Euphemia performance issues: Feed-back on EUROPEX identified issues and proposed solutions

Market ESC
Brussels, 3rd December, 2015

Joint presentation EFET-EURELECTRIC

1. Introduction

Euphemia performance issues …

- Growing concerns on the quality of the solutions found by Euphemia
- Market participants **don't have enough information to understand** the optimization process
- Market Parties (MP) are missing statistics on Euphemia performances

… needs a proper diagnosis

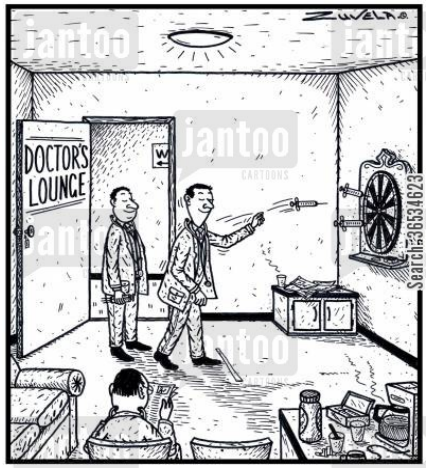
- **Need to be a proper diagnosis of the problem before trying to find a solution**
- Need a better sense of the complexity induced by each component
- Importance to identify the real cause of the problem before going forward
- Need a periodic update on performance results published by the PCR project

2. MP miss background and statistics of Paradoxically Rejected Blocks

Definition: PRB (Paradoxically Rejected Blocks): All orders can only be either executed fully, or rejected fully. Because of this constraint, block orders can be rejected even if they are in the money, in which case they are called Paradoxically Rejected Blocks (PRB).

- Is there any **public** report available on PRBs since go-live (20/05/2015)of FB in DA?
- **Statistics** on number of PRBs per market/bidding zone (both on **block orders** and **smart orders**)?
- Is there a link identified between the optimality of the solution and occurence of PRBs? (= would we have less PRB in (a more) or (the) optimal solution ?)
- Could the PCR project identify the **products that are the main cause** of PRBs?
  - Is it possible to provide the relationship between the **amount/volume/type of used complex bids/block bids and the amount of PRB** ?
- Is it the number of block bids, or the **number of links between block** bids that cause the PRB?
- How does the **PRB reinsertion** work?
  - Is there any cut off in place to prevent (paradoxically) rejection of blocks that are (deep) in-the-money?
  - If yes, is it documented? Who monitors, who defines the cut off, does it create suboptimality ?

3. Inventory of potential sources of sub-optimality is needed



- What are the elements that need **heuristic** implementation (see ESC presentation) ? Does heuristics ensure to find "the" optimal solution ? (= highest social welfare)
- Which of the **patches lead to sub-optimality**? How are they impacting the algorithm performance? E.g. FBI patch, adequacy patch, …
- **Does Limitation of calculation time lead to suboptimality ?**:
  - What would be the result with an **extension of the calculation time**? In term of welfare? In term of number of PRBs? MP miss any evidence !
  - What is the calculation time for each step/ sub problem of the process (e.g. to solve the **Italian PUN, MIC, block orders**, etc)? Is there a report available on this?
    - Potential gain (calculation time and thus reducded suboptimality?) if "PUN", "MIC", .. would be abandoned ?
  - **HVDC cable losses** seem to be considered as network constraints → does it impact calculation time, does it lead to potential suboptimalities ?
  - **HVDC ramping constraints** are to be considered as network constraint or system constraint?
    - What would be the gain (suboptimality, PRBs, ..) if these ramping rated would be reduced or abolished?

4. Feed-back on the proposed solutions:

- *Option 1: "Reduce the amount of blocks types and other complex products allowed per participant and market (bidding zones)."*
- *Option 2: "Reducing the range of products treated in EUPHEMIA?"*
- *Option 3: "Relaxing the linear pricing rule (accept that the result has more than one price per bidding zone and time period)."*

General comments: we should work step by step !

