28th November 2017

CACM Implementation update

NORD POOL

CACM Methodologies delivered by NEMOs

1. MCO Plan - approved
2. Harmonised Maximum and Minimum Clearing Price Proposals for
   a) Single Day Ahead Coupling (SDAC) -ACER decision
   b) Single Intra Day Coupling (SIDC) -ACER decision
3. Algorithm Methodology including SDAC & SIDC Algorithm Requirements
4. SDAC Products Proposal
5. SIDC Products Proposal
6. SDAC and SIDC Backup Proposal

amended proposals submitted to NRAs

NORD POOL

MCO Plan - timeline

- NRA approved MCO plan on 26th June 2017
- Implementation deadline – 26th June 2018
  - Go-live subject to approval and implementation of NEMO methodologies listed in CACM Article 9 and
  - Implementation of Multi NEMO Agreements pursuant to Art. 45 and 57 of CACM (legal and IT arrangements)

NORD POOL

Harmonised maximum and minimum clearing price proposals for SDAC and SIDC

ACER decision published on 14th October

- The decision by ACER was due to NRAs being unable to by August agree on the proposals submitted by All NEMOs in February, thus pushed it to ACER.
- In general ACER agreed with the concepts and the “min/max limits” proposed by All NEMOs in February, but with a few key amendments as follows:
- Maximum harmonised clearing price for single day-ahead coupling (SDAC) shall be + 3000 EUR/MWh; Minimum price shall be - 500 EUR/MWh
- Maximum harmonised clearing price for single intraday coupling (SIDC) shall be +9999 EUR/MWh; Minimum price shall be - 9999 EUR/MWh
- If the clearing price exceeds 60 % of max clearing price for SDAC in ANY BZ in 1 hour on 1 day:
  - Max clearing price limit to be deemed as increased by +1000 EUR/MWh the next day, but in practise only applied in the bidding zones five weeks later.
- MAIN CHANGE TO NEMOs PROPOSAL: NEMOs rule to change the max «limit» was that the 60% threshold must be reached 1 hour in at least 1 BZ on 3 different days within a 30 day period

NORD POOL

- However, if during this five-week period, the clearing price exceeds 60 % of the newly increased harmonised maximum clearing price for SDAC:

  The maximum clearing price for SDAC **would be deemed as increased again from the following day, but in practise only applied in all the bidding zones five weeks later.**

- The general 5 week transition period for adjusting the actual “limits” in all bidding zones is meant to give time to market participants to adjust to the amended value of the harmonised maximum clearing price for SDAC, while minimising the impact on free price formation.

- MAIN CHANGE TO NEMOs PROPOSAL: The 5 week transition period to implement the higher «limit» was given also in the All NEMO proposal, but without clarity about what would happen if the threshold was reached again within the transition period.

NORD POOL

- **The harmonised max clearing price for SIDC should never be below the harmonised maximum clearing price for SDAC,** i.e:
  - Maximum price for SIDC shall be amended if max price for SDAC via the triggering rule is increased above the maximum clearing price for SIDC.
  - Harmonised maximum clearing price for SIDC shall in such an instance be increased to be equal to the harmonised maximum clearing price for SDAC.
  - Changes shall be implemented and applied at the same time that the harmonised max clearing price for SDAC is applied, i.e. 5 weeks later.

- The new Harmonized Maximum and Minimum Clearing Prices should be implemented immediately after the market coupling operator ('MCO') function has been implemented (expected end June 2018)

- In ACER's view this effectively facilitates free price formation principles and is able to substitute the value of lost load (VOLL).

NORD POOL

Other NEMO methodologies

On 13th November 2017 All NEMOs submitted, for approval, to All NRAs amended proposals on:

1. Algorithm Methodology including Single DA Coupling (SDAC) Algorithm Requirements and Single ID Coupling (SIDC) Algorithm Requirements
2. SDAC products
3. SIDC Products
4. SDAC and SIDC Back-up Methodology Proposals

In addition NEMOs provided for information the current public descriptions of respectively the SIDC algorithm and the SDAC DA algorithm, which are documents that will be updated continually over time when new or amended products/features are introduced.

NORD POOL

Amended algorithm methodology proposals

The proposals set out among others:

- What the algorithm shall achieve in terms of objectives linked to performance, repeatability (auditability), reliability and scalability
- For both the DA and ID timeframes, an ‘interim solution’ in a ‘prototyping phase’ based on an R&D pathway to achieve an ‘enduring solution’ with regards to those objectives and to include products and features not listed as initial but as future (or other) requirements
- The change management process for amendments, developments and implementations

NORD POOL

Price coupling algorithm implementation timeline

The DA algorithm is based on the Existing DA Algorithm solution (PCR-EUPHEMIA). This is not fully compliant with the CACM objectives of performance, repeatability (auditability), reliability and scalability.

