

I-SEM Trialing of EUPHEMIA

I-SEM EUPHEMIA Working Group
Meeting 4
23rd July 2015



EUPHEMIA Workshop – Agenda

- Update by SEMO
- Further Analysis of Trial Batch 1 and 2
- Trial Batch 3
- Initial Phase Report
- Review for Commercial Phase Plan
- Next Steps



Further Analysis



Further Analysis

- Following previous WG, detailed analysis shared based on:
 - SNSP/Wind Penetration
 - Units scheduled below min stable generation
 - Two starting units

- All data was analysed using the following conditions:
 - Complex order format
 - Original 3 trading days



Further Analysis – Complex Schedule Feasibility

➤ Concerns around feasibility of complex schedules:

- Fewer conditions applicable than in the SEM
- Harder to represent technical characteristics

➤ Potential risk for generators:

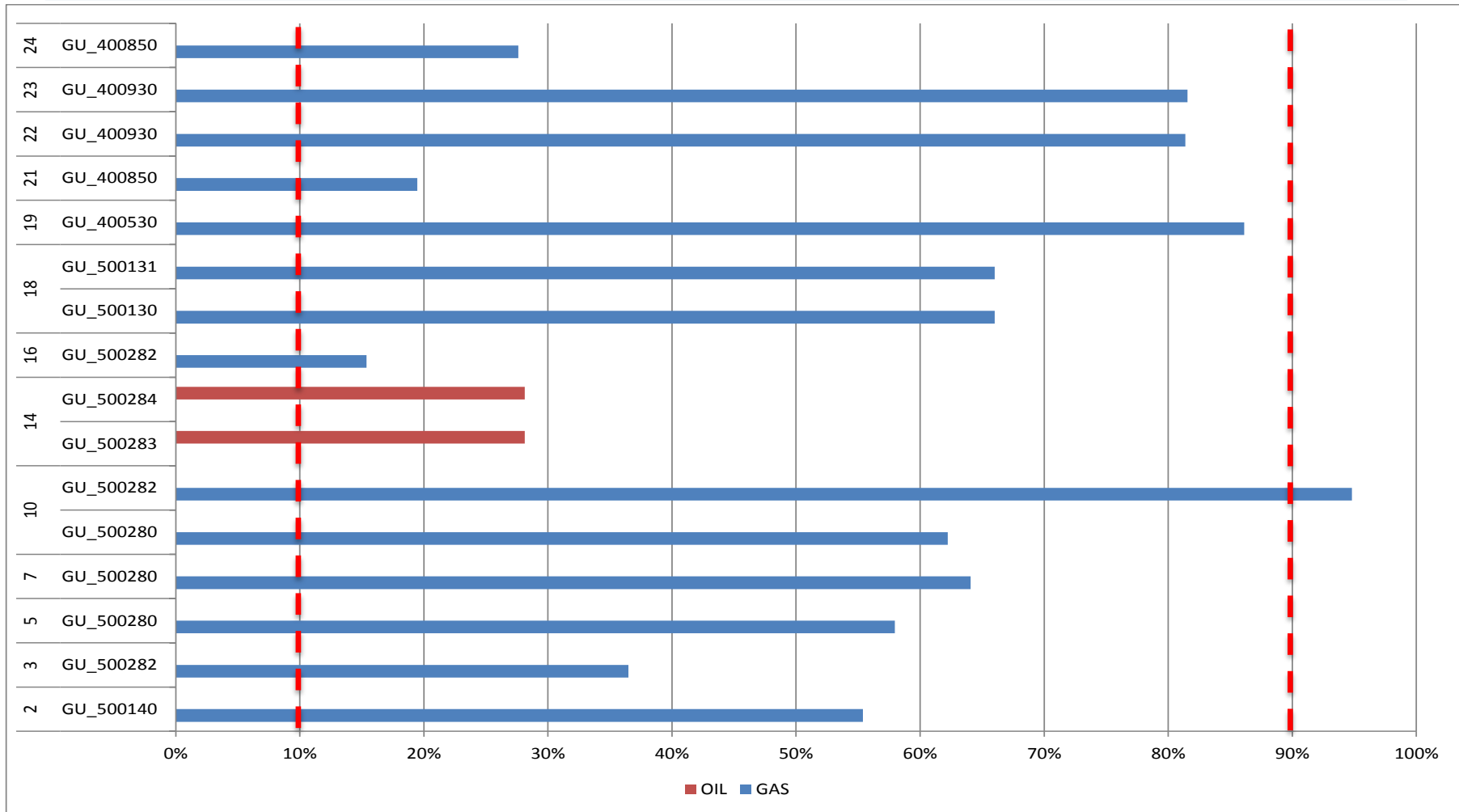
- Potential intra-day actions
- Potential balancing actions
- Potential under recovery of costs

➤ Analysis to quantify the risk:

- How often do such actions occur in the datasets



Further Analysis – Units Below Min Stable Gen



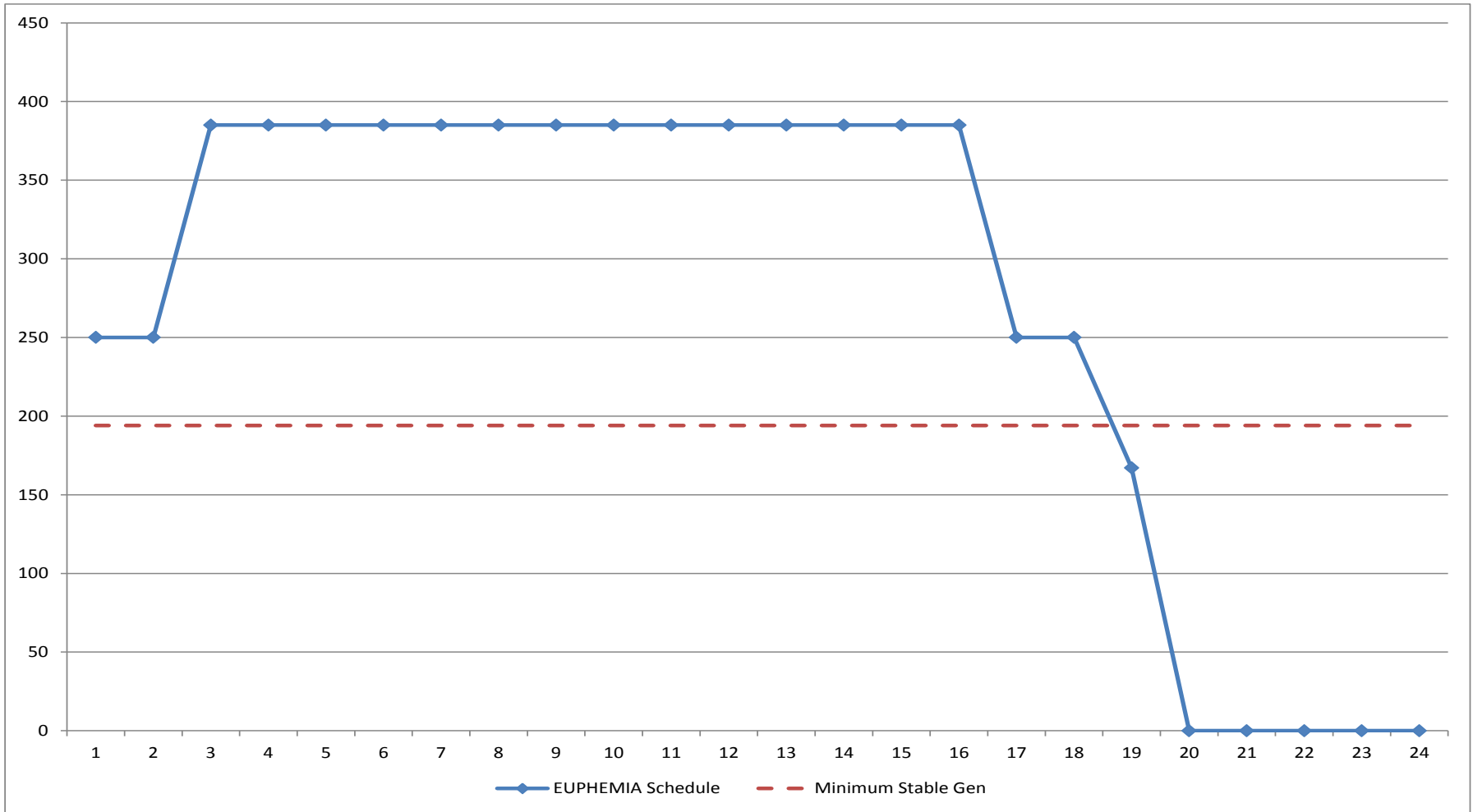
- Example day above - occurrences across a range of units/times
- High or low percentages potentially require cheaper actions

