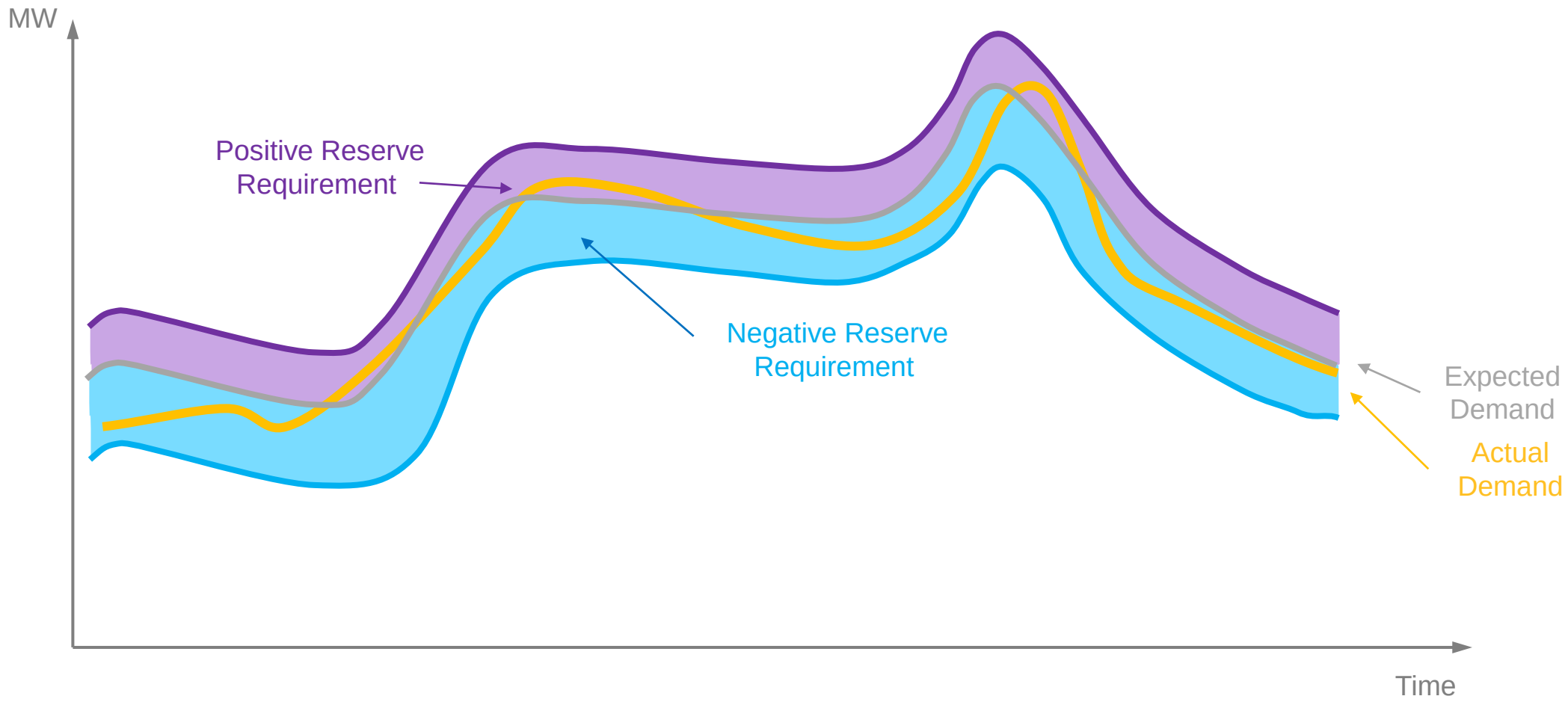
ESO Reserve Reform

February 2024

ESO

Why do we need Reserve?



Balancing Reserve

- Balancing Reserve is a new reserve service which will allow ESO to buy firm reserve capacity through a Day Ahead auction.

- Units will compete for BR capacity contracts in the day ahead pay-as-clear auction for both Positive and Negative Balancing Reserve across 48 half-hour service windows.

