TRANSITION
Technical Trial Data Analysis
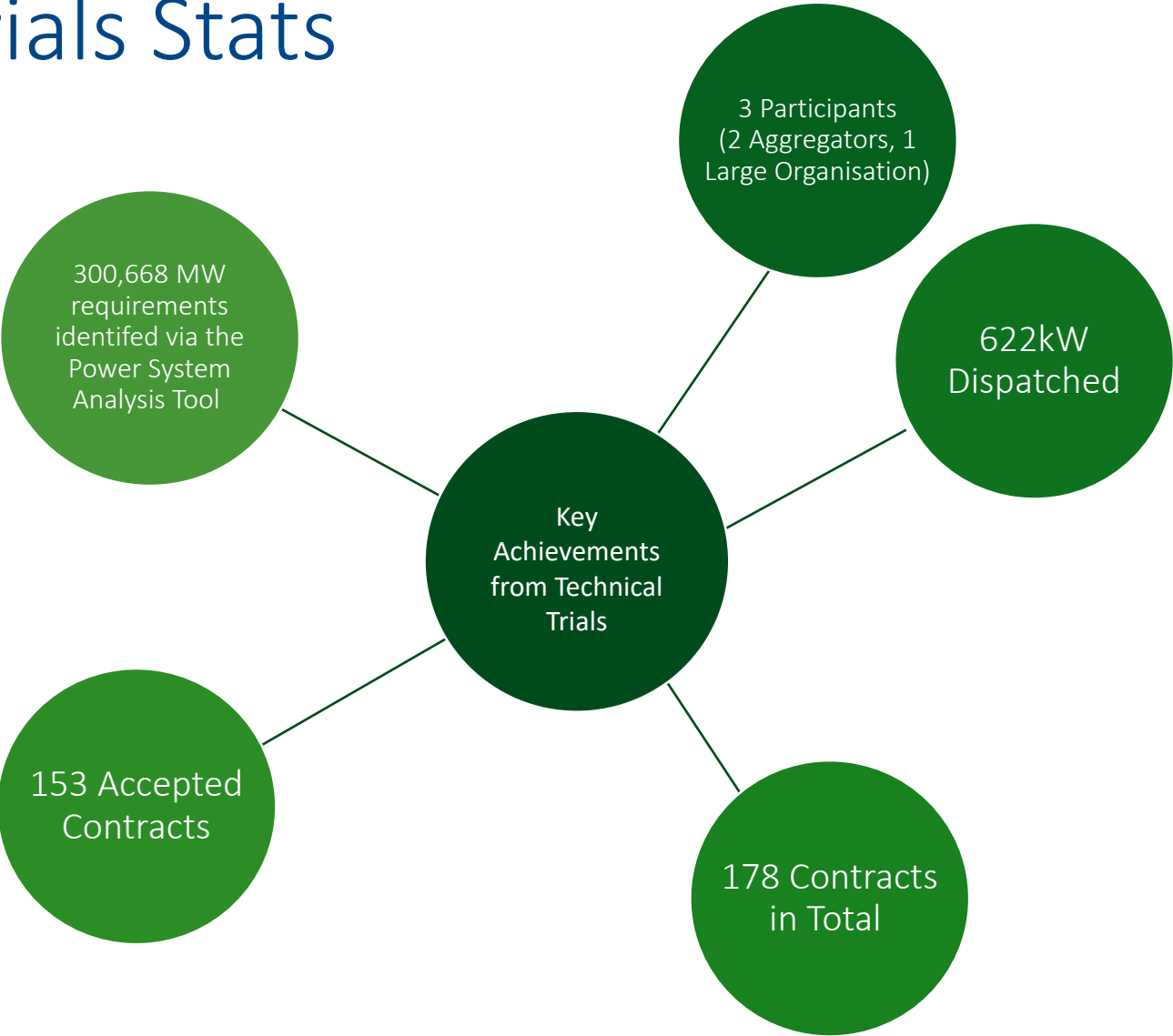S&D and PSA

S&D and PSA Trials Analysis Results
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  - Number of file batches and iterations of S&D and PSA processing
  - Variation in Sensitivity Factors by participant asset and constraint

Technical Trials Stats

transition
Moving to a smart future

3 Participants
(2 Aggregators, 1 Large Organisation)

300,668 MW requirements identifed via the Power System Analysis Tool

622kW Dispatched

*Requested dispatches from DSO, sensitivity factor is reviewed again prior to dispatch

Key Achievements from Technical Trials

153 Accepted Contracts

*S&D tool accepts on criteria of both Total Contract Value and Sensitivity Factor

178 Contracts in Total

Scottish & Southern Electricity Networks

In partnership with LEO Local Energy Oxfordshire

Select & Dispatch Tool
Technical Trial Data Analysis

Total Contract vs Accepted/ Rejected (NMF)
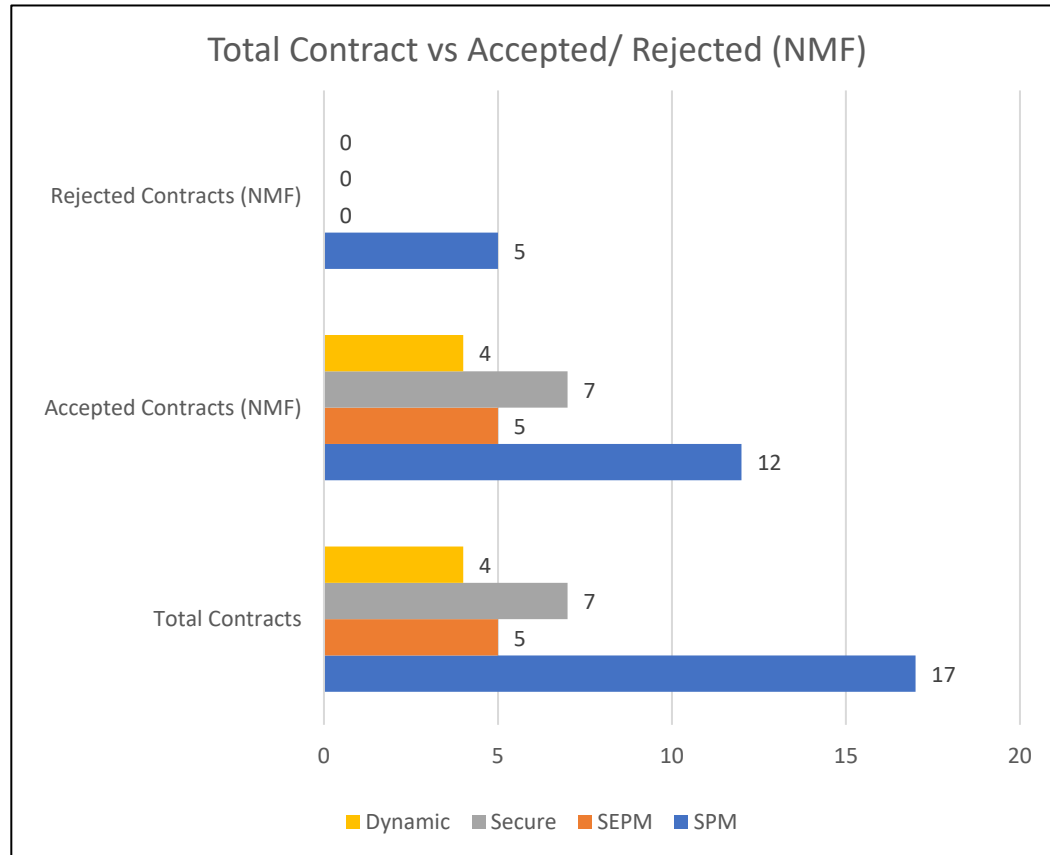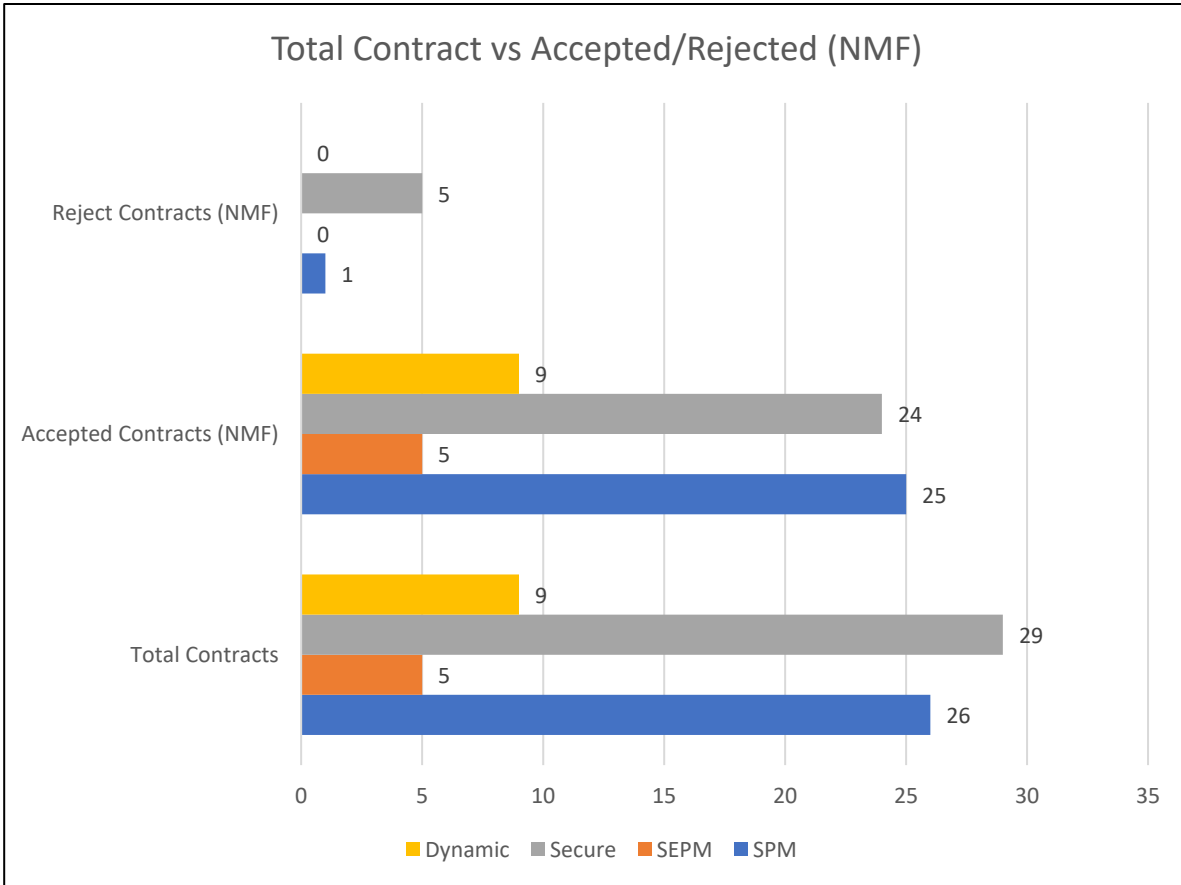

