Dispatch Transparency Event

2 June 2023

ESO

Dispatch Transparency Event
Cathy Fraser

Systems, Support and Insight Manager

Q & A – Sli.do code #ESODispatch

Please visit **www.sli.do** and enter the code **#ESODispatch** to ask questions throughout the event.

We ask that you enter your full name or organisation in Sli.do so that we can follow up directly for any specific questions.

Please note that given the time available and the facilities within the webinar format we will be prioritising questions on the content shared during the session.

We will answer as many questions as possible in the Q&A at the end of the session. We may have to take some questions away in order to consult our expert colleagues. We are intending to publish the Q & A from this event on our website alongside those from the weekly Operational Transparency Forum. If you would prefer your question is not published please make this clear in Sli.do

If there are questions or expectations which go beyond the immediate scope of this event we will endeavour to refer the questioner to the appropriate team or expert within the ESO, or provide contact details for an external organisation where needed.

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Agenda

The objective today is to provide a deep dive into how we currently make dispatch decisions including what skips are, how we share our decision making, and to share our plans for the future of dispatch

Welcome and introduction	Cathy Fraser	09:30 – 09:40
How the ESO currently dispatch	Will Ramsay	09:40 – 10:10
The future of dispatch	Bernie Dolan	10:10 – 10:25
Current ESO Dispatch Transparency methodology	Will Ramsay	10:25 – 10:40
Comfort break	All	10:40 – 10:50
Q&A	Cathy Fraser & Alex Knight	10:50 – 11:30

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Question

Please answer the question which will appear on your screen:

On a scale from 0 to 10 how well do you feel you understand how the ESO dispatches?

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What is a "skip rate"?

- A skip is a BOA *(*Bid Offer Acceptance) instruction sent by the ESO Control Room to increase or decrease the output of a generator but **at a price that was higher than an alternative option**. The ESO "skipped" an option that appears to be more economic.

- Skip Rate generally refers to **the number of times a skip occurs** in a given period such as a day.

Why worry about skips?

- The ESO has a licence condition to operate efficiently and economically and a target to reduce the balancing cost as much as possible.

- There are genuine skips where alternative instructions could have been sent for a lower cost. However, most actions that appear to be skips in data analysis are taken for operational reasons and are not preventable.

- The ESO strives for zero preventable skips.

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How the ESO dispatches
Will Ramsay

Operational Manager

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ESO Dispatch Overview

- Overview of scheduling process

- Risk management in dispatch process

- Example of most common source of uncertainty in dispatch timescales

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Demand profile

The balancing process starts with the demand forecast

Greater confidence in the forecast leads to more efficient planning and dispatch

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Scheduling – Energy and margin

Expected Maximum
Total maximum output for scheduled BMUs, after adjustments

──────── ≥ ─ ─ ─ ─ **Positive Reserve Requirement**

Expected Operating Level
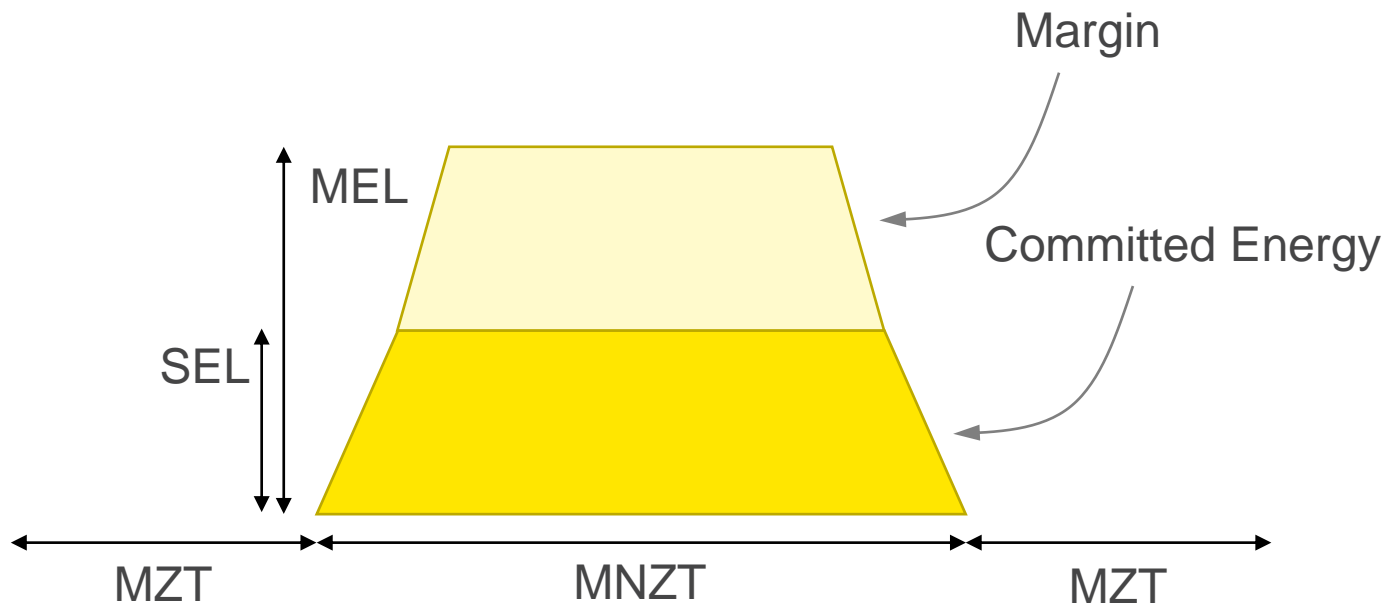Total scheduled BMU PNs and additional BMUs at SEL, after adjustments

──────── ≈ ─ ─ ─ ─ **Demand**

Expected Minimum
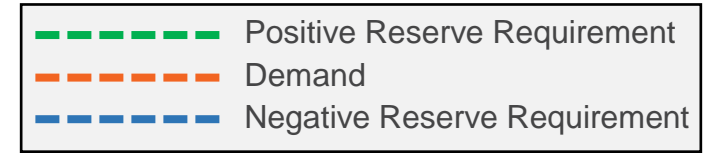Total minimum output for scheduled BMUs, after adjustments

──────── ≤ ─ ─ ─ ─ **Negative Reserve Requirement**

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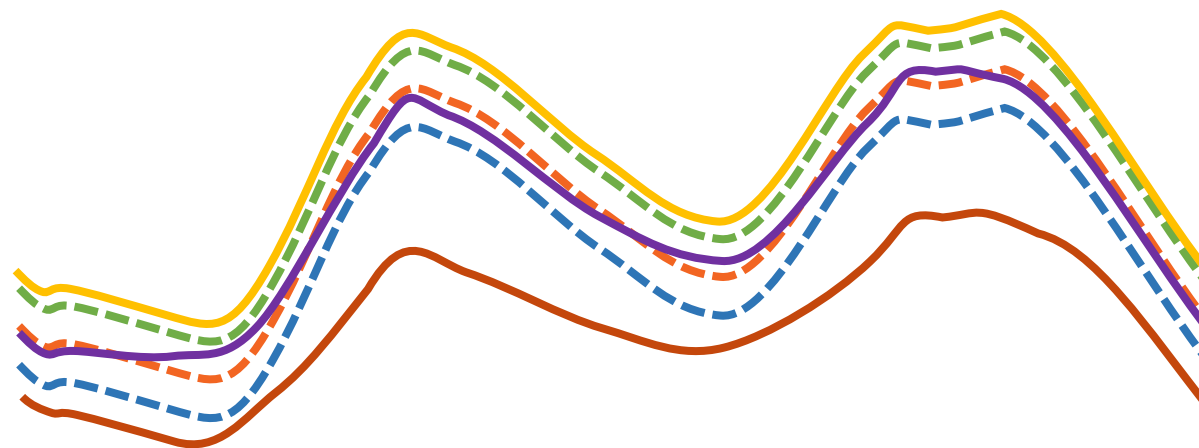
Scheduling – Energy and margin

Scheduling – Energy and margin

Positive Reserve Requirement
Demand
Negative Reserve Requirement

Gen 1
£120/MWh

Gen 2
£150/MWh

Margin shortfall
Energy shortfall

Margin shortfall

Day A
Market short vs demand forecast and additional positive margin required

Target – lowest energy price
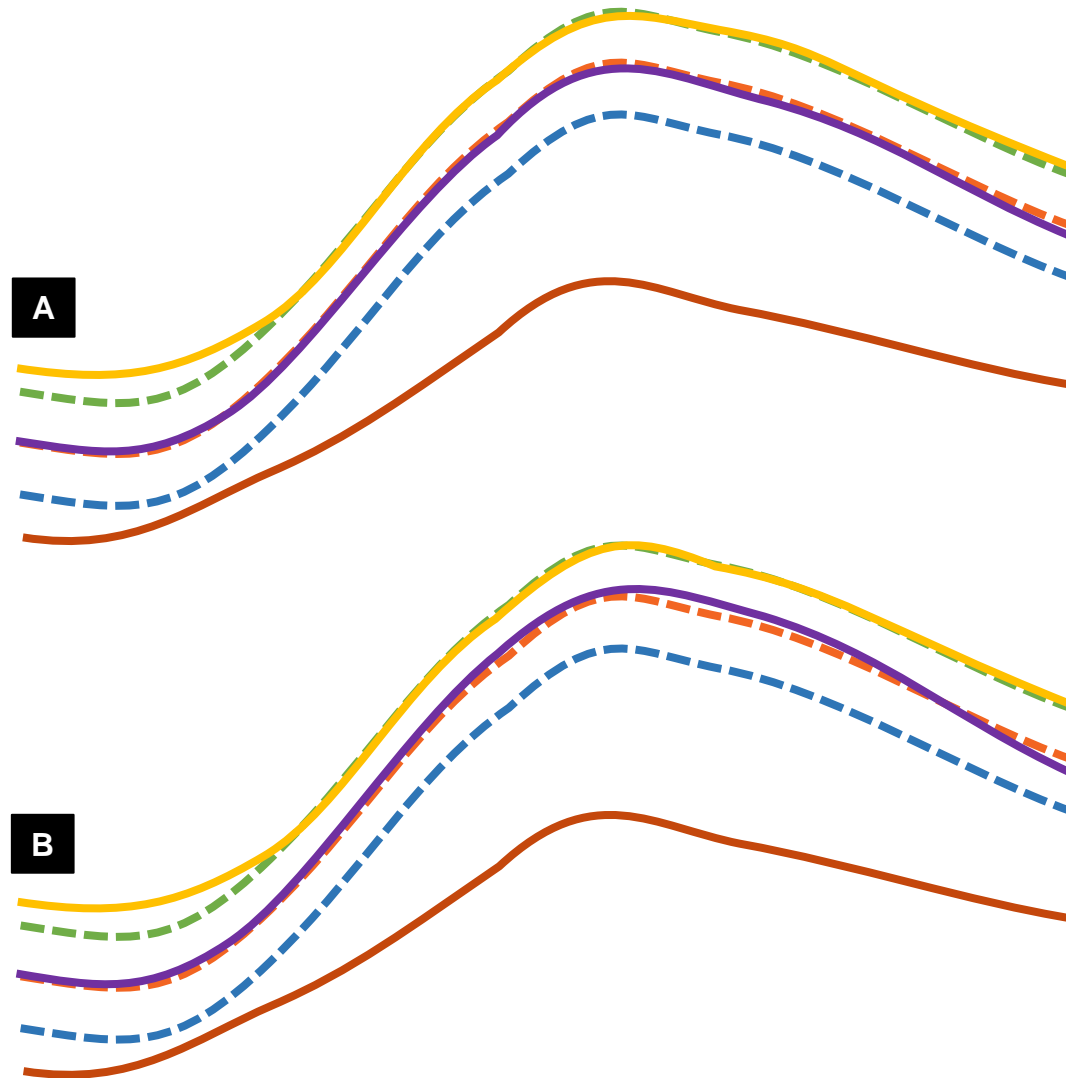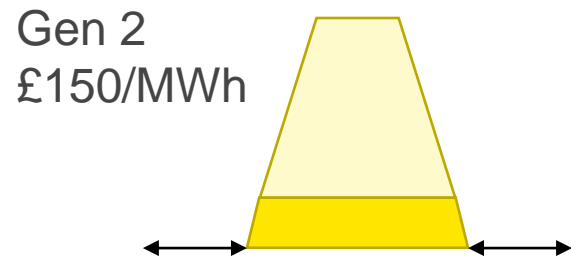
Schedule Gen 1

