ESO Demand Flexibility Service
Industry Show & Listen Workshop
8th February 2023

ESO

Agenda

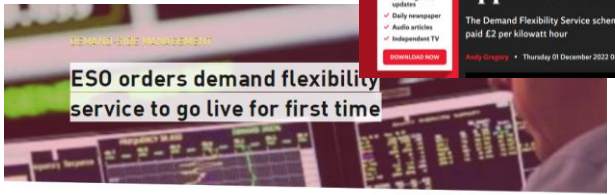
Time	Topic	Presenter
10:00 – 10:30	Arrival – continental breakfast on arrival	
10:30 – 10:45	Setting the scene	
10:45 – 11:00	Industry Feedback so far	
11:00 – 12:15	Event Insights & Flexibility Future Operability	
12:15 – 13:00	Lunch	
13:00 – 13:10	Moving towards next winter	
13:10 – 15:30	Collaboration and future development	
15:30	Close	

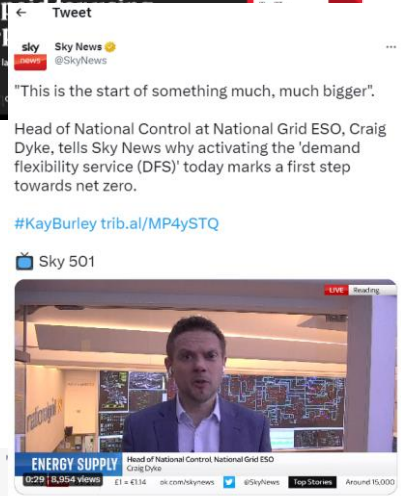
Demand Flexibility Service

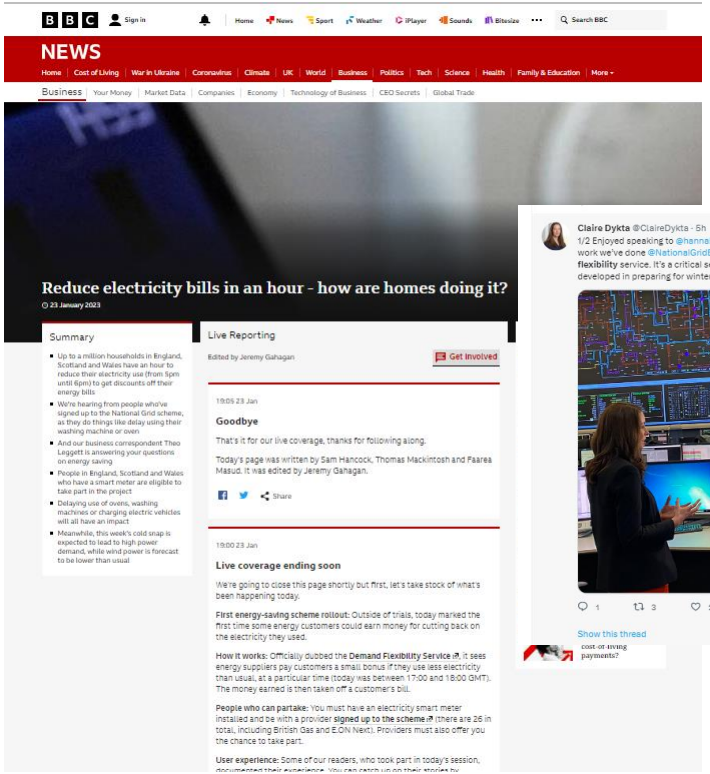
The Demand Flexibility Service (DFS) has been developed to allow the ESO to access additional flexibility when the national demand is at its highest – during peak winter days – which is not currently accessible to the ESO in real time. This new innovative service will allow consumers, as well as some industrial and commercial users (through suppliers/aggregators), to be incentivised for voluntarily flexing the time when they use their electricity.

