement?**

2. New Product Delivery

Last year we set out a common framework for flexibility products as well as our commitment to roll out the Sustain product alongside longer term versions of our Secure and Dynamic products. This framework, tied to a redesign of how we run our procurements, would also allow for the creation of closer to real time products in due course.

See the framework below, with the detailed mapping to our proposed products in Appendix 1.

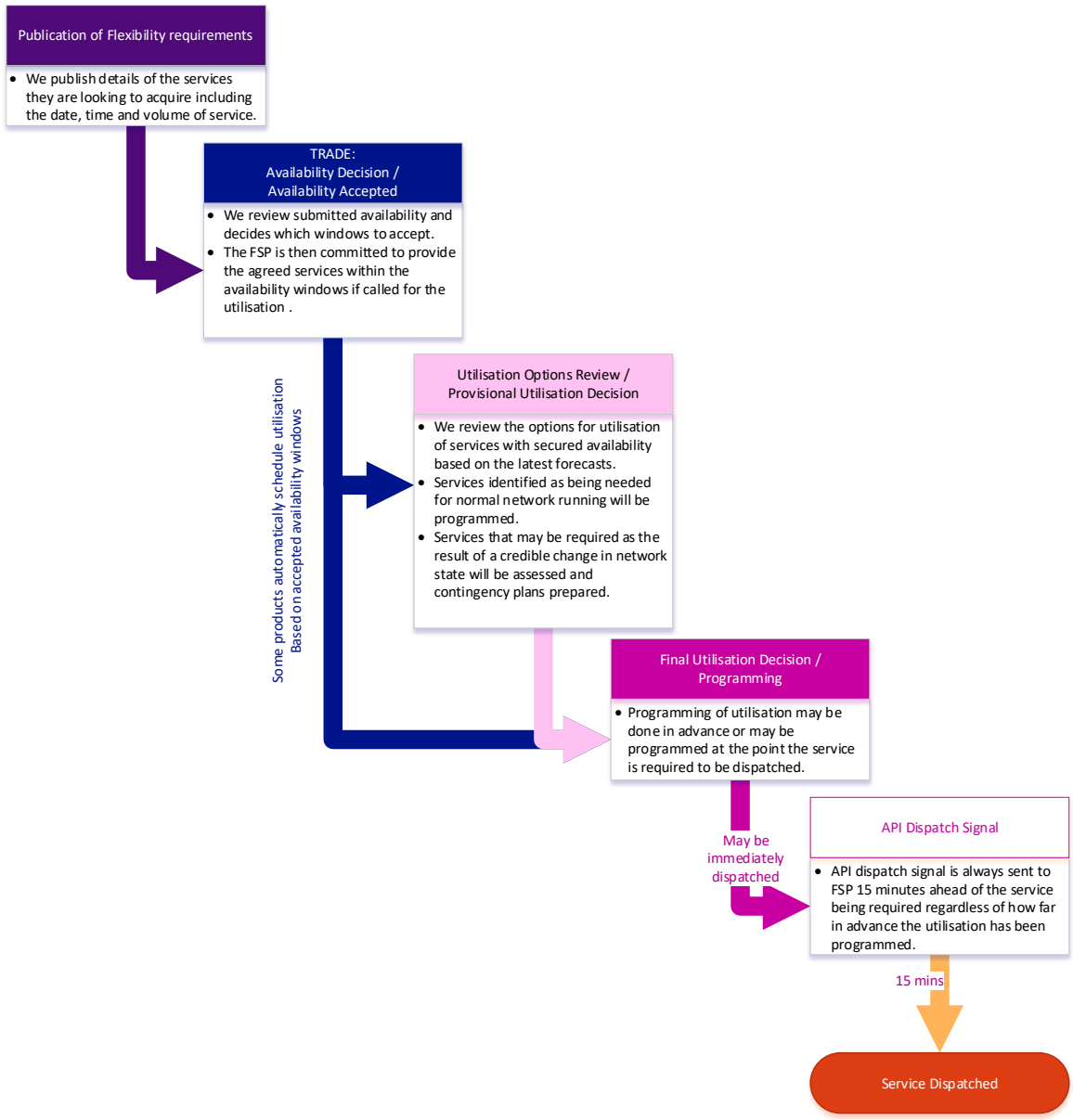


Figure 2: Standard Product Framework

Having progressed the delivery of this new framework and the associated products, we now have a number of more detailed topics for discussion.

2.1. Sustain

Service Overview

A key new product for next year is our Sustain Product. Sustain is the fourth product defined under the Open Networks project and is a scheduled constraint management service. By scheduling the entire behaviour ahead of time, Sustain services require less technical integration to participate in and can be easier to participate in. However they are also less targeted.

A few key differences from our other Active Power products should be noted:

- Sustain is a “drop to” service. As it is scheduled ahead of time with a fixed baseline, FSPs have clarity well ahead of time on what is expected of them: lowering metering below a fixed value.
- There are two fixed four-hour delivery windows each weekday over targeted summer and winter seasons.
- We accept both half hourly and minute by minute metering at either asset or household level.
- We will also be using Sustain to help manage the HV/LV boundary alongside the higher voltage network.

The aim is to develop a simplified product that is easy, and low cost to roll out across domestic sites.

It should also be noted that domestic participants can, and currently do participate in some of our Secure and Dynamic products. We expect this to continue, and encourage FSPs to choose the product that best suits their assets and their commercial strategies. The development of Sustain is seen as the provision of another route to market, rather than the sole route to market for domestic assets.

Outstanding Questions

As we have further progressed the design for the Sustain product, a number of questions have emerged on the elements that drive “simplicity”, namely how we define the Sustain zones, and how pricing works.

The initial proposal was to group the large number of individual CMZs into a small number of grouped Sustain zones. This would allow for a reduced number of prices, and a reduced number of zones for qualification and reduces the up-front complexity.

However as we have progressed the design we have identified associated downstream complexity due to the fact that the value to the DSO remains at a per CMZ level.

For example within an aggregate zone, you might have one CMZ that is oversubscribed (where price competition is possible), whilst another is undersubscribed (and hence should trigger reinforcement). Aggregations makes accounting for these scenarios complex, with the need to partially accept bids. More granular zones would reduce this risk, but would increase up front burden.

Also the removal of any price competition (initially suggested) also makes the management of over subscription complex as there are no variables to select against. The addition of competition (using Pay as Clear principles as per our other products) could rectify this.

This is highlighted in the table below, which looks at how we group Sustain zones.

The original proposal aligned to option 2 (following the Sustain H trial of option 1, with feedback that this dulled the price signals).

Our Minded to position is now Option 3 with pricing competition for oversubscribed zones.

Table 1: Sustain Options

Sustain Zone Options	Option 1: Fully Averaged	Option 2: High/Medium/Low zones	Option 3: Individual Zones per CMZ
Description	Sustain uses 1 zone which combines all relevant CMZs. This was trialled in the Sustain H trial.	3 zones are created to allow for some pricing differentiation. This was proposed following the Sustain H trial.	Each CMZ is treated as its own Sustain Zone.
Price Setting	Single Price across all zones. Based on the ceiling price across all CMZs.	3 prices, 1 for each aggregate zone. Based on the ceiling prices of the relevant CMZs	Individual Price per Zone Highest level of variability
Volume requirements	Would be published on an aggregate and individual CMZ basis	Would be published on an aggregate and individual CMZ basis	Would be published on an individual CMZ basis
Asset Qualification	Via the new Market Gateway. Bulk upload of sites would be facilitated. NGED would link the Asset to the CMZ and the wider Sustain Zone	Via the new Market Gateway. Bulk upload of sites would be facilitated. NGED would link the Asset to the CMZ and the wider Sustain Zones	Via the new Market Gateway. Bulk upload of sites would be facilitated. NGED would link the Asset to the CMZ
Trade Set up	One overarching trade	Three overarching trades	Many individual trades
Zone Clearing	Behind the scenes, clearing would need to happen at a per CMZ basis. NGED would then need to break down the response to each zone. We would need to facilitate partial acceptance (removing zones that did not clear)	Behind the scenes, clearing would need to happen at a per CMZ basis. NGED would then need to break down the response to each zone. We would need to facilitate partial acceptance (removing zones that did not clear)	Cleared per zone. This is a simple and transparent process that could be replicated by any market party.
Managing over subscription	There could be local oversubscription at a CMZ level, but not at the aggregate Sustain zone level. Would need to reject some local level	There could be local oversubscription at a CMZ level, but not at the aggregate Sustain zone level.	Simple price based clearing if it occurs.

