BZR CG: status update of BZR

4 July, 9.30-11 am, online conference

entsoe

Reliable Sustainable Connected

Agenda

Topics:

1. Agenda
2. Timeline
3. Update from CE Region
4. Update from Nordic Region
5. Update on the PAN EU studies
6. Next steps and next meeting

2. New provisional target date for delivering the Bidding Zones

New provisional target date for delivering the Bidding Zones Review is Q3 2024. The Nordic TSOs will aim to deliver results for the Nordics already in February 2024.

The enormous technical complexity of the task requires this additional time: the grid models used are huge (e.g., 17000 nodes for Central Europe) as well as the size of the computation (equivalent to 60 full year simulations), which lead to long computational time. TSOs are putting massive resources in this study and have invested in additional hardware capacity to cope with this complexity. Nonetheless several months are necessary to complete the main scenario computation.

TSOs remains fully committed to deliver a good quality study and put high priority on delivering this important task. This will be the first bidding zone review under this new methodology, which includes many additional and complex requirements compared to previous bidding zone study. New IT tools had to be developed, which still require to demonstrate full functionality. Simplifications may be necessary.

Next steps:

- The Public Consultation is planned for Autumn 2023.

2. New provisional target date for delivering the Bidding Zones

Further details:

- **Complexity of the BZR Methodology** set out for the TSOs, and the **geographical scope** included in the project
- **Size of the CE computation: 10 BZ configurations x 3 climate years x 2 (main scenario + sensitivity) = 60 full-year simulations**
- **Model dimension: Size of the grid models are huge**

MODEL DIMENSION FOR NORDICS

- *700 optimized hubs (aggregation from 10 000 nodes)*
- *2 700 generators batteries*
- *11 000 lines*
- *2 000 trafos*
- *300 CNECs*

MODEL DIMENSION FOR CE

- *17 000 nodes*
- *15 000 generators batteries*
- *17500 lines*
- *5 000 trafos*
- *7 000 CNECs*

2. New provisional target date for delivering the Bidding Zones

Further details:

- **Computational time is long, particularly in CE BZRR:**
  - Hardware has been increased to reduce those computational times
  - With this hardware, the
    - Main scenario is expected to take 5-6 months for completion
    - Sensitivity analysis is expected to take 5-6 months of computational time

- **Complexity to model different operational practices in the different BZ, due to the large geographical scope of the project (ex. redispatching approach)**

- **First time a review of this complexity is done: new tools have been developed to meet the BZR requirements**
  - For Nordic:
    - Enhance BID 3, (New redispatch function module)
  - For CE:
    - New tool chain: VAMOS with existing modules
      - Integral new functionalities for redispatch optimisation algorithm
      - Integration of BID 3 in VAMOS (new interfaces has been developed)
      - TNA developed to accommodate parallel processing

2. New provisional target date for delivering the Bidding Zones

Additional information from Central Europe BZRR

- **CE TSO have created a complex toolchain in order to cope with all the computational challenges originating from the BZR methodology**

- **Being a sequential process, and given the many issues encountered, not all modules have been run yet in the online environment on a representative dataset (RAO and Loop flow analysis are still pending)**

- **CE has now two priorities:**
  - Deliver the data as an input for the pan-EU liquidity assessment ASAP (which requires runs for the basecase + CC + CE FBMC; 3 CYs, Status quo, 7 BZ configurations)
  - Run the status quo in all online modules – this is needed to get a grip on the correct functioning of the modules and the interfaces, and the **computational run times – the latter being a prerequisite before being able to provide any clarity on the CE timeline**