Block 1 Results

There was a total of 3 participants within the Technical Trials; two aggregators and a large organisation.

Where there are rejected contracts, these have either been due to TCV being exceeded or the Sensitivity Factors of the assets are too low to have an impact on the constraints identified

Learnings
- Sensitivity Factors impacts the contract acceptance and increases the risk for organisations bidding in to the market. However, it does ensure a more robust and accurate way to resolve network constraints.
- Participant feedback was to share the % of rejections due to Sensitivity Factors and constraint locations so an education decision can be made about which auctions should be bid in to for that particular asset.

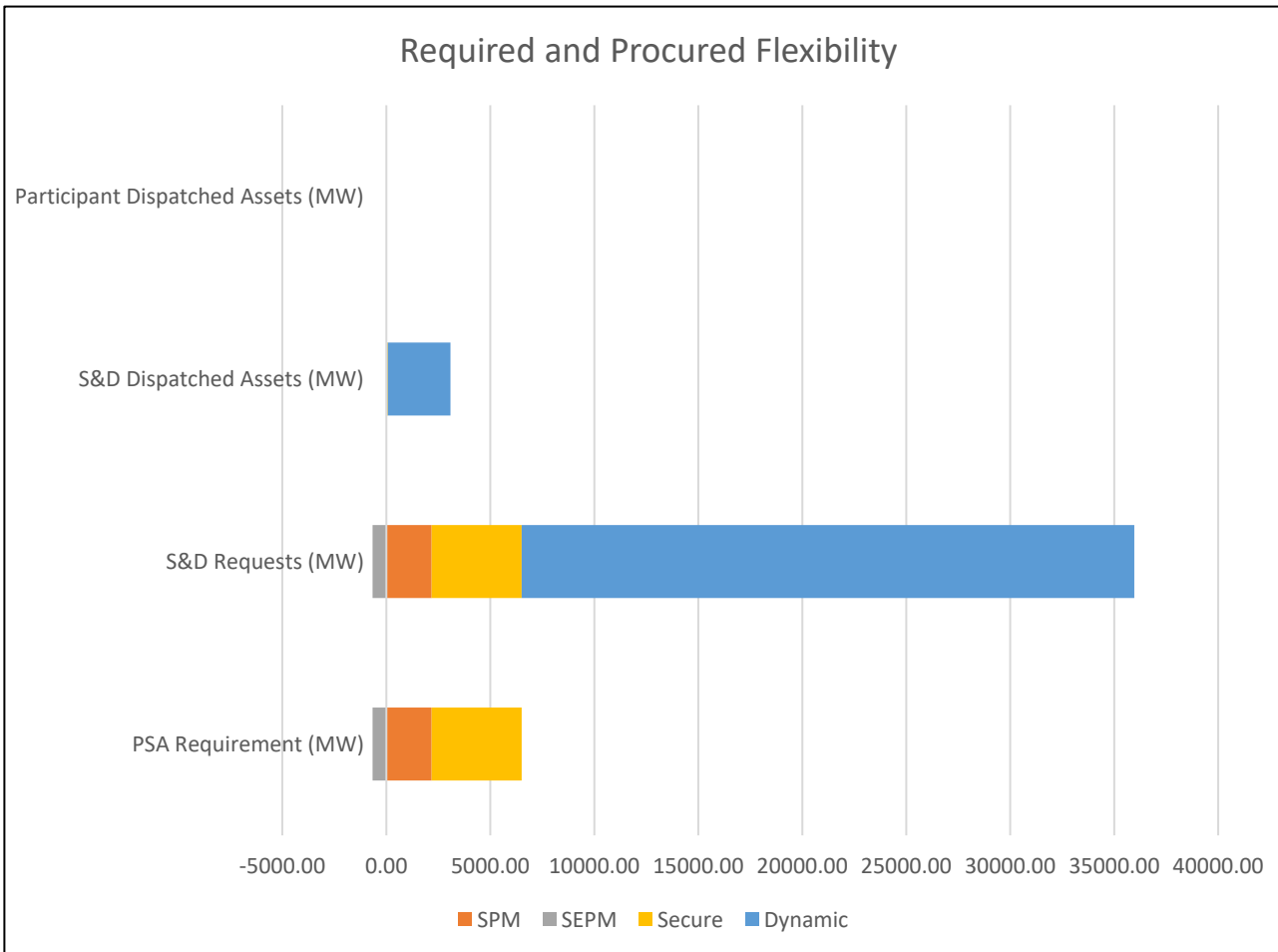# Total Contract vs Accepted/ Rejected (NMF)