	volume, whilst retaining relevant volume	Would need to reject some local level volume, whilst retaining relevant volume	
Flexible Power set up	1 zone needed	Three zones needed	Need to set up and populate many zones (Approx. 50 for EHV zones and hundreds for LV)
Metering	Would only need 1 Meterable unit	Would only need 3 Meterable unit	Would need a Meterable Unit per CMZ
Dispatch API	Would need 1 Dispatch Group and Meterable Unit per Zone	Would need 3 Dispatch Group and Meterable Unit per Zone	Would need a Dispatch Group and Meterable Unit per CMZ
Proof of delivery	Only get average view. Would need to make assumptions on per zone delivery	Only get average view. Would need to make assumptions on per zone delivery	Clear view at a per CMZ level
Invoices and reporting	Aggregate reporting and performance	Aggregate reporting and performance	A lot of detail on individual performance
Examples (based on sample assessment of LV Zones). It should be noted the total Product Value and Volume is identical across the scenarios			
Example Price	£37/kW/year	£(26,36 or 70)/kW/year	£(24-340)/kW/year
Example number of zones	1	3	388
Example Volume per Zone	9.2MW	5.1, 2.4 or 1.7MW	5-10kW

The key questions on this topic are:

3. **Do you agree that option 3 will bring the greatest value in the long run? How can we reduce the burden of the higher volumes of actions?**
4. **Do you agree that adding in pricing competition in oversubscribed zones is beneficial at this stage? Do you agree it would allow for more transparent management of oversubscription?**

2.2. Secure and Dynamic Pricing: Use of Ceiling Prices

As detailed last year, we are looking move away from fixed pricing and roll out individual ceiling prices per zone. These will be calculated against the value of reinforcement deferred.

The industry standard tool used for this assessment is the Common Evaluation Methodology, (CEM) calculates ceiling prices by holding the Utilisation rate fixed and then varying the Availability rate.

To enable our Joint Utilisation Competition we need the ability to compete on Utilisation prices. As such we will be converting the output of the CEM into an adjusted set of prices based on the current ratios between Availability and Utilisation pricing. This will factor in the zone specific volume requirements to ensure the total value offered remains. A worked example can be found in Appendix 3

We expect FSPs to respond to trades with their best Utilisation Prices. We can then calculate the associated Availability rate, and the equivalent cost of a unit of Utilisation (1 MWh of Utilisation with the relevant Availability) that will be used to assess bids and drive the Pay-As-Clear mechanism both in the long term trades and the Joint Utilisation Competition.

As we build capabilities, we endeavour to remove the fixed ratio between Availability and Utilisation and support open bidding on both elements. This will allow FSPs to better reflect their true operating costs.

With the use of ceiling prices the concept of zones being economic for flexibility becomes less absolute compared to the use of fixed pricing. Except where the fixed costs associated with operation outweigh the benefits, all zones could operate with flexibility. The key variable is the price. To target effort on both sides (DSO and FSP), we will implement a minimum value threshold this will avoid zones that are clearly not viable from being put to the market.

The Table below highlights how this will be set for the current DNOA assessment

Table 2: Key Ceiling Prices Inputs

	Secure	Dynamic
Availability/Utilisation Price Ratio	0.714	0.0167
Minimum Value Threshold (for Availability)	£50/MW/h	£2.50/MW/h

Going forwards we would like to establish a more market led and transparent process for setting this threshold.

5. **Do you see any challenges with our approach fix the ratio between Availability and Utilisation?**
6. **Do you see the value of a minimum value threshold?**
7. **How do you suggest we set this? We want to ensure we open opportunities to participate wherever possible, without creating unduly onerous processes.**

2.3. Restore Pricing

We have settled on the use of ceiling prices for our Secure and Dynamic products, and questions on Sustain pricing are raised earlier.

With this in mind we also need to update our pricing for the Restore product. Given the core use case we believe this should be priced against the value of restoring additional customers. For the DNO the core metric for this is the Customer Minutes Lost (a measure of how long customers are

without power). Alongside Customer Interruptions (a measure of the number of interruptions, which isn't helped by Restore) this is the metric against we are rewarded, and penalised on network reliability.

We will start with a single Restore price across our CMZs. This will simplify implementation for FSPs and our control room.

We are waiting for our final ED2 determinations at the end of November to set the updated Restore Price.

Over time we may look to allow free pricing of Restore. However this will require the development of internal tooling to aid our Control team to understand the viability and efficiency of such products in real time.

2.4. Support for Half Hourly Metering

Traditionally we have required minute by minute metering for our Active Power products. This is linked to our network requirement to manage the power output of the asset, rather than the energy volume associated with the power. For example, we might want to see 5MW of delivery over a Half Hour (HH). A site delivering at 2.5MW for the first 15 minutes, and then 7.5 for the latter 15 minutes would not meet the requirements of our network and could put network assets or customer supplies at risk. This behaviour would be picked up with minute by minute metering, but not HH metering. Additionally, HH metering would not accommodate dispatches that aren't on the HH very well.

To support the roll out of the scheduled Sustain product, we have built the capability to accommodate half hourly energy reading within the Flexible Power Portal. This was supported by some statistical analysis to better understand the behaviour of domestic assets and the risk associated with the lower granularity of visibility.

Given this development we are reviewing the suitability of such metering to other products.

We do not believe it is suitable for our post-fault Dynamic product, given dispatch can happen at any time, and is unlikely to align with a HH reading.

For our pre-fault Sustain and Secure products we will accommodate HH metering, as dispatch will only happen on the HH. However we will only accept this for specific domestic technologies, which are inherently more statistical in nature. We will retain the requirement for minute by minute metering for non-domestic technologies.

Restore is not a main product, it is a top-up product used only under fault conditions. Therefore, we will align it to the metering allowed in the main product. This may cause issues where dispatches aren't aligned to the HH. However we feel these are mitigated by the lower under delivery clawback associated with Restore.

These are summarised in the table below. With all products we still maintain a preference for Minute by Minute metering.

Table 3: HH metering suitability

	Secure	Dynamic	Restore
Use case	Used for pre-arranges limitations	Can be used in response to a network event	Used in response to a network event
Suitability for HH metering	As our schedules currently operate on the HH, this is suitable.	As the need could arise at any time, it is unlikely to align with the HH. HH metering	As the need could arise at any time, it is unlikely to align with the HH. However as

		would mask delivery, and could incur under delivery, both on Utilisation and Availability.	there is no wider availability claw back, and a wider grace factor on performance assessments.
Allowed going forwards?	Yes (for Domestic Assets only)	No	Yes (if allowed in main product)

2. **Do you agree with our widening of acceptable metering options for domestic technologies?**
3. **Are the limitations around Dynamic and Restore clear?**

2.5. Maximising the Value of Energy Storage

Over the last few years we have offered connections to very large volumes of Energy Storage assets on our network.

Whilst inherently flexible, and with the potential to provide significant value to the network and the wider system, the current mechanisms for connection can actually cause further issues, in some cases reducing the available capacity for traditional final demand.

We can mitigate these limits on the distribution network by procuring Flexibility Services. However we also see a number of issues arising at the transmission boundary where lead times for reinforcement tend to be longer. This boundary isn't subject to the wider access changes being delivered in the Significant Code Review.

As such we want to investigate how we can best understand the economics and then contract with operators of energy storage.

Storage assets are inherently very flexible, however the availability of that flexibility is heavily impacted by the revenue streams they are pursuing and the stackability across them. We are conscious of the high value in many alternative markets, given the fixed value of ours, we want to understand the viability of them. . For a DSO to effectively contract with storage we must ensure our products minimise the lost opportunity

As such we propose the following:

- The use of our Secure product. Acknowledging the core cost of delivery is the loss of wider opportunity, and hence focussing the value in the availability fee.
- Contracting at the longer term. We understand most storage sites settle other market opportunities closer to real time, generally at the day ahead. Whilst we could operate a product at this timescale, it would expose us to too much risk.
- Aligning baselines to our planning assumptions. For a demand turn down product this would assume the site is at full import. We know this is unlikely to be the case in reality, however the value in the product is in allowing is to demonstrate we can manage the associated risk. We would expect pricing to reflect this position, with low bid prices.
- Tied to the above, we would look to support partial response from a site. In the example above, there is value in simply knowing the site will not go above half of the import capacity. We are keen to understand if it makes it more stackable.