Further Analysis – Context of scheduling

- Implementation of tie breaking:
 - Where multiple simple bids are marginal, evenly apportion volume
 - Same principle as complex orders
 - May lead to below min stable gen values
 - Ultimately, the choice of the PX

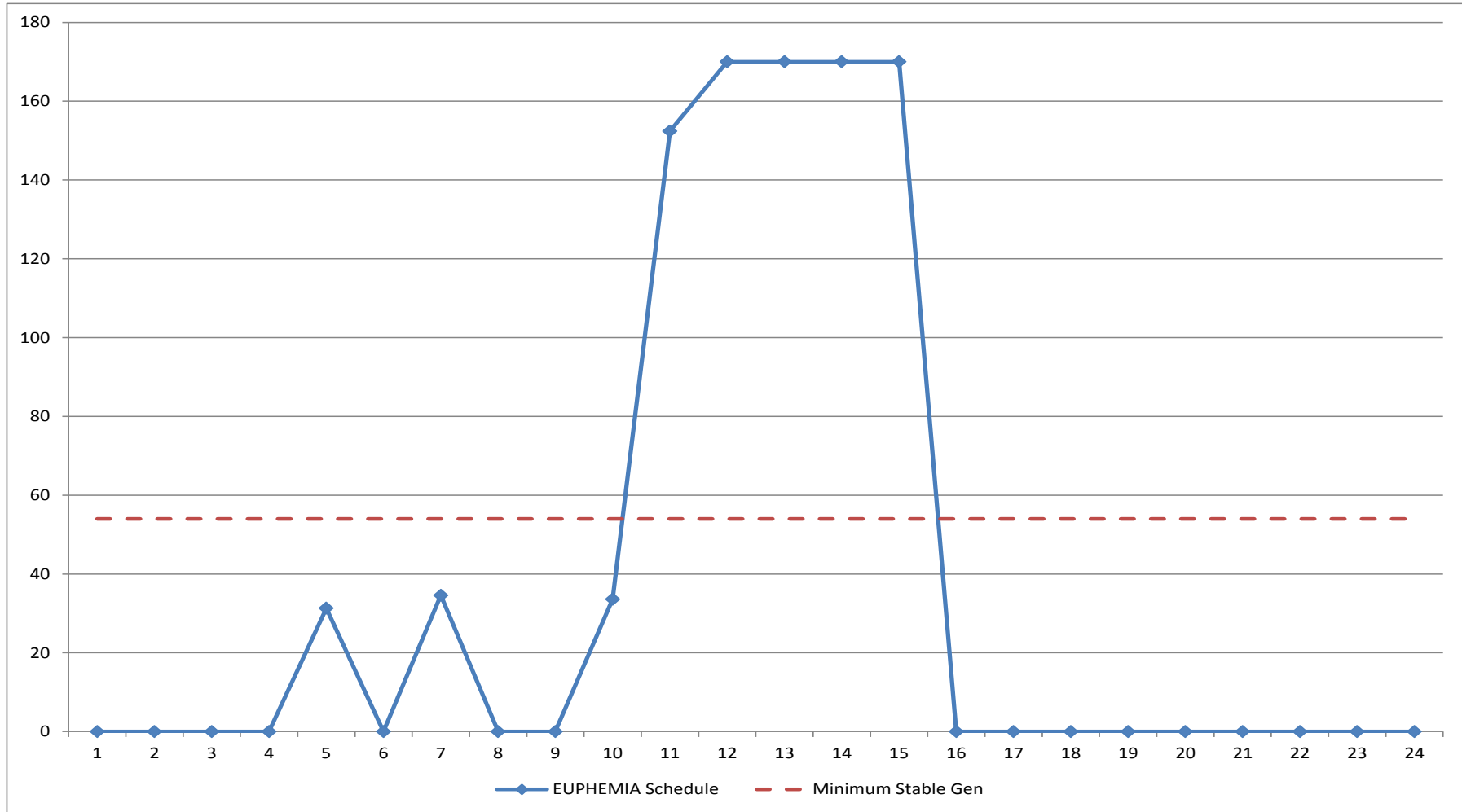
- Scheduling needs to be considered across the day:
 - What is the unit doing at min gen (e.g. ramping)?
 - What is the unit doing for the rest of its profile?
 - Is the unit profitable in the DAM?