Block 2 Results
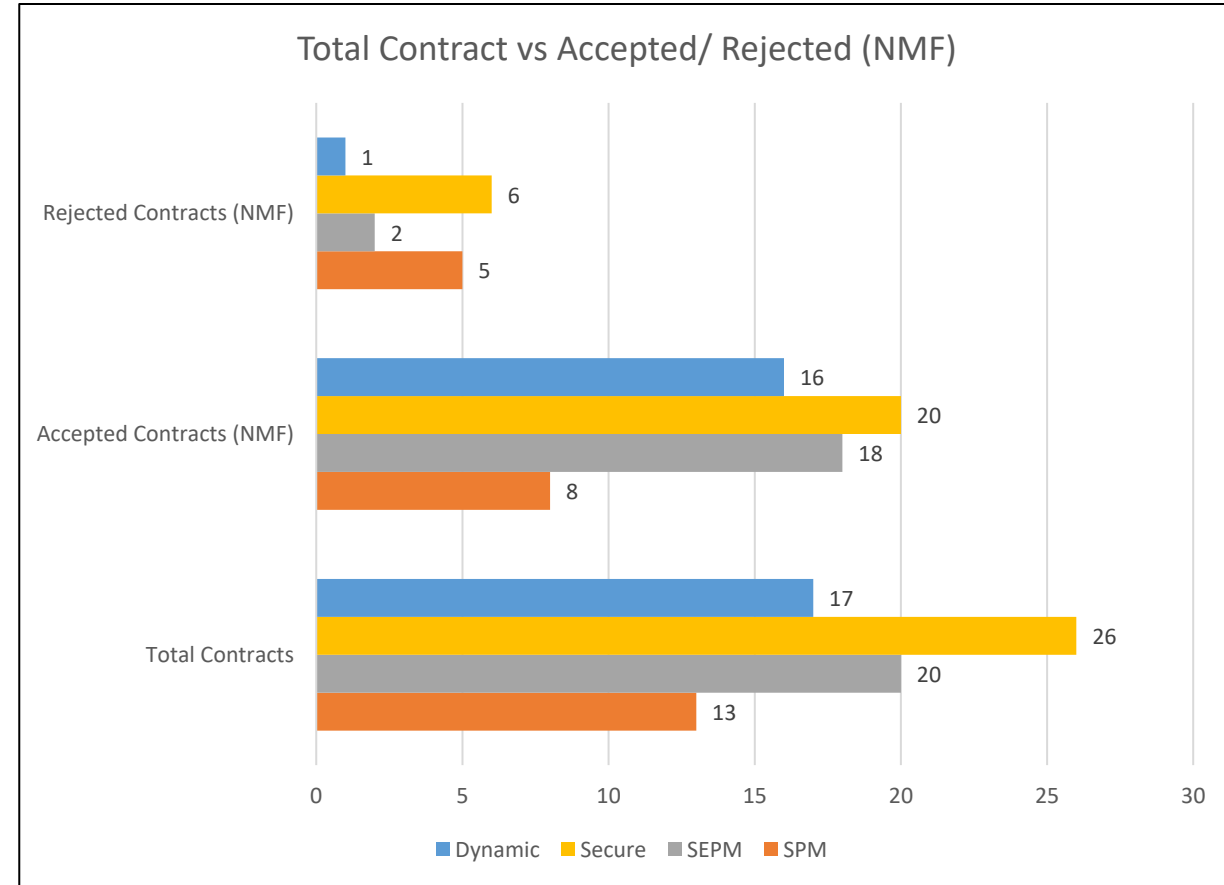
Block 3 Results

Required and Procured Flexibility

Required and Procured Flexibility

Block 1 Results

- The graph shows what was identified within the network as a requirement/constraint per service and what was provided by participants.
- Note that there were dummy assets used within the trials which is why the S&D selection of the assets is significantly higher than the participant dispatched assets. This is also due to the S&D not considering the utilisation time limits of assets.
- The variation between the S&D requests and the PSA requirements are due to the Dynamic requirements as these were solely dealt within with in the S&D tool.
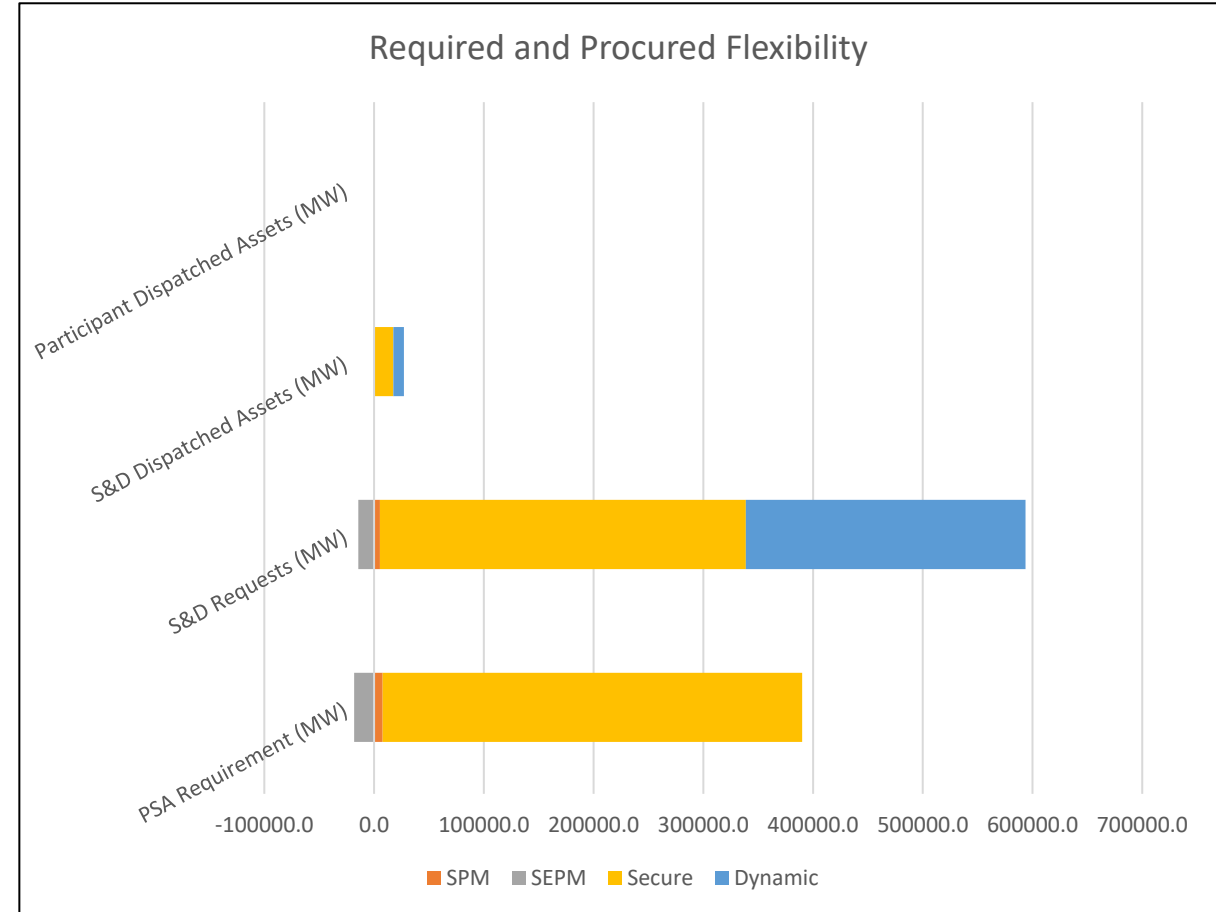
Learnings
- Key learnings are that the constraints identified were much greater than the flexibility that could be provided from assets. The market would need further considerations to ensure constraints could be resolved.
- Another key learning was the Dynamic service was usually undelivered from participants regardless of contracts, we believe this is due to the short 30 minute notice period to dispatch.