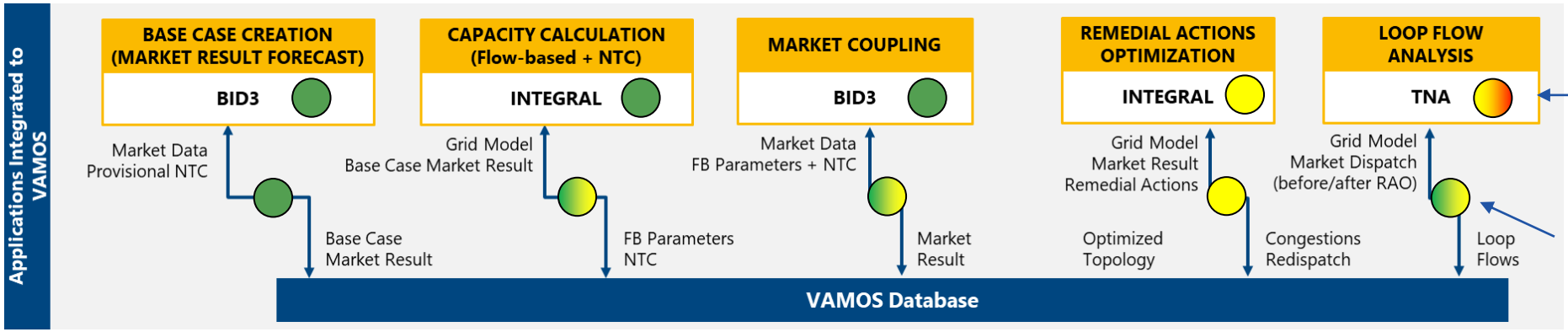
2. New provisional target date for delivering the Bidding Zones

Additional information from Central Europe BZRR

- **The development of the various calculation modules has proven to be more difficult than anticipated due to the complexity of the study, resulting in significant delays. Various calculation modules are still under active development and testing, where they were planned to be operational in the summer of 2022.**
  - New software had to be developed in order to cope with the complexity and scale of the study.
    - The scale of the study requires automation of the calculation modules and integration into an online model operating system.
    - This has required the development of new interfaces between calculation modules.
  - Existing calculation tools are pushed to their limits due to the requirements in the BZR methodology.
    - New functionalities have been implemented for existing software in order to improve performance. E.g. LODF and new solver for Integral (RAO) and parallelisation for TNA (LF).
    - Still, long calculation times are observed for various modules. Stability is still a concern as calculations occasionally crash, which requires a restart.
  - The interdependency of the calculation modules effectively lead to a sequential development and testing process.
    - Complete testing of a module is only possible when a previous module is showing stable results, that are required as an input for subsequent modules.
    - Testing efforts are further slowed down due to the long runtimes observed; full runs are required for testing a module's functionality.
    - Data adjustments for one module can affect the functionality of other modules.
  - Hardware optimisations have not shown universally positive results.
    - Improvements for one calculation module has been observed to have detrimental effects for other calculation modules.
- **Recently, significant progress and improvements have been made on the functionality of the FB CC and FB MC modules.**
  - FB CC module is nearing operational status in the online environment.
  - FB MC module is in final testing stage. Various issues in the interface have been identified and fixed.
  - RAO module is in development and testing stage. A new solver is being implemented, and optimisations is being calibrated. Full testing is pending FB MC results.
  - LF module development and testing is pending FB MC and RAO results.

3. Update from CE Region

CE: Status of toolchain development and runtimes



Module	Status	Observed / estimated runtime (days)*
allEU NTC market coupling - BID3	Operational	4 ~ 7
CE FB capacity calculation - Integral	Operational	3 ~ 5
CE FB market coupling - BID3	Final testing stage	3 ~ 5
Remedial action optimisation – Integral	Development / testing stage	6 ~ 11
Loop flow analysis (2x) – TNA	Early testing stage	7 ~ 12
Total expected runtime per scenario		**23 ~ 40**

*Considering that calculations occasionally fail or crash and require a restart

Expected runtime for 1 base / sensitivity case: 10 configurations x 3 climate years / 7 CompCores x 23~39 days ≈ 99~171 days

4. Update from Nordic Region

- The Nordic TSOs have recalculated the HHI indicator for all configurations after re-simulating the dispatch. The data has been provided as input for the Pan-European Liquidity study.
- The modeling problem in the southern bidding zones have been fixed. The new redispatch function provides reasonable results. First results hopefully after the summer.
- We are working on the indicator calculations. Collaboration with colleagues from Central Europe on the indicator assessment and the study report structure has been established and will persist.
- Following the six-month extension to the study, the Nordic TSOs have already committed to conduct a second sensitivity analysis to investigate dry-year scenarios. The Nordic TSOs are currently investigating the need for a third sensitivity analysis for 2030 to ensure the study's long-term robustness.
- The Nordic TSOs will aim to deliver results for the Nordics already in February 2024. This will be followed by an update in a second delivery with CE BZRR results (final delivery is a common report). Legal assessment is ongoing.
- Overall, the Nordic BZR work is progressing as planned.