Further Analysis – Units Below Min Stable Gen



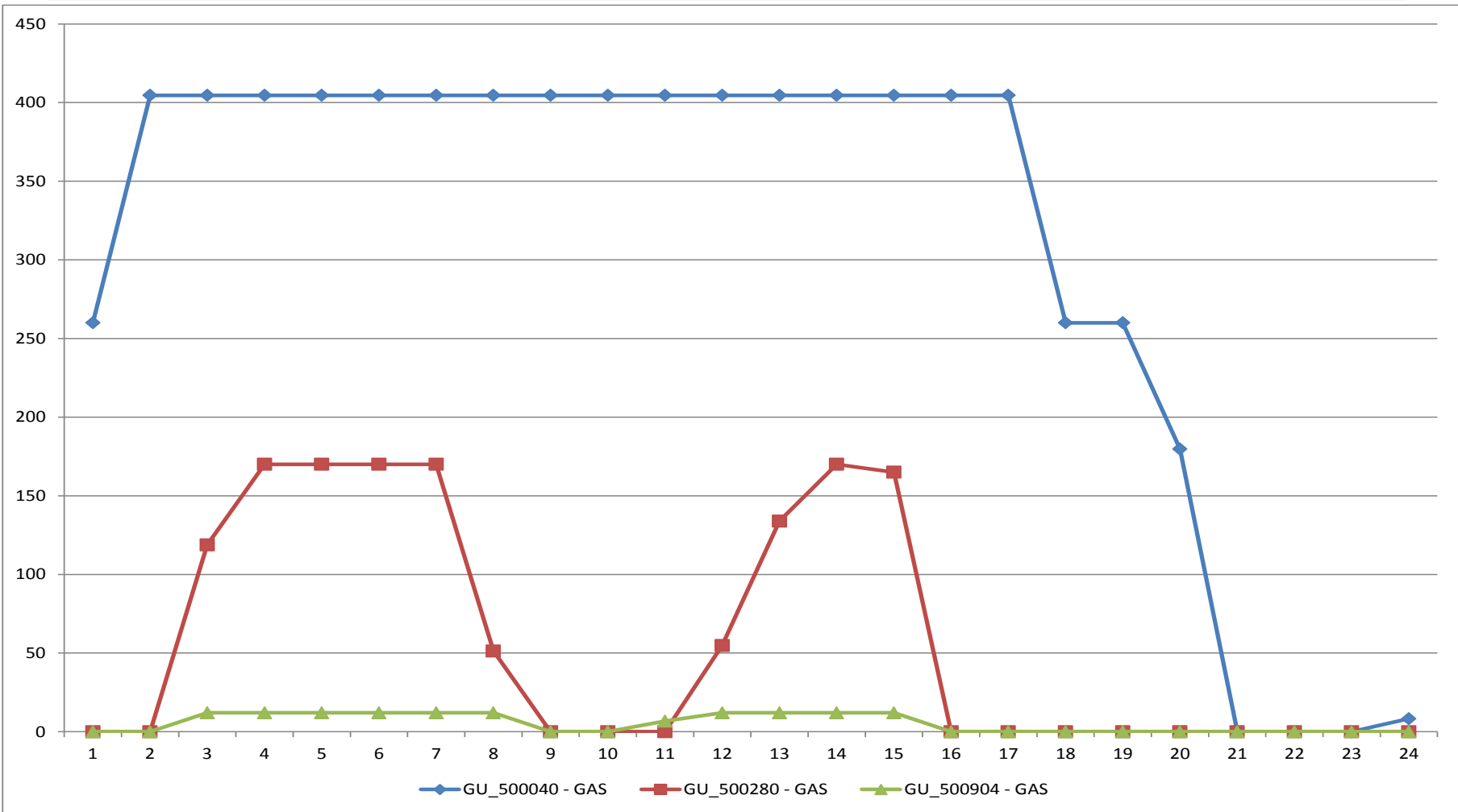
- May occur due to ramping on or off
- Potentially less problematic in these cases

Further Analysis – Units Below Min Stable Gen



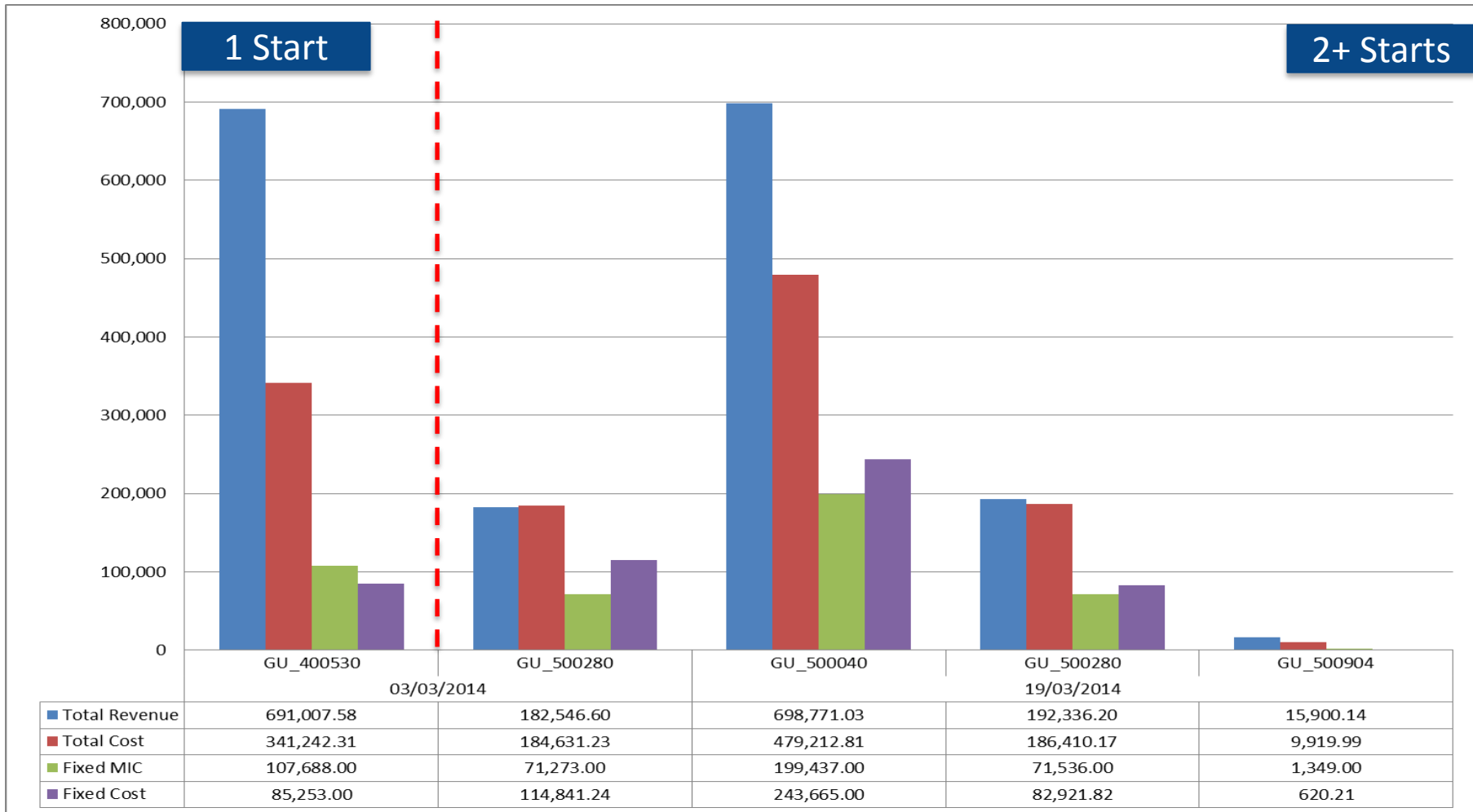
- May be a unit's scheduled value without ramping
- Potentially more problematic in these cases

Further Analysis – Two Starting Units



- Occurrences in last hours of the day for small volumes
- Occurrences of two distinct multi-hour profiles