A further question on this product is how it is funded. For our current products, the value is derived from the ability to defer reinforcement. Where the above would allow this, then we can easily use

the same funding mechanism. However in many of the cases we are looking at, especially on the Transmission Interface, the challenge is on the delay associated with that reinforcement.

As such we keen to engage with Ofgem to understand the value of the delay and how we can fund products to accelerate connections. In some cases we have forecasted increased transmission connection costs that will also be delayed until the reinforcement has been completed. We would need regulatory approval to use these funds for other purposes.

3. **Would our proposed product be attractive to Energy Storage sites? If not, why? How could we make them more attractive?**
4. **What level of pricing would you expect to see for such a product?**
5. **Are there any further details on the economics of storage that would be beneficial for us to consider?**

2.6. Asset Duplication

As we build out the new products and the associated processes, we are aware of the need to develop robust processes for the management of asset duplication. This is when multiple FSPS look to register the same asset. This could happen for a number of reasons like the asset owner contracting with a new aggregator, or both a supplier, and the smart charging provider could look to register a domestic EV charge point.

As far as we understand, the ESO currently treats these cases on a manual basis, generally referring back to the asset owner. Whilst we agree with this principle, we see some natural limitations as we scale up the volume of assets, and lower the size. For example referring to the owner of a domestic asset is not seen as pragmatic. We also need to be clear on our role, and want to facilitate resolution, whilst respecting the existing commercial relationships between entities.

As such we are looking to build out a more robust process. We expect the process to evolve over time, and will need to standardise across industry, but need a starting point for our initial build.

To build a process we see a three key considerations:

1. When is a conflict identified?
2. What is the resolution process?
3. How do you manage assets during the resolution process?

The responses to each option interact, so whilst they are different elements, they must be considered as a whole.

It should also be noted that the DSO may have limited involvement is some of the steps. For example if resolution requires mutual agreement between FSPs, the role of the DSO is to highlight the conflict, and have clear rules of operation during the conflict, but is not to force a resolution.

Table 4: Asset Duplication: When is a conflict identified?

When is a conflict identified?	Pro	Con	Minded To?
If any two FSPs claim an asset. I.e. at the Asset Qualification Stage?	Easy to identify. Aims to resolve the issue as early as possible	Conflict might be overstated. There may be times when an asset might genuinely have 2 FSPs. One might be succeeding the other. Alternatively might they be controlling at different times of day.	N

When the dual claims actually conflict. I.e. at the Trade Stage.	This is when the genuine conflict happens	There is no time to find a resolution ahead of the trade.	N
When the dual claims actually conflict. However the potential clash is highlighted at Asset Qualification.	Gives early opportunity to resolve potential conflicts. Limits DSO intervention to Genuine conflicts		Y

Table 5 Asset Duplication: Resolution Process

What is the resolution process	Pro	Con	Minded To?
Mutual Agreement by Claimants	End point is agreement between commercial entities	May not find a resolution Could get difficult to administer	Y(for larger assets when owner not known)
First Come First Served	Simple	No incentive to pass on ownership. Could encourage rush to register and "hold" assets	N
Decided by Asset Owner	Would allow the owner to reflect their latest commercial position	We may not know who the owner is. Not practical for domestic assets	Y (combined with another where owner not known)
Supplier Gets priority	Simple	Is this fair for non-suppliers?	Y (for smaller assets when asset owner not known)

Table 6: Asset Duplication: Action Taken during conflict resolution

How do you manage assets during resolution process?	Pro	Con	Minded To?
Freeze Asset for all parties. No one can use them	Clear incentive to rectify	Impact on existing provider, adds significant uncertainty. Could be used maliciously	N
Asset remains with first comer	No impact on delivery	No incentive on first comer to resolve conflict.	N
Asset remains with first comer for a period, then it freezes	Incentive to rectify, but	Adds delays into the process.	Y

	limited immediate impact on delivery

We believe our minded to positions balance the requirement for incentives on parties to resolve conflict, whist reducing the operational impacts of such conflicts.

2. **Are the scenarios we have considered all credible? Are there any scenarios we haven't considered?**
3. **Are there any existing processes for managing these issues in other markets?**
4. **Do you agree with our suggested routes forwards?**
5. **Are there any additional options we haven't considered?**

2.7. Trade Clearing

As we look to deploy longer term trades, a number of questions have emerged.

These focus on the details of how trades are specified and then cleared.

There are a range of options, trading off different priorities.

At one end of the spectrum, we can focus on making the clearing process as simple and transparent as possible, whilst at the other end, we can focus on matching our needs with maximum efficiency. As we develop more experience on the topic, and better tooling, we see this trade off lessening.

In either option we propose capping the max MW bid size to our maximum need.

Simplifying the trade.

To make the trade as simple as possible, we can look to limit the complexity of our need. At the simplest end of the spectrum, this would involve providing the timing of availability requirements and a simple, single MW value. Providers would be expected to be available for the full duration and clearing simply involves moving up the price stack till the MW need is met.

This is a clear and transparent process, but could be onerous on FSPs, needing them to be available for the entire duration (potentially 6 months).

Another key downside is the inefficient matching to the network need. To manage the associated network risk, but procure to a single MW value, the DNO would need to procure to their peak requirement for the full availability window. As the value to the DNO remains constant, this can significantly reduce the value of each unit of availability.

The example below highlights how this might operate for a 4 month trade. Given the need for a fixed MW requirement, this is set at the peak for the months. As can be seen this significantly over procures in April. The total volume of requirement is about 2.5 times the actual requirement. It should also be noted that this example only looks are the monthly variations, and does not consider the daily variation between months.

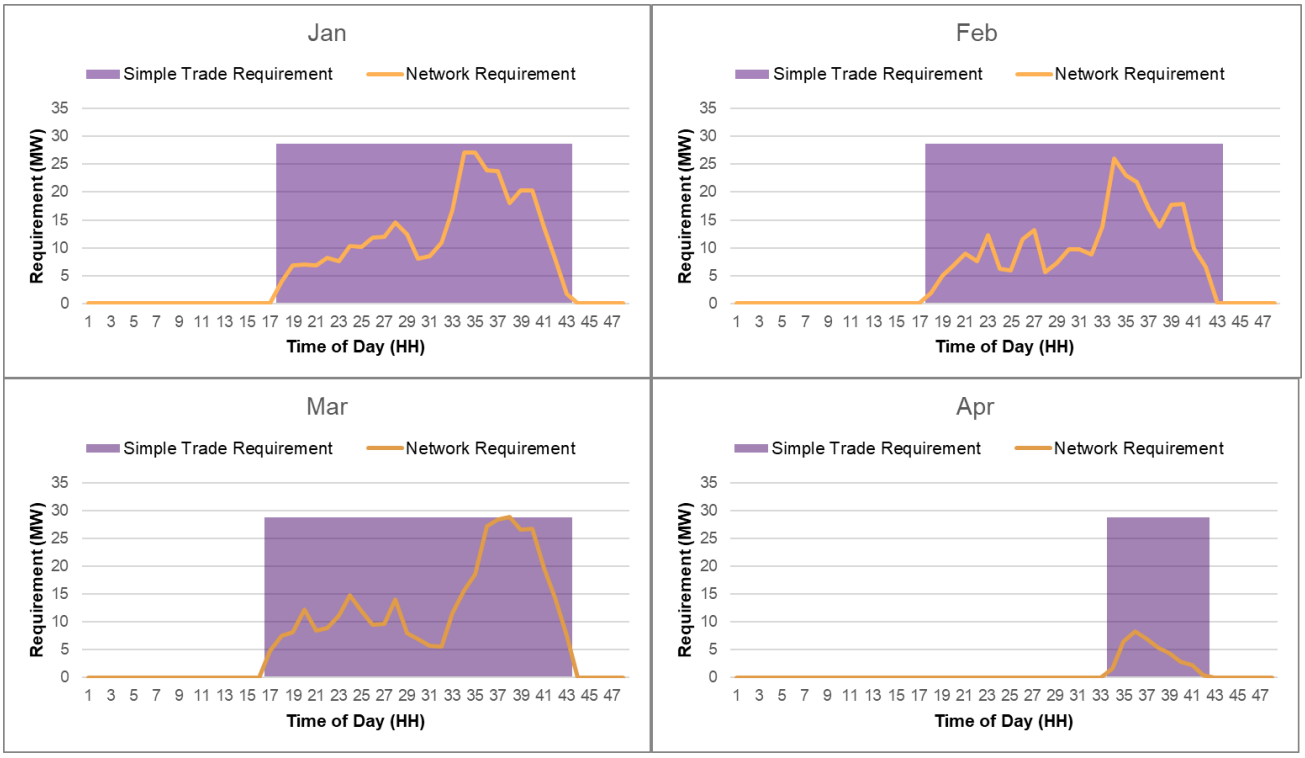


Figure 3: Example of simplifying the trade

Efficient matching to Flexibility needs

At the other end of the spectrum, the trade could be defined to match the network needs as closely as possible. This would give a variable MW requirement over a period of time.

