

A man with glasses and a beard is looking out a window at night. The background is dark with blurred neon lights in shades of blue and purple. The man is wearing a light-colored t-shirt with a small circular logo on the chest. The overall mood is contemplative and modern.

Welcome

9 February 2023

A futuristic, curved hallway with blue lighting and people walking. The hallway has a curved ceiling and walls, with a series of vertical supports. The floor is dark, and there are glowing blue lines on the wall and ceiling. Several people are walking away from the camera in the distance.

Balancing Programme

Quarterly engagement session

9 February 2023

Welcome



#BPQuarterlyWorkshop

An aerial photograph of a river with white water rapids. The water is a mix of dark green and white foam. Overlaid on the right side of the image are several bright blue, wavy, energy-like streaks that appear to be emanating from the top right corner. The text 'Introductions & Aims of the day' is centered in the lower half of the image in a white, sans-serif font.

Introductions & Aims of the day

Aims of today

- We want to share our progress on what we have delivered to date
- We want to give you insight into how we are transforming the balancing capability of our control room
- We want your input into how our system transformation will impact you
- We want your insight into how we tackle some of the key challenges of transforming our balancing capabilities

Agenda

Time	Title	Details
09:30 – 10:00	Arrival	Tea and coffee
10:00 – 10:05	Welcome	Welcome and housekeeping
10:05 - 10.15	Balancing Programme Vision & Strategy	Objectives and vision of the Balancing Programme Collaborating with Stakeholders
10.15– 11.30	Update on our progress to date	Successes What has been delivered in our existing systems Skeleton IT Systems Laying the foundations for the Open Balancing Platform to enable future delivery Skip Rates in Existing systems Progress made based on feedback from stakeholders, the changes implemented to our current systems and the benefits delivered MW Dispatch System developments we are implementing for MW dispatch, the value to stakeholders and how control room view the change. Storage SH Group Purpose of group and key objectives
11.30-12.00 Lunch (12.00 -12.45) 12.45-14.15	Future Deliverables (4 x 30 minute breakout sessions)	Open Balancing Platform (OBP) demonstration Demonstration of OBP Developments OBP collaboration Discussion on optimisation & instruction principles Axe the fax Overview of the activity that we're commencing replacing fax machines and legacy comms line and seek feedback on potential solutions Forecasting Roadmap view, current performance, Forecasting challenges and the need for change
14.30 – 15.15	Q & A Panel	Opportunity for attendees to ask questions
15.15 – 15.30	Close	Recap of the day and opportunity to provide feedback

How will today run?

Meeting Environments



Breakout sessions will occur during the course of the day



We want these sessions to be mutually beneficial for both the ESO and our stakeholders



We would like to set some meeting norms ahead of these sessions, so that they can be productive as possible



We will take discussions and feedback from these sessions into consideration moving forwards

Event environment – what can you do to get the most from the session



- Be prepared to contribute
- Be present during the session
- Maintain energy levels
- All ideas welcome

Breakouts

- Reserve judgement when generating ideas
- Be prepared to give feedback
- Enter into open and honest discussions
- Reflect after the sessions – What went well? What could go better
- Feedback options

A landscape photograph of a field at sunset. The sun is low on the horizon, casting a warm glow. In the foreground, there are several bright, glowing green light trails that curve across the field, suggesting movement or energy. The background shows a line of trees under a cloudy sky.

Balancing Programme Strategy and Vision

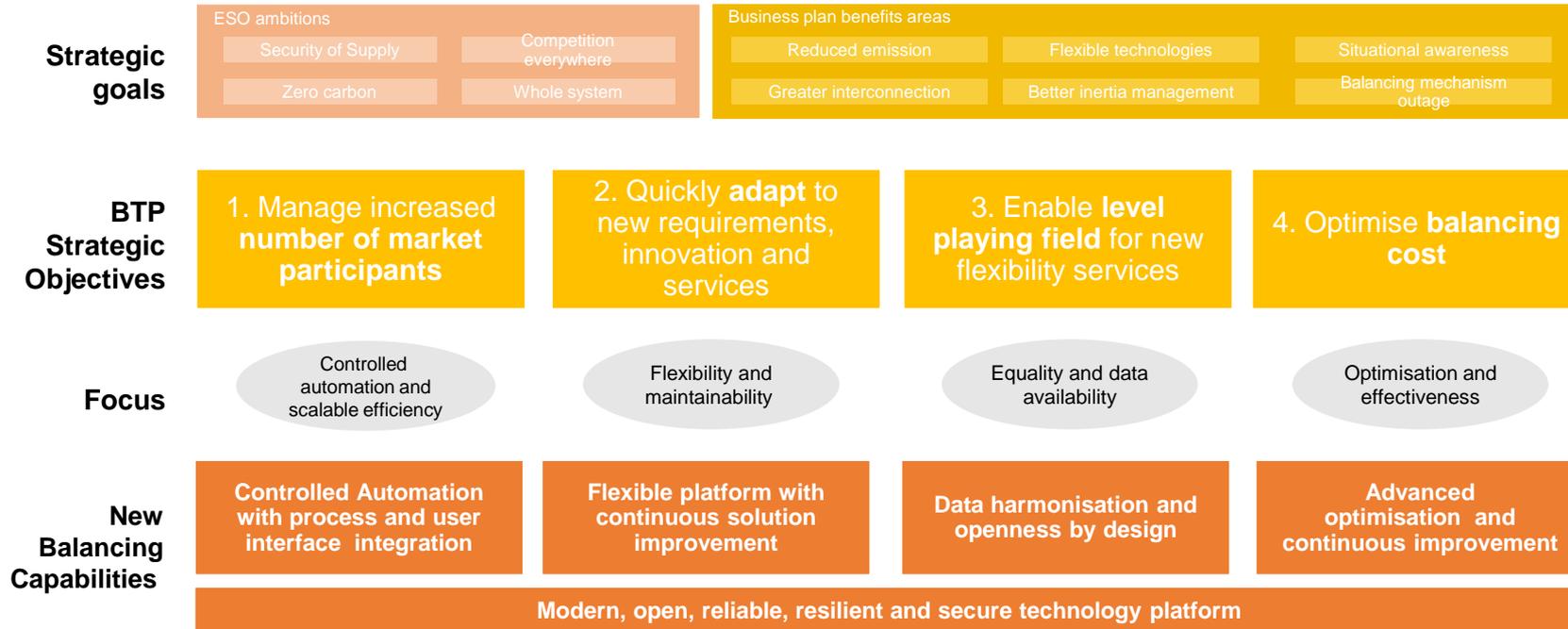
Balancing Transformation



- **Improving** existing systems
- **Develop** the future systems
- **Enhancing** the balancing capabilities of our control room
- **Deliver** significant benefits

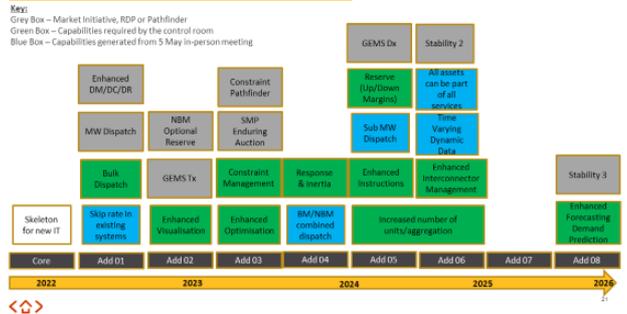
Balancing Transformation vision

The programme strategic objectives and the new enabling business capabilities were set to address the scalability challenges and modernise the core platforms to provide increased reliability and flexibility in line with RIIO-2 business plan



What have we done so far

Industry co-created roadmap



<>

Roadmap: A roadmap which stated when functionality would be delivered by the balancing programme.

This was first time we have ever created a plan that pulls together control room requirements, market initiatives and industry's requirements.

Benefits and the case for change

Direct benefits delivered by Balancing Transformation

Submission	2021/22	2022/23	2023/24	2024/25	2025/26	Total
Dec 2019 ¹	£9.4m	£12.1m	£30.7m	£44.5m	£55.7m	£152m
June 2022	£0m	£0.5m	£11.6m	£55.0m	£123.8m	£191m

Other programme benefits

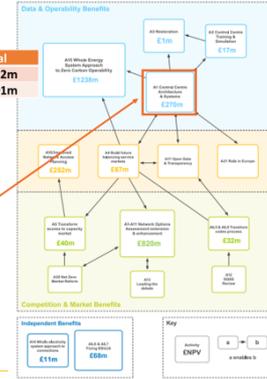
Capability	RIIO-2 benefits
Platform for Energy Forecasting	£1,048m
Balancing Asset Health	£23m (for FY23) ²

Net present value (NPV) delivered by Balancing and Network Control)

Submission	5 year NPV
December 2019	£1,754m
August 2022	£2,467m

¹ - half of the A1 CBA as submitted in the December 2019 RIIO-2 plan

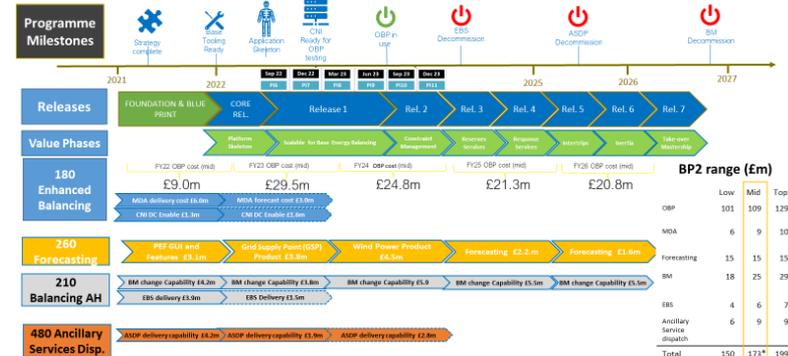
² - figure for FY23 only as scope of work for remaining years has not been confirmed. Work will be delivered in an agile way, responding to requirements.



Benefits: Articulation of the benefits from the implementation of the roadmap

Value for money: Implicit from relationship between costs and benefits

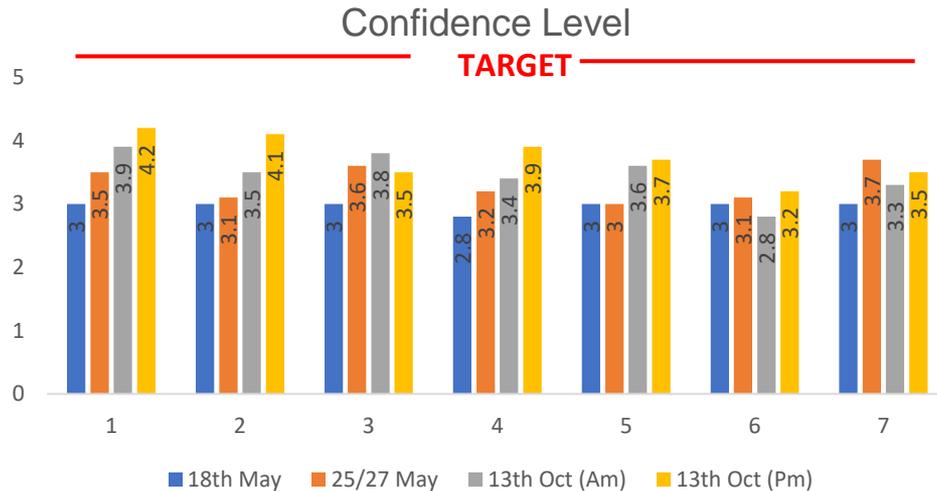
Transformation Roadmap Totex Ranges Overview



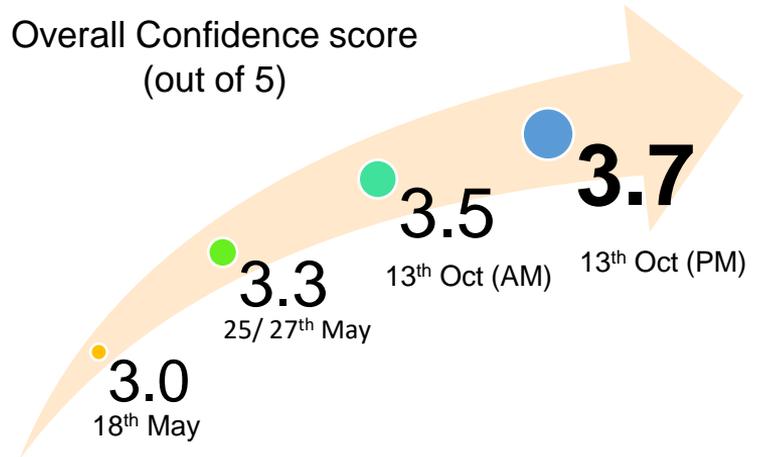
*Estimated cost for 18 May industry workshop at £164m, which excluded Modern Dispatch Analyser and CNI Data Centres.