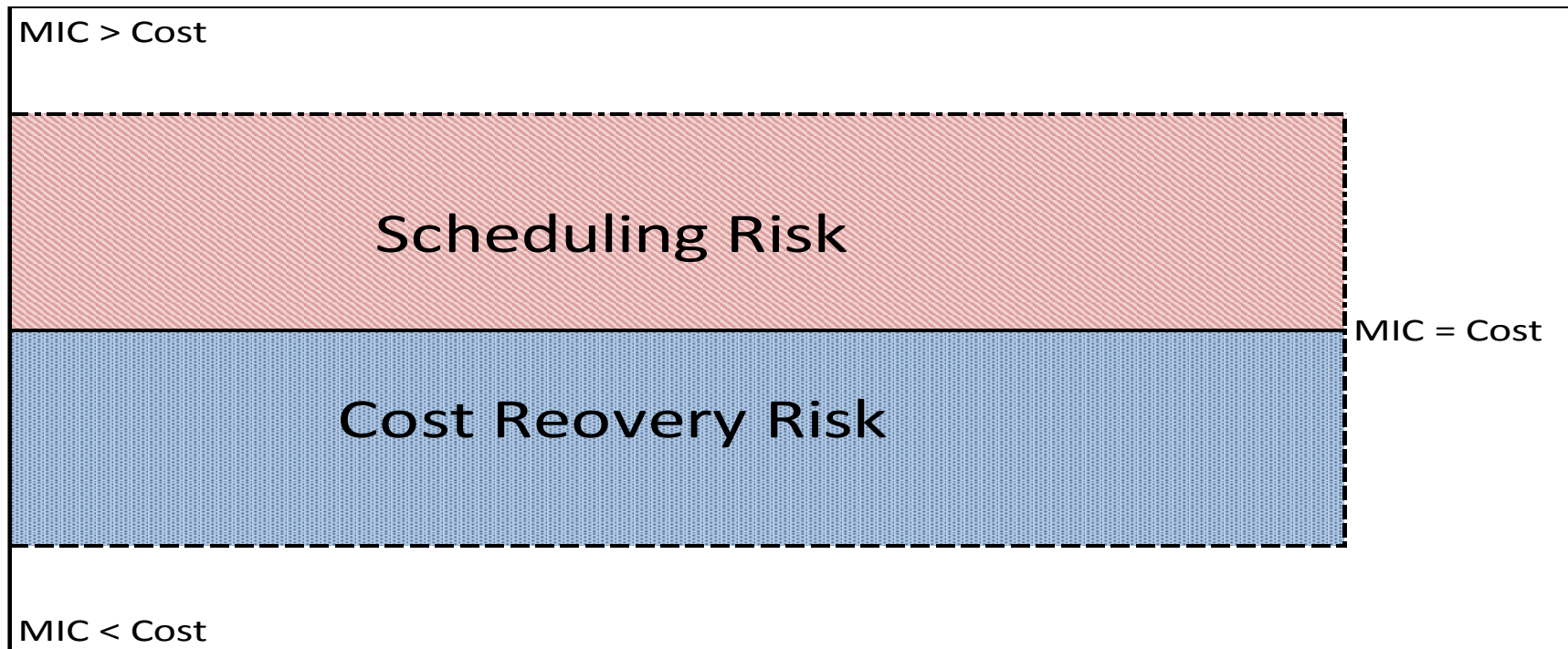
Placeholder – Revenue Adequacy



- Risk occurs where fixed MIC is lower than fixed cost
- Risk of under recovery not always realised (3/20 multi starts)

Further Analysis – Risk Associated with MIC

- Level of MIC used affects the risk:
 - A high MIC increases risk that the unit will not be scheduled
 - A low MIC increases risk that the unit will not recover its costs



Further Analysis – Revenue Adequacy

- Despite risks, few cases of cost under recovery:
 - ❑ Units may compensate fixed costs with infra marginal rent
 - ❑ Units may compensate unplanned starts with estimated no loads
 - ❑ Risk not necessarily leading to occurrence

- Potential to address under recovery:
 - ❑ DAM costs/revenue will affect later actions
 - ❑ May be able to avoid costs in lieu of revenue
 - ❑ Ultimate profitability will depend on all markets

Trial Batch 3



Trial Batch 3 – Baseline Assumptions Used

Unit Type	Assumption
Thermal Non-Peaker	Complex
Pump	Linked Block
Hydro	Simple
Peaker	Simple
Interconnector	Trading Day ATC
Supplier	Price Taker
Wind	Price Taker

➤ Alternate conditions based on:

- 2020 wind levels
- Constrained interconnector and/or pump outage



Trial Batch 3 – Execution

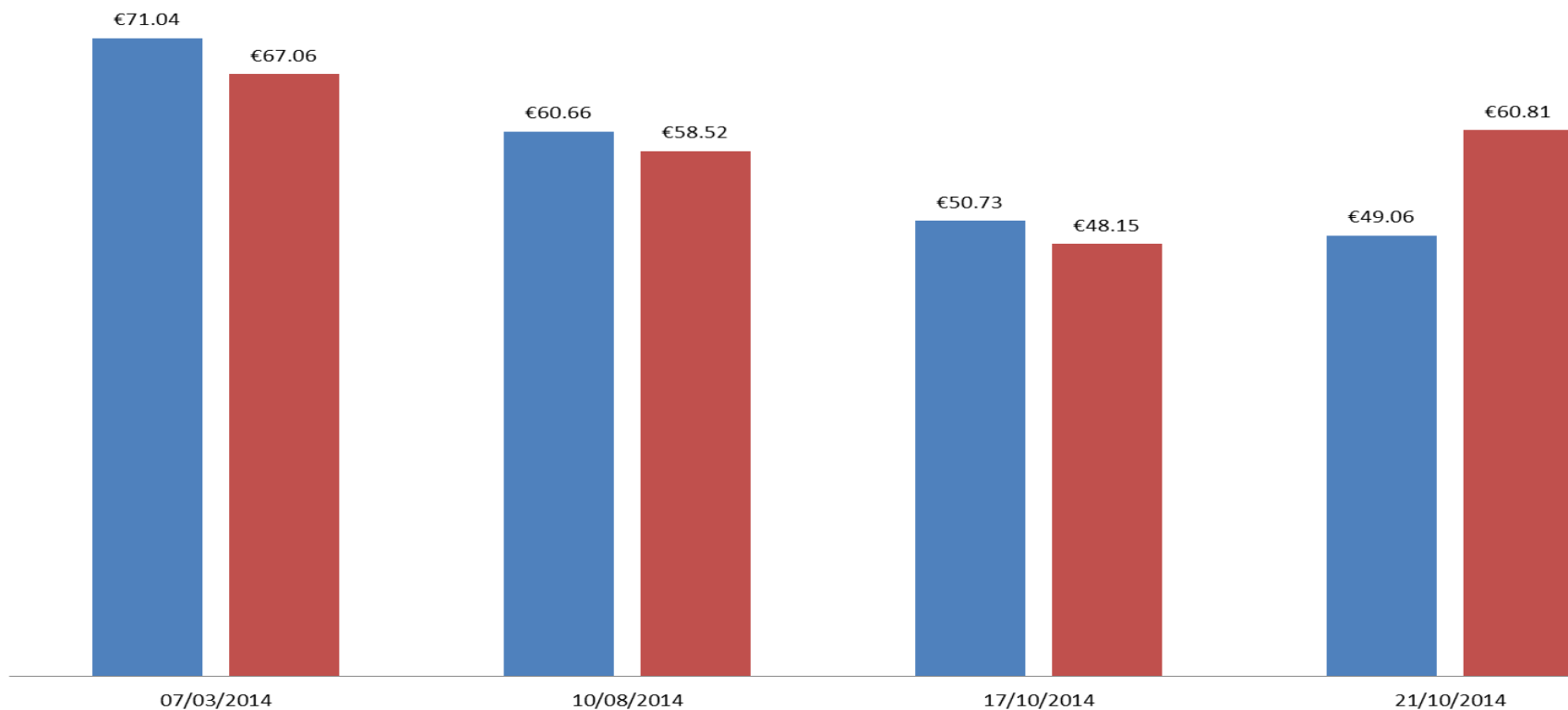
- 39 datasets submitted to APX
- Executed in EUPHEMIA and results returned for 36/39:
 - Solutions not found for 3 datasets
 - All complex datasets with 2020 wind
- Issue is related to SEMO input data:
 - No issue with MRC only data
 - SEMO input data is being reviewed by APX
 - No clear cause at this point