Day B
Market satisfying demand forecast but additional positive margin required

Target – lowest committed cost

Schedule Gen 2

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Scheduling – Energy and margin

Gen 1
£120/MWh

Gen 2
£150/MWh

A

Day A
Market short vs demand forecast and additional positive margin required

Target – lowest energy price
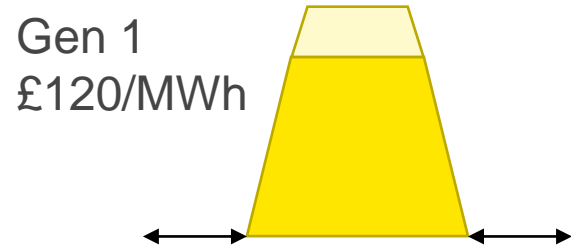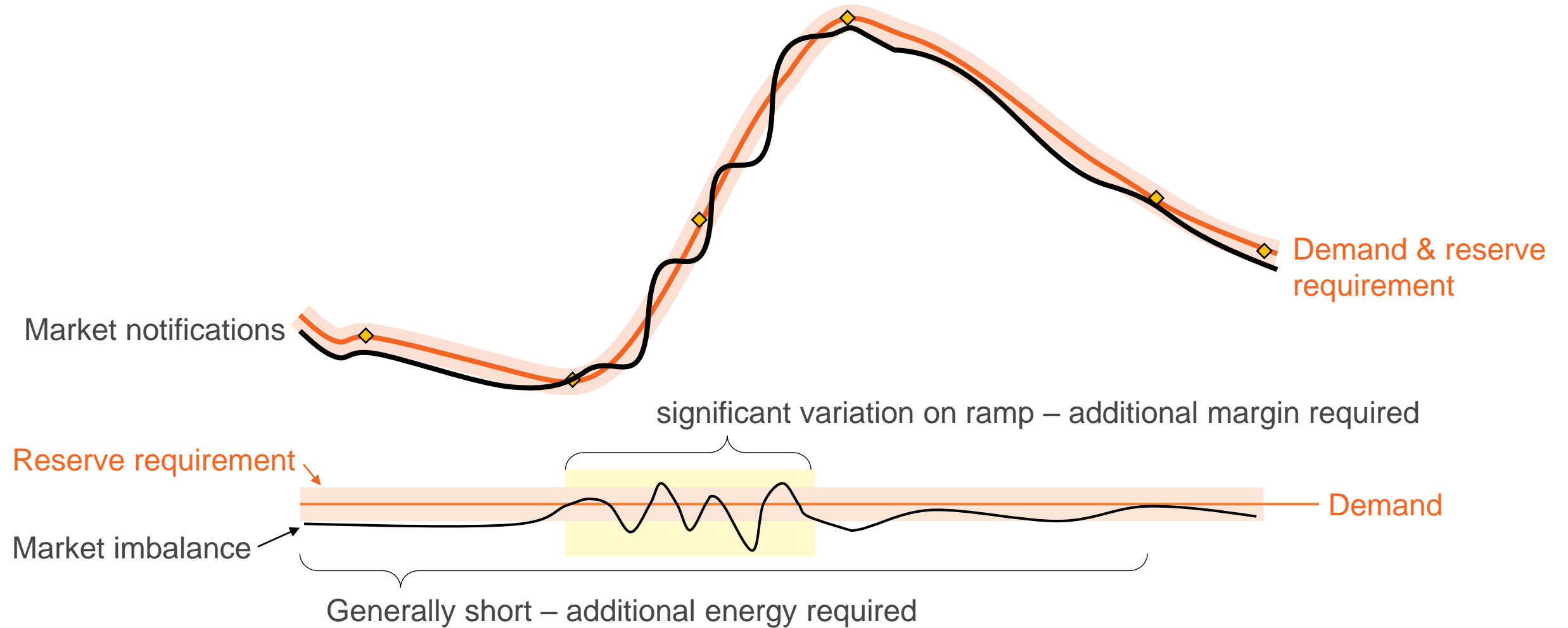
Schedule Gen 1

B

Day B
Market satisfying demand forecast but additional positive margin required

Target – lowest committed cost

Schedule Gen 2

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Scheduling – Energy and margin

Demand & reserve requirement

Market notifications

significant variation on ramp – additional margin required

Reserve requirement

Demand

Market imbalance

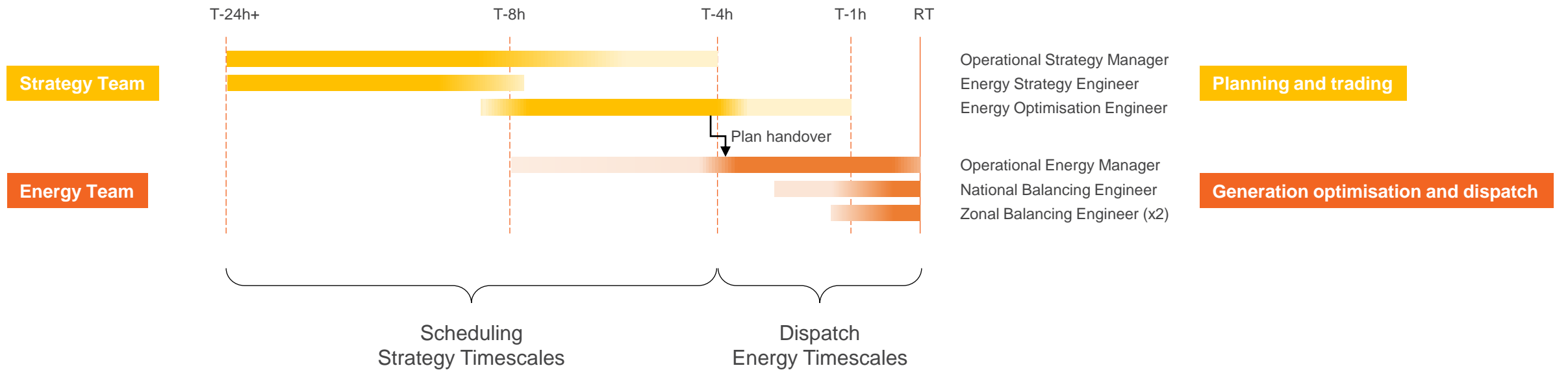Generally short – additional energy required

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Operational Roles in the Control Room

Simplified overview of roles and responsibilities over time

Strategy Team

Operational Strategy Manager
Energy Strategy Engineer
Energy Optimisation Engineer

Planning and trading

Energy Team

Operational Energy Manager
National Balancing Engineer
Zonal Balancing Engineer (x2)

Generation optimisation and dispatch

Transmission Team

Transmission Analysis Engineer (x2)
Transmission Security Manager
Transmission Security Engineer (x6)

Network security and optimisation
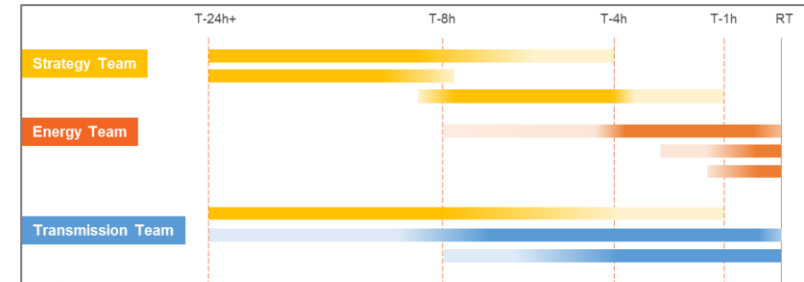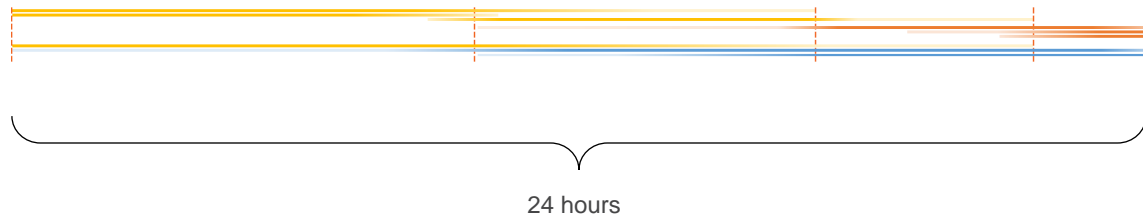
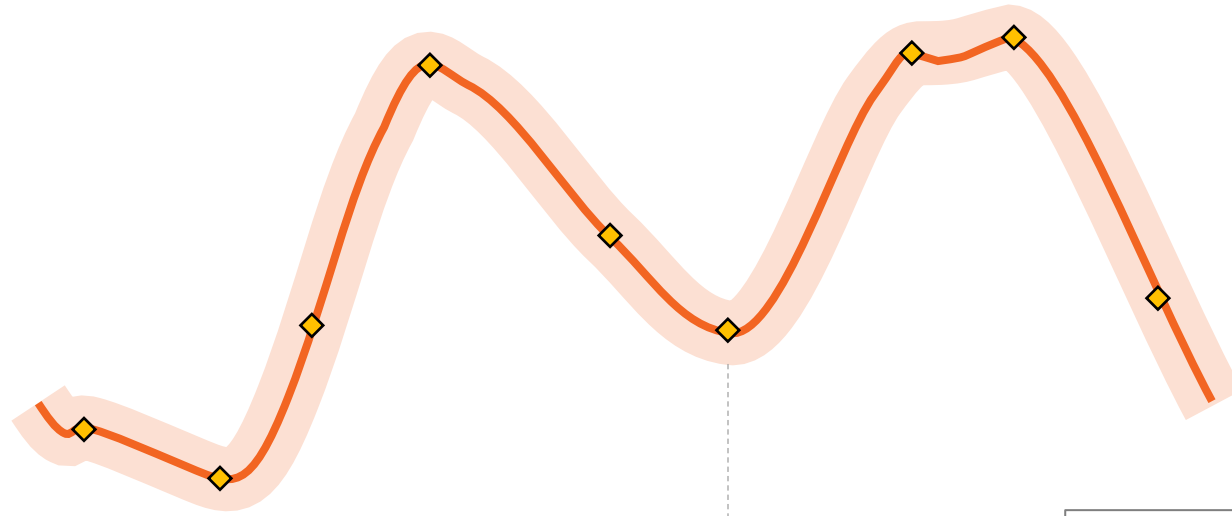T-24h+   T-8h   T-4h   T-1h   RT

