# DFS Deep Dives

Tue 25th and Thu 27th April 2023

Pre-read materials

ESO

# Information

This document provides pre-read ahead of the deep dive sessions on 25th and 27th April 2023.

The document outlines the process we progressing through for the development of the Demand Flexibility Service, and it covers the context for how we are approaching design proposals and decisions.

This pack discusses the proposals we have developed using the feedback received via the call for input. The deep dive sessions will delve into the proposals developed and look for feedback on these. This further feedback will support us to develop the final proposals that will go out for consultation, collaboration between industry and ESO is key.

## Contents

# Overview

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## Stages of service development

| Initiation | Development | Creation | Consultation | Onboarding | Go-live |
|---|---|---|---|---|---|
| • Review of DFS for winter 2022-23<br>• Kick-off session (Feb ‘23) | • Industry webinar (Mar ‘23)<br>• Call for input<br>• ESO review<br>• Deep dive sessions | • ESO review deep dive outcomes and create service terms for consultation | • Industry consultation<br>• ESO review and update<br>• Ofgem review and approval process | • Provider onboarding | • Service go-live |
| Complete | **Current stage** | April / May ‘23 | 3-4 months | 1-2 months | Aiming for end of October ‘23 |

## Deep Dive sessions

### Session 1 – Tue 09:00 to 11:00

This session will be focused on where we are in the proces of service development, playing back the feedback we received in the call for input, how we will be positioning DFS for winter 2023-24, what we’ll cover in the other sessions, and a Q&A session at the end.

### Session 2 – Tue 14:00 to 16:00

This will be an interactive session focused on the commercial elements of DFS, including: procurement process & timing; tests, including role, mechanisms, number and GAP, and; bid structure, price discovery & payment.

### Session 3 – Thu 10:00 to 12:00

This will be an interactive session focused on the process and operational elements of DFS, including: baselines, metering, MPANs, and automation.

# Call for input

# Call for input

**About**

The call for input was set up to help understand the industry views on the next steps for demand flexibility following the closure of the initial ESO Demand Flexibility Service Winter 22/23

The insights gained from this call for input have been used to develop the demand flexibility deep dive workshops.

A total of 48 responses were collated, mainly via an online form, as well as several offline submissions sent directly.

The main categories of respondents were suppliers, technology companies and aggregators.

Responses were also received from wider market influencers such as the regulator, government bodies, trade and consumer bodies, academia, network operators and generators.

## Priorities

You rated the following topics most highly:

- Baseline methodology
- Driving consumer participation and exploring consumer incentives
- Alignment with Balancing Mechanism & Ancillary Services
- Guaranteed Acceptance Price (GAP) & price discovery
- Event opt-in
- Bidding process & mechanism
- Closer to real-time procurement/dispatch
- MPAN process/duplication resolution
- Process improvements & automation

We will explore this feedback and prioritisation in detail in the first deep dive session on Tuesday, and the summary is included with this pre-read material.

# Role of DFS for winter 2023-24

# Context

## Security of Supply & Winter Outlook

- We expect to publish our Early View for winter 2023-24 by June. This will be published alongside our review of last winter and invite stakeholder feedback through our annual Winter Outlook consultation.
- The Early View will set out our developing view of both system margin and daily operational surplus that we expect throughout winter. It will also set out further details on some of the steps ESO is taking for winter 2023-24.

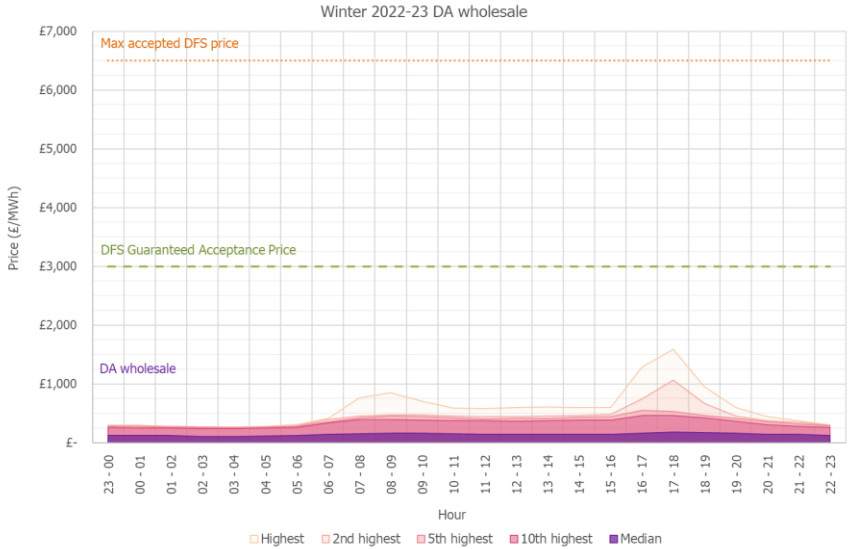
## Growing, learning from, and supporting demand flexibility

