

I-SEM Trialing of EUPHEMIA

I-SEM EUPHEMIA Working Group
Meeting
12th November 2015



EUPHEMIA Workshop – Agenda

- Update by SEMO
- Recap of OMIE Discussion
- Review of commercial phase batch one
- Discussion of recent working group feedback
- Discussion of commercial phase batch two
- Proposals for training arrangements
- Next Steps



Update by SEMO



SEMO Update - EUPHEMIA

- New version release to production:
 - ❑ Reflects latest version of EUPHEMIA used in SEMO trials
- European Stakeholder Committee set up on market design issues
- Set up by ACER, includes ENTSOE, EUROPEX, eurelectric, etc.
- Presentations at meeting in September by eurelectric on EUPHEMIA
- Questions around complexity, optimality, transparency, etc.
- Presentation by PCR on performance of algorithm
- <https://www.entsoe.eu/major-projects/network-code-implementation/stakeholder-committees/Pages/default.aspx>



SEMO Update - EUPHEMIA

- PCR presentation includes discussions of possible future changes to the algorithm
- Includes proposed development of “Thermal” order which would have some technical characteristics
- Presentation is a potential solution put forward by the vendor and is not an agreed plan
- No consensus among PCR members on the way forward
- Solutions put forward would require “radical” redesign of EU market and pricing regime
- Next steps to be discussed between vendor, ALWG and Steering Committee later this month
- APX to brief SEMO following meeting (*as permitted under NDAs*)



SEMO Update – Project Progress

- Commercial phase batch one complete:
 - ❑ 50 trial datasets processed (results discussed later)
 - ❑ Behind original schedule by 5 weeks

- Plan to end 2015 has been reviewed:
 - ❑ Turnaround times on batch two reduced
 - ❑ Amendments allowable will be restricted (as discussed)
 - ❑ Assumes full resource availability for EirGrid
 - ❑ Planned to be 2 weeks behind original schedule at end 2015



SEMO Update – Project Progress

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- WG meeting 7

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- Batch two inputs

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- Batch two execution

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- Batch two analysis

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- WG meeting 8



Call with OMIE



OMIE Call - Overview

➤ Call with OMIE on 29/10/15:

- Organised by partner in APX
- Follow on from OMIE input to initial phase report
- Questions largely based on WG feedback

➤ Additional expertise:

- Knowledge on how complex orders are used by participants
- Able to provide background on market and orders
- Able to provide practical insights from experience



OMIE Call – Use of MIC

Type of complex order

Number of complex orders having load gradients and not having minimum income condition	22	0.08%
Number of complex orders with load gradients and minimum income condition	3774	14.27%
Number of complex orders having minimum income condition and without any load gradient	22659	85.65%
Total Number of complex orders	26455	100.00%

- MIC order is most commonly used alone:
 - FT for start up costs; VT for fuel costs
 - MIC can not be more than twice total bid revenue

OMIE Call – Use of Scheduled Stop Conditions

Number of Scheduled Stop periods	Number of complex orders	% value over complex order declaring minimum income condition
0	22020	83.30%
1	2008	7.60%
2	397	1.50%
3	2008	7.60%
Total of complex order having MIC condition	26433	

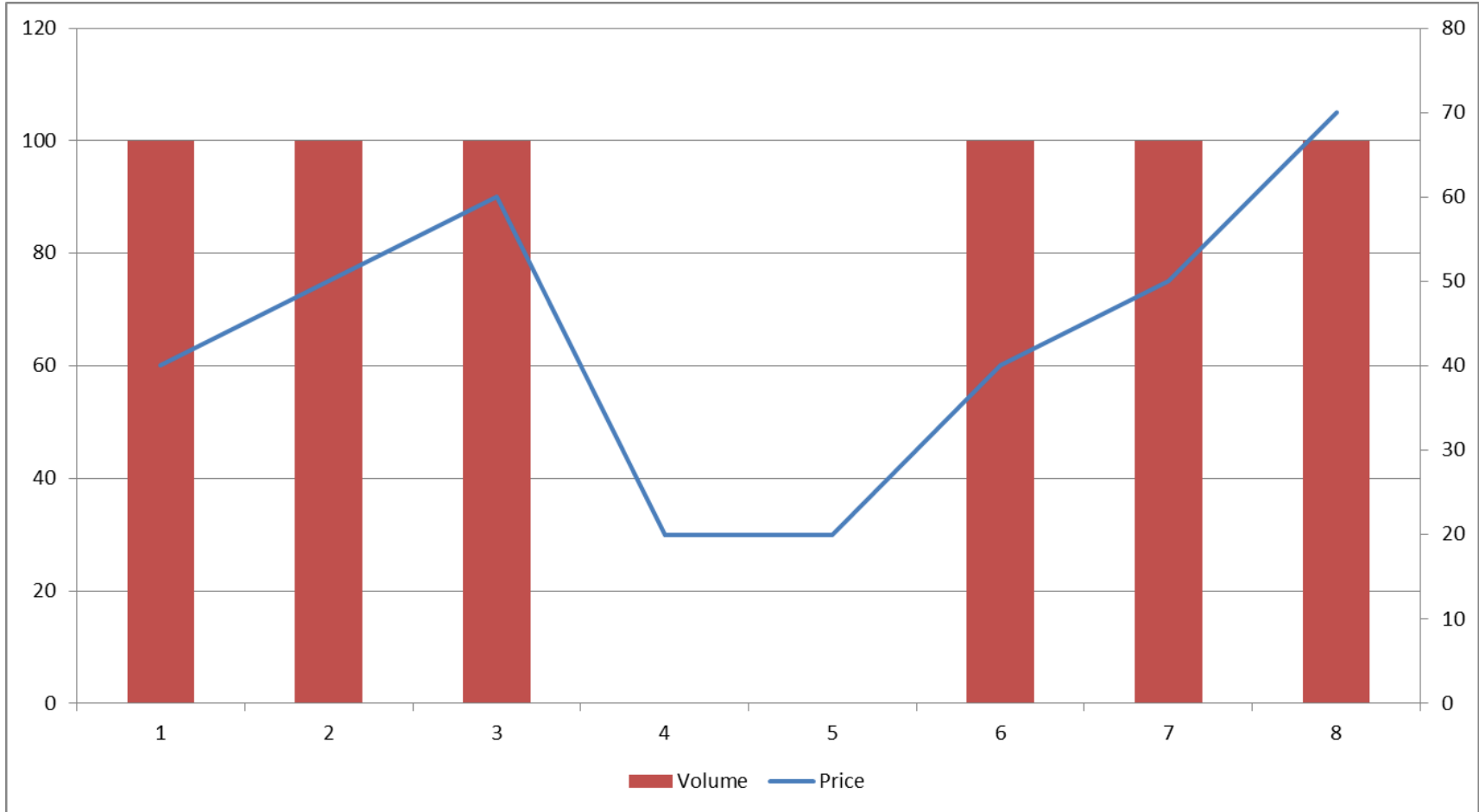
- Most common to use no scheduled stop conditions:
 - Used where needed to avoid unwanted shutdowns
 - Sometimes used in combination with load gradient