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Operational Roles in the Control Room

Simplified overview of roles and responsibilities over time

ESO
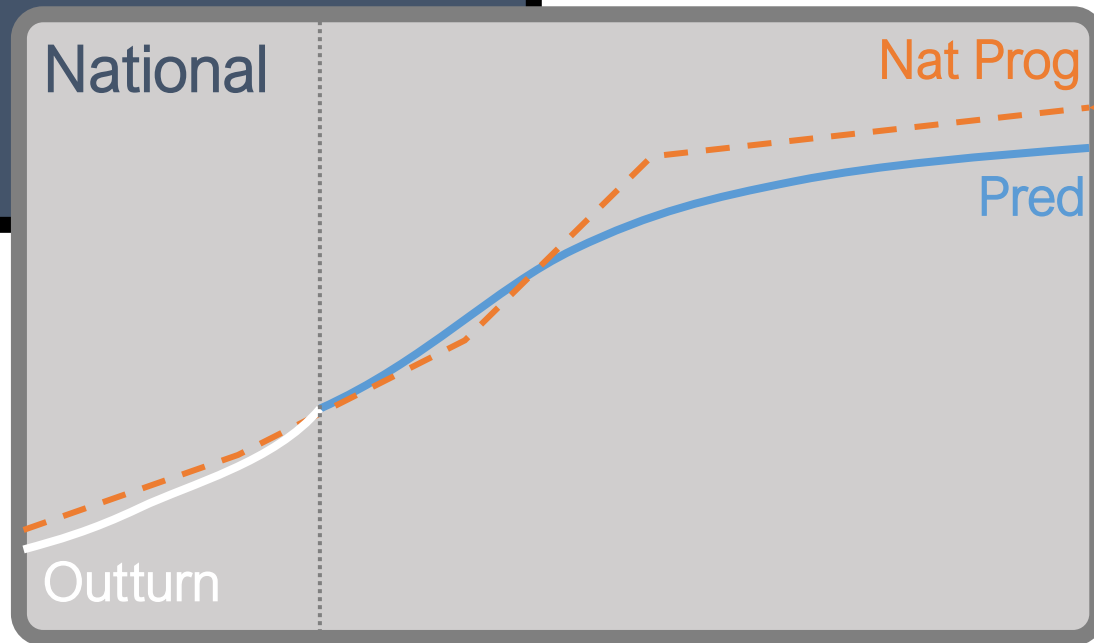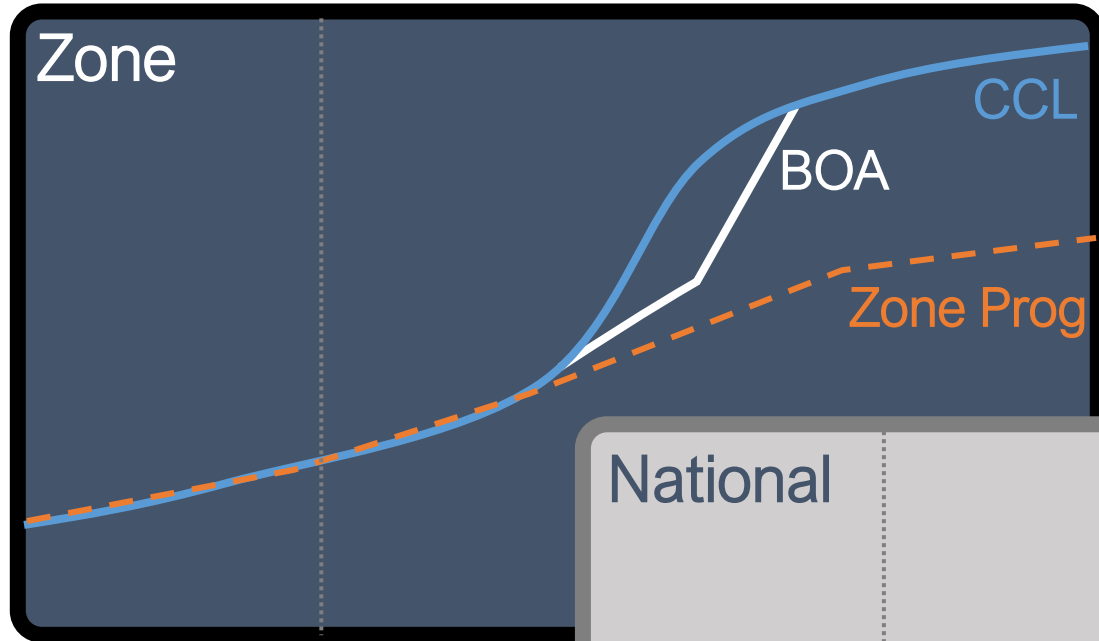
Planning horizons

24 hours

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Planning horizons overlap and interact
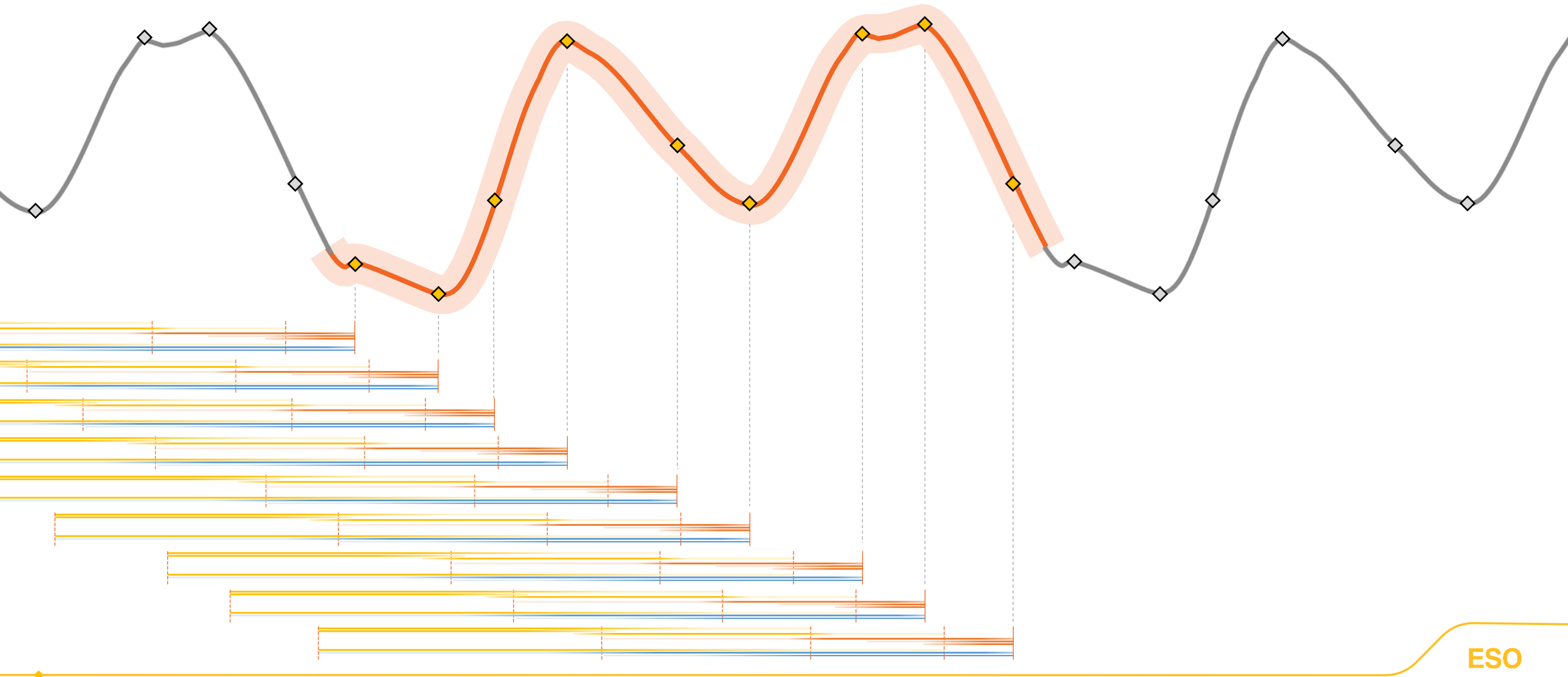
Dispatch –
Risk
Management