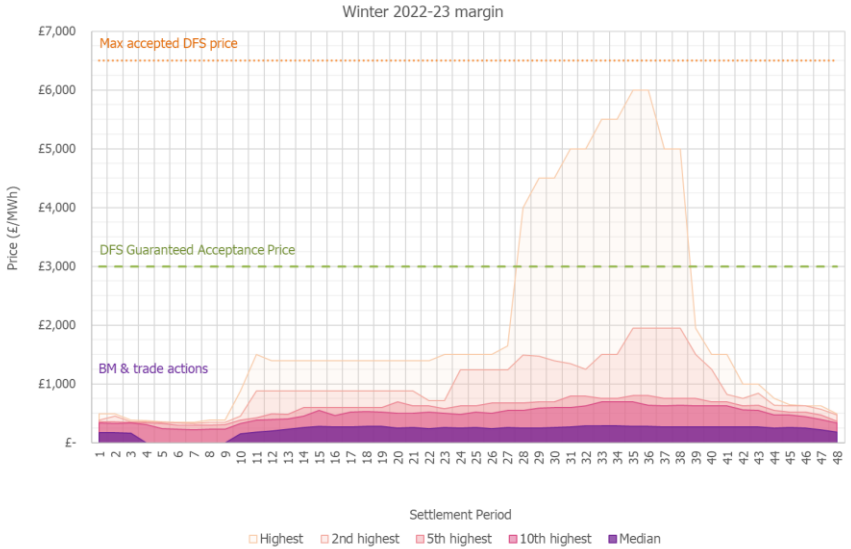
- As well as its primary role providing risk mitigation for security of supply, DFS also marked the first large-scale demonstration of demand flexibility and created good momentum in this arena.
- Ultimately, our Ancillary Services and Market-wide Half-Hourly Settlement (MHHS) will deliver the right opportunities and incentives for providers and suppliers to provide and use flexibility.
- In the meantime, there is a broad consensus across the industry, ESO, Ofgem and DESNZ that maintaining the momentum of DFS is a good thing to do to facilitate this transition and to enable and grow the role of flexibility, while acknowledging that it is still a relatively new and immature service that needs to build for the future and champion and protect end consumers.

## Evolving the role of DFS

- The 2022-23 DFS market was primarily set up to maximise volume for security of supply, with most capacity coming from one provider. That means there has been little price discovery or competition to date.
- The DFS needs to cater for a wide range of total potential supply, both small (a few tens of MW) and large (hundreds or thousands of MW), to make sure the ESO can dispatch how much it needs, when it needs it.
- Prices in the wholesale market and Balancing Mechanism were generally much lower than the £3,000/MWh Guaranteed Acceptance Price in winter 2022-23, and there are questions about the viability of an in-merit commercial service

# DFS vs. BM vs. DA wholesale prices




- Day Ahead wholesale prices have been well below the £3,000/MWh Guaranteed Acceptance Price (GAP) all winter
- Despite this, we have seen other parties pursue their own commercial versions of demand flexibility

- Real-time margin prices have only exceed the GAP on one day this winter (12th Dec 2022), and nine-times in the previous winter
- Typical margin prices have been £250-£300/MWh, around 1/10th of the GAP

# Aims for DFS in winter 2023-24

## Potential aims

- Maximise the volume participating
- Make the service a viable proposition for providers
- Make the service a viable proposition for consumers
- Create confidence on volume that will be delivered
- Maintain confidence on volume that will be delivered
- Confidence in pricing assumptions and price discovery
- Incentivise early entry to market
- Incentivise continued participation in the market
- Test the end-to-end process
- Improve the end-to-end process
- Bridging the gap to Market-wide Half-Hourly Settlement