- **Market parties need a detailed diagnosis before starting discussions on any of the suggested changes (option 1-2-3)**
- **Each option should be explained in detail by PCR and allow for in depth discussions**
- **To be followed by a proper consultation on these proposals**

4. On the increasing complexities and number of products that are used :

- Is there a list of products available per bidding zone?
  - Is the documentation on EPEXspot website complete ? (see reference docs)
- Which products are specific for some regions/country?
  - Why do we have these specific products?
  - Who has asked for these type of orders? PX initiative ? MP requests ?
  - Would some products be possibly not longer needed by reviewing market design ?
- What is the current use of these products on the different markets?
- Is there an evolution in the use of these products observed?
- How are these products influencing the time of iteration?

5. Could we harmonise market design before questioning harmonisation of products ?

- If block order is confirmed to be an issue: would it be possible to **reduce the use of hourly bids** (instead of block bids)?
  - E.g. : abandoning the obligation to introducy day ahead balanced programs might reduce need BB ?
- Would it ease the solution finding to evolve towards **one type of hourly orders**? (instead of co-existing hourly step orders and hourly linear pricewise orders)
- Would iterations be reduced by introducing **portfolio bidding in the Spanish** market instead of plant/plant bidding including ramping constraints, minimum income orders ?
- Would **abandoning/reducing allocation constraints** (ramping rates, losses) not be more appropriate than reducing range of products?
- Do we need to keep the “PUN” design in Italy ?

In short: before discussing a new patch combining “whichever” market design, should we not first harmonise/simplify the existing individual market designs: this would definitively lead to a much more understandable market and not adding a new patch in order to keep the underlying problems “under the carpet”.

Any further PCR extension should not add additional complexity (products, …) nor additional market design elements that can be harmonised beforehand

Generally speaking: harmonise the underlying, do not couple the “unharmonised” : a nice carpet can hide a lot of dust.

Workshop !

- **EURELECTRIC and EFET welcome the scheduled workshop (11/1/2016) to let the PCR project provide answers and understanding to all these questions.**
- **Stakeholder involvement is essential to achieve a transparent "Euphemia 10.0"**

- **Thanks for preparing this.**

Reference documents

- **EPEX SPOT documentation:** https://www.epexspot.com/en/market-coupling/pcr
  - **Public description August 2015**
  - **Public documentation September 2015**
- **Euphemia performance [September 2015]**

https://www.entsoe.eu/Documents/Network%20codes%20documents/Implementation/stakeholder_committees/EuphemiaPerformance_ESC_29%20SEP%202015_VF.PDF

CCG presentation 19 November 2015

Example : PUN requirements leading to additional iterations !

PREZZO UNICO NAZIONALE (PUN) REQUIREMENT

- National demand of Italy (with the exception of storage pumps) is matched to a single purchase price (PUN), regardless of its location
- Expenses coming from the consumers paying the PUN must be equal to the expenses that would have come from consumers with zonal prices (minimum tolerance accepted)
- Acceptance/rejection of buying bids subject to PUN must respect the following conditions
  - Buying bids in-the-money (Offered price > PUN) are fully accepted
  - Buying bids out-of-the-money (Offered price < PUN) are fully rejected
  - Buying bids at-the-money (Offered price = PUN) can be curtailed
- In order to respect the aforementioned requirements, PUN and bidding area prices must be calculated simultaneously (PUN cannot be calculated ex-post)

PUN AND MERIT ORDERS

In GME:

- Supply Merit orders are selling offers. They are cleared at their bidding area price
- Non-PUN demand orders (pump plants and buying bids on cross-border long term capacities) : Buying Bids from pump plants and buying bids in non-Italian national zones* are demand Merit Orders. They are cleared at the price of their bidding area
- PUN Merit Orders : the rest of the buying bids (the ones related to national consumption) are cleared at the common national PUN price (which is different from their bidding area price)

This PUN price is defined as the average price of GME marginal market prices for its bidding areas, weighted by the purchase quantity assigned to PUN Orders in each bidding area (subject to a tolerance, ϵ). That is:

$$P_{PUN} * \Sigma_z Q_z = \Sigma_z P_z * Q_z + \epsilon$$

* «Non Italian Zones» are limited poles of productions (available production capacity is bigger than ATC) and zones where holders of crossborders capacities rights submit bids .