Skip Rates Behind Active Thermal Constraints

Final Methodology – March 2026

Skips Behind Constraints: Overview

Provides transparency on dispatch decisions taken on BMUs behind active thermal constraints

Objectives:

- Identify and analyse skips that occur behind thermal constraints
- Develop a methodology to assess and measure skips within constraint boundaries, accounting for:
    - Nested constraints
    - Complimentary constraints
- Agree a methodology with industry by 31st March 2026
- Publish data in a format both useful to industry and within NESO's security standards

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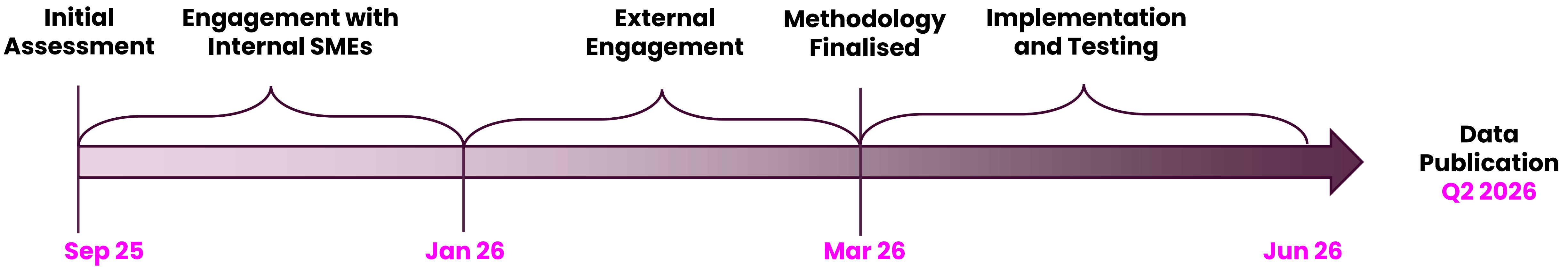
Skips Behind Constraints: Timeline



Based on positive feedback received from industry (slide 25) during external engagements*, the following methodology has been agreed as of March 2026.

Implementation is currently in progress, with a view to publish data externally in Q2 2026. The format of the data is still to be finalised but we will aim to meet industry's preferences (slide 26).

*External engagement includes Dispatch Transparency forum (January 2026), Skips Behind Constraints Webinar (March 2026), and attendance at industry groups' own forums (March 2026). The slides & recordings from these events can be found on Skip Rates page.

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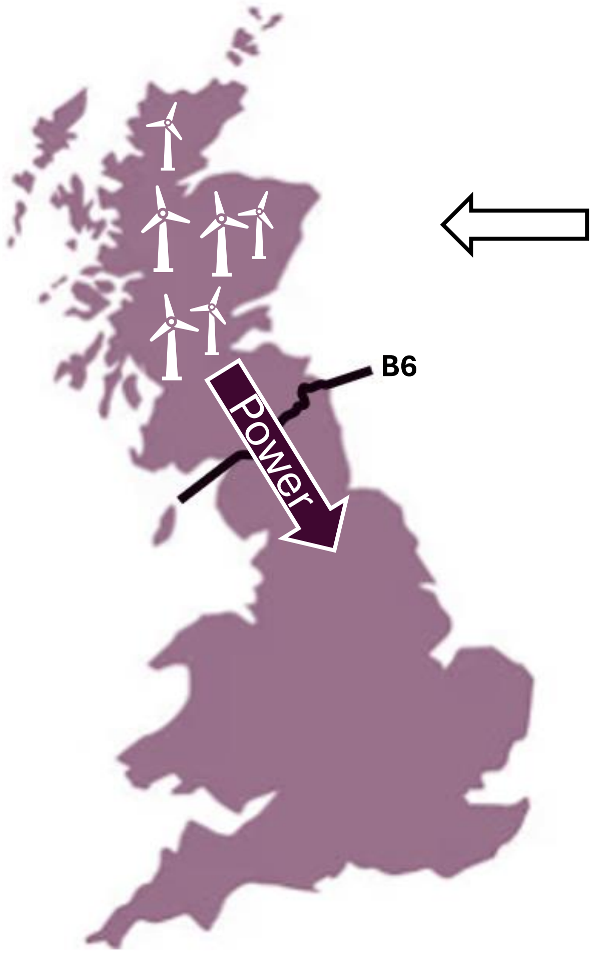
What are Constraints?

- Thermal constraints are theoretical lines drawn across the UK that help visualise the limited power that can flow across physical wires and cables. They are operational limits that protect physical infrastructure.
- An **active constraint** is a constraint that control engineers are currently taking actions to reduce the flow across. It is affecting dispatch decisions.
- **Export constraints** limit the power that can flow out of a region. They often surround areas of high generation and low demand, such as Scotland on a windy day.
- **Import constraints** limit the power that can flow into a region. They often surround areas of high demand and low generation, such as large cities.
- Constraints can also be due to voltage or stability. These are less common and not in the scope of this project.

Import and Export Constraints



Export constraints

- Limit the power that can flow **out** of a region
- Surround areas of high generation and low demand

Import Constraints

- Limit the power that can flow **into** a region
- Surround areas of high demand and low generation

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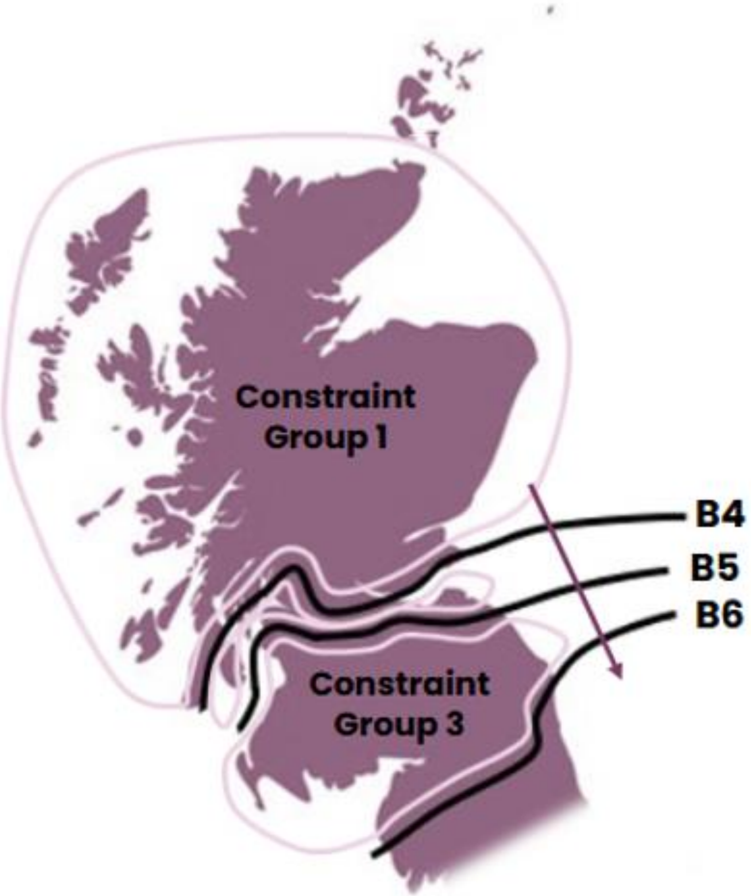
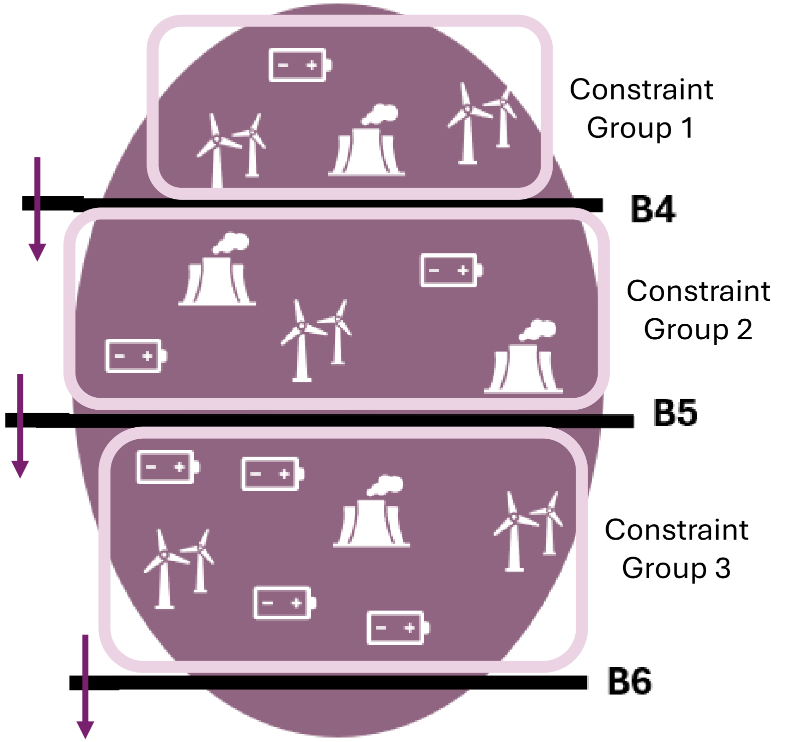
The Method: Defining groups



