Public

Skip Rate Forum

1 May 2025

NESO
National Energy System Operator

Public

#SkipRates

Agenda for the day

Main Room

Arrival, Registration & Coffee	9:30 – 10:00
Welcome and recap	10:00 – 10:15
Programme Updates: • Skip rate by fuel type • Touching on root cause analysis • Engagement and codes	10:15 – 11:00
Q&A	11:00 – 11:15
First Workshop	11:15 – 12:00
Lunch	12:00 – 12:45
Second Workshop	12:45 - 13:45
Third Workshop	13:45 – 14:45
Summary & Next Steps	14:45 – 15:00
Close	15:00

Workshops

(45 to 60 mins each)

Skip Rate Datasets

Skip Rate Methodology Changes

Skip Rate Materiality

First Workshop	11:15 – 12:00
Lunch	12:00 – 12:45
Second Workshop	12:45 – 13:45
Third Workshop	13:45 – 14:45

WIFI
Name: HiltonHonors
Password: Hiltonmeetings

NESO
National Energy System Operator

Housekeeping

Please note we will be taking **photos** and **video** throughout the day –
please let a member of the NESO team know if you don't want to be captured

NESO
National Energy System Operator

How can you engage today?

Join at Slido.com

#SkipRates

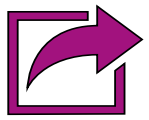
1. **Throughout the day:** Utilise the Slido Q&A function.
2. **During workshops :** Polls and Q&A functions.
3. **To close:** Provide us with your feedback from the day.

We will have roaming microphones available for Q&A if you would like to ask questions directly.

Q&A via Slido

Please post any questions you have for our speakers on Slido – #SkipRates- ensuring to list both your full name and organisation; this will enable us to follow up with you after the event where necessary.

All questions posted in Slido will be published online with answers after the event; this will include any questions we are unable to answer in the session due to time constraints or the need for further information.



Out of scope questions will be forwarded on to the appropriate NESO team or expert for a direct response. We may ask you to contact us by email to ensure we have the correct contact details for the response.

Please use the Slido upvote function for questions asked, we will be taking questions in an upvoted order in the Q&A panel session at the end of the day.

Slido will close at the end of the event; if you have any further questions, please get in contact with us at box.SkipRates@neso.energy

NESO
National Energy System Operator

Welcome & Recap

NESO
National Energy System Operator

#SkipRates

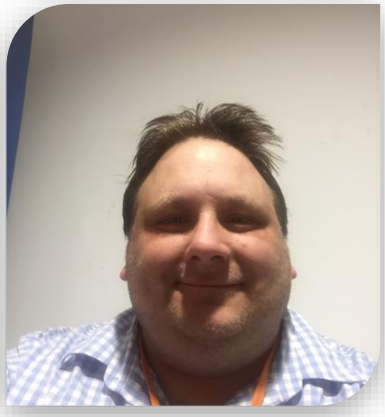
Meet the NESO team

Hannah Kirk-Wilson
Dispatch Transparency Programme Manager

Mili Gupta
Head of Systems, Support & Insight

Juliette Richards
Economic Analytics & Insights Manager

Anna Blackwell
Skip Rates Technical Manager



Leon Walker
Governance & Insights Manager

David Dixon
Balancing Costs & Operational Insights Manager

Sam Mancey
Senior Engineer

Katherine Munns
Senior Operational Insight Analyst

Vivian Echebima
Balancing Data Scientist

Will Seward
Data Scientist

Harsh Kapil
Operational Insight Analyst

Ivan Sanz
Data Scientist

NESO
National Energy System Operator

We have delivered several initiatives aimed at improving transparency and skip rates

Battery Dispatch
- Improved algorithm in OBP and improvements in other systems to address constraint dispatch
- Additional resource in Control Room for battery dispatch
- 15-minute instruction rule moved to 30-minute duration, with additional instructions available

Transparency
- All BM Skip rate and Post System Actions skip rate published daily
- Weekly review of skip rate performance at Operational Transparency Forum

Engagement
- Battery Storage & Skip Rate Forums hosted 4 December 2024 and next 1 May 2025
- Investor and Customer visits to Control Room and NESO visits to Customer sites
- CEO Roundtable

Market Services & Rules
- 15 minute rule to 30 minutes
- Introduction of Balancing Reserve and Quick Reserve
- Penalties for Quick Reserve

Skip Rate Methodology
- LCP Delta definition and methodology report published
- Webinar & engagement with industry to explain methodology & proposed amendments

NESO National Energy System Operator

We will continue to focus on improvements through a recently established Dispatch Transparency Programme

Root Cause Analysis

Identify causal factors driving skip rates

Define actions to address identified causal factors

Build capability for ongoing continuous improvement

System improvements

Deliver enhancements to forecasts through enriched datasets

Embed enhancements in processes

Continued delivery of Open Balancing Platform Roadmap*

Process improvements

Remove battery dispatch limitations through implementation of GC0166

Conduct a dispatch strategic review to define 2030 approach

Transparency

Enhance skip rate methodology to best represent avoidable skips

Deliver and improve tools to visualise and analyse skip rates

Provide transparency on skip rates and dispatch processes

Stakeholder Engagement

*delivered by the Balancing Transformation team

Significant change is planned for this year

Dispatch Strategic Review →

Root Cause Analysis & improvements →

Skip Rate Methodology improvements
Addressing limitations in LCP Delta methodology

OBP: constraint management
Improved situational awareness for dispatch of units behind constraints

✓ **Transparency tool improvements**
UI improvements live in control room

✓ **Increased response holding**
Managing frequency fluctuations

✓ **Additional dispatch control engineers**
Full time battery dispatch engineer providing 24/7 cover

✓ **Fourth dataset release**
Including unit exclusion reasons

OBP: constraint optimisation
Further improved dispatch efficiency for units behind a constraint

Slow Reserve Go Live
More sustained delivery in a post fault event

OBP: national optimisation
Improved dispatch advice and efficiency

GC1066 Approval
Ofgem approval of GC1066 code modification

Quick Reserve Phase 2 Go Live
Quicker energy imbalance restoration

Skip rate materiality
Kicking off skip rate materiality work

Continuous improvements
Ongoing skip rate monitoring and improvements

Forecasting improvements
Implemented in control room

Improvement Key

- **IT system changes** – *reducing skip rates*
- **Dispatch efficiency measurement & transparency** – *improving data & method*
- **Market changes** – *balancing services*
- **Forecasting improvements** – *reducing skip rates*
- ✓ **Complete**

2025 | Jan - Mar | Apr - Sep | Oct - Dec | **2026**

Programme Updates

Skip rates by fuel type

Definition

2 potential external definitions

LCP defined fuel skip rate as:

Skipped volume by fuel as a percentage of in-merit by fuel

$$\frac{\text{Fuel Type Skips}}{\text{Fuel Type Skips} + \text{Fuel Type in merit taken}}$$

Each fuel type skip rate is independent

No consideration of total volume

Alternative is:

Skipped volume by fuel as a percentage of all in-merit

$$\frac{\text{Fuel Type Skips}}{\text{All Skips} + \text{All in merit taken}}$$

Fuel skip rates add up to total skip rate

Considers amount of fuel within the skipped volume

Note: currently planning to do this for PSA only

Examples

If we have 200MWh of Energy actions:

- 40MWh of in-merit are Fuel Type A, 2 MWh are Fuel B
- 10MWh of Fuel A is skipped, 1 MWh of Fuel B
- 50MWh total skipped volume (all fuel)

Total PSA skip rate = 50/200 = 25%

Option 1 (LCP calculation):

- Fuel A - 10/40 = 25%
- Fuel B - 1/2 = 50%

Option 2 (NESO suggestion)

- Fuel A - 10/200 = 5%
- Fuel B - 1/200 = 0.5%

Skip Rate by Fuel Type

These are **indicative** skip rates by fuel type, calculated manually due to current data configuration.

Stage 5 Post System Action (PSA) data

NESO method

Offers PSA	Battery	CCGT	Pumped Storage	Overall
January	8%	18%	3%	**34%**
February	9%	20%	4%	**33%**
March	8%	19%	4%	**29%**
April (MTD)	10%	28%	1%	**42%**

Bids PSA	Battery	CCGT	Pumped Storage	Overall
January	10%	19%	12%	**53%**
February	12%	25%	5%	**49%**
March	11%	16%	6%	**47%**
April (MTD)	13%	16%	5%	**44%**

The sum of all fuel types equals the overall skip rate (subject to rounding)

LCP method

Offers PSA	Battery	CCGT	Pumped Storage
January	45%	30%	44%
February	45%	31%	45%
March	43%	27%	45%
April (MTD)	38%	44%	75%

Bids PSA	Battery	CCGT	Pumped Storage
January	45%	42%	65%
February	62%	41%	78%
March	52%	32%	69%
April (MTD)	45%	39%	43%

NESO National Energy System Operator

Public

Touching on root cause analysis

NESO
National Energy System Operator

Introduction

The aim of Root Cause Analysis is to:

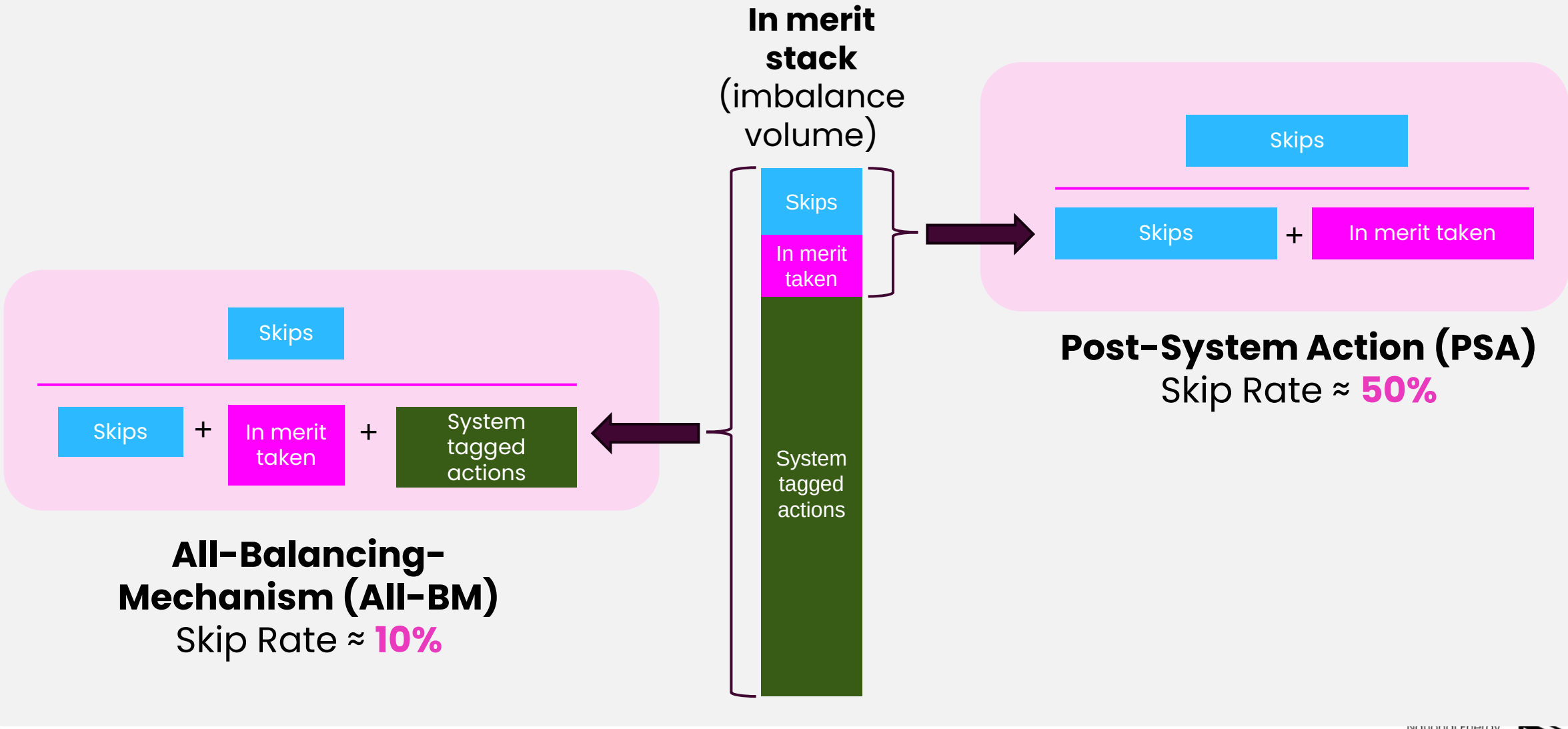
1. Identify causal factors driving skip rates
2. Define actions to address identified causal factors
3. Build capability for ongoing continuous improvement

- The team have been focusing on methodology development, limiting available resource for root cause analysis.

This section covers

- Underline some of the fundamental principles of the data and what is driving variability
- Provide context on a specific characteristic of the data

All-BM vs PSA

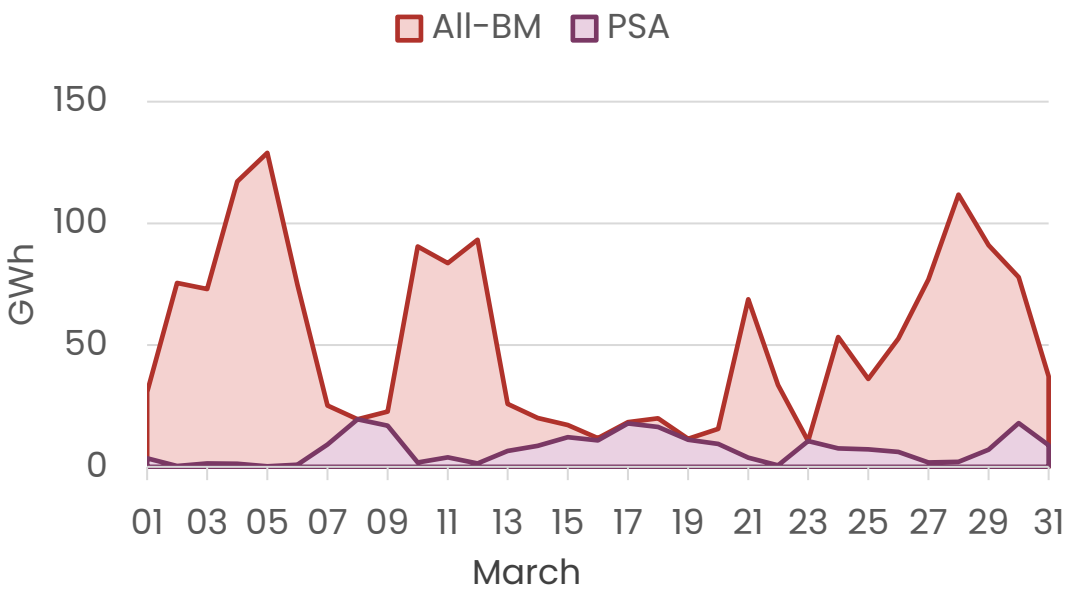

In merit stack (imbalance volume)
Skips
In merit taken
System tagged actions
Skips
Skips + In merit taken
Post-System Action (PSA)
Skip Rate ≈ 50%
Skips
Skips + In merit taken + System tagged actions
All-Balancing-Mechanism (All-BM)
Skip Rate ≈ 10%

All-BM vs PSA: in merit volume

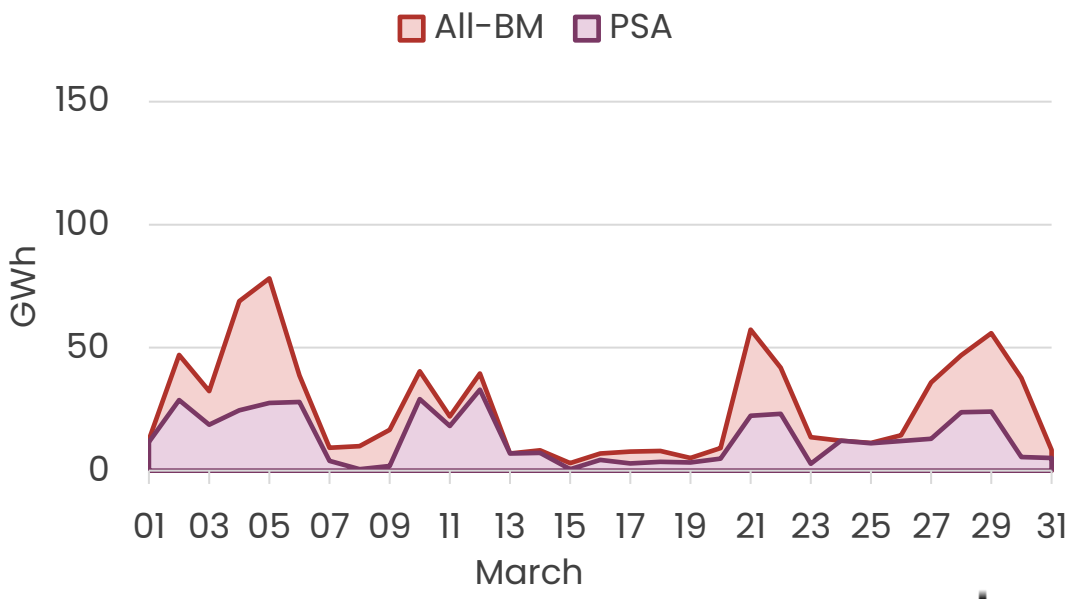
The figures show the sum of Stage 5 in-merit volume for All-BM and PSA, in March 2025.