Required and Procured Flexibility
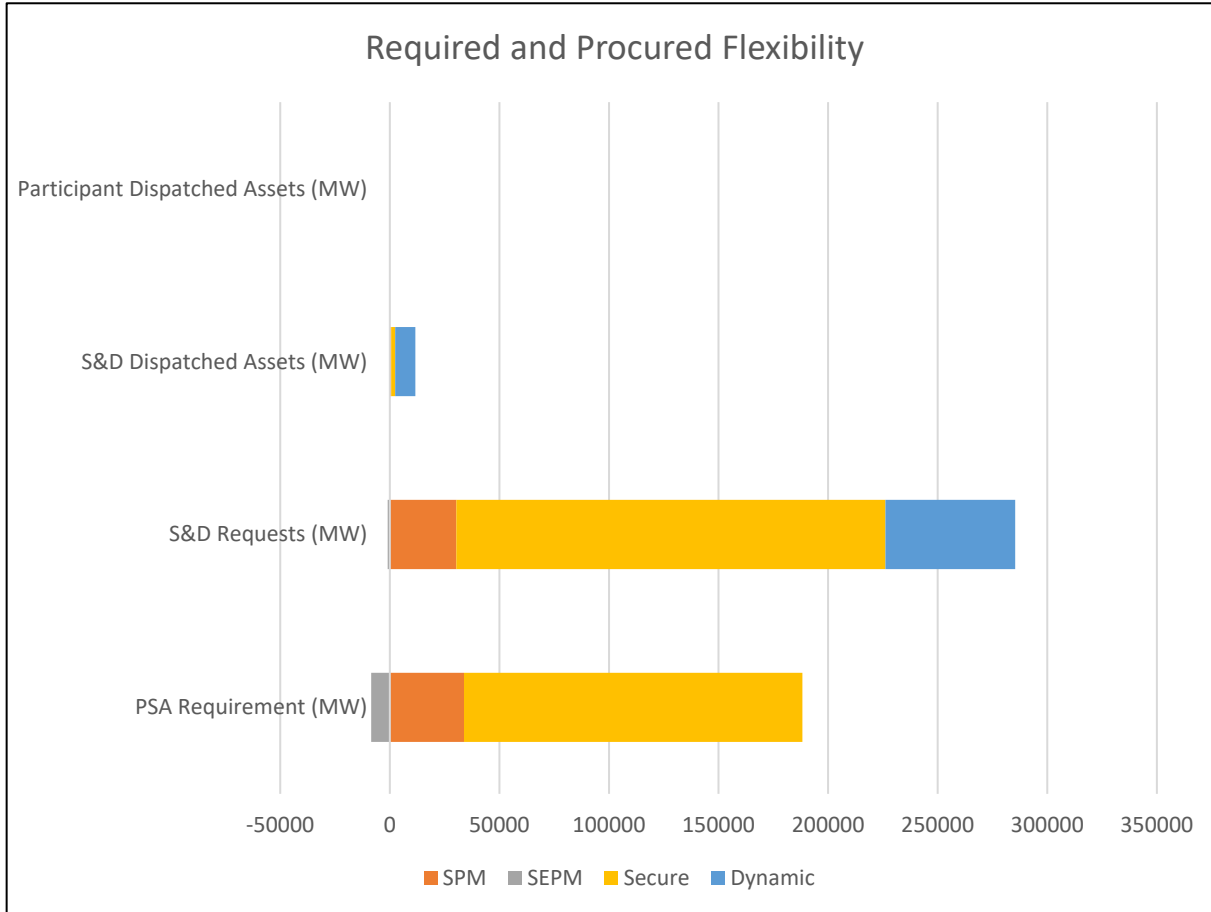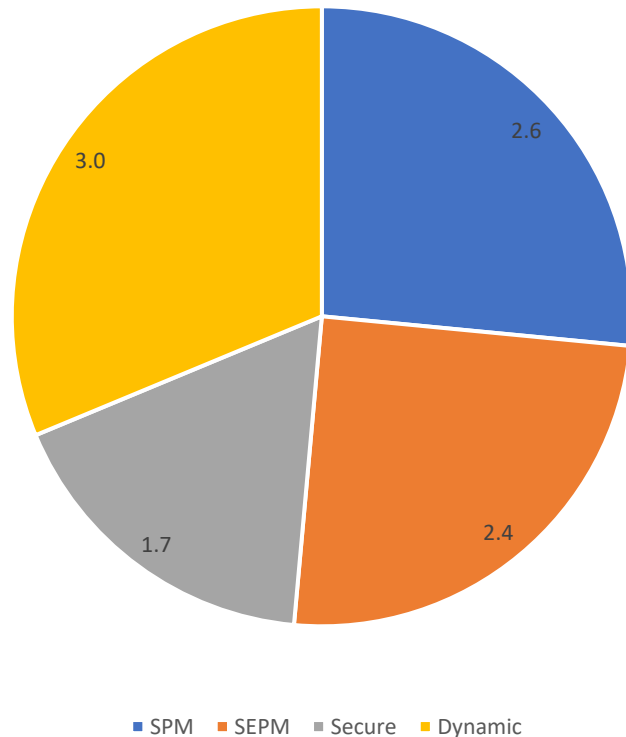

Block 2 Results

Block 3 Results

Average Asset Dispatch Time

Average Asset Time Dispatched (Hrs)

Pie chart segments:
- 2.6 (SPM, blue)
- 2.4 (SEPM, orange)
- 1.7 (Secure, grey)
- 3.0 (Dynamic, yellow)

Legend: ■ SPM ■ SEPM ■ Secure ■ Dynamic

Block 1 Results

- The graph shows the average utilisation requested time from the S&D on participant assets
- Note that the solver within the S&D did not consider the max utilisation hours identified per asset due to time and complexity within project timelines. The S&D solver would identify the best contract to resolve the identified constraint and call on the asset for as long as required if it was showing as available.