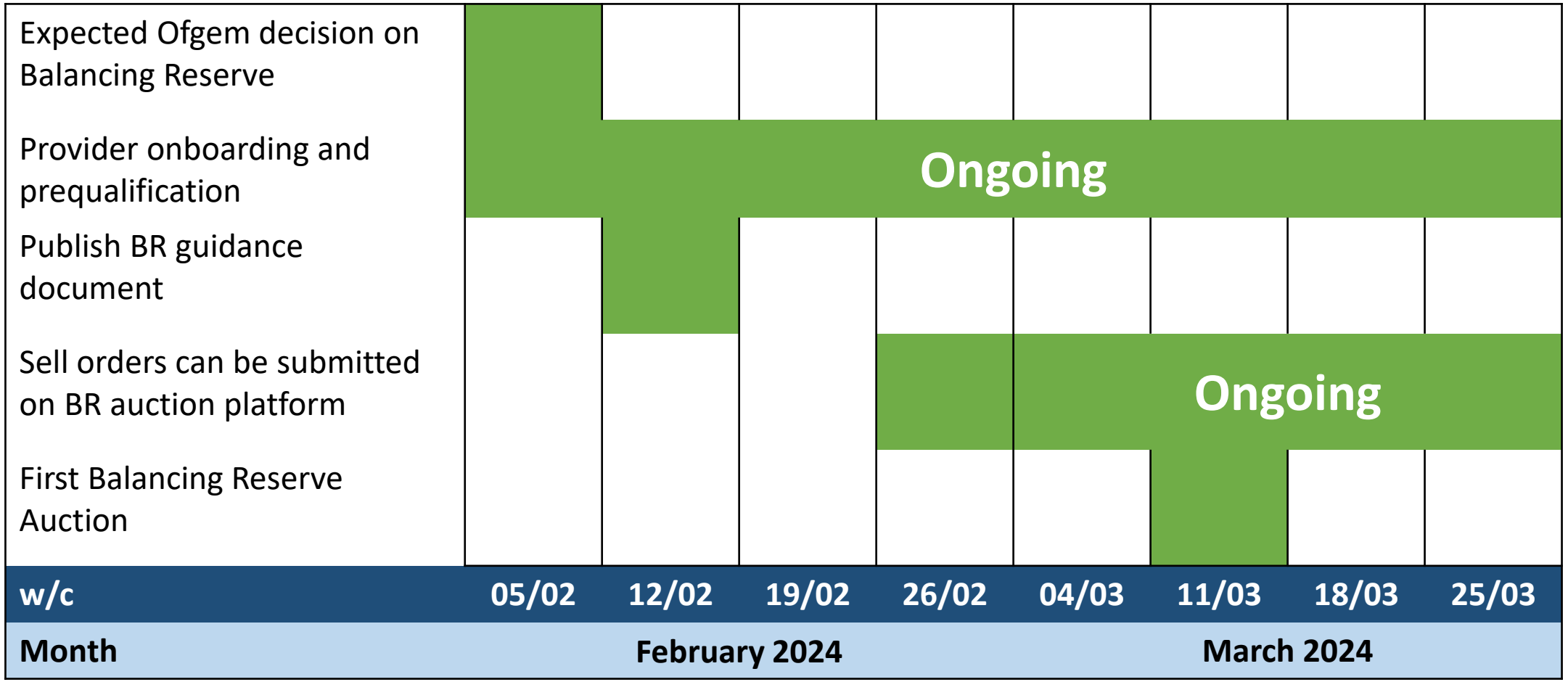
- If successfully awarded a contract the units will then submit their dynamic parameters e.g. Maximum Export Limit (MEL), Stable Export Limit (SEL), FPN (Final Physical Notification), ramp rates etc. to demonstrate their available capacity.

- In real time the ESO control room can then dispatch the reserve capacity using Bids or Offers in the Balancing Mechanism (BM).

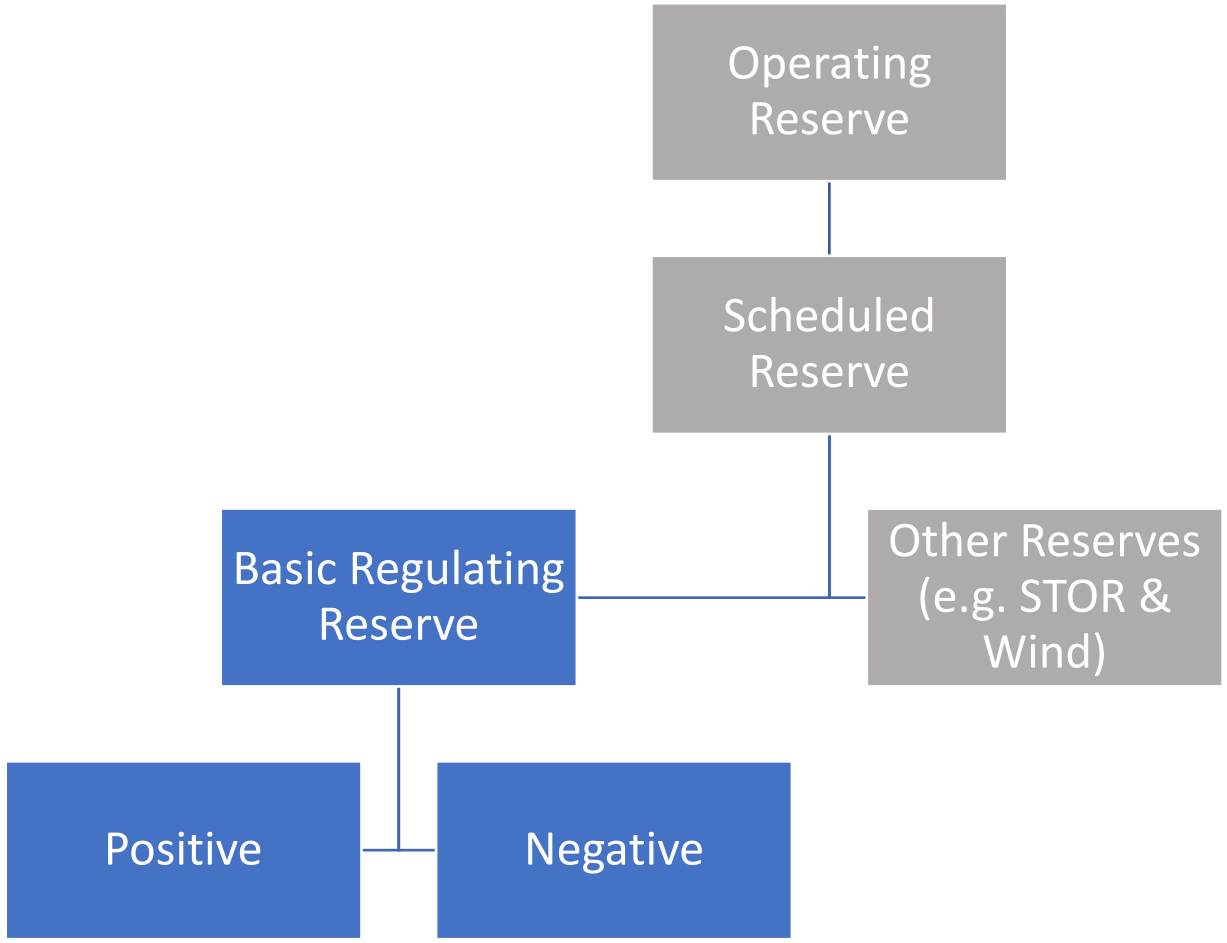
- Providers are paid for their available capacity via the Availability Payment (£/MW/hour) and if dispatched via their Bid/Offer price (£/MWh).

