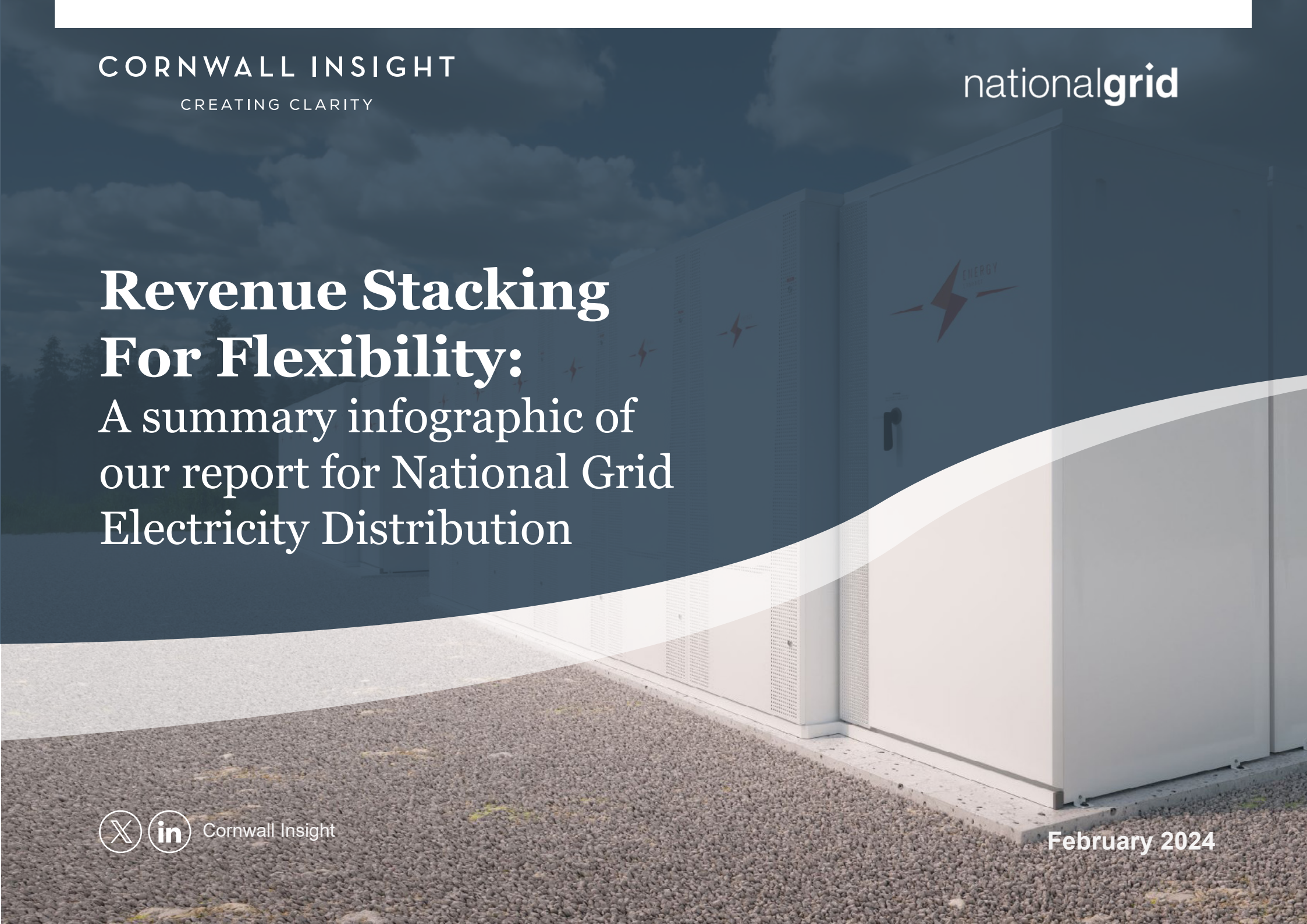
CORNWALL INSIGHT

CREATING CLARITY

nationalgrid

Revenue Stacking For Flexibility:

A summary infographic of our report for National Grid Electricity Distribution



Cornwall Insight

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About Cornwall Insight

Getting to grips with the intricacies embedded in energy markets can be a daunting task. There is a wealth of information online to help you keep up-to-date with the latest developments, but finding what you are looking for and understanding the impact for your business can be tough. That's where Cornwall Insight comes in, providing independent and objective expertise. You can ensure your business stays ahead of the game by taking advantage of our:

- Publications
- Market research and insight
- Training, events and forums
- Bespoke consultancy services

For more information about us and our services, contact us at enquiries@cornwall-insight.com or 01603 604400

About National Grid Electricity Distribution

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, its 6,500 colleagues are committed to providing a safe, stable and reliable electricity supply and ensuring the highest quality of customer service.

