CONSULTATION RESPONSE

Response to the Co-optimisation R0 report consultation by NEMOs and TSOs

Brussels, 30 June 2025

Introduction

We welcome the additional research provided on co-optimisation. We reiterate the following points, previously stated in our position paper with Eurelectric.[1] The potential implications of the implementation of a co-optimisation process include several practical challenges identified by market participants, e.g. algorithmic and bidding complexities or co-optimisation compatibility with flow-based. We emphasise the need to consider the overall welfare impacts of co-optimisation on the functioning of the market.

Key messages

- Challenges remaining to be addressed include algorithmic and bidding complexities or the compatibility with the flow-based.
- If the theoretical benefits of co-optimisation cannot be realized considering real-world constraints and the benefits are outweighed by negative practical consequences, any further implementation steps should be stopped.
- The R&D on co-optimisation should consider a broader perspective, notably overall welfare impacts, assessing the potential benefits under realistic market assumptions and highlighting the costs involved with the collateral impacts on balancing capacity and wholesale markets.
- Furthermore, clear boundaries on the design choices available to R&D should be made to preserve existing market structures. For example, having self-dispatch and

[1] https://cms.energytraderseurope.org/storage/uploads/media/energytraderseurope-eurelectric-cooptimisation-position-paper.pdf

portfolio bidding in European energy markets rather than central dispatch and unit bidding.

- Another trade-off to be aware of is the more co-optimised and sophisticated the market is, the less adaptable that structure is to future changes impacting all the energy sector.

Detailed comments

Public consultation questions - Bidding products related questions

8. Section 3.1.2 of the report identifies several issues with "explicit bidding" and, on this background, clearly concludes in favour of "implicit bidding". Do you have comments on these issues, the conclusion to further develop implicit bidding or on possible advantages of co-optimisation with explicit bidding compared to implicit bidding with a possibility of an explicit 'premium'? For further detailed information, please refer to sections 2.2 - 2.4 of Appendix A: N-Side Report.

We fully agree that there are issues with explicit bidding. However, we strongly disagree with the conclusion preferring implicit bidding instead. Our concerns towards combined bids are much stronger.[2] Also addressed in Question 16, we highlight that the complexity of the implicit bid will be significantly bigger than indicated in the study.

While explicit bidding poses challenges for market participants and the clearing algorithm, at least the bidding format and the corresponding market outcome are comprehensible.

9. With implicit bidding, opportunity costs of balancing capacity that occur in SDAC will be automatically taken into account in the optimisation and at least recovered by each market

[2] https://cms.energytraderseurope.org/storage/uploads/media/energytraderseurope-eurelectric-cooptimisation-position-paper.pdf

participant. However, there may be other costs related to offering balancing capacity that are not captured within the SDAC optimisation. Section 3.1.3 of the report suggests the possibility of a premium for balancing capacity to be able to cover such costs. Do you agree with the need to have a premium for balancing capacity? If no, please explain why you disagree.

We agree with the need for a separate premium for each individual balancing capacity product.

Also dedicated bids for energy need to be possible: afrr-pos, afrr-neg, mfrr-pos, mfrr-neg, cmp. Page 3 ("energy-only or balancing capacity-only").

10. The R0 report mentions some specific costs that can be reflected by means of a premium. Which costs would you consider relevant to be reflected by such a premium? There are highly specific portfolios and market situations to be considered. We include below a non-exhaustive list of cost elements that echo the diversity of portfolios and market situations in practice.

A non-exhaustive list of elements not mentioned we identified: Intraday market opportunity costs, balancing bids activation probability and balancing power 2nd step pricing, generation forecast quality (insecurity), and the incurred costs of the non-ability to construct enough sophisticated bids (related to the asset or market position).

11. Do you have any additional suggestions for this premium (e.g. potential restrictions, maximum, etc.)?

No restrictions or caps should be applied to the premium, apart from the respective technical limits for energy and balancing capacity. We caution against any limitations on price, volume and links.

The premium should also be allowed to become negative, to facilitate all possible bidding considerations.

Public consultation questions - Bid design related questions

12. Section 3.2.2 of the report proposes both "linked bids" and "combined bids" to be used in a potential future co-optimised SDAC market. For more detailed information on linked and combined bids, please refer to sections 3.1 and 3.2 of Appendix A: N-Side Report. Do you see the need to enable both types of bids, combined and linked?