The difference between All-BM & PSA is driven by **system exclusions** made in Stages 2 and 3.

Bids



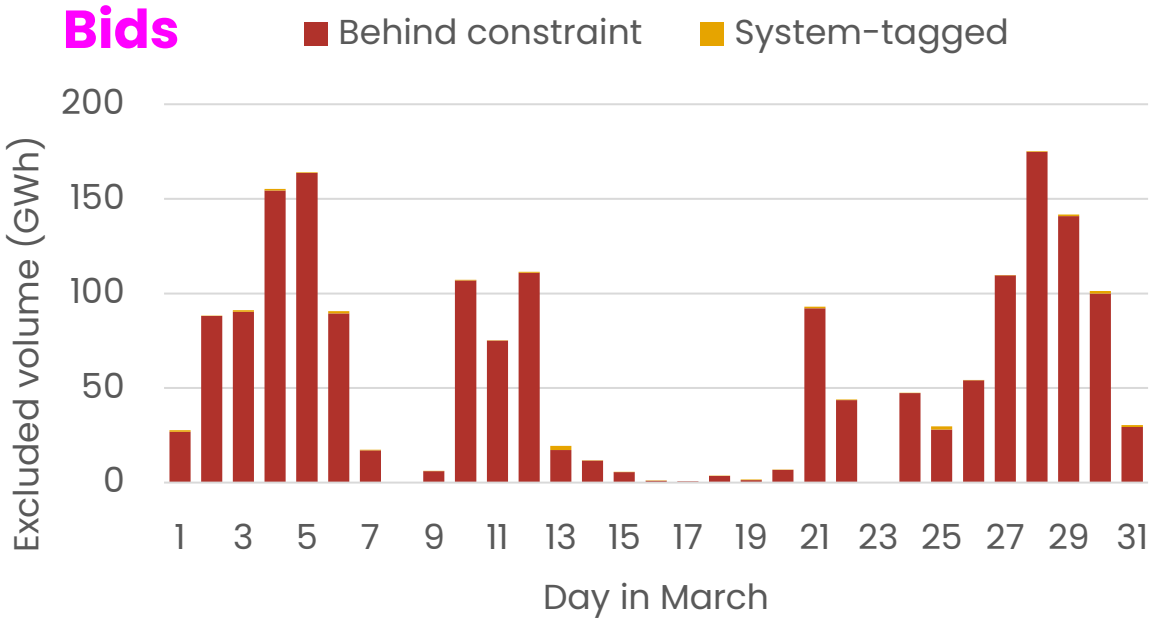
Offers

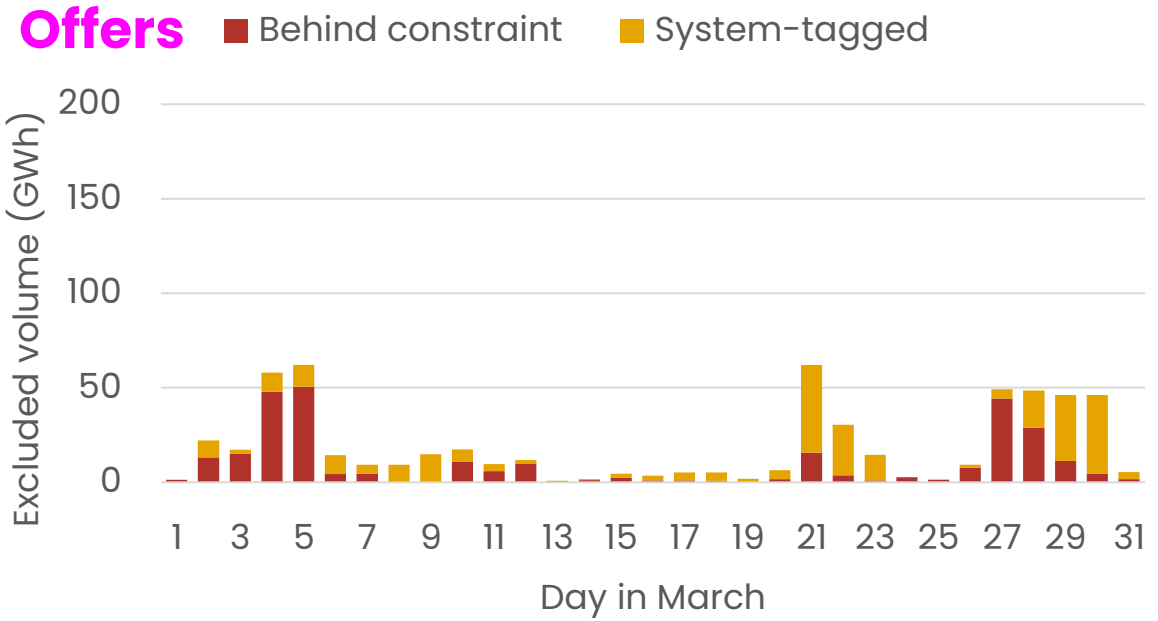


Datasets used: In Merit All Balancing Mechanism, and In Merit Post System Action

All-BM vs PSA: excluded volume

The figures show excluded volume from March 2025 for the exclusion reasons: **behind constraint** and **system-tagged**.





Systems exclusions for bids are mostly for solving **constraints**.

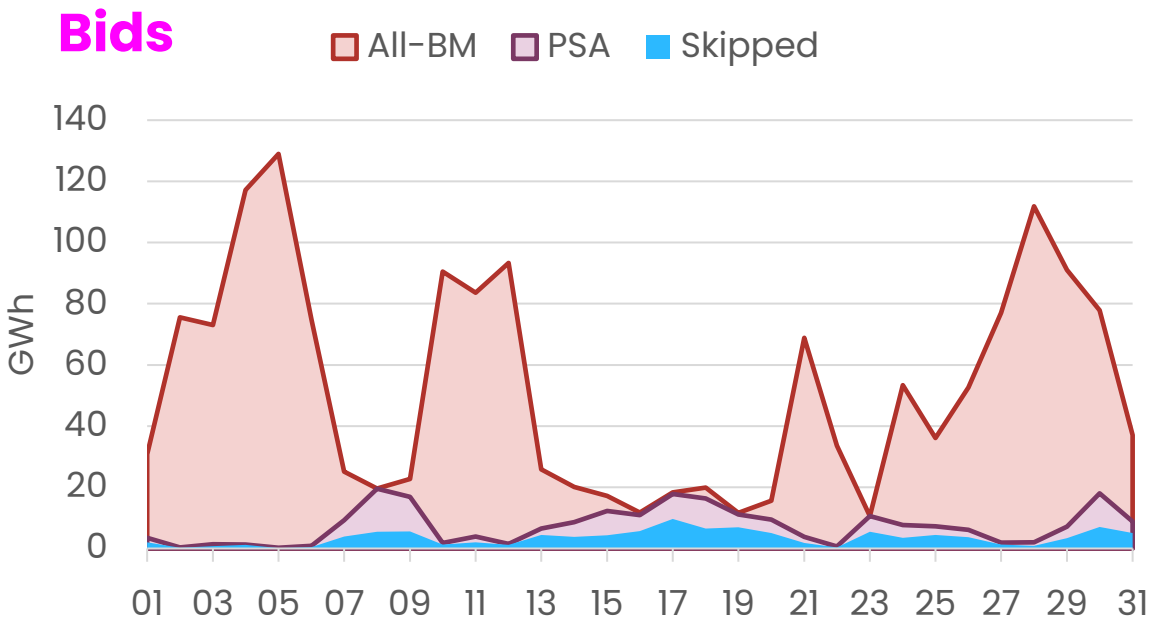
Systems exclusions for offers are largely related to **system-tagged** actions, voltage and inertia.

Dataset used: Exclusion Reasons

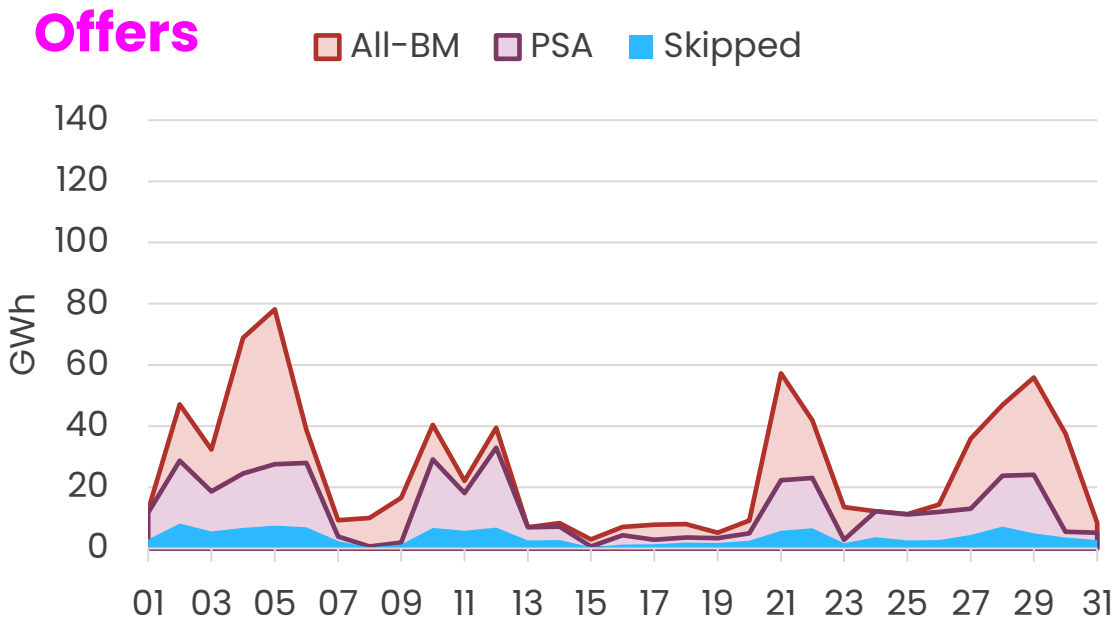
All BM vs PSA: skipped volume

The figures show total Stage 5 in-merit and skipped volume for All-BM and PSA, in March 2025.

The highest skipped volume aligns with the highest PSA in-merit volume.



Highest PSA in merit volume is when there are fewer overall actions.



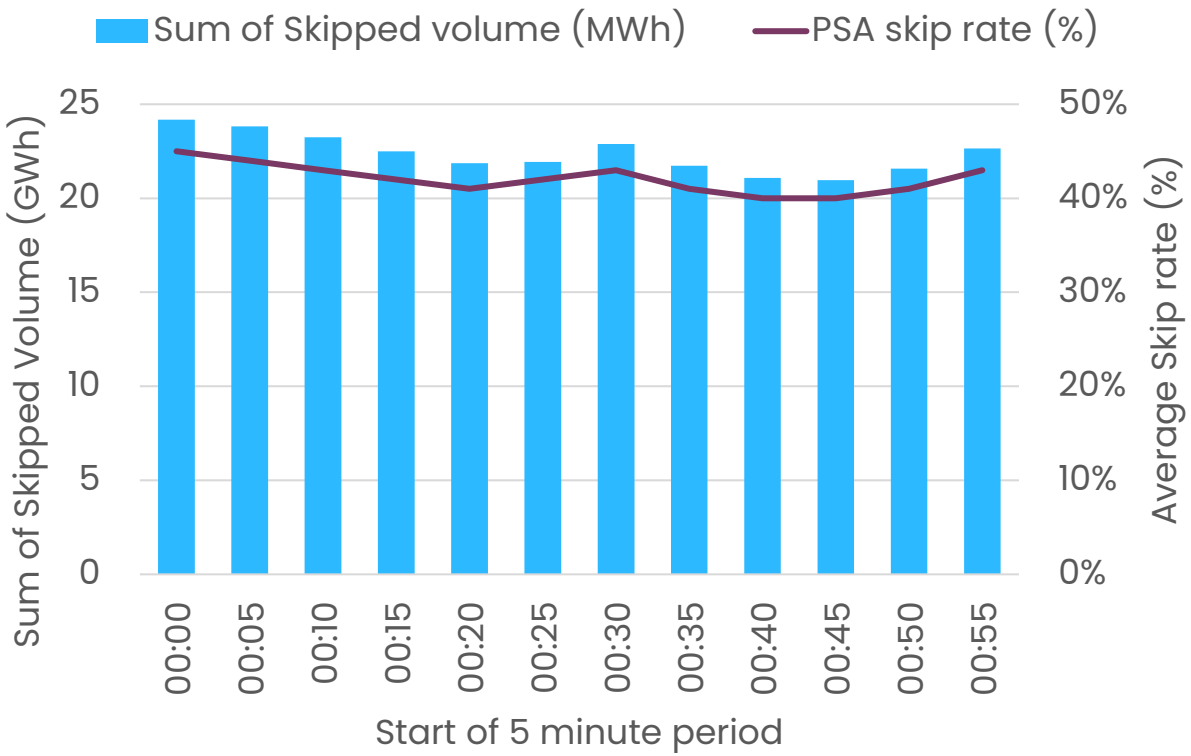
Highest PSA in merit volume is when there are more overall actions.

NESO National Energy System Operator

Datasets used: (1) In Merit All Balancing Mechanism (All-BM), and (2) In Merit Post System Action (PSA)

Time within the hour

The figures show the Stage 5 total skipped volume and average skip rate for each 5-min period in an hour, for March 2025.



We see higher skipped volume and skip rate on the half hours.

- Up to 15% increase in total skipped volume.
- Up to 5% difference in average skip rate.

Time within the hour

Price changes are typically aligned to **30-min settlement periods**.

- Wholesale markets: 30-min settlement periods.
- NESO flexibility services: Electricity Forward Agreement (EFA) blocks, quick reserve service windows, Demand Flexibility Service (DFS).
- Distribution System Operator (DSO) flexibility services: various blocks aligning to 30-min settlement periods.
- Time of use tariffs: start and end of windows align to 30-min settlement periods.

Time within the hour

Some of the causes can be grouped in the following categories.

Visible volatility

Fast ramping visible in Physical Notification (PN) submissions

Challenge:
- Uncertain and volatile frequency due to ramping.

Control process:
- Proactively instruct bids and offers to manage ramping.

Impact:
- Lots of actions required in a short time.
- Preventative actions with uncertainty.
- Bids & offers taken out of merit to manage ramping.

Non-visible volatility

Fast ramping not visible to control room

Challenge:
- Rapid changes in frequency with no notice.

Control process:
- Reactive frequency management.
- Prioritise stabilising frequency.

Impact:
- Bids and offers required at short notice.
- Prioritising fast ramping units.
- May require undoing previous instructions.

Utilising low prices

Ramping units at an unattractive price to maximise use of an attractive price.

Challenge:
- Price changes between settlement periods result in paying a high price before or after the half hour.