About this infographic & engaging with NGED

National Grid Electricity Distribution (NGED) commissioned Cornwall Insight to conduct a review of flexibility services available for distributed assets, with a particular focus on how these services interact: their "stackability".

This summary report provides key takeaways from this review. To see the full review, findings and recommendation, please see the full report here.

NGED welcomes your feedback on our findings regarding the stackability of flexibility services, including any unecessary barriers and any improvements that can be made to support market participants. You can provide feedback via this survey (here), or alternatively contact NGED.flexiblepower@nationalgrid.co.uk.

Summary

Key takeaways from this infographic:

1. **As the electricity system evolves, the system services procured to maintain security of supply are changing and becoming more numerous**
   - Increased decentralisation of generation and flexibility provision from demand-side response mean that services are being provided from a greater number of smaller assets than ever before
   - We count 21 different revenue streams either currently or shortly available to distributed flexibility assets
2. **The interactions between services are varied; some can be delivered simultaneously, others allow splitting of MW between different services simultaneously, and others allow assets to jump between them in different periods. Many do not have explicit interactions**
3. **While good progress has been made by network firms and operators, our key recommendations include:**
   - Ensure that there is suitable guidance and transparency on services, such as whether they are available to assets with non-firm connections
   - Provide visibility of ability to stack services with other services, and whether stacking is an intention
   - Seek to align service windows and procurement timelines where possible
   - Align contractual terms, service requirements, data provision and baselining methodologies where possible

To see the full review of findings and recommendations, see the full report here.

Who are the key actors?

nationalgridESO — National Grid ESO is responsible for planning and day to day balancing of the national transmission system. It is the purchaser of all transmission-level services.

nationalgrid — Distribution Network Owners (DNOs) are responsible for managing the 14 distribution networks. DNOs are increasingly purchasing flexibility from flexible assets to manage constraints on their networks.

FSPs — Flexibility Service Providers (FSPs) include a range of market actors. They provide flexibility and optimise revenues across a range of streams and services.

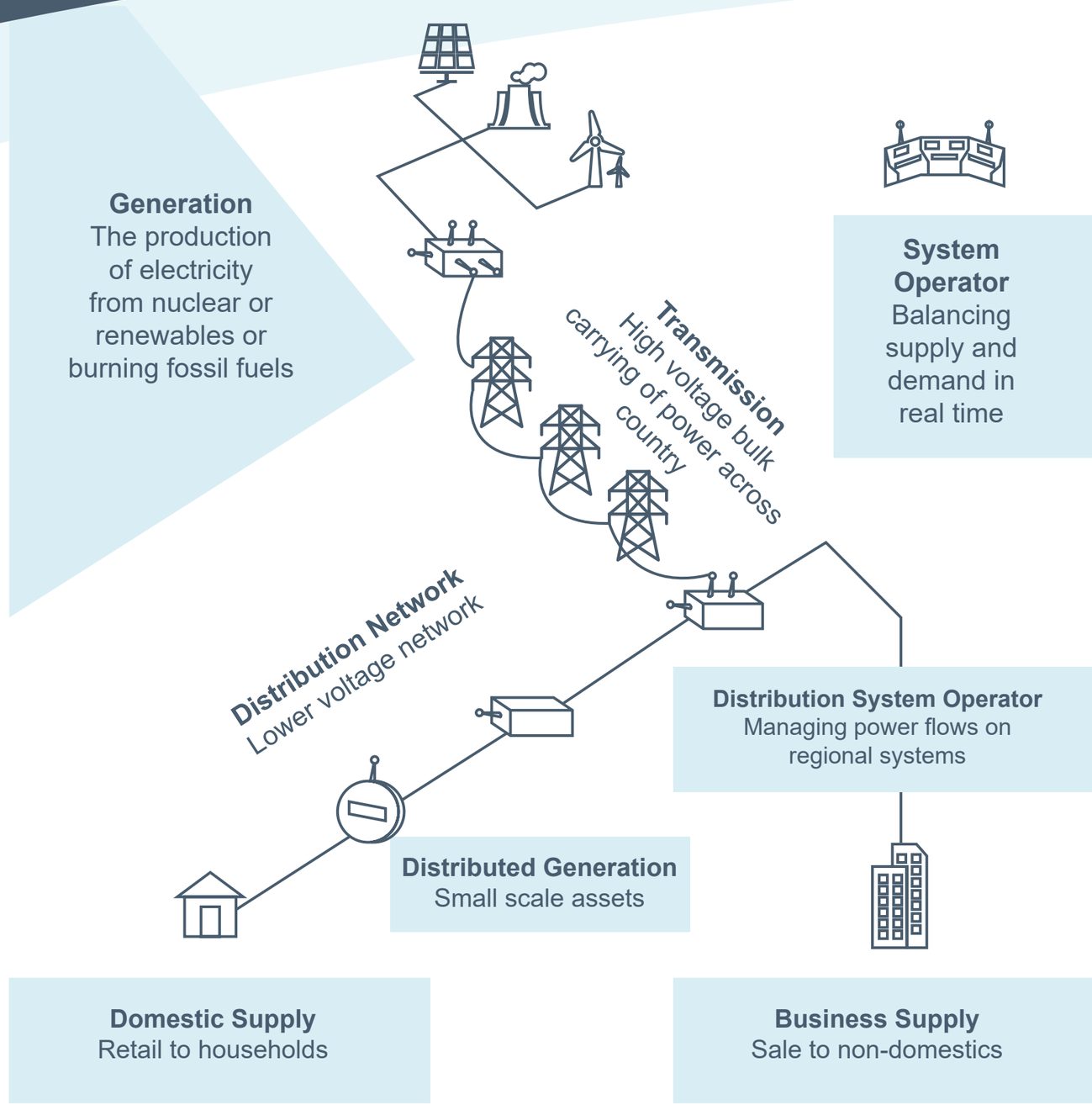
Facilitators — Aggregators/ Optimisers – facilitators who aggregate small assets together and/ or support asset owners in optimising revenue streams. Sometimes identical to FSPs.