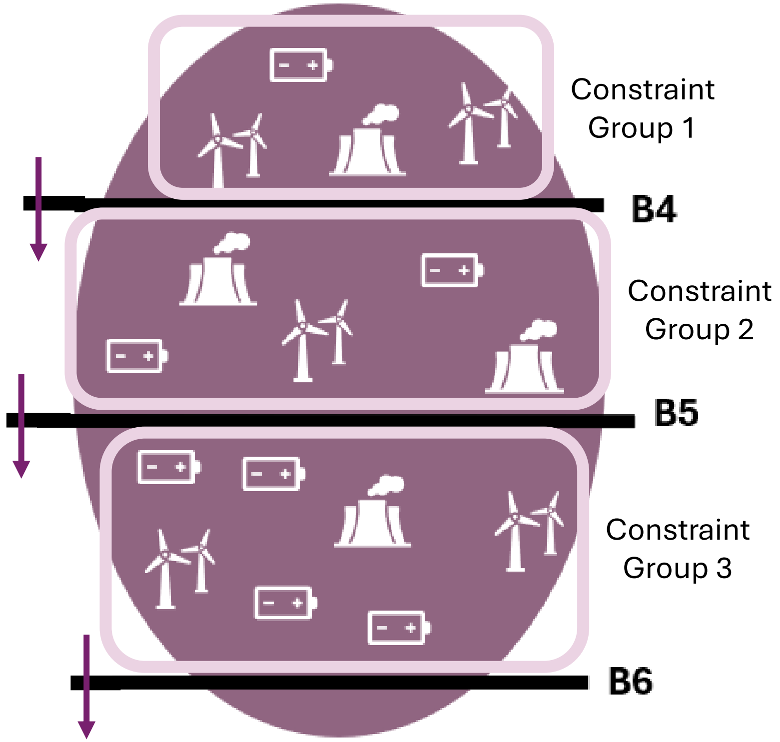


The boundary of a group is the **largest shape** you can draw without crossing any **active constraints**.

The Method: An Overview

The following method is applied at a **5-minute granularity** within individual groups, and separately for bids and offers. Only bids are considered behind export constraints, and only offers are considered behind import constraints.

1. All feasible volume inaccessible to the control room is excluded from the analysis.
2. The total volume of bids/offers accepted by the control room within the given group is calculated (the group imbalance requirement)
3. The cheapest feasible volume that could have fulfilled the group imbalance requirement is deemed 'in merit.'
4. Any volume deemed in merit but not accepted by the control room is considered skipped.



Assumption: All available generators have the same effectiveness in managing constraints.

Example: Skip Rate Calculation

Feasible merit stack

- Calculated at a **5-minute granularity**
- Calculated for bids and offers separately
- Calculated for each group separately

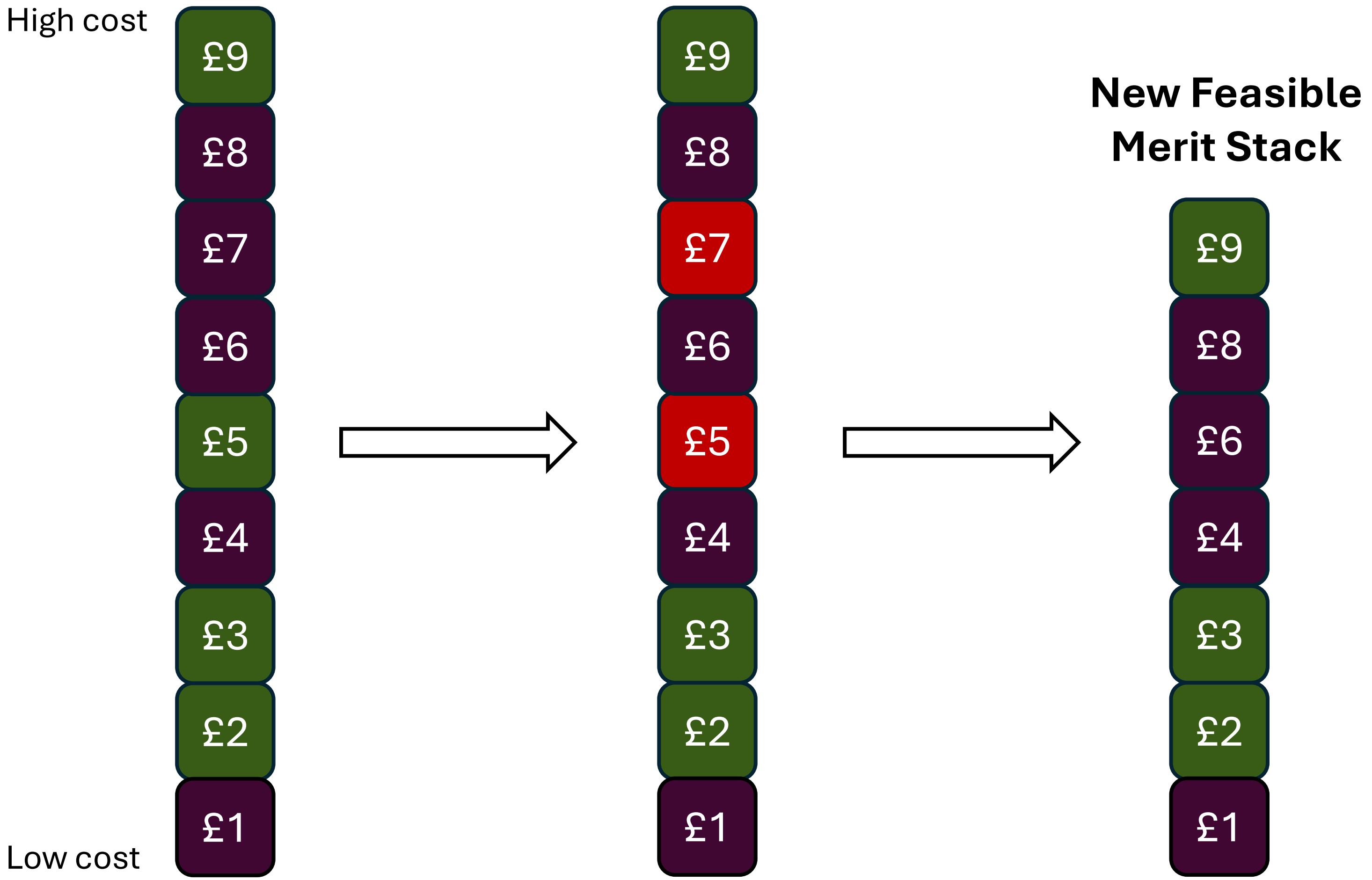
Key:

- Green: Feasible volume of 1MWh - not accepted by the control room
- Purple: Feasible volume of 1MWh - accepted by the control room

Example: Skip Rate Calculation

Feasible Merit Stack

Step 1: Exclude volume inaccessible to the control room



Key:

- Feasible volume of 1MWh - not accepted by the control room
- Feasible volume of 1MWh - accepted by the control room
- Volume of 1 MWh not accessible to the control room

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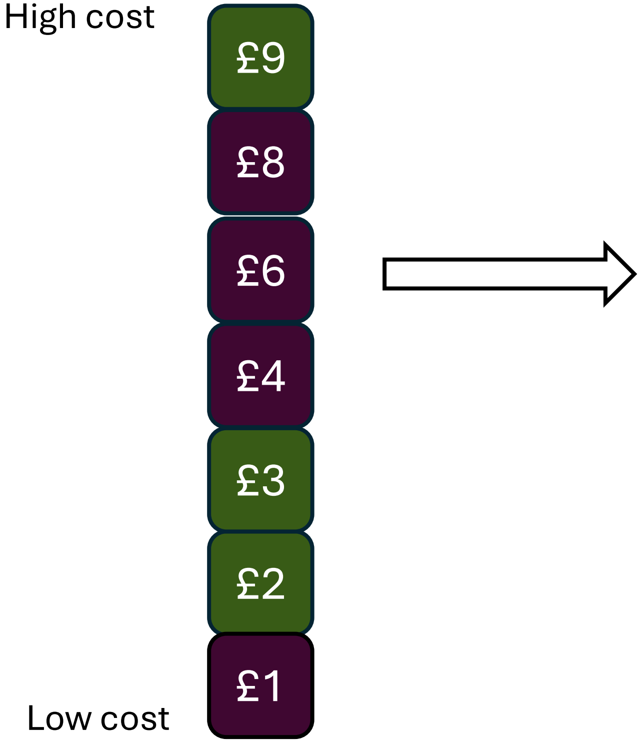
Example: Skip Rate Calculation

Key:

- Feasible volume of 1MWh - not accepted by the control room
- Feasible volume of 1MWh - accepted by the control room

Step 2: Calculate the total accepted volume of bids/offers within one group (the **group imbalance requirement**)

Feasible Merit Stack



£1 + £4 + £6 + £8

Group imbalance requirement = 4 MWh

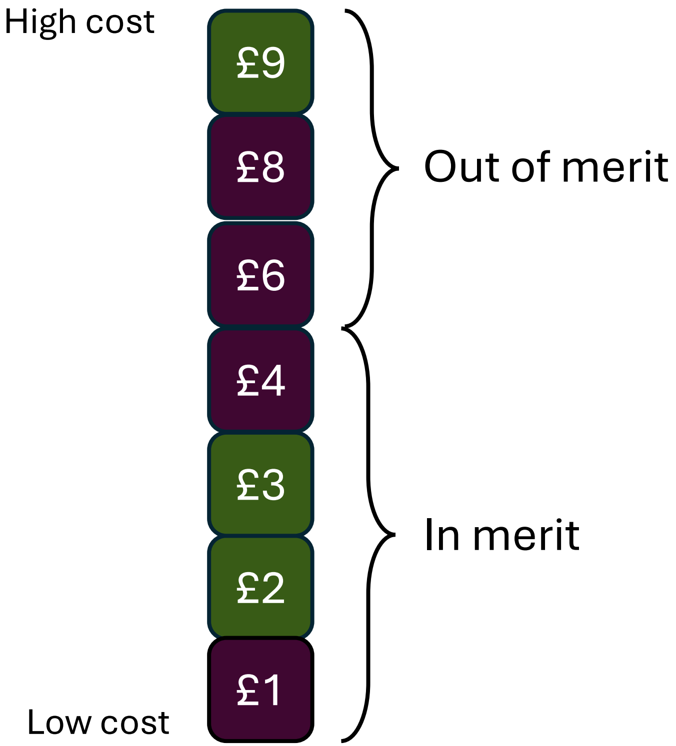
Example: Skip Rate Calculation

Key:

- Feasible volume of 1MWh - not accepted by the control room
- Feasible volume of 1MWh - accepted by the control room

Step 3: The cheapest volume that can fulfil the group imbalance requirement is deemed 'in merit'

Feasible Merit Stack



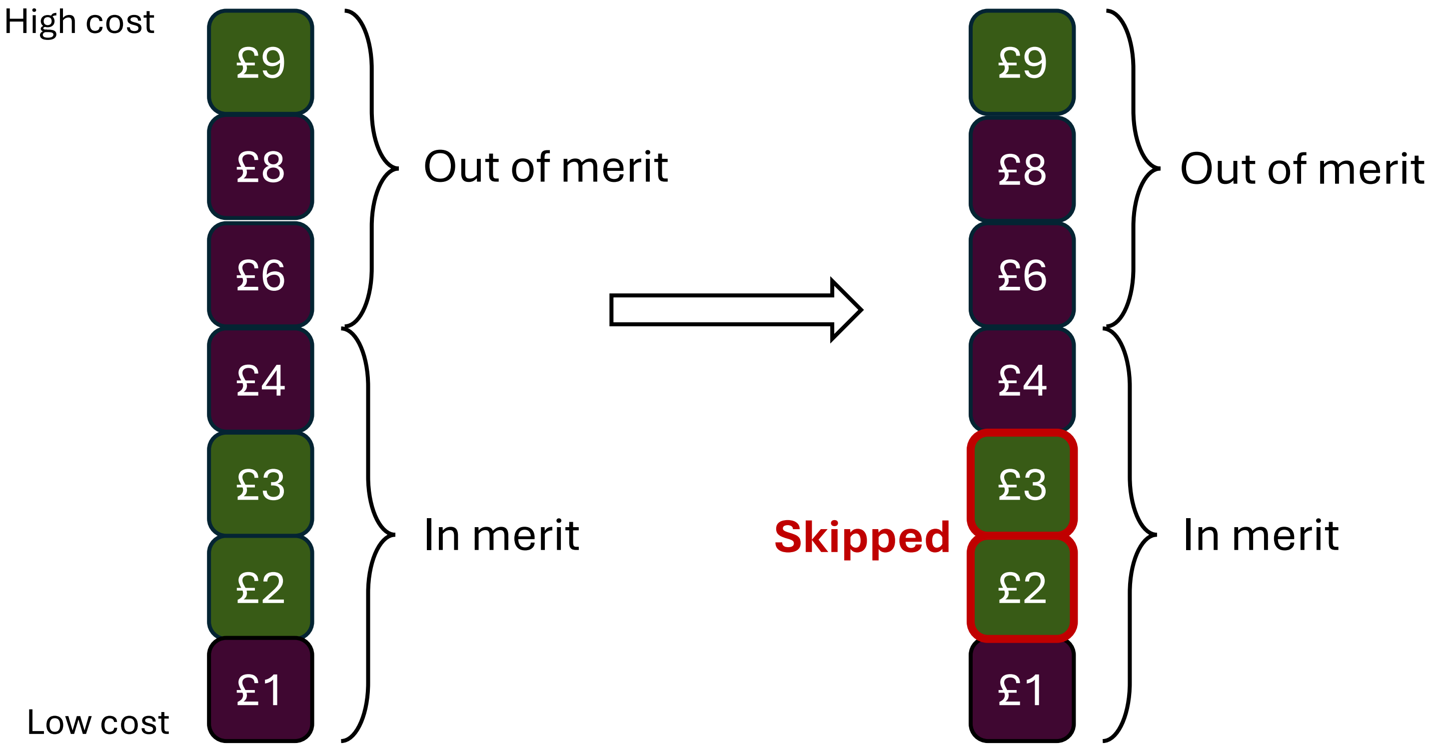
Group imbalance requirement = 4 MWh

Example: Skip Rate Calculation

Step 4: Any volume that was both deemed in merit and not accepted by the control room is considered skipped

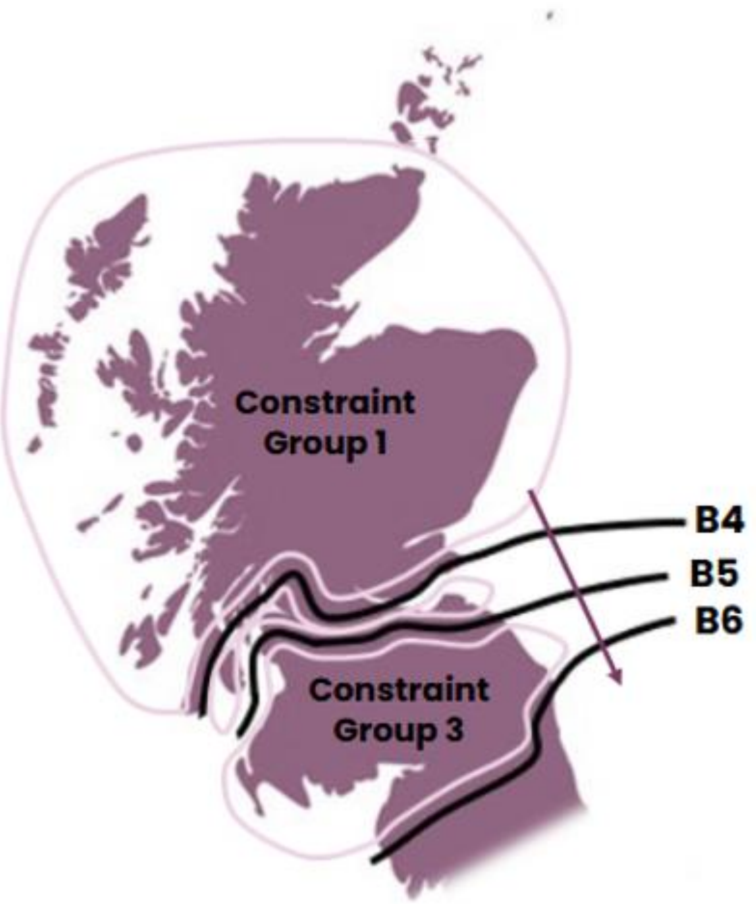
Key:
- Green: Feasible volume of 1MWh - not accepted by the control room
- Purple: Feasible volume of 1MWh - accepted by the control room

Feasible Merit Stack

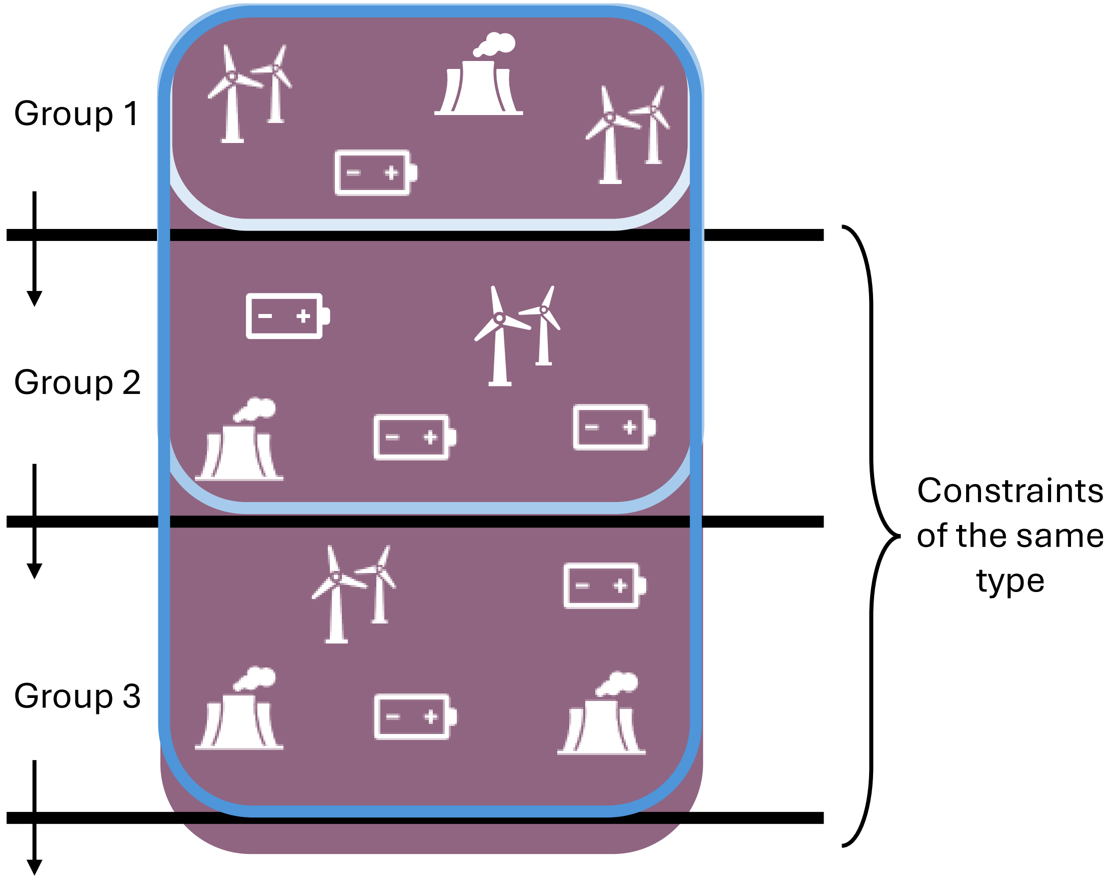


Nested Constraints

- Nested constraints are more complex, as actions taken to affect one constraint boundary may affect others.
- The example to the right shows three nested export constraints.
- Any actions taken in constraint group 1 to manage B4 also affects both B5 and B6.
- Similarly, any actions taken in constraint group 2 to manage B5 also affects B6.
- This is true whether nested constraints are import, export, or mixed.