SEMO Update – Hydro and Storage

- Hydro generally participate in aggregate:
 - Single market unit representing multiple physical units
 - Single set of simple bids input for the unit
 - Operator determines how to meet market schedule

- Storage units participate as two separate units:
 - One unit to buy and one unit to sell
 - No link between buy and sell bids
 - Pumped hydro is the only storage in the market
 - Imbalances handled by operator in later market timeframes

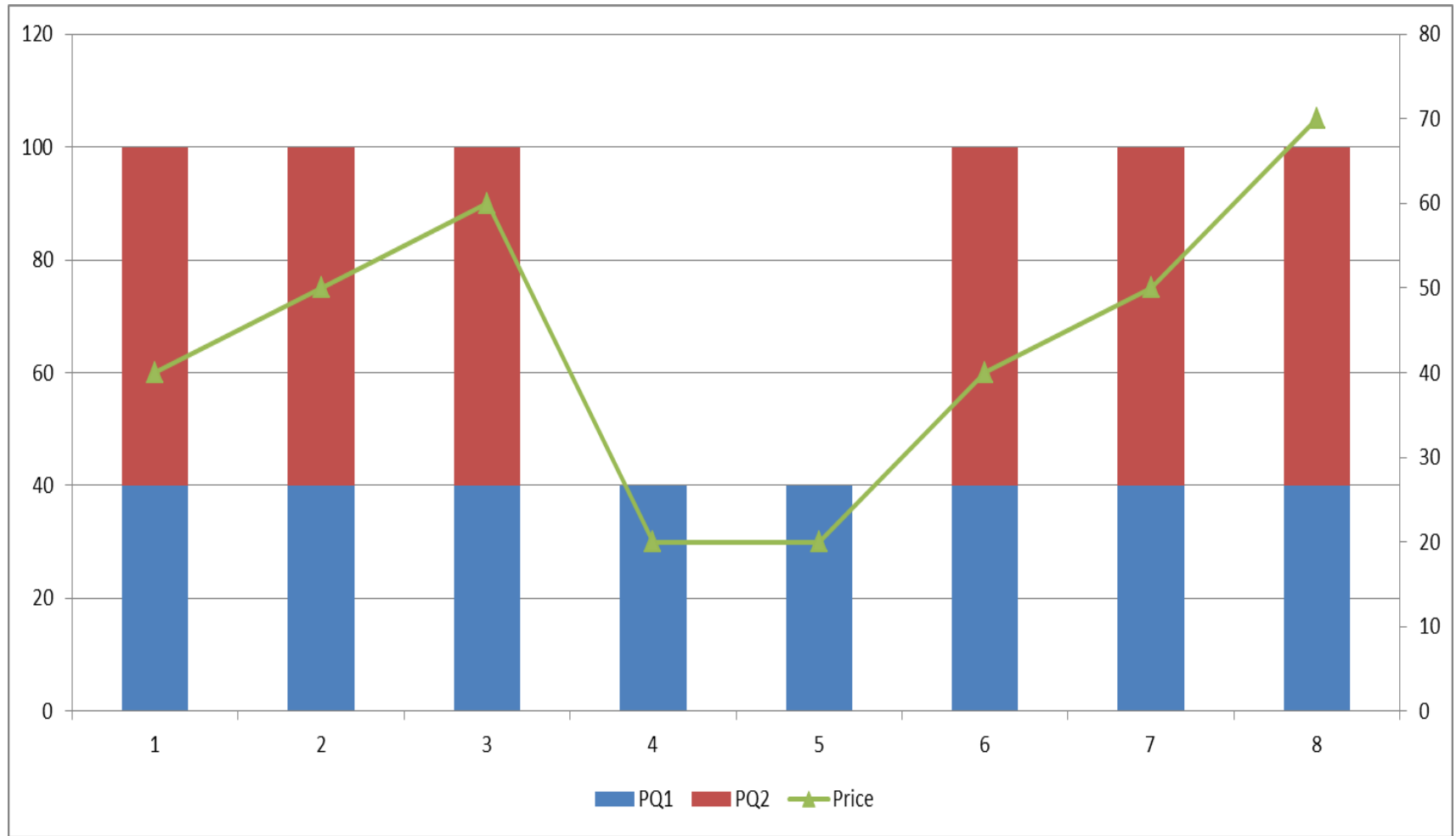
OMIE Call – Volume Risk



➤ Example PQ (€30,100MW)

➤ As price drops unit shuts off - Participant exposed

OMIE Call – Volume Risk



- PQ1 is now below lower than price in period 4 and 5
- Participant avoids additional start cost

SEMO Update – Volume & Financial Risk

- MIC elements are still used to manage costs:
 - ❑ FT and VT used in conjunction with PQ pairs
 - ❑ Overall, the MIC will need to be satisfied $[(VT \times \text{volume}) + FT]$
 - ❑ Affects the possible scheduling

- PQ1 will come in below VT:
 - ❑ Increase total MIC without covering the costs
 - ❑ Primarily to avoid unwanted starts or shutdowns

- Consideration required for how to compensate for lower PQ1



Commercial Phase Batch One



Batch One – Recap

➤ 50 trial datasets:

- Linked blocks with complex orders
- Exclusive groups with complex orders
- Linked blocks in isolation

➤ Price making demand and wind:

- Wind priced at €0
- Demand priced at previous day average SMP x 1.2
- Single price used for all periods for wind and load