On the one hand, we see the need for linked bids. On the other, we are more sceptical about the need for combined bids. From our position paper, we reiterate our serious concerns on the bidding structure.[3]

Should combined bids be pursued and in addressing portfolio bidding, it would be interesting to have links between combined bids and linked bids.

13. Do you agree with the proposals referred to in Question 12 and/or do you have further suggestions for the design of linked bids and combined bids, for example, what kind of linking should be possible or what kind of combined bids should be provided?

Here are the types of links to consider:

- Intertemporal and specific inter-product (energy market, aFRRpos, aFRRneg, mFRRpos, mFRRneg) links;
- Parent-child and exclusive groups including bids for all MTUs and products.

In the current system, there is already an insufficient number of parent-child bids, as well as exclusive. A complex and detailed study that would enhance all aspects of

[3] https://cms.energytraderseurope.org/storage/uploads/media/energytraderseurope-eurelectric-cooptimisation-position-paper.pdf

interdependencies and relations within a market participant having a large and complex portfolio was not made. Thus, there is no prerequisite that the proposed bids can ever be enough and efficient. The examples described in Figures 16 and 17 of the N-SIDE study are of low complexity.

In the proposed logic, there is no complex solution for a market participant needing to optimize with all the production parameters outcomes from the Stakeholder survey as mentioned in APPENDIX B.

14. Are there special characteristics in your portfolio or your country that are not adequately addressed in the proposed bid structures? What are your suggestions for additional features that may be needed? You may also consult Appendix B of R0 report to review which already provided input might be particularly important for you.

We disagree with the approach to formulating asset- or country-specific attributes into the bid design. We share the concern that it is highly complicated to set all the parameters of the portfolio and construct a complete conditionally complex bid.

15. Specifically, to what extent do the proposed bid designs address portfolio bidding?

With combined bids for particular asset types, unit-based bidding is not explicitly required, but portfolio flexibility is more complex and reduced (also see answer to question 21).

More specifically in chapter 3.2.3 and thermal bids, transferring the optimization of any type of unit to the complex European implicit system is hard to imagine for any of the operators.

Lastly, we question the study's mention of solely relying on the products currently available on the day-ahead market, which does not fully meet the future needs of market participants.

16. If you consider that portfolio bidding is not sufficiently supported, what kind of additions or improvements would you suggest?

Bid design should be product-specific, and not to certain asset types. The market participant decides to combine all assets in his portfolio to match the required products. This is particularly relevant for continuously optimizing the portfolio until delivery. With asset type-specific bids, the possibility of reassigning assets to deliver certain products is severely limited, resulting in a loss of efficiency (also see answer to question 21). For this reason, combined bids should be viewed very critically.

We also highlight some missing elements. One is the lack of attention to the changing cost structure related to load. The variable cost is not a static value throughout the entire load range. To imagine a complex portfolio function is misguided. Portfolio management is complex, and we do not see a chance to get all the optionality into the co-optimised parameters for efficient bidding into the market.

Secondly, the study forgets the relationship between time units from the following perspective: the up or down balancing power is dependent on the power in each period and, importantly, on its changes between periods. In the case of the ramp between two levels of base points in different periods, there might not be enough space (power) for balancing bid activation. This functionality is completely missing.

17. Specifically, if you operate storage facilities, do the proposed combined and/or linked bids cover your needs?

We raise a list of non-exhaustive absent points. What is not described in the material are the interdependencies of different time intervals and groups of time intervals between each other. All the examples presented are related only to one virtual time duration. What remains unresolved: time between charge and load, resting time, preparation time, minimum discharge time, complex situation of multi-optimization of run on the river

generation units cascade (one can hardly create a flexible complex interlinked bid for an interlinked group of generators connected by a river with specific hydrological conditions).

18. In your opinion, what additional benefits could result from the ability to also include linking of combined bids? For additional information, please refer to section 6.3 of Appendix A: N-Side Report.

Linking combined bids adds another layer of complexity to an already complex problem. The example provided in 6.3 does not sufficiently cover the needs of a market participant. We also have doubts about whether Figure 31 and Figure 32 describe the same situation. It works for blocks A' and A" but seems not to be the same for A and A".

What is also missing is the implementation of this example into an exclusive bid as a market participant would like to have the option to start the generation at the most convenient period within the day.