FSPs would inform the DSO of when they are available, rather than being required to be available for the full duration.

The DSO would then look to match the volumes available to the time series requirement as efficiently as possible. Pricing would be determined by the highest cost FSP utilised by the DNO.

In the example below, assuming the FSPs are in price ascending order, the clearing price would be that of FSP 4

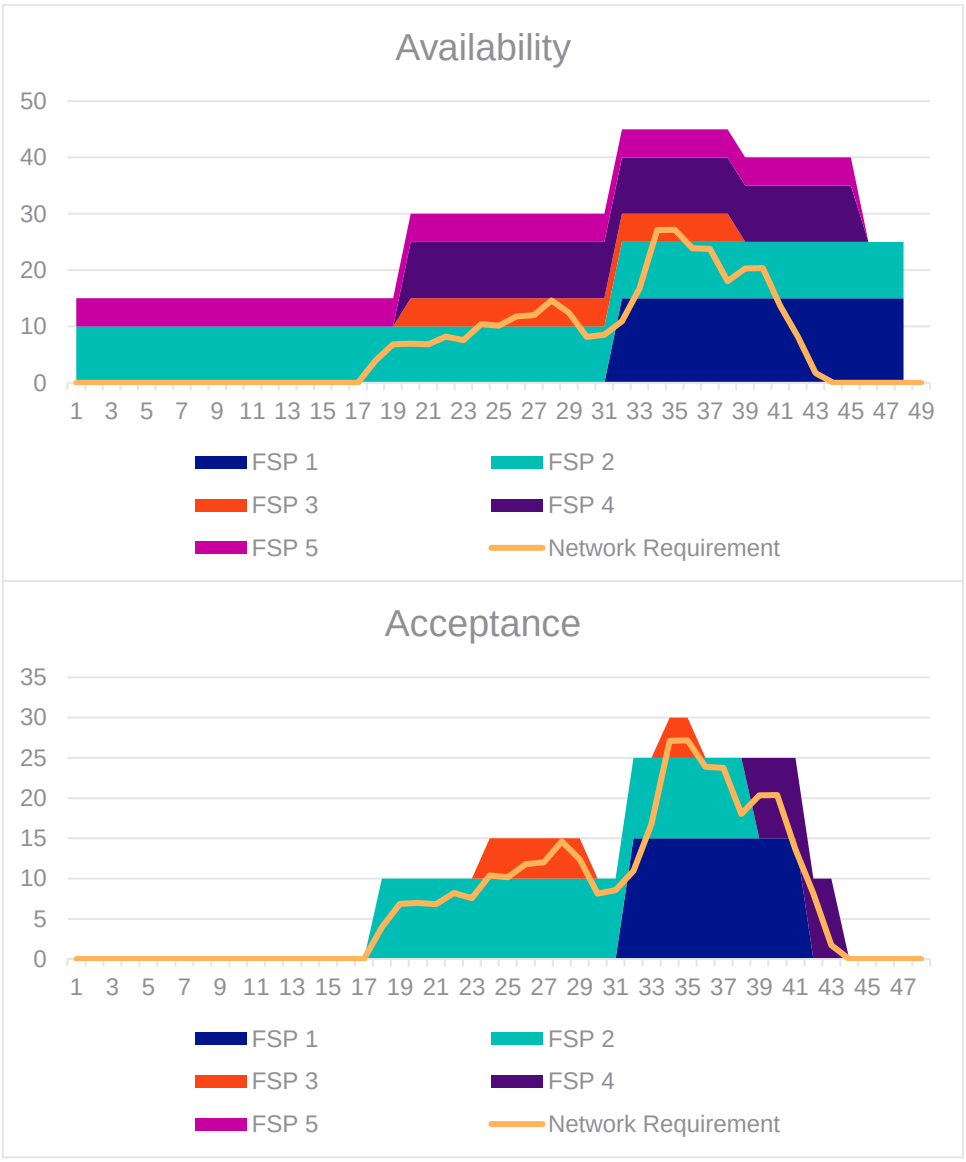


Figure 4: Example of more efficient matching to needs

This process would be conducted manually initially, but could evolve into a more automated process as capability is developed. This would be a far more complex optimisation problem making transparency more challenging. However as it is automated, we will endeavour to make it as open as possible.

Is should be noted that as our Sustain product has a simplified set of Flexibility needs. As such there is minimal difference between the two approaches.

Table 7: Trade clearing options

	Simplifying the trade	**Efficient matching to Flexibility Needs**
Pro	Simple rules. Easy for any party to verify.	Higher value per MWh More efficient use of Assets

Con	Lower value per MWh	More complex mapping. Harder to verify.
Current Capability	Manual clearing. Blocks cover worst case requirement for 6 months	Manual matching based on profile
Future development	Build out automated auction capabilities	Build out automated optimisation capabilities

These challenges apply to a greater or lesser extent depending on the time period covered for the trade. Reducing the size will make reduce this issues, but greatly increases the volume of interactions and the associated costs of management.

It also removes the natural interaction across bids for FSPs and the DSO. The DSO will want confidence that it can manage all its network risk and so will want to link clearing across a season. From an FSP perspective the price offered may vary depending on linking of the bids.

Support for interlinking bids will be considered going forwards, but will require significant development of internal systems to support.

Moving forwards we will be looking to match acceptance to flexibility needs. Given the consistent feedback provided on the limited value of DSO markets, we want to protect the value offered to the market.

In the short term, we will use manual processes. We will use the learning to feed into the development of new systems. As we gather more operational data, we will refine our processes, and are keen to engage with FSPs to make sure we keep the right balance.

To drive our capabilities in this space forwards will be looking procurement activity in the New Year. This will help us determine our needs and ultimately tender for a strategic partner to help us develop capabilities. We acknowledge this is a complex space and will required an iterative approach to delivery. As detailed in section 4, we are keen to take the first steps as early as possible, and learn by doing.

3. **Do you agree with our direction of looking to focus on the efficient matching of our Flexibility needs, over the simplification of the clearing process?**
4. **What can be done in the short term to maximise the transparency of this process?**

3. Delivery Plan

As highlighted in the sections above, and in our previous Evolution Paper, we have a number of new products in development. Each adds new value to the market. Building on our experience of building the relevant capabilities, and updated internal prioritisation we have updated our delivery plan to the below. This combines the desire to remain ambitious and delivery as early as possible, with the requirements to build internal capabilities to support the products. As detailed in the next section, there are a large number of support functions and processes needed to deliver new products and then operate them effectively.

We aim to deliver Sustain and the long term Secure and Dynamic products by the end of the financial year. These will be targeting operation for winter 2023. We then aim to have our weekly trades in place for operation over the same time period.

Our Demand Turn Up products will be launched for Summer 2024 when we expect the outcomes of the Access Significant Code Review to have generated the need to manage export constraints with Flexibility products.

Short term products, such as those trialled in IntraFlex remain a key next step, and will be targeted at winter 2024, giving us additional time to build out internal tooling.