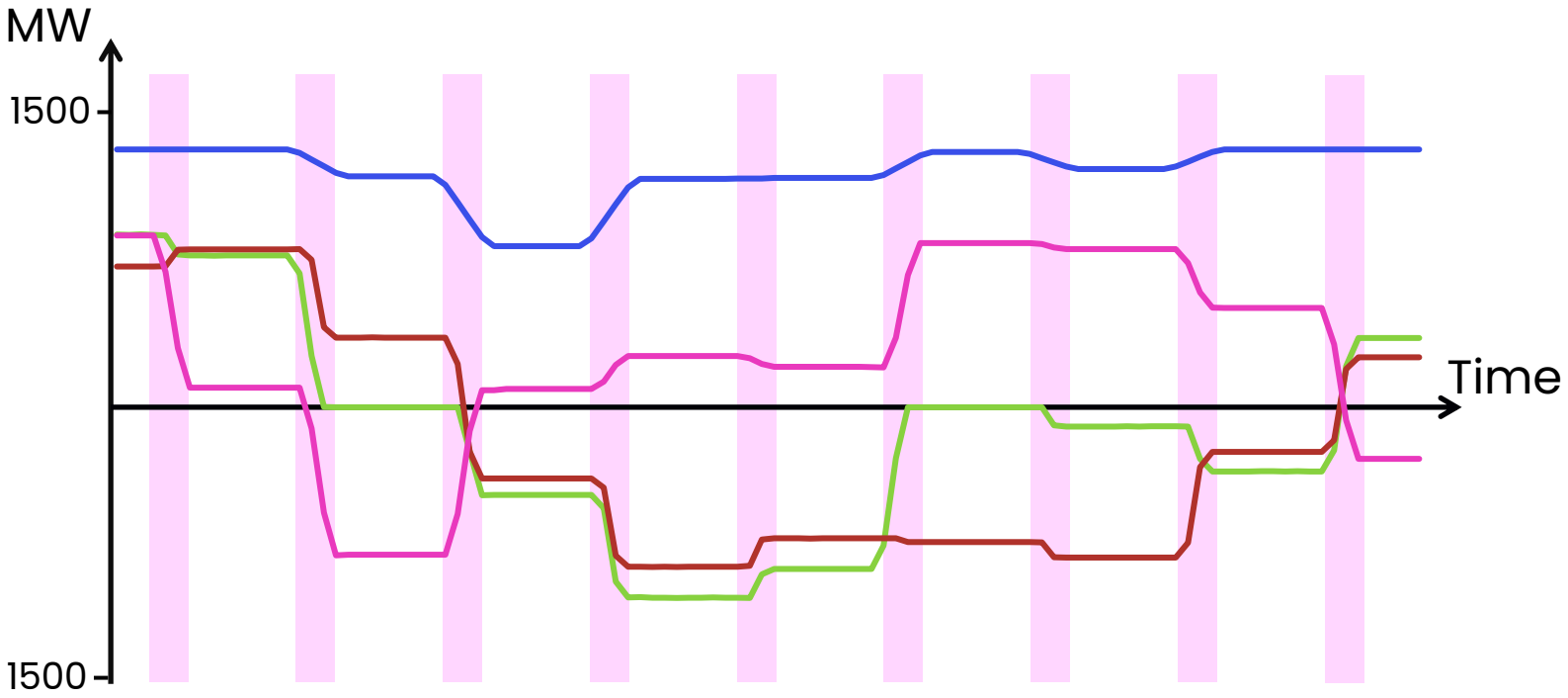
Control process:
- Pay the high price for a short time, to capture maximum period with a low price.

Impact:
- Accepting units out of merit around the half hour.
- Leads to skipped volume around half hours

Time within the hour

Visible volatility

This figure shows a snapshot of four interconnector flows.



We see similar changes around half hours for:

- Pumped storage
- Aggregated battery PNs
- Transmission demand

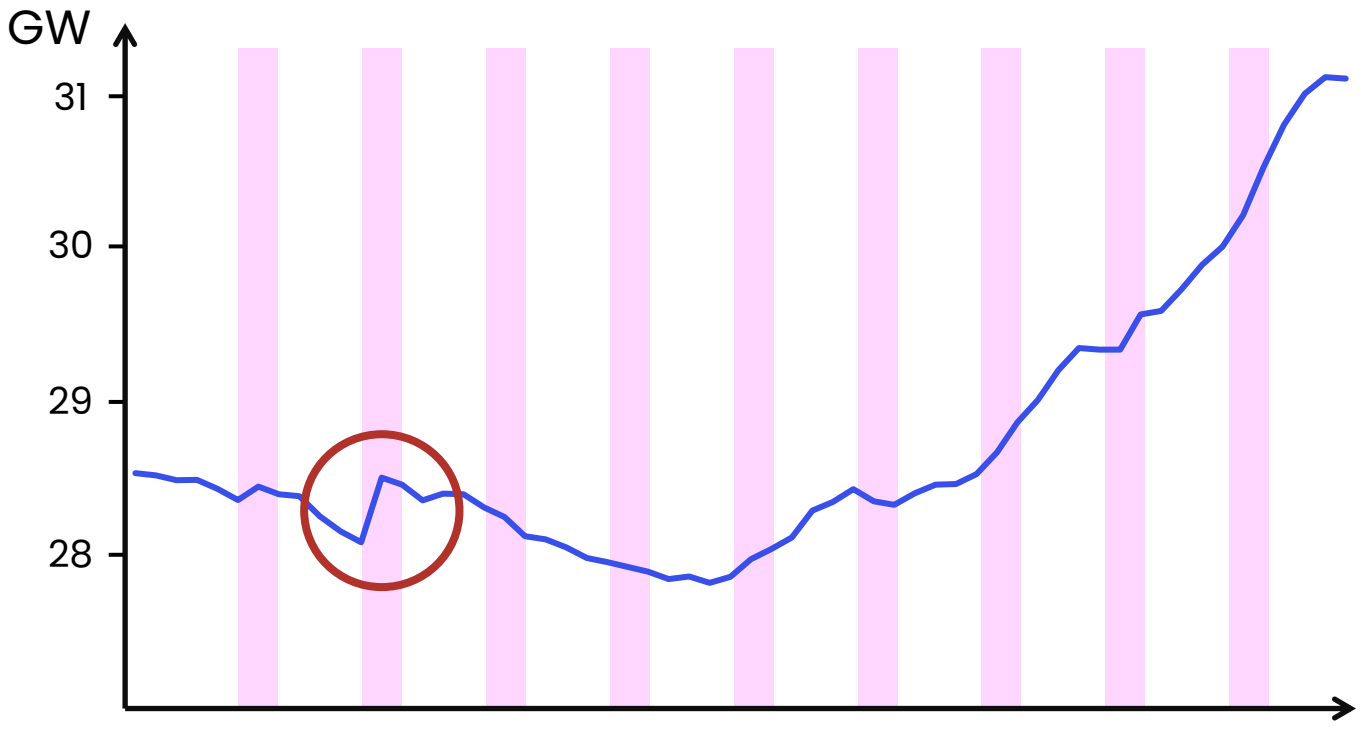
Pink sections highlight the **first** and **last 10 mins in every hour**

NESO
National Energy System Operator

Time within the hour

Non-visible volatility

This figure shows a snapshot of transmission system demand.



This volatility may be driven by:

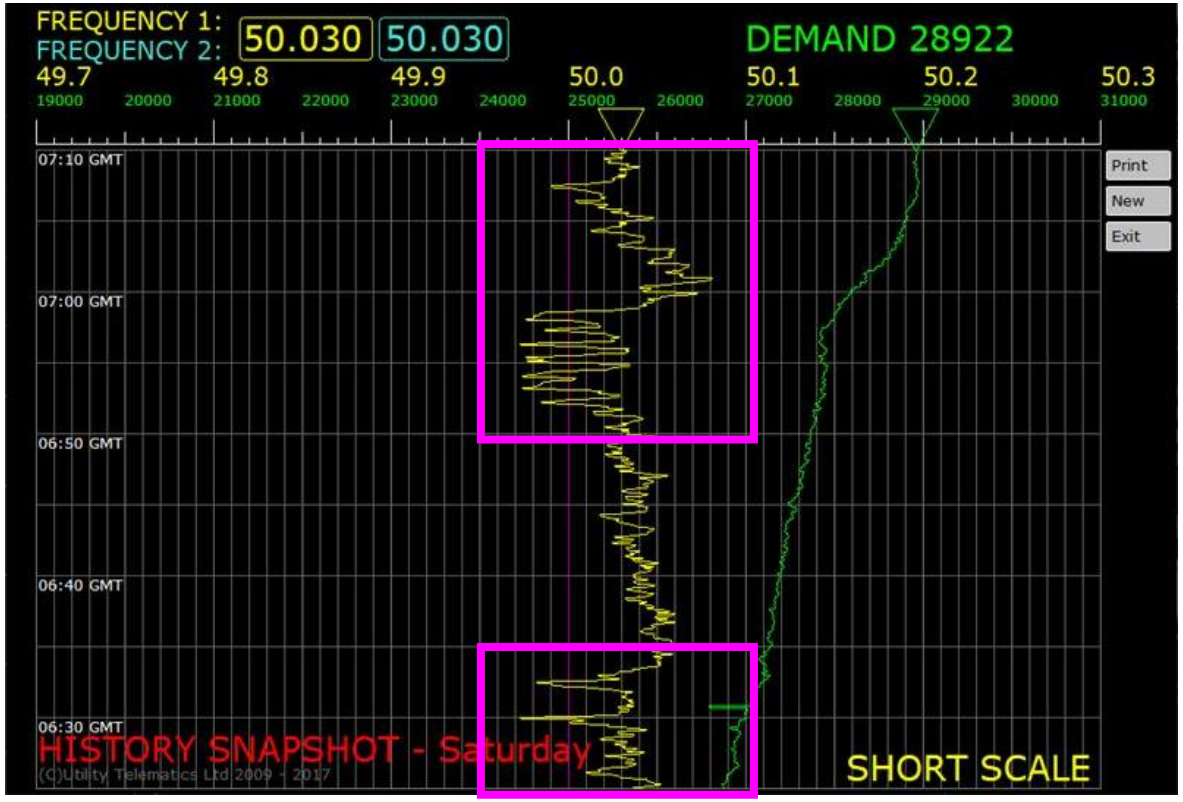
- Non-BM wholesale trading
- Time of use tariffs
- DSO flexibility services

Pink sections highlight the **first** and **last 5 mins in every half hour**

NESO
National Energy System Operator

Time within the hour

This screenshot shows the frequency trace from the control room on a historic Saturday.



Three key stages of frequency:

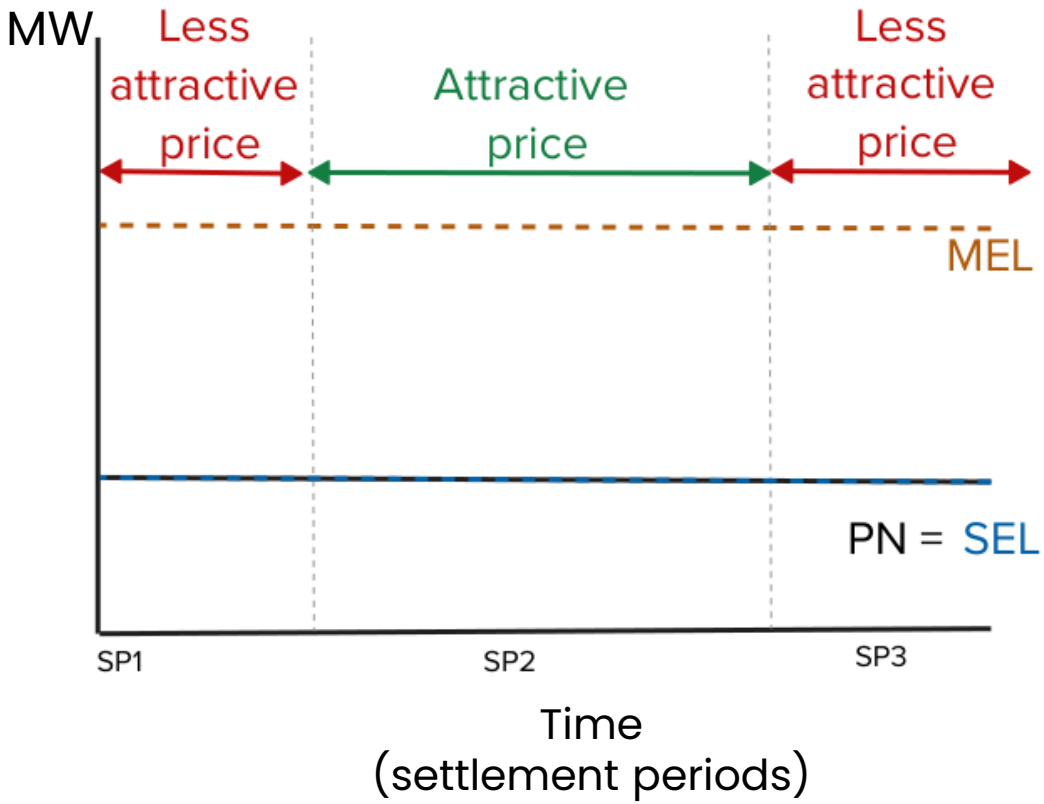
- Volatility around 6:30
- Stable from 6:35 to 6:50
- Volatile from 6:50 to 7:10

NESO
National Energy System Operator

Time within the hour

Utilising low prices

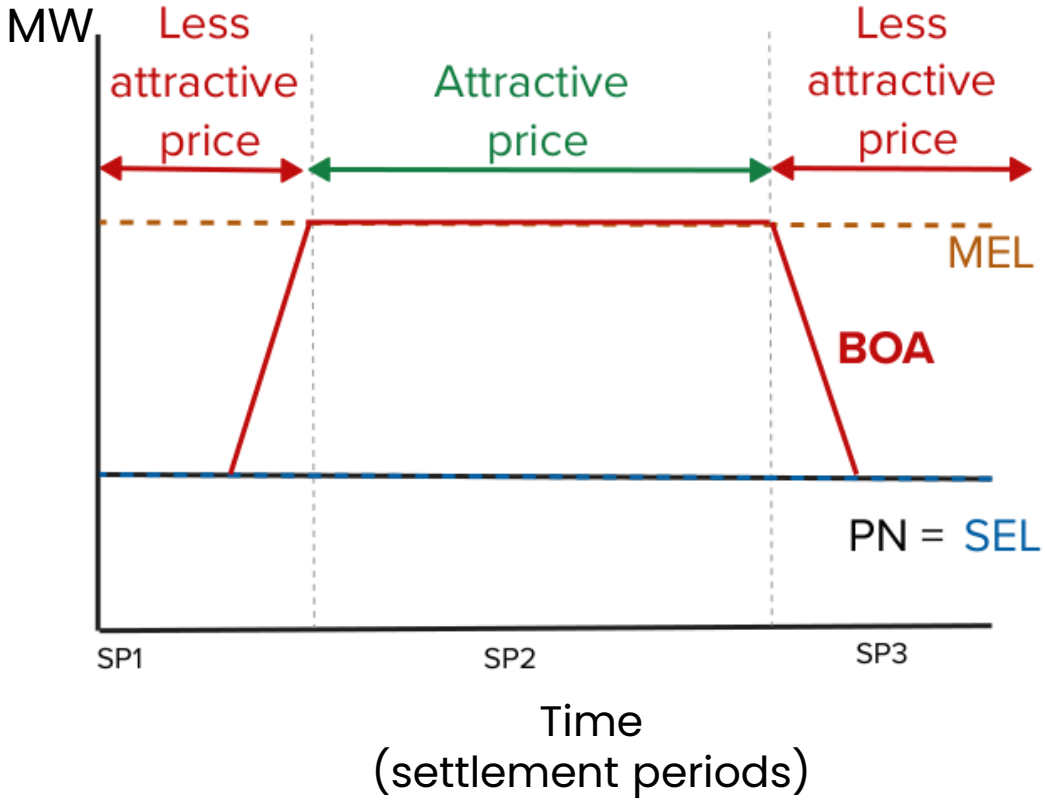
The figure shows a unit with PN = Stable Export Limit (SEL), a more attractive Offer price for settlement period 2 (SP2) and available offer volume up to Maximum Export Limit (MEL).



Time within the hour

Utilising low prices

The figure shows a unit with PN = Stable Export Limit (SEL), a more attractive Offer price for settlement period 2 (SP2) and available offer volume up to Maximum Export Limit (MEL).