19. If you own or operate any of the following asset types, please identify which type of bid format (combined bid, linked bid, linking of combined bids, all of them) would address your technical and economic constraints in the best possible way and why: Biomass; Demand response; Solar; Battery storage; Pumped hydro; Thermal generators; Wind; Other (please specify). If none of the proposed bid formats are suitable for your asset types, please explain which needs are not properly addressed and why. Disclaimer: NEMOs and TSOs are aware that portfolio bidding is the current practice in most European countries. This question could still help discover additional requirements.

No response.

20. What kind of challenges do you foresee for your own company related to the proposed new bid designs (linked and combined bids)?

The proposed bid designs lead to an increased bidding complexity which may not be manageable. Market participants could then need to resort to simplified bidding structures which would not reflect the full potential of their portfolio capabilities, resulting in higher system costs.

In particular, such bidding complexity could lead to an artificial split of offers between spot and balancing capacity markets. This would have detrimental market impacts, e.g. reduced market liquidity, and would lead to inefficiencies at a significant social cost which could outweigh any theoretical benefits of co-optimisation.

The operators and market participants will also face costs and challenges when creating a complex bidding mathematical tool for a complex portfolio-optimized bid under the described conditions. Such costs are not included in the co-optimisation effects.

Public consultation questions - Pricing related questions

21. The report (Chapter 3) considers non-convexities as a major challenge for co-optimisation, caused by the technical characteristics/constraints of production assets (primarily thermal generators and their startup costs, minimum generation levels, minimum up/down times and other modelling options). What other sources of non-convexities do you see that have not been considered (e.g. in hydro fleets)?

We identify any cascade for connected generation units, systems of connected dams, pump storage, accumulation and combustion gas turbines, and more sophisticated complexes of power generation-heat supply-balancing services provision systems.

Although it is stated that combined bids do not imply unit-based bidding (asset-specific bidding), with more specific bid structures there is an obvious tendency towards unit-based bidding. This would restrict the efficiency gains that market participants can generate by portfolio bidding and self-dispatch up to delivery.

22. Do you have comments on the proposed pricing approach with a preference for a solution where Paradoxically Accepted Bids (No PAB) are removed from the solution? For more detailed information on the No PAB design, please refer to section 5.4.1 of Appendix A: N-Side Report.

We agree with the proposed removal of Paradoxically Accepted Bids. The "No PAB" design ensures clear and uniform pricing, which enhances market coherence, transparency, and trust. It aligns with existing SDAC practices and supports consistent price signals across markets.

However, if this design proves ineffective, it should be possible to revise it together with market participants, taking into account consequences on price formation and on Euphemia (notably stress on the algorithm).

23. What are your reflections on other alternative pricing options outlined in the report and its annexes?

The ambiguity introduced in price formation by jointly clearing energy and balancing capacity is increased with more sophisticated pricing options.

Additionally, the report and all co-optimisation proceedings do not appertain to the backup procedures in case of decoupling. In the current setup, we observed a few problems where one partial decoupling resulted in significant losses for market participants. We see a considerable risk for grid stability and security under co-optimisation where TSOs will not have any balancing reserves.

24. What is your view on the substitutability rule for aFRR and mFRR, or do you have suggestions to modify or improve it? For more information on the substitutability rule, please also refer to section 6.1 of Appendix A: N-Side Report.

We agree with the proposal for substitutability between aFRR and mFRR products if this is explicitly included in the bid ("mFRR-substitutable"). If a fraction of aFRR bids is transformed into mFRR because there is limited liquidity and the price is higher, the mFRR price should also be applied to mFRR-substitutable aFRR bids that are accepted as aFRR bids. Additionally, it should be possible to declare an aFRR bid as aFRR-only.

General questions

25. Are there any issues regarding bidding products, bid design and pricing that have not or not sufficiently been addressed in the report? If yes, please explain.

We underline two elements.

In co-optimization, the allocation of Cross Zonal Capacity (CZC) will be performed according to an integrated welfare calculation as part of the Euphemia target function. The market-based methodology does a similar calculation when determining the value of CZC. While the CZC available for balancing capacity in the market-based methodology is restricted to 10%, it is not limited to co-optimization.

With the price-insensitive demand and generally steeper offer curves, it will possibly result in a preference for balancing capacity when allocating CZC. Such a potential bias needs to be evaluated and properly communicated, as the risk of increased SDAC spreads and reduced levels of price convergence are of high general interest to various stakeholders.