Balancing Reserve Requirements Setting

- This recording will explain how the ESO sets reserve requirements today, how that is changing with a new Dynamic Reserve Setting methodology and how these methodologies will inform the procurement volumes for Balancing Reserve from Day 1 of the service.



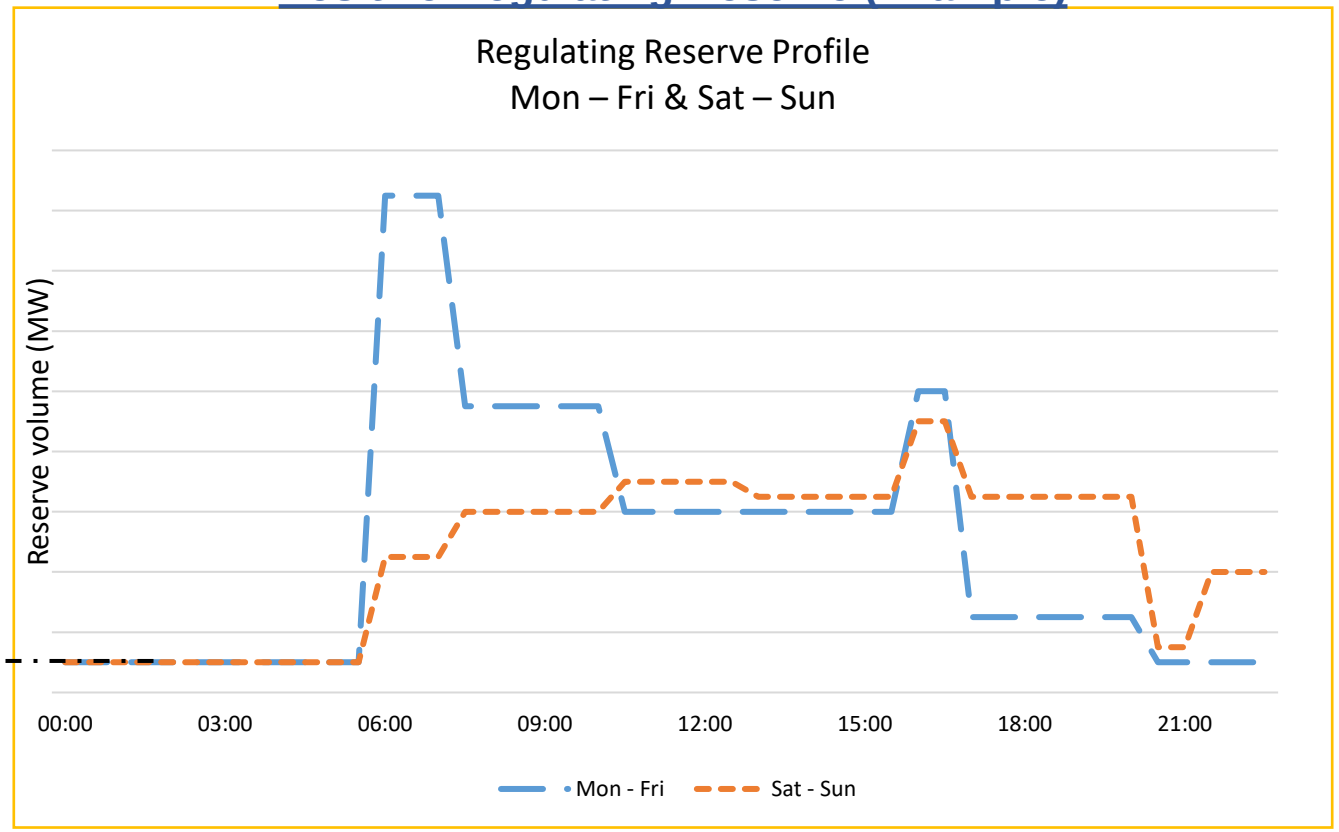
Operating Reserve



Setting the requirements: Positive Basic Regulating Reserve

A “Static” approach is applied to reserve setting producing lookup tables before the new season (BST/GMT) for **Regulating Reserve** and wind reserve. These levels are produced based on 3 years of historical data and are proposed and approved within ESO stakeholders.

Positive Regulating Reserve (Example)



***Minimum: 400MW**

Once the levels are agreed for the duration of the season Regulating Reserve requirements vary only by time of day and type of day.