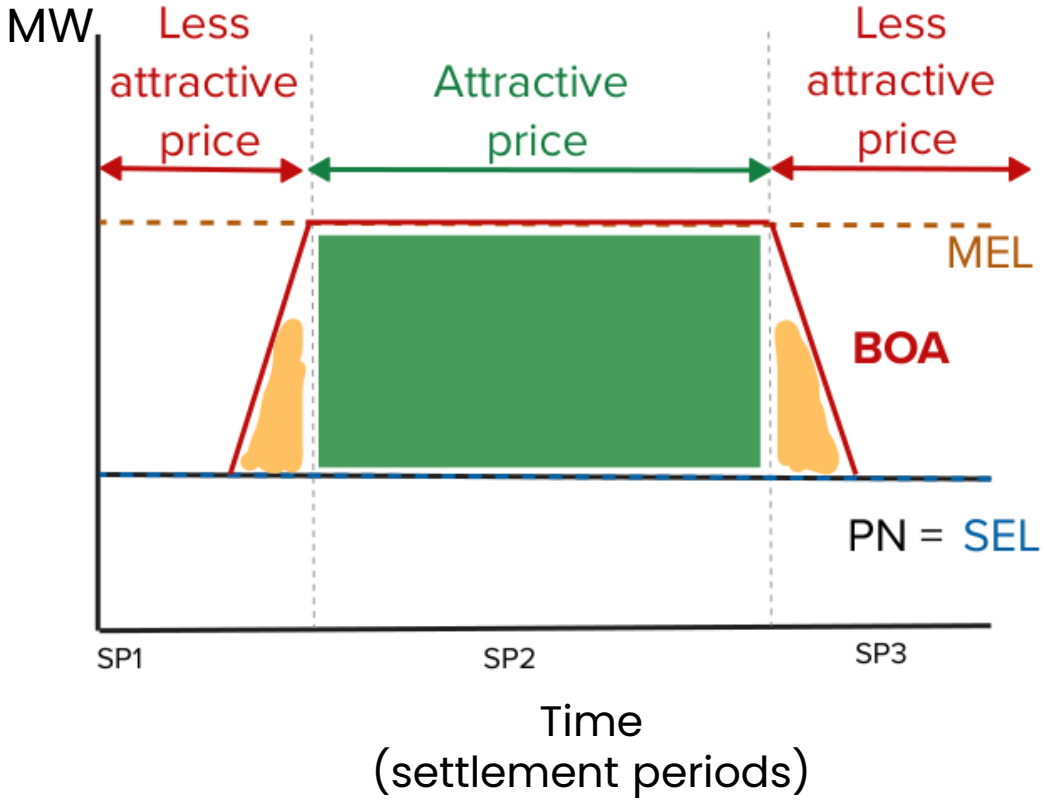
We aim for lowest total cost of energy, which may result in a small volume being accepted at a higher price.

BOA = Bid Offer Acceptance

Time within the hour

Utilising low prices

The figure shows a unit with PN = Stable Export Limit (SEL), a more attractive Offer price for settlement period 2 (SP2) and available offer volume up to Maximum Export Limit (MEL).



We aim for lowest total cost of energy, which may result in a small volume being accepted at a higher price.

This leads to instructions shown as **accepted out of merit** in settlement periods 1 and 3, potentially causing higher skipped volume.

BOA = Bid Offer Acceptance

Next steps

Address three methodology limitations that are impacting skipped volume and skip rates.

1. Mandatory Frequency Response
2. Spin Gen and Spin Pump
3. Ramp rates

- We are kicking off a short project to identify the key areas for root cause analysis of skip rates.
- This will build on the areas we've already identified and set a foundation for more targeted analysis and targeting improvements.

Public

Engagement & Code activity

NESO
National Energy System Operator

Engagement activity (post go-live)

Surgeries / drop in session (12/03/25 & 15/04/25)

10 attendees

Skip Rate Website

OTF – Weekly Skip Rates Stats and opportunities for Q&A

16 queries

Queries inbox

box.SkipRates@neso.energy
8 queries

Webinar (27/02/25)

115 attendees

CEO roundtable (Storage Community)
2 events (03/12/24 & 01/04/25)
51 attendees

Day to day use: Data scientists, Commercial & Operational Focus

How we are performing: Wider community

Emerging Themes

Clarifications

Gaining understanding of what is being provided:

- Methodology
- Data
- Interpretation

Reporting Disaggregation

- Fuel Type Breakdown
- Individual BM Unit breakdown

Technology Specific

- Inclusions of interconnectors
- Treatment of Long notice plant

Learn more at today's breakouts

Covered as part of wider dispatch review

Ongoing Engagement activity

It is important to us to provide a balanced and engaging set of activities

Materiality: We are considering hosting online drop-in event. Please provide feedback on whether this is something helpful at todays materiality breakout.

GC0166:

- Working group finalised solution end March 2025.
- Seeking approval from Grid Code Panel prior to proceeding to Code Administrator Consultation. Ofgem will then take a decision and publish accordingly, anticipated around August 2025.
- Feedback from the working group was that implementation would be c. 6-12m following Ofgem approval due to technology changes to implement. NESO agreed to be ready for industry and will implement the system changes when OBP strategic is implemented and as part of EDL/EDT migration work planned for the end of the year.

Answer the poll on Sli.do now

Opportunity to feedback on the collective impact and effectiveness of skip rate engagement activities

1. **What engagements do you want more of? (Check box)**
2. **Any different engagements or style of engagements you would like? (free form)**
3. **What future topic areas would you like us to cover? (free form)**

Please take the opportunity to elaborate on your comments with any of the NESO team today.

NESO National Energy System Operator

Invitation to share

Tell us about your experience

Have you seen a reduction in BM units being skipped? Have you seen an increase?

We would like to collect observations and insights from the market that:

- Demonstrate where we are making progress
- Indicate where we need make more progress

We invite you to share with us your own experience, analysis and perception of trends.

Please contact us at box.SkipRates@neso.energy

NESO
National Energy System Operator

Q&A

Introduction to Workshops

Workshop Groups

Please refer to your lanyard for your group letter (A, B, or C).
Each workshop will be 45 mins, including time for Q&A.

	Skip Rate Datasets	Skip Rate Methodology Changes	Skip Rate Materiality
	Campanula	Great Western (main room)	Redstar
11:15 – 12:00 **First Workshop**	Group A	Group B	Group C
Lunch			
12:45 – 13:30 **Second Workshop**	Group C	Group A	Group B
13:45 – 14:30 **Third Workshop**	Group B	Group C	Group A
Return to Great Western for wrap up			

NESO National Energy System Operator

Public

Breakout session: Skip Rate Datasets

NESO
National Energy System Operator

Breakout session: Skip Rate Datasets

Agenda

1. Current State
   - Existing datasets
   - Misalignment

2. Future State
   - Alignment of existing datasets
   - Potential new datasets
   - Potential dashboard

} Linked to skip rate by fuel type

Join at Slido.com

 # SkipRates

-> Data

NESO
National Energy System Operator

Current State – Existing Datasets

We publish 4 datasets on the data portal here at Day + 1.

Skip Rates

A new dataset to calculate Skip Rates using the methodology developed with LCP Delta. For more information on this methodology see the Skip Rate section of the website. This dataset provides the skip rates per 30mins of each day following each stage of exclusions as set out in the methodology on the website.

Balancing costs

4 Data Files

Name	Format	Last Changed
Skip Rate - In Merit All Balancing Mechanism	CSV	2 hours ago
Skip Rate - In Merit Post System Action	CSV	1 day ago
Skip Rate - Exclusion Reasons	CSV	1 day ago
Skip Rate - Summary	CSV	1 day ago

Split into monthly files

Please watch the webinar recording from 27th February if you want more information about how these datasets are structured and how to interpret them

Current State – Misalignment

Issue

- The total skipped volume in the 'Summary' dataset does not match the total skipped volume in the 'In Merit' datasets
- In some cases, this statement is not true:

In Merit Volume = **Accepted Volume** + **Skipped Volume**

Causes

- The marginal unit is accepted and multiple units are available at same marginal price (i.e. the last unit that should have been accepted based on price)
- Accepted volume > feasible available volume (according to the methodology)

Solution

- We are adjusting the logic and will be reissuing all existing datasets -> **target date: w/e 9th May 2025**
- There may be a slight change in the skip rate

Future State

Alignment

- Alignment of the existing datasets is necessary to enable an accurate calculation of skip rate by fuel type and individual unit -> **target date: w/e 9th May 2025**

Additional Datasets

We have identified two additional datasets that may provide useful insight

1) Acceptances (separate files for All BM & PSA)

2) Summary Skip Rate by Fuel Type

Future State – Potential New Datasets

1) **Acceptances**
   - List of units that were accepted (irrelevant of whether they were in merit)
   - Same structure as current 'In-Merit' datasets
   - Different to other data available on Elexon as this dataset would only include volume that is considered in scope at the relevant stage of the methodology

   - Answers: "I was skipped – what was taken instead?"

   Question:
   - Is this useful to you / your organisation?

   Use your sticky dot to vote: yes / no / unsure
   - We propose only publishing 1 stage of data: which stage should this be?

   Use your sticky dot to vote: stage 0 / 1 / 2 / 3 / 4 / 5

Future State – Potential New Datasets

2) Summary Skip Rate by Fuel Type

- Same structure as current 'Summary' dataset with an additional column for fuel type
- This would give one row per fuel type per 5 min period
- Two potential calculation methods (on next slide)
- Only for PSA for stage 5

Questions:

- Is this useful to you / your organisation?

Use your sticky dot to vote: yes / no / unsure

- Which calculation method should we use?

Use your sticky dot to vote: LCP / NESO / both / unsure

Note: it will be possible to calculate skip rate by fuel type from the existing datasets once we have completed the alignment work. Adding this as an additional dataset would remove the need for everyone to setup their own analysis/dashboard and ensure consistency.

NESO National Energy System Operator

Future State – Potential New Datasets

Fuel type calculation options

LCP defined fuel skip rate as:

Skipped volume by fuel as a percentage of in-merit by fuel

$$\frac{\text{Fuel Type Skips}}{\text{Fuel Type Skips} + \text{Fuel Type in merit taken}}$$

Each fuel type skip rate is independent

No consideration of total volume

Alternative is:

Skipped volume by fuel as a percentage of all in-merit

$$\frac{\text{Fuel Type Skips}}{\text{All Skips} + \text{All in merit taken}}$$

Fuel skip rates add up to total skip rate

Considers amount of fuel within the skipped volume

Note: currently planning to do this for PSA only

NESO National Energy System Operator

Future State – Potential Dashboard

We have received feedback that a dashboard would be helpful to allow easier interrogation / interpretation of the datasets

We could embed an interactive dashboard on the NESO data portal (using the published data) to allow users to interact with the data in a more user-friendly way.

This would use the existing data on the data portal.

Questions:

- Is this useful to you / your organisation?

Use your sticky dot to vote: yes / no / unsure

- If so, what questions do you want to be able to answer?

Write on Slido using code: SkipRates -> Data

- What do you think of the mocked-up dashboard on the tables?

Annotate the diagram

Feedback Questions

We'd really appreciate your feedback:

1) Which stages of the data do you consider important?

2) Are there any other **data related** improvements / additions / clarifications you would like?

3) Is there anything else (data related) that you think we should have covered?

Write on Slido using code: SkipRates -> Data

Public

Appendix: Skip Rate Datasets

NESO
National Energy System Operator

Dashboard mock-up - illustrative

Skip Rate Dashboard

All Balancing Mechanism | Post System Actions

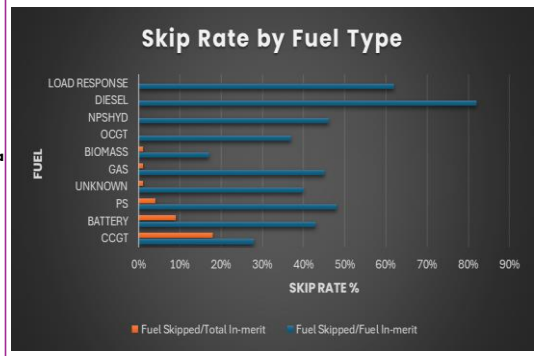
Start date: 15/01/2024 | End date: 31/04/2025 | BM_Unit: All | Stage: All | Bid/Offer: Bid / Offer

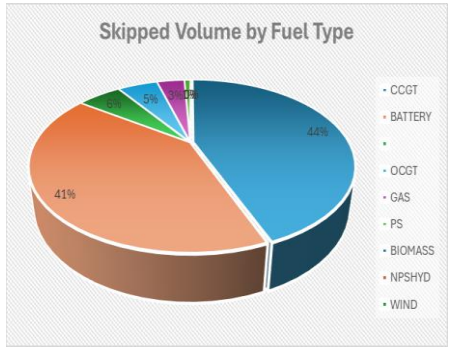
Fuel Type: All, Battery, CCGT, Wind

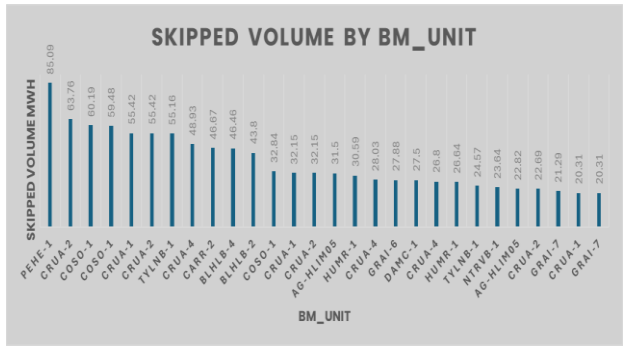
Time Granularity: Half-hourly, Daily, Weekly, Monthly

Overview/ Summary | Export Data | Report | Setting

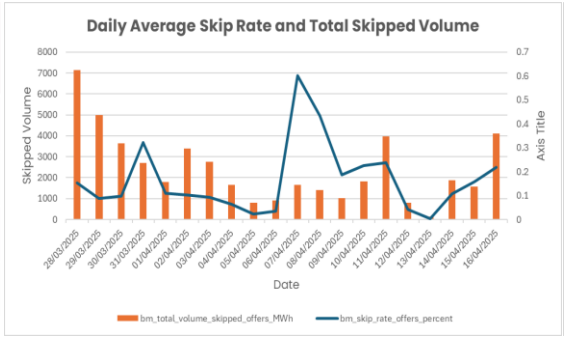
Average Skip Rate	Most Skipped Period	Total Skipped Volume	Total In-merit Volume
42%	07:00	449,013 MWh	961,036 MWh

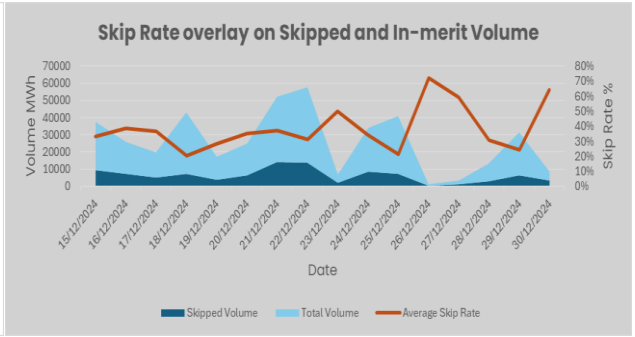






Weekly Average w/e	Offers - All BM	Offers - PSA	Bids - All BM	Bids - PSA
30/03	14%	29%	5%	48%
06/04	8%	43%	21%	45%
13/04	13%	41%	27%	41%
20/04	9%	44%	17%	41%





Footnote considerations: insert arrow to either drill down to datasets, navigator to other pages or visuals, or exit current visual