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Energy Balancing

SORT Zones

Zone — CCL, BOA, Zone Prog

National — Nat Prog, Pred, Outturn

SORT Zones: North, N Wind, South, S Wind, IC, PS, STOR, Small BMUs

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Energy Balancing

Zone

CCL

BOA

Zone Prog

Large volume of instructions required
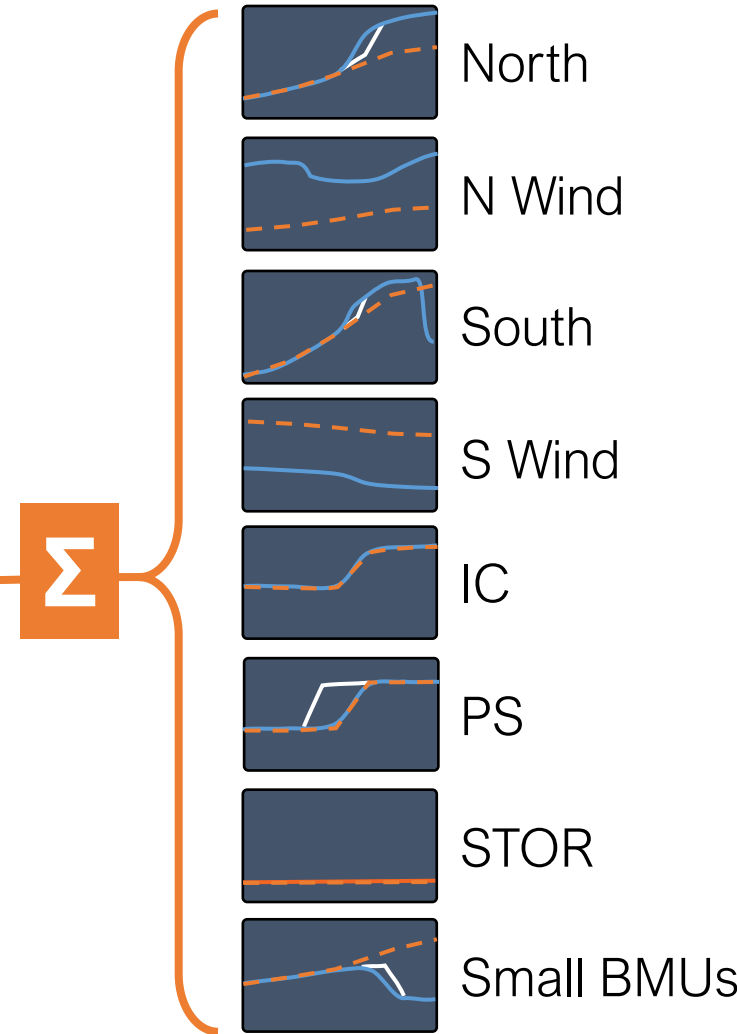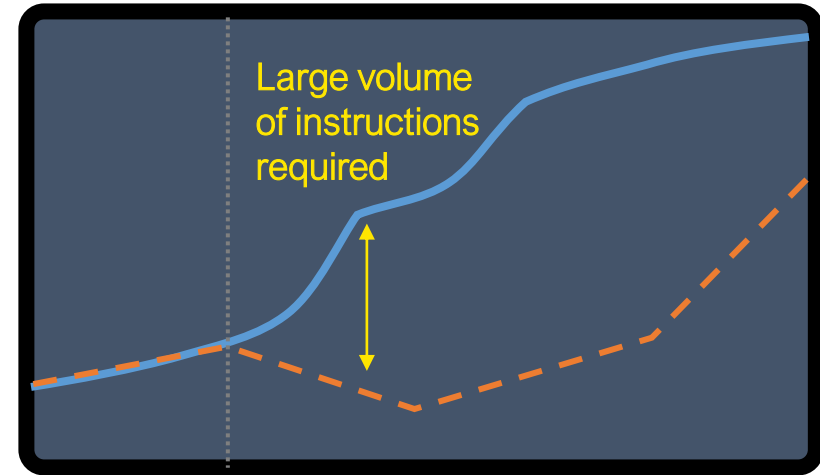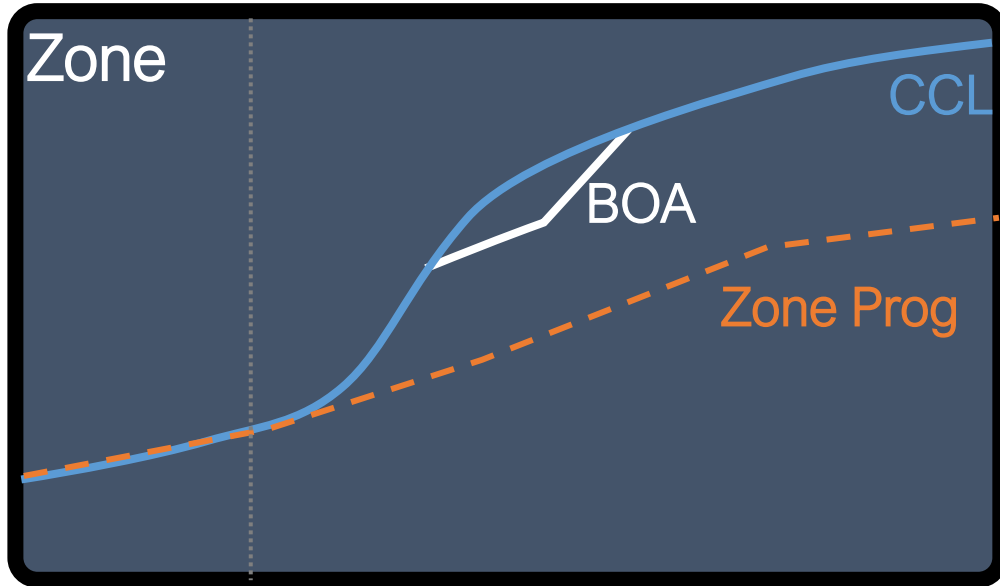
Programme lowered

Unwind required
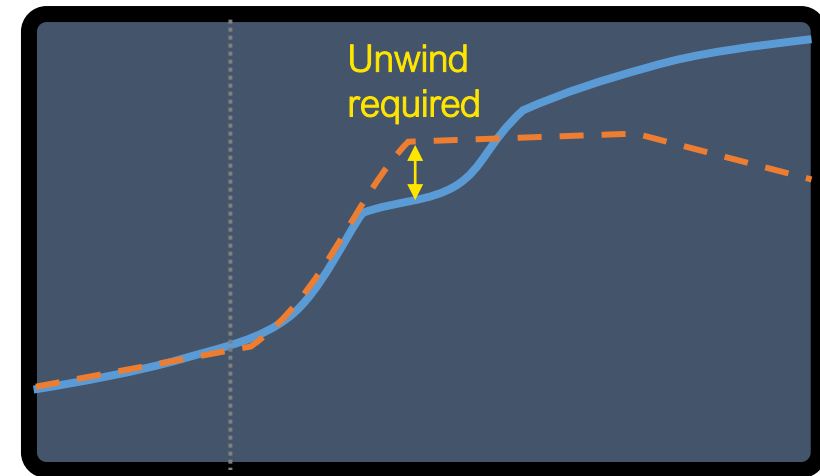
Programme raised

As conditions change in real-time, the National Balancing Engineer will revise the programmes in each zone.

The Zonal Balancing Engineers send BOAs to reach programme, but must leaving flexibility to adapt to programme changes without having to unwind previous instructions.

Meanwhile, they must also maintain constraints, response requirements, reserve allocation, monitor generation and market changes, take operational calls…

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Sources of Uncertainty
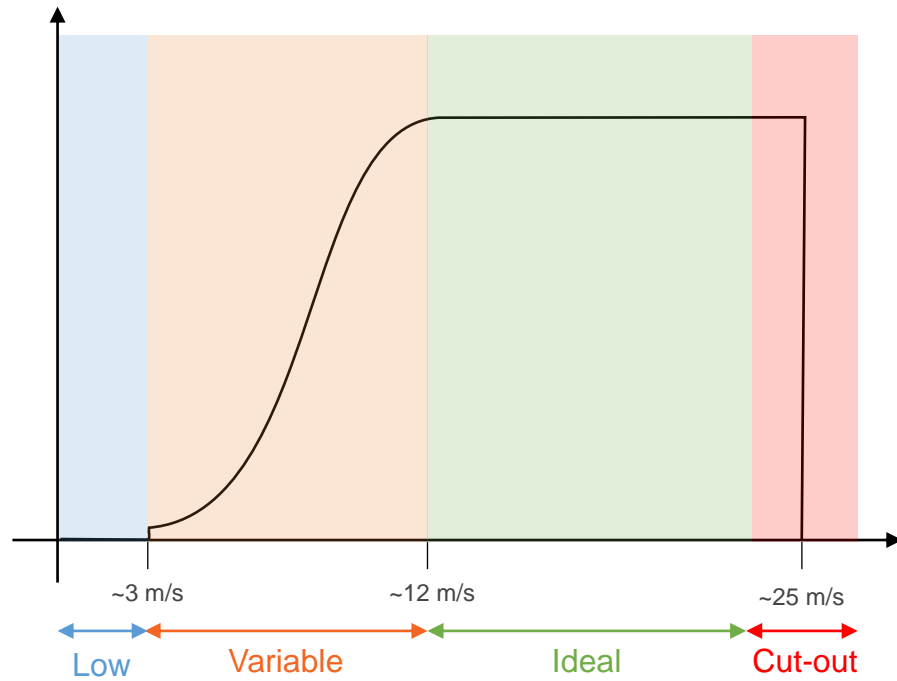
Wind generation output, especially in 'variable' and 'cut-out' conditions
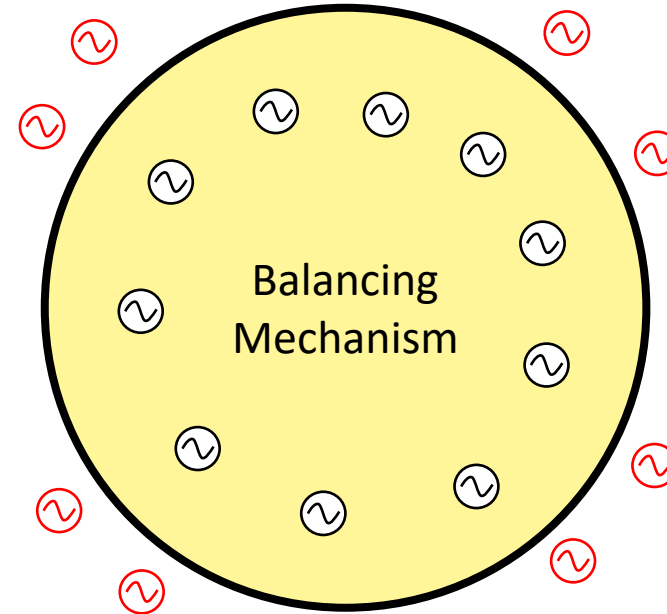
Active generators outside the balancing mechanism, which do not provide the ESO with any visibility or control