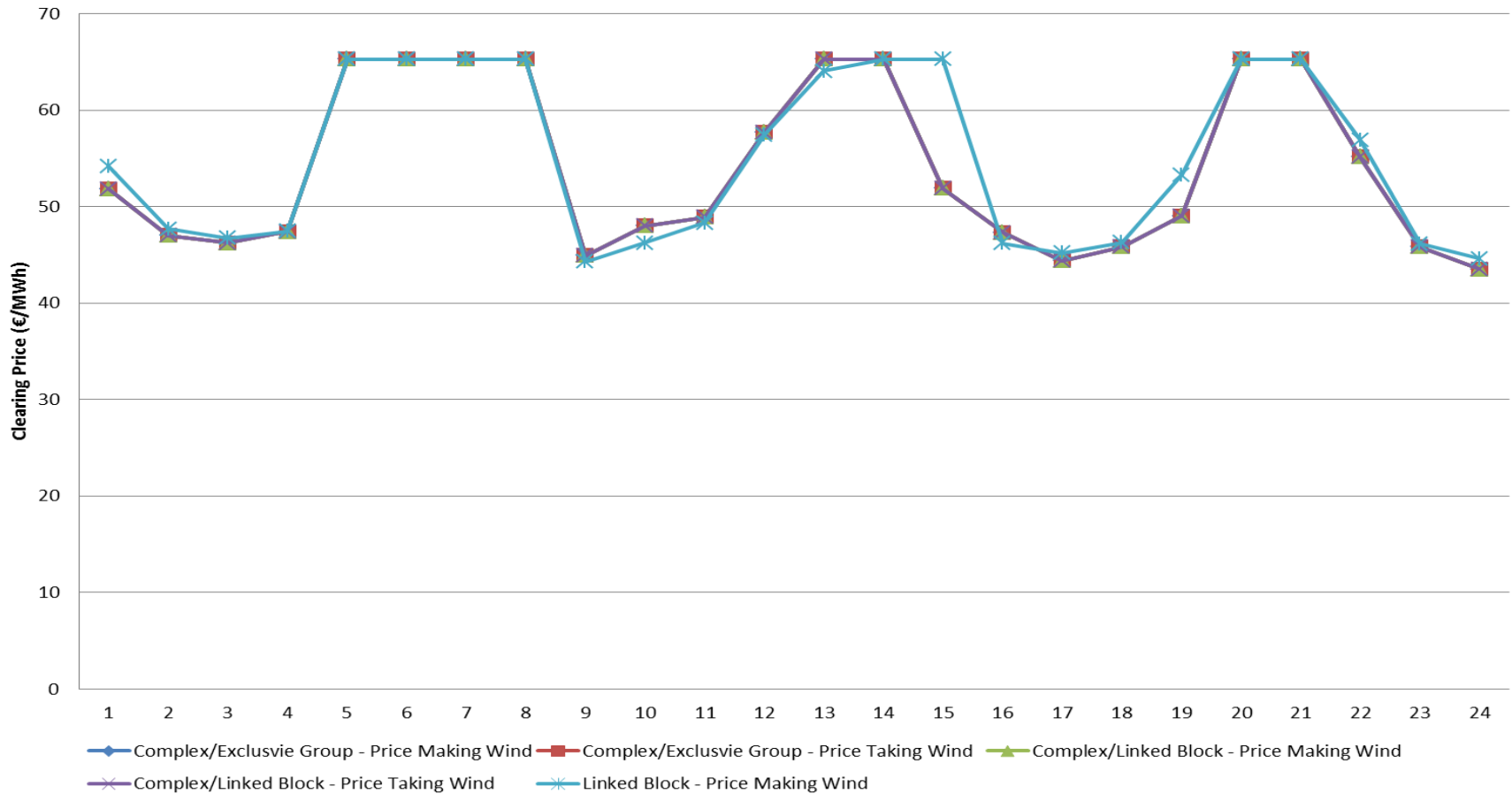
Known Issues with Batch One

- GU_400500 - Incorrect ramp rate used
 - ❑ Error in input data
 - ❑ Ramp Rate per minute rather than per hour

- Units scheduled above maximum availability
 - ❑ Affecting GU_400850, GU_400120 & GU_400121
 - ❑ Only linked block data affected
 - ❑ Additional block order inserted due to COD

Price Formation

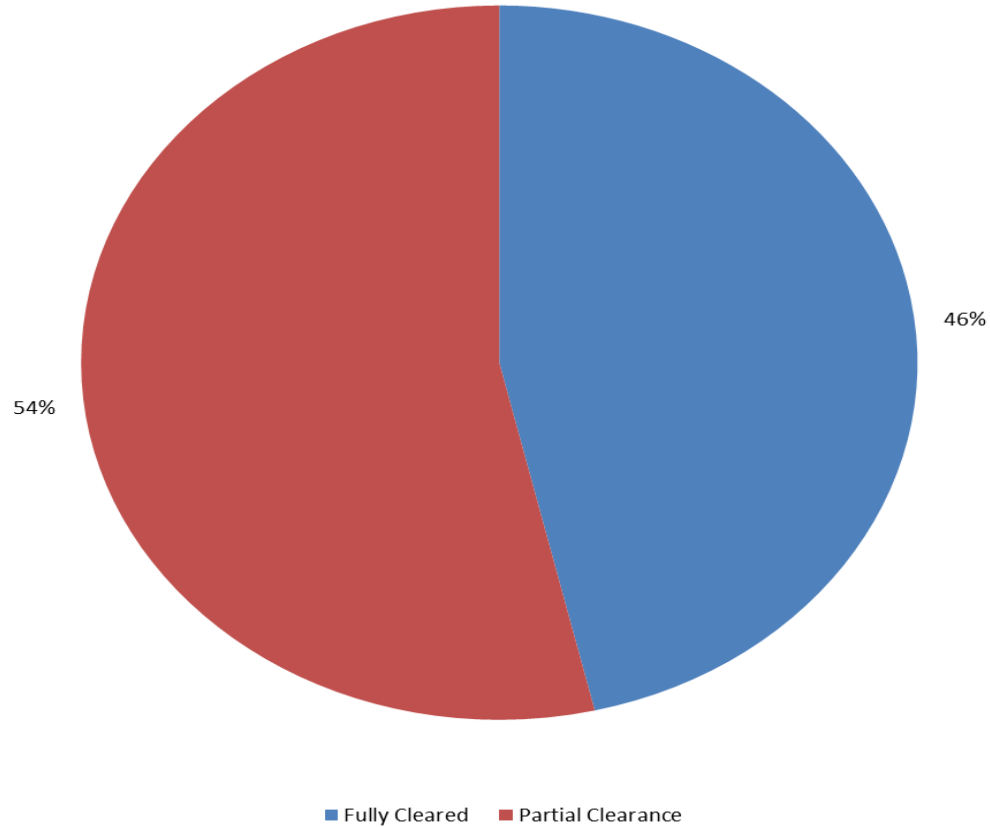
Hourly Clearing Prices - 05/10/2014



- Similar prices across scenarios used
- Largely but not fully due to demand setting the price