Learnings
- Assets could not deliver the length of time the S&D requested. This would need to be included going forward as this means the constraints were not resolved due to non-delivery. This increases the complexity and iterations required between the PSA and S&D.
- Longer utilisation impacts the Total Contract Value, considerations on how to ensure TCV is not exceeded but the market remains fair is required.
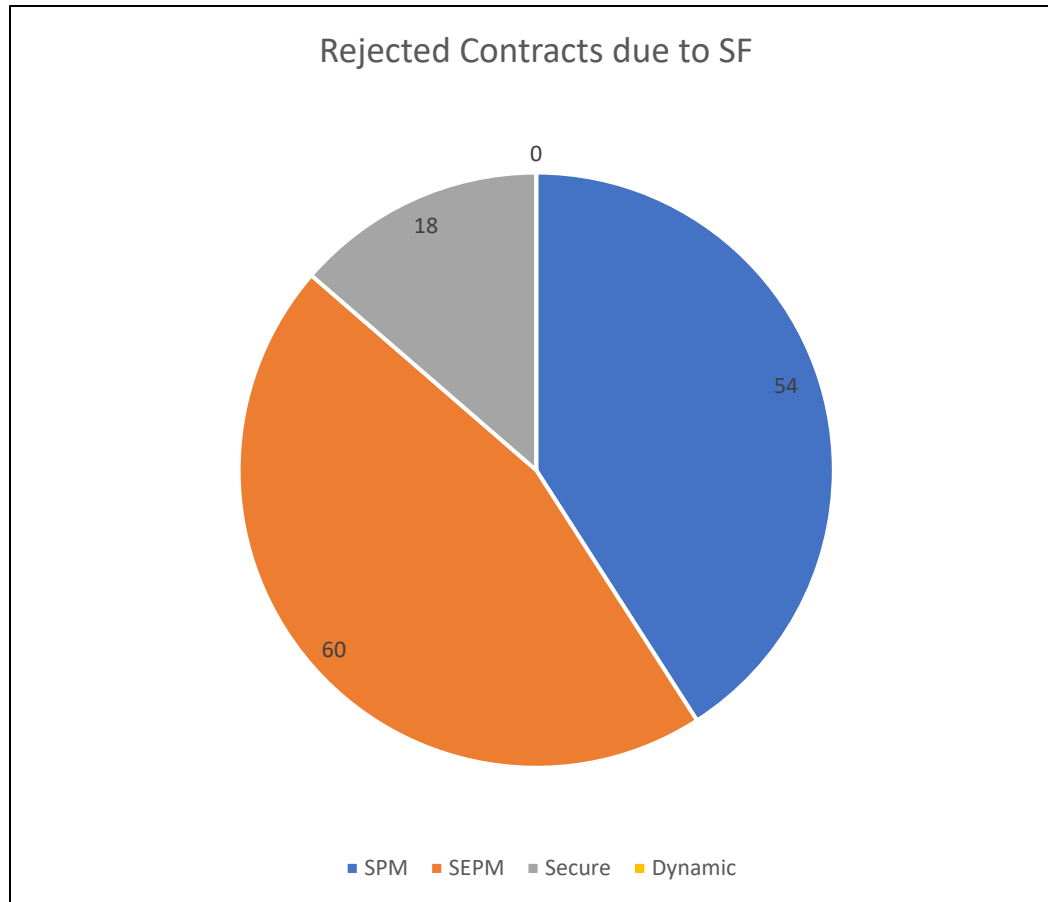
Average Asset Dispatch Time
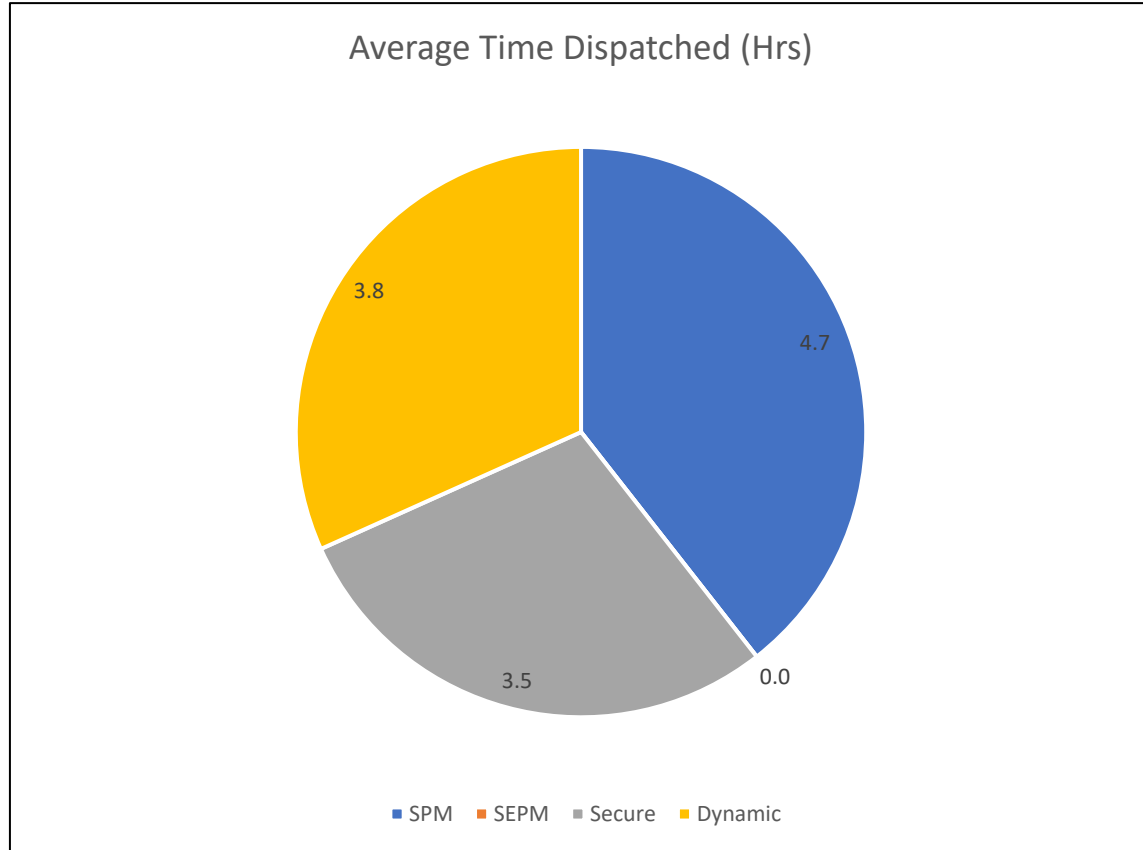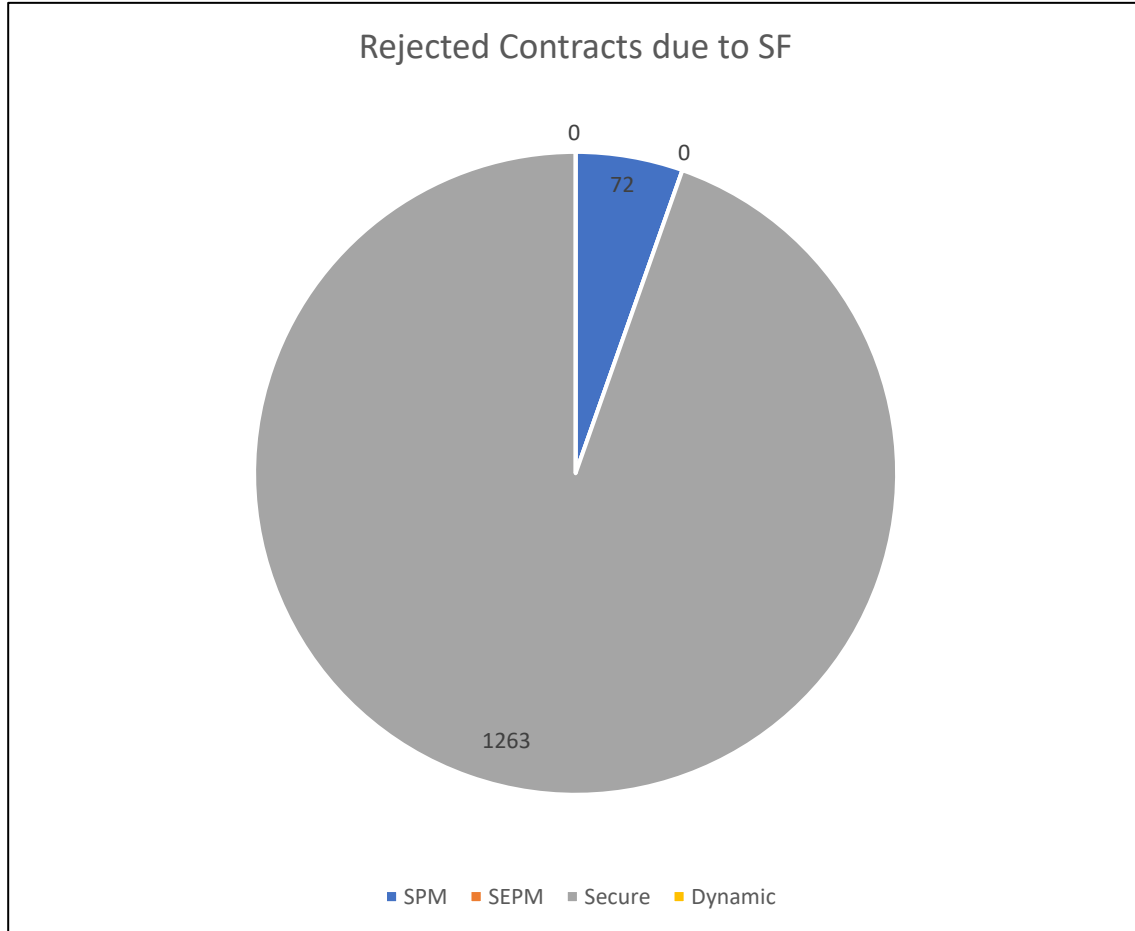