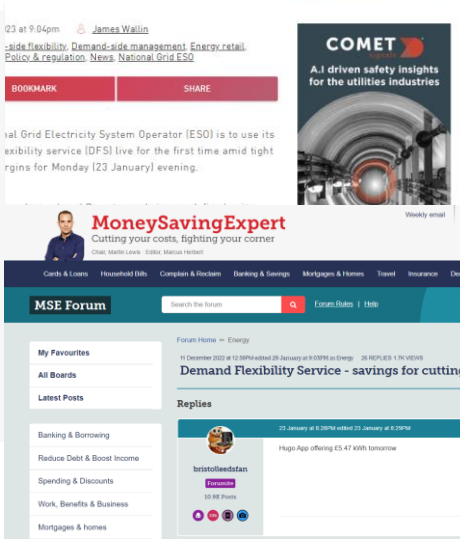
Demand Flexibility Reach

We've had an unprecedented amount of interest from the media

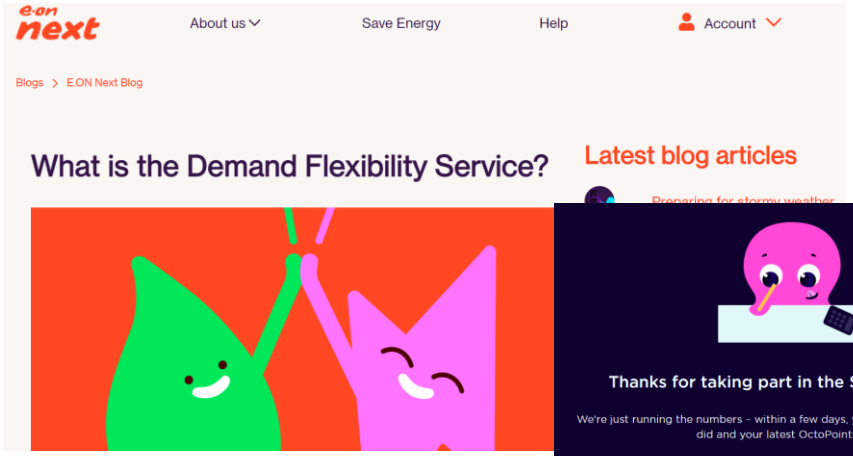


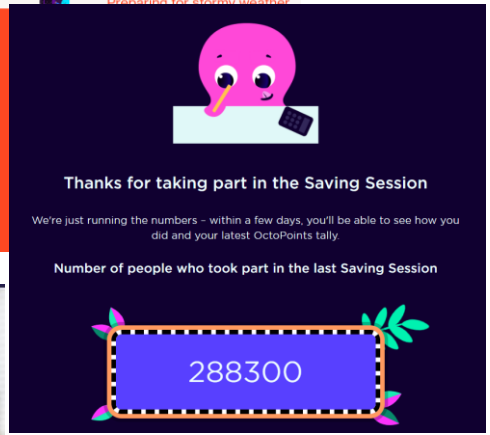


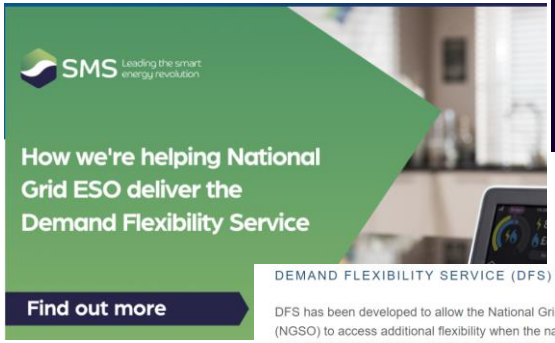




And a big thanks for all the support from our providers too

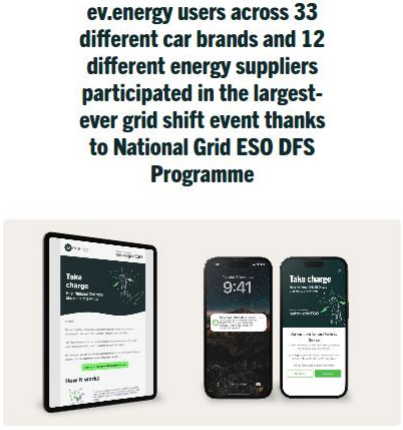


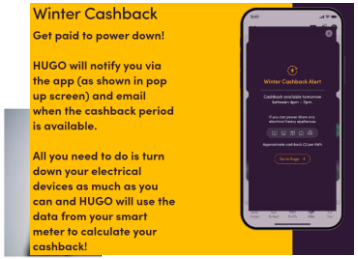


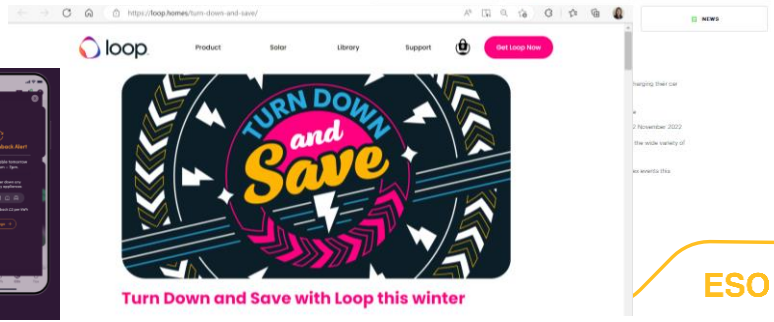


DEMAND FLEXIBILITY SERVICE (DFS)

DFS has been developed to allow the National Grid Electricity System Operator (NGSO) to access additional flexibility when the national demand is at its highest – during peak winter days – which is not currently accessible to the NGESO in real time. This new innovative service will allow residential consumers, as well as some industrial and commercial users via VpowerU, to be incentivised for voluntarily flexing the time when they use their electricity.







What we’ve heard

What we've heard from providers so far

DFS engagement

MPAN checks & process

Baseline Methodology

Revenue Certainty

Customer Communications

What we've heard from providers

"just one MPAN can make a big difference."

"1:1 calls were very welcomed"

"we feel we have had a voice and a point of contact"

"can non suppliers get involved in the EUK working group"

"how will this work with HH settled meters and time of use tariffs?"

"Love DFS (no penalties, day ahead, email, no intrusive metering)."

"we are looking at what product we might do ourselves"

"How do we define who owns the MPAN. Some think it should be whoever had it first and others think it should be whoever had it last."

"can data transfer be done via API with instant validation"

"customers like the fact they are helping the system"

"complicated processes consumers must follow to give consent and the documents to access the data"

"long term flex as automated delivery rather than humans".

What we've heard from consumers

Largely public response has been positive with lots of social media
Direct feedback from consumer enquiries can be grouped in the following areas:

Consumer Participation

- How do I join the service?
- I don't have a smart meter
- My smart meter doesn't work
- It's not fair – everyone should be able to join

Incentive

- How much will I get paid
- Why didn't I save any money
- Why is this not an automatic payment?

Provider participation

- My supplier isn't on the list
- I've not been invited by my supplier
- Why is this not mandatory for all suppliers to participate

Protection

- What if there's a power cut
- Please don't disconnect me I'm elderly/disabled/vulnerable

Evaluating consumer response

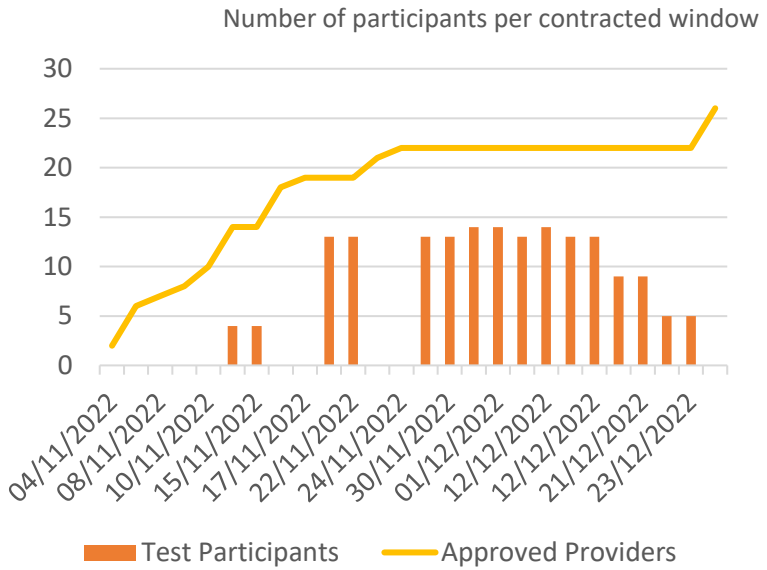
Research is underway to provide valuable insights

- Consumer experiences, motivations, perceived benefits and challenges through the DFS
- Analyse the energy impacts of the DFS
- Explore the relationship between household characteristics and the volume of demand flexibility delivered