Price Formation

Matched Demand vs Unmatched Demand - All Trial Sessions



➤ Demand setting price in 54% of cases

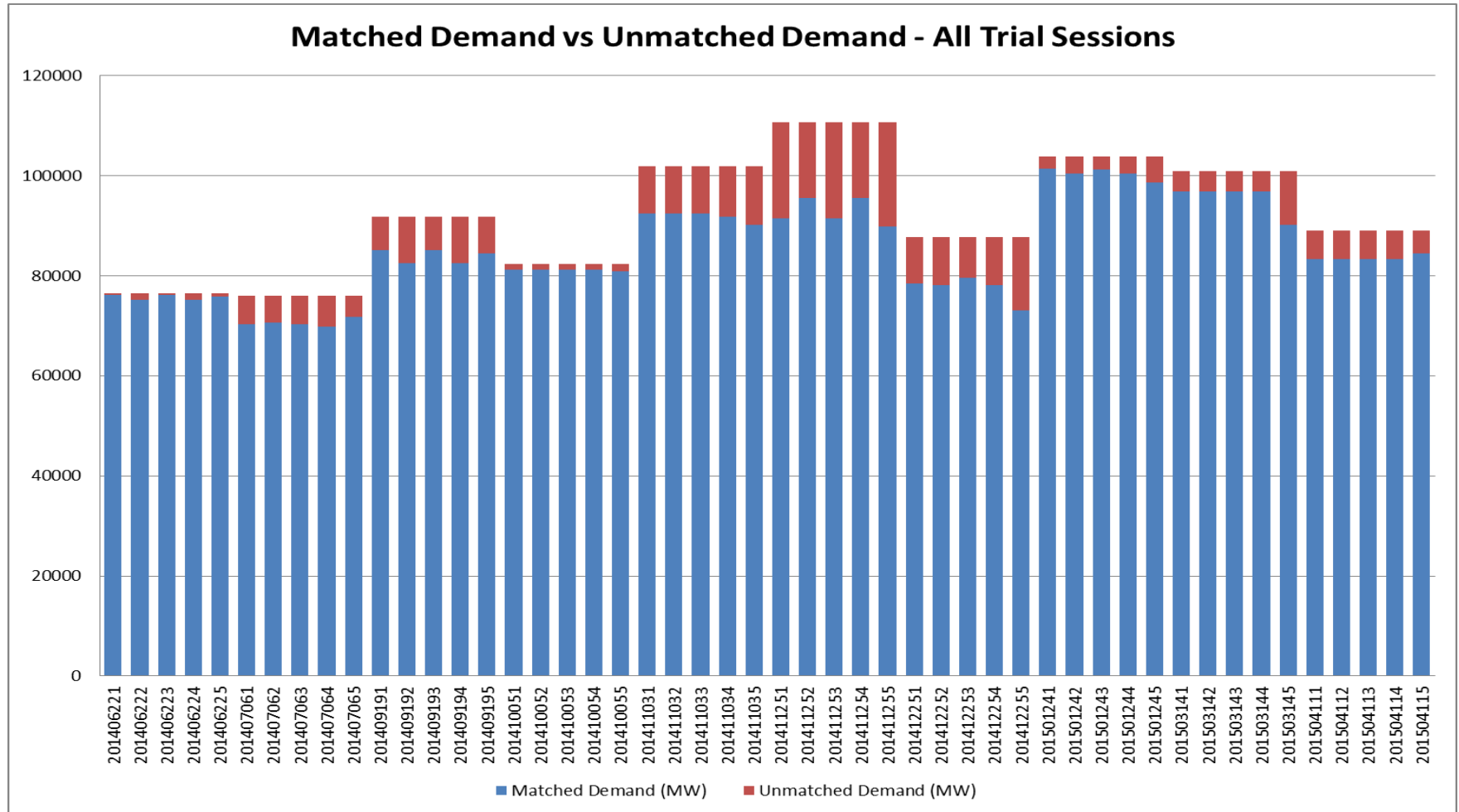
➤ Function of low demand price input to EUPHEMIA