Introduction

Changing landscape

- The electricity system is undergoing fundamental transformation
- The traditional model of large centrally connected and controllable fossil fuel-fired power stations is increasingly giving way to a more complex system
- As older power stations are closed and replaced with new wind and solar generation, the carbon intensity of grid electricity is falling
- Assets are typically smaller, more likely to be embedded in the distribution network, and often intermittent in nature. They typically have different routes to market for wholesale power and other services than legacy plant
- To help manage system stability, NGESO is evolving the services that it procures
- DNOs now have a role as Distribution System Operators (DSOs) and procure services from local flexible generation as a cheaper alternative to traditional system reinforcement
- This results in a complex tapestry of different revenue streams available to assets that can change their consumption or generation in response to a price signal

The potential combinations of different revenue streams are vast. Our report describes 21 different revenue streams available or shortly to be available for distributed flex assets.



There are a wide range of different types of service and revenue streams available

Here we provide a summary breakdown of different revenue streams and services, characterised under six themes:

DSO Services – used to manage the local distribution network, and there are a range of planned flexibility, post-fault and pre-fault services that DNOs procure. These are highly location specific in nature, and being increasingly standardised across the DNOs

- Sustain
- Secure
- Dynamic
- Restore

Markets or mechanisms – these include market-wide or near market-wide procurement of specific products or services, including energy, power when required, the ability to support system balancing, or chasing revenues

- Wholesale
- Balancing Mechanism
- Capacity Market
- Net Imbalance Volume (NIV) chasing

Constraint management – these services are relatively new and are used by NGESO to manage constraints on the wider integrated transmission system. Due to their locational nature, assets need to be in the right part of the network to be able to provide these services

- Local Constraint Market
- MW Dispatch Service
- DNO non-firm connections

Frequency response – these fast-acting services are procured by NGESO to rapidly respond to deviations in system frequency. They include the fastest response times on the system and require automation to deliver, provided by batteries and rapidly responding DSR.

- Firm Frequency Response
- Dynamic Containment
- Dynamic Regulation
- Dynamic Moderation

Reserve – these are assets held in reserve by NGESO to manage a sudden mismatch between power generation and demand, such as a large power station tripping off the system. Response times are slower than frequency response, making them suitable for a wider range of assets

- Short Term Operating Reserve
- Slow Reserve
- Quick Reserve
- Balancing Reserve
- Demand Flexibility Service

System security and restoration – services to secure specific network characteristics (e.g. voltage and reactive power levels) and to restart the system in the extremely unlikely event of a national black out