Block 2 Results
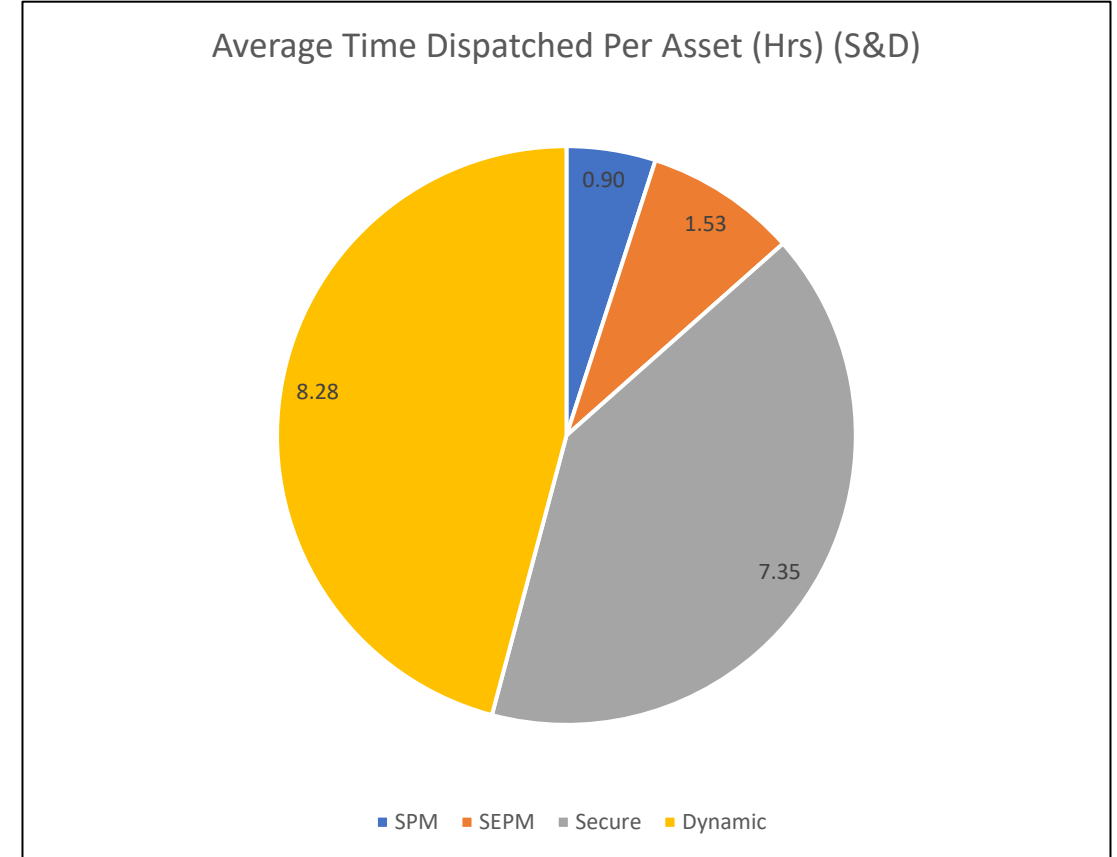
Block 3 Results

Rejected Contracts due to Sensitivity Factors

Rejected Contracts due to SF
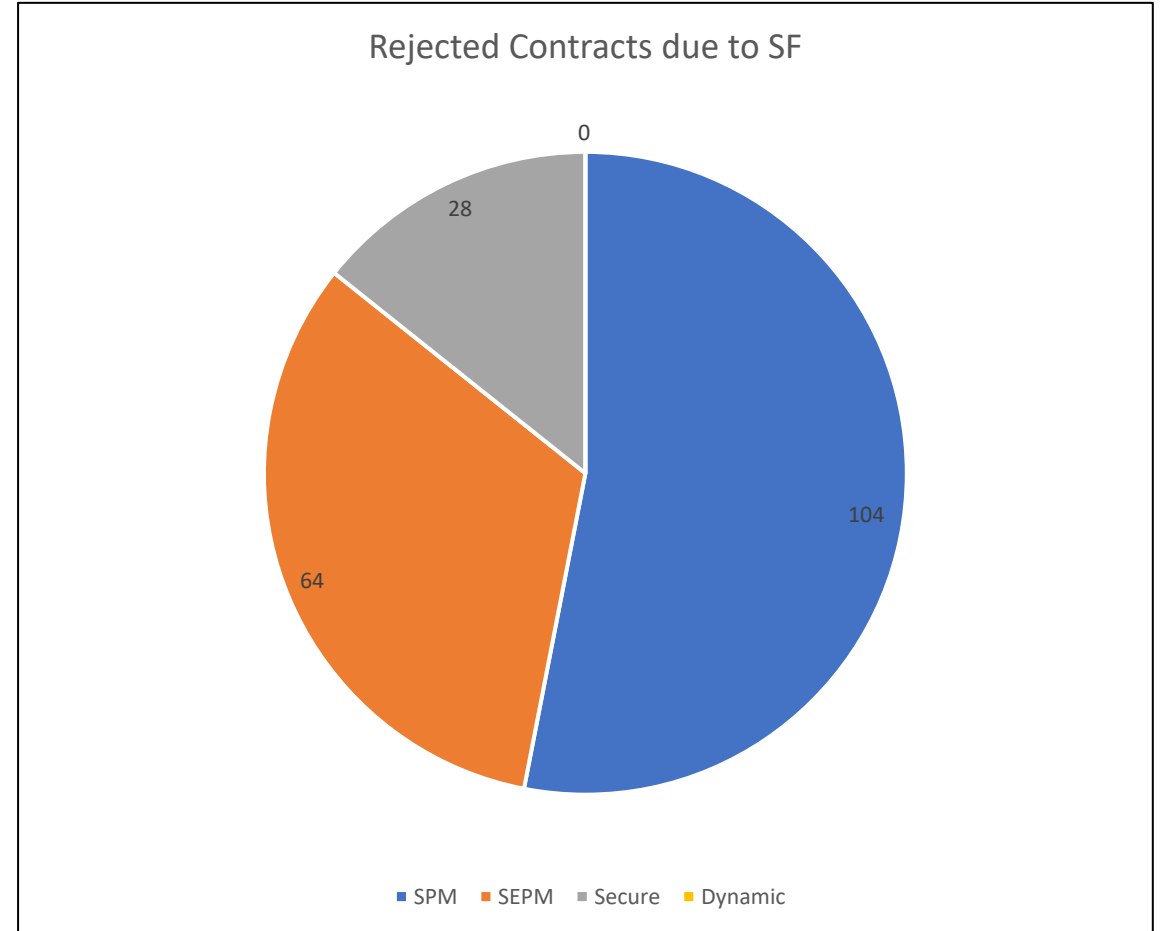

54
0
18
60

■ SPM ■ SEPM ■ Secure ■ Dynamic

Block 1 Results

- The graph shows how many contracts were rejected based on Sensitivity Factors within the S&D Tool

- Note that the contracts looks larger as the contract considers each half hourly availability of each asset as a separate contract acceptance.

- Learnings
- The percentage of contracts rejected on Sensitivity Factors were much lower than those accepted.
- Further work is required to assist participants in this type of market. E.g. Knowledge transfer, transparency of constraint location and risk averments.
- Sensitivity Factors do not always remain the same, it depends where the constraints is located within the network and where the participating assets are located in relation to that constraint. Due to this, assets can become more or less impactful to each constraint.
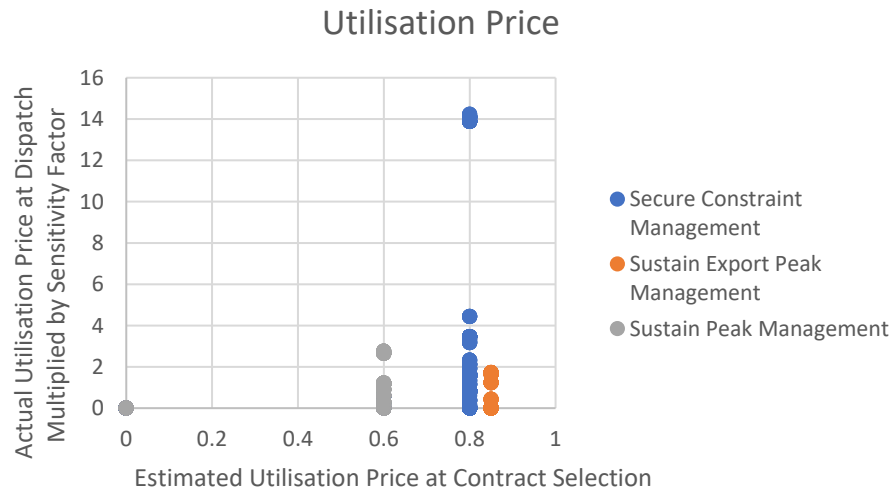
Rejected Contracts due to Sensitivity Factors

Rejected Contracts due to SF

Block 2 Results

- 0
- 72
- 0
- 1263

Legend: SPM, SEPM, Secure, Dynamic

Rejected Contracts due to SF

Block 3 Results

- 0
- 28
- 64
- 104

Legend: SPM, SEPM, Secure, Dynamic

# Utilisation Price against Constraint Alleviation

This graph on the top left shows the estimated utilisation price (using estimated utilisation hours) as calculated at contract selection against the actual utilisation price taking into consideration the actual utilisation hours and the sensitivity factors. The lower graph shows the sensitivity factor of the original responses, plotted against their estimated utilisation price.
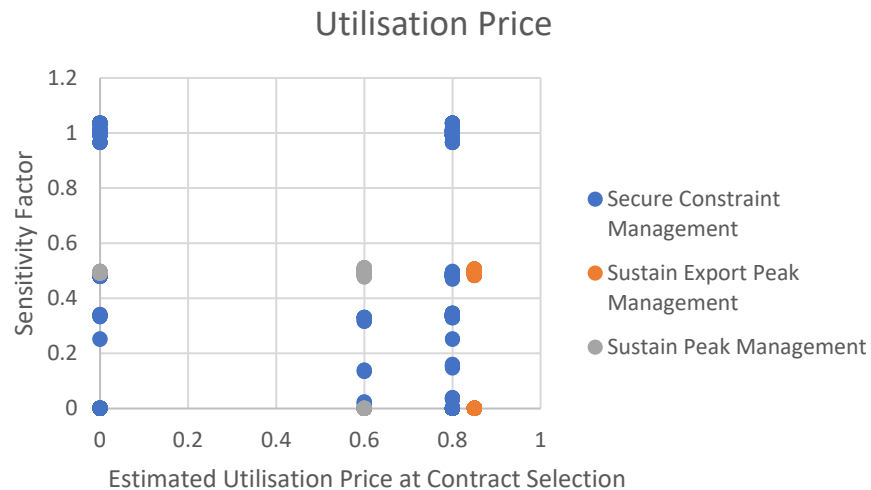
Learnings:

- In almost all cases people bid in maximum utilisation prices at contract selection .
- When we consider the actual utilisation hours and sensitivity factors - in around 50% of cases we paid more for utilisation than estimated at contract selection.
- Results are heavily skewed by the utilisation hours at contract selection being estimated as '1'.

