

I-SEM Rules Liaison Group

EUPHEMIA Testing
15th October 2014



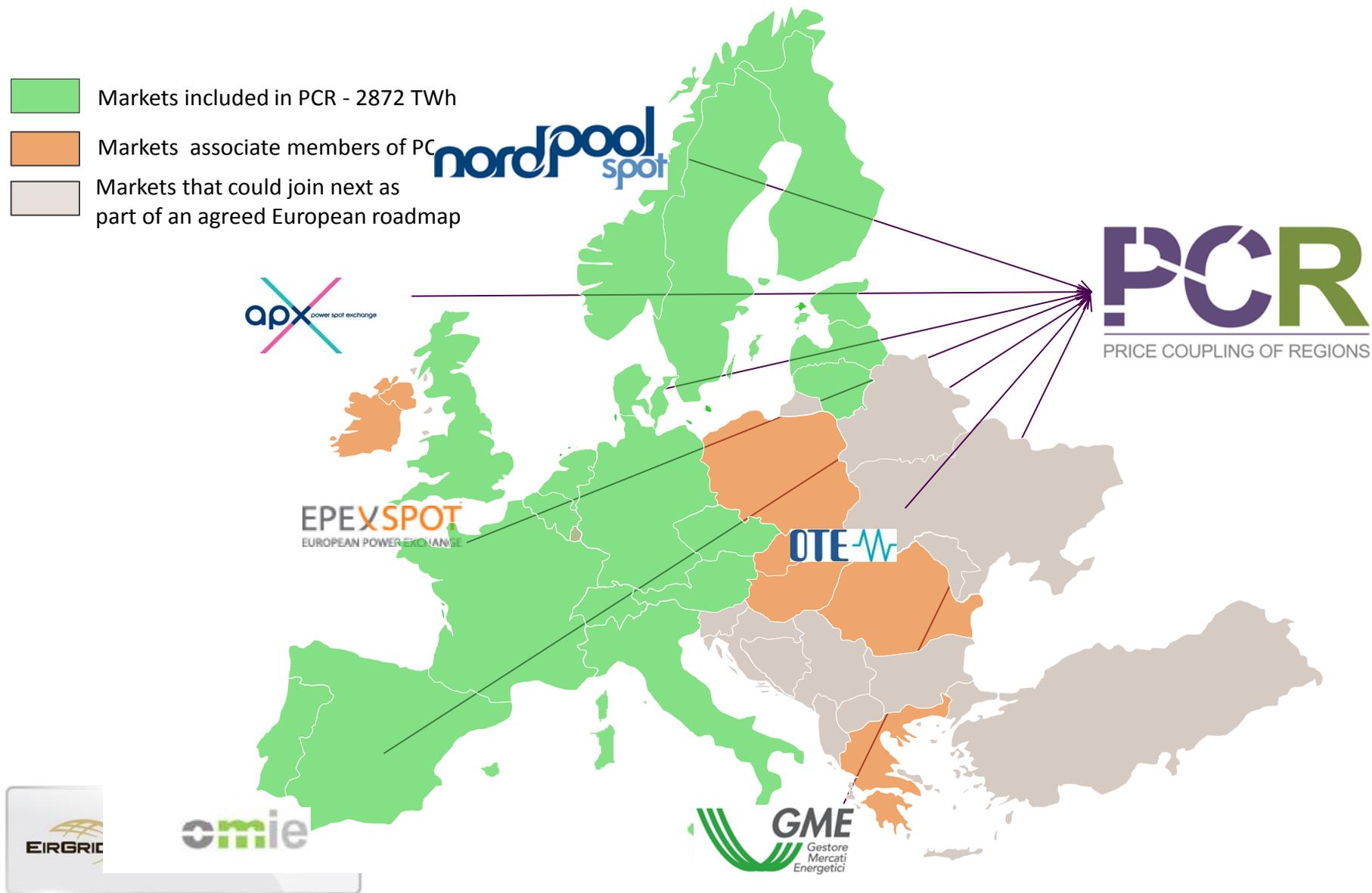
EUPHEMIA - Background

- EUPHEMIA is the algorithm used for day-ahead market coupling across Europe;
- **Pan *European Hybrid Electricity Market Integration Algorithm***;
- Initiative of seven Power Exchanges: APX, Belpex, EPEX SPOT, GME, Nord Pool Spot, OMIE and OTE, who have developed a price based market coupling algorithm for cross border trades between their market areas;
- Covers the day-ahead electricity markets in Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and UK;
- Initiative started in 2009, and the PCR parties signed the PCR Cooperation Agreement and PCR Co-ownership Agreement in June 2012



EUPHEMIA - Background

-  Markets included in PCR - 2872 TWh
-  Markets associate members of PCR