Interactive Dashboard

Breakout session: Skip Rate Methodology Changes

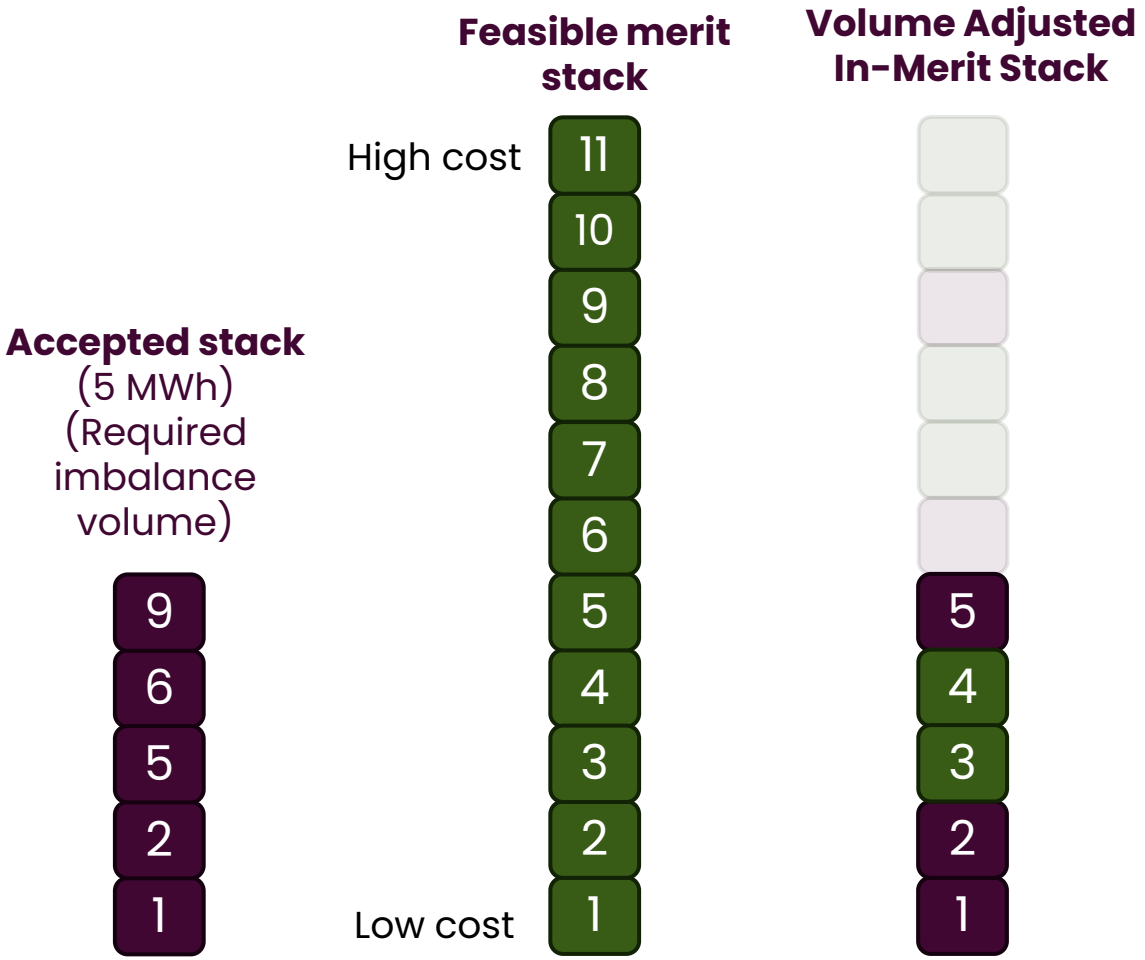
Join at Slido.com

SkipRates

Useful links to available content on methodology

- Skip rate Methodology and Implementation guide
- 27th Feb Battery Storage & Skip Rates Webinar slides
- NESO Skip rate Website
- LCP methodology and report
- 4th Dec Battery forum slides

Skip Rate Calculation refresher



Each box represents 1 MWh

Calculated at **5-minute granularity** for bids & offers

$$\text{Skip rate} = \frac{2\ MWh\ (green)}{5\ MWh\ (green + purple)} = 40\%$$

Exclusions refresher

Exclusions are made because **not all units can be dispatched in real time**.

Stage 0	All bids and offers available in a 5-minute period.
↓	
Stage 1	Exclude volume **not accessible in the BM**. Wind offers
↓	
Stage 2	Exclude volume **not accessible in BM timescales** or unavailable due to **Constraints** Very long notice plants: MZT* >= 12 hours, MNZT** >= 12 hours and NDZ*** >= 90 mins.
↓	
Stage 3	Exclude volume that is **System-tagged**.
↓	
Stage 4	Exclude **Unwind** volume.
↓	
Stage 5	Exclude volumes that could **not be accessed by the balancing team in the control room**. Long notice plants: MZT >= 31 mins, MNZT >= 31 mins, NDZ >= 31 mins and pumped storage through zero.

*MZT: Minimum Zero Time
**MNZT: Minimum Non-Zero Time
***NDZ: Notice to Deviate from Zero

BSADs

Join at Slido.com

Balancing Services Adjustment Data (BSAD) records actions taken outside the balancing mechanism. BSAD data includes interconnector trades. These are decisions that are made ahead of time, with uncertainty with built in risk vs cost management. The control room cannot see BM bid/offer prices when these decisions are made.

#SkipRates

- LCP consider BSAD data as acceptances stage 0 and excluded it at stage 1.
- NESO's implementation of the methodology currently neglects BSAD actions.

Please rank the following in terms of importance using Slido:

1. Including these in our methodology and excluding them at stage 1 (aligning with LCP)
2. Do not include them in our methodology

In either case they would be considered as part of the wider dispatch review.

Limitations of LCP methodology

Run-up/down Rates:

Feasible volumes are not constrained by run-up and run-down rates.

State of Charge:

Each 5-minute period is assumed to be independent and the state of charge of storage assets is not tracked.

Tracking state of charge would introduce additional complexity to the analysis (would need to decide in which periods it is optimal to dispatch these assets) and in turn introduce additional assumptions around cycling limits, round-trip efficiency and state of health.

Each 5-minute period is assessed independently of any preceding and successive period. This will limit the exposure of efficiencies that the ENCC could have accessed by dispatching assets across multiple 5-minute periods.

Data Availability:

Dispatch Transparency data is incomplete, this data is used to retrieve which units were utilised for Frequency Response.

Thermal Constraints:

Accounting for thermal constraints (beyond the exclusion of system tagged actions) would introduce additional complexity to the calculation of the skip rate metric making it less transparent and difficult to reproduce.

It would entail the calculation of locational merit stacks to ensure actions taken behind thermal constraints were efficient.

Ancillary Services:

Assets held back by ESO in readiness to provide other ancillary services (Reserve, Response) are not excluded.

Pumped Storage:

Data is not available to show when pumped storage units are in 'Spin Pump' or 'Spin Gen' modes which would impact the feasibility of providing balancing actions.

Limitations of LCP methodology

Ramp rates

Run-up/down Rates:

Feasible volumes are not constrained by run-up and run-down rates.

State of Charge:

Each 5-minute period is assumed to be independent and the state of charge of storage assets is not tracked.

Tracking state of charge would introduce additional complexity to the analysis (would need to decide in which periods it is optimal to dispatch these assets) and in turn introduce additional assumptions around cycling limits, round-trip efficiency and state of health.

Each 5-minute period is assessed independently of any preceding and successive period. This will limit the exposure of efficiencies that the ENCC could have accessed by dispatching assets across multiple 5-minute periods.

Data Availability:

Dispatch Transparency data is incomplete, this data is used to retrieve which units were utilised for Frequency Response.

Thermal Constraints:

Accounting for thermal constraints (beyond the exclusion of system tagged actions) would introduce additional complexity to the calculation of the skip rate metric making it less transparent and difficult to reproduce.

It would entail the calculation of locational merit stacks to ensure actions taken behind thermal constraints were efficient.

Mandatory Frequency Response

Ancillary Services:

Assets held back by ESO in readiness to provide other ancillary services (Reserve, Response) are not excluded.

Spin Gen & Spin Pump

Pumped Storage:

Data is not available to show when pumped storage units are in 'Spin Pump' or 'Spin Gen' modes which would impact the feasibility of providing balancing actions.

NESO
National Energy System Operator

Mandatory Frequency Response

Mandatory frequency response (MFR) is an automatic change in active power output in response to a frequency change.

Units are instructed to an optimum delivery position by the control room to keep frequency within statutory and operational limits.

Current approach: **no account of units providing MFR**

Implications:

Accepted volume – instructions sent for MFR shown as accepted out of merit and are potentially causing skips.

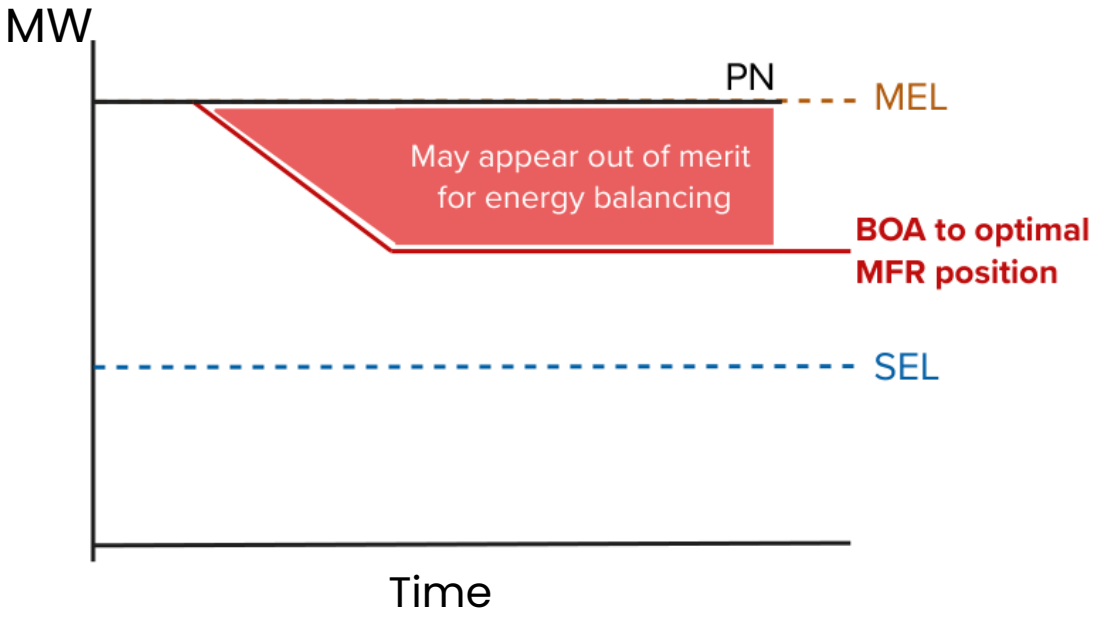
Feasible volume – volume sterilised for MFR shown as skipped.

Mandatory Frequency Response

Current approach

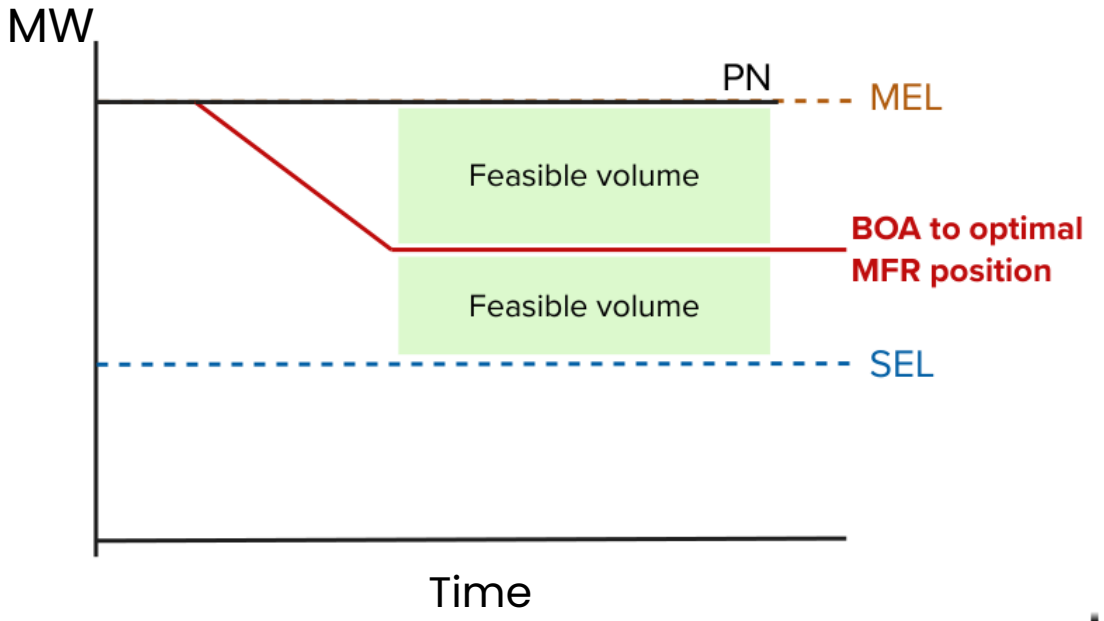
Accepted volume

Volume is accepted to put a unit in optimum position for delivering MFR.



Feasible volume

A unit optimally positioned for MFR seems like it has feasible volume.

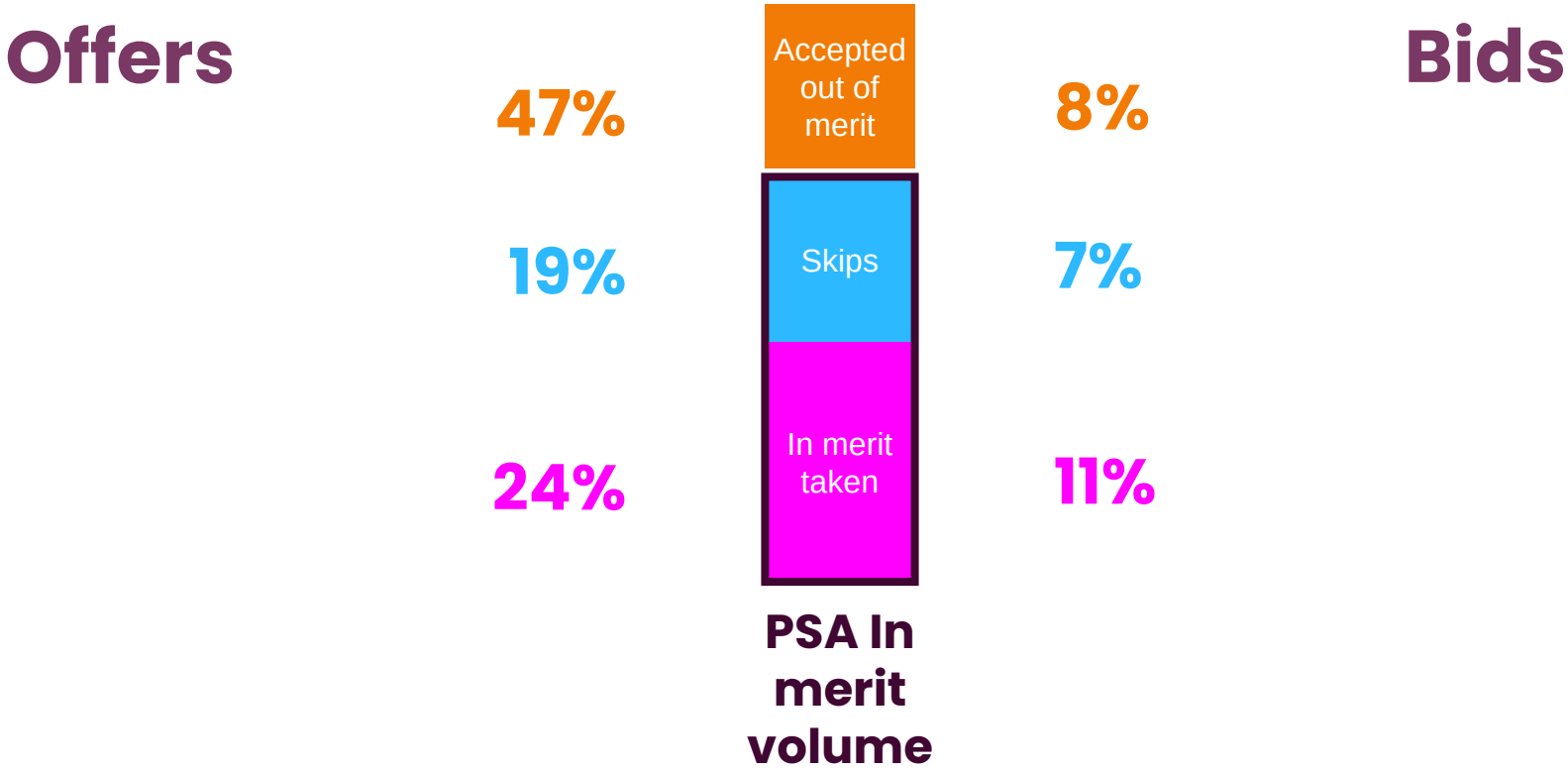


Bid Offer Acceptance (BOA), Physical Notification (PN), Stable Export Limit (SEL), Maximum Export Limit (MEL)

MFR impact analysis

This estimation of impacts utilises a snapshot from the Post System Action (PSA) dataset, at **Stage 5**.