Findings published in summer

Event insights

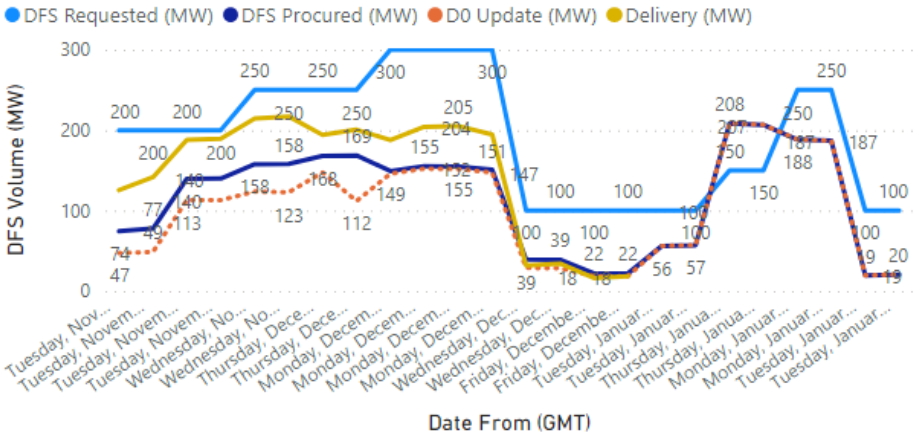
DFS Tests Insights



PARTICIPATION

- Appetite for participation has been high (23 of 26 providers signed up in first two weeks)
- There is ongoing interest from new participants
- Some smaller providers (who can't make 1MW) are coming on board via aggregators but slightly slower to market.
- MPAN numbers have fluctuated significantly, with 1.1m unique MPANs as of 16th January. These figures have been inflated by inclusions of potential customers by providers rather than just those signed up.
- MPAN duplicates have also varied – peak of 6.3k on 25th Nov reduced to 262 on 16th Jan. The number of duplicates has been increased by provider approaches (e.g. using auto-opt ins)
- The ESO has worked with providers on their customer journeys to improve clarity for end consumers - resulting in a reduction in these duplicate MPANs over time

DFS Tests Insights

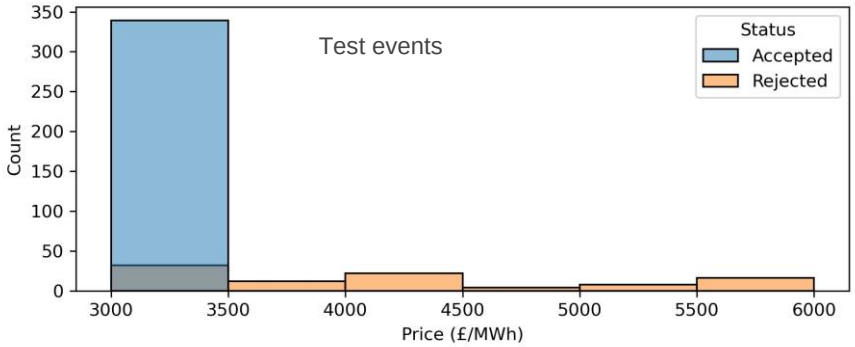


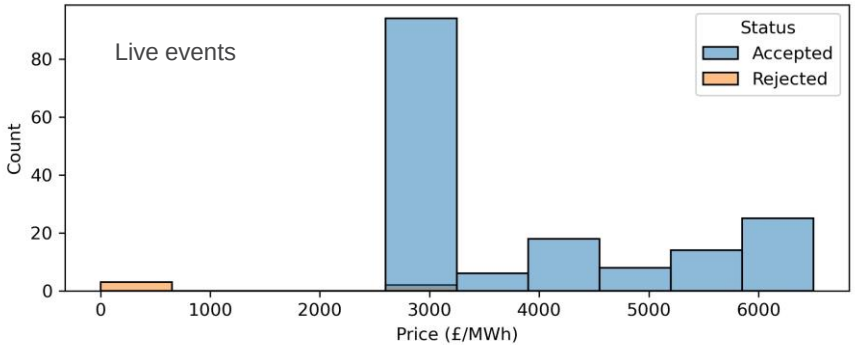
VOLUMES

- Providers have over delivered significantly across the first 6 tests (c38% on average*).
- Over-delivery has reduced over time (c49% Nov to c26% Dec*) as providers learn more about their customers
- End-consumers are additionally reducing their consumption before and after the contracted window**
- End-consumers sustained their reduction over the course of 2-hours in the tests carried out on 12th December.
- Volumes quickly reached c200 MW but have plateaued since 9th Dec

**Tests on the 21st and 23rd Dec were targeted to a subset of providers so have been excluded from this analysis.*
***OFGEM analysis*

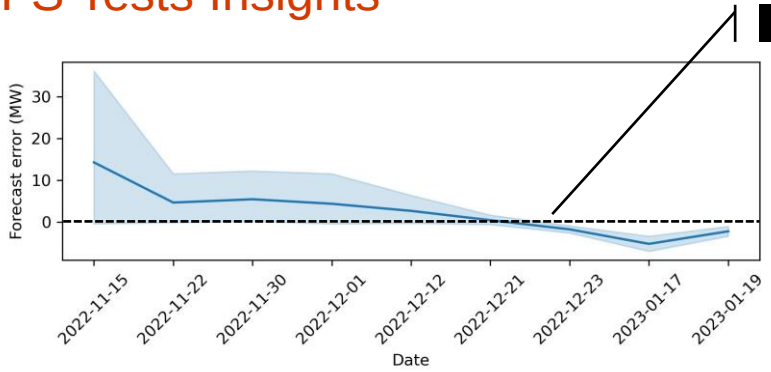
DFS Tests Insights



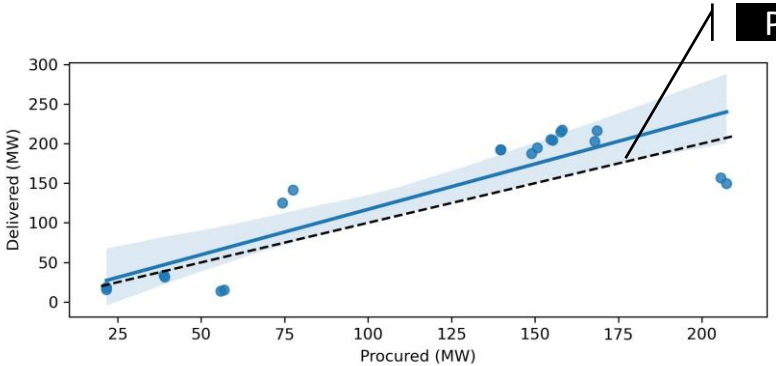


- Figures on the left show the number of bids from DFS Units for each event.
- For **Test events**, only a few providers have submitted prices higher than the GAP of £3000/MWh. For **Tests events**, we could accept units priced higher than the GAP depending on the price of the marginal unit in the BM.
- For **Live events**, we have accepted bids ranging from £3000/MWh to £6500/MWh.