5. Update Pan EU studies

The work on the pan EU studies is on-going.

Status liquidity study:

- Data collection is complete;
- Analysis of the historical data and litterature review is being finalised;
- Analysis of the impact of a change in bidding zone configuration in the Nordic based on simulated data is on-going;
- Delivery of the simulated data by BZRR CE is pending.

Status transition costs:

- Answers received during the 2 online surveys are being assessed;
- They are cross-checked with the interviews and EU stakeholders are contacted directly in case of unclarity

6. Next steps and next meeting

Next meeting: September/October (before the public consultation)

ENTSO-E Mission Statement

Who we are

ENTSO-E, the European Network of Transmission System Operators for Electricity, is the **association for the cooperation of the European transmission system operators (TSOs)**. The 42 member TSOs, representing 35 countries, are responsible for the secure and coordinated operation of Europe's electricity system, the largest interconnected electrical grid in the world. In addition to its core, historical role in technical cooperation, ENTSO-E is also the common voice of TSOs.

ENTSO-E **brings together the unique expertise of TSOs for the benefit of European citizens** by keeping the lights on, enabling the energy transition, and promoting the completion and optimal functioning of the internal electricity market, including via the fulfilment of the mandates given to ENTSO-E based on EU legislation.

Our mission

ENTSO-E and its members, as the European TSO community, fulfil a common mission: Ensuring the **security of the interconnected power system in all time frames at pan-European level and the optimal functioning and development of the European interconnected electricity markets**, while enabling the integration of electricity generated from renewable energy sources and of emerging technologies.

Our vision

ENTSO-E plays a central role in enabling Europe to become the first **climate-neutral continent by 2050** by creating a system that is secure, sustainable and affordable, and that integrates the expected amount of renewable energy, thereby offering an essential contribution to the European Green Deal. This endeavour requires sector integration and close cooperation among all actors.

Europe is moving towards a sustainable, digitalised, integrated and electrified energy system with a combination of centralised and distributed resources. ENTSO-E acts to ensure that this energy system **keeps consumers at its centre** and is operated and developed with **climate objectives** and **social welfare** in mind.

ENTSO-E is committed to use its unique expertise and system-wide view – supported by a responsibility to maintain the system's security – to deliver a comprehensive roadmap of how a climate-neutral Europe looks.

ENTSO-E Mission Statement

Our values

ENTSO-E acts in solidarity as a community of TSOs united by a shared responsibility.

As the professional association of independent and neutral regulated entities acting under a clear legal mandate, ENTSO-E serves the interests of society by optimising social welfare in its dimensions of safety, economy, environment, and performance.

ENTSO-E is committed to working with the highest technical rigour as well as developing sustainable and innovative responses to prepare for the future and overcoming the challenges of keeping the power system secure in a climate-neutral Europe. In all its activities, ENTSO-E acts with transparency and in a trustworthy dialogue with legislative and regulatory decision makers and stakeholders.

Our contibutions

ENTSO-E **supports the cooperation** among its members at European and regional levels. Over the past decades, TSOs have undertaken initiatives to increase their cooperation in network planning, operation and market integration, thereby successfully contributing to meeting EU climate and energy targets.

To carry out its **legally mandated tasks**, ENTSO-E's key responsibilities include the following:

- Development and implementation of standards, network codes, platforms and tools to ensure secure system and market operation as well as integration of renewable energy;
- Assessment of the adequacy of the system in different timeframes;
- Coordination of the planning and development of infrastructures at the European level (Ten-Year Network Development Plans, TYNDPs);
- Coordination of research, development and innovation activities of TSOs;
- Development of platforms to enable the transparent sharing of data with market participants.

ENTSO-E supports its members in **the implementation and monitoring** of the agreed common rules.

ENTSO-E is the common voice of European TSOs and provides expert contributions and a constructive view to energy debates to support policymakers in making informed decisions.

Our values define who we are, what we stand for and how we behave.
We all play a part in bringing them to life.

EXCELLENCE

We deliver to the highest standardss. We provide an environment in which people can develop to their full potential.

TRUST

We trust each other, we are transparent and we empower people. We respect diversity.

INTEGRITY

We act in the interest of ENTSO-E

TEAM

We care about people. We work transversal and we support each other. We celebrate success.

FUTURE THINKING

We are a learning organisation. We explore new paths and solutions.

We are ENTSO-E