The Method – Nested Groups



1. Calculate the skipped volume in the most constrained group as normal. (The most constrained group is the group behind the highest number of active constraints).
2. Calculate the skipped volume in the 2nd most constrained group:
   - Calculate the imbalance requirement using only units in group 2.
   - Create the feasible merit stack from all feasible volume in group 2, and any remaining volume in group 1.
3. Repeat the process with the next most constrained group in the same way:
   - Calculate the imbalance requirement using only units in group 3.
   - Create the feasible merit stack from all feasible volume in group 3, and any remaining volume in groups 1 and 2.

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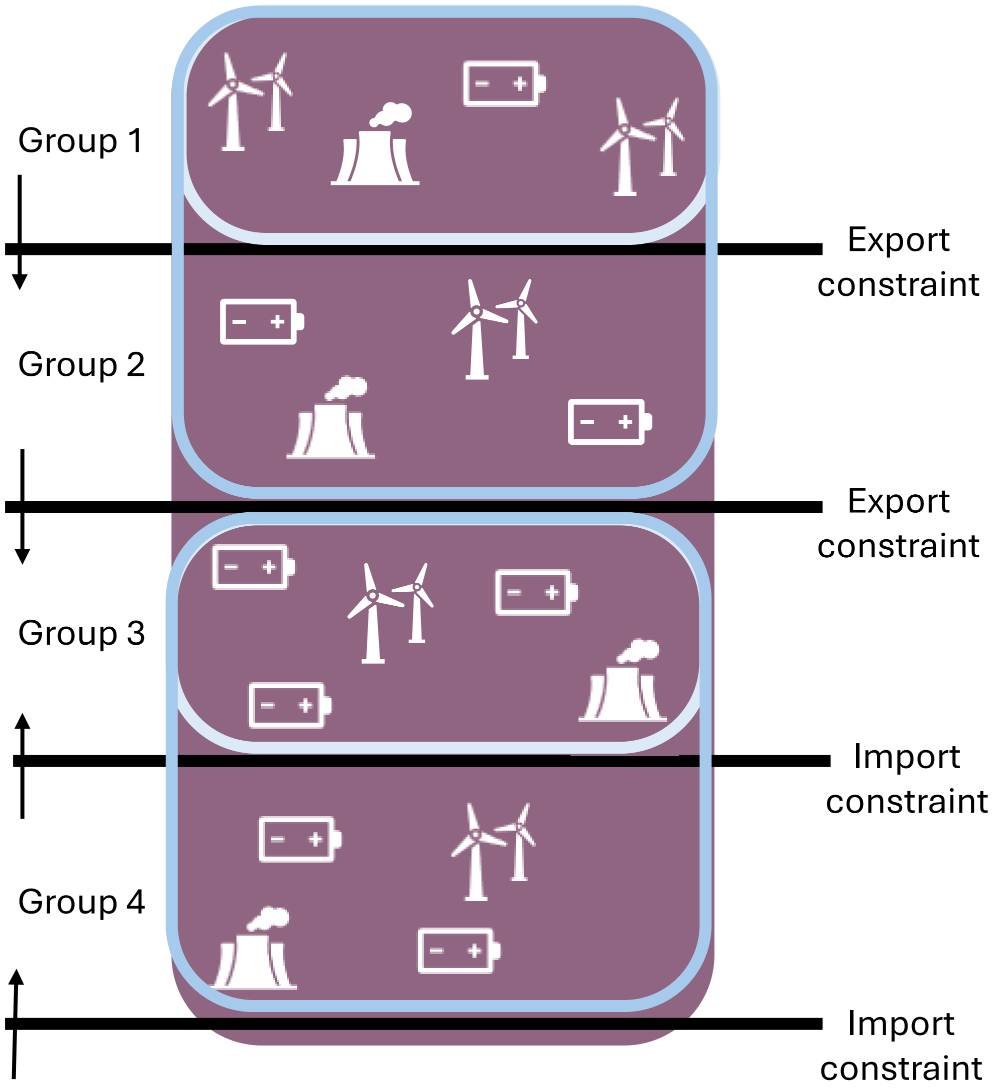
The Method – Mixed Nested Groups



1. As before, begin with the most constrained group.

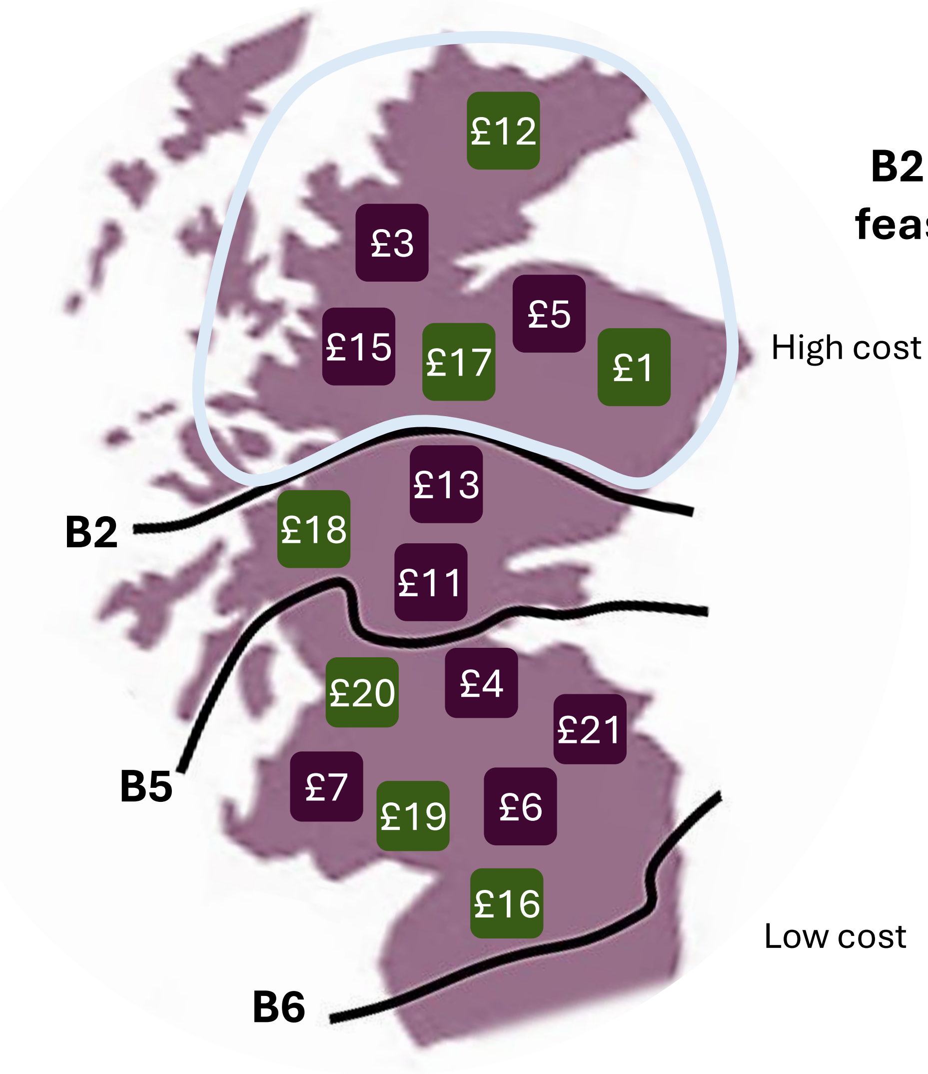
2. As before, calculate the skipped volume in the 2nd most constrained group:
   - The imbalance requirement is the sum of accepted volume in group 2
   - The feasible merit stack is formed from all feasible volume in group 2, and all remaining feasible volume in group 1.