DFS Tests Insights

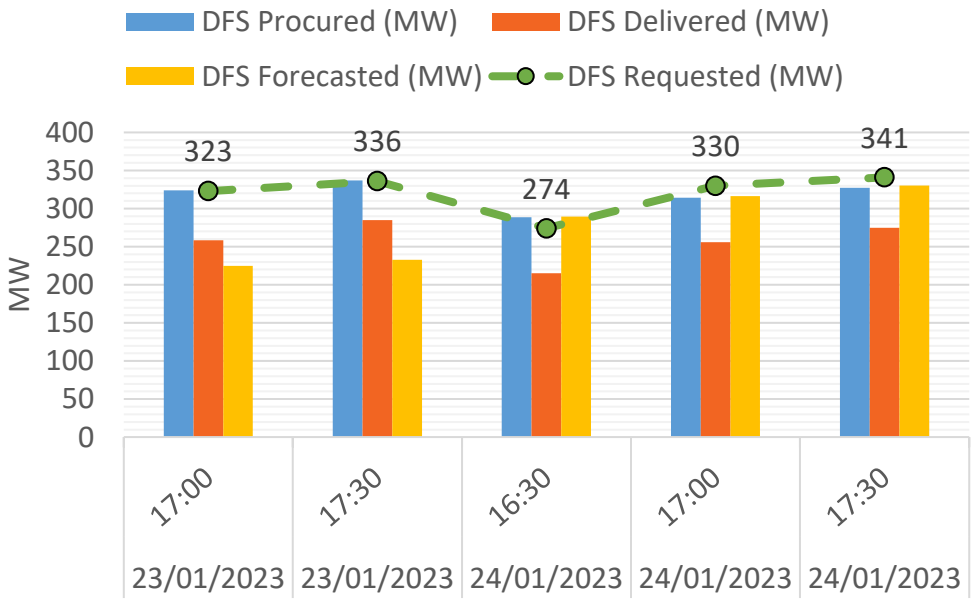


- This figure shows the average difference between forecast and delivery across all units and providers.
- It appears as if the error is decreasing over subsequent test events, however, with the existing data it cannot be established whether it is due to providers having improved their forecast process or due to random fluctuations



- This figure shows the procured vs delivered values for all DFS test events grouped by contracted period.
- There is a slight trend towards over-delivery as most points fall above the dashed line representing a perfect delivery.

DFS Live Activation



VOLUMES

- Combined delivery for the 23rd of Jan was **271.6 MWh** across the period from 17:00 to 18:00. The procured amount of DFS for that same period was **330.3 MWh**.
- Therefore, the ratio of delivery to procured quantities was around 0.82 (or an **under-delivery of around 17.8% with respect to procurement**).
- For the 24th of Jan, the combined delivery was **372.9 MWh** between 16:30 and 18:00. The procured amount of DFS was **465 MWh**.
- Delivery to procured ratio of around 0.8. Or, **under-delivery of 20% with respect to procurement**.

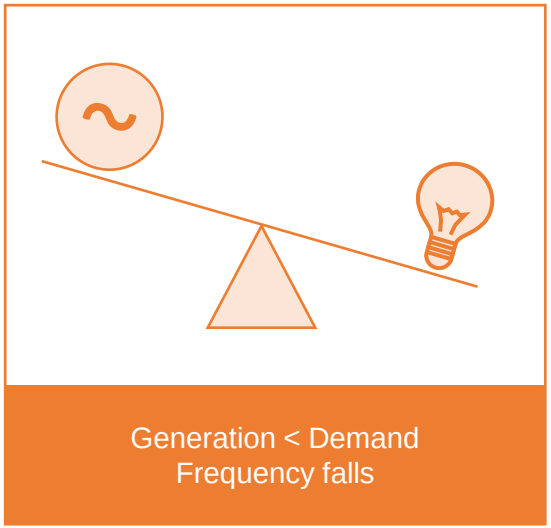
Note: These are preliminary numbers, subject to change.

Next steps beyond DFS for winter 2022-23

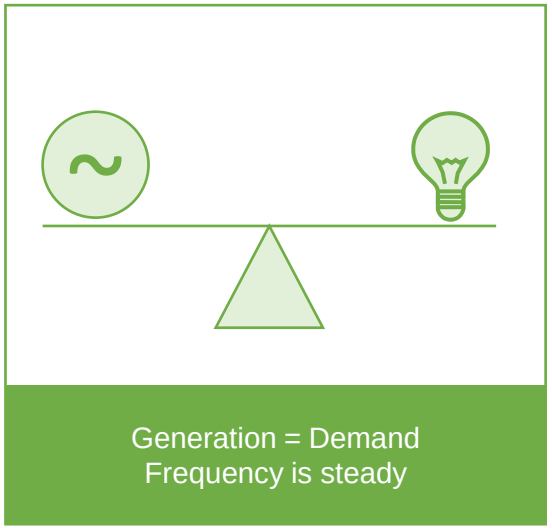
ESO

Energy balancing 101

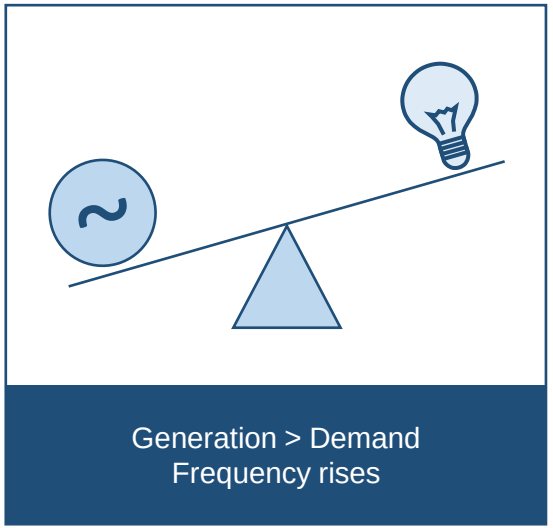
- One of the most fundamental requirements of an electricity system is that supply and demand are always balanced
- For us to achieve this energy balancing we need flexibility, in both supply and demand, adjusting both sides to ensure they always match
- The wholesale market currently provides the majority of system balancing during the day, with the ESO performing the residual balancing and balancing on a second-by-second basis