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Energy Balancing

Wind Zone

4000

3000

Conventional Zone

7000

6000
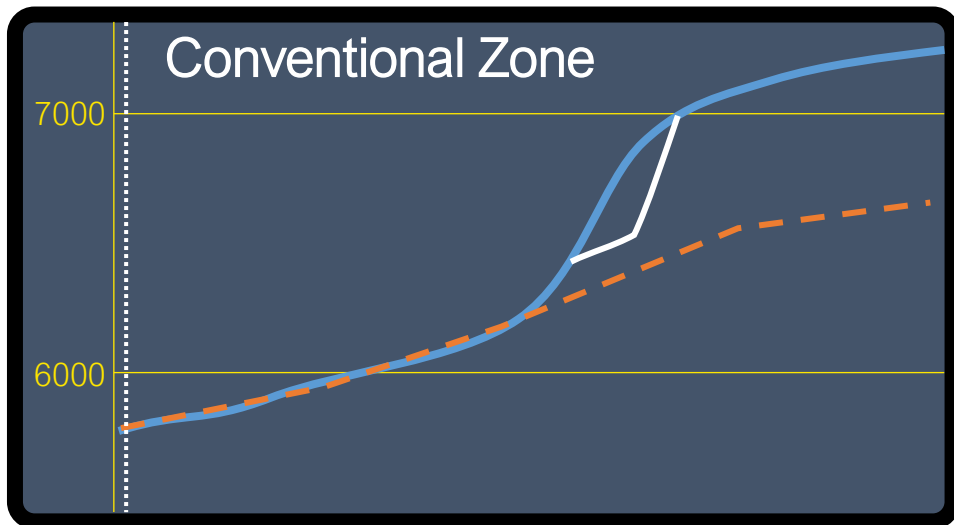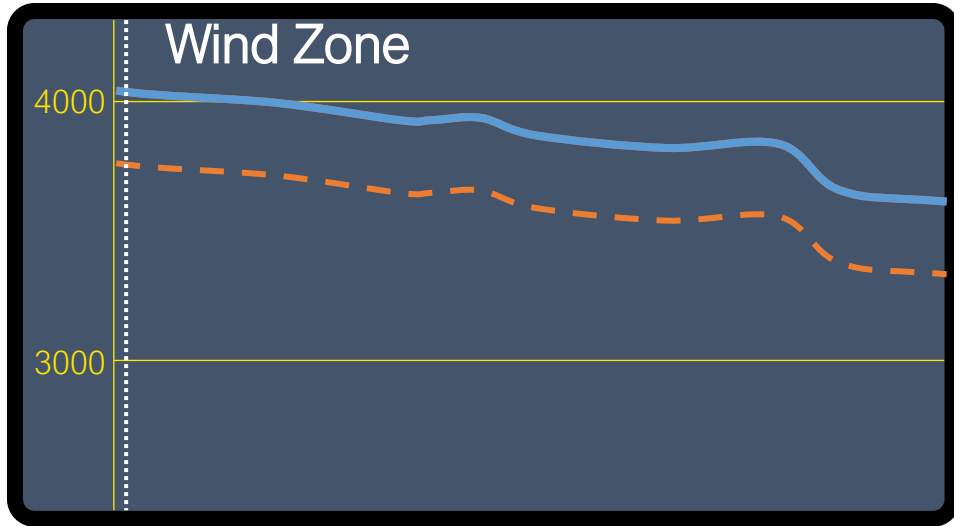
Zone programme – instruction from National Balancing Engineer to Zonal Balancing Engineer (ZBE)

Capped Committed Level (CCL) = FPN + BOAs, capped by MEL

ZBE sends BOAs so that CCL matches zone programme

CCL Zone Prog

ESO
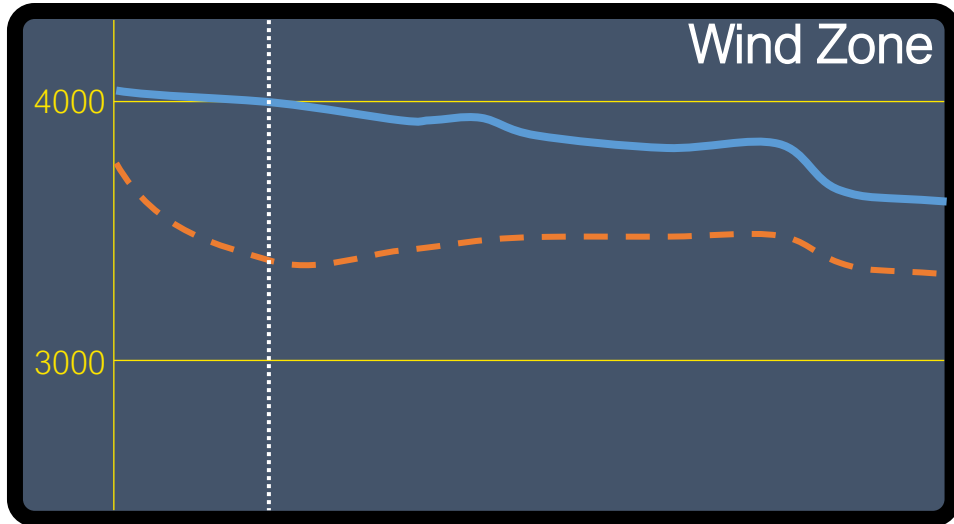
Energy Balancing

No BOAs required in wind zone so CCL remains equal to FPN

Wind programme updated to match real-time metering +/- projected change

Conventional programme updated to compensate

BOAs issued on conventional units to meet new programme, with the risk of having to unwind prior instructions

CCL | Zone Prog

ESO

Energy Balancing

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CCL | Zone Prog

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CCL Zone Prog

ESO

Energy Balancing

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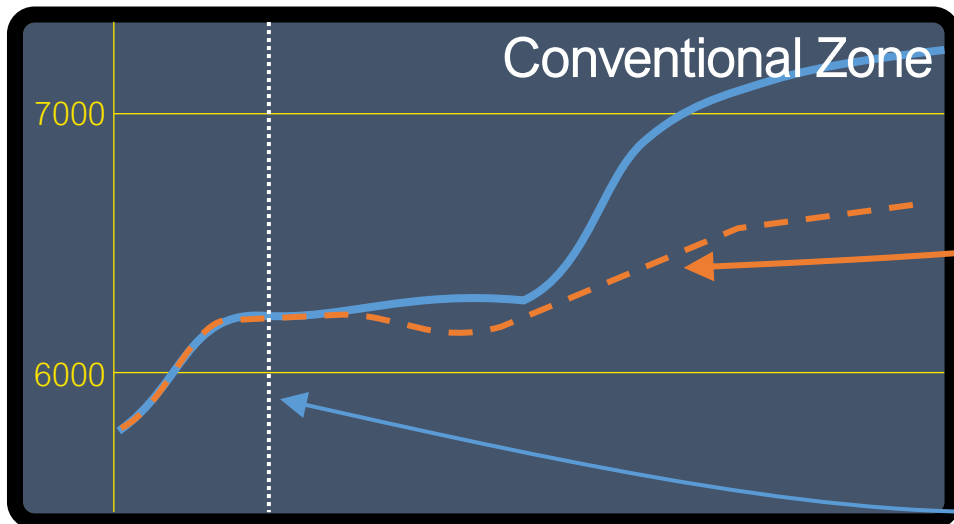
Actual outturn

Conventional Zone

7000

6000
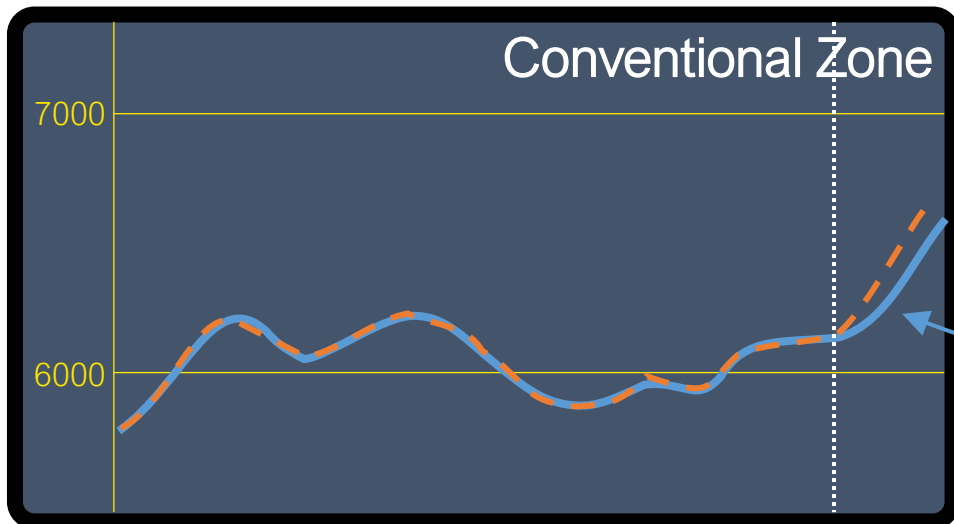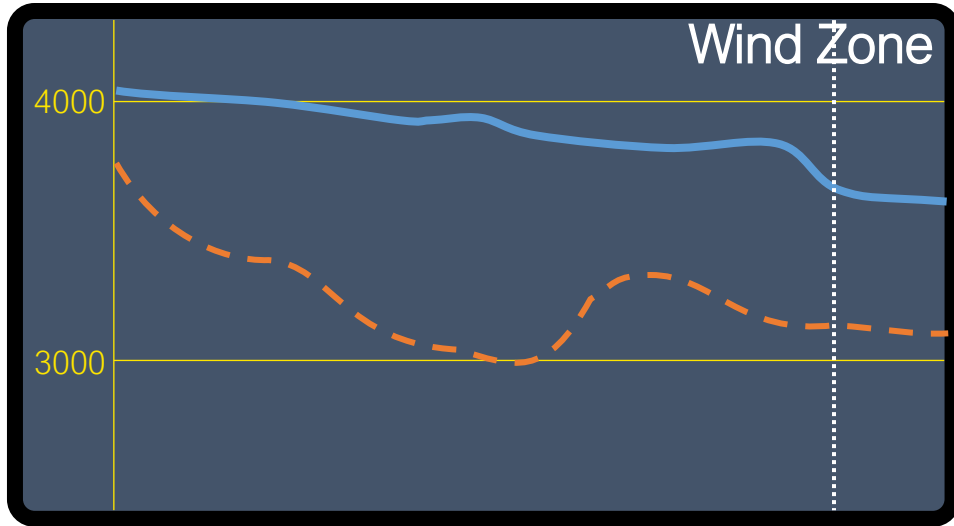
Original programmes

