

I-SEM Rules Liaison Group

EUPHEMIA Trials – Conceptual phase
update

21st January 2015



Background

- SEMO as associate member of PCR in discussions with Algorithm Working Group (ALWG)
- Have agreed on first stage – conceptual phase
- Running three historical days from the SEM through the algorithm, using three approaches
 - Linked blocks
 - Exclusive groups
 - Simple orders with complex conditions (“complex orders” used in MIBEL)



Initial Results

- Our original objectives –
 - *Can EUPHEMIA handle the complexity we were proposing?*
 - *Will the algorithm fall over with the number of blocks / complex orders we were going to use?*
- In all cases run so far, the algorithm solved
- All demand was matched against generation
- Significant performance issues with how we used exclusive groups
- We are yet to run a full coupled case



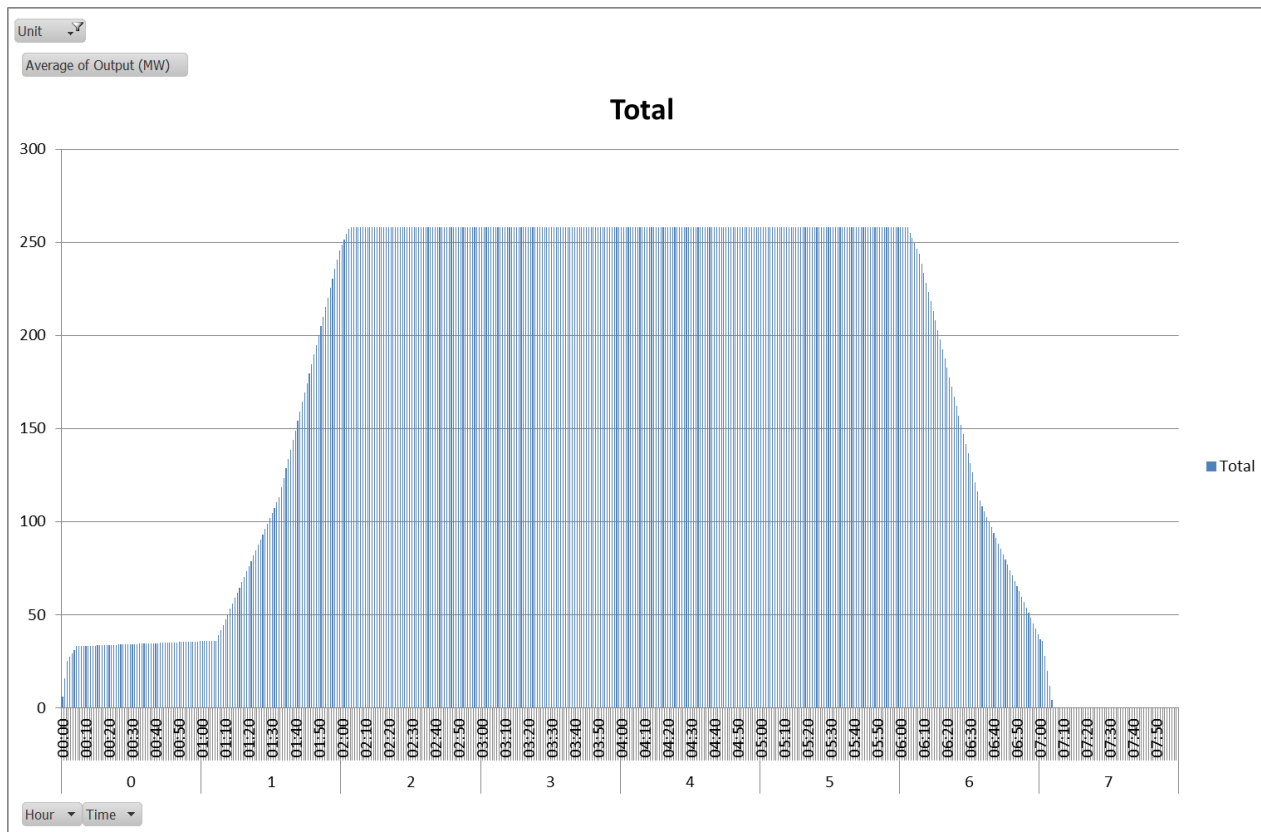
Assumptions Made

- Demand was modelled based on demand forecast from EA1 for each of the days
- Price taker for all demand; therefore, no flexibility in the demand curve
- All wind set as price taker using simple bids (wind forecast from EA1)
- Price taker bid = volume with price range from floor (-€500) to cap (+€3000)
- Interconnector capacities set to zero for cases run so far
- Pumped storage modelled using linked blocks or simple bids (buy at low price, sell at high price)
- EA1 was run with interconnectors off to come up with a base case for comparison