Generation < Demand
Frequency falls

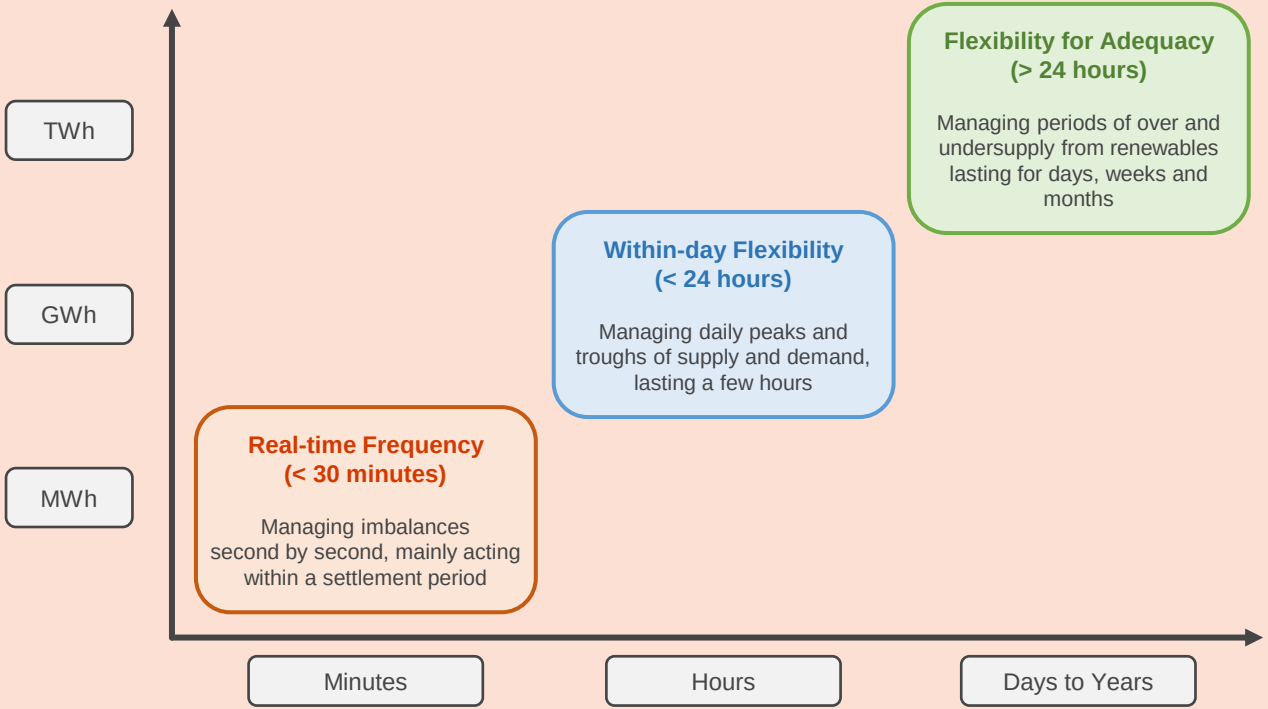


Generation = Demand
Frequency is steady



Generation > Demand
Frequency rises

Energy balancing over different timescales

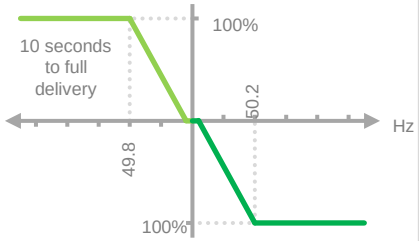


https://www.nationalgrideso.com/research-publications/system-operability-framework-sof

Pre-fault

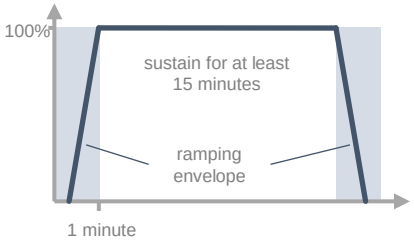
Post-fault

Dynamic Regulation



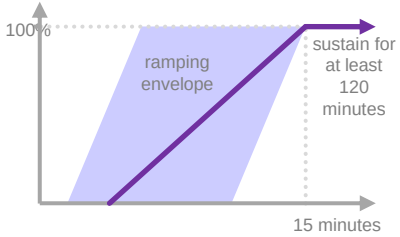
Assist in keeping frequency near to 50Hz during normal conditions

Quick Reserve



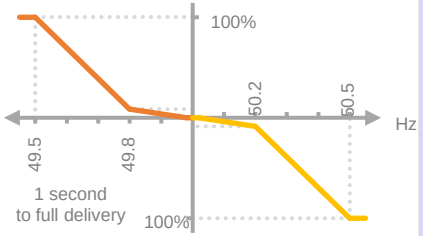
Recovery frequency back towards 50Hz, mainly during normal conditions

Slow Reserve



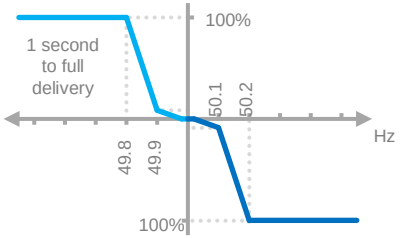
Recover frequency from to 0.2Hz within 15 minutes

Dynamic Containment



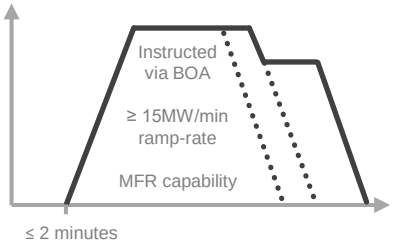
Prevent frequency deviations outside -0.8Hz / +0.5Hz following large losses

Dynamic Moderation



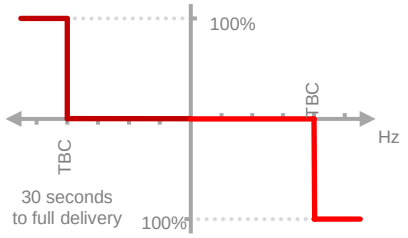
Assist in keeping frequency within 0.2Hz, especially during more volatile conditions

Balancing Reserve



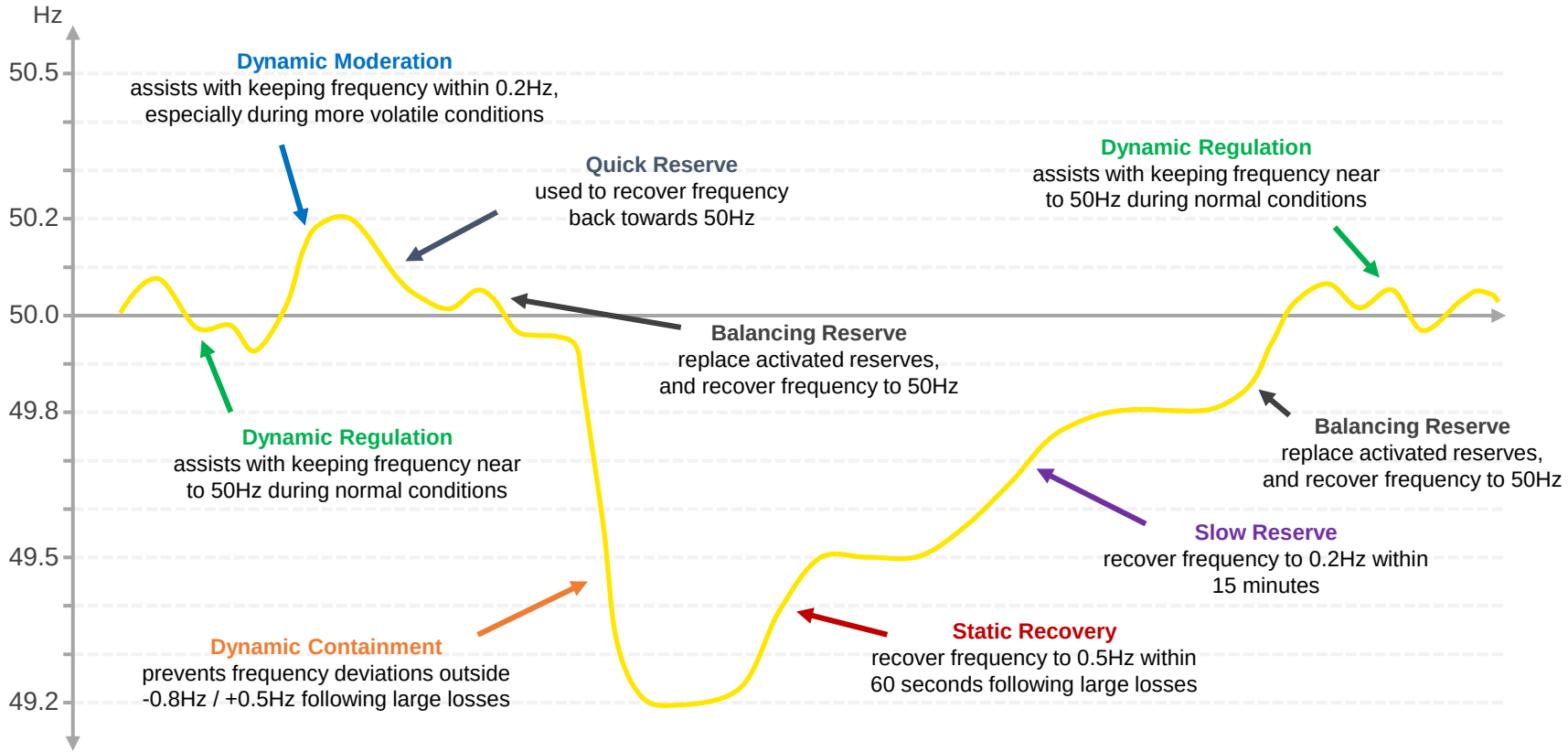
Manage real-time imbalances, and replace activated reserves