Availability Price against Constraint Alleviation
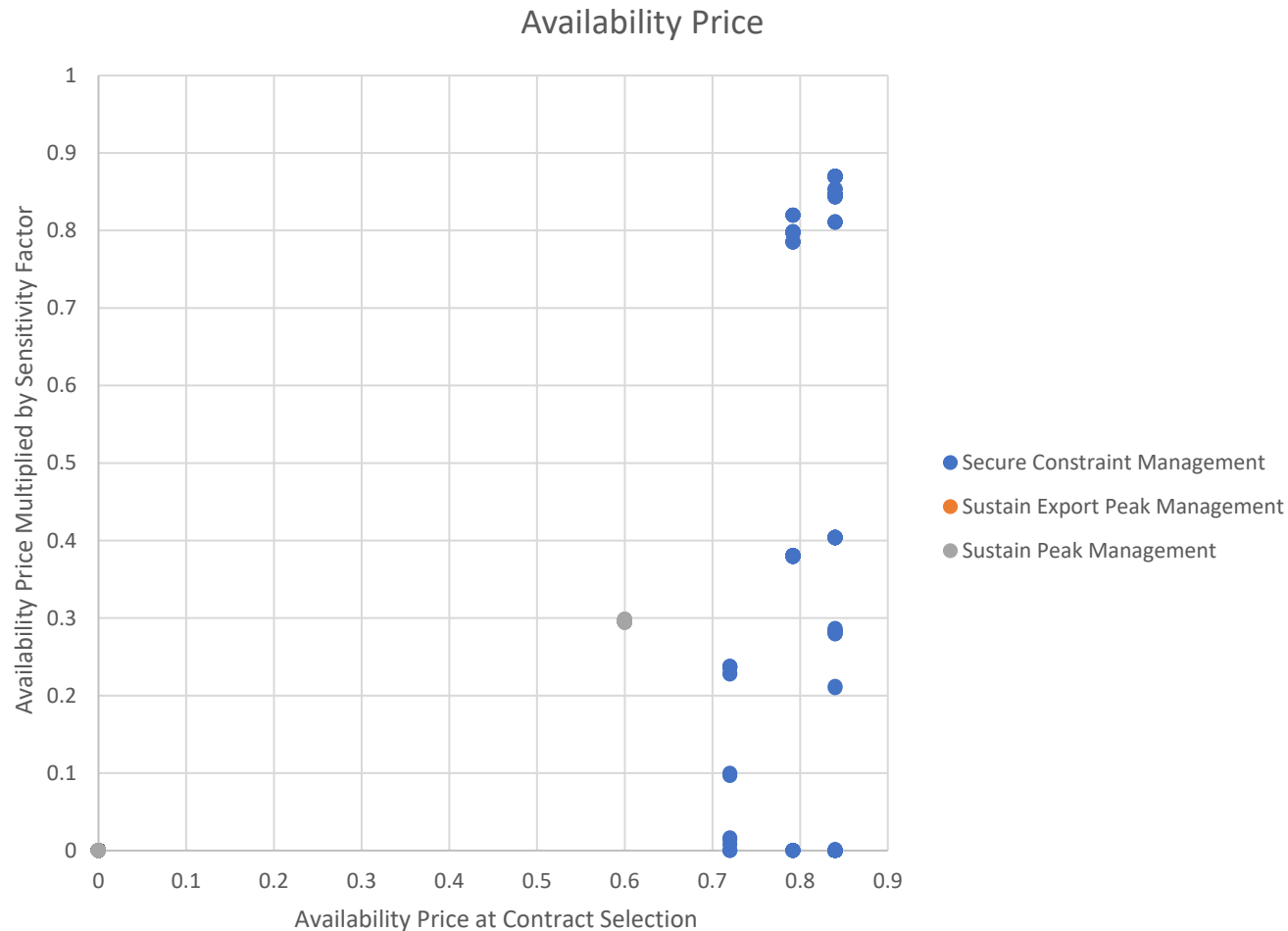
This graph shows the availability price as calculated at contracted selection plotted against their availability price multiplied by the sensitivity factor.

Learnings:
- Mainly Secure contracts that bid in a higher availability price.
- In all cases we were paying for assets to be available that would not totally elevate the constraints.
- In many cases the assets alleviated only half of the constraint/requirement.
- Not influenced by as many factors as utilisation price.