Trial Batch 3 – 2020 Wind Prices

Average Price - Normal v 2020 Wind

■ Normal/Complex ■ 2020 Wind/Complex

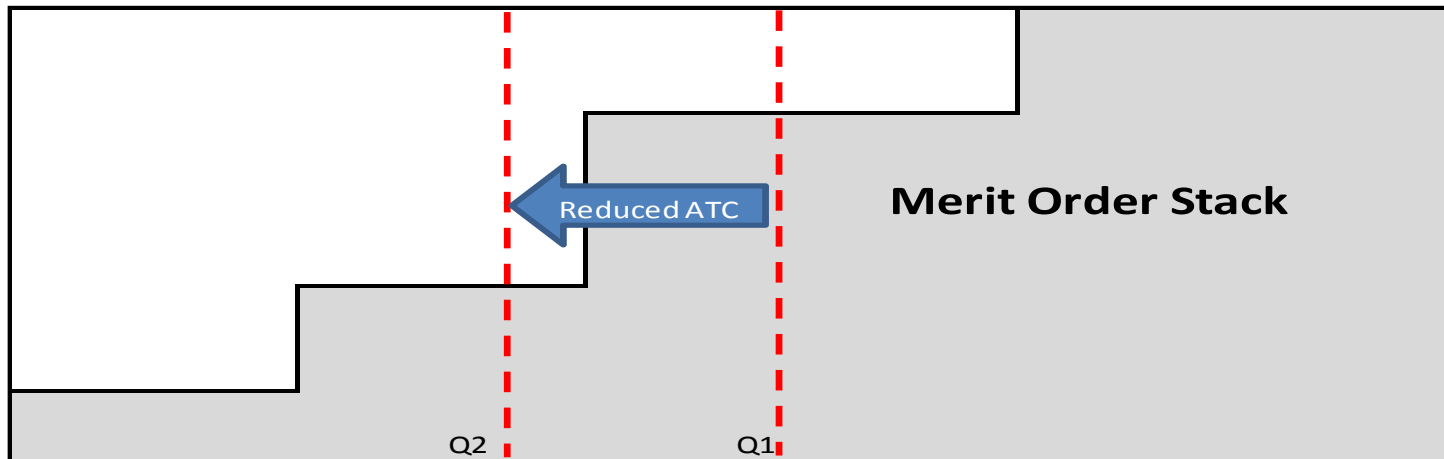


- Lowers price in 3/4 cases
- Best social welfare not necessarily lower I-SEM price

Trial Batch 3 – 2020 Wind & Interconnector Constraint

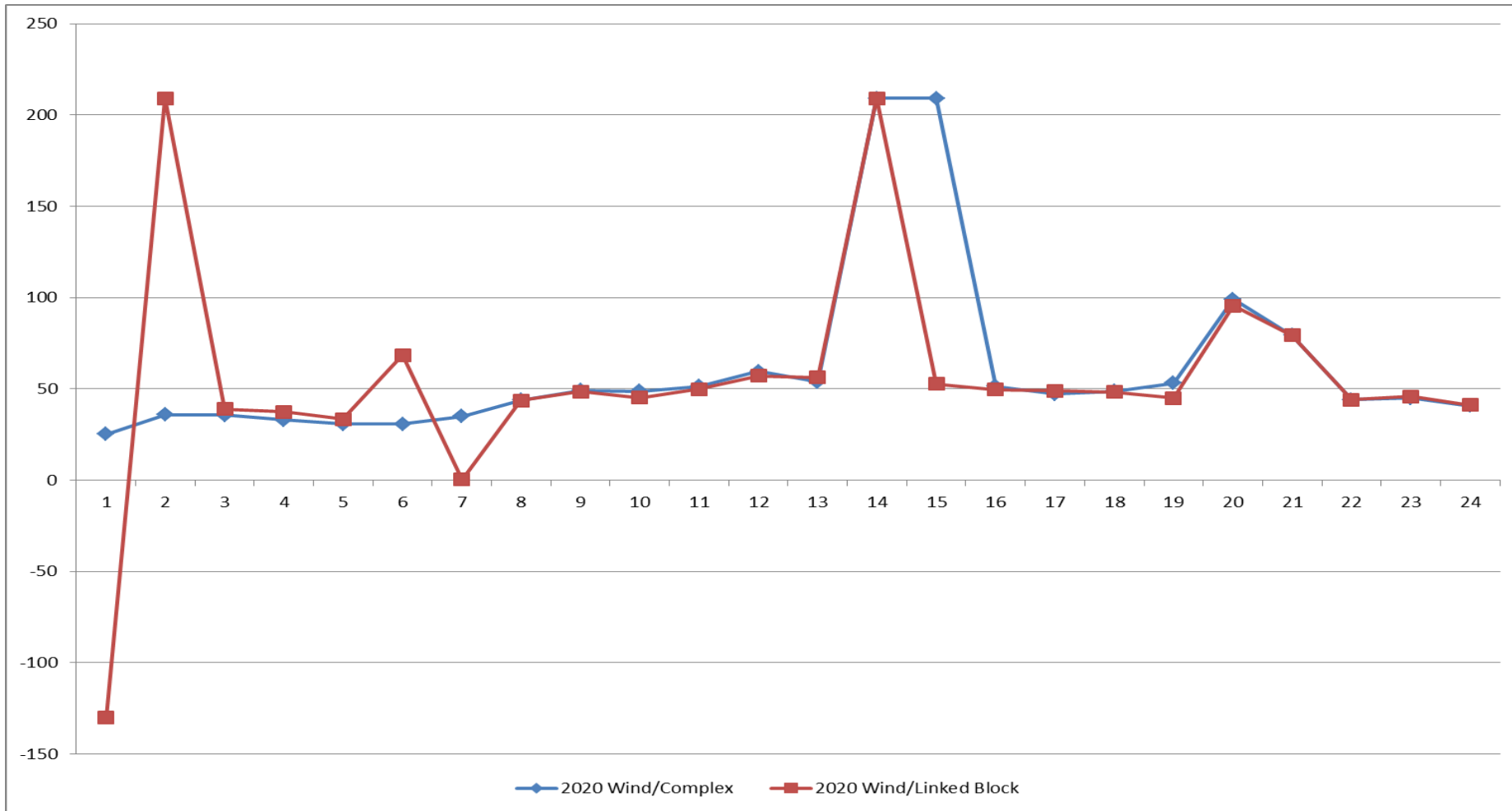
➤ Datasets show constrained I/C lowering the price:

☐ Lower level of export – lower in merit order stack



	Average of Price	Max of Price	Min of Price
10/08/2014	53.62	173.60	23.98
2020 Wind - Constrained I/C & No Pump/Complex	48.72	173.60	23.98
2020 Wind/Complex	58.52	173.60	30.64
21/10/2014	55.69	223.30	25.25
2020 Wind - Constrained I/C & No Pump/Complex	50.57	223.30	25.25
2020 Wind/Complex	60.81	209.16	25.25

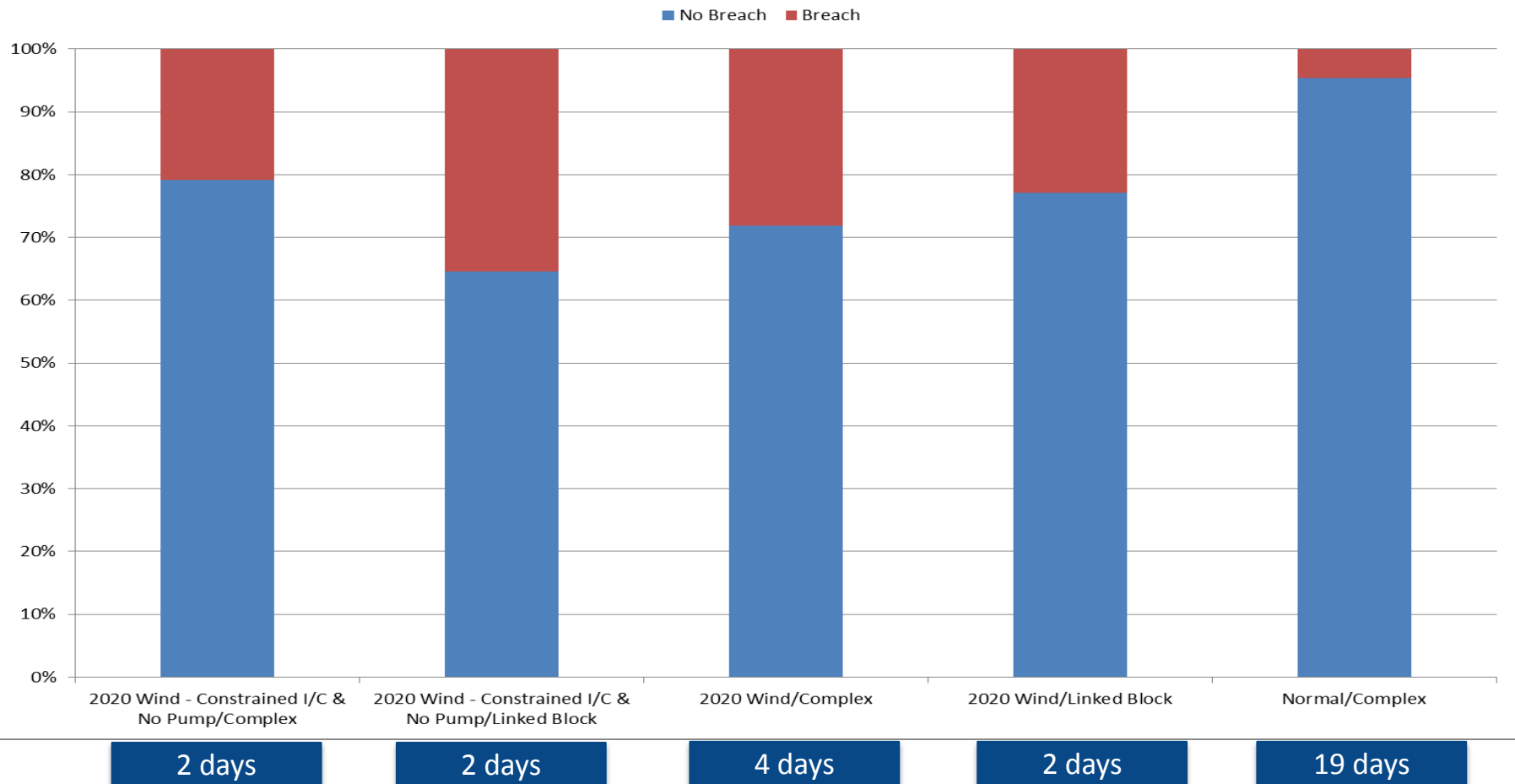
Trial Batch 3 – 2020 Wind & Linked Blocks



- Volatile pricing remains in linked blocks
- Linked blocks producing negative prices

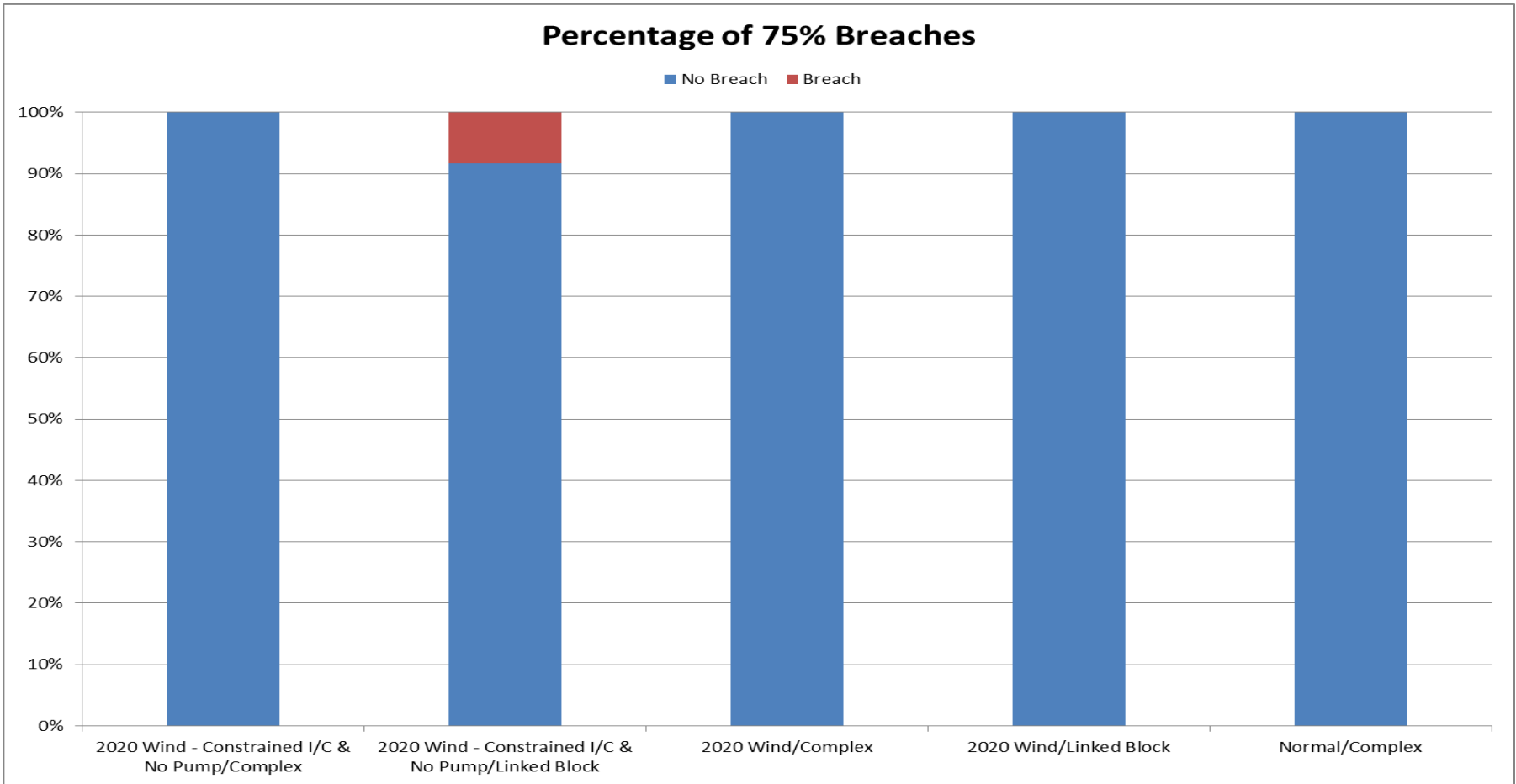
Trial Batch 3 – 2020 Wind and SNSP Limit