Price Formation

Lowest Price		Highest Price	
€21.35	22/06/2014	€86.53	14/03/2015 - Demand

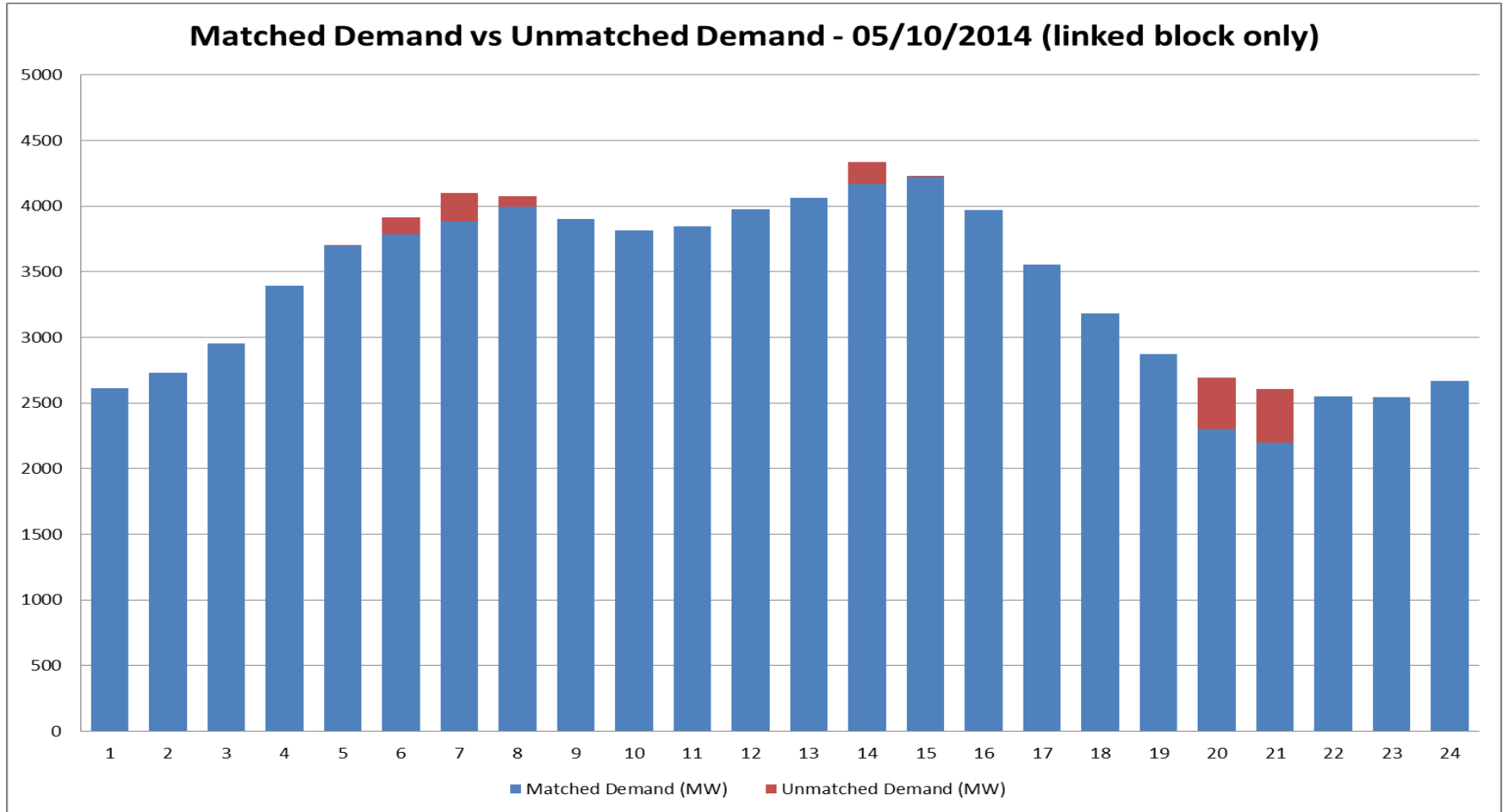
- Demand Price based on average price *1.2:
 - Sets price in multiple hours
 - Peaker units priced out of market
 - Market does not always fully clear
- No negative or zero prices:
 - Price too high for wind to set price

