ENTSO-E European Resource Adequacy Assessment 2021 consultation

A Eurelectric response paper

January 2022

Eurelectric represents the interests of the electricity industry in Europe. Our work covers all major issues affecting our sector. Our members represent the electricity industry in over 30 European countries.

We cover the entire industry from electricity generation and markets to distribution networks and customer issues. We also have affiliates active on several other continents and business associates from a wide variety of sectors with a direct interest in the electricity industry.

We stand for

The vision of the European power sector is to enable and sustain:
- A vibrant competitive European economy, reliably powered by clean, carbon-neutral energy
- A smart, energy efficient and truly sustainable society for all citizens of Europe

We are committed to lead a cost-effective energy transition by:

investing in clean power generation and transition-enabling solutions, to reduce emissions and actively pursue efforts to become carbon-neutral well before mid-century, taking into account different starting points and commercial availability of key transition technologies;

transforming the energy system to make it more responsive, resilient and efficient. This includes increased use of renewable energy, digitalisation, demand side response and reinforcement of grids so they can function as platforms and enablers for customers, cities and communities;

accelerating the energy transition in other economic sectors by offering competitive electricity as a transformation tool for transport, heating and industry;

embedding sustainability in all parts of our value chain and take measures to support the transformation of existing assets towards a zero carbon society;

innovating to discover the cutting-edge business models and develop the breakthrough technologies that are indispensable to allow our industry to lead this transition.

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WG Wholesale Market Design & Investment Frameworks

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Documents under consultation:
ERAA 2021 | Downloads

6. The ERAA target methodology is set to support the achievement of the EU 2030 climate and energy objectives set out in Article 1(a) of Electricity Regulation. Do you agree that the ERAA 2021 is already an important analysis in view of EU ambitious climate and energy targets?

- Strongly agree
- Agree
- Neutral
- Disagree
- ***Strongly disagree***
- Don't know

7. How is the ERAA 2021 useful to you or your business?

- Adequacy situation in the mid-term drives our business decisions.
- The results of ERAA are a support for our policy or regulatory decisions.
- We are interested in understanding the methodology of ERAA for research purposes.
- ***We are interested in understanding the methodology of ERAA for business/consulting purposes.***
- ***Other (please explain)***

In case you checked the box "Other", or in case you want to give additional explanations, please provide your comments in the text box below.

Coming back to our answer to Q6, there are important shortcomings/open questions in the assumptions, methodology, and results of ERAA 2021. See additional detailed national inputs revealing the problematic situation. Besides, the primary goal of ERAA is to contribute to ensuring security of electricity supply by highlighting potential future resource adequacy issues considering (i) the energy policy choices made to reach the climate objectives pursued, (ii) the expected evolution of demand, (iii) the expected evolution of supply (additions and retirements). The objective is not to support the EU climate objectives and targets as such. Incidentally, let us stress that there does not exist a single EU target for security of electricity supply, but a collection of national targets.

As an outcome of the Clean Energy Package, the Electricity Regulation introduced the European Resource Adequacy Assessments (ERAA) as a cornerstone for setting up and maintaining capacity mechanisms (capacity markets and strategic reserves). Where needed, ERAA 2021 confirms that capacity markets can help to reach the reliability standard set by the public authorities while achieving we highlight that capacity mechanisms are deemed necessary to ensure system adequacy while reaching the ambitious EU decarbonization objectives. Eurelectric believes important to ensure that ERAA will ultimately be fit for purposes and ensure the identification of adequacy issues

In addition, we would be interested if ENTSO-E could provide further analysis to help us understand why there are major discrepancies between national results in ERAA and between ERAA and other NRAAs. Also, some clarification on assumptions would be most welcome, for instance, in the case of Spain.

Finally, the underlying methodology still needs further improvements in order to provide reliable results.

8. In your opinion, what are the most important methodological achievements of the 2021 ERAA edition? Rank your answers from 1 (most important) to 5 (least important).