Costs: High level estimates to deliver the roadmap during BP2 period

Confidence Levels



Overall Confidence score
(out of 5)



Confidence Questions: On a scale of 1 to 5 (1 = Low – 5 = High)

Q1: How confident are you in the approach we are proposing to take to deliver the initial roadmap?

Q2: How confident are you that we have captured the benefits accurately?

Q3: How satisfied are you with the timeframe of the initial roadmap? (does it deliver when you need it to)

Q4: How confident are you that the proposed initial balancing capability roadmap will deliver the quality and what you need?

Q5: How confident are you in the ESO to deliver to the proposed roadmap?

Q6: How confident are you that you understand the cost associated with the initial roadmap?

Q7: How satisfied are you with the costs compared to expected benefit delivery?

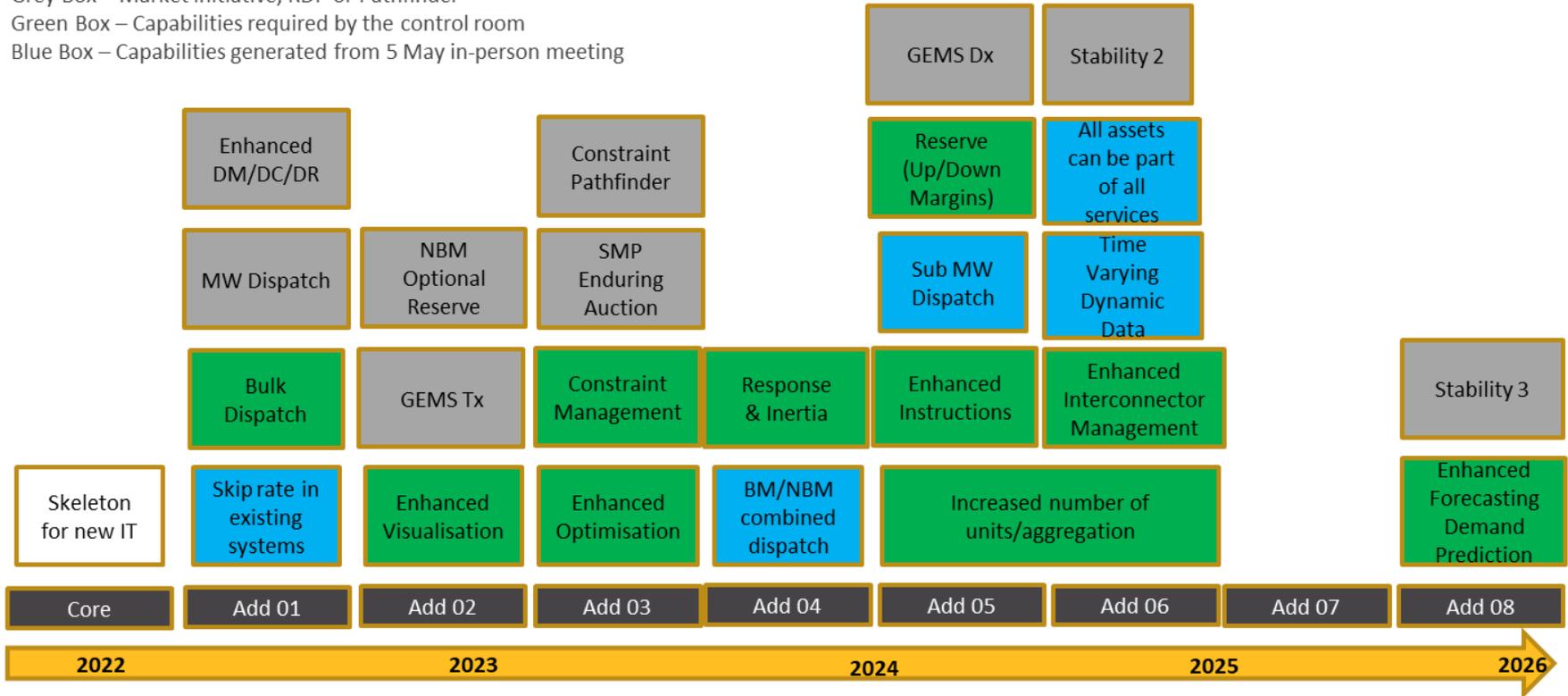
Industry Co-created Roadmap

Key:

Grey Box – Market Initiative, RDP or Pathfinder

Green Box – Capabilities required by the control room

Blue Box – Capabilities generated from 5 May in-person meeting



A landscape photograph of a field at sunset. The sun is a bright white circle in the upper right, casting a warm glow. The sky is filled with soft, grey clouds. In the foreground, there's a field of tall grass. Overlaid on the scene are several bright green, glowing light trails that curve across the middle ground. The bottom of the image features a solid yellow footer with a white curved shape on the right side.

Update on progress made

Completed: BM R2 – 17 November & 6 December

User experience

- Modifications for Demand Flexibility Service (DFS) – DFS instructed ~10 times including tests
- Improvements to Auto Instruction Repeater (AIR) functionality – reduced need for additional resource
- Enhancements to Constraints page - clearer visibility of constraint actions
- Fixes to Stable Export Limit button on price stack - improves dispatch accuracy when workload is high

Business plan & regulatory

- Fast keys for Voltage Pathfinder & Frequency Response services to reduce manual actions
- Data fixes for CMP326 compliance to ensure accurate settlements for frequency response
- Improved Frequency Response awareness

Asset Health

- Performance improvements to key computational processes
- Performance improvements to how EDL handles re-declarations
- Increasing number of Short-Term Operating Reserve contracts that can be loaded
- Increase interconnector limit in BM

BOAs IN CONSTRAINT: ZONSHORE

BMU	BOA	Target MW	End Time	Return MW	Return Time	Cost (£)	Highest Price (£/MWh)
	32919	35	6-SEP 16:59	36	6-SEP 17:00	23.00	69.00
	32836	62	6-SEP 17:02	63	6-SEP 17:03	35.50	71.00
	7426	80	6-SEP 17:03	81	6-SEP 17:04	24.38	48.76

BACK

0

CONSTR

1

LIMIT

2

OVIEW

3

GENS

4

LINES

5

B_SEL

6

SOFLAG

7

PSTACK

8

HELP

9

Completed: ASDP R13 – 8 December 22

User experience

- Situational awareness enhancements to enable control room to nominate most economical units to dispatch for Fast Reserve
- Active health status from service providers through heartbeat signal, including alerts in case of failures
- Physical notifications for units providing response for visibility to the control room at unit, Grid Supply Point (GSP) and service type level

Business plan & regulatory

- Enhancement of ASR Response availability service to receive redeclarations between 0 MW to contracted MW
- ARM/DISARM Frequency Response services, units under Dynamic Regulation (DR), Dynamic Moderation (DM) and Dynamic Containment (DC)
- Availability and arming status for response services sent to settlements daily

Asset Health

- Security enhancements
- Technical optimisation for performance improvement and better user experience

New Situation awareness pop-up

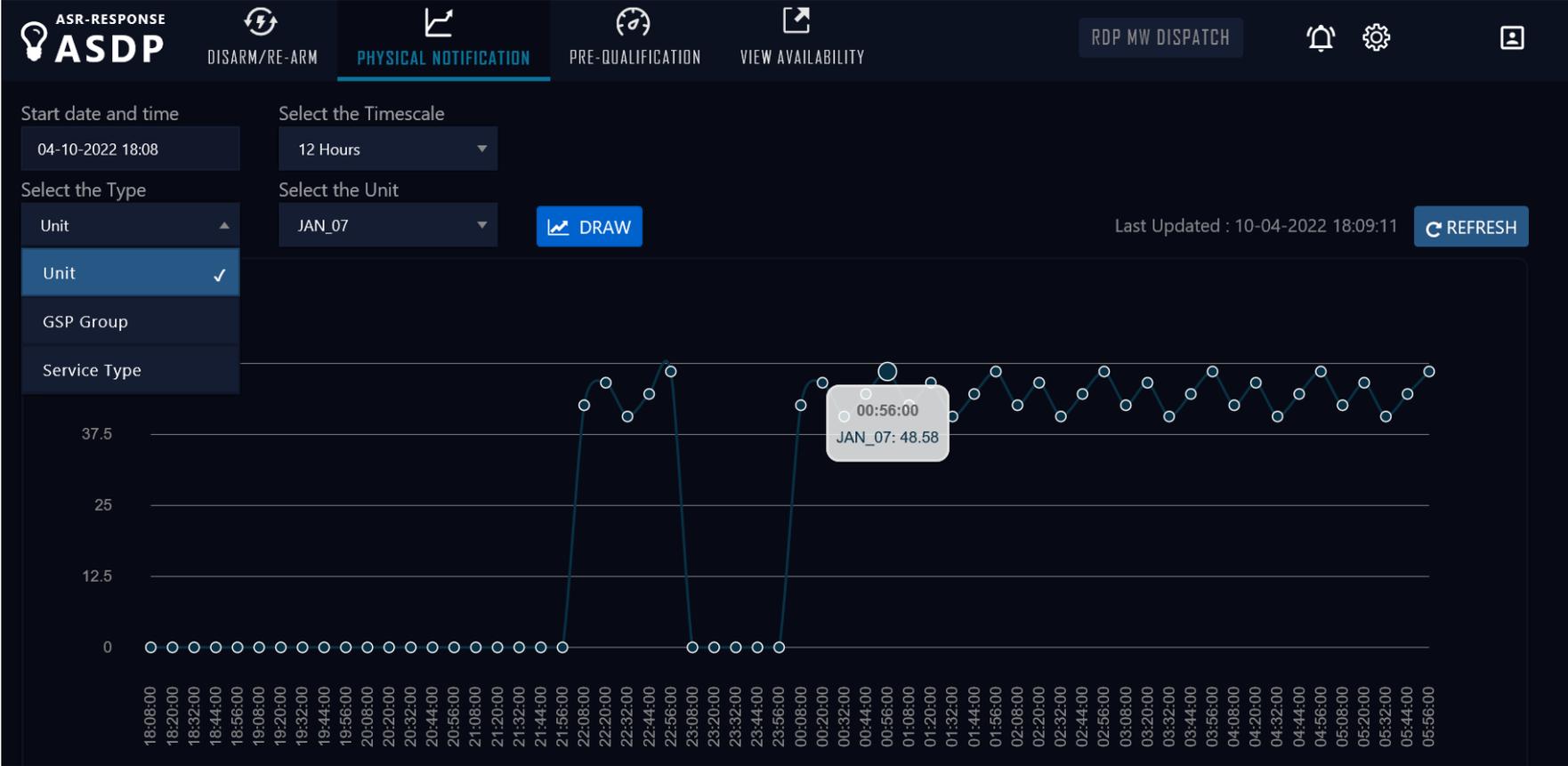
Upon clicking on Confirm button

The screenshot displays the ASDP interface with a central notification pop-up. The background interface includes a 'DISPATCH AVAIL' gauge showing 40 Offers, a 'UNARMED RESERVE' section, and a 'DISPATCHED' table with columns for RTM, CEASEABLE, and RCVY. The notification pop-up is titled 'NOTIFICATION TO REVIEW CHEAPEST CONTRACT FROM NOMINATION' and contains a table with the following data:

Service Type	Contract ID	MW	Util Price	Availability Price
OPT_FR	[Redacted]	60	11	30
OPT_FR	[Redacted]	30	13	10
OPT_FR	[Redacted]	36	12	25

Below the table, a warning message states: 'Back to nomination will redirect to Nomination screen to review the cheapest contract before sending dispatch instruction.' At the bottom of the pop-up are two buttons: 'BACK TO NOMINATION' and 'CONTINUE'. The 'CONTINUE' button is highlighted in blue. The background interface also features a 'RESET' button and a 'CONFIRM' button at the bottom.