## Order of Action: Winter 22

| Everyday Actions | Order | Comments |
|---|---|---|
| Reconfigure Transmission Network to reduce network congestion, including: Change substation running arrangements, Tap Quad Boosters, to control flow of energy and Making use of enhanced ratings | Normal operating practice – no cost | Changing daily operating conditions can result in different network configurations to reduce congestion |
| Review and refine reserve requirement within day dependent on system conditions | Normal operating practice – no cost | Changing system conditions can relieve requirements for reserve or increase requirements. This can change at any time as the conditions change. |
| All deliverable Offer action on all available BM participants | #1 based on Cost | Scheduled from Day Ahead, action taken in real time – some offers may not be available due to networkcongestion |
| Issue warming instructions to cold BM participants including Winter Contingency units | #1 based on Cost | Scheduled from Day Ahead, action taken in real time |
| Buy energy from continental Europe | #1 based on Cost | Scheduled from Day Ahead, action taken from Day Ahead to 4hrs ahead of time by ESO Traders |
| Reconfigure CCGTs to increase available energy (e.g.sync additional GTs) | #1 based on Cost | Scheduled from Day Ahead, managed within the control timescales within day |
| SO-SO trade in cost order | #1 based on Cost | SO to SO trade with other SO in Europe/ Ireland |

| Enhanced Actions (if everyday actions are insufficient) | Order | Comments |
|---|---|---|
| Recall TO assets from outage to increase network availability and increase available capacity | #2 | Anytime through to control room timescales, depending on ERTS (Emergency Return to Service) time |
| Plan use of Emergency Assistance (EA) from other SO | #3 | Enacted close to real-time. Only applicable if capacity is available on interconnectors. EA can be withdrawn at any time |
| **Instruct Demand Flexibility product** | **#4** | **Decision made at timescales as determined by product created (instruction at 24 hours)** |
| **Instruct Winter Contingency Units** | **#5** | **Decision made at timescales as determined by dynamic parameters (warming at 12-48hrs)** |

| Emergency Actions (if enhanced actions are insufficient) | Order | Comments |
|---|---|---|
| Emergency Instruction (EI) to other SO | #6 | including MaxGen |
| OC6 demand control instructions to DNOs | #7 | This could be via voltage control or demand control (disconnecting customers) |
| Recommend to BEIS to implement ESEC | #8 | Ongoing conversations prior to this so all parties would be aware of risk |

| Notices are issued at any time as required | Comment |
|---|---|
| Issue Electricity Margin Notice (EMN) | Request to market to increase available energy or reduce demand. Likely to be issued at Day Ahead. Updated regularly |
| Issue a High Risk of Demand Reduction (HRDR) system warning | Warning network operators of high likelihood of demand control. Further request to market to increase available energy or reduce demand. Closer to real-time than ENM |
| Issue Demand Control Imminent (DCI) system warning | If possible, this system warning will be issued 30 minutes prior to demand control. Warning to network operators |
| AUTOMATICALLY TRIGGERED: A Capacity Market Notice (CMN) is automatically triggered to alert CM participants | Driven by calculation of Market data at 4 hours ahead of real time |

## Relative importance of each aim

We are deliberately building in flexibility to the service terms and processes so that we can use DFS to best meet these aims, particularly the balance between maximising volume and price discovery. We will publish final details on how and when we expect to use DFS at the time of the Winter Outlook Report.

## DFS for winter 2023-24

We propose that DFS should continue as an enhanced service for winter 2023.

This will allow us to deliver both test events and, where necessary, live events. By doing so, we can continue to learn about demand flexibility, incentivise new demand flexibility, and help to bridge to gap to Market-wide Half-Hourly Settlement and entry in to our Ancillary Services.