No BOAs required in wind zone so CCL remains equal to FPN

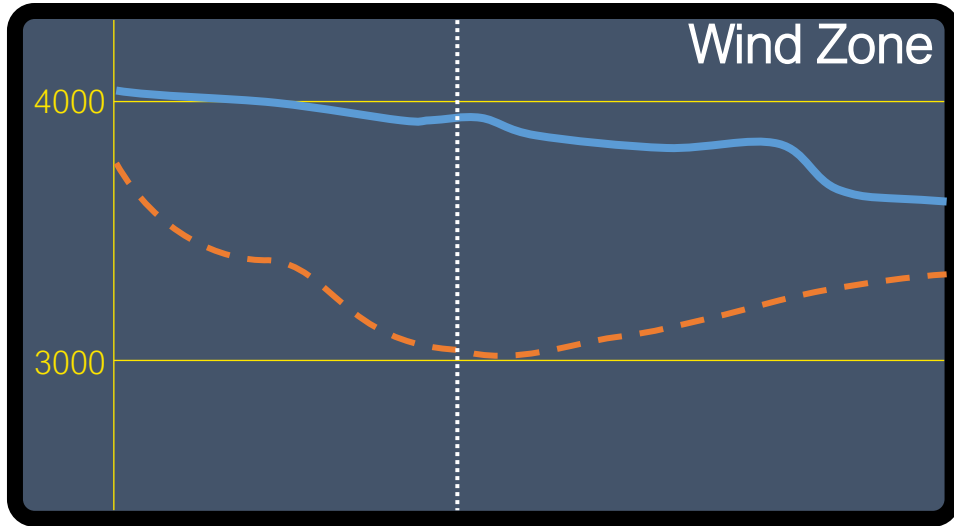Wind programme updated to match real-time metering +/- projected change

Conventional programme updated to compensate

BOAs issued on conventional units to meet new programme, with the risk of having to unwind prior instructions
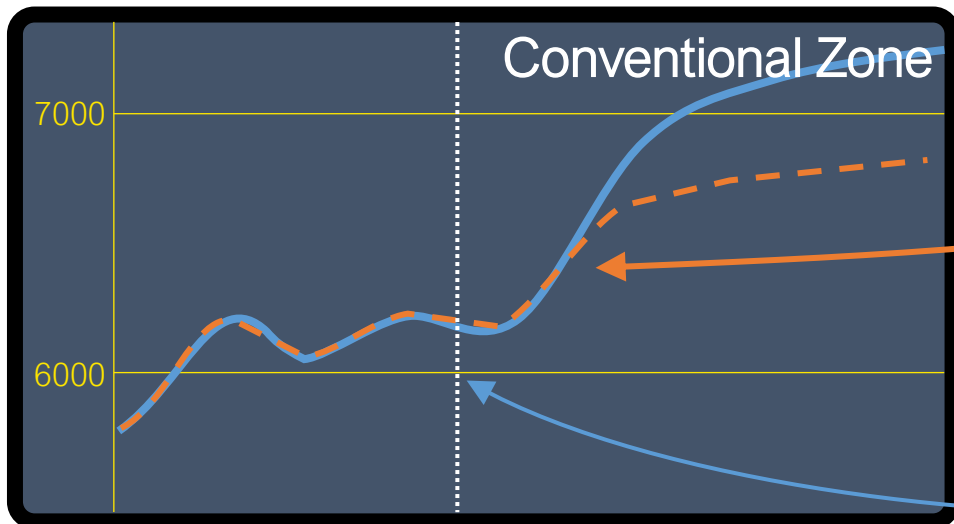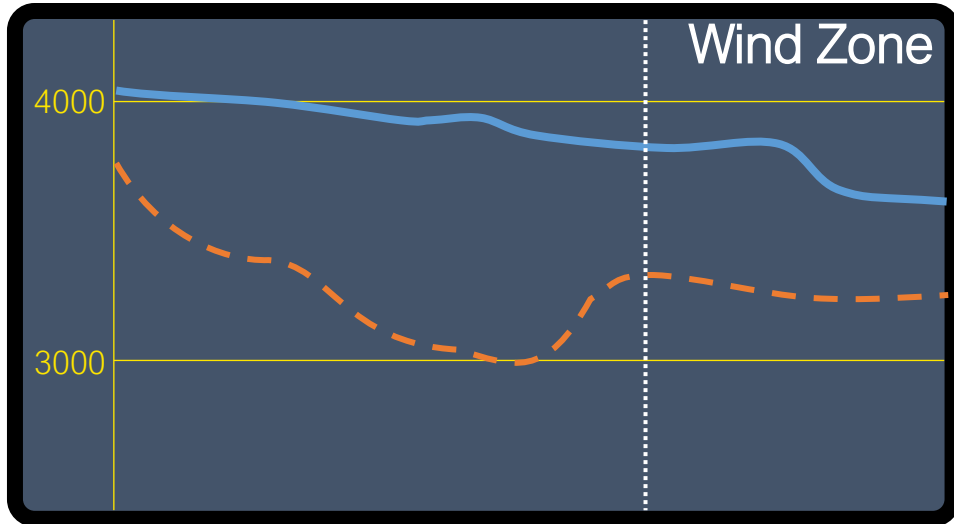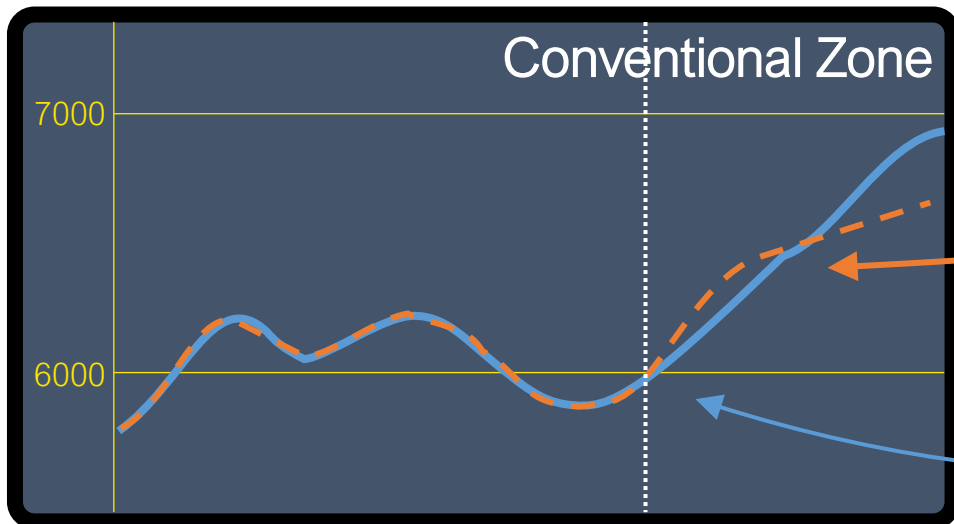
CCL Zone Prog

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Future of Dispatch
Bernie Dolan

Principal Product Manager

Balancing Transformation

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Balancing Programme Engagement event

- On the 15th June the Balancing Programme will be hosting their next engagement event in London.

- As part of our ongoing commitment to keep you, our stakeholders, informed of our progress to transform our balancing capabilities and continue to ensure our roadmap for the future has your input and meets your needs.

- The details of the event are below:

Date: 15th June

Time: 09:00 – 16:30

Venue: Hilton London Paddington, 146 Praed St, London, W2 1EE

Registration is now closed but if you have any questions please get in touch by email to:
.box.balancingprogramme@nationalgrideso.com

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Skips - Root Cause

Sli.do code #ESODispatch

Risk Management

Reason Group	Caused by:	Improve:
Frequency	Time to make decisions	User Experience / Manual workarounds
Flexibility	Complexity of decisions	Situational awareness
Incomplete	Efficiency of dispatch process	Better dispatch advice
Zonal Management	Legacy processes	Dispatch mechanism
Reason not auto assigned	Accuracy of participant's data	Capture required data
	Unavailability of contextual information	Processes and policies

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Skip Rates – Approach to System Changes

Automating & simplifying time consuming, manual processes

Improving Situational Awareness

Improving dispatch advice

Process Improvements

These changes give users additional time and improved information to facilitate merit order dispatch

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Current system improvements to address skip rates

Sli.do code #ESODispatch

Legend:
- Delivered (green)
- To be delivered (blue)
- New system (orange)

Previous releases ← | → Future releases

Timeline: 2021 — 2022 — 2023 — 2024

Release 0 - Winter 21
- Flex Flag: Enabling dispatch advice to make better use of small BMUs
- Power Available: Changes to dispatch advice to prevent unnecessary Wind pullbacks

R2 - Winter 22
- Situational Awareness: Visibility of BOAS per constraint
- New screens to enable quick dispatch of bi-directional units

R4 – Winter 23
- Quick nav from price stack to BOA instruction
- Reduction of 'Nuisance' Alarms
- Visibility of metering overrides
- 'Auto fill' metered wind
- Reducing clicks needed to accept programme

R1 - Spring 22
- Automatic Instruction Repeater (AIR)
- Reducing manual work for dispatch engineer

R3 – Spring 23
- Battery Zone
- Find cheapest battery units & instruct to the edge of each price band
- View forecast profile separate from dispatch advice

OBP Release 1 – Winter 23
- Bulk dispatch
- Enhanced user experience
- Better economic decisions, reduced workload in control room

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Skip Rates - Benefits delivered

12,000 hours per year of control room time is being saved as a result of removed workarounds releasing time to make better decisions

80% reduction in Zonal Balancing Engineer workload during busy times due implementation of Automatic Instruction Repeater (AIR)

40% estimated performance improvement of EDL and EDT as a result of system improvements so no need to phone control points

Improved situational awareness and user experience achieved by various incremental usability changes across systems

Changes to metering visibility due to overrides resulting in better quality of data and improved situational awareness

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- Following the principles of Scaled Agile the new Open Balancing Platform is being developed using Program Increments (PIs)
- We have now completed PI7 (in April) and are now into PI8
- During PI10 we will make our first production release (Dec 2023)

GOAL

A Zonal Balancing Engineer will be able to bulk dispatch fast acting units ("Small BMU" zone) without breaking constraints

Benefits

Reduction in skip rates , better economic decisions, reduced workload in the control room

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OBP - After Bulk Dispatch

Enhanced Visualisation

Our new system makes no distinction between BMUs and non-BMUs – all information is viewed together
Control engineers will not have to look in disparate systems for the information they need

Enhanced Optimisation

Our intention is to co-optimise all services in one place
Different services will be "harmonised", then optimised together, then "de-harmonised" for different instruction types
We want to increase transparency and so a key feature of new optimisation tools is to make certain the tool gives reasons for decisions which can be shared

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OBP - After Bulk Dispatch

BM/NBM combined dispatch

All assets can be part of all services from start

OBP will allow services to be dispatched from one tool
This reduction in workload will allow the control room time to execute decisions

Services will be configurable. We intend to implement this as a business rules engine – essentially, we have a "super contract" with different attributes that can be turned on and off
We have already implemented a "service X" to test this
The aim is to reduce the time to get services established and eliminate the need for manual process in initial deployment