-  Markets that could join next as part of an agreed European roadmap



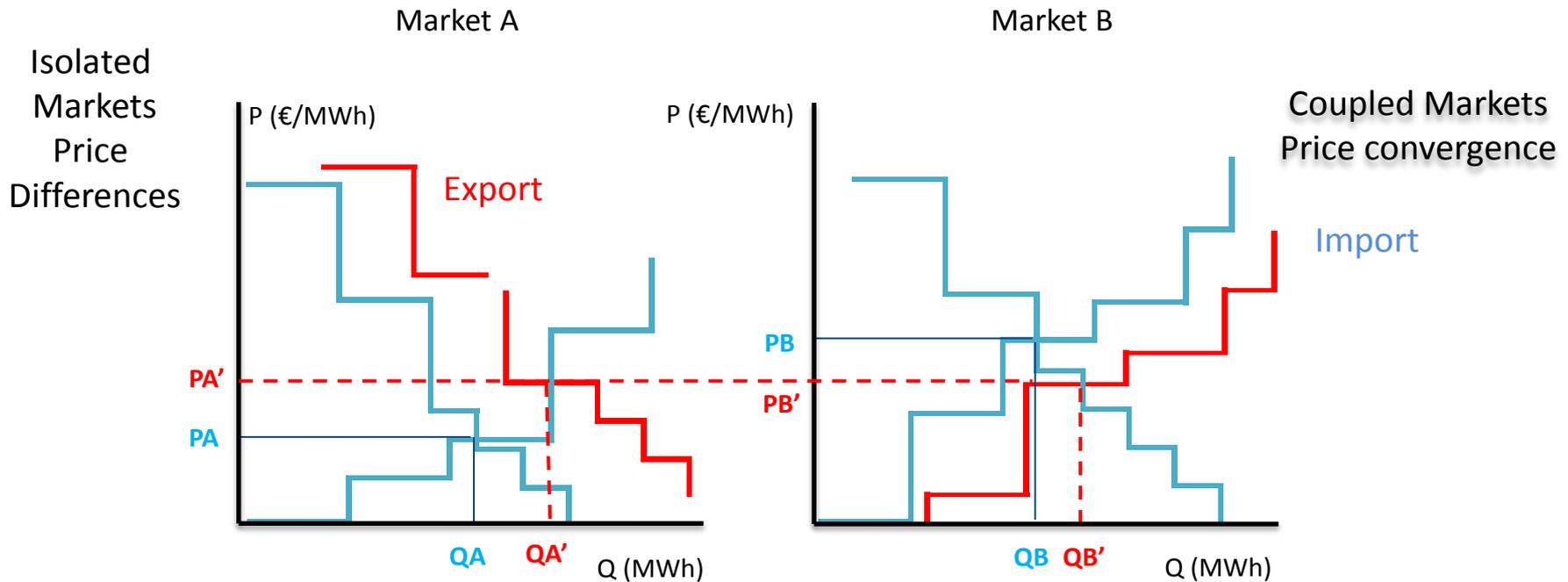
EUPHEMIA - Background

- PCR is based on three main principles:
 - a single algorithm,
 - robust operation and
 - individual Power Exchange accountability.
- The common algorithm will give a fair and transparent determination of day-ahead electricity prices and allocate cross borders capacity.
- The PCR process is based on a sharing of data, providing a robust and resilient operation.
- The PCR Broker and Matcher service enable exchange of anonymised orders and area-to-area transmission capacities among the Power Exchanges
- Euphemia will be used to calculate electricity prices across Europe;
- It will also optimise the overall welfare and increase transparency of prices and flows