Setting the requirements: Negative Basic Regulating Reserve

Negative Regulating Reserve

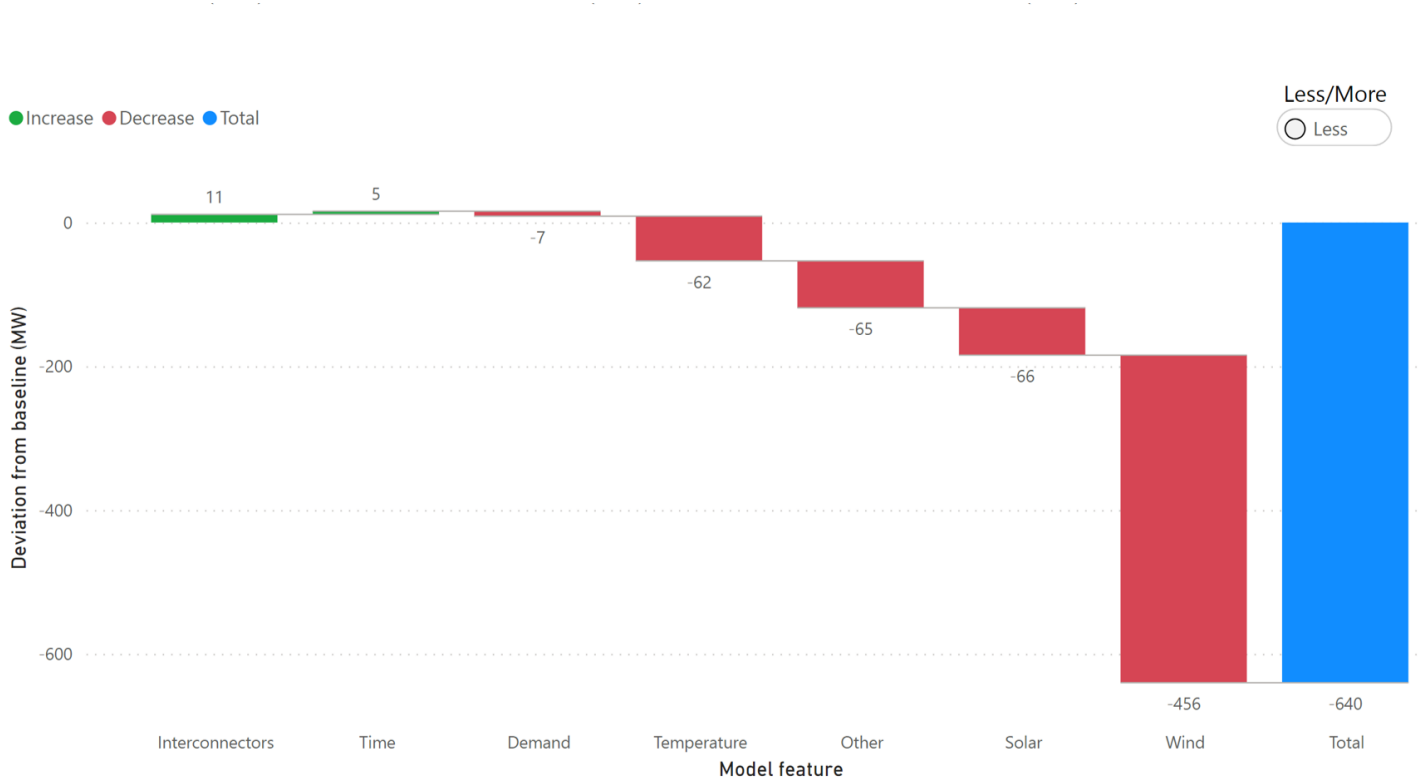
The Negative Regulating Reserve Requirement (NRR) is applied as a single value across all settlement periods and is the maximum of the Largest Secured for the Scheduled Demand Risk.

What is Dynamic Reserve Setting?

- The aim of DRS is to set reserve levels dynamically based on system conditions.
- It is a set of machine learning models developed in partnership with the Smith Institute and hosted on ESO systems.
- There are 2 types of models for upwards (positive) and downwards (negative) reserve.
- DRS models are designed to be “explainable” to show how the reserve number was obtained.
- They are designed to better define and explain how reserve levels are set.
- DRS continues to take in new data and set new reserve requirements using a broader set of features than the current methodology.