The figures are the percentage of current volume impacted



MFR proposal

Proposal: **do** implement MFR methodology change

Approach:

At Stage 5, units instructed to provide MFR have:

Feasible: all bids and offers excluded

Accepted: all bids and offers excluded

Reasons:

- Significant impact on accepted and skipped volume.
- Methodology is relatively straight forward.

Spin Gen & Spin Pump

Spin Gen & Spin Pump is a bilateral contract between NESO and pumped storage units to make them available to dispatch large volume at short notice.

A unit in Spin Gen must be shut down for its Minimum Zero Time (MZT) before pumping.

A unit in Spin Pump must be shut down for its Minimum Zero Time (MZT) before generating.

Current approach: **do not account for units providing Spin Gen and Spin Pump**

Impact:

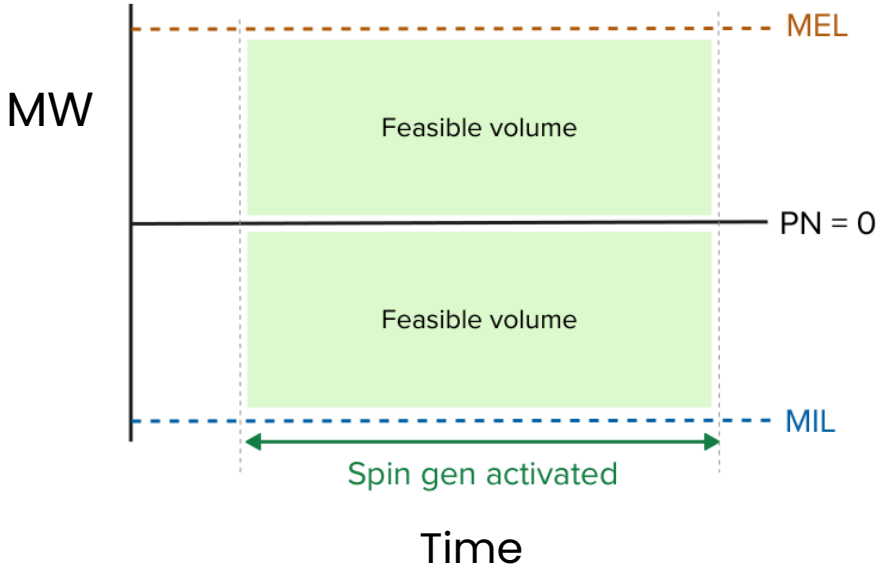
Feasible volume – Infeasible volume shown as skipped. i.e., pumping volume when in Spin Gen and Generating volume when in Spin Pump.

Spin Gen & Spin Pump

Current approach

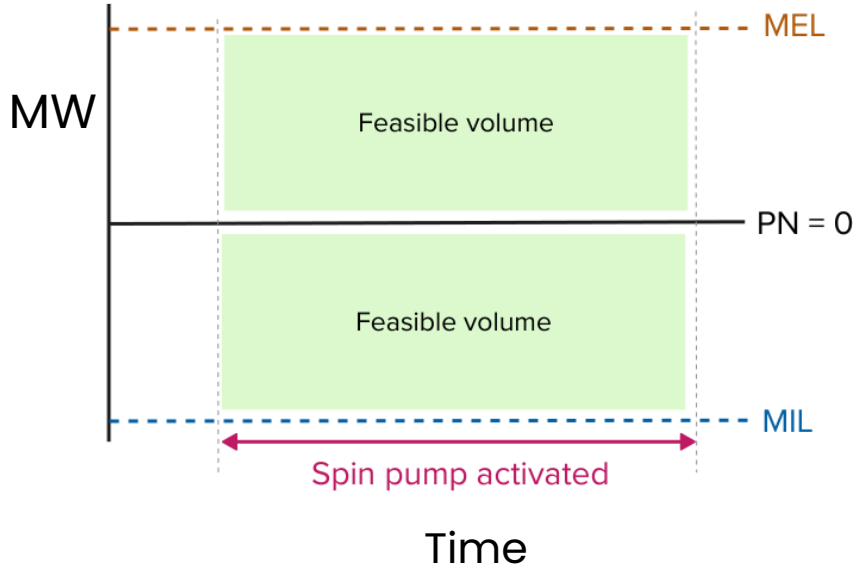
Spin Gen – feasible

Do not account for Spin Gen, so all volume is feasible, when the PN is zero.



Spin Pump – feasible

Do not account for Spin Pump, so all volume is feasible, when the PN is zero.

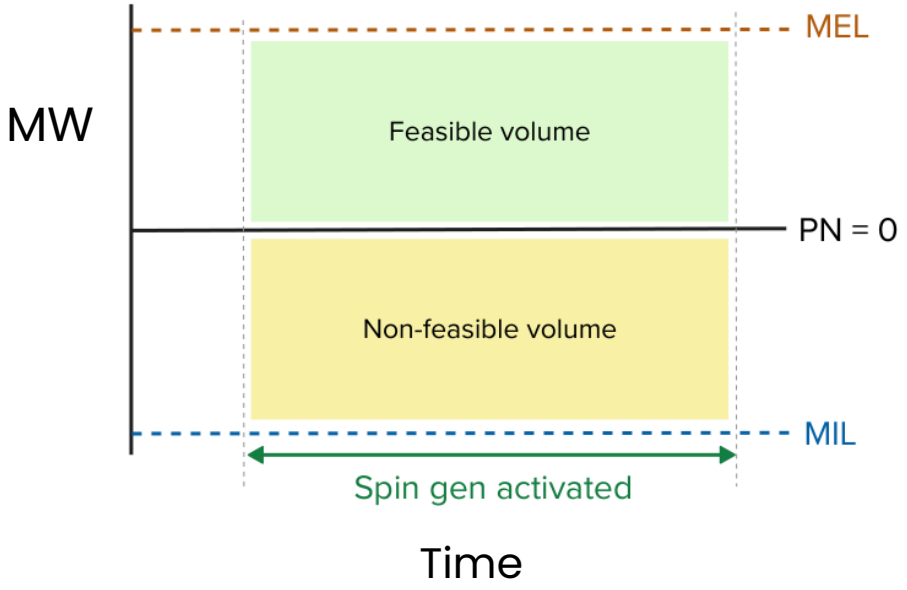


Physical Notification (PN), Maximum Export Limit (MEL), Maximum Import Limit (MEL)

Spin Gen & Spin Pump

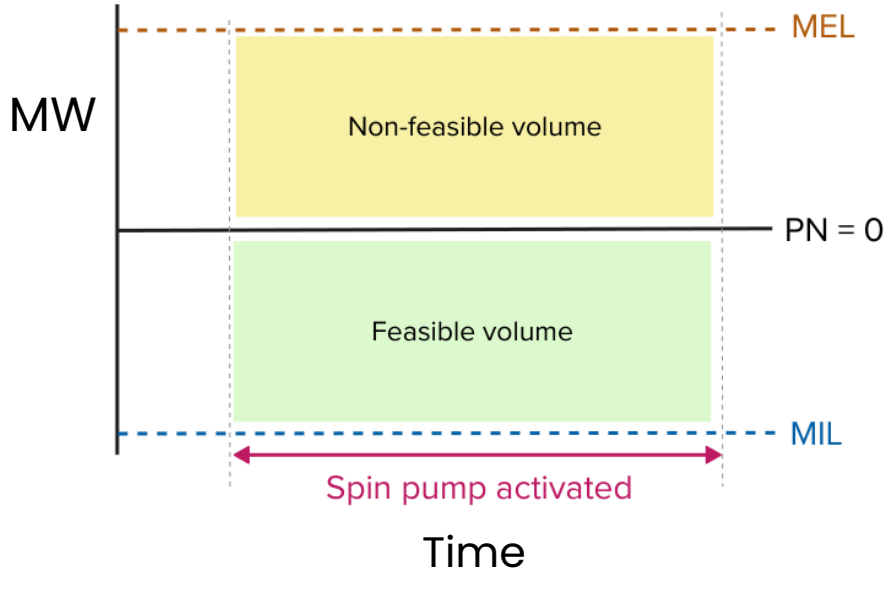
Spin Gen – feasible

The yellow box shows the non-feasible volume while in Spin Gen.



Spin Pump – feasible

The yellow box shows the non-feasible volume while in Spin Pump.



Physical Notification (PN), Maximum Export Limit (MEL), Maximum Import Limit (MEL)

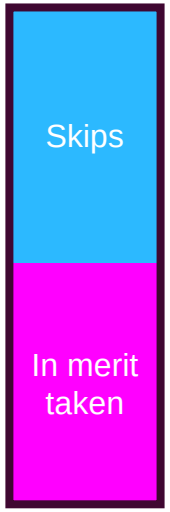
Spin Gen & Spin Pump: impact analysis

This estimation of impacts utilises a snapshot from the PSA dataset, at Stage 5.

The figures are the percentage of current volume impacted

Offers

4%



PSA In merit volume

13%

Bids

Spin Gen & Spin Pump proposal

Proposal: **do** implement Spin Gen & Spin Pump methodology change.

Approach:

At Stage 5,

units in Spin Gen have their bids excluded from the **feasible** stack,

units in Spin Pump have their offers excluded from the **feasible** stack.

Reasons:

- Removing skipped volume that is technically infeasible.
- Methodology is relatively straight forward.

Ramp rates

Ramp rates are the technical parameters that define the maximum speed a unit can increase or decrease its power output.

Ramp rates ensure instructions adhere to the submitted dynamic data of units.

Current approach: **assume full export availability to MEL & import availability to MIL, not accounting for ramp rates.**

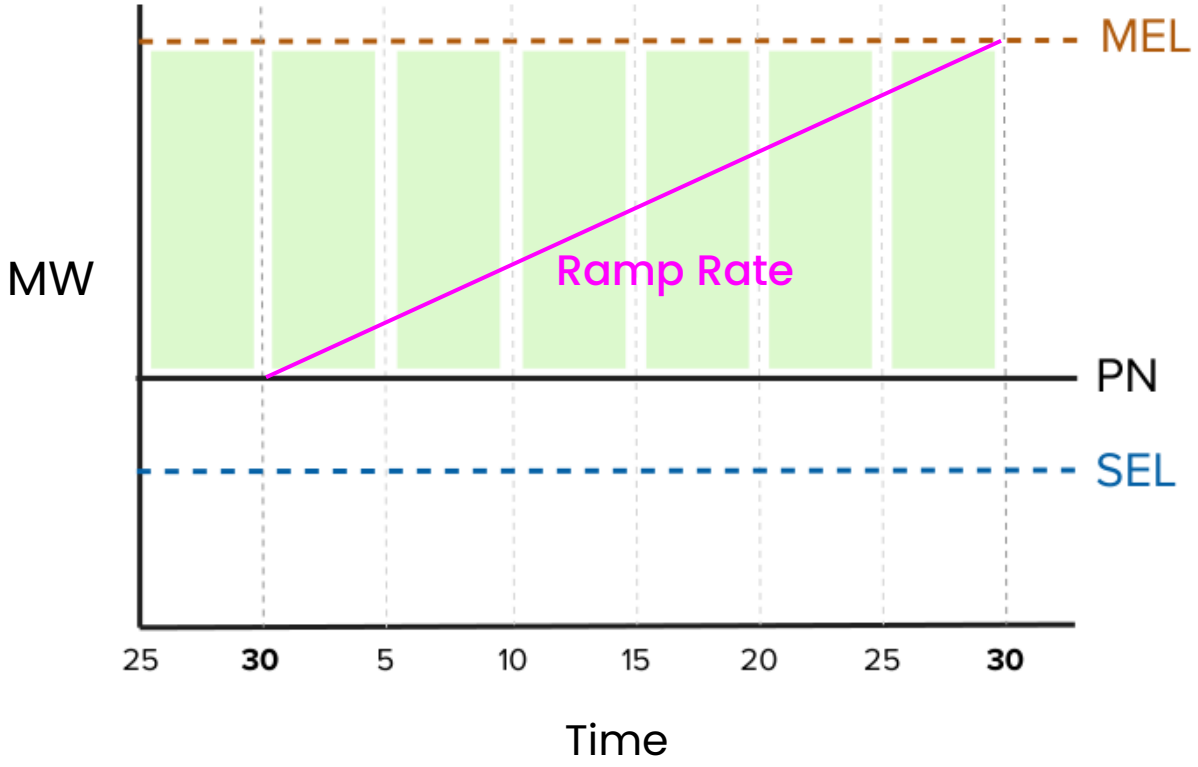
Impact:

Feasible volume – Infeasible volume shown as skipped. i.e., full volume deemed as feasible, not accounting for the unit's ramping dynamic data.

Ramp rates

Current approach

Do not account for ramp rates when calculating feasible volume.



The figure is an example of the volume that is assumed to be available in a particular scenario.

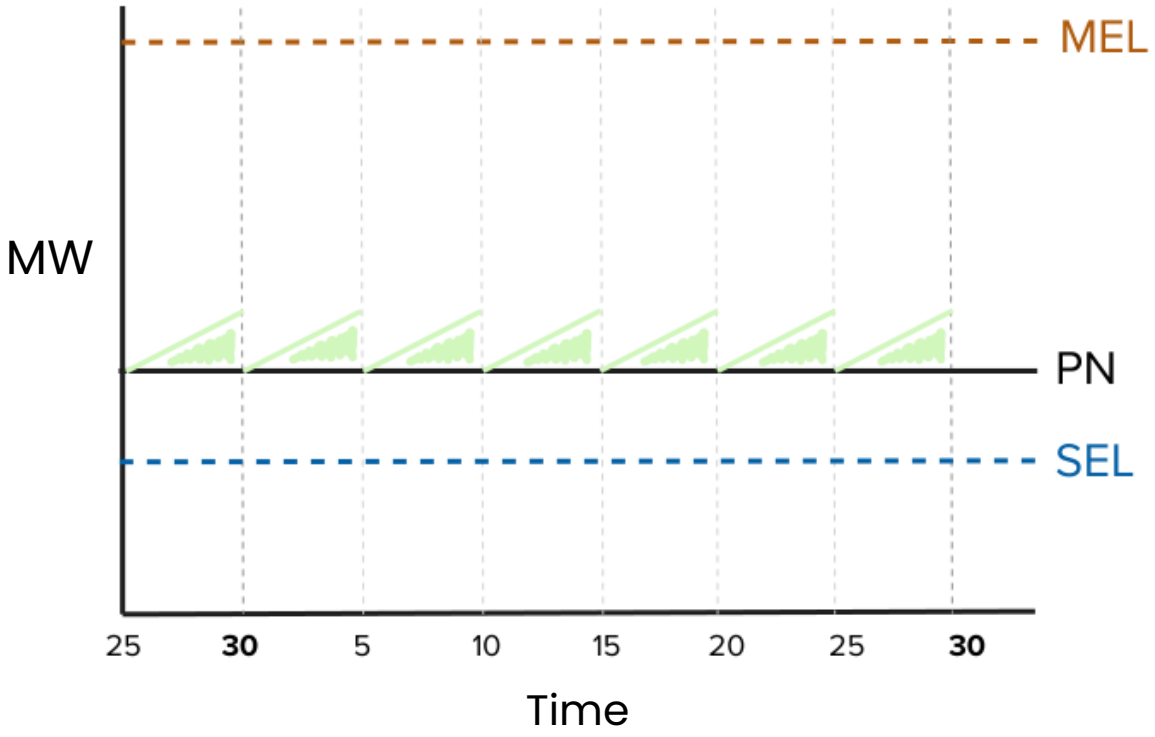
- The green areas show feasible offer volume.
- For units with non-instantaneous ramp rates, this volume is not feasible in practise.
- The pink line represents a maximum ramp rate.