Completed: ASDP R13 – 8 December 22



Completed: ASDP R13 – 8 December 22

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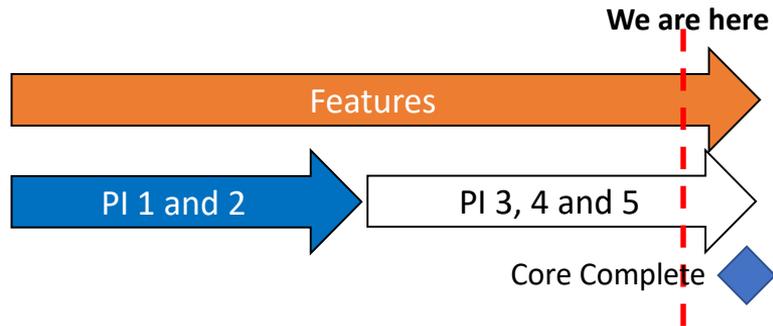




Skeleton IT Systems

Core Skeleton Phase

The 'Core' skeleton of Open Balancing Platform (OB)P was completed at the end of September. This delivered a basic platform for us to then deliver the functional & non-functional features in subsequent Programme Increments, which in turn deliver the value, release-by-release.

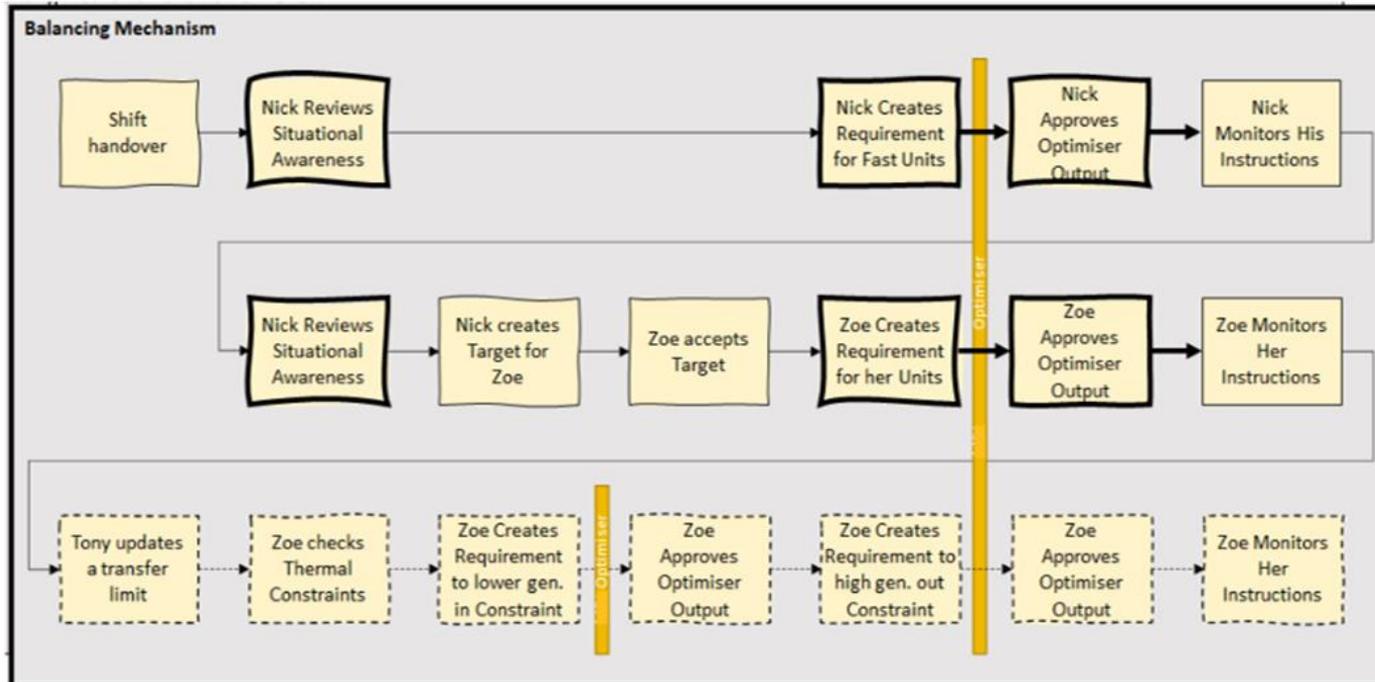


- Enable development across all technologies
- Enable the ability to system test requirements
- Enable microservice to microservice integration
- Enable microservice integration to front end screens
- Proving support for basic balancing story board



Objectives of Core

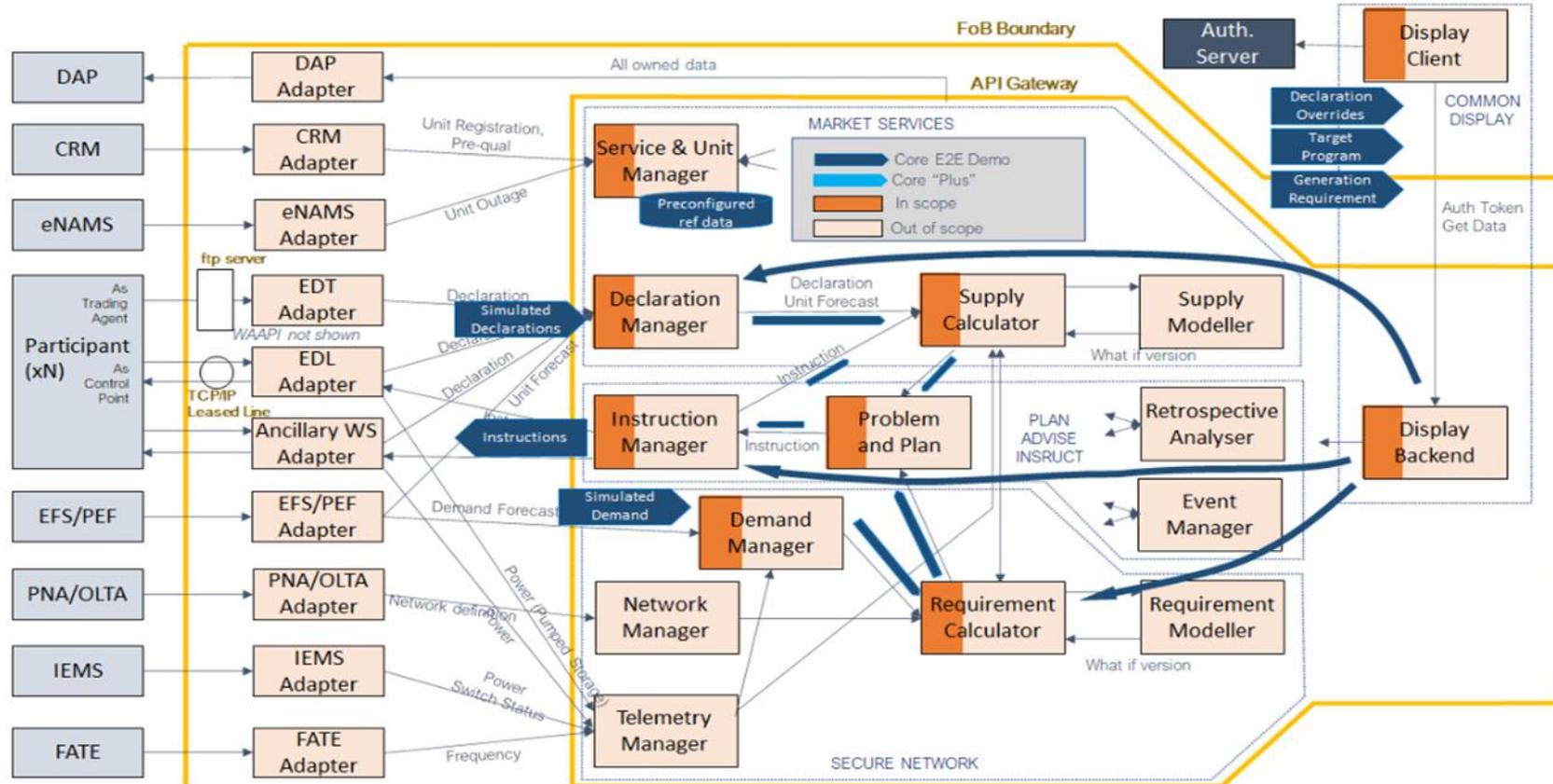
Core enables the basic Balancing Story Board



“Core” has enabled the essential process of balancing

- receiving and harmonising declarations
- placing alongside target programs for requirement creation
- determining the optimum set of instructions to be submitted
- feedback into the residual calculations

What this does in detail



A landscape photograph of a field at sunset. The sun is low on the horizon, casting a warm glow. The sky is filled with soft, wispy clouds. In the foreground, there is a field of tall grass. Several bright green, glowing light trails curve across the middle ground, creating a sense of motion and energy. The overall mood is serene yet dynamic.

Dispatch Transparency & Skip Rates

Dispatch Transparency & Skip Rates

- 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 has to manage several operational variables such as voltage requirements, system stability and thermal constraints simultaneously. **Instructions are sent to generators to manage these with consideration for overall cost**
- Skips are classified and published in the **Dispatch Transparency dataset**

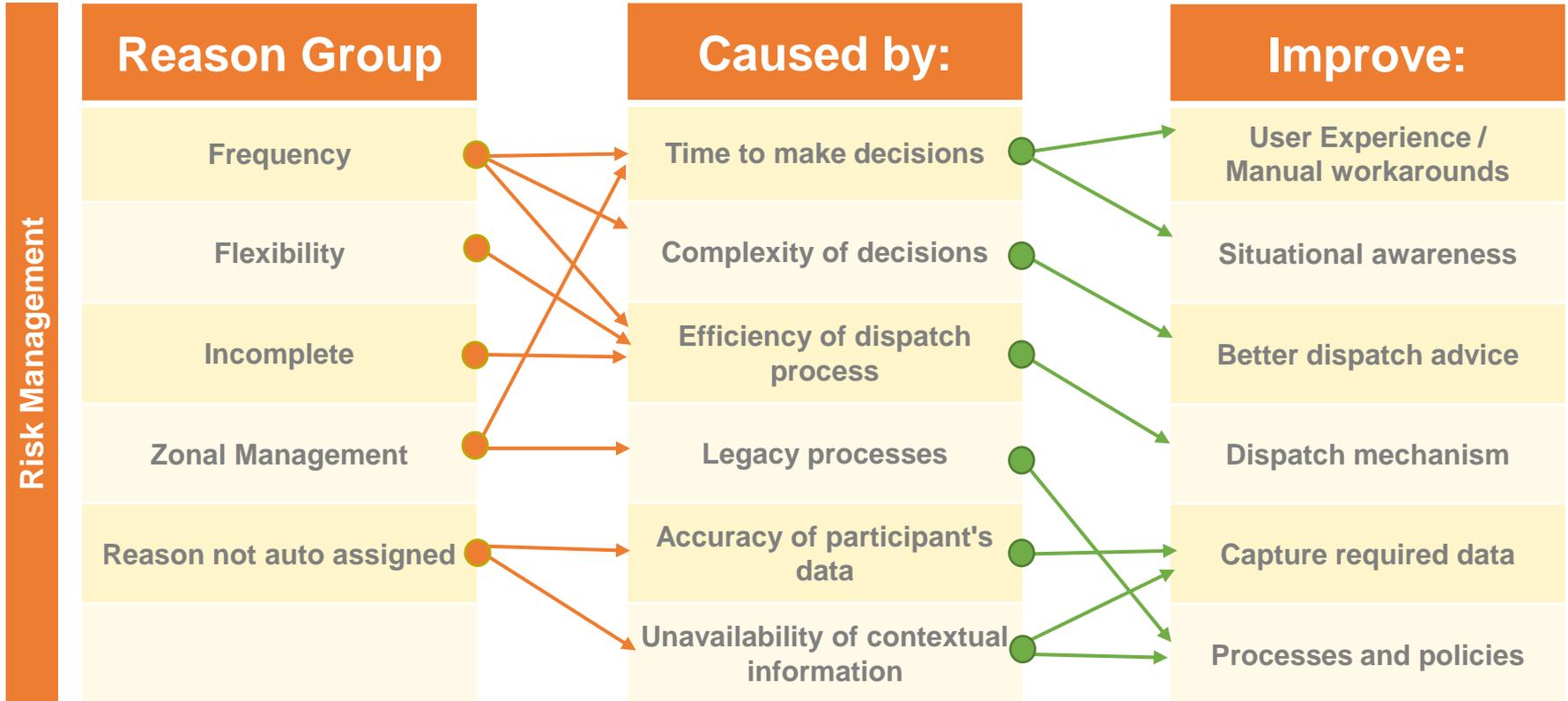
Why are they of interest?