To develop an enduring solution compliant with the CACM requirements the implementation timeline is structured in three phases:

I. Prototyping phase: up to three years dedicated to developing the activity of R&D on the Existing DA Algorithm Solution aimed at reaching a solution complying with the properties of the enduring solution.

During the prototyping phase all NEMOs adopt the DA interim solution

II. Extended prototyping phase: up to one further year at the end of the prototyping phase, if necessary to finalize the research and development activity;

III. Industrialization phase: up to one year, dedicated to the industrialization of the prototype delivered by the R&D activity, if such prototype has been proven suitable, announcing to stakeholders the specific features of the enduring solution and to draft if needed an amended version of the Algorithm Proposal.

NORD POOL

Price coupling algorithm implementation timeline

i. By the end of June 2018, the DA interim solution shall be able to support:

- all Initial Requirements reported with the Proposal
- the requirement of adequate maximization described in the Proposal
- the Multi-Nemo operation
- the schedule exchange calculation functionalities according to methodology for the calculation of SEC and the coupling of all bidding zones in the EU plus Norway

ii. By June 2020 the DA interim solution shall be able to support the requirement of adequate repeatability described in the Proposal

iii. By the end year 1 of the prototyping phase, all NEMOs shall communicate to all NRAs and make publicly available to all stakeholders the Change Control Procedure and the Algorithm Monitoring Procedure referred to the existing solutions.

NORD POOL

Price coupling algorithm implementation timeline

iv. By the end of the extended Prototyping Phase: public consultation in accordance with Article 11 of CACM Regulation

v. By the end of the industrialization phase the DA interim solution shall be able to support all Future Requirements reported in Annex 1 of the Proposal and the requirement of adequate scalability

vi. By the end of the industrialization phase, all NEMOs shall also communicate to all NRAs and make publicly available:

- the detailed description of the enduring solution,
- the Change Control Procedure and
- the Algorithm Monitoring Procedure referred to the enduring solution.

vii. By the end of the industrialization phase, all NEMOs shall start the prototyping phase of the other functionalities described in Annex 1 of the Proposal following the Change Control Procedure.

NORD POOL

Continuous trading matching algorithm implementation timeline

The ID algorithm shall use the existing ID solution as the starting point.

In order to reach to an ID enduring solution compliant with the CACM requirements listed in the Proposal, the implementation timeline is structured in four phases:

I. First implementation phase: up to one year dedicated for go live of the Existing ID Algorithm Solution, to be considered as SIDC interim solution;

II. Prototyping phase: up to three years after the first implementation phase is completed: dedicated to the activity of R&D aimed at reaching a solution complying with the properties of the enduring solution described in the Proposal

NORD POOL

Continuous trading matching algorithm implementation timeline

III. Extended prototyping phase: up to one further year, to be granted to all NEMOs by all NRAs at the end of the prototyping phase, based on a request provided by all NEMOs in order to finalize the research and development activity;

IV. Industrialization phase: up to one further year, dedicated to the industrialization of the prototype delivered by the research and development activity, if such prototype has been proven suitable, announcing to stakeholders the specific features of the enduring solution and to draft if needed an amended version of the Algorithm Proposal.

NORD POOL

Amended product methodology proposals

The proposals:

- List the products that shall be available for trading in the SIDC and SDAC markets, and their main characteristics and

- Follow:

  - the price coupling algorithm monitoring principles, to monitor the quality of market outcomes and identify potential deterioration in the algorithm performance, and

  - the Change Management Principles and process described in the Algorithm Proposal for introducing any changes to the available products

- Require NEMOs to consult all parties at least every 2 years on the available products

NORD POOL

Amended product methodology proposals

DA products

1. Aggregated MTUs orders
2. Complex orders
3. Block orders
4. Merit orders and PUN orders

ID products

1. Hourly
2. Half hourly
3. Quarter hourly
4. User defined blocks: on-demand combinations of hourly, half-hourly or quarter-hourly contracts defined by the market participant.

NORD POOL

Amended backup methodology proposals

The proposals set out the key elements of the backup procedures (preceding potential decoupling/fallback) that are to be followed in the event any of the MCO Function related procedures fail to be carried out in the normal way and on time.

- DA Timeframe: No changes compared to existing PCR / MRC procedures
- ID timeframe: procedures follow XBID agreements

NORD POOL

NRA approval process

- NRAs can accept, request further amendments or escalate to ACER by 13th January 2018
- ACER approval within 6 moths of deferral
- If ACER is unable to issue a decision, escalation to European Commission

The amended NEMO proposals are available here:

https://www.nordpoolgroup.com/the-power-market/Integrated-Europe/cacm-methodologies/

NORD POOL

NORD
POOL

Governance of NEMOs

How should NEMOs govern themselves to deliver on CACM requirements?