# Commercial proposals

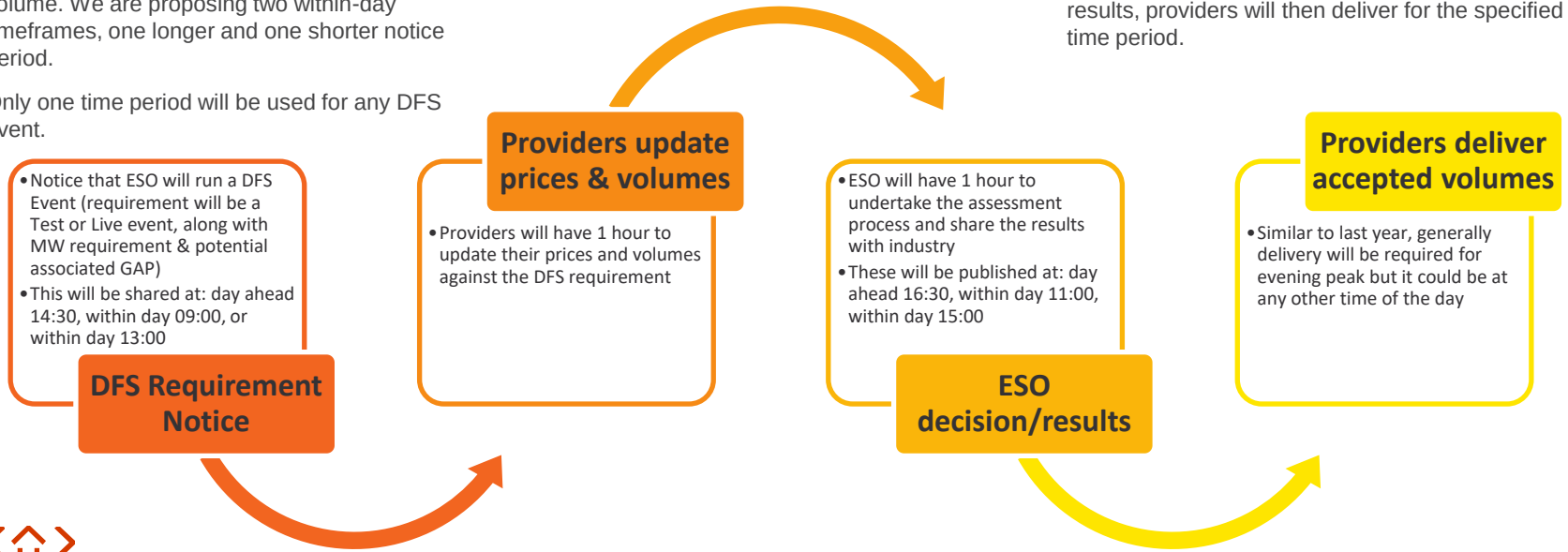
# Procurement process & timing

## Timings

ESO's ambition for the DFS is to move the service closer to real time as it provides us with significantly greater operational certainty.

We are proposing to have 3 procurement periods that allow flexibility on when the service is called. We will continue to have a day ahead option as feedback identified this would provide most volume. We are proposing two within-day timeframes, one longer and one shorter notice period.

Only one time period will be used for any DFS event.




## Process

The proposals for the procurement process are small changes to enable the added flexibility the procurement timeframes give us.

A notice will be given, similar to this year, that ESO is going to procure the DFS, which will set out the requirement (is it a test/live event, what is the MW requirement, any associated price). Same as last year, providers will submit their bid (price & volume), ESO run the assessment and publish the results, providers will then deliver for the specified time period.

# Tests: role, mechanisms, number and GAP

## Role of tests

Tests are used by:

- **ESO** to gain confidence that participants can deliver the service.
- **ESO** to get an accurate estimation of how much demand can be reduced on a live event.
- **ESO** to discover the price that different providers have to reduce demand at different times of day, days of the week, etc.
- **ESO** to understand impacts of dispatch time on volume level.
- **Participants** to gain confidence in their delivery of volume (checking their systems/processes/portfolios etc).
- **Participants** to ensure that they can recover the costs to set up the service.
- **End consumers** to engage with flexibility first hand.
- **OFGEM** to get data to derive policy and other services.

## Test mechanisms

Remove onboarding tests, tests are available to all providers onboarded. Mock events run during the onboarding stage.

**Test vs Live events:**

Live events – may be called at the different procurement times dependant on certainty of requirement.

ESO will use test events to:

1. Explore the impact of dispatch timeframes on provider volume.
2. Investigate price discovery by procuring partial volume against full available volume.

Tests may be different durations.

## Number of tests

Depending on whether the service leans towards **price discovery** or **volume maximisation**, the expected number of tests will vary.

It will be key to balance any live uses of the DFS alongside the number of tests.

## Guaranteed Acceptance Price (GAP)

Proposal is to continue to have a GAP for tests that trial the different dispatch timeframes – this would be published alongside a notice of a DFS test event and volume requirement.

No GAP for those tests aimed at price discovery.

Proposals for how a GAP could be set:

- The BM marginal price or the wholesale price, whichever is highest.
- Or, depending on outputs from the Winter Outlook there may be a requirement to set a higher GAP, similar to year 1 (£3000/MWh)

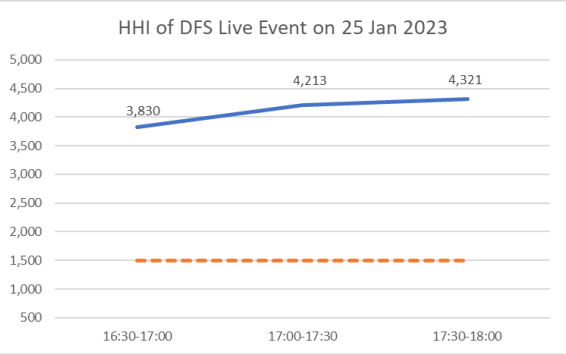
Stakeholder have also raised that near-term prices for demand flexibility need to avoid setting a false expectation for enduring prices.

# Bid structure, price discovery & payment

## Payment mechanism

Analysis of the two live DFS events shows that the Herfindahl–Hirschman index (HHI) for DFS is very high, well over the 1,500 concentration level that would indicate the potential for anti-competitive behaviours and gaming.