- The majority of skips are taken for operational reasons and are not preventable. Genuine skips where alternative instructions could have been sent for a lower cost are rare
 - **Example:** 29 January 2023, 3 unclassified skips out of a total of 2,787 actions
- The ESO strives for zero preventable skips
- The ESO has a licence condition to operate efficiently and economically and a target to reduce balancing cost as much as possible

Work ongoing in this space

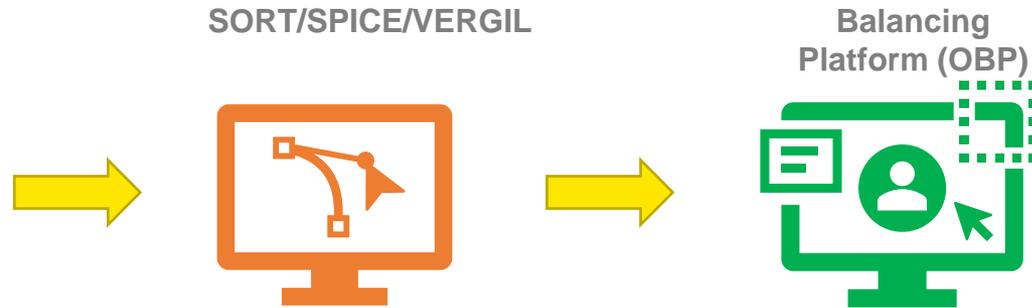
- Dispatch Transparency dataset published weekly showing volume of actions and number of unassigned skips
- In person dispatch transparency session event on December 5th discussed:
 - ESO's current dispatch methods and the future of dispatch
 - Current ESO Dispatch Transparency methodology
- OTF update in December on content covered

Skips – Root Cause

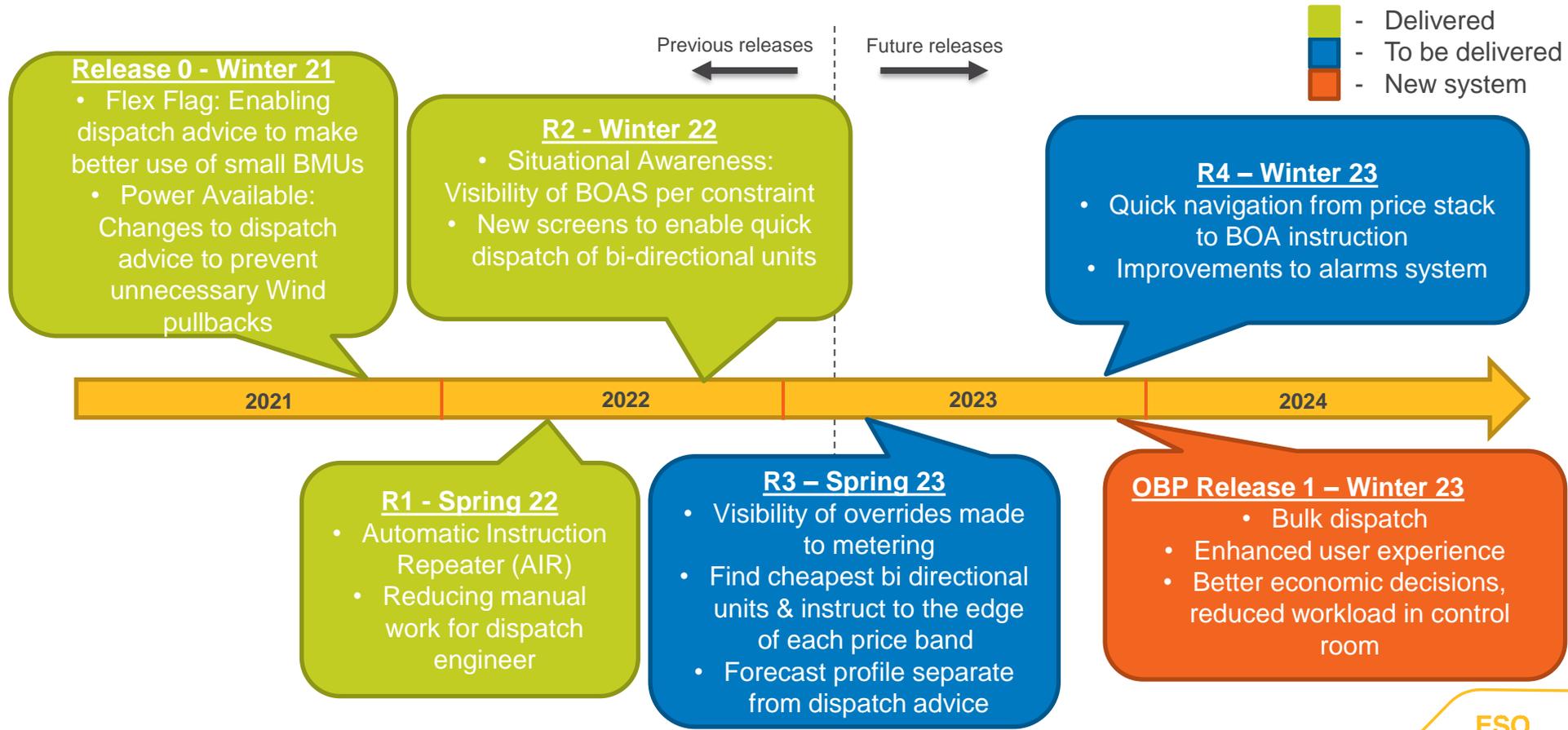


Incremental changes to reduce skip rates

Improve:
User Experience / Manual workarounds
Situational awareness
Better dispatch advice
Dispatch mechanism
Capture required data
Processes and policies



Current system improvements to address skip rates



Skip Rates - Benefits delivered (in ENCC & Data)



12,000 hours per year of ENCC time is being saved as a result of removed workarounds



80% reduction in ZBE 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



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



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



MW Dispatch

Megawatt Dispatch

What Is It?

- Turn down to zero service for distributed non-BM participants
- Pre-fault service used intra-day to manage transmission thermal constraints
- Providers are paid for the MW volume they have curtailed. No availability payments applicable
- To be trialled with National Grid Electricity Distribution at 8 GSPs initially and then followed by UK Power Networks
- Utilises legacy Distributed Energy Resource Management Service (DERMS)/Active Network Management (ANM) and SCADA (PowerOn) systems
- Minimum size of providers is 1 MW

Why develop it?

Improve Coordination

- Provides whole system approach to manage transmission level thermal constraints
- Improve outage co-ordination between ESO and DNO
- Provides test bed for Primacy work

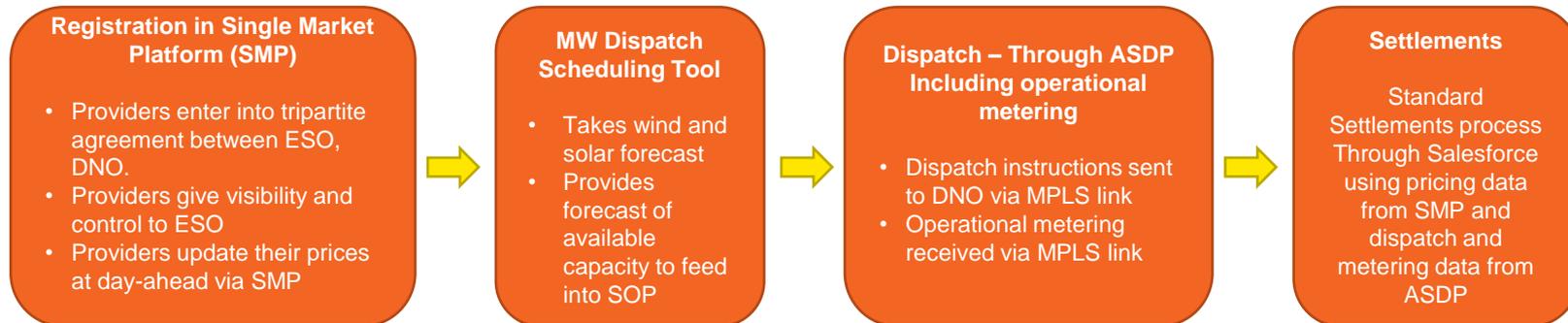
Market providers benefits

- Provides a way for Distributed Energy Resource (DER) to fulfil their Visibility and Control Connection Agreement terms
- Allow faster, more cost-effective participation in services

ENCC benefits

- Offers ESO additional resource to manage constraints
- ENCC can Dispatch non-BM DERs near to real-time
- Additional ICCP links will provide situational awareness to ENCC

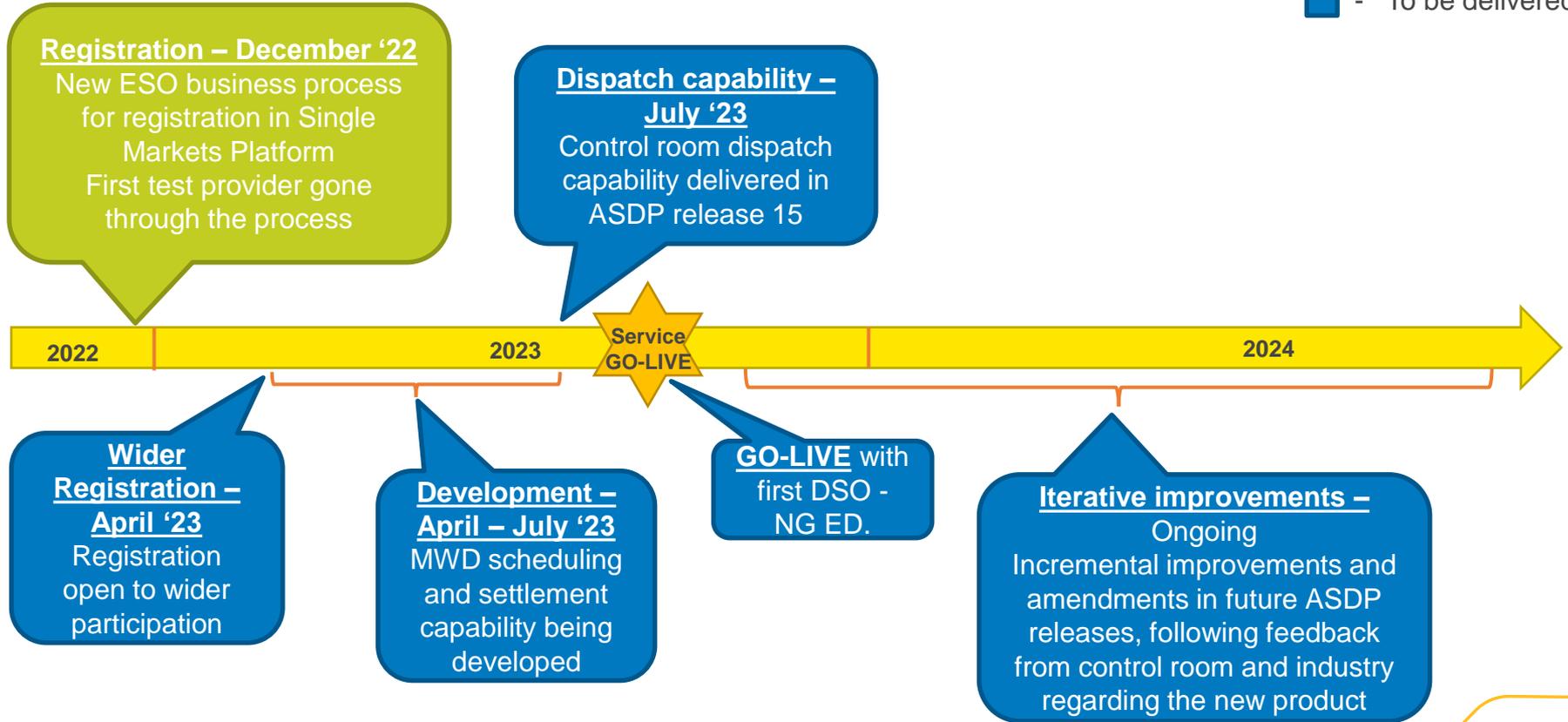
So how does the MWD process work?



Megawatt Dispatch (MWD) system development

#BPQuarterlyWorkshop

-  - Delivered
-  - To be delivered



A landscape photograph of a field at sunset. The sun is low on the horizon, casting a warm glow. The field is a mix of green and golden-brown grass. Several bright green, glowing light trails curve across the middle of the image, suggesting movement or energy. The sky is a mix of orange, yellow, and blue.