Conclusion: not accounting for ramp rates leads to infeasible skipped volume.

Physical Notification (PN), Stable Export Limit (SEL), Maximum Export Limit (MEL)

Ramp rates: simple approach

Apply ramp rates to each 5-min period.



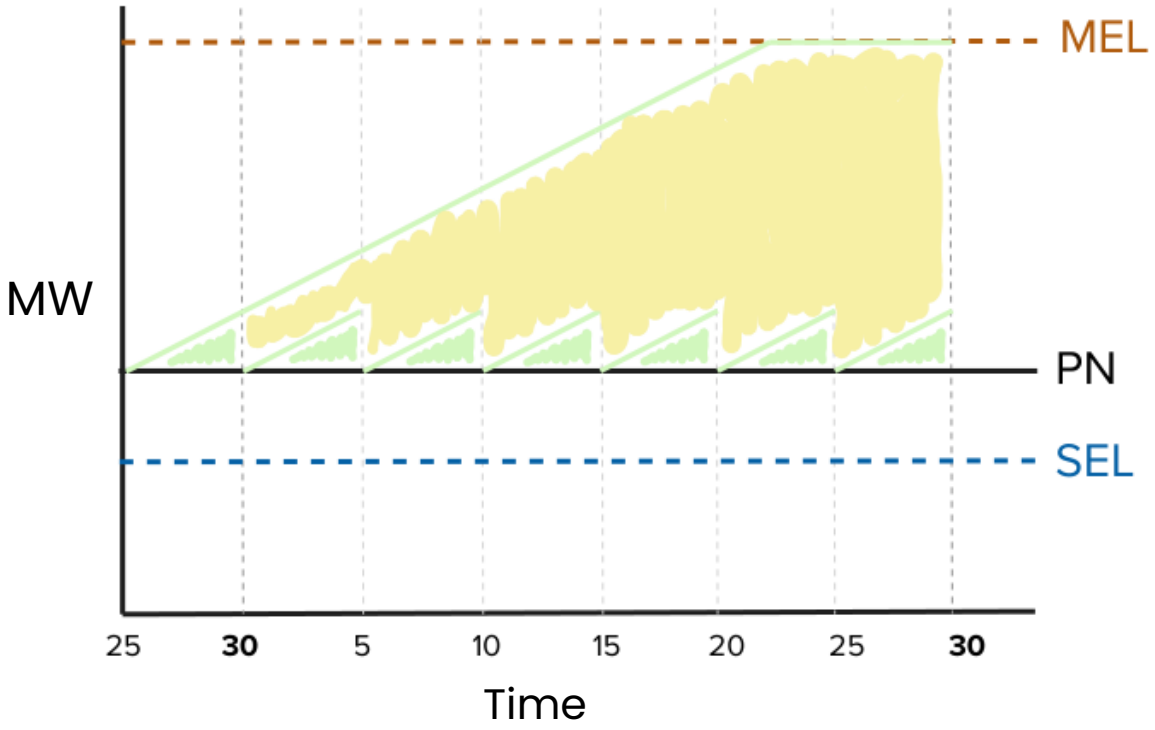
The figure is an example of the volume that would be available in this case.

- The green areas show feasible offer volume.
- The feasible volume is limited by the unit's maximum ramp over 5 mins.

Physical Notification (PN), Stable Export Limit (SEL), Maximum Export Limit (MEL)

Ramp rates: simple approach

Apply ramp rates to each 5-min period.



The figure is an example of the volume that would be available in this case.

- The green areas show feasible offer volume.
- The **feasible volume is limited by the unit's maximum ramp over 5 mins**.

Conclusion: applying ramp rates to each 5-min period is too restrictive to the feasible volume.

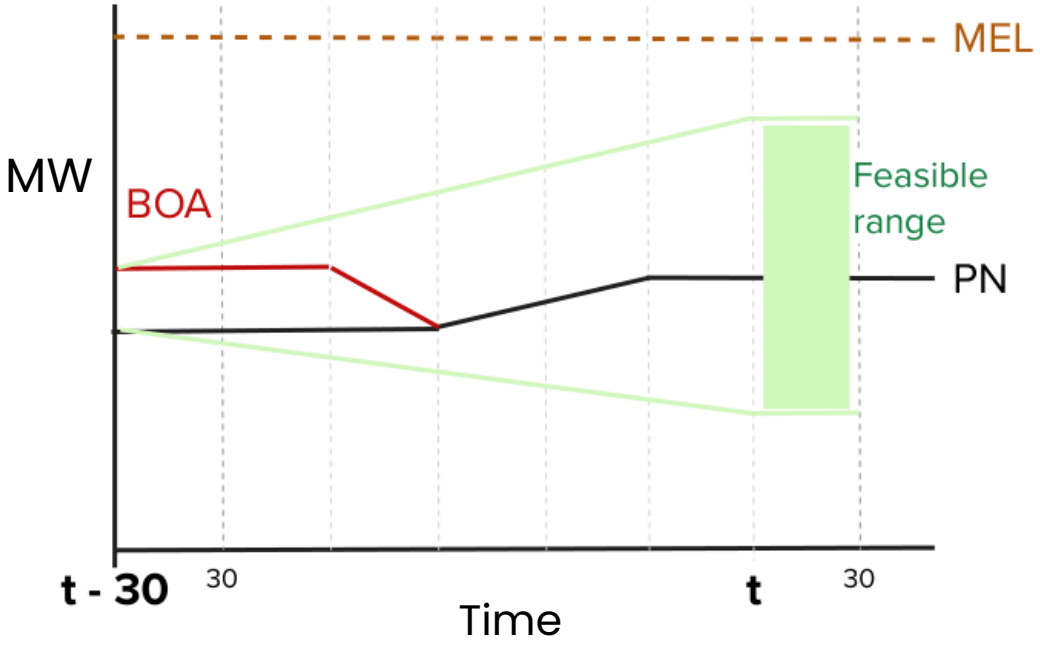
Discounted as too restrictive and unfairly removes significant volumes.

Physical Notification (PN), Stable Export Limit (SEL), Maximum Export Limit (MEL)

Ramp rates: complex approach

Include volume accessible within a 30-minute window.

This is consistent with the approach applied in Stage 5, to exclude volumes that could not be accessed by the balancing team in the control room.



The green line shows the maximum ramp for the 30 mins up to real time.

- From PN only and PN + BOA.
- Take the maximum range available: Feasible range.

We propose PN and PN+BOA range because the BOA from t-30 mins may have been accepted out of merit. Therefore, the unit should have been at PN.

Bid Offer Acceptance (BOA), Physical Notification (PN), Maximum Export Limit (MEL)

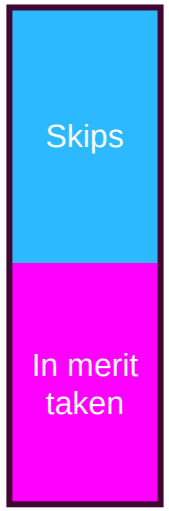
Ramp rates: impact analysis

This estimation of impacts utilises a snapshot from the PSA dataset, at Stage 5.

The figures are the percentage of current volume impacted

Offers

19%



PSA In merit volume

3%

Bids

Ramp Rates proposal

Proposal: **do not** implement ramp rate methodology change.

Reasons:

- Simple method leads to restrictive assumptions
- Complex method, complex to implement, with large number of edge cases.
- Impact limited to a small number of units.

Further considerations:

- Conduct stand-alone assessment of ramp rates via root cause analysis.
- Apply simple method to a specific selection of units.

Feedback

Join at Slido.com

Please use Slido to answer these three questions:

1. Is refining the energy balancing skip rate methodology, at Stage 5, a priority?
2. Are there other areas outside of energy balancing you would like the NESO to focus on?
3. Are there other areas within energy balancing you would like the NESO to focus on?

#SkipRates

Prioritisation of changes

Please rank the methodology areas in terms of priority for you.

Change to browser for results of slido

SkipRates

Breakout session: Skip Rate Methodology Changes

Q&A and close

Join at Slido.com

SkipRates

Public

Breakout Session: Skip Rate Materiality

David Dixon & Juliette Richards

Join at Slido.com

SkipRates

NESO
National Energy System Operator

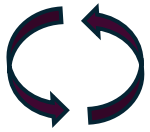
Materiality of skip rates

Background

Following the previous analysis from LCP published last year, we committed to investigating the materiality of skip rates in 2025.

We have worked with internal teams and LCP Delta to consider possible ways of approaching this.

- We firstly considered a calculation which simply considered the difference in the cost between a skipped unit and the unit taken out of merit.



- However, this approach does not consider how actions taken in one settlement period can impact actions taken in another, for example:
  - NESO is incentivised to optimise costs over a day (rather than a settlement period). This could lead to, for example, not using a battery at 3pm in order to use it at 5pm when other options are more expensive – an 'economic' skip.
  - Only considering the delta in cost between the unit taken and the skipped battery at 3pm would not capture how this contributes to a *reduction* in cost later in the day.
  - Similarly, all storage units that are used in 1 settlement period will need to Spin Pump / charge in another settlement period, potentially impacting the wholesale price at that time.

*Arriving at a 'true' cost of skips is therefore fairly complex, as you need to consider all of what would have happened had a unit **not** been skipped, to consider costs against an accurate counterfactual.*

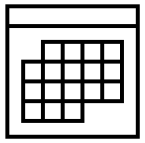
NESO National Energy System Operator

Potential options: Option 1

Working with internal teams and LCP, we have scoped 2 possible pieces of work that would examine the materiality of skips – we would like to get feedback as to what would be most valuable to stakeholders.

Option 1:

- **Engage LCP to build an algorithm** to produce an optimised re-dispatch for each day, and then calculate the difference in cost between actual and a feasible re-dispatch, accounting for unit constraints and storage duration limits.
- Initially this analysis would be undertaken for c. 4 months so that new data including constraints can be used. We could look to repeat this analysis in January 2026 to get a full year figure.



- However this work would assume perfect foresight / hindsight so would still not be perfectly accurate.
- The work would take c. 4-6 months to complete due to the complexity of building a new optimisation algorithm.

End product(s): a £ number estimating the cost of skip rates from mid December to mid April, supported by case studies examining actions in particular settlement periods.

Potential options: Option 2

Option 2:

- **NESO to produce a cost analysis of skips identified in Stage 5 of the skip rate methodology. These Stage 5 skips will be categorised as either an economic skip or an avoidable skip, with the latter being costed.**
- Economic skips are defined as instances where it is more cost-effective to defer a BMU's volume now and use in a later settlement period, an example is provided in the later slides.

- We would cost the 'avoidable skips' category using the difference in the cost between a skipped unit and the unit taken out of merit. As noted, there are limitations to this costing method, but as economic skips are removed from this analysis, these limitations would be minimised.
- To best illustrate economic skips that reflect optimisation decisions, we propose to identify a set of rules that can be applied. For example, units that are used within the next [X] hours. This would be more transparent and once in place we could replicate the analysis quickly in the future.

- This work would take c. 3 months to produce
- We propose to include external assurance process for the work should this be of value to stakeholders. One option could be to establish an industry working group to validate our methodology, particularly related to the rules applied to economic skips. Alternatively, we could consider an external audit to verify the accuracy of our results.

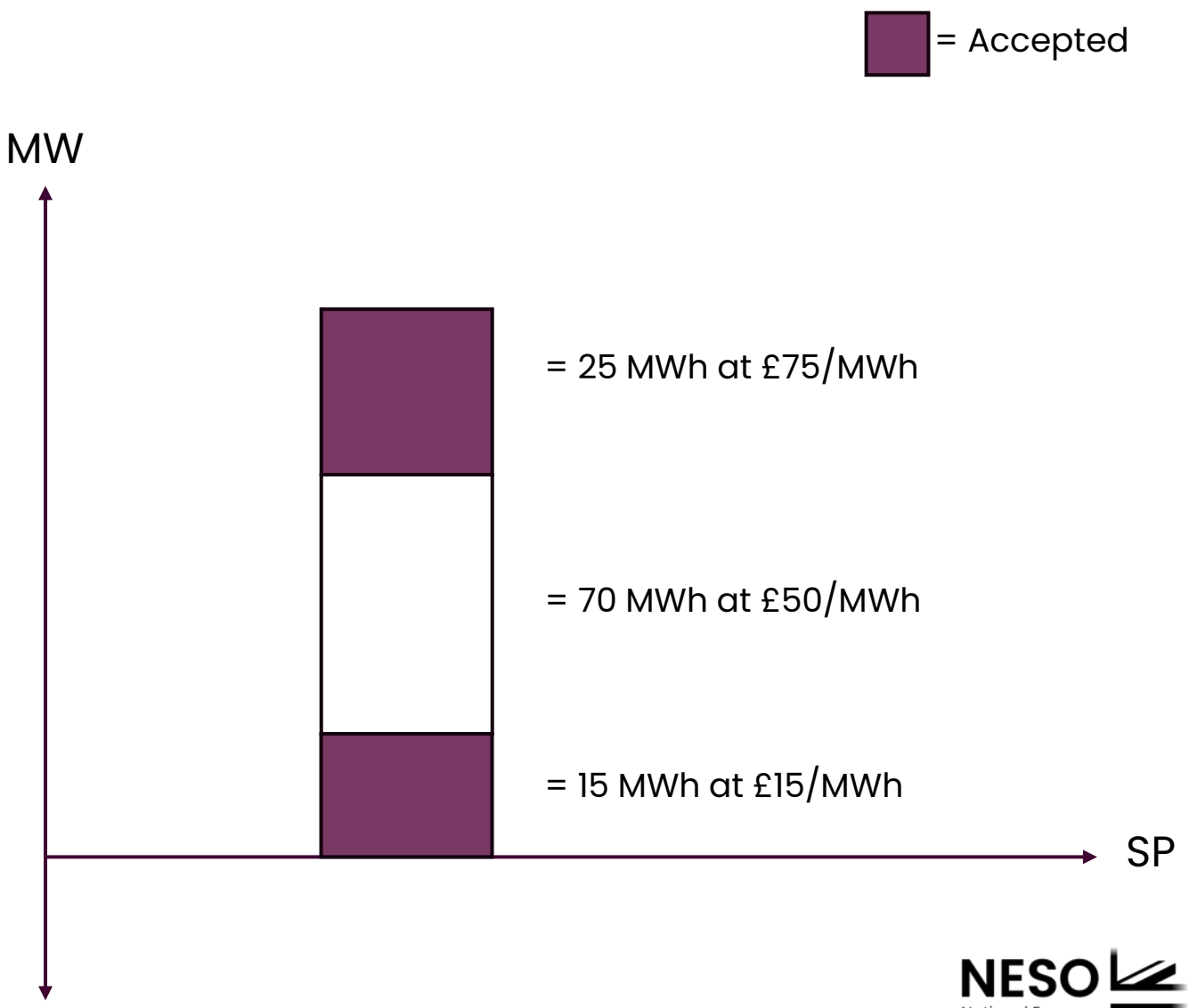
End product(s): Analysis estimating the cost of skips (£m) based on Stage 5 data and excluding economic actions across settlement periods.