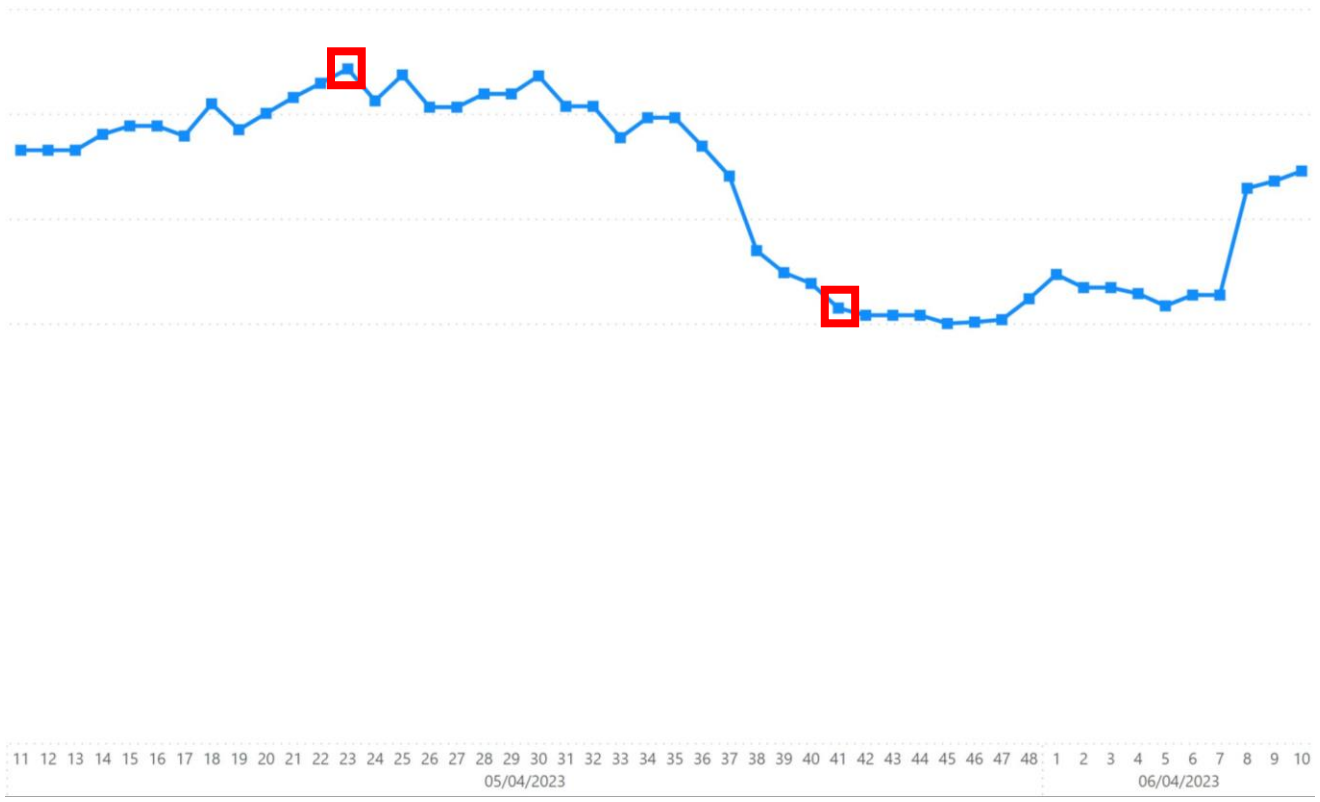
How does DRS work?

- DRS works by modelling the average settlement period for a given lead time. For balancing reserve this lead time is 4 hours.
- From this base model deviations are calculated based on system conditions such as (but not limited to):
    - Wind speed
    - Time of day
    - Temperature
- These deviations are grouped by type as shown on the right, and added to the base value to give an explainable representation of the final reserve recommendation.
- This is done for every lead time and settlement period.
- DRS is a probabilistic model, this modelling is done for several different quantiles of risk
- DRS will recommend between 400-4000MW of Reserve



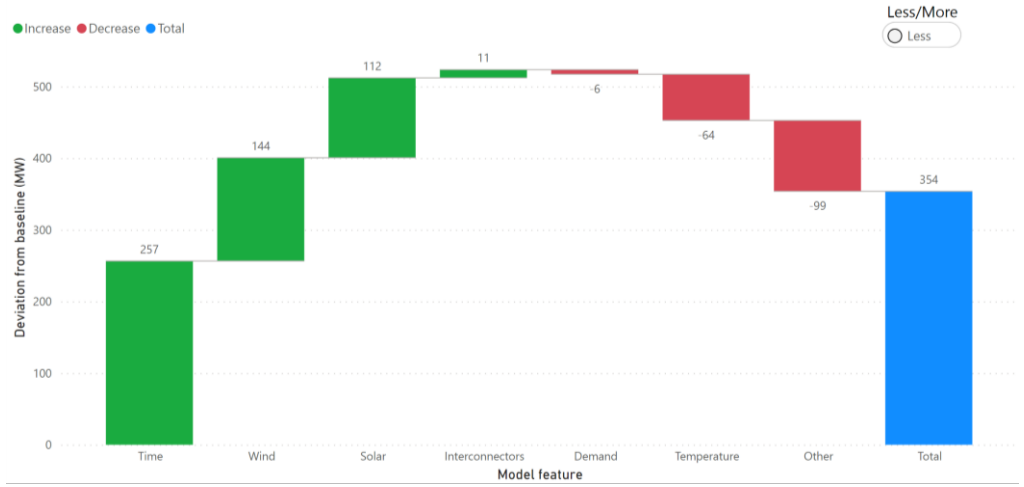
Example: Normal Day

- Here we can see the reserve recommendations for a typical spring day
- The total positive reserve level sits higher across the day before falling overnight
- The temperature was slightly above average for this time of year
- The wind was lower than average throughout the day and higher than average in the evening and overnight
- The maximum reserve recommendation is during settlement period 23
- The minimum reserve recommendation is during settlement period 45
- On this day most settlement periods do not deviate much from the baseline reserve level.