Storage Stakeholder Group

Key objectives

- Align internal balancing enhancements with industry expectations
- Active involvement in sessions to identify and work through problems and opportunities
- Work together on potential grid code changes to allow for smooth transitions
- Provide an empathic voice for storage market participants within the balancing programme
- Work together to understand the current pain points of market participants
- Work with the group to put forward changes to current processes such as the “15 min battery workaround”
- Align our internally generated personas with market participants
- Agree future ways of working and operational parameters for limited storage units

Meet the Storage Stakeholder Group

Rhys Oliver



Department for
Business, Energy
& Industrial Strategy

Olly
Frankland
regen
transforming energy

Dan Brimelow

Origami
ENERGY TECHNOLOGY

Currently building
a snowman

Charlotte
Horne

ESO

Richard Sykes

ESO

I like new technologies,
spending time with the
kids and user centric
design practices

Mark Howitt

STORELECTRIC

New technologies,
long walks in the
hills, church

Gary Preece

Highview
Power®

Davide Miriello

enel x

Beth Warnock

CATAPULT
Energy Systems

I like to guess the
name of the Tx line
when driving around the
country

Matthew Margot

Elpower
power electronics

Long walks with
the dog

Giorgio Balestrieri



Making the UK
system 100%
carbon-free

Mike Ryan

CONSTANTINE
ENERGY STORAGE

Herding kids

Steve Sinclair

Flexitricity

I make beer in my
utility room when not
optimising batteries

Giulio Beseghi



Nick Huntbatch
Head of Product at
Electron

ELECTRON

Multi-market flexibility
platform

Paul Rowe-Jones

ZENOBE

Skiing and
drawing graphs.

Deepak Lala

ESO

Enabling zero
carbon transition

Semih
Oztrevés

ZENOBE

Progress and outcomes so far

Shorter term

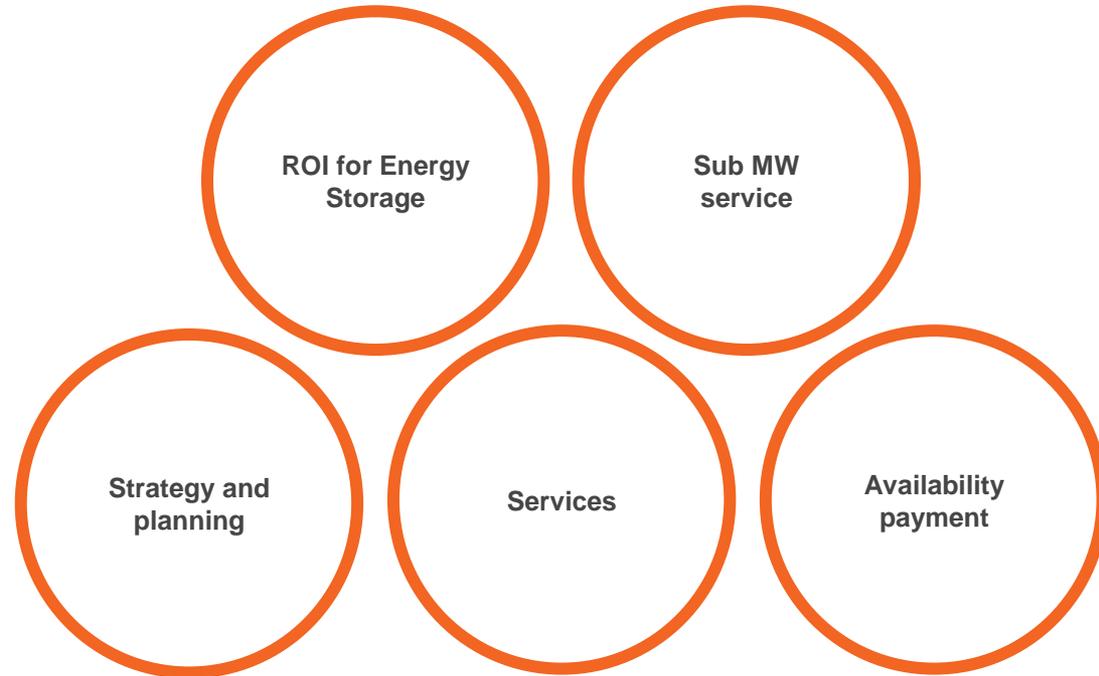
- Clarified assumptions that have unblocked work for OBP release 1
 - Programmatically calculating MWh based on MEL/MIL. Currently a manual workaround in current systems
 - Clarified unwritten rules and practices
 - The shorter term clarification has also help us build for the future in OBP
- Started to work together on some iterative changes for market data specifically to give new systems better visibility
 - Technical codes teams have been engaged with us since the group started
 - We want to work together, both the technical codes team and the storage stakeholder group to get the right solution for everyone



Progress and outcomes so far

Longer term

- First session had an open floor for conversations about challenges and pain points directly from stakeholders
- Grouped these into themes
- Deeper discussions around each themes challenges and pain points
- Next session in March to involve other parts of the ESO on some of these challenges
- Continue these meetings to continually work towards improvements for everyone



There is enough conversation to keep us going for a while!

Find out more and join

Scan to join our Storage
Stakeholder group



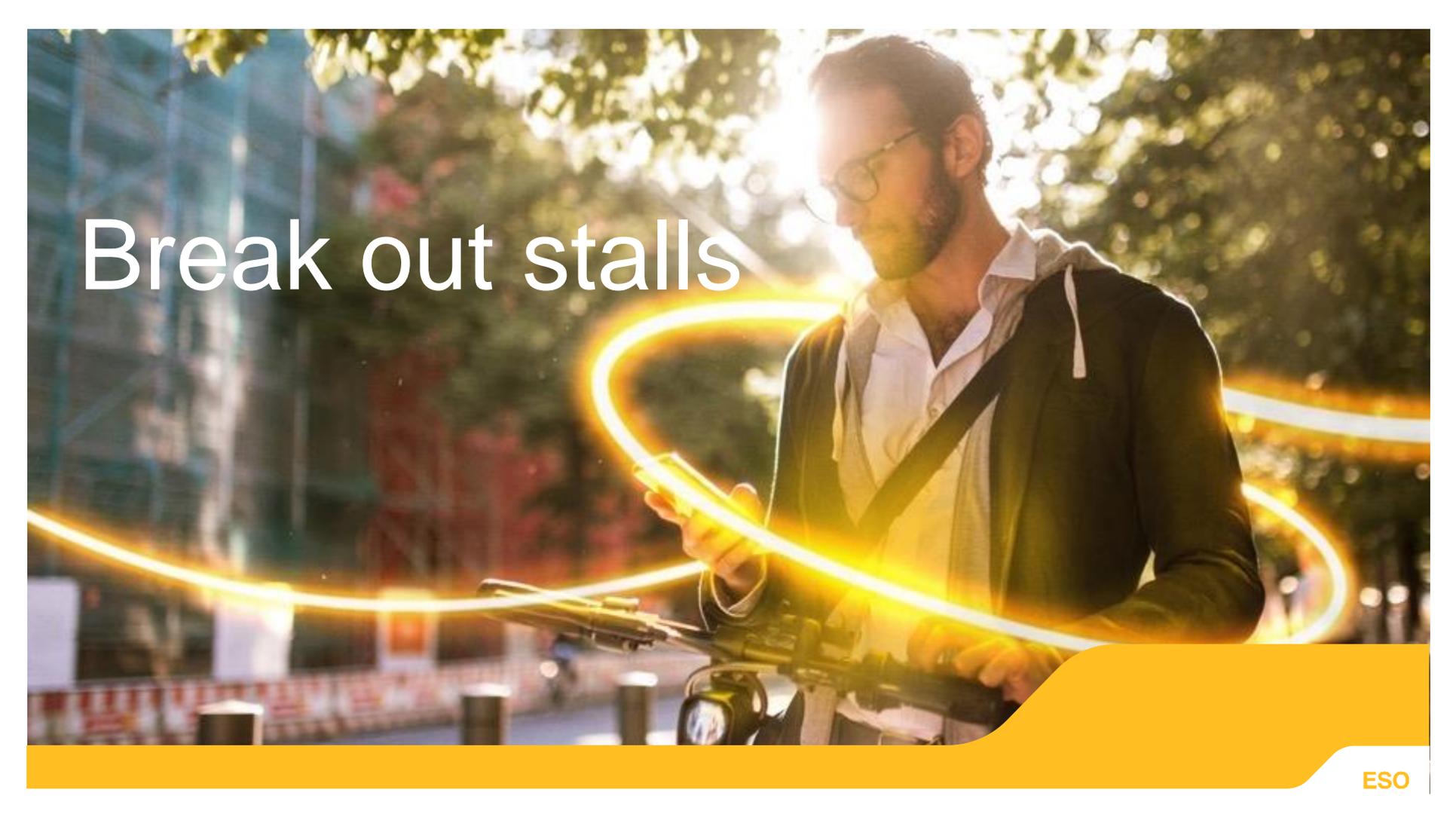
Check out the Mural
board



More about the
balancing programme



Break out stalls

A man with a beard and glasses, wearing a dark jacket over a light shirt, is riding a motorcycle. He is looking down at his phone. The scene is set outdoors with trees and buildings in the background. The image is overlaid with several glowing yellow light trails that form loops around the man and the motorcycle. The overall lighting is warm and golden, suggesting a sunset or sunrise.



Open Balancing Platform (OBP) Demonstration

The problem of scale – National Balancing

- The Control Room has a manual based process for the interpretation of optimisation and subsequent dispatch
- With increasing number of smaller units, the Control Room has an urgent need to scale and automate its processes for optimisation, dispatch and monitoring



Existing – What have we just seen?

- Heavily dependent on manual activity
- Control Room have to search and find units to dispatch individually
- Unit data is not always valid
- Users have to manually enforce rules such as the "15 minute rule for batteries"
- Dispatch in cost order may not be cost optimised overall
- Time taken (40s) for individual instruction leads to drive to send fewer but larger and longer instructions
- Pressure and stress impacts during impacted periods
- Time spent “doing” rather than “managing”

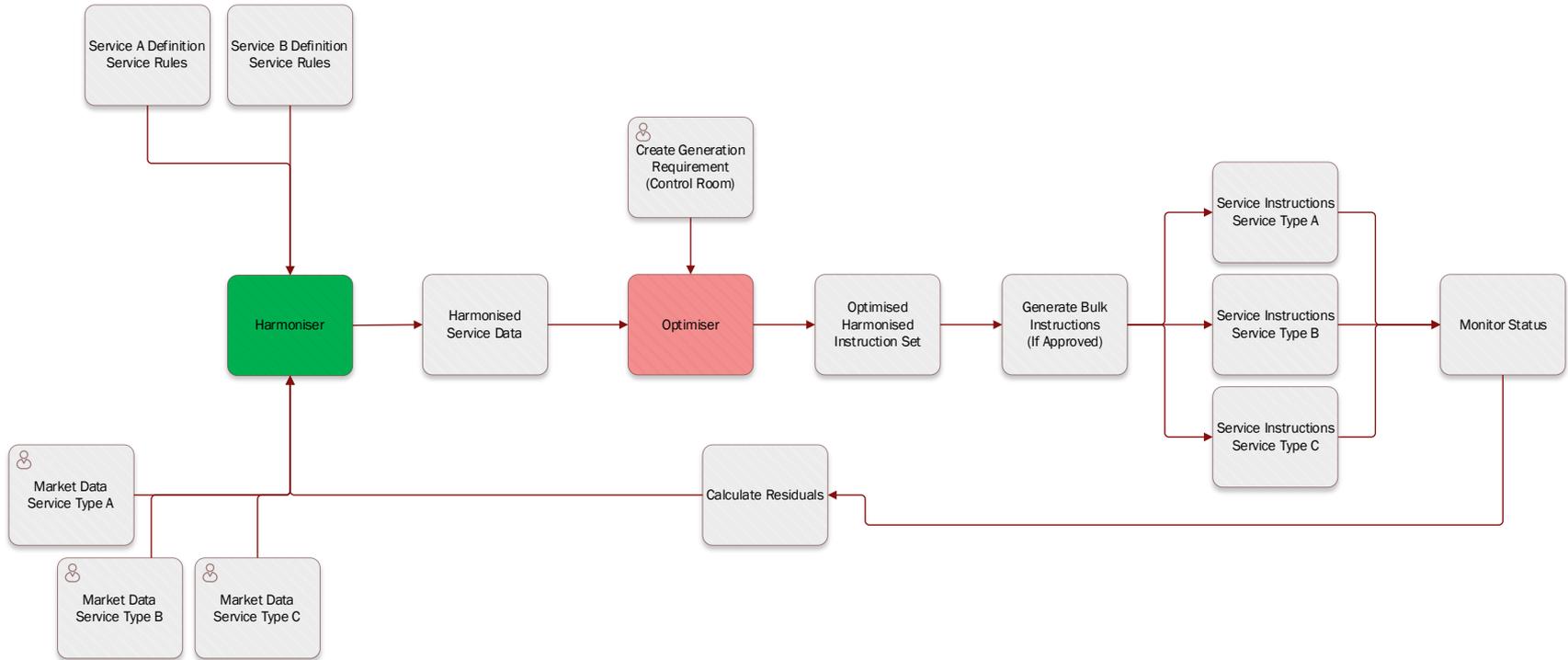
Restrictions

- OBP and our existing BM system will be operating in parallel
- Required to manage co-existence where units may be managed in existing systems
- Applies a directional clamp for dispatch action
- Enables OBP processes such as battery logic (until new processes)
- Manages communication down
- Ensure no “unpicking” of earlier actions in the existing BM system