NESO
National Energy System Operator

Calculating the cost of skips

- Ultimately, we are trying to calculate the lost benefit from a skipped unit.
- This has been done previously by others (such as Modo) by looking at the price difference between a skipped unit and the next accepted unit

- We spent (15*15)+(25*75) = £2,100
- Alternative scenario: (15*15)+(25*50)=£1,475
- Therefore, the cost is £625

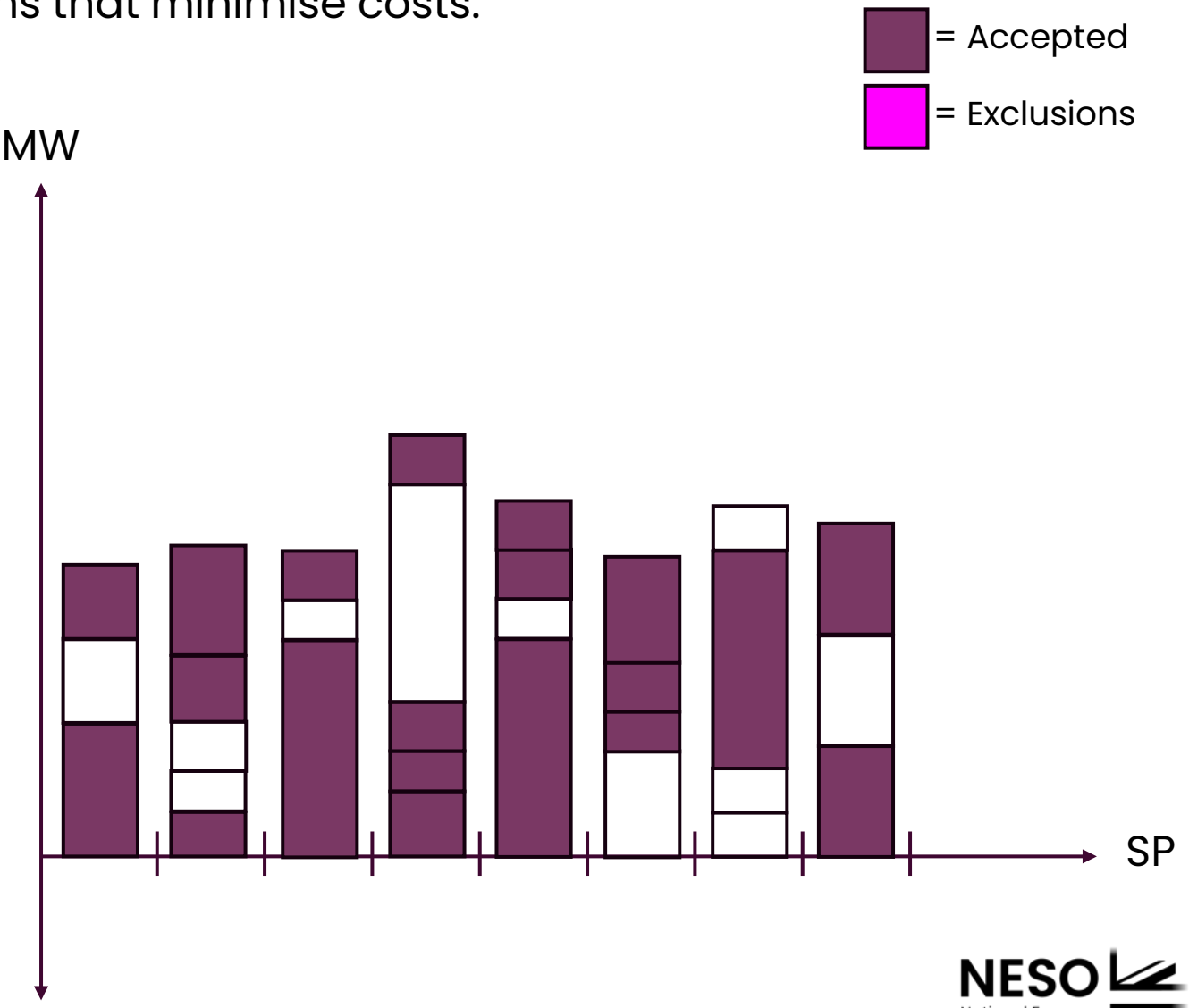


Exclusions

It is in NESO's license obligations to take actions that minimise costs.

Prior to calculating the cost of skips, there are a number of exclusions which are made because not all units can be dispatched in real time.

Exclusions are taken out of the order through the skip rate methodology and the cost analysis commences from Stage 5



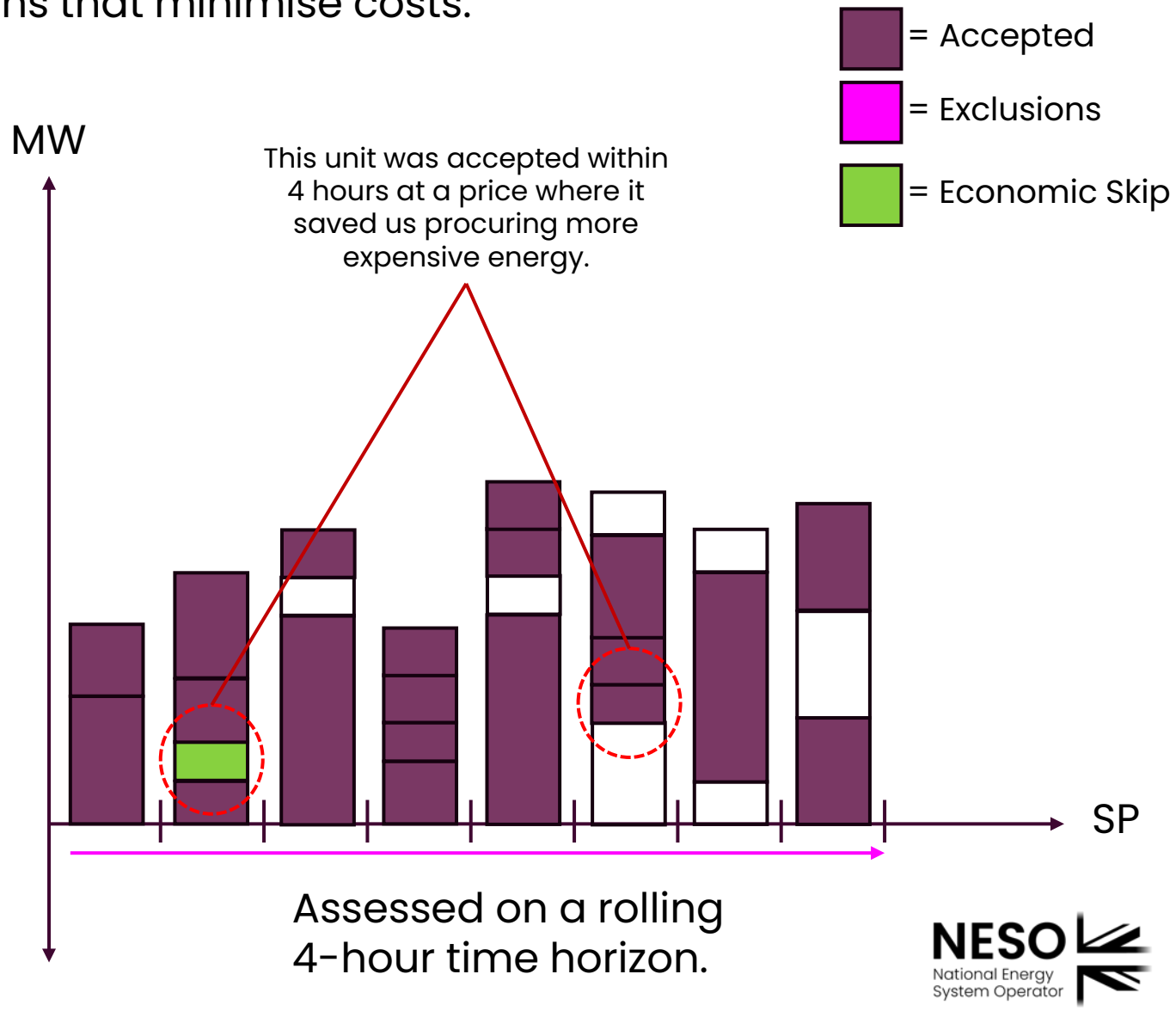
Calculating the cost of skips – economic skips

It is in NESO's license obligations to take actions that minimise costs.

When calculating the cost of skips it is important to note there are economic reasons where skips may occur but not produce a cost.

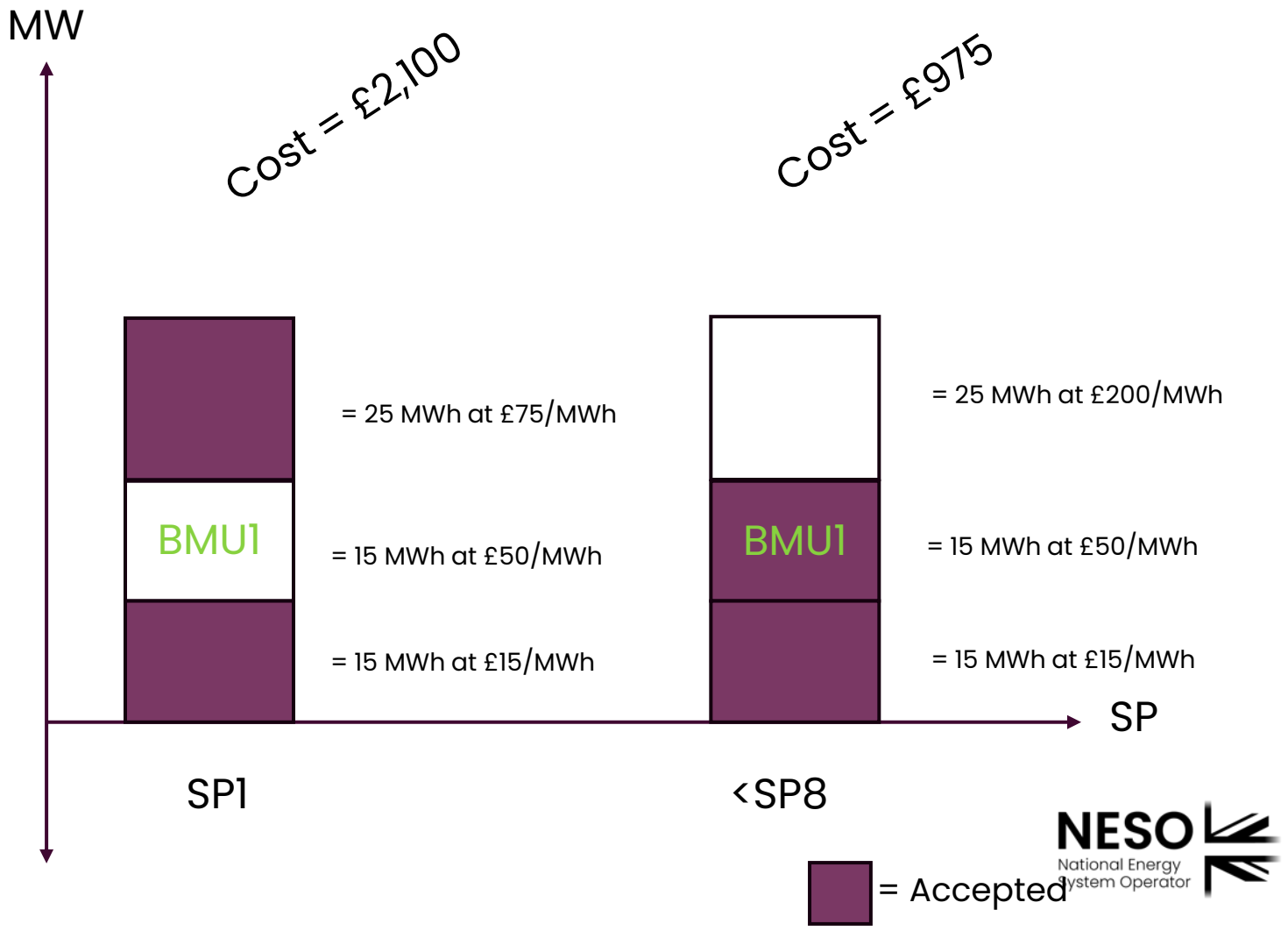
Economic skips occur when it was cheaper to use a BMU's volume at a later time.

We shall assess economic skips across several time horizons within a rolling 4-hour period focusing on storage assets that have a fixed rate of charge.



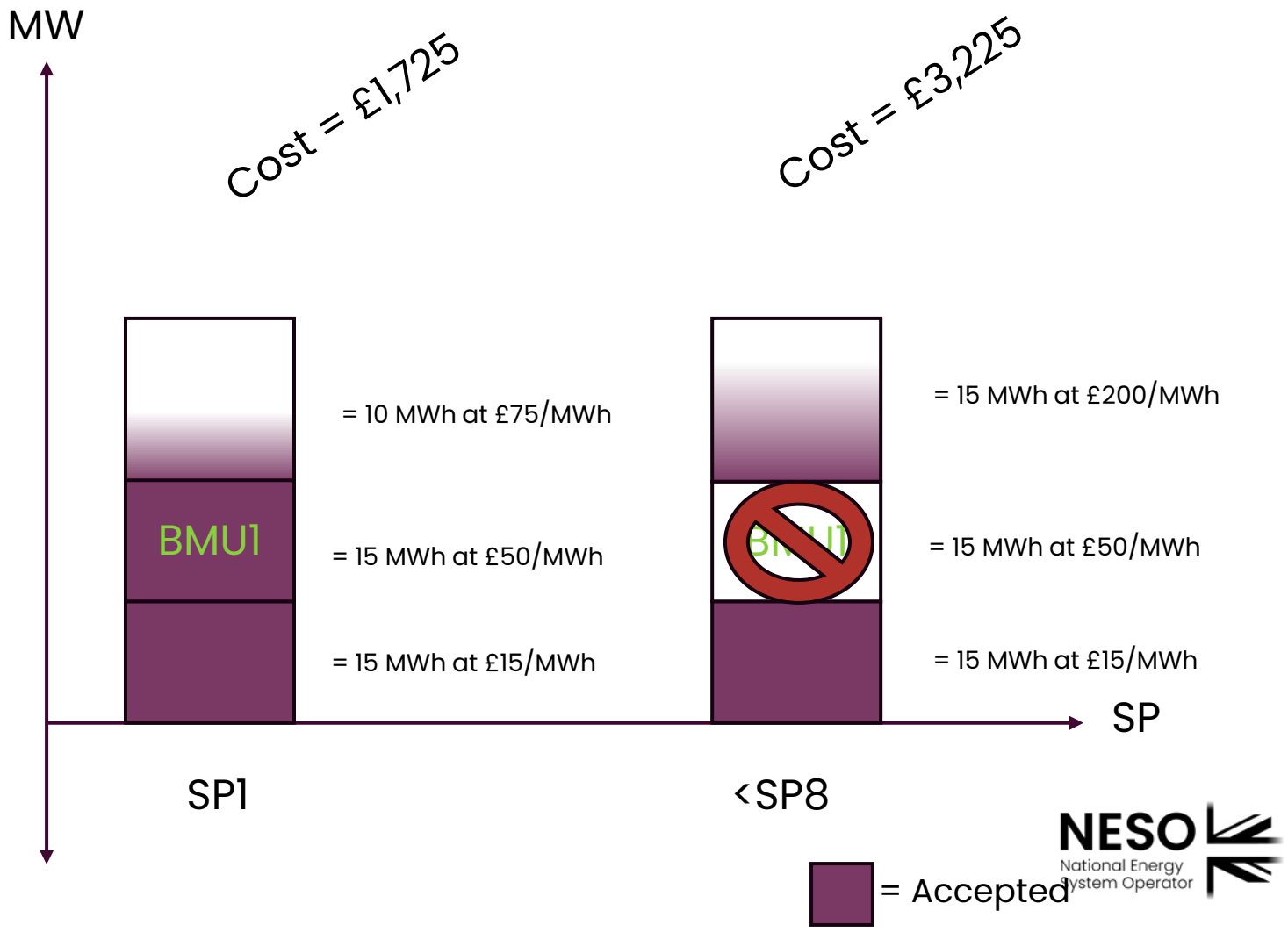
Economic Skip – Example (1/2)

Under these scenarios, the total cost for the two settlement periods would be £3,075



Economic Skip – Example (2/2)

Under the alternative where BMU1 was not skipped, the total cost for the two settlement periods would be £4,950.



Materiality Study Takeaways

- Produce cost analysis of skips based on Stage 5 of the skip rate methodology.
- Incorporate the economic ‘benefit’ of skipped storage
- This will be done on several horizons (1-, 2-, 3-, and 4-hour horizons).

Questions

Join at Slido.com

SkipRates

- What are your thoughts on our scope of works?
- What are the advantages and disadvantages of each approach?
- What are the key things you are looking to understand from the materiality work? What data would be most valuable to you as stakeholders?
- If the work is undertaken by NESO, what sort of external assurance would you expect to see?
- Could you share your thoughts on the most appropriate way to identify economic skips?

Write on Slido using code: SkipRates -> Materiality

NESO
National Energy System Operator

Q&A

Thank you and safe journey

NESO
National Energy System Operator