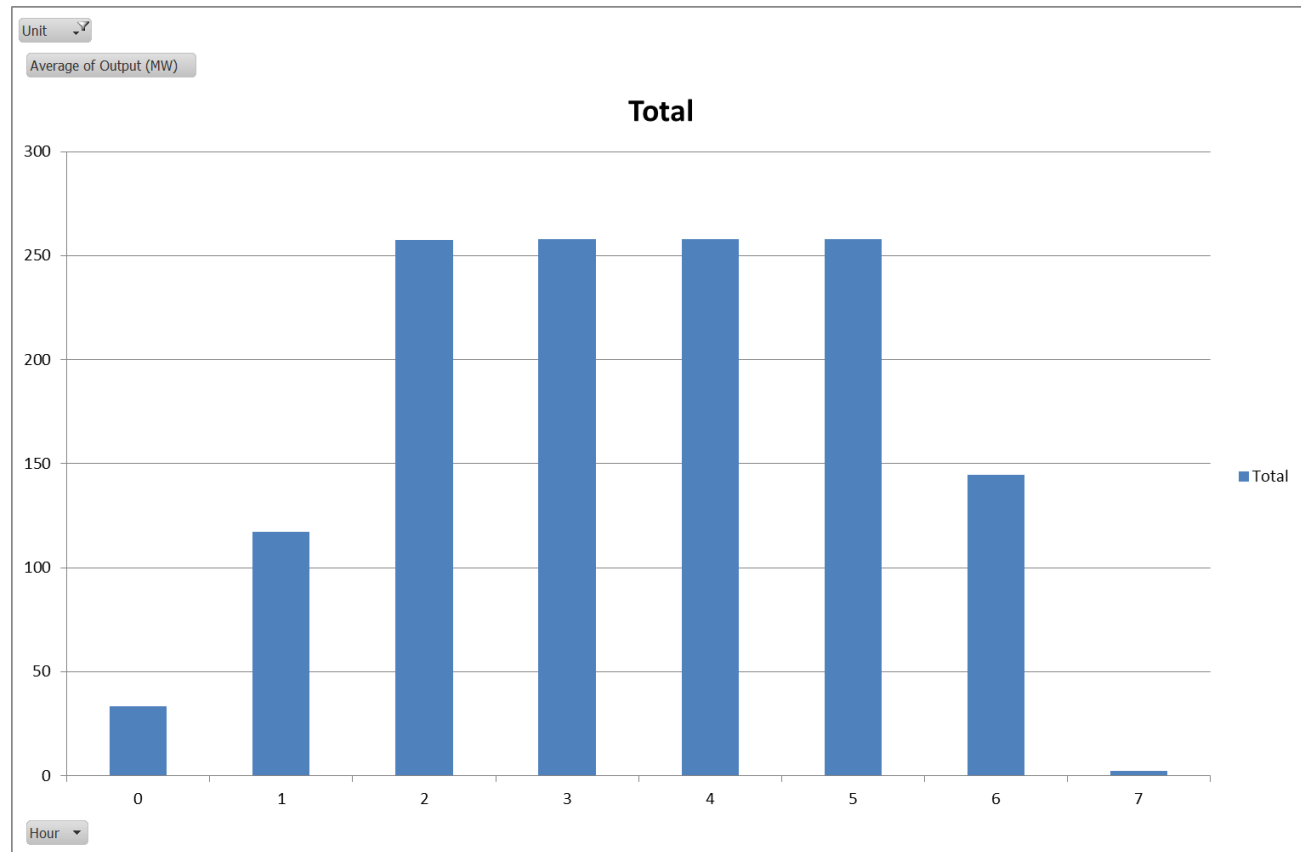
Profiled Linked Blocks

- Used technical characteristics to create a minute by minute generator profile



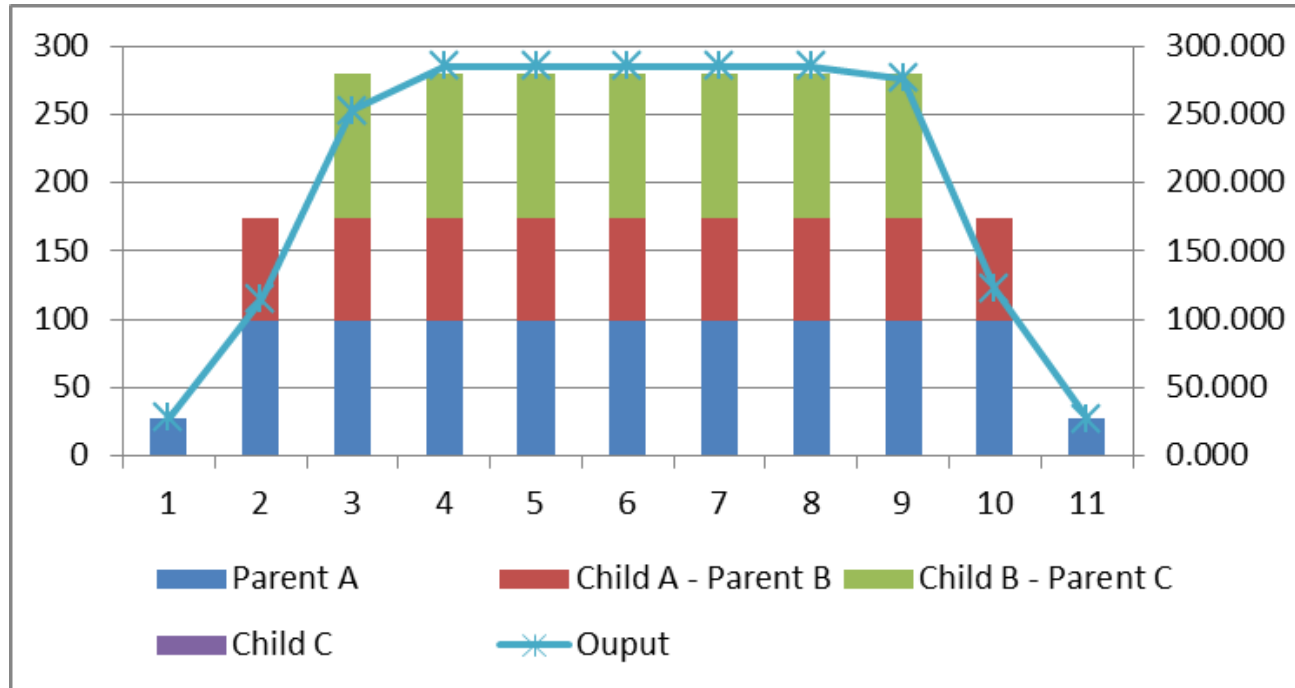
Profiled Linked Blocks

➤ ...and from this, create an hourly average output



Profiled Linked Blocks

- ...and using price/quantity pairs, create parent child blocks



- Can use linked block orders either side of the parent block to extend the running time of a generator



Applying “uplift” costs into the parent block allows cheaper child blocks to be in merit

Profiled Linked Blocks

- As linked blocks are set up as “fill or kill”, their behaviour is more akin to Price Taker generation than we originally understood
- Each of the blocks was set with an acceptance ratio of 1 or 0 to ensure the dependent block was filled before the next one activated
- A linked block set up this way cannot set the clearing price
- It will be scheduled when the price ensures cost recovery
- By setting up to 20 mid-merit generators as linked blocks, this removed a large number of “price setting” generators from the problem
- While the algorithm gave feasible schedules at all times, the resulting prices were more volatile and higher than expected

Simple bids with complex conditions

- Alternative can be to use minimum income condition (*MIC*)
- Simple price quantity pairs but with “uplift” costs noted separately
- Ensures unit does not run when at a loss
- We also used the load gradient to model ramp rates for some units



Simple bids with complex conditions

- Using the algorithm in this manner is more like the MSP in the SEM
- The algorithm selects the best schedule based on the economic cost
- Setting up orders in this manner permits more “price setting” generation
- As with the other types, all demand was met and the market cleared
- Prices in these runs were more similar to the SEM prices
- We observed clearing prices that corresponded to the SMP where large uplift had been applied
- We also observed a form on inter-temporal pricing during the morning ramp



Exclusive groups

- Exclusive groups allow generator to submit multiple running options
- This can have the generator start at any time but needs to include an order for this
- Acceptance ratio values used to ensure only one feasible set is selected
- However, use of acceptance ratios as “fill or kill” resulted in similar issues as those observed with the linked blocks
- All demand scheduled, generator profiles were feasible
- Prices were volatile and higher than expected based on SEM runs



Next Steps

- Adjust the acceptance ratio on the exclusive groups to see if more “price setting” generation gives prices more in line with expectations
- Exclude pumped storage as simple bids and only use linked blocks
- Turn on the interconnectors
- Creation of more price sensitive demand curve to be considered?
- Working with algorithm working group to see how to use available orders to deliver a solution closer to the SEM results



Questions?