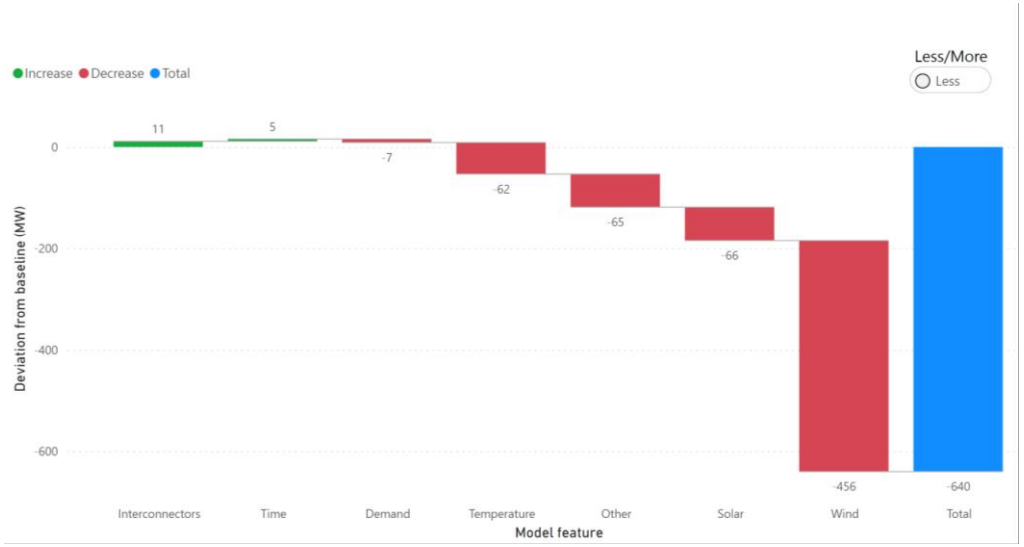
Example: Normal Day

- The wind is lower than average for this settlement period thus contributing to higher reserve
- Temperature is more mild than usual at this time of year, lowering our reserve requirement
- At this time of day we are around the solar peak, so the effect of solar forecasting error on our reserve requirement is higher
- The overall result is an increase in reserve of around 350MW from the baseline.



Settlement period 25

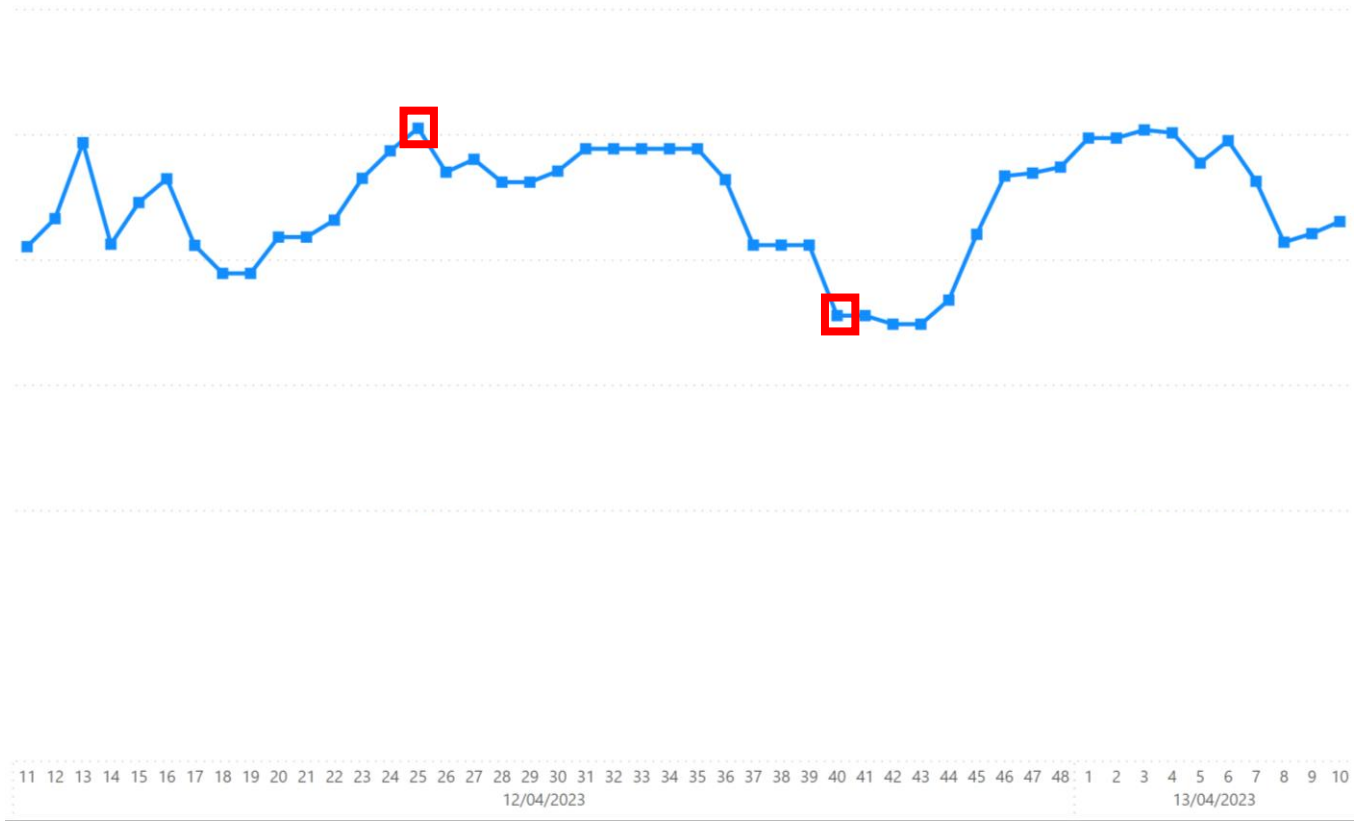
- At this time wind has picked up to a higher level where it is less variable lowering reserve
- Temperatures contribution has stayed around the same as it was during the day
- At this time of year we don't expect any solar generation at this time of day, so it lowers our reserve requirement as it is not a source of error
- The overall result is a decrease in reserve of around 650MW from the baseline.