Percentage of 50% Breaches



- Greater proportion in 2020 wind cases
- Affected directly by interconnector ATC

Trial Batch 3 – 2020 Wind and SNSP Limit



2 days

2 days

4 days

2 days

19 days



- Few cases of 75% breach
- Highlights the relationship between SNSP and I/C flows

Interconnector Representation

- Interconnectors represented as in SEM:
 - ❑ Individual representation of Moyle and EWIC
 - ❑ Characteristics as in the SEM on trading day
 - ❑ Ramping, losses and ATC represented
 - ❑ Moyle deadband is not applicable

- Representation in trial equivalent to production:
 - ❑ Use of virtual zones required
 - ❑ Setup is slightly different than production requirement
 - ❑ Functionally the same but simplified for trial

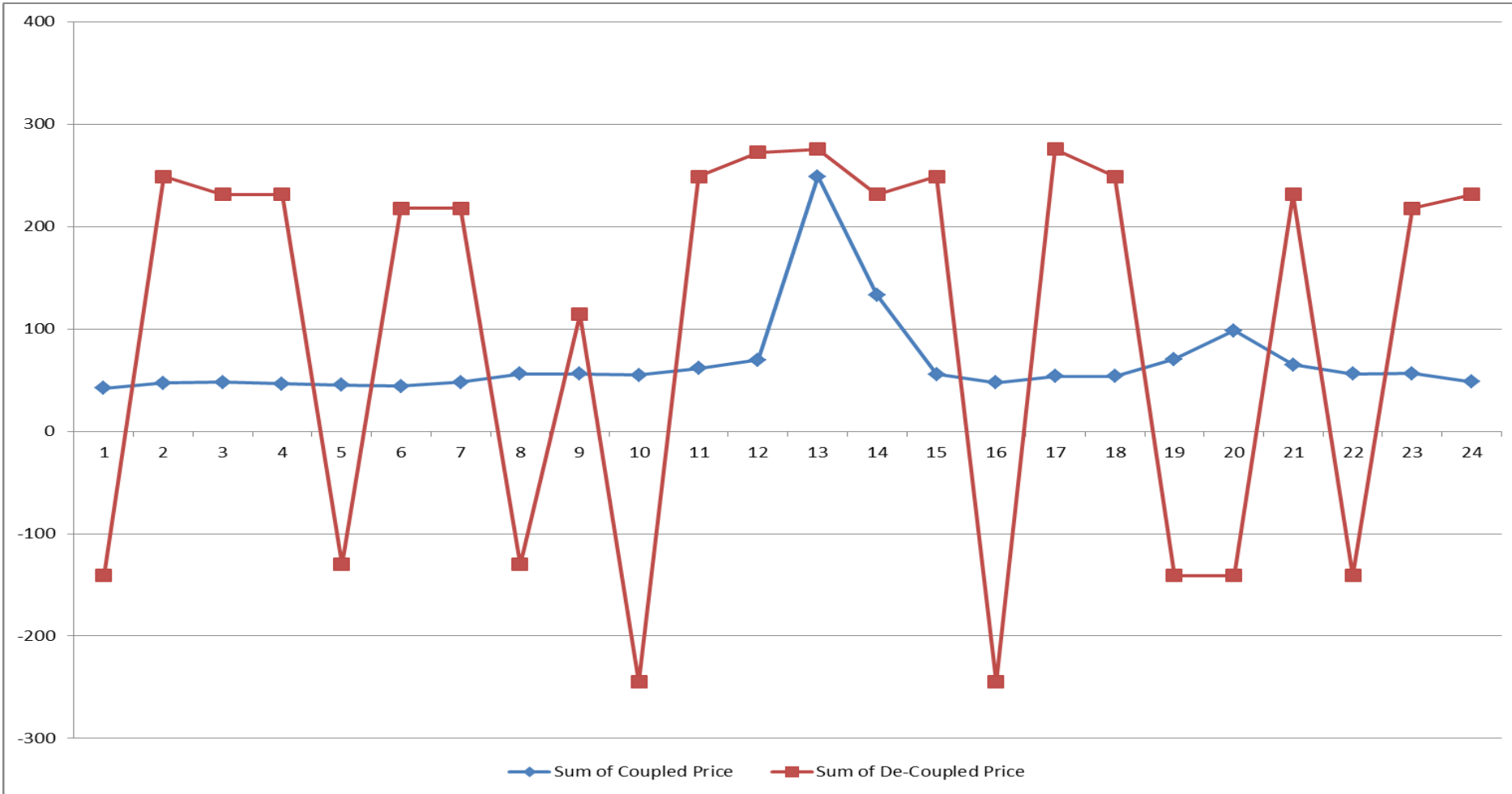


Trial Batch 3 – Coupled Linked Blocks

- Coupling lead to improve price formation:
 - Positive effects of having access to other order books
 - Prices are more stable and reflective of scarcity

	Average of Coupled	Average of Decoupled
03/03/2014	68.86	105.22
Adjusted Pump Storage/Linked Block	70.78	109.31
Normal/Linked Block	66.95	101.13
19/03/2014	75.98	111.76
Adjusted Pump Storage/Linked Block	76.18	99.39
Normal/Linked Block	75.77	124.13
23/03/2014	59.46	136.15
Adjusted Pump Storage/Linked Block	59.61	158.40
Normal/Linked Block	59.31	113.91