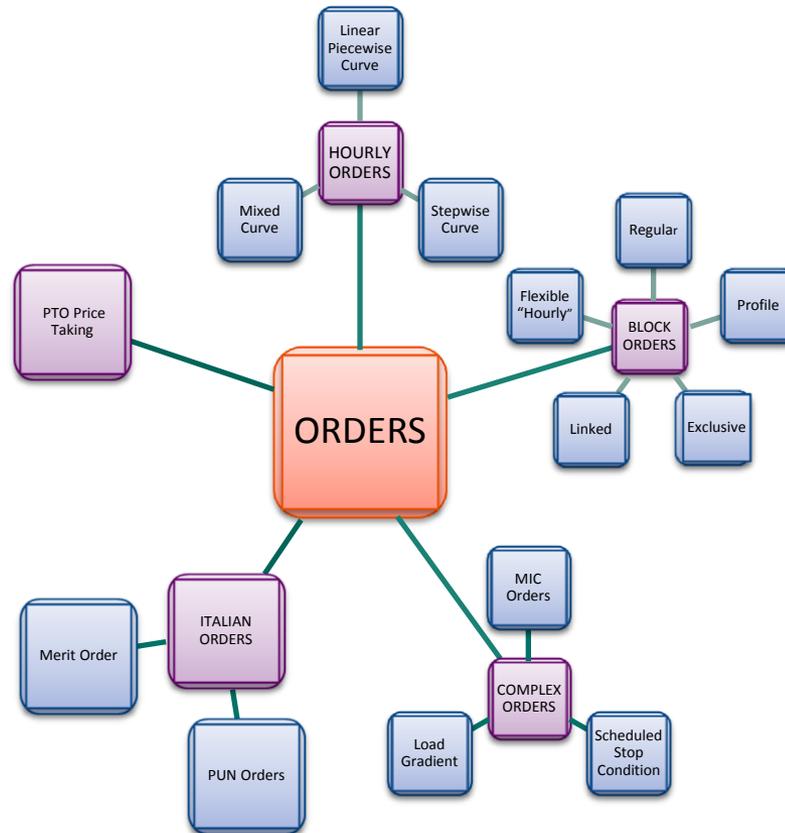
EUPHEMIA - Background

- For the power market: **Most competitive price will arise & Overall welfare increases**



- For TSOs: Efficient capacity allocation

EUPHEMIA - Orders



EUPHEMIA – Public information

- For further information on EUPHEMIA -
 - PCR EUPHEMIA Clarification - http://www.eirgrid.com/media/PCR_EUPHEMIA_CLARIFICATION.pdf
 - Presentation on order types in EUPHEMIA - <http://www.allislandproject.org/GetAttachment.aspx?id=0ac939fe-af6a-49d4-83d0-efaf77335bf3>
 - EUPHEMIA Public Description - <http://www.apxgroup.com/wp-content/uploads/Euphemia-public-description-Nov-20131.pdf>



EUPHEMIA – Testing

- SEMO signed up as associate members of PCR
- Have had discussions with algorithm working group (ALWG) members
- Progressed our understanding of the different order types and how these could be used
- Requested of the PCR Steering Committee that testing be facilitated
- Testing for I-SEM was approved at the PCR Steering Committee in June
- Other priority projects taking major focus (*Italian Borders coupling*)
- Despite this, we have progressed with members of the ALWG