We pay attention to the assumptions and parameters used in the study. There was no example of bidding proceedings for market participants with complex portfolios. With the study focused on theory, the implications and application to real operations are lacking.*

26. For potential providers of balancing capacity: what conditions must be satisfied for you in a co-optimised market to bid at least as much balancing capacity as today and potentially more? Please be as specific as possible.

Liquidity of balancing capacity bids offered will likely be reduced in a co-optimised market due to the increased uncertainty. One can assume that market participants will respond to an increased uncertainty by overly complex bidding or arbitrary clearing rules by resorting to simplified bidding structures that would not reflect the full length of their portfolio's capabilities. The potential reduced liquidity in balancing capacity and SDAC markets would have considerable negative welfare implications.

In sequential bidding, Balancing Service Providers (BSPs) can re-optimize their bids after each auction outcome and offer all of the remaining capacity to subsequent balancing capacity and day-ahead markets. Not all combinations of balancing capacity and energy assignments are operationally feasible, particularly for operators of storage assets.

However, BSPs still bear full responsibility for any balancing capacity assignment of the algorithm. To account for the uncertainty involved in receiving an arbitrary auction result for energy and balancing capacity, a more moderate bidding behaviour is necessary. Due to market participants' response, this would result in a decrease of liquidity, with considerable negative welfare implications.

We detail below one approach for market participants to deal with the increased uncertainty introduced with co-optimization. To offer similar volumes of balancing capacity (neglecting re-optimization of aFRR vs. mFRR), one approach would be to restrict the bid to balancing capacity only. This is linked to an efficiency loss at the day-ahead stage, as energy bids will only be submitted intraday in case of no acceptance for balancing capacity.

27. Please provide any other general comments to R0 report on Co-optimisation

We fully support the statement by NEMOs and TSOs: "NEMOs and TSOs remain highly sceptical on the technical and market function feasibility of co-optimisation - especially concerning the appropriate consideration of multiple constraints on the side of balancing service providers in all kind of bidding regimes" (Executive Summary).

The impact of modifying the price formation on the energy system is not adequately considered. Without explicit bid prices for each product, market clearing and transparent price formation - as it is - will change, and instead of providing straightforward price signals, SDAC and balancing capacity results may be more complex to anticipate and understand. This affects both long-term investments in flexible assets and forward markets settling on the SDAC price.

When assessing the benefits of different co-optimization implementation variants, changes in bidding behaviour need to be considered. Simulations with historical or synthetical data can provide insights into the computational aspects of the algorithm but will not provide a valid quantitative assessment of the potential benefits.

ACER acknowledged in its evaluation report[4] the increased complexity in bids due to intertemporal dependencies for storage units. However, that was not considered in the study at all. Feedback from market participants must be adequately considered with a proper qualitative assessment of the potential benefits and drawbacks of co-optimization. We also doubt that such a complex optimization task can be calculated in a reasonable time with acceptable security for the results. As mentioned before, the costs incurred by market participants (changes of optimization processes, implementation for creating the "new bids", etc) are not incorporated in the valuation of co-optimization.

In the initial statement on page 1, it is emphasized that other markets where co-optimisation is applied are fundamentally different. Central dispatch and unit-based bidding are used, and all subsequent timeframes are included. Energy trading and dispatch optimization in EU energy markets is not a single exercise formulated into a day-ahead bid but is continuously performed up to delivery.

[4] https://www.acer.europa.eu/sites/default/files/2024-09/ACER_Decision_11-2024_Annex_V.pdf, Nr. 12

An accepted balancing capacity bid is an obligation that cannot be reversed like an accepted energy bid that forms a trade position. Unlike in a central dispatch setting, market participants bear full responsibility for delivering the assigned balancing capacity and therefore need to have control over the offered and accepted capacity.

It is unclear which Standard Product Balancing Capacity is envisaged in the study. Currently, the 4h block for balancing capacity is well established in several markets. Reducing the product length will result in additional costs for balancing capacity provision due to frequent changes in unit allocation.

We also disagree with the statement from the 5.5 chapter in the N-Side Co-optimisation study that there have not been any fundamental showstoppers identified at this stage as the study is of insufficient complexity and only on a theoretical level. In the same part, it is also mentioned that several risks and challenges are not solved.

Additionally, there is a risk of losing liquidity in the day-ahead market as the complexity of the bids will cause an exodus of market participants to the SIDC markets, significantly reducing the balancing volume of bids in the market.

An additional element not covered in the report is the case where starting costs are covered by multi-day operations. It only confirms that the dependency on explicit price forecasting measures cannot ever be completely avoided.

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