- Pan-European Adequacy simulation → ***2***
- Economic Viability Assessment → ***1***
- Flow-Based Market Coupling → ***4***
- Temperature-Detrended Climate Database → ***3***
- Other → ***5***

In case you checked the box "Other", or in case you want to give additional explanations, please provide your comments in the text box below.

While some achievements were made in this first ERAA 2021 exercise, there is clearly room for several improvements. A particular attention should be set in explaining the results obtained for some countries, esp. what would be the fundamentals behind ENTSO-E analysis, notably in comparison with NRAAs.

9. Are the ERAA 2021 Economic Viability Assessment results and conclusions in line with your expectations?

- Yes, in line with my expectations
- ***Mixed answer, somewhat in line with my expectations***
- No, not in line with my expectations
- No opinion

Additional comments:

It is important to stress that some limitations in the modelling approach are affecting downwards the level of our expectations towards the EVA results and conclusions.

Please refer to the comments provided in our response to the ACER's consultation as well as the elements mentioned below.

The Economic Viability Assessment (EVA) was long overdue. Eurelectric welcomes this methodological improvement. Nonetheless, the EVA methodology and ERAA underlying assumptions must be improved significantly improved to provide reliable results.

Finally, ERAA should not be considered as the only tool for decision-makers but it should be complemented by more accurate national assessments to be used as a basis for policy decisions regarding generation adequacy.

If no, what did you expect differently (multiple answers are possible; specific zones and technologies can be mentioned in the accompanying text box below):

- More retirements
- Fewer retirements
- More investments
- Fewer investments

Additional comments:

Pending on the country, we question the way the ERAA is interpreting the retirements and investments which leads to shortcomings in the results (such as the impact on the reliability standard)

We note some inconsistencies regarding LOLE/ENS indicators and expected net revenues, which should be analysed and further explained in the overall EVA results. For example:

- ***Simultaneous decommissioning of CCGT and commissioning of significant DSR, both with similar fixed costs (30EUR/kW/y) but DSR with higher activation cost than CCGT.***
- ***There are countries in table 11 of Annex 2 where different technologies receive substantially different net revenues from ENS (which is same for all technologies). These differences do not seem directly justified by differences in availability and variable costs.***
- ***The detailed results of the ERAA 2021 (Annex 2, Table 11) show that, many plants would have a net margin equal to zero in the EVA 2025 by assuming the generation mix from the National Estimates, without taking into account the effect in economic viability of previous target years.***
- ***Expected evolution of the EVA results when other resources could retire/enter in future exercises (i.e. different types/duration of storge) are not explained in the ERAA documents.***

We would appreciate full interpretation of the results from ENTSOE, showing overall consistency of the national results presented in the documents, as a first step to define priorities of improvement in future ERAA in the roadmap.

In the absence of convincing explanations (in the report or, at least, in a dedicated workshop) Eurelectric finds it difficult to check/confirm - from the elements provided by ENTSO-E - whether the Economic Viability Assessment is properly modelled in ENTSO-E tools, which are the intrinsic limitations of the approach and whether the results obtained are properly reflecting the expected market dynamics.

What are your key takeaways from the EVA results and conclusions?

ERAA 2021 is far from meeting the legal requirements (specially art. 23.1 and 23.5 of Electricity Regulation). In particular, the EVA should still be considered as "work in progress". Although we acknowledge the full methodology is expected to be deployed in 2024, we think that nowadays there is still room for clarifications and improvements in this first EVA in particular, as stated in our response to ACER's consultation and the answer to question above.

Overall, ERAA should not be considered as the only tool for decision-makers but it should be complemented by more accurate national assessments to be used as a basis for policy decisions regarding generation adequacy.

10. Are the ERAA 2021 Flow Based Market Coupling proof of concept results and conclusions in line with your expectations?

- Agree
- Neutral
- ***Don't agree***
- Don' Know

Additional comments:

While the flow-based (FB) analysis is not relevant for all countries, in some cases, a more in-depth analysis is necessary.