Settlement period 40

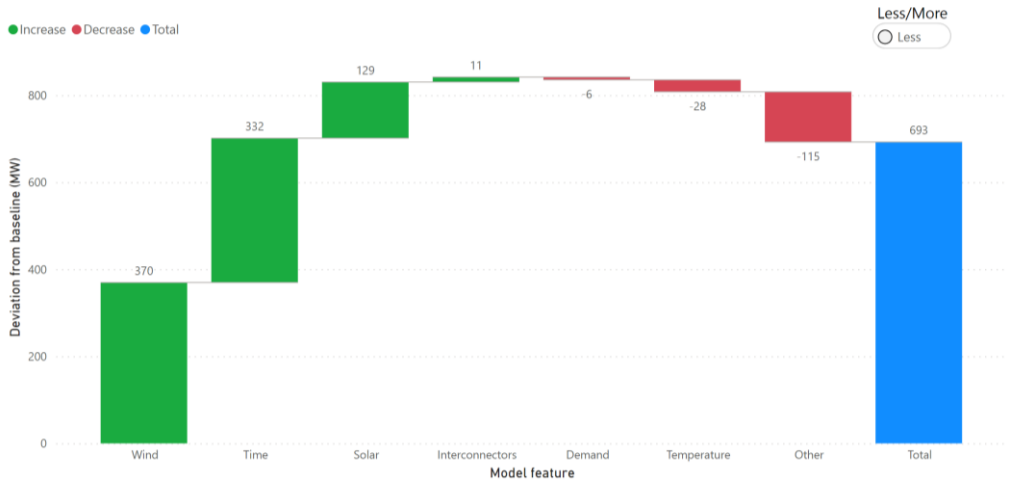
Example: Stormy day

- Here we can see the reserve recommendations for a stormy day
- The reserve level is high across most of the day with a lull to in the evening before picking up over night
- The temperature was average for this time of year
- The wind was much higher than average throughout the day
- Solar output was lower due to increased precipitation and cloud cover
- The maximum reserve recommendation is during settlement period 25
- The minimum reserve recommendation is during settlement period 42
- On this day most settlement periods are above the baseline reserve.



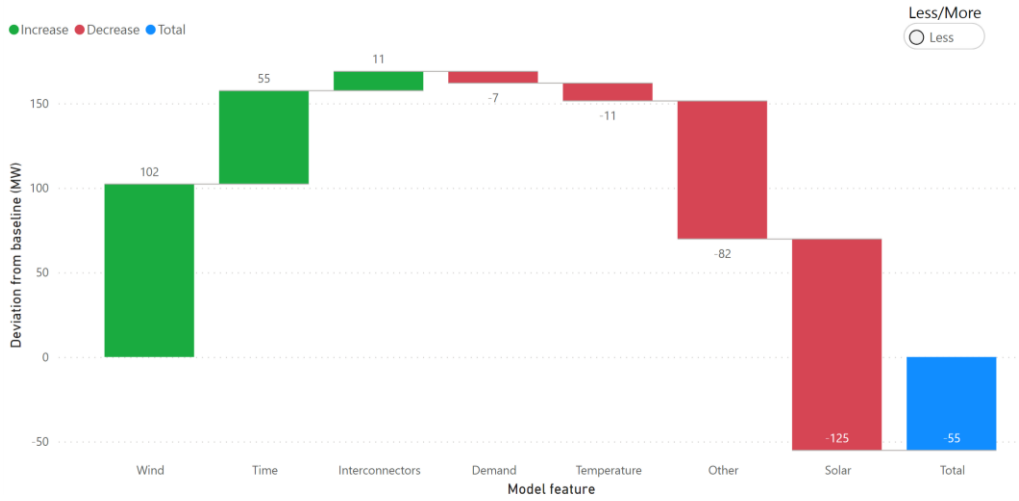
Example: Stormy day

- The wind is much higher than average and gusting contributing to higher reserve because higher variability
- Temperature is average for this time of year having little impact on our requirement
- Due to cloud cover from the storm our solar forecasting error is higher
- The overall result is an increase in reserve of around 700MW from the baseline.



Settlement period 25

- At this time wind has lulled where it is less variable but still increasing our reserve requirement
- Temperature has stayed around the same as it was during the day
- At this time of year we don't expect any solar generation at this time of day, so it lowers our reserve requirement as it is not a source of error
- The overall result is a decrease in reserve of around 50MW from the baseline.