PSA (Power Systems Analysis) Technical Trial Data Analysis

Volume of Files Processed

Number of Files Per Block
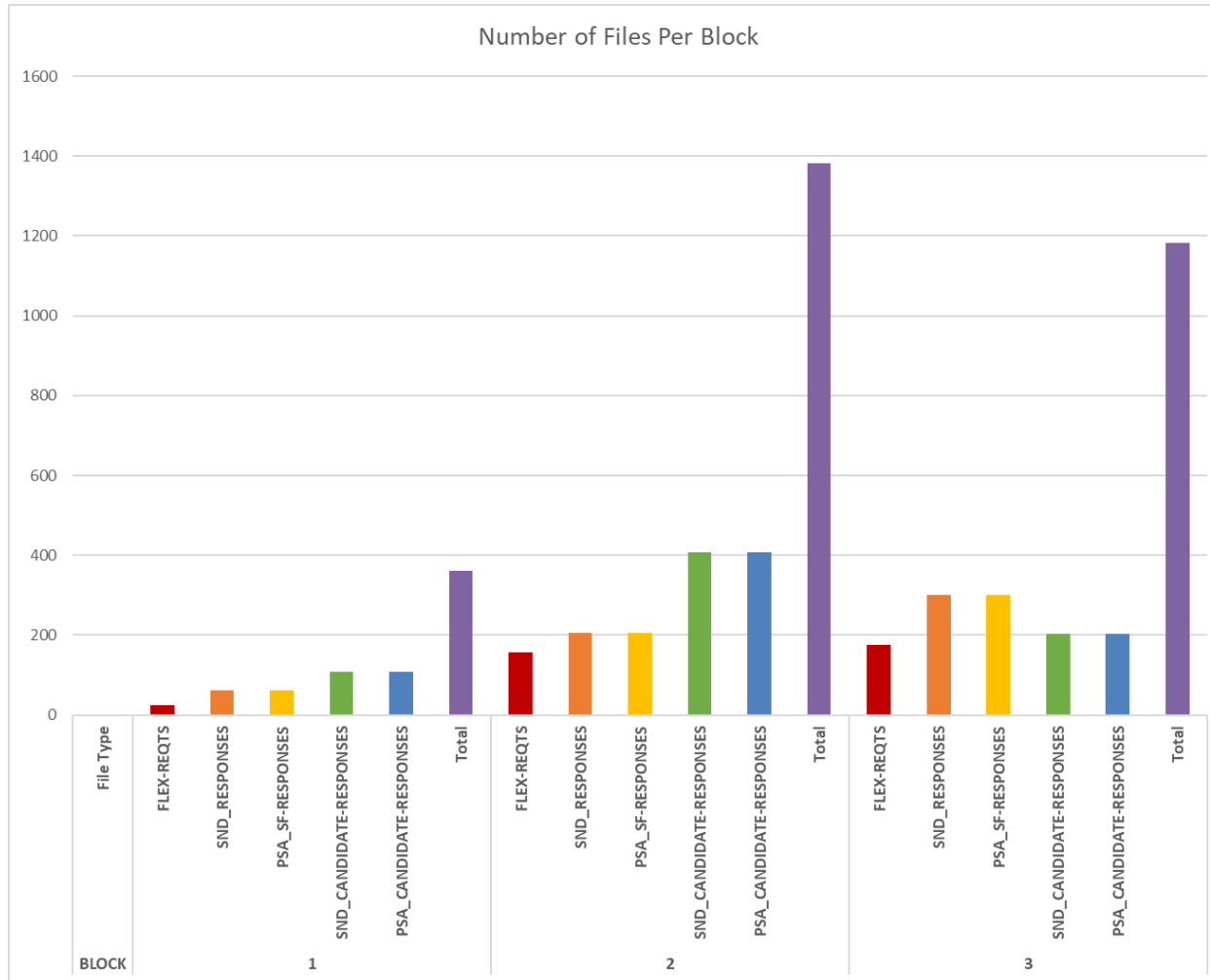
Key Points:
- Number of files increased after block 1 as PSA was running more continuously during blocks 2 and 3
- This didn't impact the trials and was planned testing of performance and continuous processing capability
- The ratio between FLEX_REQTS and SND_RESPONSES increased in block 3 due to an improvement in S&D by requesting more SF calculations but with fewer entries in each file
- The relative number of SND_CANDIDATE_RESPONSES reduced significantly in block 3 due to PSA applying an SF minimum threshold and aggregating responses, and S&D improving the iteration process
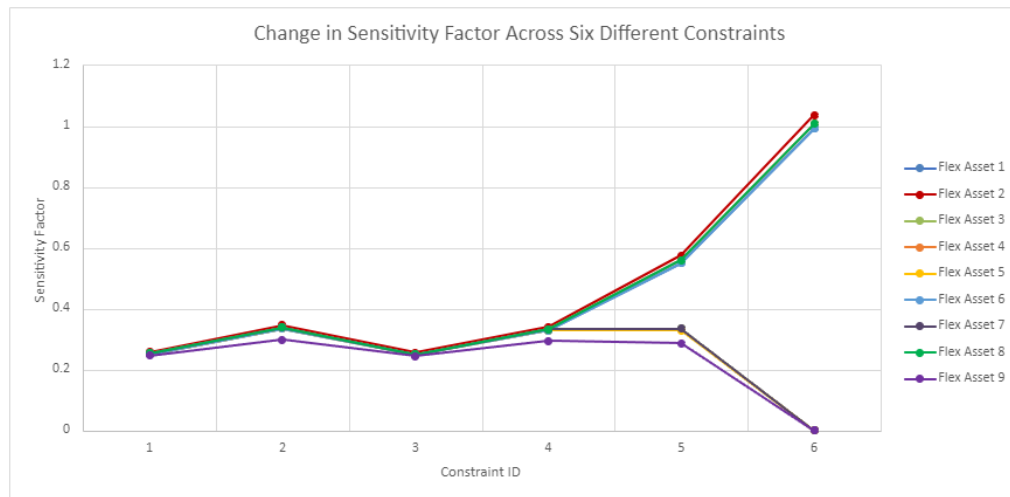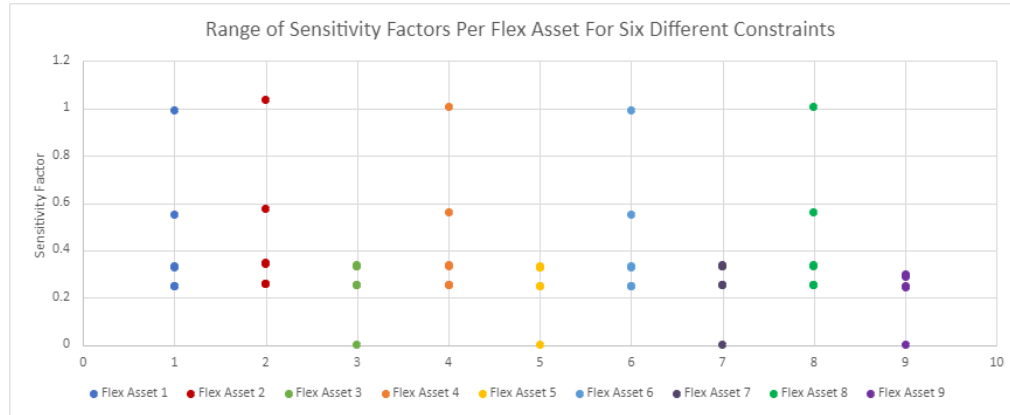
Volume of Batches and Iterations Processed
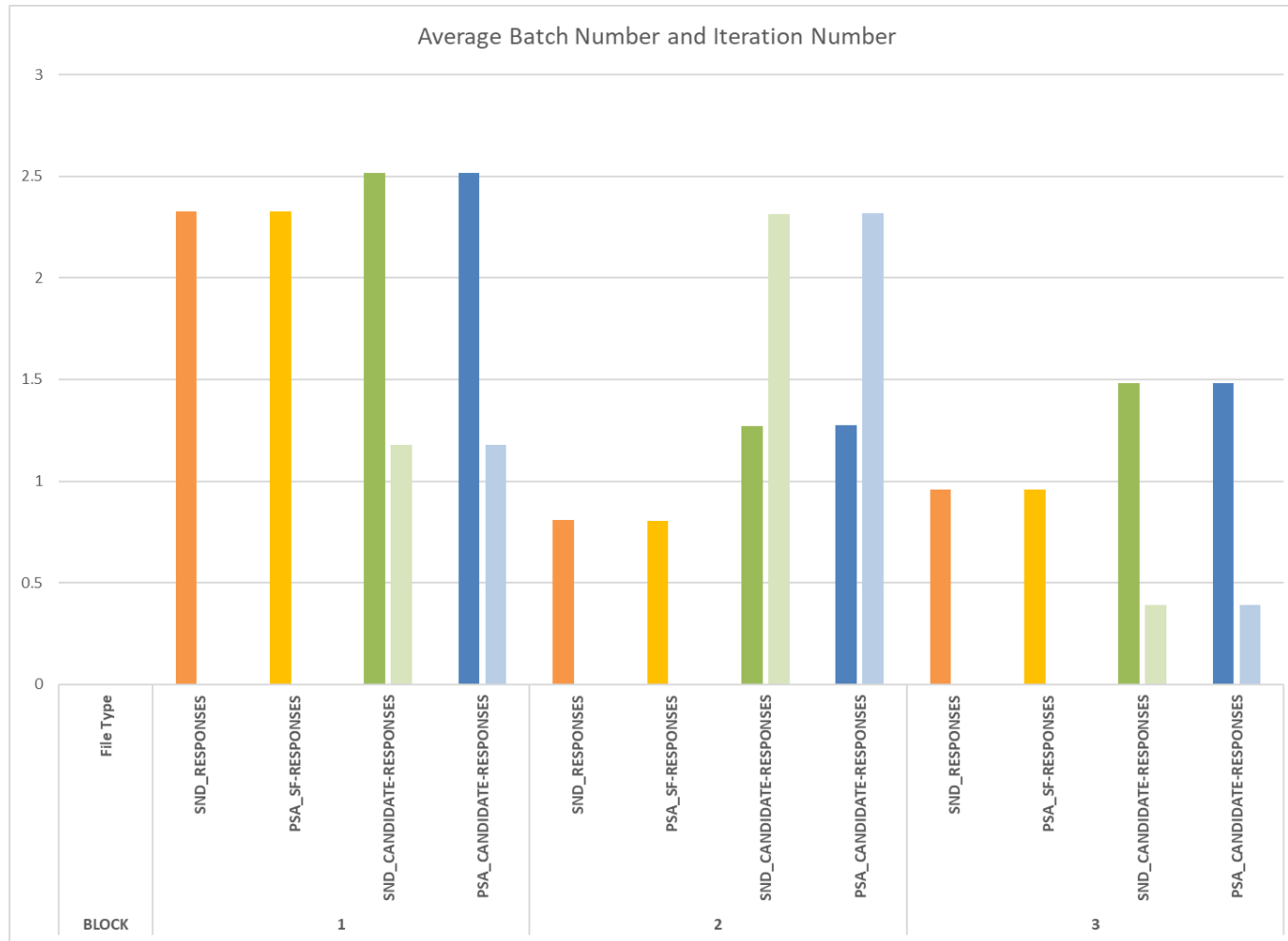
Key Points
- S&D requests SF calculations from PSA in batches according to the type of service (SPM, SEPM, Secure, Dynamic) that the FLEX_REQTS indicates
- The FLEX_REQTS generated in block 1 were more complex and generated more service options
- The CANDIDATE_RESPONSES are processed in batches and are iterated over until constraints are resolved. The use of improved iteration algorithms and PSA aggregation of responses and "dummy assets" significantly reduced the iterations and the processing time required in block 3

Variation in Sensitivity Factors (SFs)

Range of Sensitivity Factors Per Flex Asset For Six Different Constraints

Change in Sensitivity Factor Across Six Different Constraints

Key Points
- SFs are not constant, they change depending upon the prevailing network conditions and the constraint in question
- The top graph shows the SFs for 9 different flex assets against 6 different constraints (some values are duplicated and not visible. This shows the variance in SFs for a specific flex asset for different constraints
- The bottom graph shows the SFs for the same 9 flex assets against the 6 constraints showing how SFs can vary depending on the constraint (lines will be obscured by other lines)