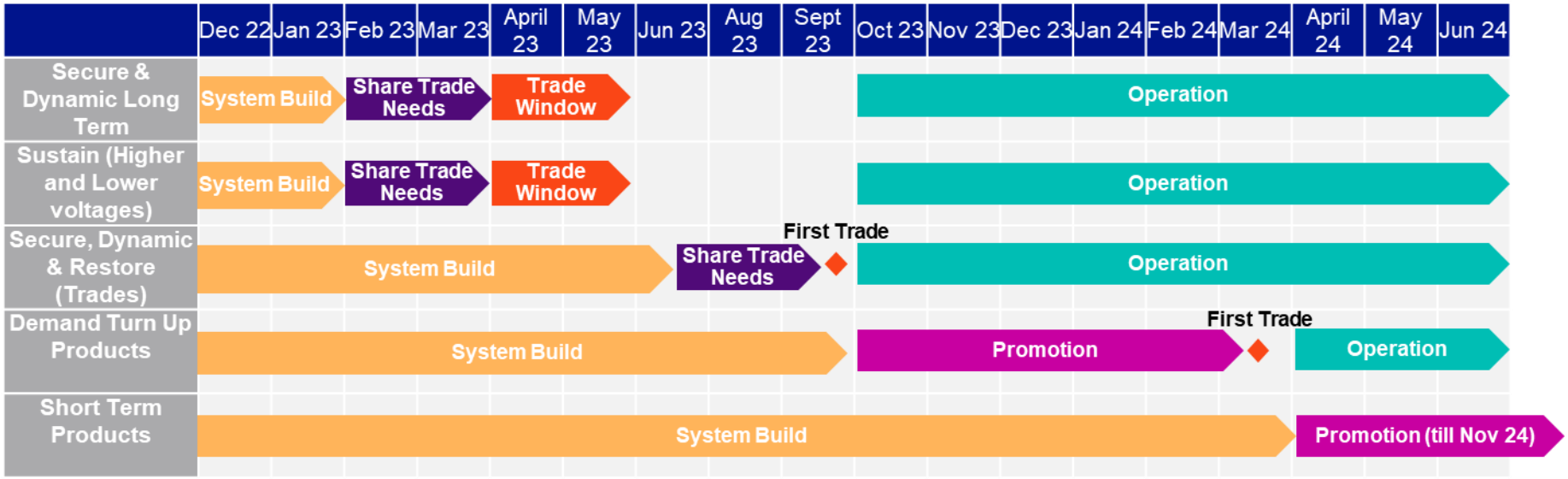


Figure 5: Product Delivery Plan

4. Platforms and Processes

As detailed in our engagement last year, we see a number of key platforms and interfaces needed to support a vibrant flexibility market.

As an industry we need our systems and processes to make participation in our products as easy as possible. We believe there are two broad approaches to achieving this:

- Delivering a common overarching platform across the ESO and DSOs, or
- Focussing on the development of a common data layer and common interfaces.

We support the value of third party marketplaces, platforms and services and want to build out a decentralised, modular architecture.

We believe that developing a single overarching industry wide system is fraught with complexity, especially in this early stage of market development. There is also significant risk of single vendor lock in and limited ability to further develop capabilities and innovate.

As such we prefer a model focussed on building a common, industry wide data layer, and developing a more modular, decentralised architecture. Given the gaps in this common layer, initially we are prioritising agility and speed of development, to help us better understand requirements. We hope that an element of competition in delivery will drive the industry to better standards, pulling everyone forwards, by showing what is possible rather then progressing at the pace of the slowest actor. As requirements settle we will look to consolidate standards rather than systems wherever possible. We will be sharing our learning generated with wider industry and will adopt or adapt best practice developed by other system operators.

We want to drive competition across capabilities, and want to build a well-defined modular system, with clearly defined interfaces. This maximises our ability to tender our capabilities and evolve as new technologies emerge.

The core building blocks are laid out in the diagram below with more detailed mapping on individual blocks in Appendix 2. These focus on the operation of Flexibility products. For more detail on how determine our network needs please look at our DFES, NDP and DNOA documents.

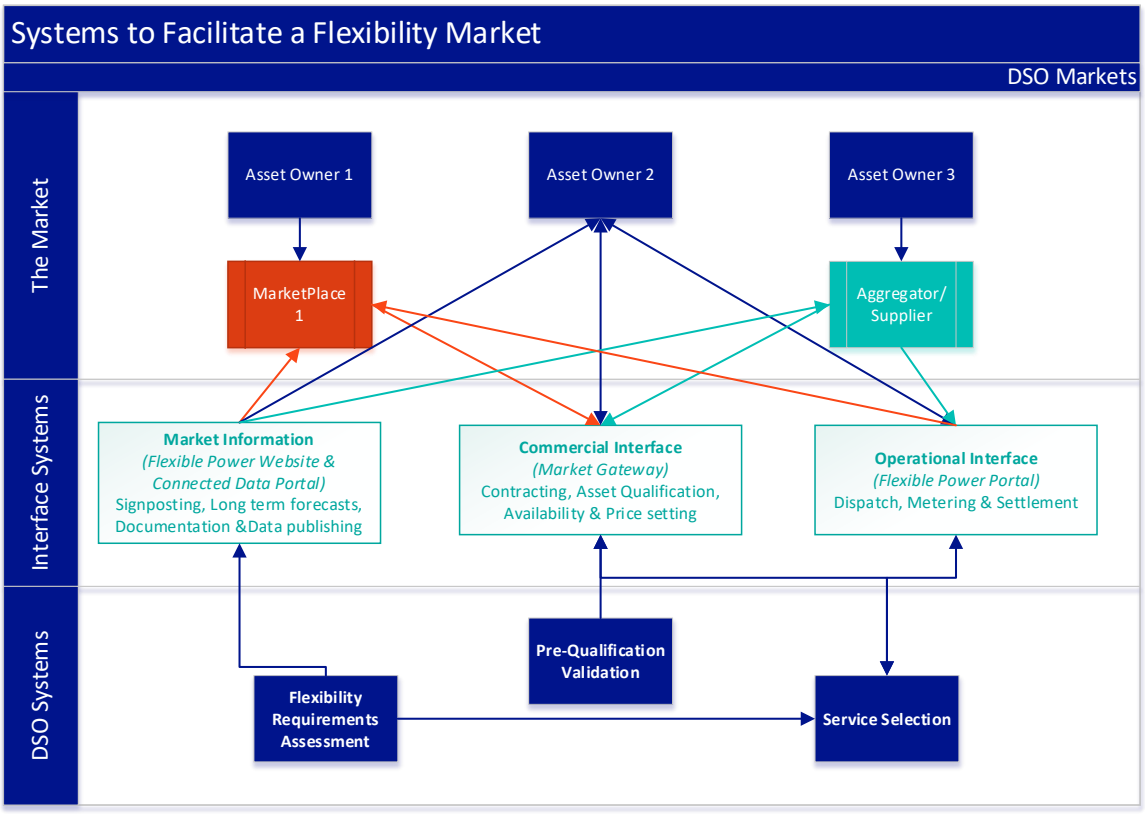


Figure 6: Systems to Facilitate a Flexibility Market

This is split into 3 key areas:

DSO Systems

These cover traditional roles, like the identification of network needs, but also extend to any service selection/clearing processes. This is needed internally to allow it to optimise across all the different routes to market (direct or via a number of market places). Should a single external market place emerge, then this could live externally, however given it's criticality to the effective operation of the DSO, measure need to be implemented to ensure it's transparency and ability to adapt.

Whilst we define these functions as internal to the DSO, we expect to tender out requirements as appropriate to help us develop the best capabilities, using the latest tools and techniques. We have long established processes for networks modelling and needs identification, but will soon be starting procurement activity around the development of Selection/Clearing capabilities. We expect this capability to build out over ED2.

We also see some elements of pre-qualification processes (the linking of assets to network locations) as staying with the DNO, as it holds the latest mapping on customer to the network. Whilst this can be shared for larger assets, there are a number of GDPR challenges associated with sharing this data for domestic assets.

Interface Systems

Interfaces have a clear role in helping us get data and signals in and out of the DSO in a consistent manner. We aim to align with common industry data layers as they develop and to take a leading role in developing these where they don't exist to ease interaction from FSPs.

This starts with simple data around needs that we share via our Connected Data Portal (built on the same technology as the ESO's) and the Flexible Power Map (shared with a number of other

DNOs). It then evolves to cover commercial interactions which will be handled in our new Market Gateway (to be launched in 2023), and Technical interactions which occur via the Flexible Power Portal

The specific tools used for the interfacing have been chosen for a number of reasons including existing use (CDP and Flexible Power Website), breadth of existing capability (Flexible Power Portal), or speed of potential deployment (Market Gateway). We see value in initially standardising the data and formats coming from these systems, and potentially the systems themselves (we are already collaborating with a number of other DNOs on the Flexible Power tools).

We will regularly review the technology and vendors used for these interfaces system to ensure we retain the best available tools.

The Market

We see a critical role for wider market actors to help grow understanding and access to our products. These will help asset owners, or operators to package up their capabilities into the products we need to procure, as well as understand how to optimise revenues across wider markets. As detailed in Section 5, there is significant value to be generated in helping asset owners maximise value across the different market products, whilst reducing the complexity they are exposed to. As more requirements come to the fore, through work such as primacy, this will only increase. This role is crucial to widening access to DSO Flexibility products and driving the volumes and competition we are looking for.