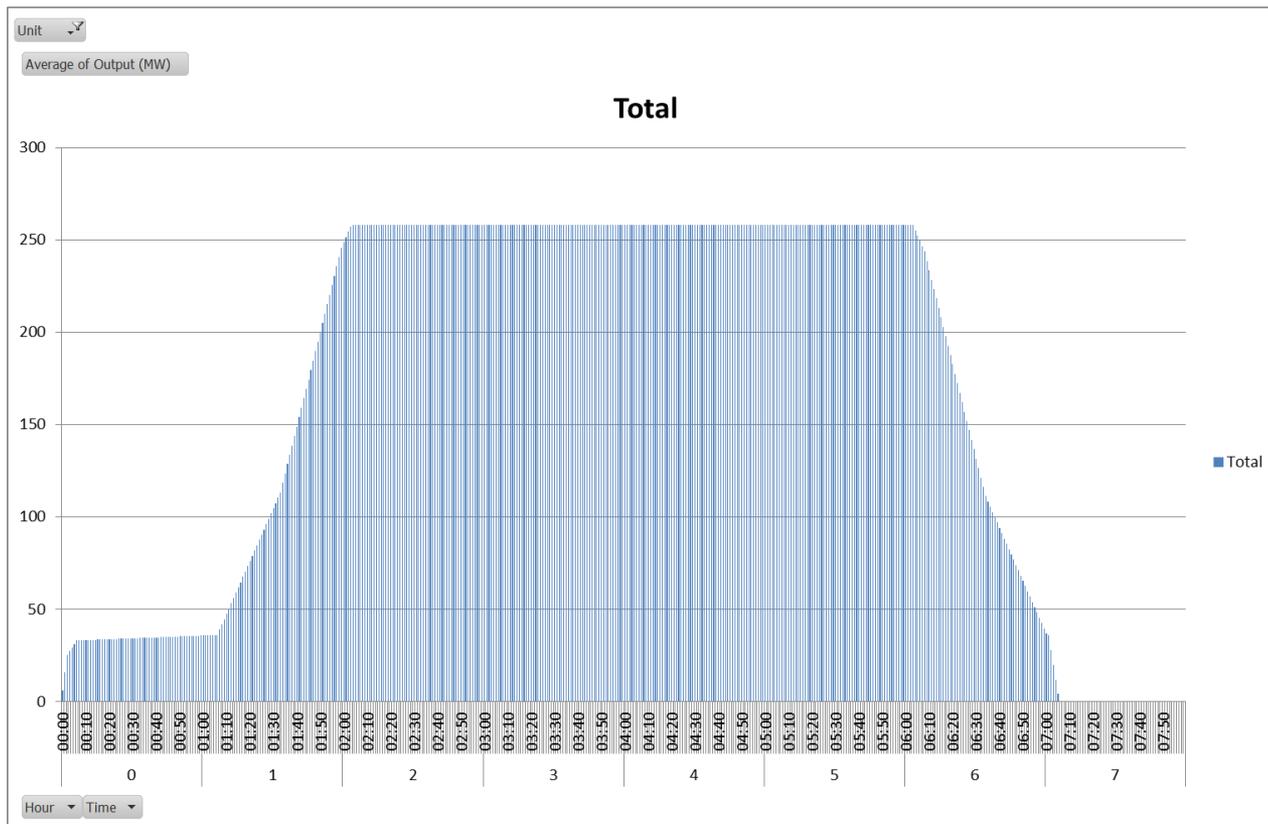
EUPHEMIA – Testing

- First phase of testing to be completed by SEMO
- This is the “conceptual test” phase
- Objective of this phase: to represent a SEM generator’s commercial submission in EUPHEMIA format
- To test three days of the SEM using actual input data from the EA1 schedule
- To assess the different order types that can be employed
- Each day has been set up using either linked block orders, exclusive group orders or minimum income condition orders