Effect of Price Making Demand



- Variable across trading days
- Small percentage of total demand

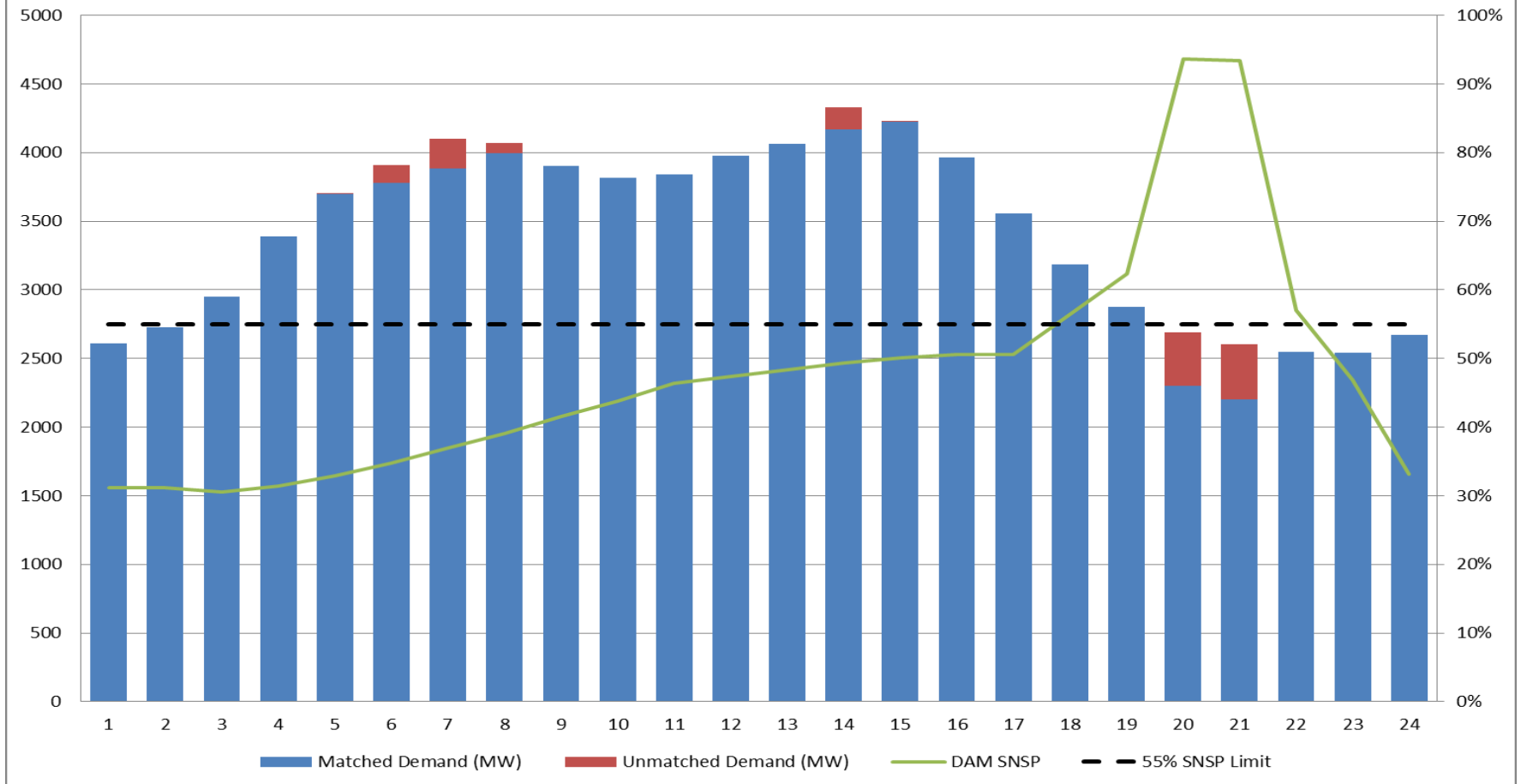
Effect of Price Making Demand



- Variable across trading periods
- Typically occurs more often at peak times

SNSP

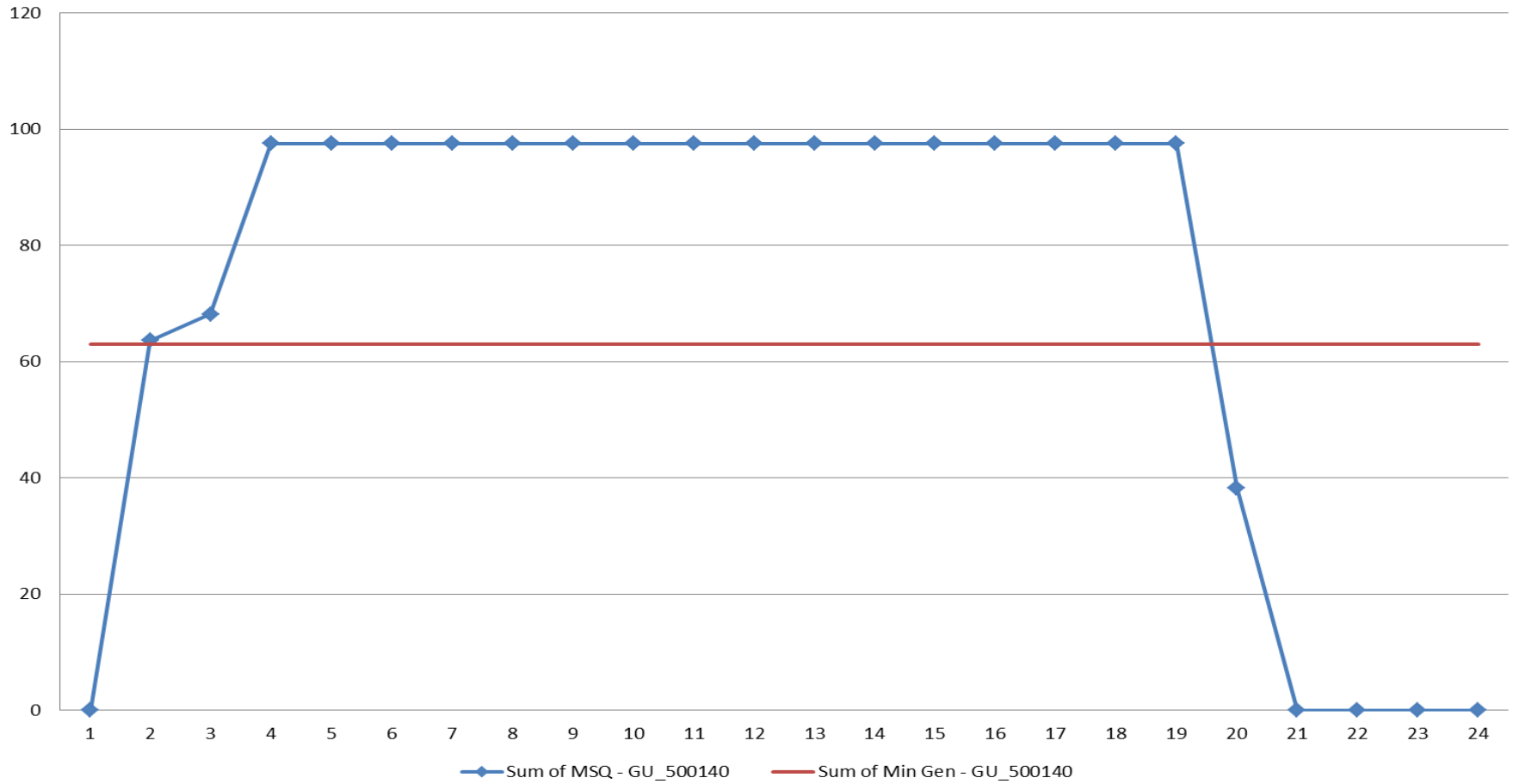
SNSP at 55% Limit - 05/10/2014 All Linked Block



- Volume of demand cleared affects SNSP
- Only affects DAM results – Load will still need to clear