Further Analysis - Coupled Linked Block Data



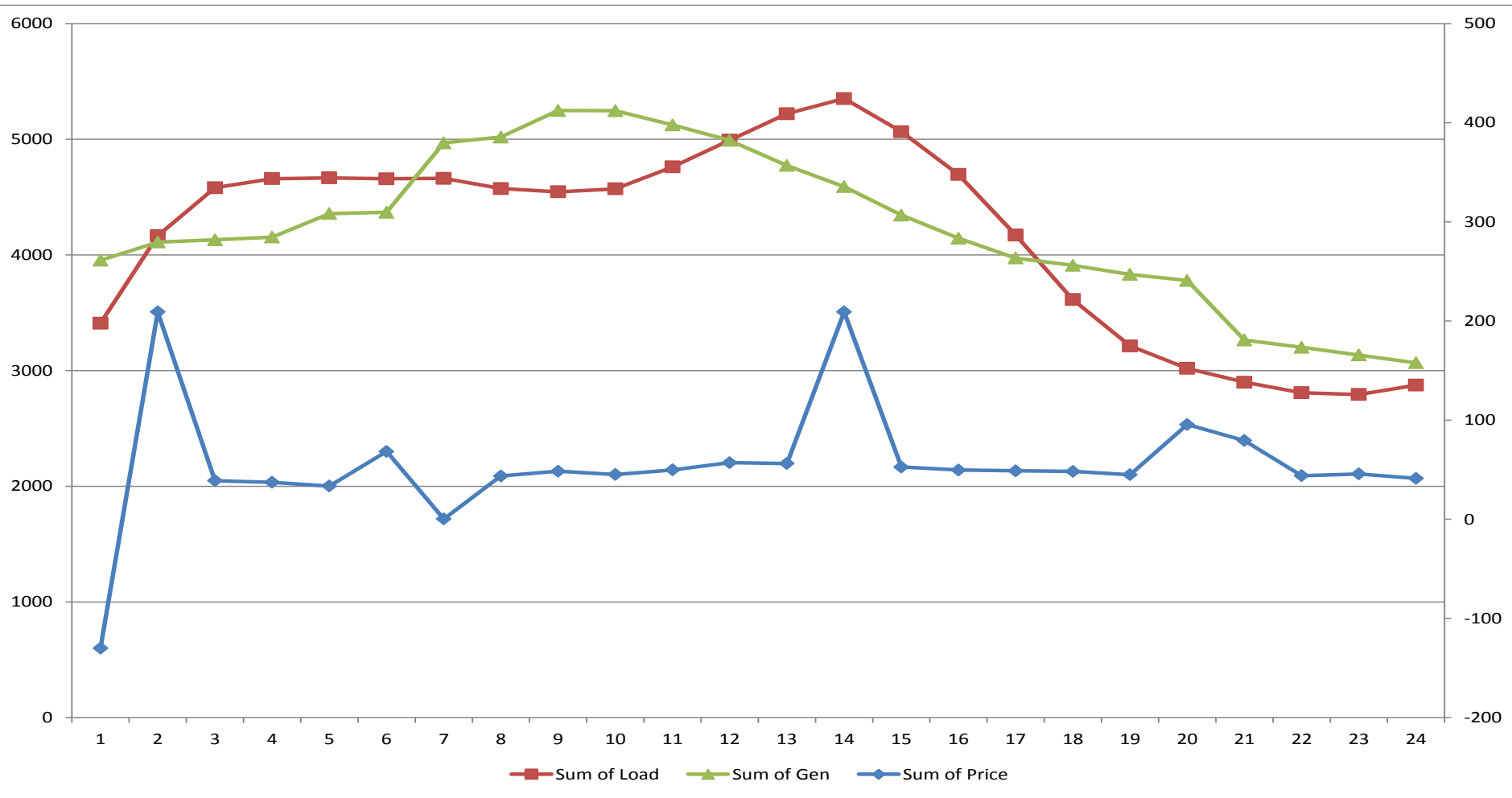
- Prices more stable and linked to load
- Average price significantly lower with same conditions

Trial Batch 3 – Coupled Linked Blocks Batch 3

- Issues still persist with linked block price formation:
 - ❑ Insufficient price makers
 - ❑ Prices are erratic when set in the I-SEM
 - ❑ Fundamental approach not altered

- Issues more prevalent in batch 3:
 - ❑ Issues at time of interconnector congestion
 - ❑ More congestion with 2020 wind conditions
 - ❑ Evidence of issues seen in batches one and two

Further Analysis - Coupled Linked Blocks Batch 3



- Exposed to linked block issues at points of congestion
- Prices formed in the I-SEM may be erratic

Trial Batch 3 – Coupled Linked Blocks

- Coupling lead to improve price formation:
 - Positive effects of having access to other order books
 - Prices are more stable and reflective of scarcity
- Fundamental issues persist:
 - Evidence of erratic pricing at interconnector congestion points
 - Congestion includes points of ramp constraint
 - Approach to linked blocks must be refined
 - Additional price makers must be added to the solution



Initial Phase Report



Initial Phase Report

- Version circulated pending review/update:
 - Trial batch three results
 - Review by APX
 - Feedback from interested parties
 - Internal Review and Sign-Off

- Includes SEMO's findings and emerging thinking:
 - Reflective of working group materials
 - Not necessarily reflective of views of reviewers



Initial Phase Report - Feedback

➤ Feedback welcome from working group members:

- Feedback welcome on all aspects of the report
- Aim to have as comprehensive a report as possible
- Want the report to be valuable to target audience
- Feedback will be incorporated as best possible

➤ Intention is to share on a wide basis:

- Will host additional public workshop (date TBC)
- Will make available to stakeholders not in WG



Review of Commercial Phase Plan



Review of Commercial Phase Plan

- Initial plan based on three batches:
 - ❑ One scripted
 - ❑ Two unscripted – potential for confidential trial
 - ❑ Scheduled to complete December 2015

- Desire of the working group to change structure
 - ❑ Include more batches to allow for incremental learning
 - ❑ Increase flexibility as understanding broadens
 - ❑ Allow for refinement/rejection of assumptions based on results



Review of Commercial Phase Plan

- SEMO agreed to review the plan:
 - More closely meet requirements of WG
 - Provide maximum value to stakeholders
 - Provide a more flexible approach

- Some restrictions apply:
 - Will require extension to timeframe/budget
 - Will require agreement from RAs
 - Contract terms (including number of datasets) are finalised



Review of Commercial Phase Plan

➤ Restructuring of the plan:

- More scripted batches included
- Iterative changes to assumptions used
- Same scenarios used with changes to underlying conditions
- Same overall level of trialling

➤ Feedback through the working group:

- Will be looking for input on assumptions/revisions
- Will be managed through meetings and emails
- Same level of participation expected throughout scripted phase



Next Steps



Next Steps

- SEMO to finalise initial phase report:
 - Update for batch three
 - Finalise all necessary reviews (SEMO, APX, RAs)
 - Working group feedback welcome

- SEMO propose to move forward based on revised plan:
 - Subject to RA approval
 - SEMO will continue to develop a trial script
 - Trial script based on submitted scenarios
 - SEMO will circulate details of trial script to WG members



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