Category	Description
Battery Management	Restriction applied when a battery has been instructed. Removed when a new MEL/MIL redeclaration received
Constraint	Unit restricted (directional) due to a constraint
Comms Failure	Unit restricted due to a failure in their comms link (e.g. EDL is down)
Flexibility	Unit is restricted due to limited flexibility (e.g. nuclear plants)
Response	Unit is restricted as instructed for response
Reserve	Unit is restricted to adhere to a reserve contract
Data Reliability	Unit is restricted because of data reliability issues such as bad data
Managed in BM	Interim reason while transitioning from BM to OBP. Specific types of units can be excluded from the OBP system until the system can manage them
Other	Unit required to be restricted but none of the above reasons apply

Note: new categories can be added should a specific scenario reoccur

The new end to end process



Optimisation, Instruction Creation & Sending

What are your thoughts on how we plan to Optimise and create/send "linked" instructions? How quickly would you respond and be ready for a second instruction?

How many instructions (for multiple units) can you process at a time?

Can you think of anything we need to consider before implementing this?

Approach

Are there benefits you can foresee for you by our new approach?

Are there changes you would like to see to help support you in this approach?

How would you like us to engage with you to prove integration and the new approach?



Open Balancing Platform (OBP) Collaboration

BSC Issue Group 98

Introduction

BSC Issue Group 98 covered the topic of “Review of the current practice of setting Dynamic Parameters within the Balancing Mechanism”. The review was conducted between November 2021 and June 2022.

As part of this review we presented a number of rules that can be implemented by our new algorithms when generating instructions

The purpose of these rules is ensure we do not over-instruct plant (e.g. multiple small instructions instead of one large instruction)

A detailed report from the Working Group is available on the Elexon website

Scenario 1 – Flat top



Description

A BM unit is issued a BOA (Bid-Offer Acceptance) that has a flat top and the length of the flat top is relatively short. BM units cannot be issued BOAs whose flat tops are less than the acceptable minimum flat tops associated with the unit (or class of units) in question

The aim of this rule is to allow units to stay at a given output level before being requested to change direction. For example, large thermal generators may need a minimum time before changing direction whereas batteries may not

Proposed behaviour

Each BM unit would be associated a number which is used as a minimally acceptable length of flat tops of all BOAs before a change of directions is issued to the unit. This value is known as the minimum flat top

Industry participants to set the value as part of pre-qualification process from 0 to 5 minutes, with a proposed default to 5 minutes

Scenario 2 – Minimum delta MW



Description

BM unit is issued a BOA that moves the unit from flat top at level W1 to a flat top at level W2. A minimum delta MW ($=\text{ABS}(W2-W1)$) would be applied

This is to prevent scenarios where a unit will be given a series of very small instructions

Proposed behaviour

Each BM unit would be associated a number which is used as a minimum delta MW

Industry participants to set the value as part of pre-qualification process. A default would be set, e.g. 5 MW or a percentage of the max capability of the unit

Scenario 3 – Near MEL/MIL/SEL/SIL action

Description

Dispatch advice might suggest an instruction that is close to one of these limits (e.g. within 5 MW). When close to such a limit we might issue an instruction to that limit as the expectation is that further dispatch advice will take us there

Proposed behaviour

Each BM unit would be associated with a number which is used as the “closeness” value

Industry participants to set the value as part of pre-qualification process. A default would be set, e.g. 5 MW

If MEL was 100 MW and dispatch advice gave an instruction to 95 MW this would be converted to 100 MW

NOTE – MEL (Maximum Export Limit), MIL (Maximum Import Limit), SEL (Stable Export Limit), SIL (Stable Import Limit)

Scenario 4 – Splitting large MW instructions

Description

Dispatch advice might suggest a very large instruction to one BM Unit (typically after a loss on the system). Sending one instruction to one BM Unit is seen as risky in these circumstances and so the instruction would be split between more than one BM Unit using the next BM Units in merit

This would be an exception in urgent circumstances where the failure of a single BM Units to follow the issued BOA may leave the system at risk

Proposed behaviour

ESO would set this value dynamically, depending on system conditions such as inertia, but inform the market of the splitting methodology and the values used to implement this

Scenario 5 – State of Energy

Description

Some technologies, such as batteries and pumped storage hydro, may be depleted if we instruct them for too long and may not be available at later, more critical or economic, times

Currently we use MEL and discussions with providers to decide how to issue instructions to these BM Units

Proposed behaviour

At this time our algorithm teams need to investigate this. However, we also want to check if industry feel this is a valid parameter and mode of behaviour

We are pursuing this via our Storage Stakeholder Group

Scenario 6 – Max number of instructions in a 30-minute settlement period

Description

Potentially an algorithm can issue a large number of instructions to one BM Unit or control point

Can all units/control points handle an increase in the number of instructions? Are there some BM Units that still have manual processes making it hard to accept and act on such instructions? Will IT at sites fall-over if we increase the number of instructions?

Can downstream systems also cater (e.g. settlement at Elexon)

Proposed behaviour

How can we set a limit if one exists?



Axe the fax

Axe the fax – What do we use faxes for?

ESO uses faxes to send and receive data of varying importance with market participants. Some of them are used repeatedly, some are rarely used.

Using paper faxes delivers the following benefits

- Proof that the message has been received by the destination fax machine
- Easy to modify (create new templates) if needed
- Relatively easy for new market participants to acquire the hardware required to participate in the market
- Easy to identify when new information is received

*BUT...*there are a number of disadvantages which are increasing challenging....

Axe the fax – the challenge



The clock is ticking - The telephone network which the faxes run on is due to be decommissioned at the end of 2025. *(FYI : this date also applies to ISDN lines which we are already working on)*

Additional challenges:

Significant Manual Work involved in the process

Increasing Cyber Security Risk

Legacy technology

Increasing costs and efforts to procure Fax Machines, parts and ink cartridges etc.

Growth in number of Market Participants requires a future proof solution

Axe the fax - The requirements

We're moving from a paper-based system to a digital system. The core functionality needed is...

Resilient: Whilst the Faxes are not used for System Restoration, they are used to send information used for System Restoration, so the solution needs to be highly resilient

Non-repudiation: Evidence that messages have been sent / received by the market participants

Data-based: Creation of records in an electronic format to facilitate reporting, auditing and search

Secure: Data must be encrypted, users only able to see only their own data

Standards-based: Use industry standards where possible, facilitates ease of integration / adoption by new market users

Grid Code & STCPs

The Grid Code has several points in it where it mentions that certain transfers of data have to happen via the fax machine, the places that this is mentioned are below.

Grid Code	
OC7- Appendix 1	Permits the use of “fax or other electronic means” for relevant system warnings
BC1 – 1.4.1 a	Ambiguous: EX/IM Limits and Dynamic Parameters “may be submitted by telephone or fax”
BC2 – Appendix 2-4	Revised MVar capabilities must be by fax Frequency Sensitive Mode by fax

The Grid Code team are currently looking into changing the grid code so that the method of data transfer does not have to be reliant on the fax machine

Transmission - There is also investigation into the STCPs that relate to the Transmission faxes

Categorisation of faxes

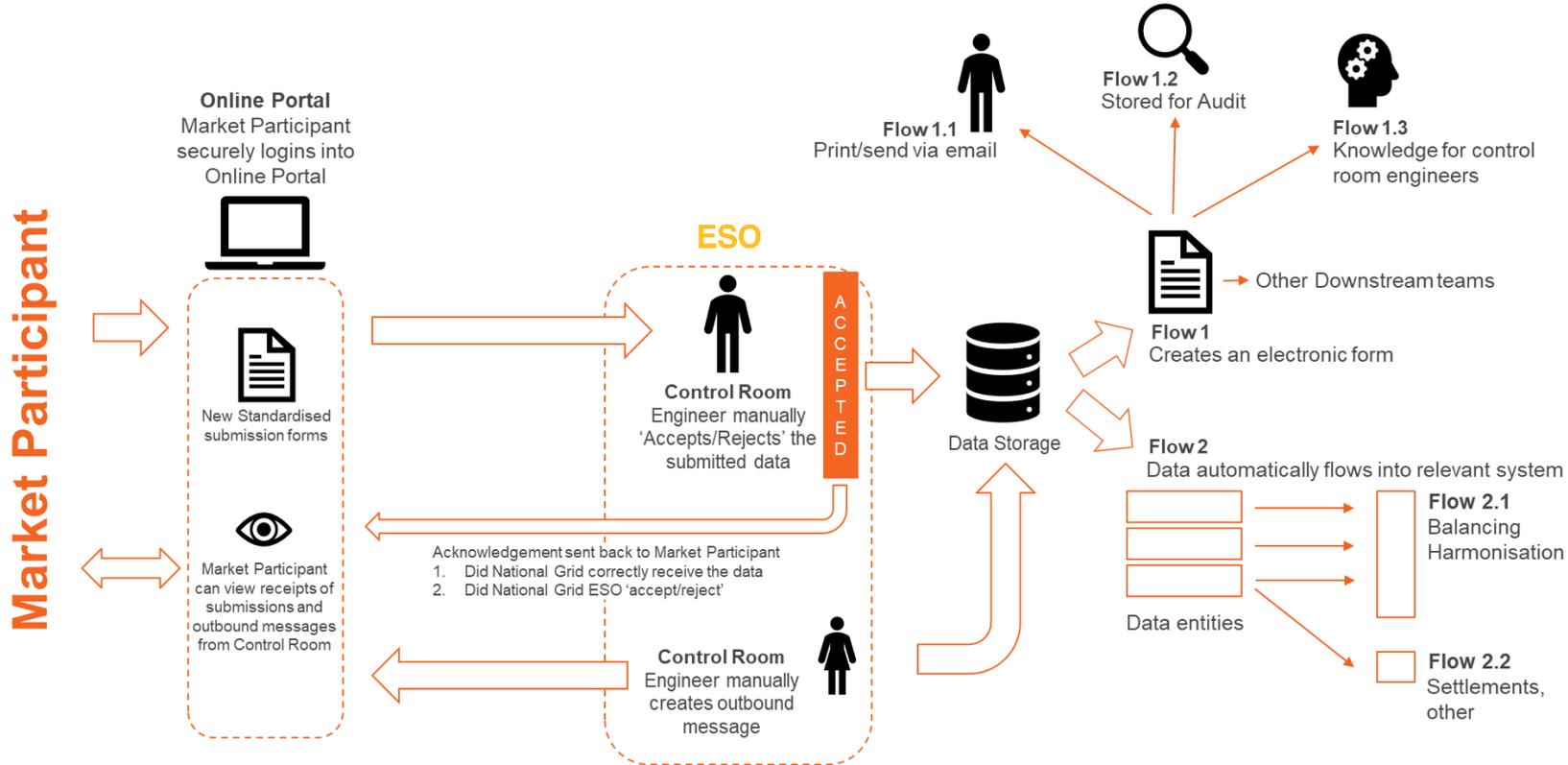
Category	Description	Number in Category
1	Operationally important. These faxes are targets for harmonisation with existing or future interfaces with Market Participants, for example EDL/EDT	15
2	Operationally informative : These faxes are targets for an 'online portal' solution, this is due to <ul style="list-style-type: none">• An interface not being found for harmonisation• Requiring a manual acceptance and actioning of the data incoming to the control room	11
3	These faxes are ad-hoc, rarely received, received through emails, or unique scenarios	10
4	These faxes are currently in progress for automation by other National Grid ESO projects	10