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OBP - After Bulk Dispatch

Increased number of units /aggregation

OBP will cater for a larger number of units
The new design moves away from the use of tables etc and presents information in a superior visual fashion
Our current systems are based on the paradigm of units at GSPs – OBP is not

Training Simulators

We will deliver training facilities to help improve the quality of decisions we make
Replaying "difficult days" will help to further improve dispatch decisions
It would also be helpful to allow external parties to come and use these facilities so they can better understand the challenges

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ESO Dispatch Transparency Methodology

Will Ramsay

Operational Manager

Filter Bid-Offer Acceptances
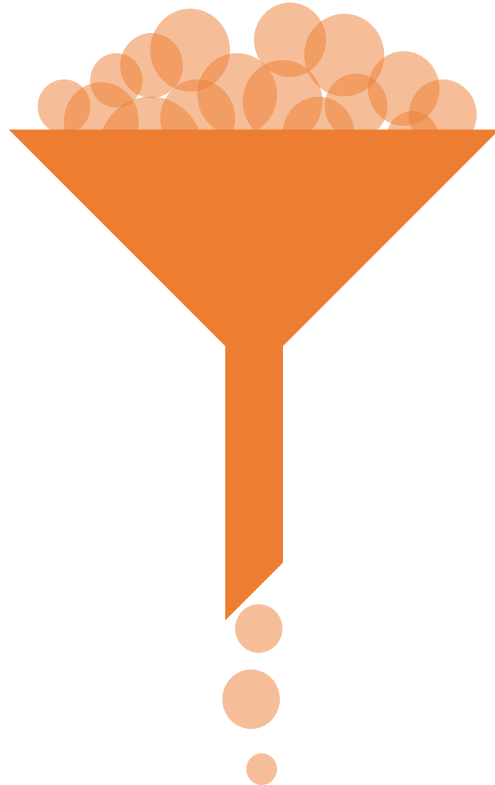
Reasons **for accepting** a bid or offer that appears not to be in merit at the time:

1. System management
   Thermal, voltage or stability constraints
   Maintain minimum system inertia

2. Frequency response
   Repositioning BMU to provide frequency response

3. Unit commitment
   To access to a BMU at another time, it needs to be/remain synchronised

4. Frequency control
   Fast, short burst of energy required to manage a frequency variation

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Filter Bid-Offer Data

Reasons **for not accepting** a bid or offer that appears to be in merit at the time:

1. System management
  Bid/offer would oppose system-flagged offer/bid in same region
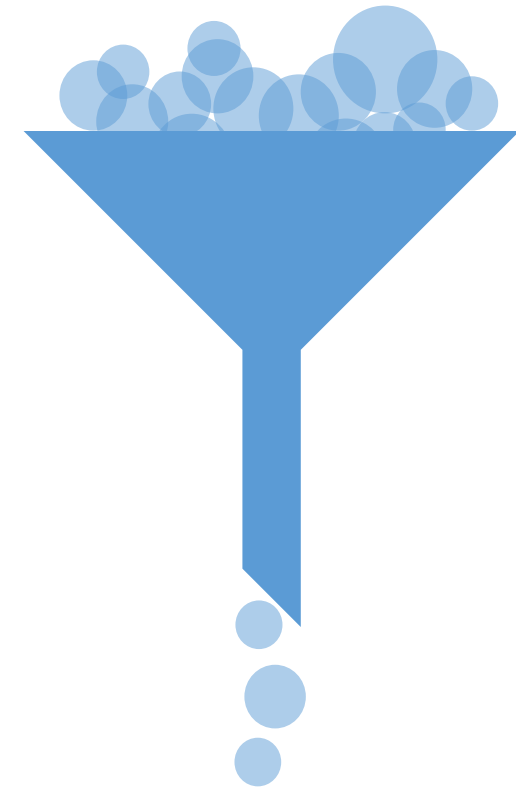
2. Frequency response
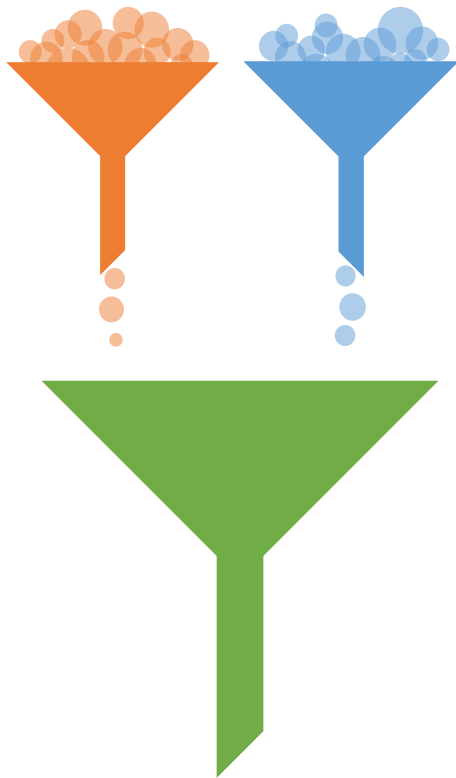 BMU armed for frequency response

3. No available volume
  Volume in the stack may not be accessible (MEL, SEL, MIL, deemed bids)

4. Unit commitment
  The requirement at the time of the instruction may not be compatible with the dynamic parameters of potential alternatives

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Risk management

Ex-post analysis of actions will struggle to identify risk management actions, which tend to relate to units' dynamic parameters and unit commitment

1. Avoiding sterilising options
- Unit 'A' (£110/MWh) is not strictly required right now
- Allowing unit 'A' to desync will make it unavailable for its MZT
- There might be a requirement for Unit 'A' and Unit 'B' soon
- If the need for A+B does not materialise, Unit 'B' (£100/MWh) is not instructed
- Unit 'A' is subsequently allowed to desynchronise

2. Managing flexibility
- In some circumstances, slow/expensive actions may need to be committed early, so that flexible capacity is not exhausted when it is needed
- This works both ways, in most circumstances, slow and expensive actions will be avoided if possible

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Data quality examples (1)
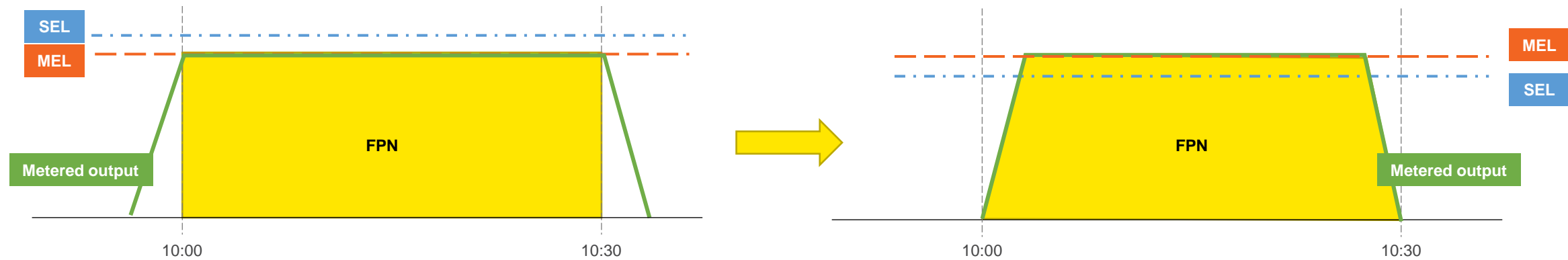
1. SEL > MEL

2. Generating without a physical notification

3. PN inconsistent with dynamic run-up and run-down rates

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Data quality examples (1)

X10 units

MEL

Metered output

FPN

20MW

200MW

10:00   10:30

10:00   10:30
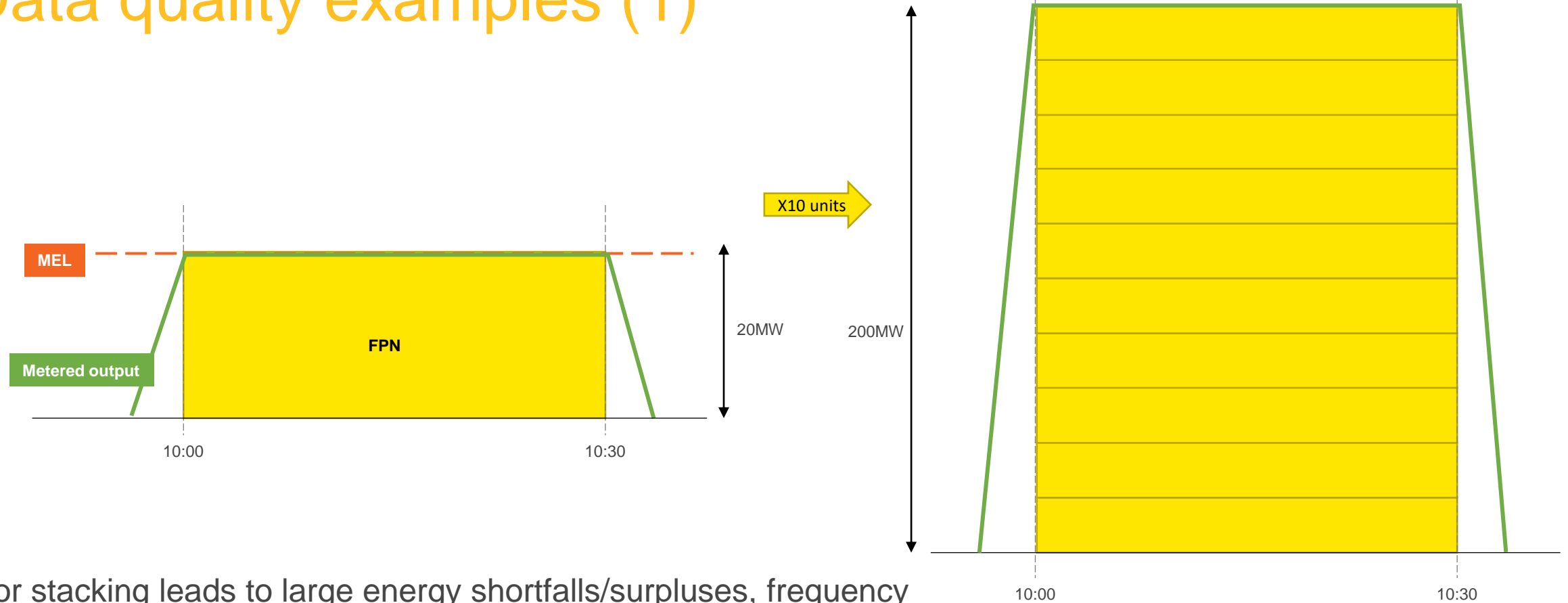
Error stacking leads to large energy shortfalls/surpluses, frequency volatility and results in the need for corrective balancing actions