Pay as bid is proposed to continue as the preferred payment mechanism given the relative concentration of the market participants.




## Bid structure

The key element we want to get from the bid assessment is some price discovery. Each provider has their own incentive offering with their consumers, this impacts the ESO's ability to understand consumer price elasticity for demand flexibility.

As a way to further gather data and understand consumer willingness to participation dependant on the reward received for their demand flexibility, proposal is to require providers to share the information on what incentive/reward they give to their customers for each event. This would be treated as highly confidential and only for ESO, and potentially Ofgem.

| | **Same MPAN in multiple units** | **MPANs mapped 1:1 with units** |
|---|---|---|
| **Non-mutually exclusive bids** | Option 1: No change to bidding structure. (ESO preferred option) | Option 2: Continue to have non-mutually exclusive bids however, MPANs must only be part of one unit and cannot be across multiple units. |
| **Mutually exclusive bids** | Option 3: Allow mutually exclusive bids, only one unit can be accepted from each individual provider, so there would be no requirement for MPAN allocation across units. Ability to have curtailable bids. | |
| **Non-mutually exclusive bids & Mutually exclusive bids** | | Option 4: Ability for the provider to decide how they bid (ability to have both mutually exclusive and non-mutually exclusive bids), however MPANs have to be allocated to specific units ahead of the bids. |

# Performance incentives

## Proposal for winter 23/24

No change. Payment for delivered quantity. No penalties or performance incentives for under or over-delivery. Removal of MPANs from settlement that did not provide demand reduction.

## Considerations for future iterations

Over-delivery:

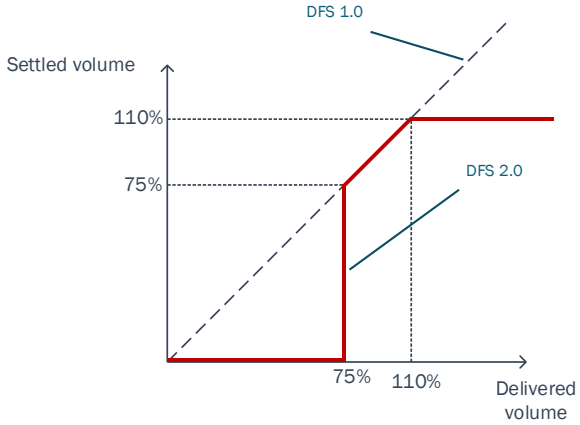
If a provider has under delivered, they are still paid for their delivery as they receive a lower revenue anyway. However, if they have over delivered, it is capped at a certain level, for example, 150%.

Include all MPANs, regardless of delivery:

Pay for actual delivery. However, all MPANs that have either opted-in to the event or not opted-out must be included within the settlement file, including those that increased consumption. This will then account for those MPANs that net out the impact of the required demand reduction.

Under- and over-delivery:

Floor for large under-deliveries and ceiling for over-delivery as shown in the figure to the left. For example, any delivery less than 75% will not be settled and delivery above 110% will be capped at 110%.



# Process & operational delivery proposals

# Baselines

## What did we want to achieve with the DFS?

We wanted to reduce demand to be below what it would otherwise have been, at certain times when normal commercial actions would not be sufficient to meet our total requirements to cover demand and upwards margin.

This is most likely to be over the darkness peak (DP) in the early evening on weekdays, typically between 5-6pm.

## How did aim to DFS do this?

Broadly speaking, the DFS paid people money to use less demand at certain times.

## How was the reduction in demand determined in DFS?

The end consumers actual demand is measured relative to a baseline, with the difference between the baseline and actual being credited as their delivery.

The baseline is calculated as the end consumer's average usage over the previous 10 working days (or 4 weekend days, as applicable).

For domestic consumers, an adjustment is made to the baseline to account for the effects that things like changes weather have on their demand from day-to-day. This within-day adjustment is based on the difference between their usage in the period from 4 hours to 1 hour before the delivery period, and the average usage over that same period on the previous 10 working days.

The baseline methodology is based on the P376 baseline methodology to allow a Virtual Lead Party of the Secondary BM Unit, or Supplier for an Additional BM Unit to determine the expected energy flows for a Metering System Identifier (MSID) Pair in the calculation of Non-Delivery Charges and Delivered Volumes.

## What are the issues with this approach?

Providers have highlighted that the current baseline methodology, combined with some other key factors, creates some perverse incentives for end consumer behaviour, or other ways that the service is ineffective. The other factors include:

a. The time at which DFS is needed is quite easy to predict

b. The unit rate for non-HH settled end consumers, which make up most of the volume, does not vary based on the time of day

## What did we hear from the call for input?

There is a general consensus to removing the within day adjustment for consumers to avoid potential for gaming, customer confusion and onerous data provision.