We also see the role expanding as our capabilities do. We have previously highlighted the key bounds between our role in secondary trading (understanding qualification, exchange of the technical obligations) and those of wider market actors (helping match requirements, managing financial flows...). Other opportunities include the support of asset duplication resolution and the support of commercial and technical qualification.

We know there are number of differing views on the roles and responsibilities within this emerging sphere. As such we have built on the capabilities table provided in the recent UKPN Local Energy Markets consultation to clarify our views in the summary table below. This highlights the general alignment of views, with a few key exceptions.

We have also shared our more detailed view of the key componentry we see in a flexibility market, and who we think should hold responsibility for it in Appendix 2. As detailed above, we prefer a decentralised, modular approach to capability development.

Table 8: Market Capabilities and Responsibilities.

Capability	UKPN View On Responsibility	NGED View on responsibility (and link to Appendix 2)	NGED Development Progress
Define strategic needs. Determine network use-cases for customer flexibility	System Operators (SO)	**Needs Identification.** Sits with the DSO via the NDP (fed by the DFES) and the DNOA.	Tied into our network modelling tooling and the CEM.
Product development. Specify flexibility products, incl. commercial and technical rules	System Operators, with support from Market Facilitator	Our products must both manage the network needs and be commercially appealing to FSPs. This is a collaborative process. The FSP must decide how this product is passed across to the asset owner.	Tied into our yearly Evolution of Flexibility engagement and development. **Reviewed Yearly**
Define operational needs. Determine requirements by location, product and time	System Operators (SO)	Sits with the DSO combining strategic needs and the **Trade Requirements**	Operational forecasting is being developed alongside a more holistic view on risk management. **Formal policy in place in 2023**
FSP Marketing. Attract FSPs and help them understand most relevant opportunities	Joint responsibility	DSO highlights needs and requirements. Key role for the market to raise interest more broadly and support requirements across System Operators.	Core requirements highlighted on the Flexible Power Website. **Commercial Officers in place to support**. More to be recruited in ED2.
Registration. Register and qualify new or updated FSPs and DERs	Market Facilitator to provide front line, with SO updating qualification status	**Procurement/Commercial Qualification**. Involves UCR compliance and signing T&Cs. Requirement sits with DSO, but could be facilitated by third parties. For example they could facilitate the process across System Operators.	Under development with the Market Gateway. **Launch expected by end of year**

		Asset Qualification. Registering assets, linking to zones, managing any duplication. Linking to zones will need to stay with the DNO to manage GDPR risks. This can facilitated by third parties.	Under development with the Market Gateway. **Launch expected Q1 2023**
		Technical Set Up. Linking to technical interfaces like the dispatch and metering API. This will need to be facilitated via the technical interface but could be supported by third parties. For Example they could provide API development/integration support.	Currently supported by the Flexible Power Portal. **To be reviewed in 2025**
Market Clearing. Determine which offers are accepted against which SO requirements	Market Facilitator, according to agreed and published market rules	**Trade Selection**. As this spans multiple routes to market, this should be an independent capability to allow selection without conflict. Iit should follow agreed rules once sufficient learning has been generated to determine them. See section 2.7 for more details	Rely on manual processes. **Commencing Procurement Activities in 2023 for a strategic partner.**
Dispatch. Utilisation of procured flexibility	System Operators (SO)	**Dispatch Selection** (scheduled and real time). This will need to be triggered via the DSO based on network need. Core functions remain with the System Operator.	Currently supported by the Flexible Power Portal. **To be reviewed in 2025.** Further tooling needed to enhance dispatch scheduling and real time selection. **Commencing Procurement Activities in 2024 for a strategic partner.**
Settlement. Make payment for flexibility procured / delivered	Market Facilitator to calculate required payments. System Operators to make payments	**Metering & Settlement**. Follows established process.	Currently supported by the Flexible Power Portal. **To be reviewed in 2025.**

Market surveillance. Review behaviour of market participants	Market Facilitator, according to agreed and published market rules	We are committed to data transparency. We will publish data in a manner that can easily be accessed and shared.	Data currently on the Connected Data Portal ready for third party absorption.

19. **Do you agree with our approach for a decentralised, modular set of platforms and interfaces?**
20. **Have we covered all the relevant capabilities?**

5. ESO coordination

We acknowledge that how we coordinate our requirements with the ESO is essential to the efficient use of flexible resources and the maximisation of whole system value. It is key to the development of liquid flexibility markets.

There are a number of key elements of coordination from system planning to real time operations.

Given the focus of this document on Flexibility Products, we want to focus on 2 key areas:

1. Stackability: how we coordinate access to the same assets. For example can the same asset provide DSO products whilst also participating in the STOR market?
2. Primacy: how we coordinate access to different assets, which electrically impact on each other. For example how to manage the conflict between ANM systems and STOR delivery.

How these are managed depends on the model used for management of assets. We see a number of theoretical models for managing coordination (these sit alongside the wider work on "worlds" which focussed more on who was taking the action, rather than the structure of the action).

Model 1: A series of separate but stackable Products

In this model each SO defines a number of products, each designed to help manage a single specific need. If defined correctly, and in sufficient depth, they should by default be stackable in the same time period where technically possible (exclusions would be due real technical incompatibility). Stacking in different time periods is possible for all products. Value optimisation is a commercial activity undertaken by FSPs, managing which products are bid for. Primacy Requirements/limitations should be fed to FSPs wherever possible, to allow them to manage their commercial exposure.

Model 2: A small number of shared Services

In this model the SOs establish a number, or just one, platform for receiving Services. This puts the onus on the FSP to describe the technical capabilities of the assets. The SOs then match the Services to their needs. This allows for greater technical optimisation across needs, and across operators. Stackability is no longer a concern as it is provided through access to the single service.

We see both models as market based, but with different focuses. One is more customer driven, putting more choice, but also complexity on FSPs, the other is more system driven, with lighter requirements on FSPS, but with more onerous back end systems.

The Table below highlights a few the differences in a more detail. This includes 2 variants on shared services model.

Table 9: Products Vs Services

	Model 1: Individual Stackable Products	**Model 2a. Shared Services (sequential)**	**Model 2b. Shared Services (co-optimisation)**
Definition	A series of Products are defined by the SOs. These are focussed on the management of specific requirements. FSPs respond to the SOs need.	A small number, or one service. This allows FSPs to state their capabilities. SOs respond to the FSPs capabilities.	A small number, or one service. This allows FSPs to state their capabilities. SOs respond to the FSPs capabilities.

Volume clearing	Done separately per product. Pay as Clear auctions seem to be the predominant mechanism for this.	Constantly clearing. SOs pick their services that best manage their individual requirements. There is no defined clearing timeframe.	Done periodically. This allows optimisation to factor in requirements of all SOs
Optimisation	Optimisation is Commercial and carried out via the FSP. This gives more control, but also more complexity to the FSP.	Done by the SOs for their individual need against the FSP capability	Done periodically. As covered above
Stackability (within time frame)	Defined in each product, by technical need.	Built in to the combined service	Built in to the combined service
Stackability (different times)	Possible for all products	Built in to the combined service	Built in to the combined service
Primacy	Limitations are communicated to the FSPs who manage their commercial positions to suit.	Implemented through sequencing of actions, and blocking of counteractions	Built into the optimisation
Pros	Faster to Deploy	Simpler FSP systems needed (simply need to state capabilities)	Simpler FSP systems needed (simply need to state capabilities)
	Value is explicitly built per products and hence transparent	Stackability is built into the solution	Primacy & Stackability are built into the solution
Challenges	More coordination sits on FSPs.	Value of different capabilities is implicit, hence less transparent.	Would need to align the timing of ESO and DSO actions.
		Certain capabilities (frequency response), may be easier served by bespoke services	Certain capabilities (frequency response), may be easier served by bespoke services
			Technical complexity of this approach

We see the current market as an interesting hybrid of models with some legacy (not shared) service such as the BM, alongside a host of new Products (which are more or less stackable) such as the new suite for Frequency products by the ESO, as well as the DNO active power services.

By default new services seem to be built with Model 1 in mind. As such in the short term we are looking to build the clearest, most stackable services we can, and as part of the ON project we are working to deliver primacy rules.

However improving stackability with certain ESO Products and Services such as the BM has made very limited progress in the last few years. Given the scale, and widening access of the BM, this should not be overlooked.