Static Recovery



Recover frequency to 0.5Hz within 60 seconds following large losses

Managing real-time frequency



Energy balancing over different timescales

Within-Day Flexibility

- Supply
- Demand

- Means being able to adjust the flexible parts of supply and demand as the inflexible parts vary over the day
- The main source of inflexible, variable supply is wind and solar generation, which is growing as we decarbonise
- Varies through the day based on consumer behaviour
- Some demand is needed at specific times and is largely non-negotiable
    - e.g. cooking and lighting
- Electrification of heat and transport will cause a rapid increase in electrical demand and the parts of this that do not behave flexibly will add to the variability that needs balancing

Achieving zero carbon

- Dispatchable generation currently provides most within-day flexibility
- We will have to replace this fossil fuelled flexibility with new, zero carbon solutions that move supply and demand through time.
- Examples of this include:
    - Shifting Domestic, Industrial and Commercial demand away from higher cost peaks to lower cost troughs
    - Storing excess wind and solar power to use overnight or in still periods

Where can Within-Day Flexibility help?

These are some of our key operability challenges where demand flexibility can play a role:

Peak Demands

Reducing demand at peak times

- The demand peaks last for a few hours and occur day after day, which is an ideal pattern for Within-Day Flexibility.
- Reducing peak demand can also help with other operability challenges; lower daily peaks can make longer duration adequacy challenges easier to manage and reduce the urgency of transmission and distribution network reinforcements

Minimum Demands

Increasing demand off-peak

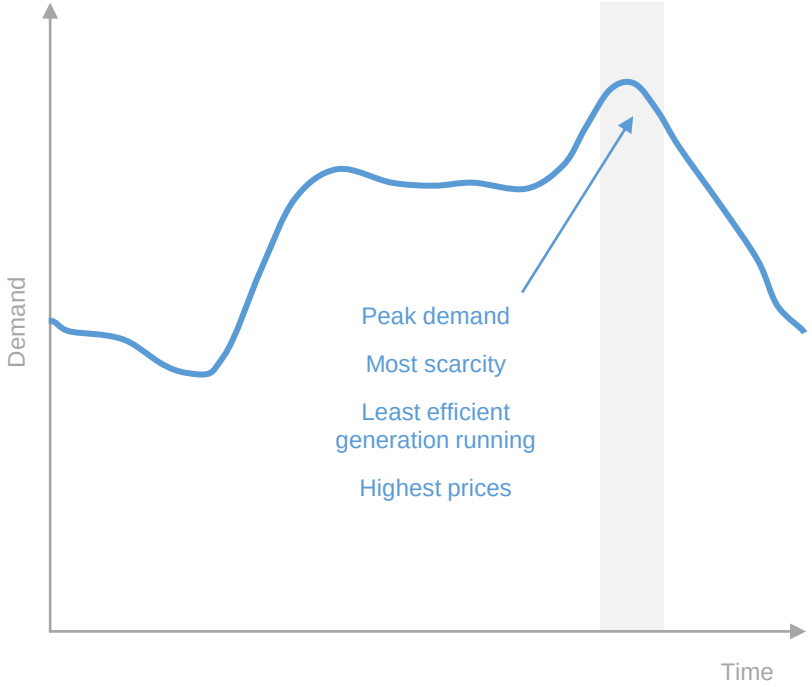
- With solar PV and energy efficiency measures continuing to grow, minimum demands seen on the transmission system will continue to fall.
- When transmission system demand is very low it can cause multiple operability challenges including with reactive power, inertia, and short circuit levels.
- During the summer of 2020, when Covid lockdown took summer minimum demand to previously unseen lows, the ESO had to take actions to ensure the security of the system through curtailment of renewables.

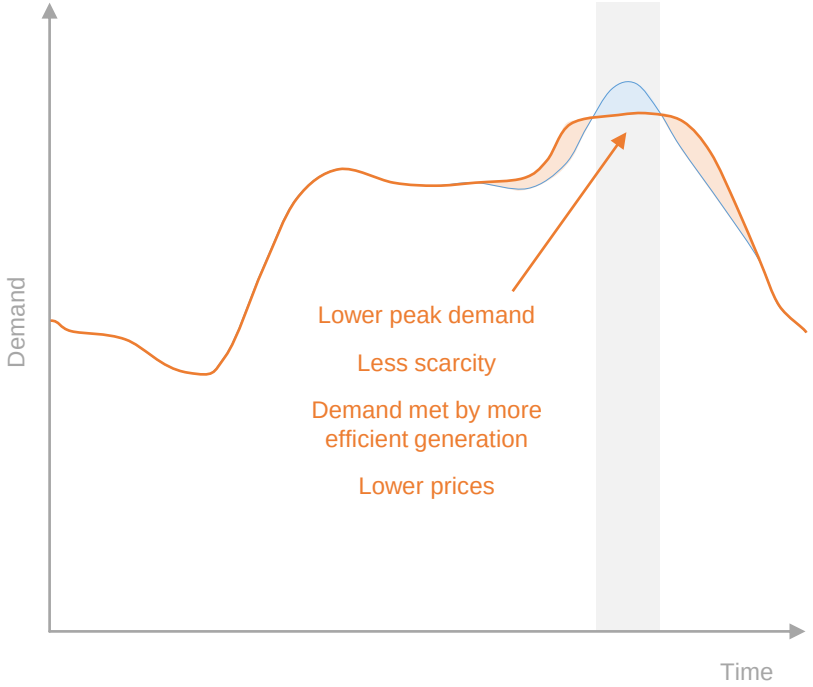
Other areas

Further into the future, operability challenges that Within-Day Flexibility could help with could include:

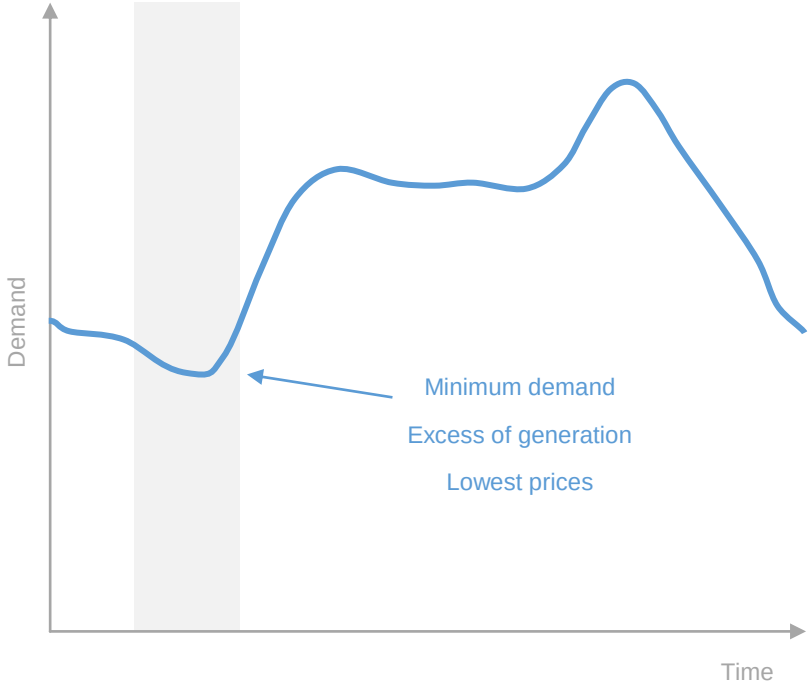
- Following renewable generation through the day to reduce curtailment
- Reducing forecast errors in supply and demand
- Reducing the steepness of supply or demand ramp rates caused by other parts of the system

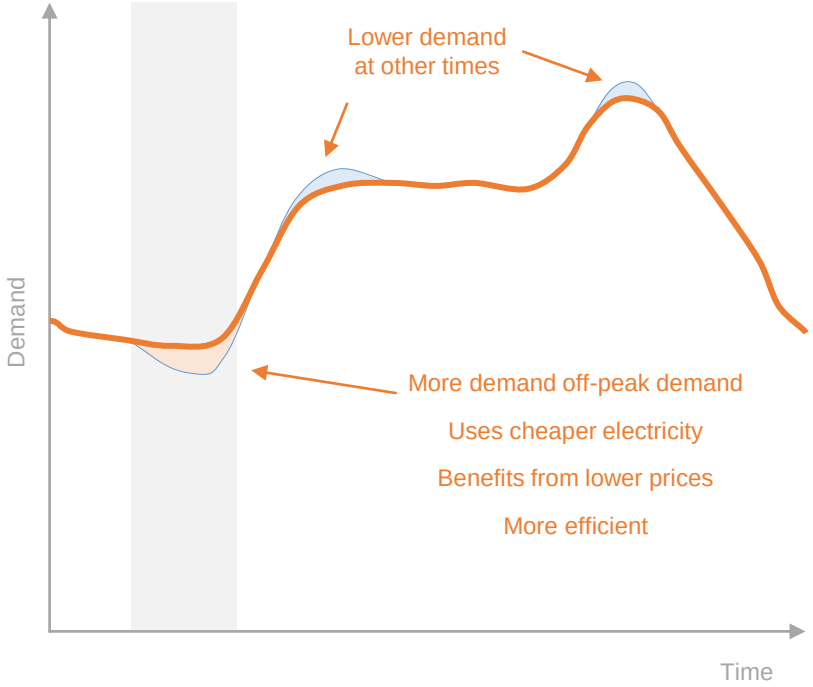
Reducing demand at peak times





Increasing off-peak demand





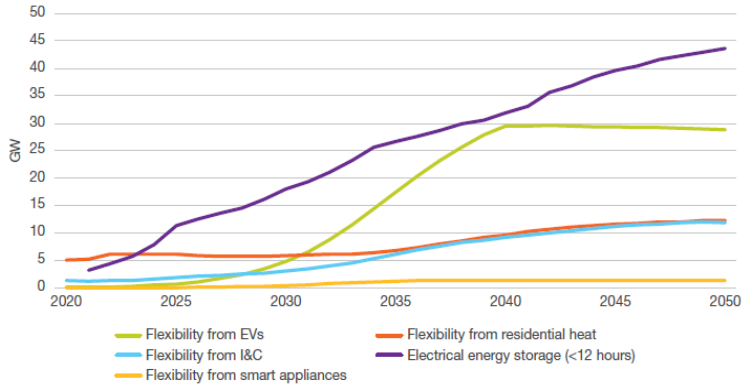
Unlocking Within-day Flexibility

Allowing the market to deliver

- Changes to market arrangements are key to unlocking within-day flexibility
- In the future, we want energy balancing to continue to be mainly delivered by price signals and markets, with the ESO acting as a “residual balancer”

Sources of Within-Day Flexibility growing over time

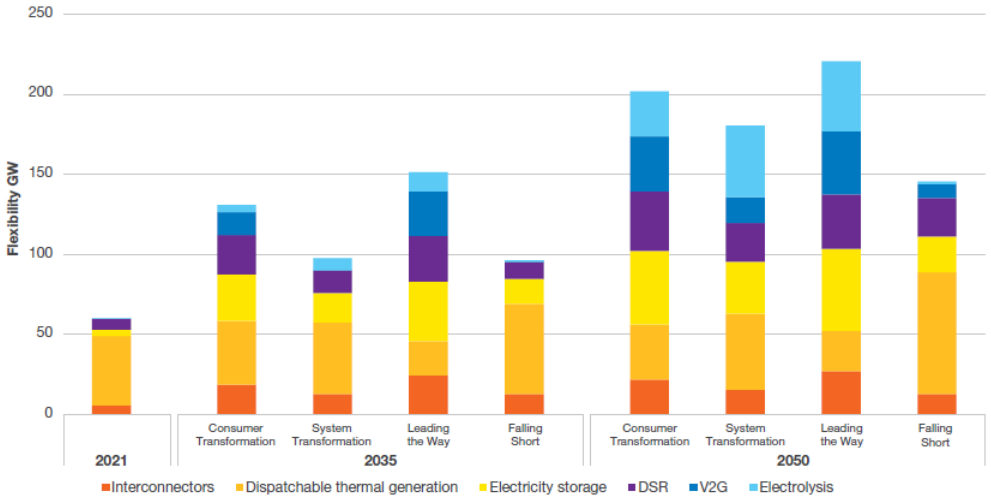
Consumer Transformation scenario



Next steps

Next steps

Sources of flexibility changing between 2021, 2035 and 2050



- The timelines for the market arrangements, consumer incentives, technology roll-outs and data provisioning are not currently clear.
- The system need for this capability might arise before the market is fully able to provide it.
- If necessary, the ESO will bridge gaps between stages by creating temporary alternative mechanisms to help price signals get through to new providers of flexibility.
- We will also continue to run trials so that we, and future participants in flexibility markets, can continually learn, informing more appropriate enduring arrangements.