Axe the fax – Options analysis

Option	Data driven (enables integration and reduces manual effort)	Resilient (can be relied upon for critical messages)	Market-wide access (easy for new market users to adopt)	Future-proofed (Likely to have a reasonable lifetime)	Supports non-repudiation	Cost effective / easily extended
1. Fit existing fax machines with digital receivers	✗	✗	✓	✗	✓	✗
2. Adapt existing comms abilities (EDL/EDT)	✓	✓	✗	✓	✓	✓
3. Extend EDL/EDT and build an online portal	✓	✓	✓	✓	✓	? ¹
4. Extend EDL/EDT and buy an online solution	✓	✓	✓	✓	✓ ²	✓

1. Building entire platforms from scratch should not be underestimated in terms of cost and complexity
2. What would constitute 'Non-repudiation' needs to be agreed by all users and be part of the product selection criteria

Online portal high level solution – Inbound/Outbound

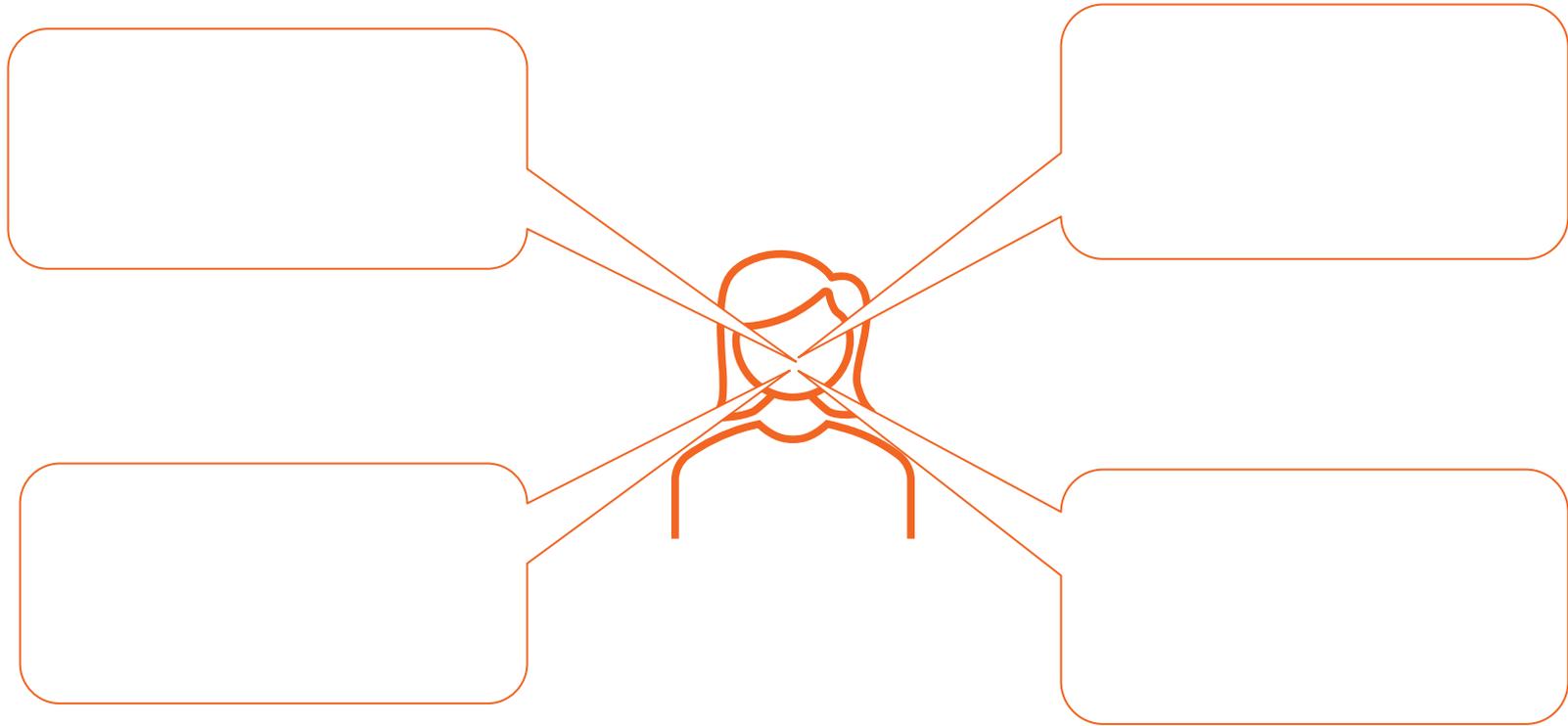


**This is a high-level concept and not committed to delivery by any programme as of yet*

But why are we here today?

....we want to hear about your experience with the fax machines and learn about your ideas

Has this challenge been solved already ? Views ?



Ideation

High

Feasibility

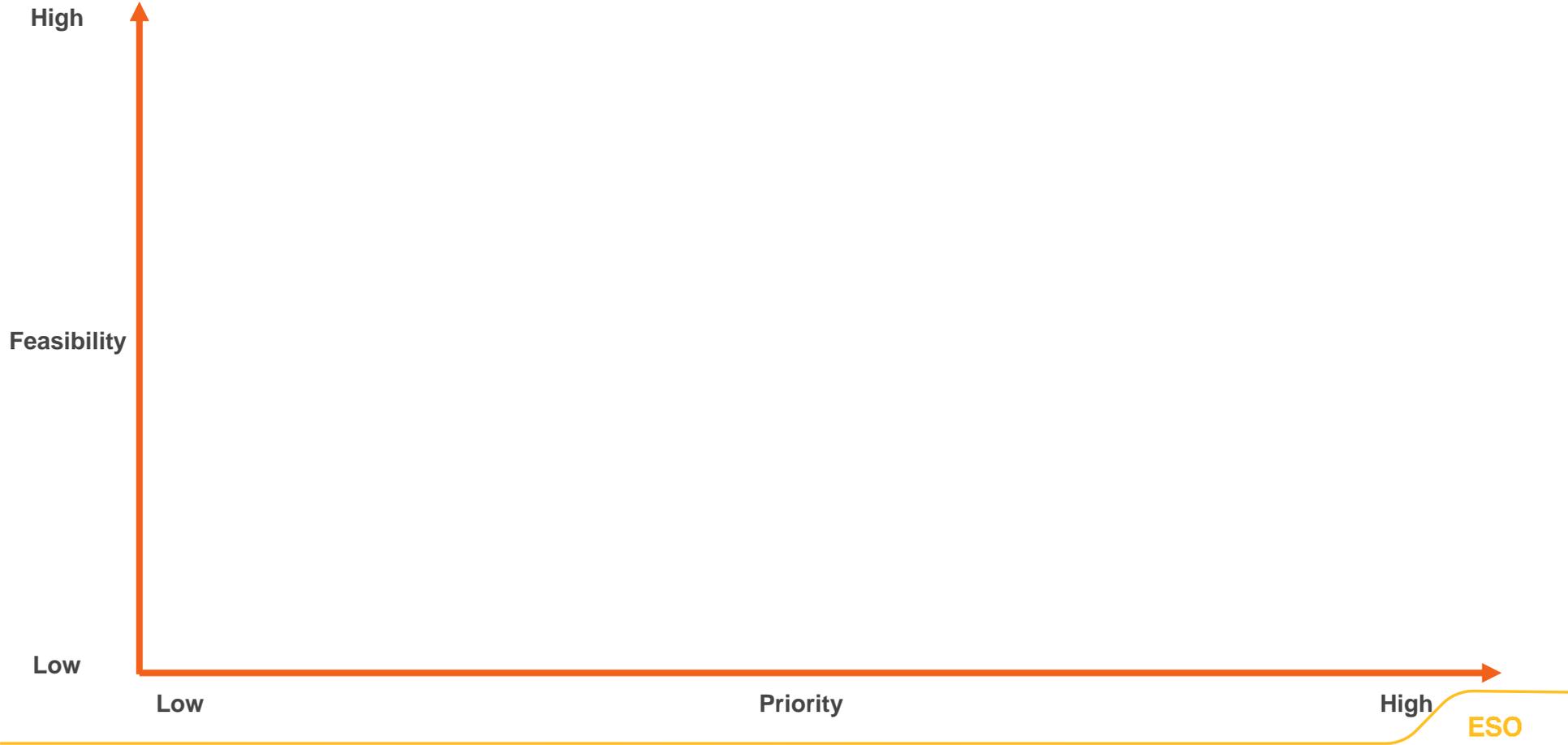
Low

Low

Priority

High

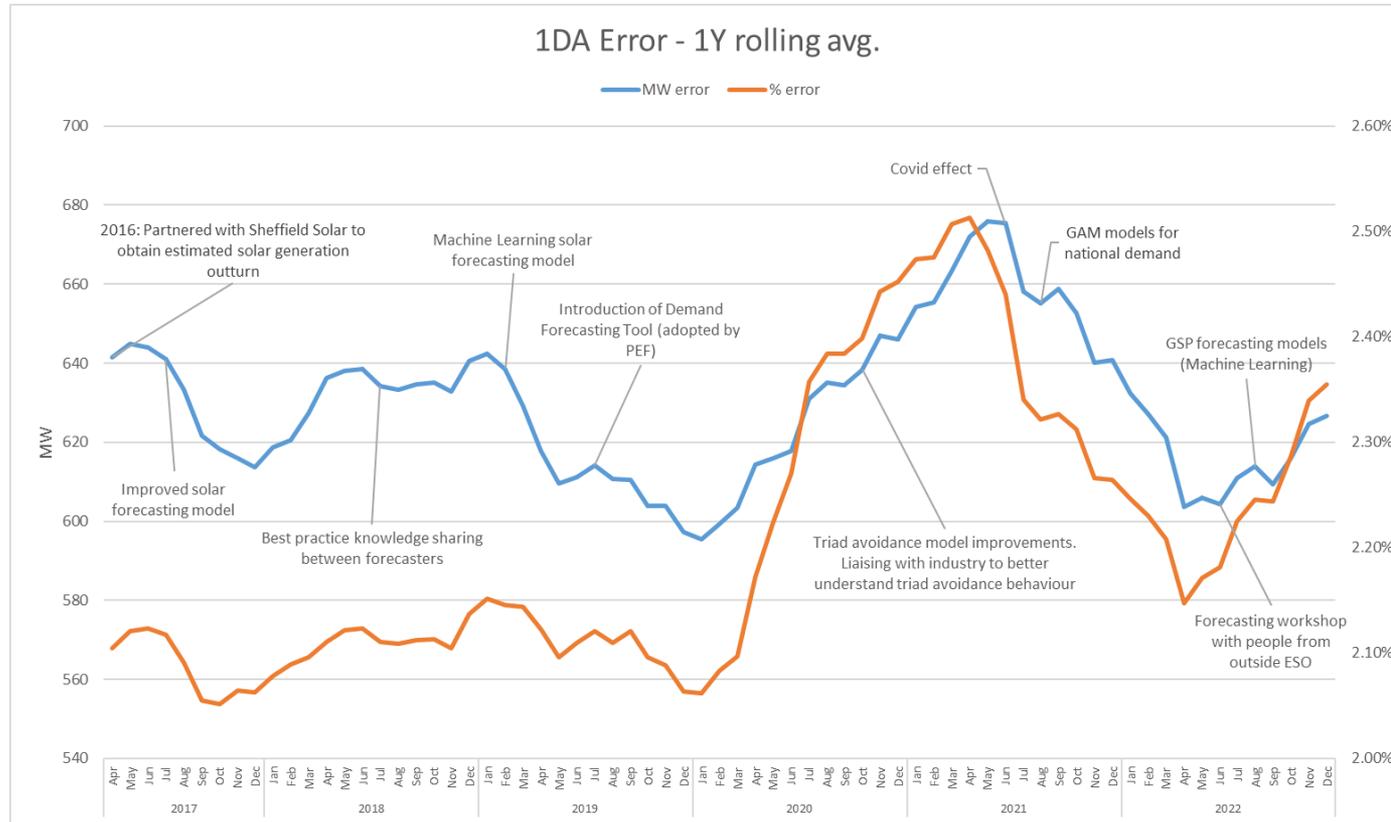
ESO



A landscape photograph featuring a sunset over a field. The sun is a bright, glowing orb in the upper right quadrant, casting a warm, orange light across the sky. The sky is filled with soft, wispy clouds. In the foreground, there is a lush green field with tall grasses. In the middle ground, a line of dark trees silhouettes against the horizon. Overlaid on the scene are several vibrant, glowing green light trails that curve across the field from left to right, creating a sense of motion and energy.