The mixing of services and products, requires the development of complex systems for both SOs and FSPs for their coordination and can lead to a lack of clarity for responsibilities.

As such, and following the findings of our Gamma Flex project, we are keen to understand the industry appetite for a more service based approach to procurement. We acknowledge that such a shift will not happen overnight, but could alleviate some of the challenges seen above.

Questions

21. **Do you agree with our assessment of the different models?**
22. **Do you see a clear preference in the way forwards?**
23. **If a more service based approach was needed, how should it be implemented?**

6. Summary of Questions

Purpose of this Document

1. Do you agree with our proposal to remove the formal consultation in the New Year?
2. Do you have any suggestions on how we can best engage with our stakeholders? Would there be value in a regular forum for engagement?

Sustain

3. Do you agree that option 3 will bring the greatest value in the long run? How can we reduce the burden of the higher volumes of actions?
4. Do you agree that adding in pricing competition in oversubscribed zones is beneficial at this stage? Do you agree it would allow for more transparent management of oversubscription?

Secure and Dynamic Pricing

5. Do you see any challenges with our approach fix the ratio between Availability and Utilisation?
6. Do you see the value of a minimum value threshold?
7. How do you suggest we set this? We want to ensure we open opportunities to participate wherever possible, without creating unduly onerous processes.

Support of Half Hourly Metering

8. Do you agree with our widening of acceptable metering options for domestic technologies?
9. Are the limitations around Dynamic and Restore clear?

Maximising the value of Energy Storage

10. Would our proposed product be attractive to Energy Storage sites? If not, why? How could we make them more attractive?
11. What level of pricing would you expect to see for such a product?
12. Are there any further details on the economics of storage that would be beneficial for us to consider?

Asset Duplication

13. Are the scenarios we have considered all credible? Are there any scenarios we haven't considered?
14. Are there any existing processes for managing these issues in other markets?
15. Do you agree with our suggested routes forwards?
16. Are there any additional options we haven't considered?

Trade Clearing

17. Do you agree with our direction of looking to focus on the efficient matching of our Flexibility needs, over the simplification of the clearing process?
18. What can be done in the short term to maximise the transparency of this process?

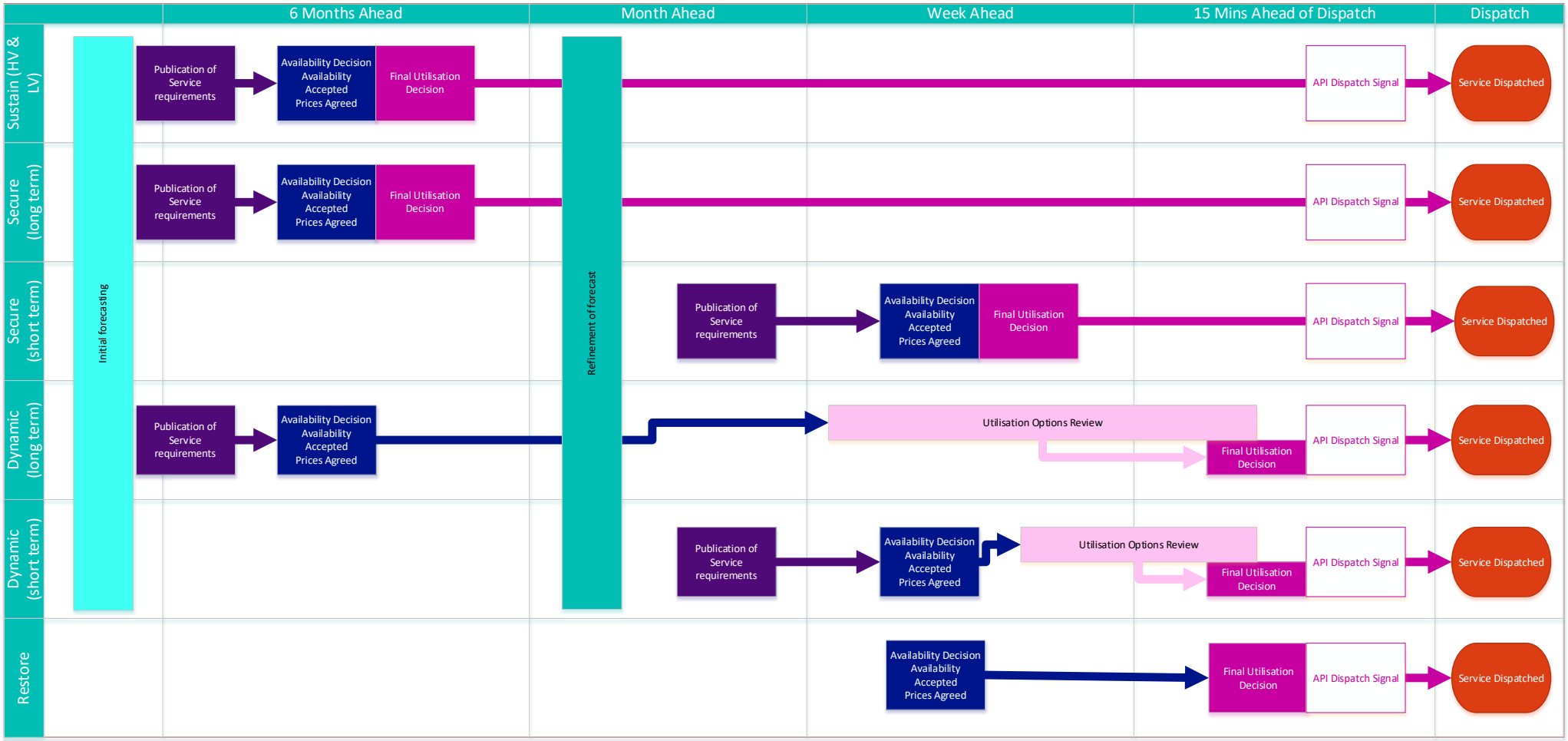
Platforms and Processes

19. Do you agree with our approach for a decentralised, modular set of platforms and interfaces?
20. Have we covered all the relevant capabilities?