These are:

1) Methodologies, terms and conditions (CACM Art 9.6):

- MCO Plan – initially submitted to NRAs for approval in April 2016, amended once, then approved by NRAs in June 2017 => to be implemented June 2018

- Maximum and minimum prices
- Products
- Algorithm
- Backup methodologies

Initial drafts published OCT 2016 which then went through a Public Consultation, and then updated versions sent FEB 2017 for NRAs approval.

In AUG 2017 NRAs responded with RfA to NEMOs for 3 of the 4 Methodologies, and passed Max-Min Limits ("HMMP") to ACER for decision.

NEMOs delivered updates to NRAs early NOV-2017

2) Day to day operational matters – operation of single ID and DA coupling

NORD POOL

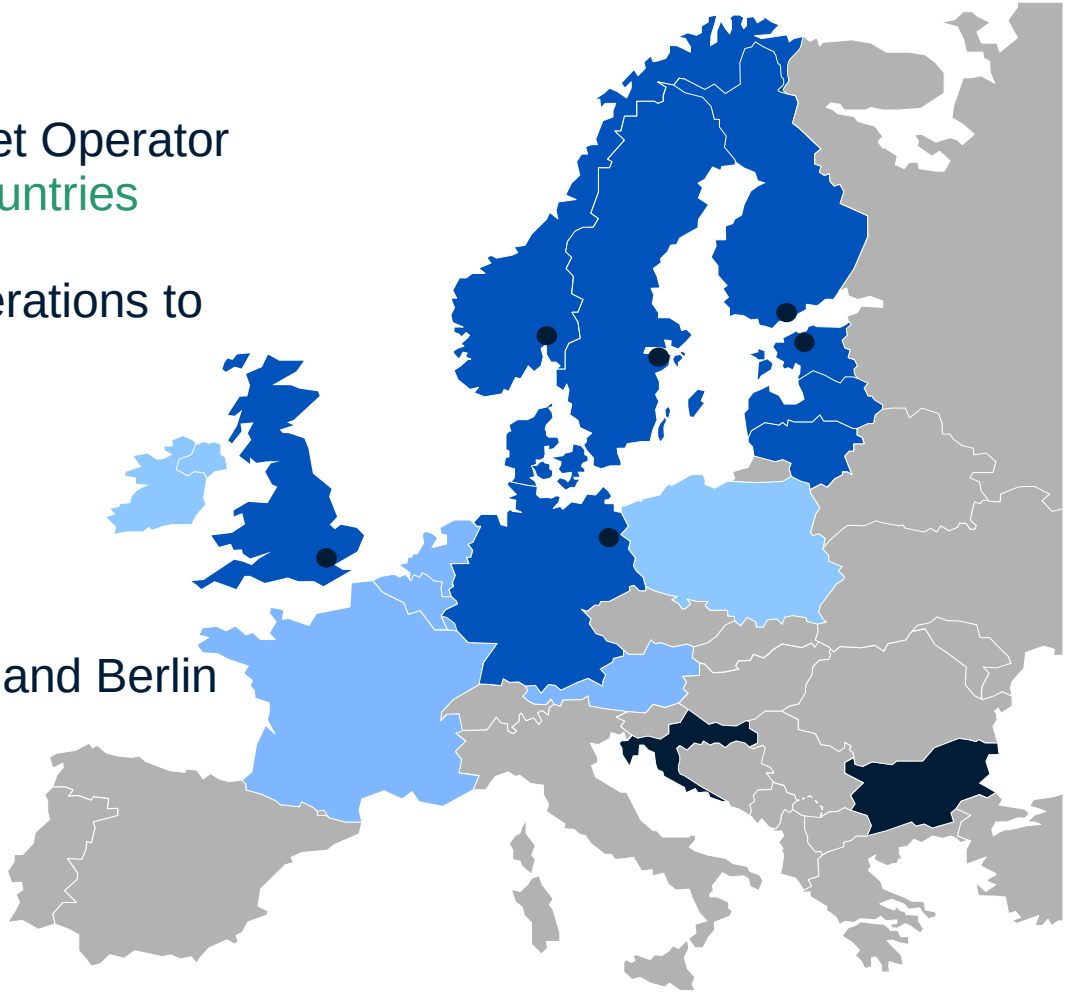
We are pioneering and expanding across Europe

Nominated Electricity Market Operator (NEMO) in 15 European countries

Delivering systems and operations to Power Exchanges
– Bulgaria and Croatia

Tailored services to TSOs

Offices in Oslo, Helsinki, Stockholm, Tallinn, London and Berlin



NORD POOL