3. Group 3 is behind a different type of constraint to the previous ones, so the 'looping' must start again.

4. Group 4 is behind the same type of constraint as group 3, so they are considered together.
   - The imbalance requirement is the sum of accepted volume in group 4
   - The feasible merit stack is formed from all feasible volume in group 4, and all remaining feasible volume in group 3

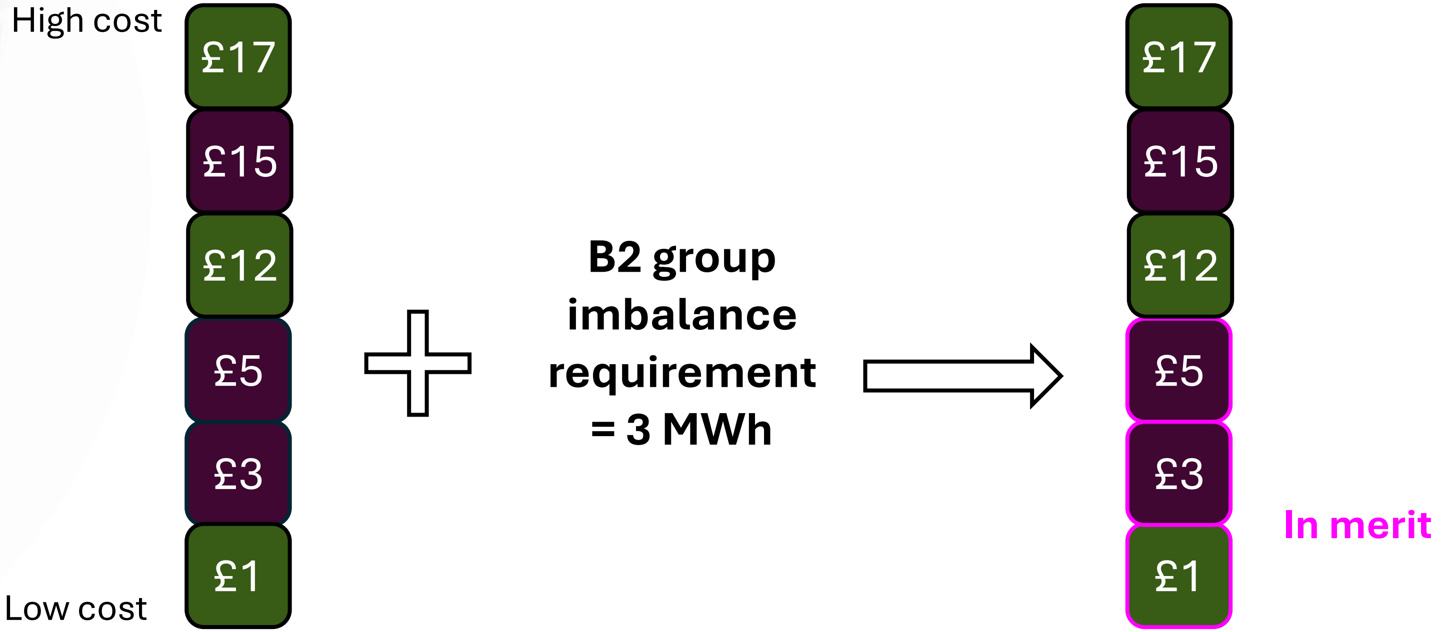
Example: Nested Export Constraints

Cost is cost to NESO



B2 boundary feasible merit stack

Calculated at **5-minute granularity**



Key:

- Feasible bid of 1MWh - not accepted by the control room
- Feasible bid of 1MWh - accepted by the control room as a system action

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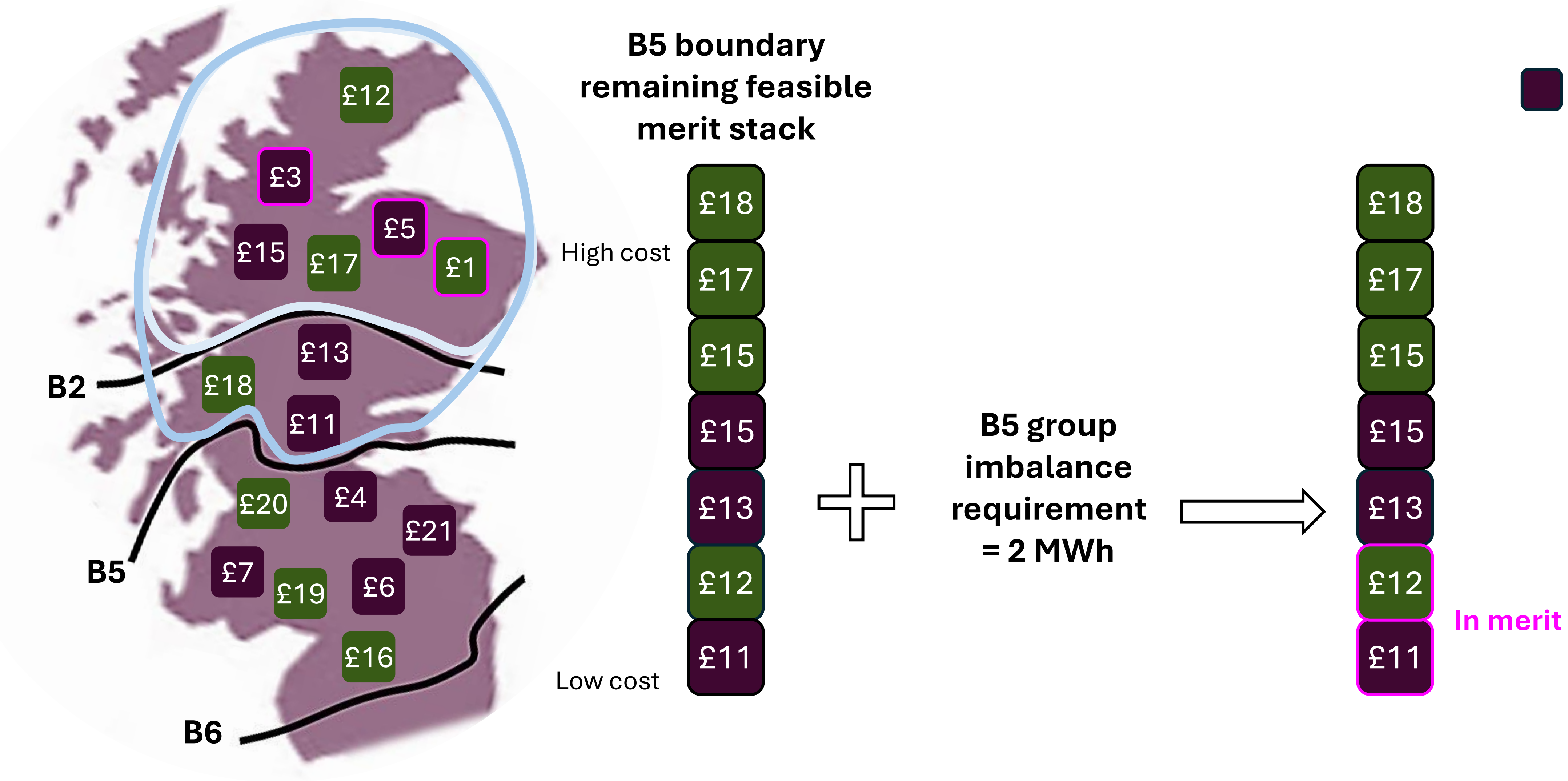
Example: Nested Export Constraints