Minimum Stable Generation

Under Minimum Stable Generation

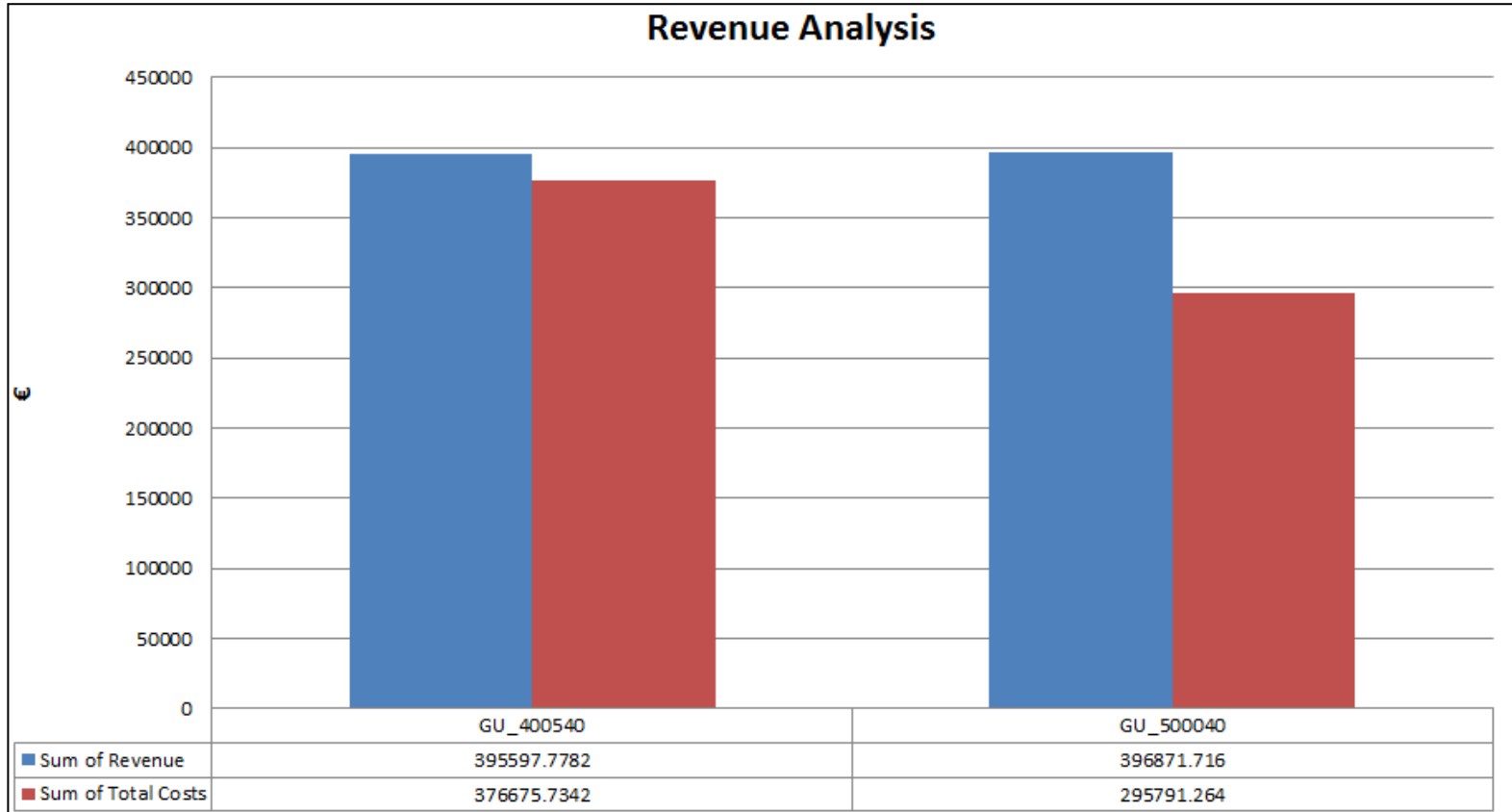


- All cases due to ramping on or off
- Actions will be required in this case already

Multi Starting Units

- Batch one saw no instances of multi starting units:
 - ❑ Use of a mixture of blocks with the complex orders
 - ❑ Elastic demand and partial clearance may have limited the risk of a unit multi starting
 - ❑ Demand price of EP2 SMP*1.2 excluded peaker unit generation

Generator Revenue



- Sample taken and no under recovery of costs observed
- Further study to guarantee that no instance of under recovery has occurred is required



Batch One Summary

Session ID	Thermal Non-Peaker Order Type	Peaker Orders	Wind - Simple	Demand - Simple	IC's - ATC	Scenario Specifics	Trial Purpose
201406221	Complex/Linked Blocks 1	Simple	Price Making	Price Making	Fully Available	Summer/Low Demand/Low Wind	Scenario specifics using mixture of complex and linked block. Aim to assess the use of block orders to bound price in conjunction with price making wind and demand. Limits on blocks are expected to improve algorithm performance.
201406222	Complex/Exclusive Groups 1	Simple	Price Making	Price Making	Fully Available	Summer/Low Demand/Low Wind	Scenario specifics using mixture of complex and exclusive group blocks. Aim to assess the use of block orders to bound price in conjunction with price making wind and demand. Limits on blocks are expected to improve algorithm performance.
201406223	Complex/Linked Blocks 2	Simple	Price Taking	Price Making	Fully Available	Summer/Low Demand/Low Wind	Scenario specifics using mixture of complex and linked block. Aim to assess the use of block orders to bound price in conjunction with price making wind and price taking demand. Limits on blocks are expected to improve algorithm performance.

- Trial batch log to record aims and outcomes for all sessions



Batch One Summary

- Effect of price making demand observed:
 - Price set by demand units in multiple hours
 - Price volatility reduced
 - Peaker units not scheduled due to price

- Effect of price making wind not observed:
 - Price remained too high for wind to act as constraint

- Refinements to pricing of wind and load required:
 - Revisions to price making volumes/proportions
 - Revisions to price of wind/load

Working Group Feedback



WG Feedback – Demand Participation

- Demand still studied in aggregate:
 - No need to separate by supplier
 - Cleared prices and volumes provide sufficient detail

- Concern around 50% volume:
 - 90 – 98% as price takers
 - Remainder participate on a tiered scale

- Concerns around price:
 - Profiled rather than single daily price
 - Price too close to SMP – potentially based on DSU pricing



WG Feedback – Wind Participation

- Discussion of tiered structure for prices:
 - 75% price taking
 - Incremental increases in range -€100 to c. €35
 - Idea is that wind will be priced out of DAM at night
- Discussion of variable structure for prices:
 - Prices varying by availability (higher price at low wind)
- Discussion of different capacity factors by location:
 - Higher on west coast



WG Feedback – Order Types

- Interest in complex and linked block:
 - Useful for different situations (unit type, initial status etc.)
 - Suggested scenarios do not include exclusive groups

- Linked blocks using different MAR levels:
 - Scenarios for MAR in range of 75% - 99%

- Interest in new uses of complex orders:
 - No-Load included in VT
 - Negative PQ at minimum stable generation



Commercial Phase Batch Two



Batch Two Details

- Plan based on WG feedback:
 - Received on 06/11/2015, following industry call
 - Shared with WG following receipt

- Compiled by SEMO:
 - Fitting submitted scenarios into 100 trial batch
 - Half looking at complex order scenarios
 - Half looking at linked block scenarios
 - All will be submitted as one batch of 100



Batch Two Details

Complex order with VC (no-load/min gen)	10	Batch 2a
Complex order with VC (no-load/max avail)	10	
All plants complex (negative bid at min gen)	10	
Baseload complex (negative bid at min gen) & mid merit linked block	10	
Mid merit complex (negative bid at min gen) & baseload linked block	10	

All linked block MAR @ 95%	10	Batch 2b
All linked block MAR @ 75%	10	
All linked block MAR @75%/95%	10	
All linked block MAR 99%	10	
All linked block MAR 75%/99%	10	