Another option is to change the adjustment period to before consumers are notified of an event or use a longer baseline assessment period.

# Baselines: options

## Option 1: remove in-day adjustment

Keep P376 Baseline methodology, but remove the within-day adjustment.

This is because the in-day adjustment has the potential to incentivise gaming by the end consumers. If end consumers know an event is scheduled well in advance, then they can increase their consumption in the adjustment period (three hours before the event). This would raise their baseline and consequently, increase their delivery (and revenue) for the same measurement.

## Option 2: adjustment period before the service notification

In-day adjustments could be maintained if the end consumer is notified of the event window after the in-day adjustment period, thereby minimising their chance to game it.

For example, if there is an event at 17:00 the in-day adjustment period goes from 13:00 to 16:00. Therefore, if the end consumers are notified after 16:00 they would have no way to change their behaviour to affect the baseline.

However, by giving consumers such short notice, their capacity to deliver DFS would be affected, and based on other feedback this is likely to be too short a leadtime for winter 2023-24.

Alternatively, the in-day adjustement period can be moved forwards. For example, if the notice is a 12:00, the adjustment period could be 08:00 to 11:00.

## Option 3: longer adjustment period

Change the within-day adjustment period to make it longer, e.g. 10 hours.

This would make it less attractive to game, as you would need to spend more money on the adjustment that you would stand to gain by gaming.

For example, in 2022-23 the typical retail energy price was around 34p/kWh, whereas the DFS GAP was £3.00/kWh. This means that it would cost £1.02/kWh (3 x 34p) for and end consumer to increase their baseline, for a net reward of £1.98/kWh (£3.00 - £1.02) over a 1hr delivery period.

If the within-day adjustment period was longer (and/or if competition made DFS prices lower, e.g. £1/kWh), this would remove the gaming incentive: 10hrs x 34p/kWh = £3.40/kWh baseline change vs. £1.00/kWh reward, which would represent a loss.

## Option 4: no change

Keep the current implementation.

# Metering

## Understanding the goal of DFS and its evolving role, Metering will play a key role to achieve :

- Security of Supply creating the **right** signal, opportunities and incentives for providers and suppliers to provide and use flexibility.
- Measurable demand flexibility at the time that we request this.
- Data at a half-hour resolution via granular metering .
- Alignment to Net Zero targets and Environmental regulations.
- Accurate remuneration of flexibility delivered.
- Realistic and ambitious metering solutions within time frames.