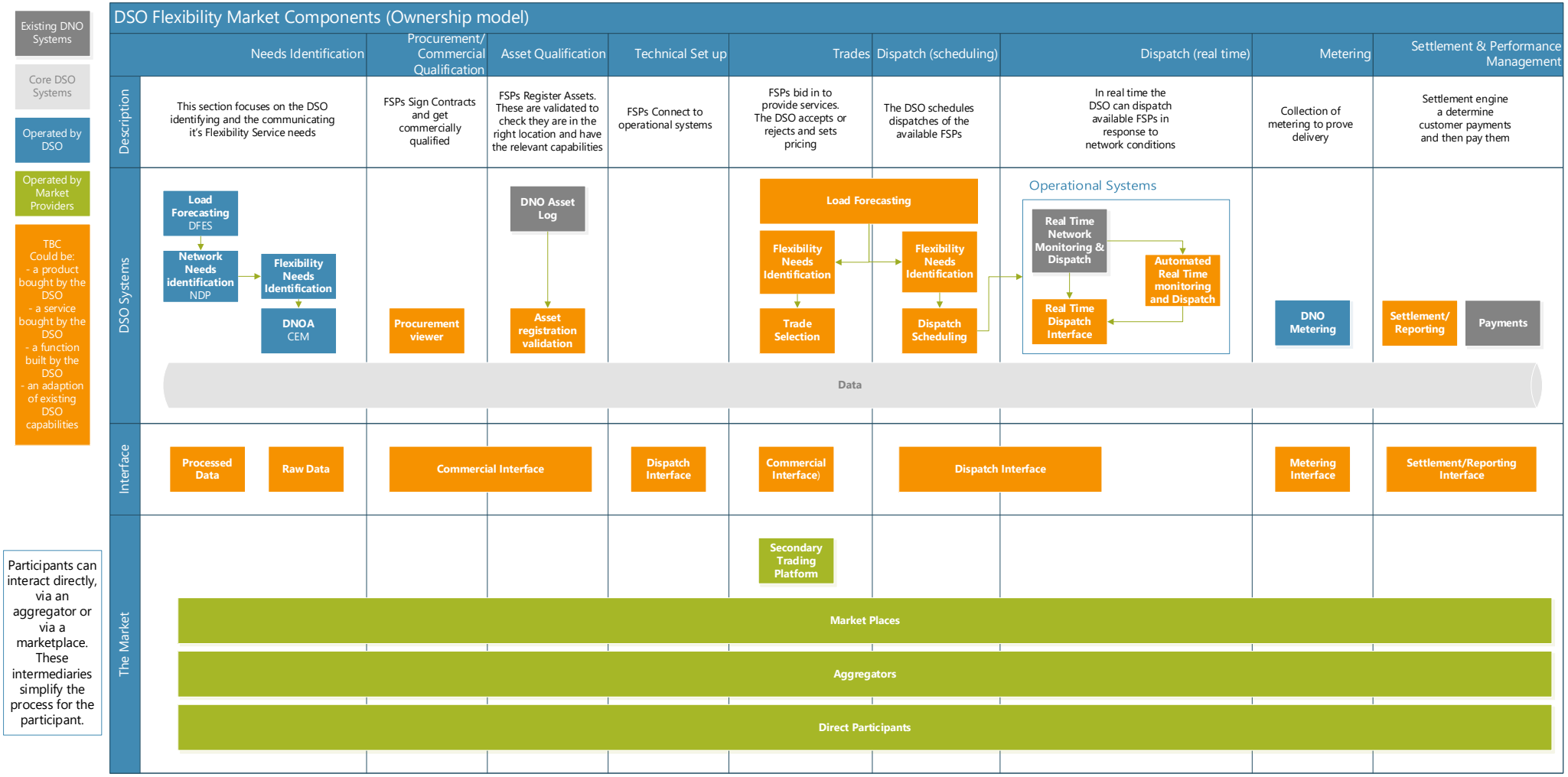
ESO Coordination

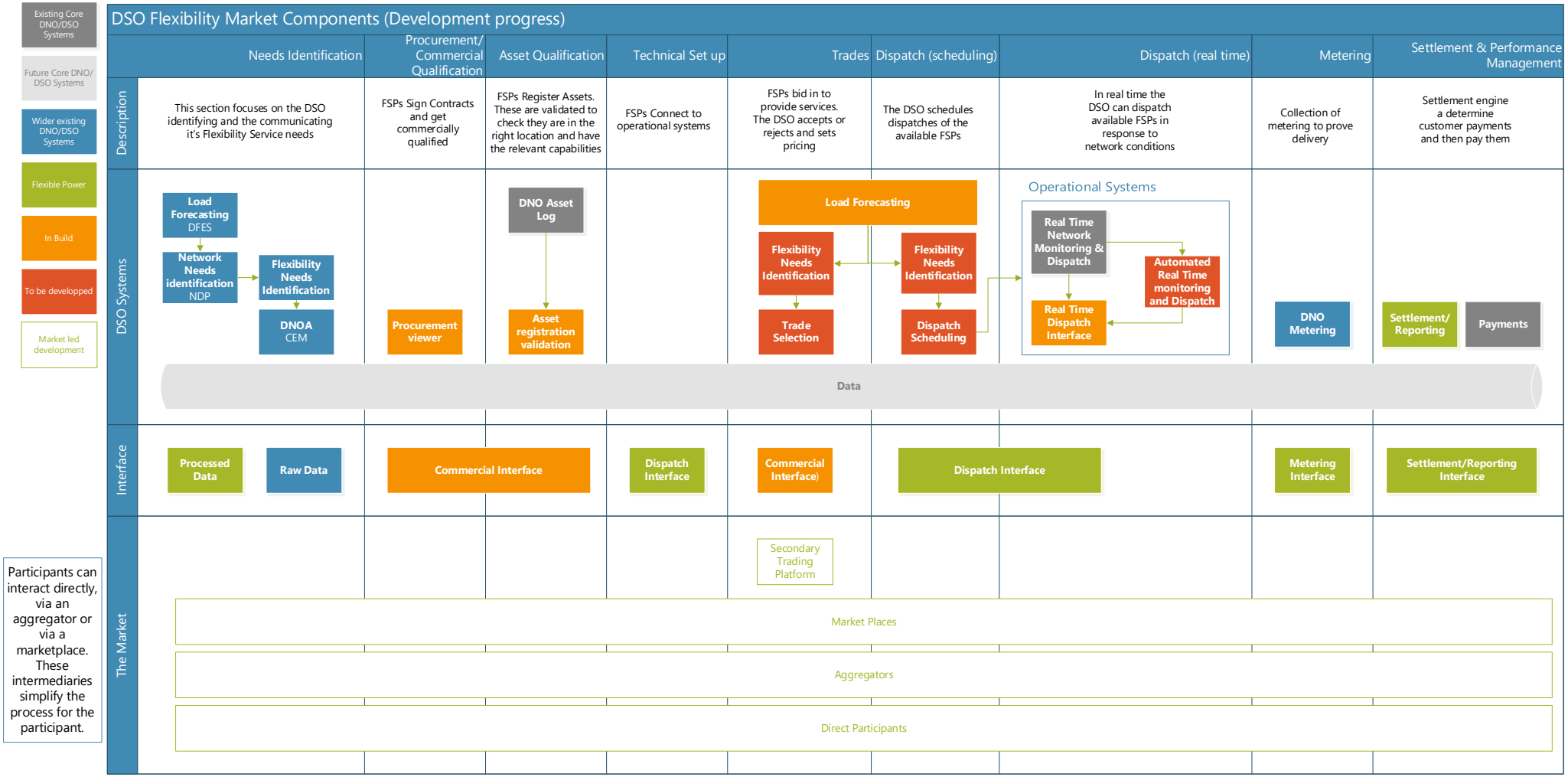
21. Do you agree with our assessment of the different models?
22. Do you see a clear preference in the way forwards?
23. If a more service based approach was needed, how should it be implemented?

Appendix 1: Proposed Products



Appendix 2: DSO Flexibility Market Components




Existing Core DNO/DSO Systems
Future Core DNO/ DSO Systems
Wider existing DNO/DSO Systems
Flexible Power
In Build
To be developped
Market led development
DSO Flexibility Market Components (Development progress)
Needs Identification
Procurement/ Commercial Qualification
Asset Qualification
Technical Set up
Trades
Dispatch (scheduling)
Dispatch (real time)
Metering
Settlement & Performance Management
Description
This section focuses on the DSO identifying and the communicating it's Flexibility Service needs
FSPs Sign Contracts and get commercially qualified
FSPs Register Assets. These are validated to check they are in the right location and have the relevant capabilities
FSPs Connect to operational systems
FSPs bid in to provide services. The DSO accepts or rejects and sets pricing
The DSO schedules dispatches of the available FSPs
In real time the DSO can dispatch available FSPs in response to network conditions
Collection of metering to prove delivery
Settlement engine a determine customer payments and then pay them
DSO Systems
Load Forecasting DFES
Network Needs identification NDP
Flexibility Needs Identification
DNOA CEM
Procurement viewer
DNO Asset Log
Asset registration validation
Load Forecasting
Flexibility Needs Identification
Trade Selection
Flexibility Needs Identification
Dispatch Scheduling
Operational Systems
Real Time Network Monitoring & Dispatch
Automated Real Time monitoring and Dispatch
Real Time Dispatch Interface
DNO Metering
Settlement/ Reporting
Payments
Data
Interface
Processed Data
Raw Data
Commercial Interface
Dispatch Interface
Commercial Interface)
Dispatch Interface
Metering Interface
Settlement/Reporting Interface
The Market
Secondary Trading Platform
Market Places
Aggregators
Direct Participants
Participants can interact directly, via an aggregator or via a marketplace. These intermediaries simplify the process for the participant.

Appendix 3: Ceiling Price Worked Example

See an example of how the ceiling price would be calculated:

	Availability	Utilisation
Current Fixed Price	£5/MW/h	£300MWh
Ceiling Price	£20/MW/h	£300 MWh
Yearly Volume Requirements	200 MW/h	20 MWh

- The current pricing ratio is 0.0167 which should be maintained.
- The current value on offer in the zone is a multiple of the prices and volumes £10k (20*200+300*20)
- An equivalent Unit of Utilisation is the total value divided by the volume of Utilisation : £500/MWh (10000/20)
- To reflect the appropriate value into the components we need to calculate ratio that would be delivered with the current fixed price: 0.143 (5*200/(5*200+300*20)). **This ratio will differ per zone.**
- This can then be used to calculate the Utilisation price (500*(1-0.143)) =£428.8MWh and the Availability Price (when divided by the equivalent volume of availability) (500*0.143/10)=£7.1/MW/h.

The outputs are summarised below.

	Unit of Utilisation	Utilisation Price	Availability Price
Ceiling Price	£500/MWh	£428.8MWh	£7.1/MW/h.

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