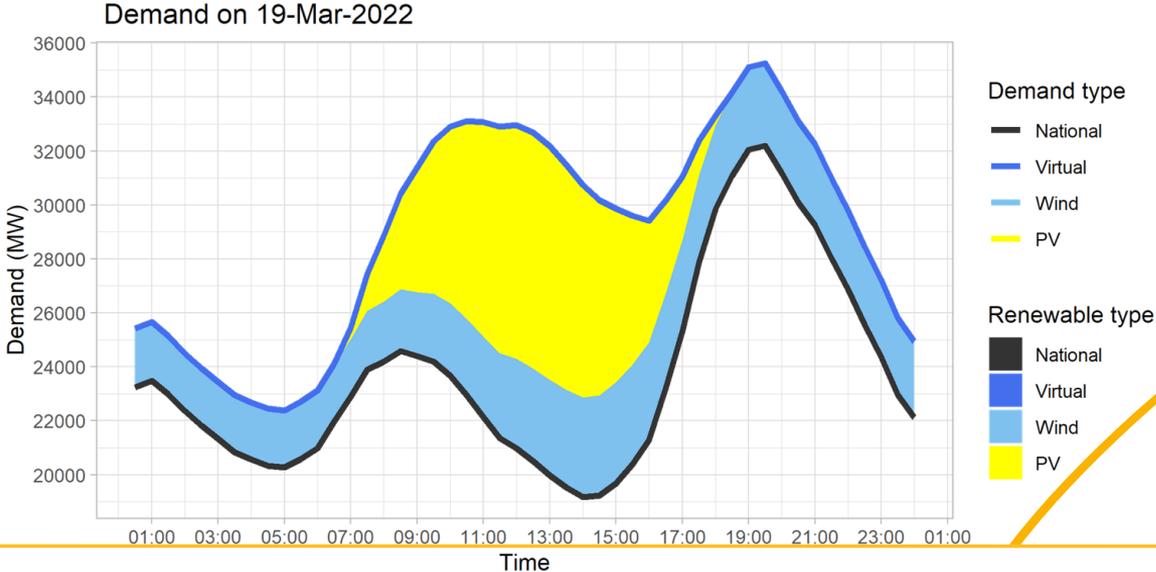
Forecasting

We have delivered improvements



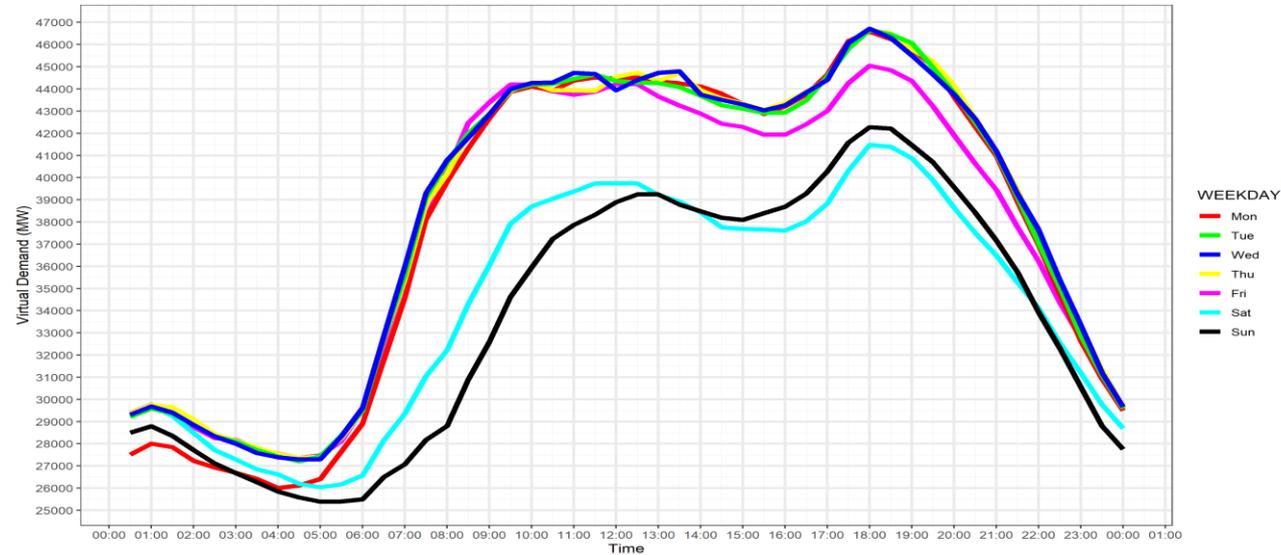
How we forecast

- Day ahead forecast at 9am
- As agreed with Ofgem and industry the ESO forecasts Initial National Demand Outturn (INDO)
- To do this, we forecast 'virtual' demand and subtract embedded wind/solar estimates
- Where virtual demand is the total underlying customer demand
- Permitted inputs: weather data, historical demand and time variables



Why do we forecast virtual demand?

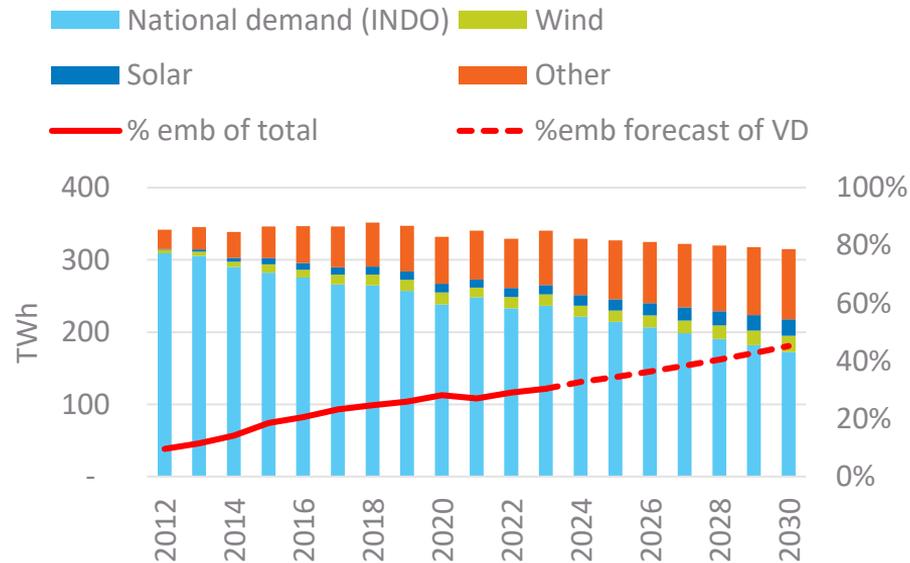
- Virtual demand is relatively “predictable”
- Forecasting virtual demand and subtracting embedded generation forecasts has provided the most accurate forecasts for national demand
- Interpretable results
- Unified approach for all time-horizons



Visibility of embedded generation

- To improve our virtual and national demand forecasts we need more data on embedded generation
- For day-ahead forecasting we need historic data on embedded generators (especially non-wind/solar)
- For real-time forecasting we need near real-time metering of embedded generators
- We also need to keep track of assets as they partake in ancillary services (e.g. response, reserve, and Local Constraint Market (LCM))
 - Minimise “double counting” of embedded assets in ancillary service markets
 - E.g. a solar farm selling reserve in the quick reserve market

Growth of embedded gen vs virtual demand



Questions

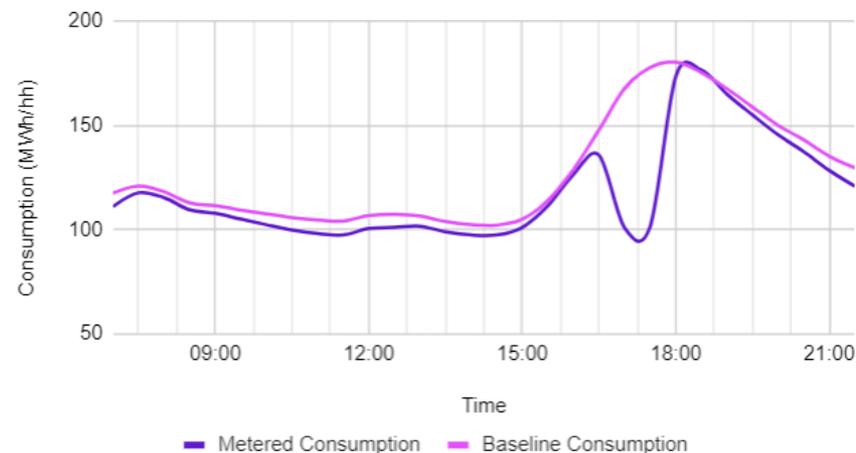
What data on embedded generation and demand can you share us with?

Could you share historical generation and demand data aggregated by Grid Supply Point and by asset type?

Forecasting time of use tariffs and demand flexibility

- Virtual demand profile is becoming less predictable
- We must develop a forecasting system which helps us manage demand flex
- We think we need to migrate to probabilistic forecasting

Saving Sessions Event - 23 January, 17:00-18:00



Source: from Twitter @DrSimEvans @OctopusEnergy

Questions

How do you think we should we forecast national demand in future?

How do we ensure that Time of Use forecasts are coherent across different suppliers and aggregators?

Can you share data that will help us forecast demand flexibility?

Forecasting Products & Roadmap



Solar Power Generation



Wind Power Generation



National Demand

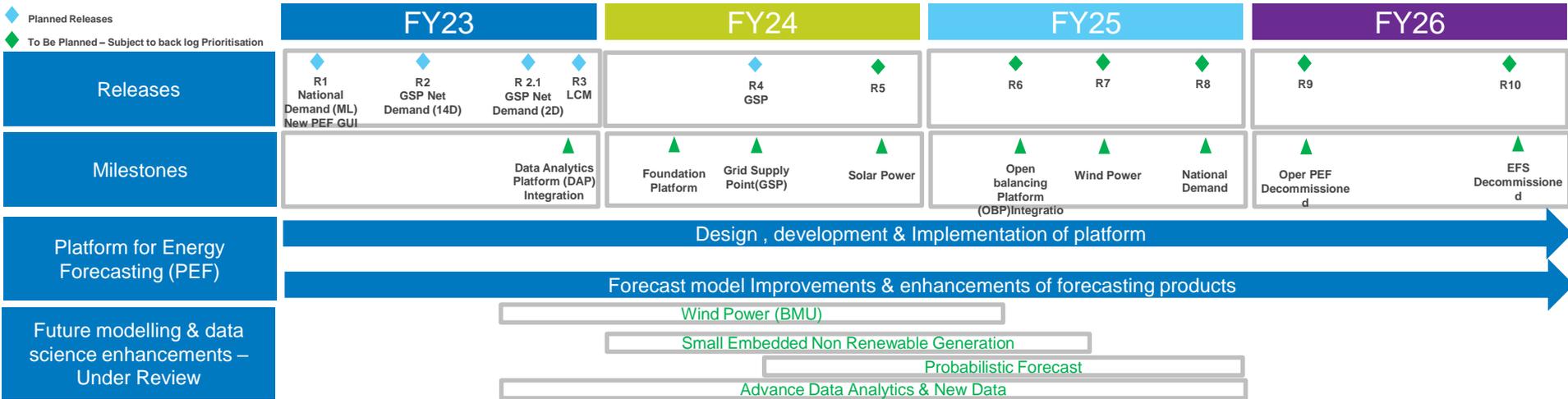


Grid Supply Point (GSP)



Real Time Predictions (New)

◆ Planned Releases
◆ To Be Planned – Subject to back log Prioritisation



We have collaborated with industry





Panel discussion/Q&A

Recap

Aims of today

- We want to share our progress on what we have delivered to date
- We want to give you insight into how we are transforming the balancing capability of our control room
- We want your input into how our system transformation will impact you
- We want your insight into how we tackle some of the key challenges of transforming our balancing capabilities

Thank you

Next Steps



We welcome your feedback



Website updates



You will be added to our mailing list for future updates

- Reach out via email –

box.balancingprogramme@nationalgrideso.com



Next event in June (location TBC)