Batch Two Details – Complex Pricing

- If PQ1 is a negative value:
 - Hours at this level are loss making
 - Other hours will need to compensate for losses
 - Subsequent PQs may not reflect incremental costs

- Three potential approaches:
 - Alter VT in the MIC
 - Alter the subsequent PQ pairs
 - Do nothing

- Approach can be reviewed in later trial batches



Batch Two Details – Linked Block Pricing

- If MAR < 100%:
 - No guaranteed cost recovery
 - Actual revenue may not recover fixed costs
 - Price may not reflect marginal cost (if PQ > average price)

- Two potential approaches:
 - Apply multiplier to block price (risk factor)
 - Do nothing – may be sensible due to high MAR values

- Approach can be reviewed in later trial batches:
 - May be best to address when risks are better understood



WG Feedback – Other Items

- Other items will be in line with feedback:
 - Wind participation (volumes and prices)
 - Demand participation (volumes and prices)
 - Refinements will be applied compared to batch one

- Final details to be shared in trial script:
 - To be shared 13/11/2015
 - Outline all trials and expected outcomes
 - Will be used to track actual vs expected results



Unscripted Phase Training



Unscripted Phase Training - Overview

- Training to cover participation in unscripted phase:
 - ❑ Training in the tools provided by SEMO
 - ❑ Will be based on tools used by SEMO for scripted phase
 - ❑ Aimed at personnel who will be creating unscripted phase orders

- Plan to finalise arrangements:
 - ❑ SEMO put forward a proposal today (WG meeting 7)
 - ❑ SEMO and WG discuss – WG feedback in 5 working days
 - ❑ SEMO detail final arrangements in WG meeting 8 and public workshop 4



Unscripted Phase Training - Assumptions

- Training will be required for a mix of new and existing staff:
 - Organisations will have different staffing
 - Some may not be actively involved in WG meetings
- New staff will be given internal updates on initial phase:
 - Results, reports and other documents have been shared
 - Staff require a recap only – will be familiar with the trial
- SEMO will provide materials in advance of training:
 - Templates and related training manuals created by SEMO



Unscripted Phase Training – Session Content

Morning

Afternoon

- Recap of trial thus far
- Recap of order types
- Recap of emerging results
- Chance for Q&A with SEMO
- Primarily for new staff
- Will have limited scope

- Practical training session
- Tutorial of SEMO tools
- Tools shared in advance
- Will cover all order types
- Will cover all steps required
- New and existing staff

➤ Two full day sessions:

- Dublin and Belfast
- Open to WG and non WG members



Unscripted Phase Training – Tools

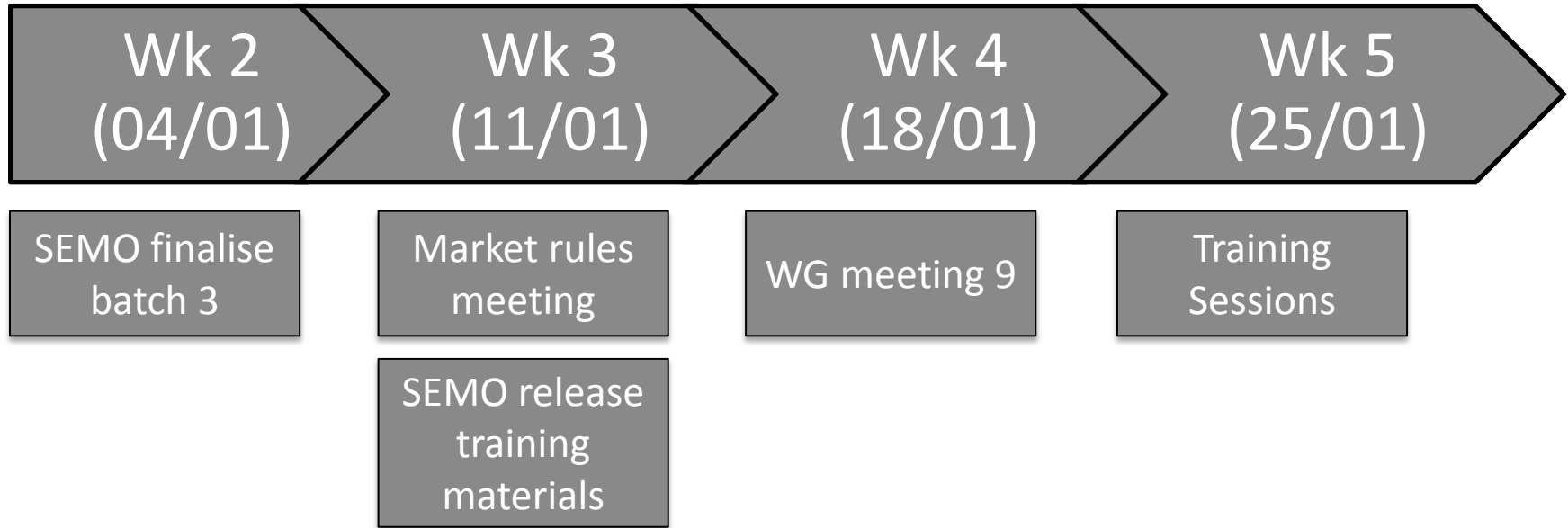
- Unscripted phase inputs will conform to SEMO template:
 - Based on scripted phase input template
 - MS Excel format – no bespoke tools required

- Tool will have capabilities built in:
 - Generator schedule profiling
 - Calculation of costs based on market data
 - Calculation of block prices and complex terms

- Training will cover SEMO template and standard process:
 - Participants will need to implement own strategies



Unscripted Phase Training - Schedule



➤ Goal is to balance work:

- Avoid unnecessary overlaps
- Provide sufficient time to review materials
- Unscripted phase starting wk 8 (15/02)

Next Steps



Working Group Meeting 6 – Next Steps

- SEMO will share final plan for batch two 13/11/15:
 - Based on working group member feedback
 - Covers 100 trial batches

- SEMO will progress with commercial phase batch two:
 - Update data and compile inputs
 - Send data to APX for execution and post process

- WG to provide feedback on training arrangements:
 - Questions to be shared by SEMO
 - Feedback by 20/11/2015



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