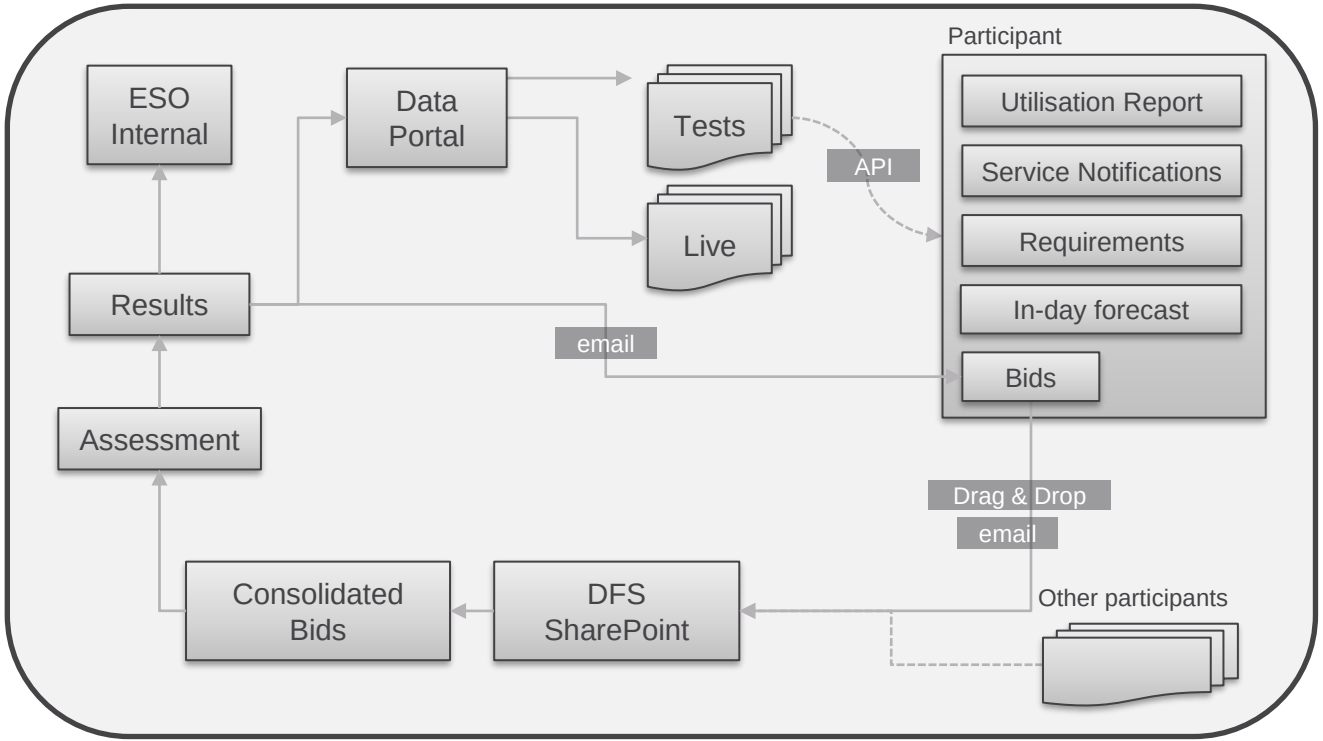
**Smart Meters**

**Boundary Meter**

**Demand Reduction capped at zero for Industrial & Comercial customers**

**ABSVD adjustment for HH Settled volume**

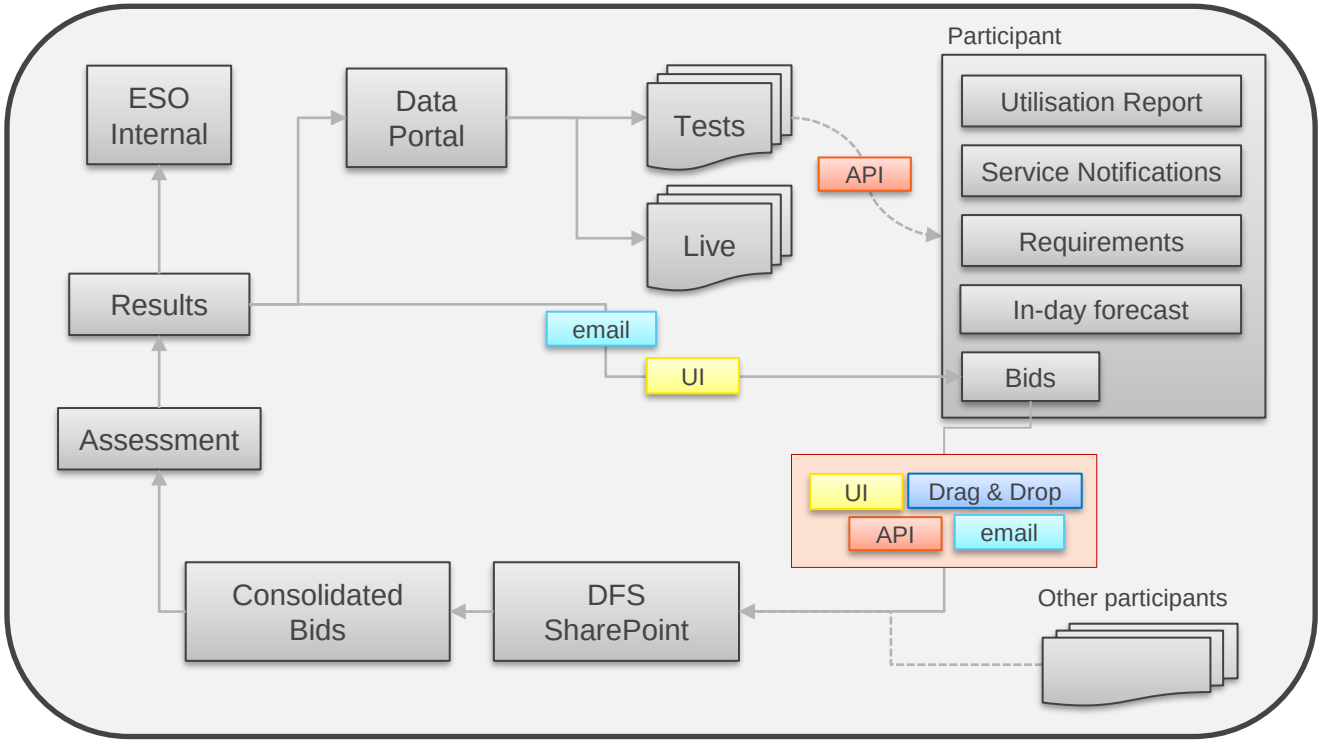
# Process - Winter 22/23




## Winter 22/23

Participants had the option of saving their files to their dedicated SharePoint site or sending them by email to our DFS box.