Cost is cost to NESO



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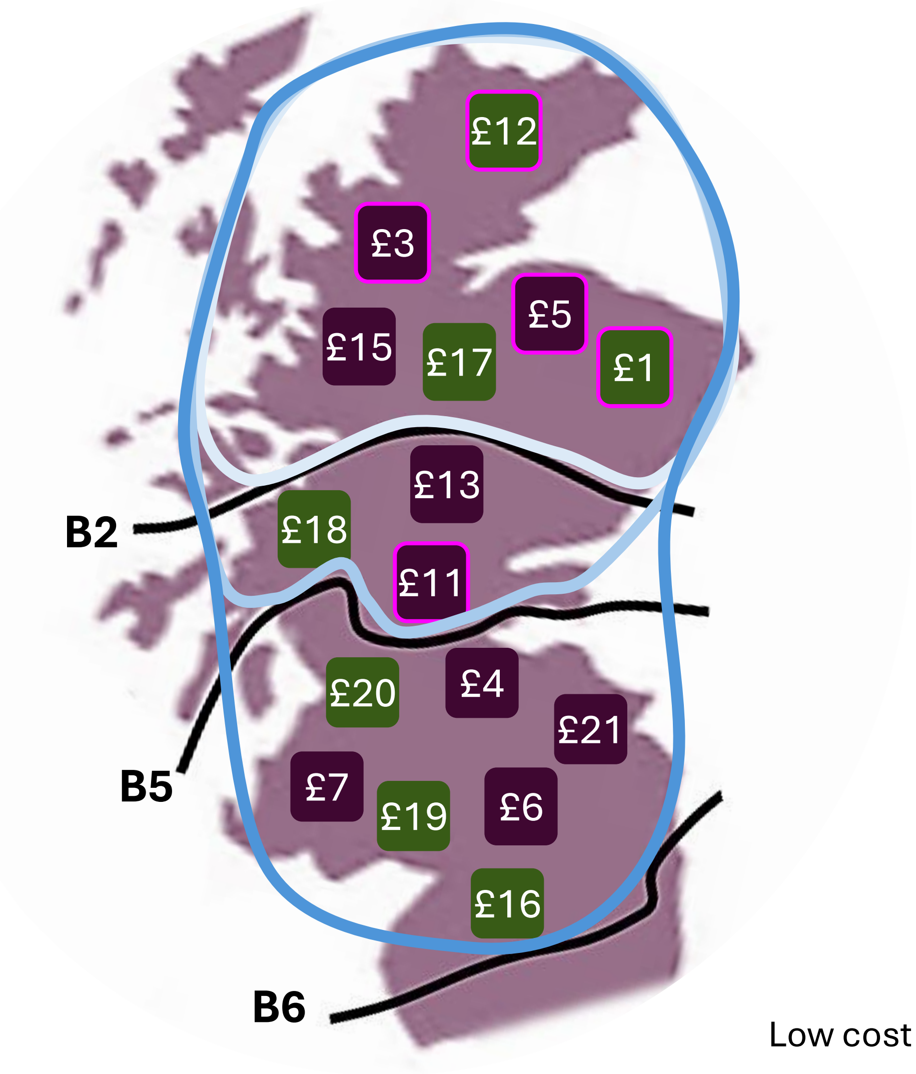
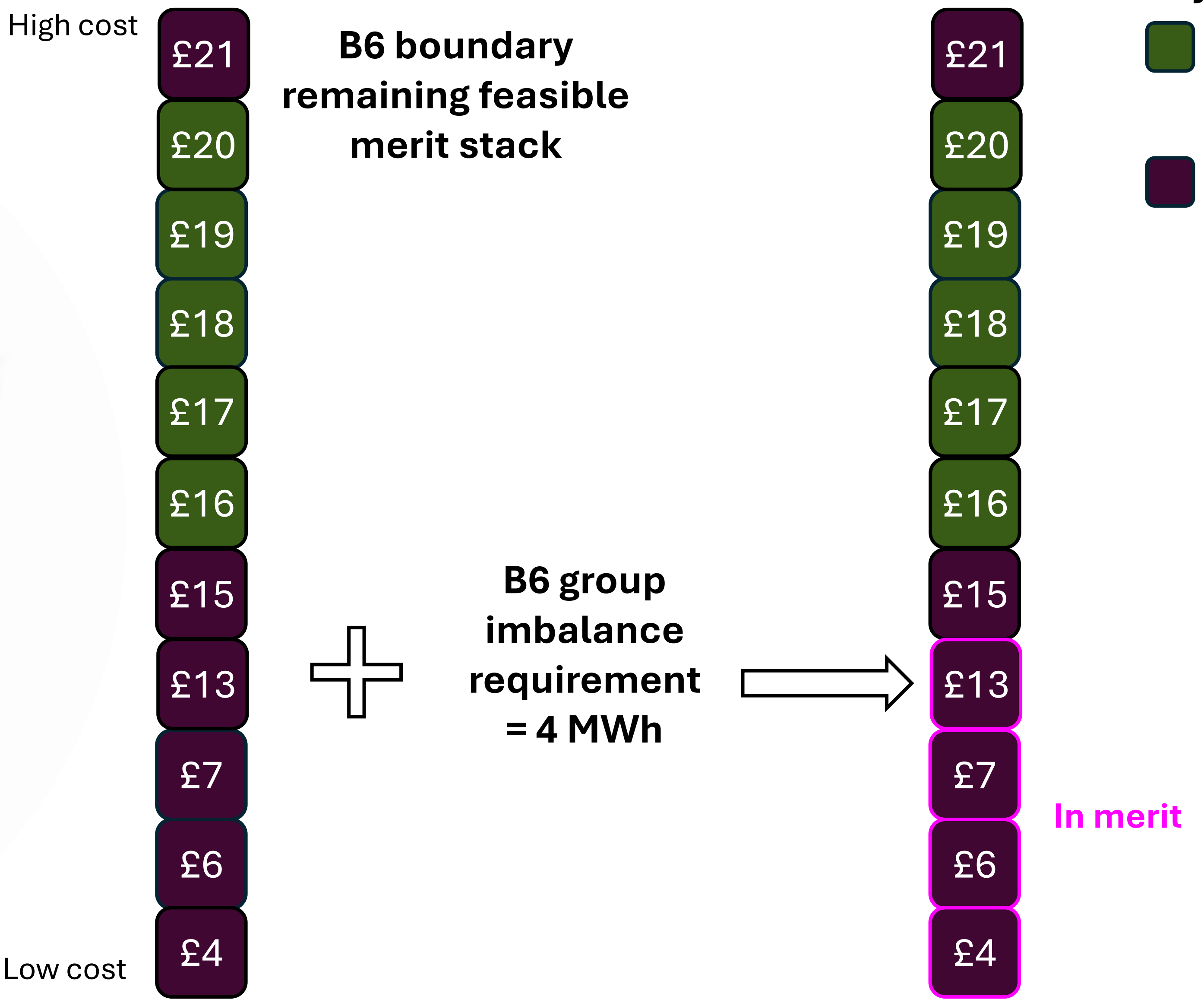
Example: Nested Export Constraints

Cost is cost to NESO





Key:

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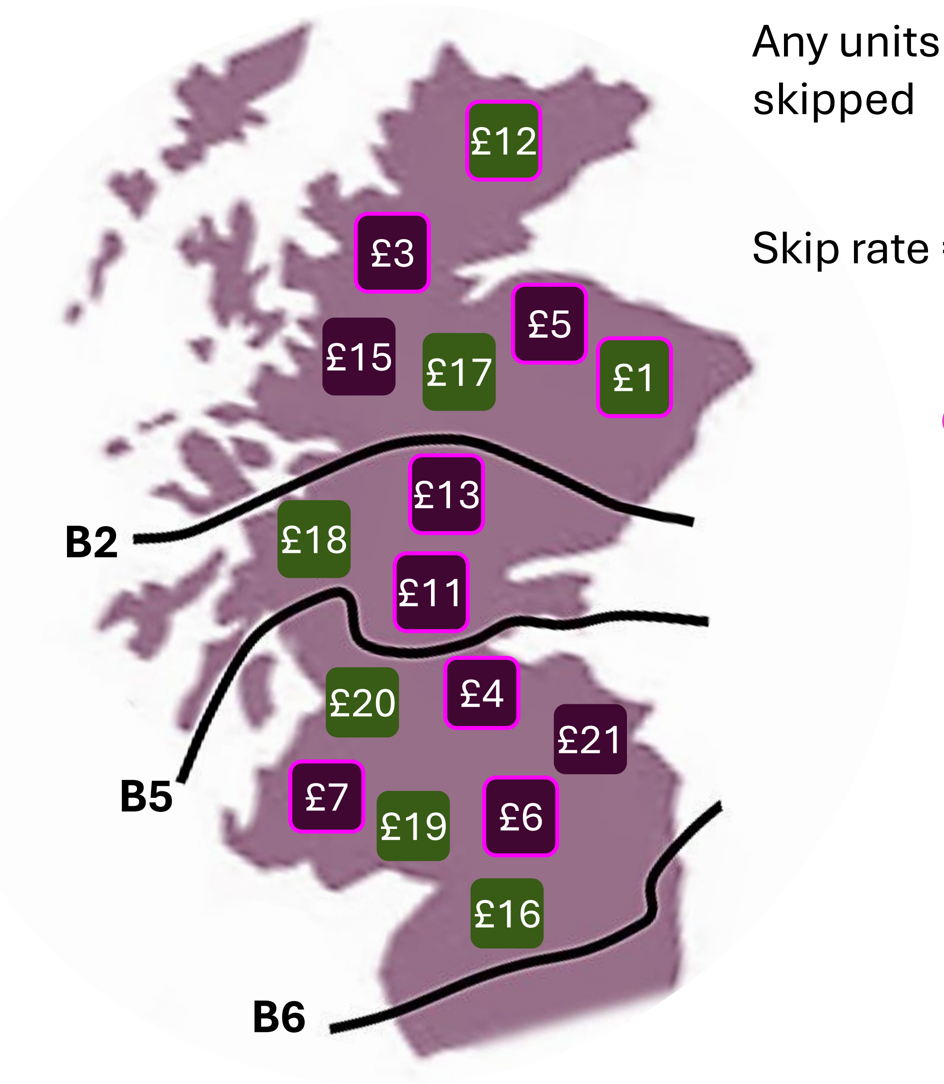
Example: Nested Export Constraints

Cost is cost to NESO



Any units in merit but not accepted by the control room are skipped

$$\text{Skip rate} = \frac{\text{Skipped volume}}{\text{Accepted volume}} = \frac{2}{9} = 22\%$$

Calculated at **5-minute granularity**

Key:

- Feasible bid of 1MWh - not accepted by the control room
- Feasible bid of 1MWh - accepted by the control room as a system action

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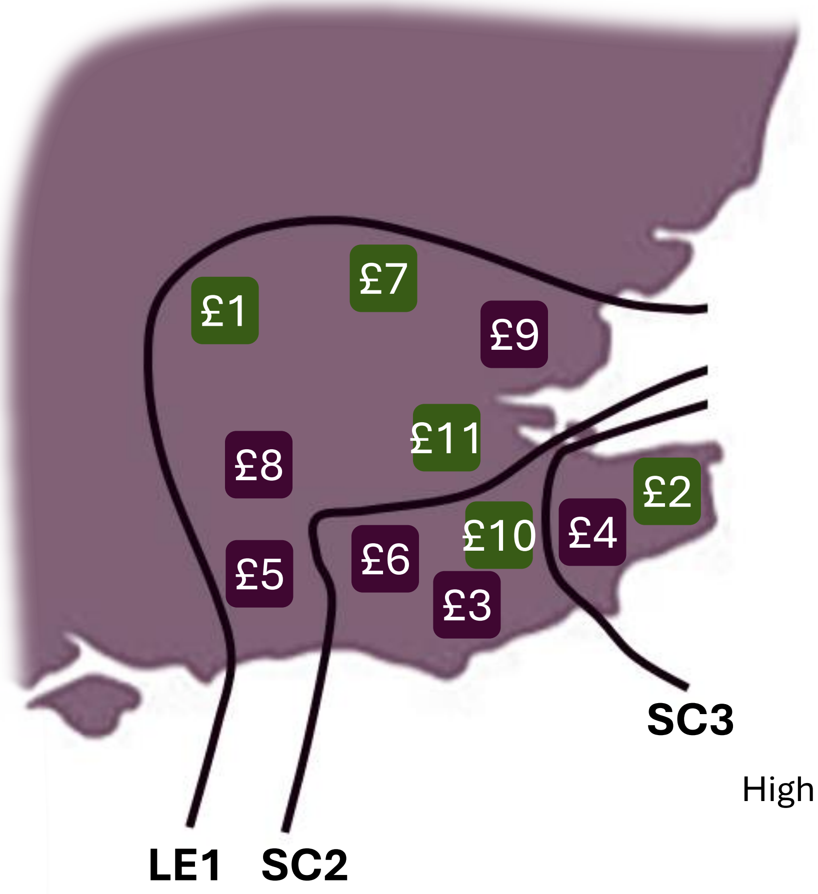
Example: Nested Import Constraints