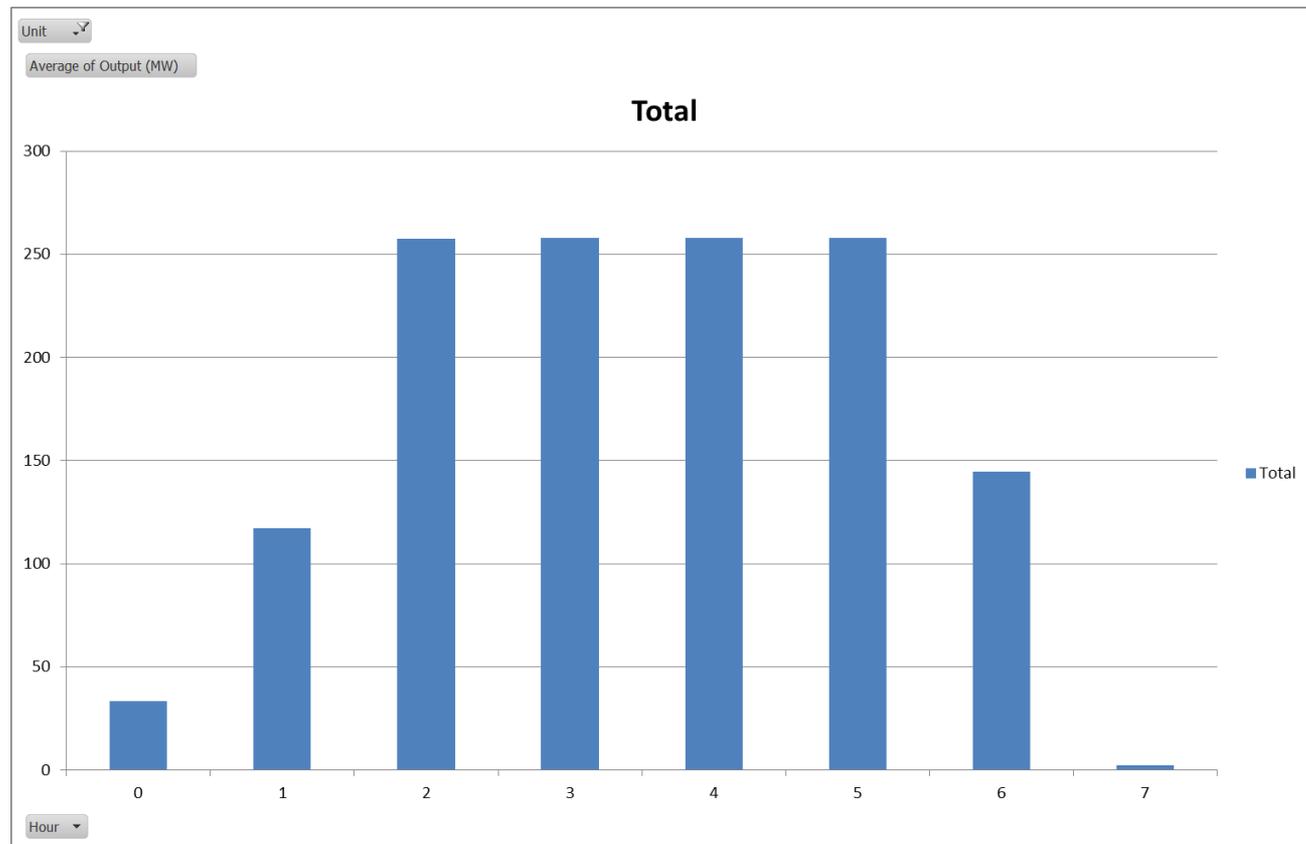
EUPHEMIA - Testing

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



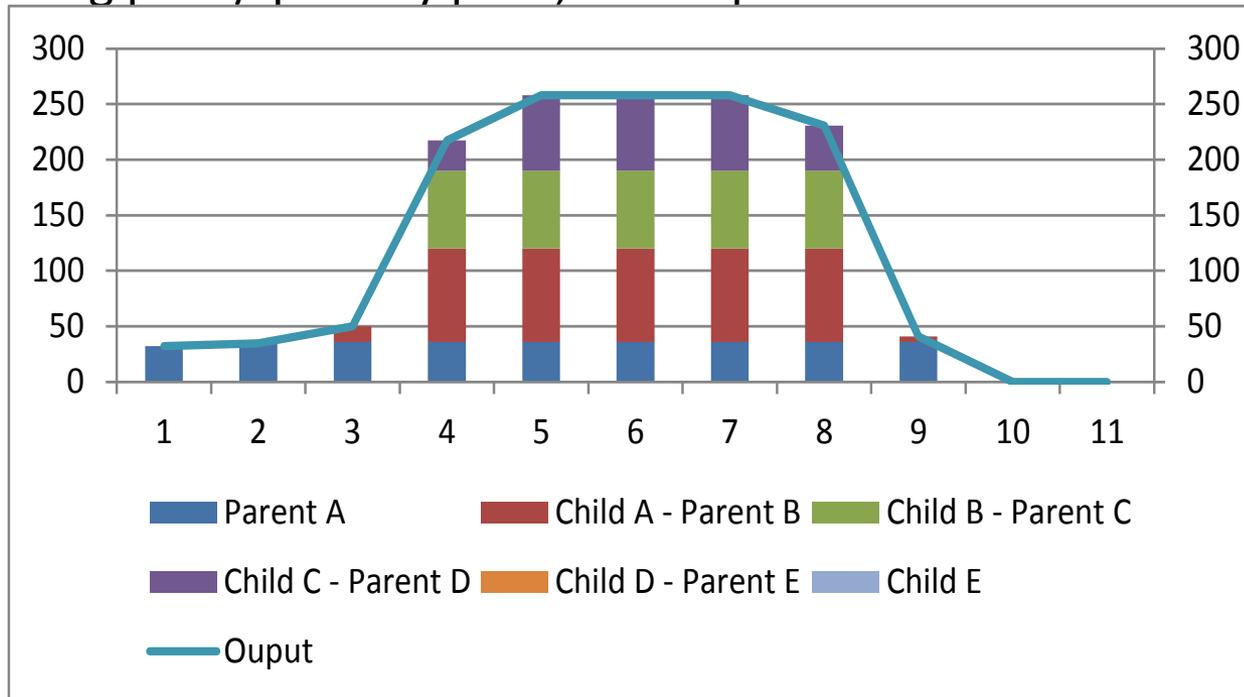
EUPHEMIA - Testing

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



EUPHEMIA - Testing

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



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

EUPHEMIA - Testing

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



EUPHEMIA - Testing

- 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
- Exclusive groups allow generator to submit multiple running options
- Exclusive Groups can have the generator start/end at any time, with a different order for every start and end time
- Acceptance ratio values used to ensure only one feasible set is selected



EUPHEMIA - Testing

- Data has been provided to the ALWG
- Has been tested and adjusted for formatting
- First tests are SEM in isolation
- Expecting first results shortly
- We expect that these will lead to changes in how we submit to the algorithm
- We don't expect to have got it right first time!
- Experience of the SEM implementation taught us this
- We expect a number of iterations with the ALWG before we're satisfied



EUPHEMIA - Testing

- Next phase of testing will be “commercial tests”
- We propose the following approach –
 1. Workshop 1: Initiation – publication of SEMO report on EUPHEMIA and results of conceptual testing
 2. Workshop 2: Testing readiness – SEMO to present on the methods used in the conceptual testing phase & to provide template workbooks to participants based on PX interfaces into which data can be submitted
 3. Further interaction: envisage more interaction between SEMO and participants in the finalisation of testing data



EUPHEMIA - Testing

- Next phase of testing will be “commercial tests”
- We propose the following approach –
 4. Test case creation: conversion of participant data into EUPHEMIA input format
 5. Test execution: submission of test cases to the ALWG, review of test results, circulation of results and issue management (re-run of tests if required)
 6. Workshop 3: presentation of results of the commercial testing.



EUPHEMIA – Next Steps

- SEMO will develop a timetable for the commercial testing phase
- In discussion with the ALWG around support for this work
- This is dependent on the successful implementation of the Italian Borders coupling in February 2015
- Participants to consider –
 - Do they support this proposal?
 - How much testing should be done (*one month, one year*)?
 - How many iterations of commercial testing will be needed?



Questions?