# Process - Winter 23/24




## Winter 23/24

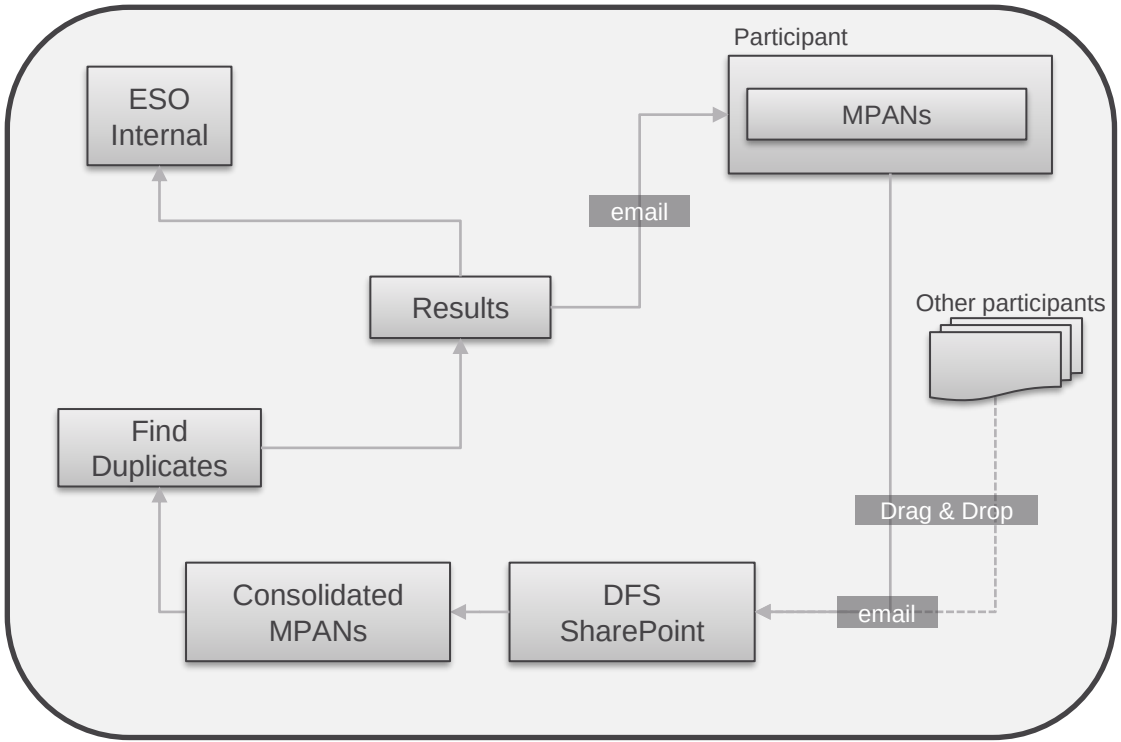
We are exploring the feasibility of enabling additional routes for participants to share the various files required to run the DFS.

For instance, we are looking at the implications for setting up an API to allow participants direct bid submission.

The benefits of these inclusions will be assessed against their implementation costs and the expected lifetime of the service.

# MPANs Duplication

Winter 22/23




## Winter 22/23

Participants submitted their subscribed MPANs on a weekly basis (Fridays).

Each provider then received a list of their MPANs which appeared on two or more providers' submissions.

## Winter 23/24

We hope to and are exploring the ability to enable daily MPAN duplication checks (as opposed to weekly). Given the large volume of data involved, this may require developing an API.

Additionally, we will explore the feasibility of enabling a portal so that participants can check if a single (or multiple) MPANs are already signed up for the service.

When assessing the cost and benefits of developing these solutions we will consider the expected lifetime of the DFS.

## MPAN duplication resolution

Our proposal is to require a timestamp of when an MPAN was signed up by a provider, the owner of any duplicated MPAN(s) will be the latest provider to have signed that MPAN up to the DFS.

# Sign-up to the deep dive sessions

## Deep Dive sessions

### Session 1 – Tue 09:00 to 11:00

This session will be focused on where we are in the proces of service development, playing back the feedback we received in the call for input, how we will be positioning DFS for winter 2023-24, what we'll cover in the other sessions, and a Q&A session at the end

**The role of DFS**

### Session 2 – Tue 14:00 to 16:00

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**Commercials**

### Session 3 – Thu 10:00 to 12:00

This will be an interactive session focused on the process and operational elements of DFS, including: baselines, metering, MPANs, and automation

**Process & operational delivery**

# Contact us

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https://www.nationalgrideso.com/industry-information/balancing-services/demand-flexibility-service-dfs