The recently developed Demand Flexibility Service is an example of this. It creates a price signal for demand side flexibility, allowing the ESO to use capacity that would otherwise be inaccessible, lowering the cost of managing generation margins for system security over the winter.

Where are we now?

Where were we last summer?

- There were risks and uncertainties this winter (2022/23) as a direct result of possible shortfalls in Europe's gas supply
- As a prudent system operator, we are took steps to ensure we were well prepared to maintain safe and secure operation of the electricity system. Those steps included actions to build our resilience and mitigate the potential impact to electricity customers in Great Britain.
- One of those steps was to explore options to incentivise greater participation of demand side response from energy consumers. This would see consumers voluntarily reducing their demand at peak times by using less energy and / or using energy at different times of the day

What was the outlook for last winter?

- Our operational modelling showed that there may be some tight periods that we expected to be able to manage using our standard operational tools.
- As an enhanced action, our new Demand Flexibility Service would allow the ESO to access new flexibility that is not currently accessible through existing services and market incentives, in the event that insufficient upwards flexibility is forecast at the day ahead stage.
- Our requirements paper for overall flexibility (winter contingency units + DFS) showed different scenarios:

Scenario	Number of days with potential requirement	Volume (MW)
Base case	0-5 days	1,000MW (up to 1,500MW)
Scenario 1	10-35 days	2,000MW (up to 5,500MW)
Scenario 2	additional 10-14 days	3,500MW (up to 12,000MW)

Implementation for last winter

- Due to the speed we developed the Demand Flexibility Service, and the maturity of the concept, the service was not setup as an every day action due to concerns on the following areas:
  - Day ahead dispatch
  - User fatigue
  - Non-firm service
  - Market distortion
  - ABSVD imperfections
- We said we would like to continue to develop the benefits we will have created for passive users who have become active participants in the electricity market, and that our ongoing plan will include support accessing our other ancillary services, the BM, and through suppliers.

What is the next stepping stone?

Next winter is already not too far away

- There are both known changes and uncertainties for next winter, such as:
  - Specific impact on peak demand of significant changes to TRIAD charges
  - Introduction of balancing reserve, changing the procurement of reserves and sharpening market signals
  - General changes in demand, including the momentum from this winter's service
  - Availability of coal-fired generation
  - New generation capacity

There's areas we'd like to improve

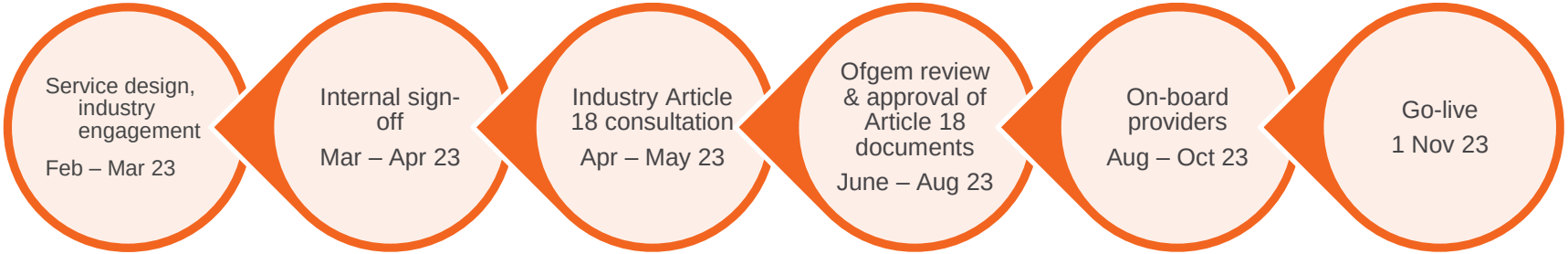
- Due to the speed we developed the Demand Flexibility Service, and the maturity of the concept, the service was not setup as an every day action
- We said we would like to continue to develop the benefits we will have created for passive users who have become active participants in the electricity market, and that our ongoing plan will include support accessing our other ancillary services, the BM, and through suppliers.

And we want your views and input too

- We know that all of the current and potential providers have their own opportunity areas and issues they'd like to raise and address
- This session is the first big opportunity to do that to help set the direction for the next stepping stone

Timelines

What could a timeline look like for next winter?



- Make improvements that we can, develop service design further, industry engagement and co-collaboration – Feb to March
- Final contract documents drafted, consultation documents finalised, internal readiness processes – April
- Industry have 1 month to review and input to consultation - April, ESO 1 month to review responses and make updates – May
- Send Article 18 consultation documents to Ofgem by end of May, they have 3 months to review as per regulatory requirements
- Begin provider on-boarding by end of August 2023 (2 months)
- Service go-live 1 Nov 2023

Lunch

Collaboration Topics

ESO

Future Flexibility - Industry Collaboration

Wider ESO Flexibility Opportunities	Supplier/Market Led Opportunities	DFS 2.0 Evolution	Maintaining Consumer Engagement	Innovative Options Ideal Future State	Regulation Standards Codes Permits
Market opportunities available	Insights and plans from industry	What worked well for DFS 2022/23?	What has worked well to drive engagement?	Blue sky thinking	Blockers for 22/23 participation & delivery?
Barriers to unlock participation	Barriers to unlock progress	What improvements could be made for an enhanced service?	What will drive increased volume? *(incentive, tech, process)*	Innovation linked learning	Unlocking additional technologies & volume
Commercial viability	What value can directly managed flexibility offer providers?	What would a commercial service look like to you?	How do we protect/provide a good experience?	What can ESO do to support?	Future risk & opportunities

Thank you

Please share your feedback or additional comments using the QR code or link: https://forms.office.com/r/Xv7XHDQKKa

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ESO Attendee	Role	ESO Attendee	Role
David Wildash	Market Operations Senior Manager	Michael Coldwell	Market Requirements Future Design & Development Manager
Kyle Martin	Market Change Delivery Senior Manager	Rob Westmancoat	Senior Strategy Analyst
Richard Hanson	Flexibility Services Development Manager	Laura Parkes	Consumer Strategy Manager
Hannah Rochford	Senior Balancing Markets Development Officer	James Kerr	Consumer Strategy Lead
Callum Wright	Power Responsive Manager	Iris Hau	Market Services Senior Contract Manager
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