Cost is cost to NESO



Calculated at **5-minute granularity**

Key:

- Feasible offer of 1MWh - not accepted by the control room
- Feasible offer of 1MWh - accepted by the control room as a system action

SC3 boundary feasible merit stack

High cost

£4

£2

Low cost

+

SC3 group imbalance requirement = 1 MWh

→

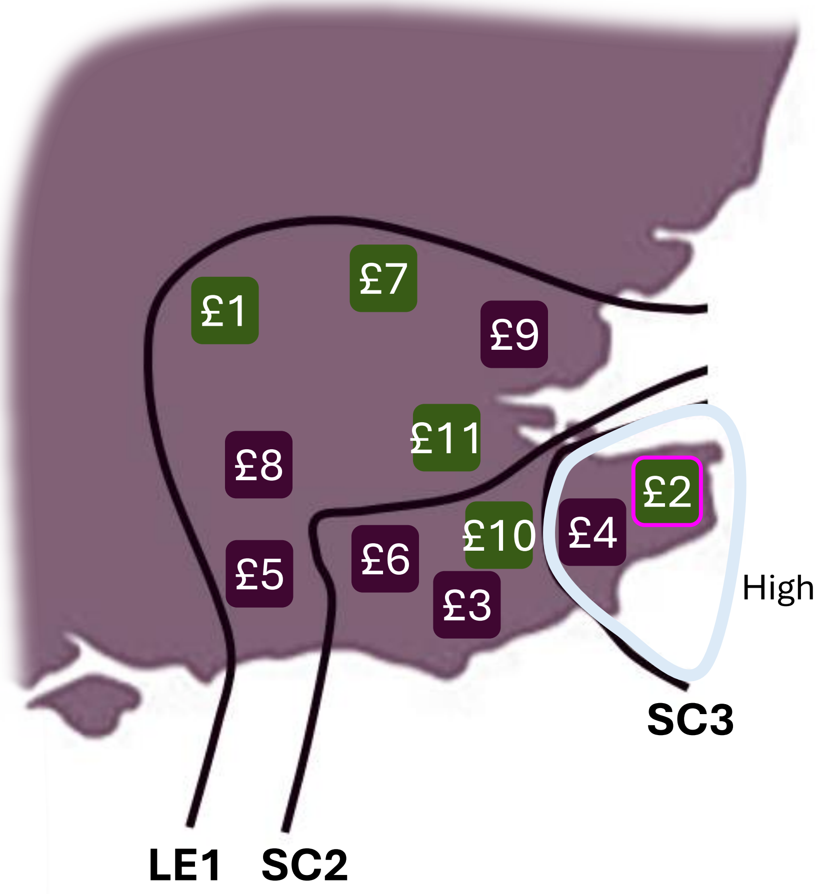
£4

£2

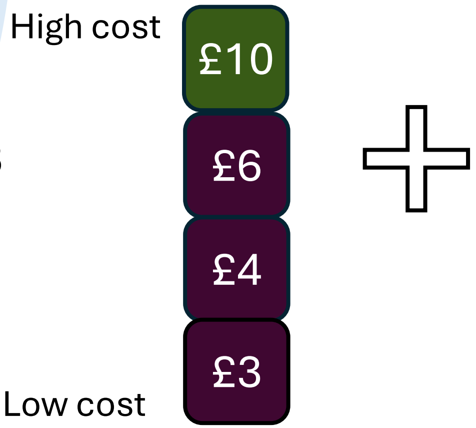
In merit

Example: Nested Import Constraints

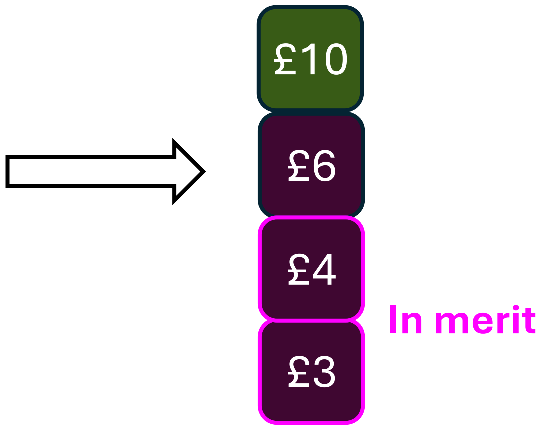
Cost is cost to NESO



SC2 boundary feasible merit stack



SC2 group imbalance requirement = 2 MWh



Key:

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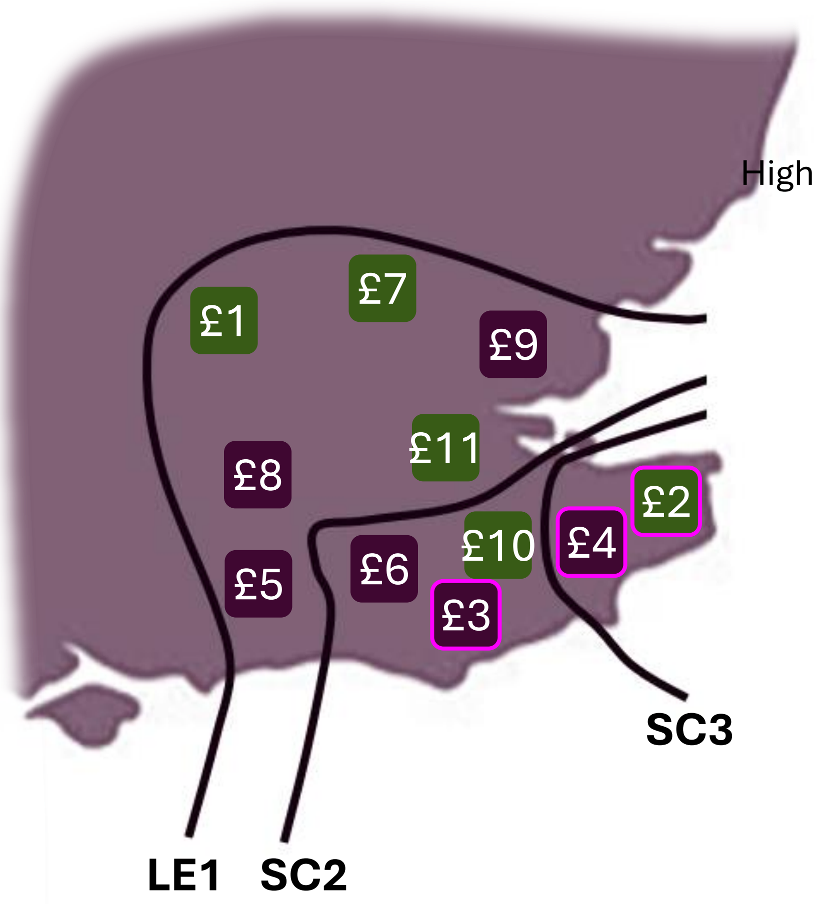
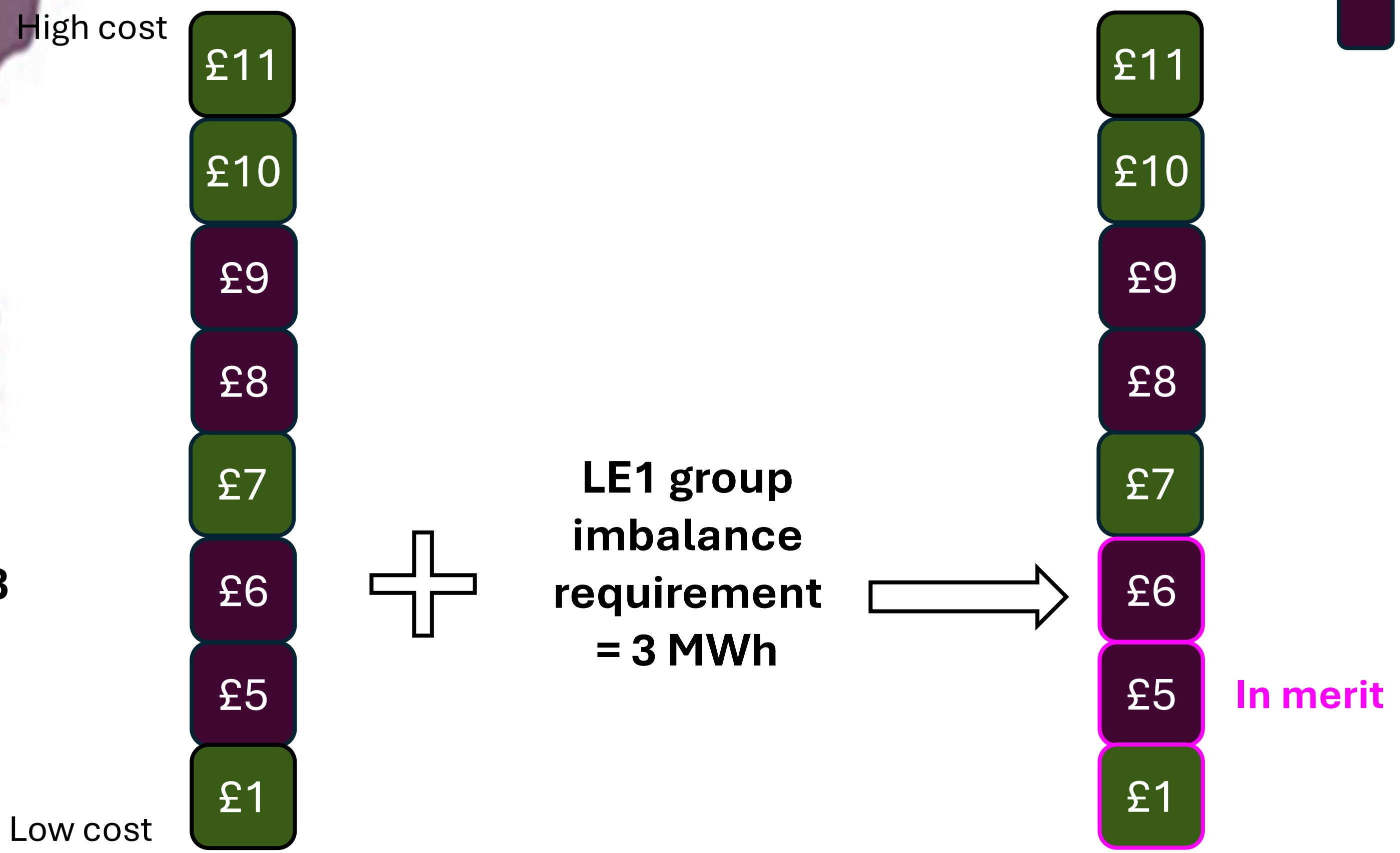
Example: Nested Import Constraints