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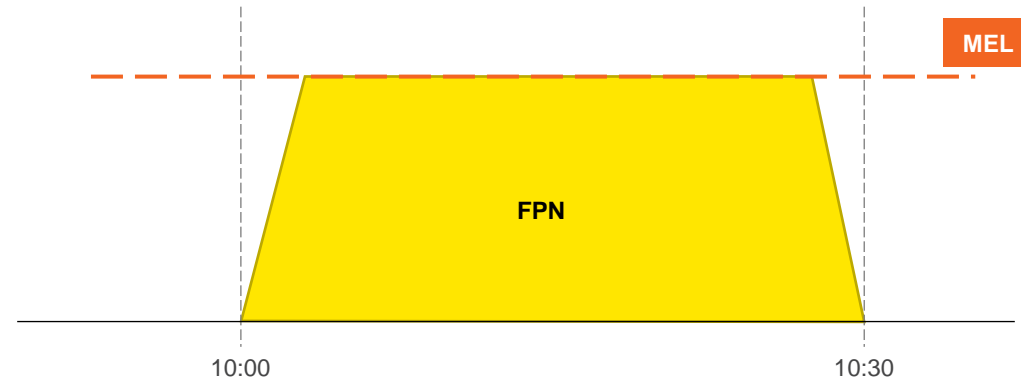
Data quality examples (2)

Data quality examples (2)

Pair	Offer	Bid
+1	£100	£85
-1	£90	£80

SP20

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Data quality examples (2)

MEL

Advance sync

FPN

Delayed desync

10:00

10:30

Pair	Offer	Bid
+1	£100	£85
-1	£90	£80

SP20

Pair	Offer	Bid
+1	£100	£85
-1	£90	£80

SP22

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Data quality examples (2)

MEL

Advance sync

FPN

Delayed desync

10:00

10:30

Pair	Offer	Bid
+1	£100	£85
-1	£90	£80

SP20

Pair	Offer	Bid
+1	£9999	£85
-1	£9995	£80

SP21

Pair	Offer	Bid
+1	£100	£85
-1	£90	£80
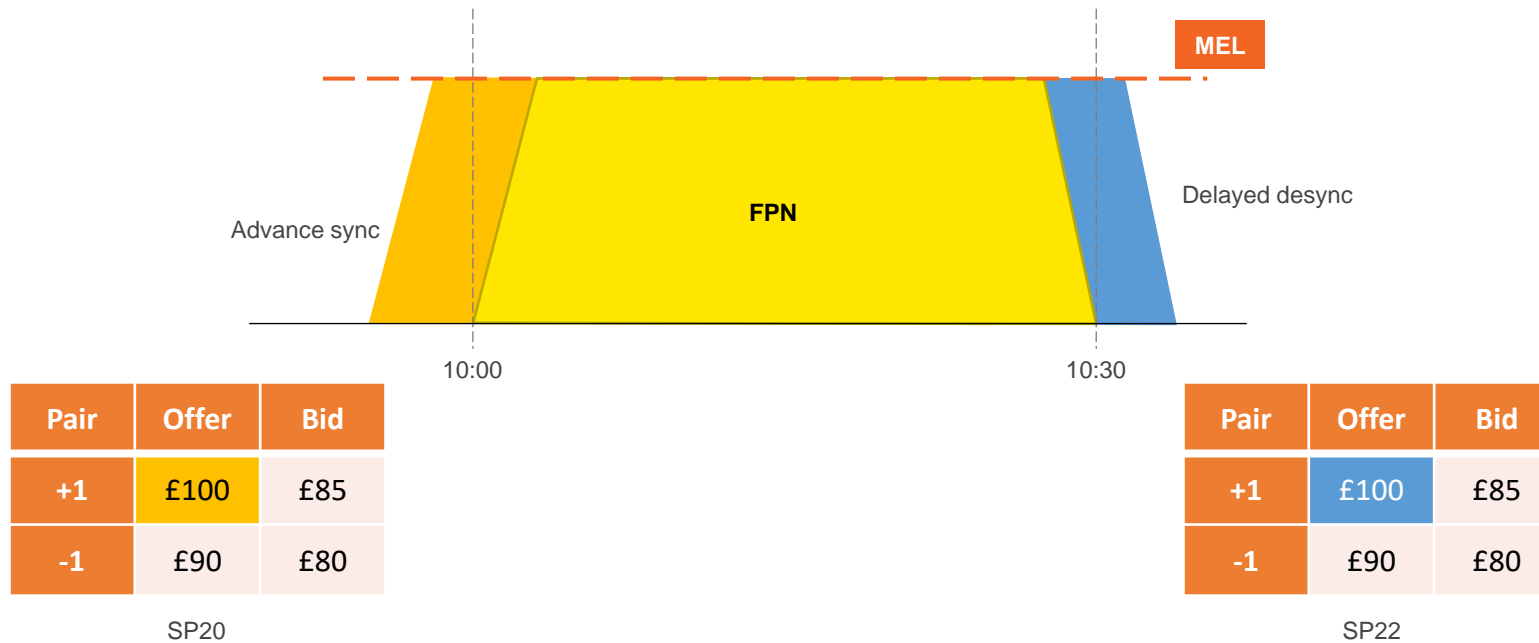
SP22

Offer prices for SP21 make **Advance Sync** and **Delayed Desync** options unviable, despite attractive prices in the adjacent settlement periods

There is no need to use high prices to prevent offer acceptances above MEL.

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Settlement period boundaries
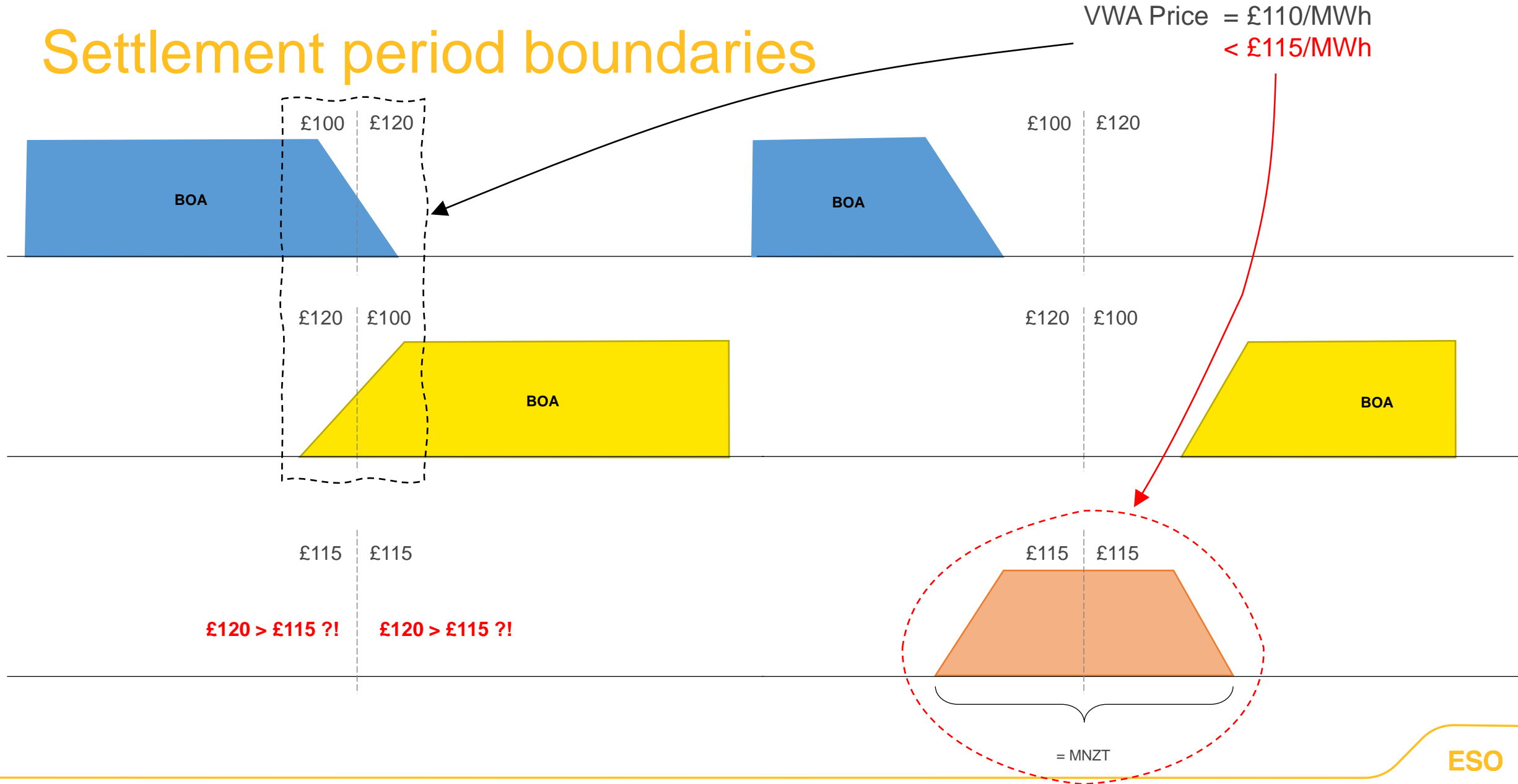
£100 | £120

BOA

£120 | £100

BOA

£115 | £115

< MNZT

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Settlement period boundaries

£100 | £120

BOA

£100 | £120

BOA

£120 | £100

BOA

£120 | £100

BOA

£115 | £115

< MNZT

£115 | £115

= MNZT

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Settlement period boundaries

VWA Price = £110/MWh
< £115/MWh

£100 | £120

BOA

£100 | £120

BOA

£120 | £100

BOA

£120 | £100

BOA

£115 | £115

£120 > £115 ?!   **£120 > £115 ?!**

£115 | £115

= MNZT

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Comfort Break

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Q&A

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What happens next?

- We will publish material and Q&A from today on our website and advise you and the OTF where to find them

- If you answer "yes" to question 4 on the next slide, we will send you a survey request asking for your feedback on today's event and providing an opportunity to comment on the ESO approach to Dispatch Transparency and give us your suggestions for the changes you would like to see.

- We will use your responses to help inform our continuing efforts to increase transparency and understanding of our dispatch decisions.

ESO

Our request of you from today

We need your help to improve what we are doing on Dispatch Transparency, please answer the four questions which will appear on your screen:

1. Now you have attended this event, how well do you feel you understand how the ESO dispatches?

2. On a scale of 0 to 10 how likely are you to recommend future ESO Dispatch Transparency events to your colleagues?

3. Why?

4. Are you willing to complete a more detailed post-event survey asking for your feedback on today's event and providing an opportunity to comment on the ESO approach to Dispatch Transparency and suggestions for the changes you would like to see?

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Thank you for joining us

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