Settlement period 40

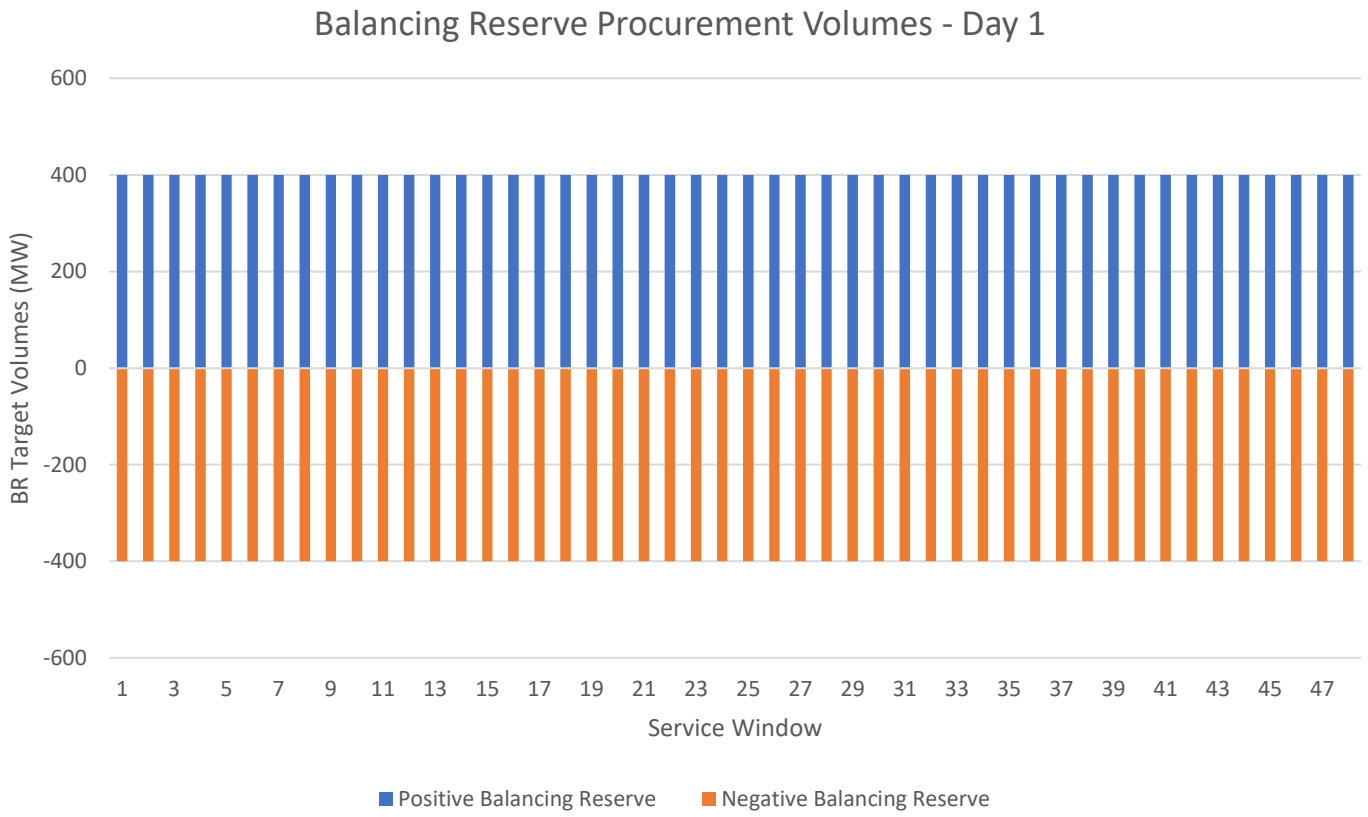
Balancing reserve procurement strategy

Pete Underhill

ESO

Procurement Volumes for Day 1 (March 2024)

- Balancing Reserve is scheduled to go live at the beginning of March with the first auction taking place on the 12 March 2024 for delivery on the 13 March 2024 EFA day.



We will aim to buy **400MW of Positive Balancing Reserve (PBR) and 400MW of Negative Balancing Reserve (NBR)** for each service window from Day 1.

The actual cleared volume will depend on prices submitted and total welfare.

https://www.nationalgrideso.com/industry-information/balancing-services/enduring-auction-capability-eac

Balancing Reserve requirement growth

- We plan to grow the market in a controlled phased manner.
  - Fixed flat requirement,
  - Increased fixed requirement with profile across the day
  - Full dynamic requirement
- The new Dynamic Reserve Setting model will be used to inform our Balancing Reserve procurement targets.
- Day ahead requirements and medium term forecast of Balancing Reserve requirements will be published on the ESO data portal.
- A new “Ancillary Services notifications” dataset is now available on data portal https://www.nationalgrideso.com/data-portal/ancillary-services-important-industry-notifications

When will we increase the target volume?

Once Balancing Reserve goes live we will be regularly assessing the market performance to determine whether our target volumes and buy order is working to deliver efficient procurement.

There are a number of categories we will be assessing the emerging BR market against to inform future changes.

- **Liquidity:** the BR market should have different companies and sufficient volumes competing for contracts to support an efficient market.
- **Impact on related markets:** the launch of BR and Quick Reserve (QR) later in 2024 may have an impact on the Dynamic response markets, we will closely monitor the impact on other ESO markets before making future changes.
- **Control room feedback:** we will work closely with the ESO control room engineers to take on board their feedback about how to maximise the value of BR.
- **Cost benefits:** the Cost Benefit Analysis (CBA) for Positive BR identified significant benefits during winter months, we will consider this in our strategy to make future procurement target changes.
- **Customer feedback:** as with all our services we will take on board market participant and customer feedback, where possible, and include this in our growth strategy.

Next steps:

Drop in session Thursday 8th February 11:00