Cost is cost to NESO



LE1 boundary feasible merit stack



Key:

- Feasible offer of 1MWh - not accepted by the control room
- Feasible offer of 1MWh - accepted by the control room as a system action

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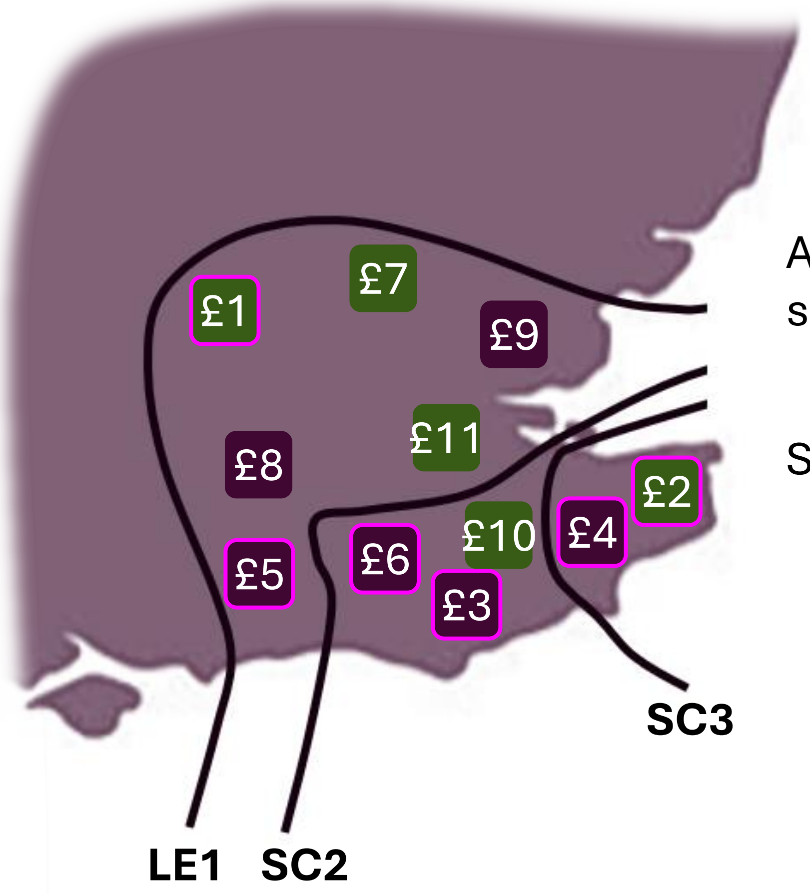
Example: Nested Import Constraints

Cost is cost to NESO



Any units in merit but not accepted by the control room are skipped

$$\text{Skip rate} = \frac{\text{Skipped volume}}{\text{Accepted volume}} = \frac{2}{6} = 33\%$$

Calculated at **5-minute granularity**

Key:

- Feasible offer of 1MWh - not accepted by the control room
- Feasible offer of 1MWh - accepted by the control room as a system action

The Method – Exclusions

Excluded in energy method

Exclusion	Justification
Long notice units: MZT | MNZT | NDZ >= 31min	These units are inaccessible to the control room in balancing timescales.
Volumes between 0-SEL and 0-SIL	Instructing a unit to a level between its SIL and SEL would result in the instruction being rejected.
Offers on wind and solar units	These technology types are weather condition dependent and therefore cannot increase output.
All units with acceptances system tagged for voltage or inertia	Although these units were accepted for system reasons, it was not to manage thermal constraints.
All units not behind active thermal constraints	These actions are assessed by the existing energy method.
Units armed for Intertrip or frequency response contracts	These units maintain a position which ensures they are able to deliver upon these contracts. If the control room changes their position, they must still pay for these contracts, despite the units being unable to deliver upon them.

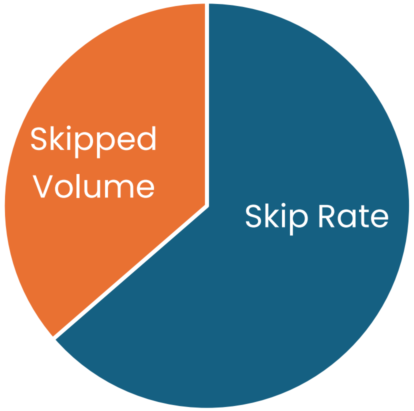
Industry Feedback on Methodology

Please provide any feedback or concerns on the methodology	NESO Response
Looks reasonable with caveat that the overall skip rate methodology still has a lot of key exclusions which make it less useful, for example interconnector related skips & BSAD information. If NESO can share skip information by BMU that would be most useful by far.	We recognise that the skips behind constraints methodology and the existing skip rate methodology both only consider actions taken in the BM. We have noted that industry are interested in other types of skips and we will revisit this in future.
Overall the methodology is sensible. I would like to see more discussion of sub-constraints within these zones.	The methodology will cover all constraints, not only the constraint boundaries that are published.
It is a good step forward Thanks.	
Your methodology is a complex heuristic. I think that industry would have greater confidence in the results if you solved using an LP	We agree that there are limitations in the methodology. We have chosen to remain consistent with the existing energy balancing skip rate
Seems sensible to me.	
Really useful - multiple views would be appreciated.	
The methodology seems good! Can you expand on the limitations? Similar to energy skips methodology we are aware that there are skips that have a reason.	We will document the limitations as part of a detailed implemented document and aim to explain reasons for skips.
Looks fine to me at this point. However, it would be good to clarify in wider/high-level marketing materials that this only takes into account thermal boundary constraints, and not any local circuit or voltage constraints.	Currently this methodology assesses only thermal constraints, as these make up the majority of constraint costs. Voltage/inertia actions are typically very localised and don't sit within a defined area in the same way as thermal constraint boundaries. This makes it very challenging to assess which other actions could have been taken to manage the voltage/inertia requirement.
Happy with the methodology for the thermal constraints. Unsure about how this can incorporate voltage and inertia constraints.	
Cost important	
None - this is how I would hope / expect the methodology to look	

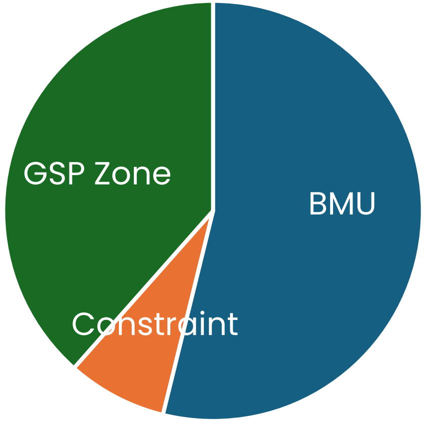
Industry Feedback on Data

Please share how you intend to use the data
To assess against performance of our assets and expected revenue.
Product improvement.
Understand how skips are affecting our trading units.
To build understanding and inform modelling assumptions.
I understand that for industry the data is mostly informative. Since NESO is not able to publish more granular data as for energy skips (hh, unit by unit). I think there is a benefit to publishing data broken by Constraints, BMU and GSP Zone. We would like to see not only skip rate, but also taken volume, skipped volume, average marginal price and new marginal price.
Guide (re-)dispatching of plants in transmission curtailment assessment modelling exercises.
Want to understand spatial variation in skip rates and how often it occurs. Enables better forecasting of a future transmission system dispatch. To add that ideally we would have information about skip rates and skip volumes broken down by all 3 options
Trying to create a dispatch methodology
To assess performance & losses as a result of skipping.
Like to understand the cost and scale of skips

Which metric is most important?



Which is more important for data to be broken down by?



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