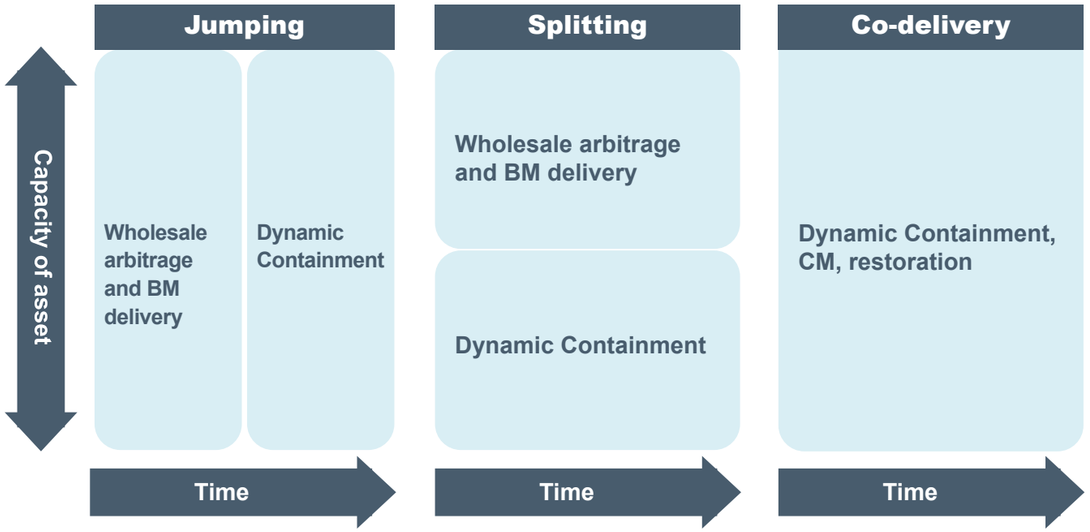
- Reactive Power Services (e.g. Enhanced Reactive Power)
- Electricity Restoration Services (Restoration and Distributed Restart)

Options for stackability of services are typically limited (but improving) and some key barriers exist

In our paper we summarised three different types of revenue stackability:

- **Jumping** reflects moving from one revenue stream to another in adjacent or proximate periods
- **Splitting** involves splitting an asset's capacity across different services simultaneously across the same time period
- **Co-delivery** is, in its strictest form, earning revenue for the same MW in the same direction (increase or decrease in output/ demand)

The graphic below summarises the revenues that are implicitly or explicitly stackable using the three categories above. More detail can be found in the full report.



Key recommendations to overcome highlighted challenges

Since our 2020 report, progress has been made against a number of recommendations:

- Standardisation of DNO T&Cs in flexibility contracts
- ENA's Open Networks programme
- National Grid ESO's review of flexibility and barriers to stacking workstream
- Primacy workstream dealing with conflict resolution

The goal isn't to make every service stackable (and potentially for good reason), as this would be inappropriate for some services. Instead, it is to remove barriers, increase transparency of what's available and enhance understanding for market participants in a more decentralised world.

This would support parties to engage with the full range of services, increasing competition and delivering more efficient outcomes for consumers.

The table overleaf summarises the main challenges and recommendations we have made to overcome these.

Challenge	Recommendation
There is broad uncertainty on whether co-delivery is allowable and an intentional market feature. Concern on this varies between procuring parties.	Make a decision on whether value should be achievable for delivery of multiples services with the same MW. Explore a cost-benefit analysis of explicitly enabling this where both services can be delivered simultaneously with no impact on delivery.
Visibility of the ability to stack services is opaque and unclear. In instances it depends on interpretation of legal text or operational conflicts/ misalignment between services. This can lead to misunderstanding of how services can be stacked and lower liquidity in the marketplace.	Establish cross-service guidance. Establish a regular opportunity for engagement between ESO, DSOs and providers. Information regularly reviewed, updated and put in one readily accessible location online.
Service window timeframes vary between services. Assets jumping between services may lose revenue waiting for new period to begin.	Align service window timeframes where possible. Shortening windows to the lowest common denominator supports jumping.
Eligibility of assets with non-firm connections is not clearly outlined in a number of services. The assumption is that they can enter but will face non-delivery penalties if curtailed. **Where eligibility is clear, requirements are often strict and exclude non-firm connections even if the requirement is likely during times of low likelihood of curtailment.**	Provide clear guidance on non-firm connection eligibility for every service. Enhanced information sharing on curtailment likelihood, supporting procuring entities in allowing service provision when curtailment likelihood is low.
No obligation to continue to consider these impacts or needs for future services or procurement platforms. **This is linked to our first recommendation in that a strategic multi-party approach to flexibility procurement would be beneficial.**	Develop a set of principles in order to maximise liquidity/ stacking in the market vis self-governance. This can be across service terms, data sources, procurement platforms, and include transparency, optimisation etc. Apply them to all new services and interactions being developed.

For more detail and the full list of recommendations, please see the full report at the following link here.

We welcome your feedback on this. To do so please contact NGED.flexiblepower@nationalgrid.co.uk.

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