Overall, we welcome the POC related to the use of FB model for capacity calculation and allocation as this is the EU target model, especially for meshed grids.

However, as FB is already implemented in CWE region for some years and in the CORE/Nordic region in the near future (2022), we find it a missed opportunity to not have implemented the FB approach for all scenario targeting the years 2025 and 2030 (at least for CORE which currently performing external parallel runs for the DA process)

Regarding the CNEC selection, we feel the approach lacks some pragmatism by only considering extreme sets (A, B and C). Why not selecting a more probable subset (of C which contains all the CNEC that will be used in CORE) checking against high PTDF value for example (similarly the temporary approach described in the DA CCM)?

"NTC modelling stands between FB Domains Set A and B, as already observed examining total EENS". This is quite worrying. Should the FB approach not always lead to a larger domain than the NTC approach? We fail to understand why the FB Set B and C create more EENS than the NTC approach, that should, to our understanding, consider the same CNEC when determining the bilateral NTC values. Do we have to understand that FB approach undermines adequacy while offering a larger space for commercial exchanges? This would be a counter intuitive result. This requires further investigation and/or explanation.

While the scope of application of the FB approach is clearly defined, we miss the explanation on Advanced Hybrid Coupling which should ensure an efficient coupling is done between different CCRs (applying FB or not).

What are your key takeaways from the Flow-Based market coupling proof of concept results?

The FBMC methodology should be further improved before being assessed in more details. Eurelectric stresses the importance, when assessing the adequacy of the electrical system's resources, of carefully considering the physical feasibility of the resulting flows.

At least, Eurelectric recommends considering transmission capacities that reflect to the best possible extent the real capabilities of the network during stress events. This could be done either by reducing the level of interconnection capacities available or by incorporating re-dispatching and counter-exchange measures. This aspect has become central since the requirement for a minimum level of available trans-zonal capacity (MACZT) of 70% that reduces the link between physical and commercial exchange capacity.

In addition, Eurelectric recommends assessing the sensitivity of the results to the key assumptions underlying the FBMC modeling and its underlying data set. Indeed, the 2019 MAF results illustrated that the impact of FBMC could be significant for some countries.

11. Should any additional analysis of results be considered in future ERAA reports?

More analysis of the results should be provided: the current report is rather descriptive of the results obtained, while further analysis of the fundamentals behind could be reported. Eurelectric would also appreciate that ENTSO-E explains how the results obtained are in line with the expected economics behind adequacy assessments and how deviations from the modelled situations would impact the results/conclusions.

A non-exhaustive list is as follows:

1) ***Result sensitivity analysis should include higher carbon price levels than those currently used (40€/tCO2 in the main case and 60€/tCO2 in an alternative scenario) given currently prevailing EUA prices.***
2) ***Further details are needed to better understand the fundamentals behind the forecasts, in particular on the assumption taken for Demand Side Response (DSR), storage potential, (e.g. estimated duration), the availability of firm dispatchable capacities during stress events (see e.g. the recent update of RTE for Winter 2021-2022), etc. Considerations on DSR to be economically viable in 2025 should be well justified in ERAA and EVA analysis.***
3) ***A price cap of 15,000 €/MWh is used in the EVA: this assumption has to be justified. As a matter of fact, the current discussion on high energy prices illustrates that price spikes that would be needed in theory would (most probably) not be accepted in practice. In addition, some capacity markets are including a pay-back mechanism based on reliability options (e.g. Italy, Belgium). It would be interesting to know whether and how this feature has been considered for existing/future capacity markets.***
4) ***Distribution aspects – see also comments in our response paper to the ACER consultation.***
5) ***NECPs objectives and achievements should be carefully considered and not be taken for granted – see also comment in our response paper to the ACER consultation.***

12. What are in your opinion the most important features to be developed in future ERAA editions with regards to the adequacy assessment? Rank your answers from 1 (most important) to 7 (least important).

- Improvement of demand forecasting methodology → ***7***
- Inclusion of climate change in the PECD → ***6***
- Consideration of more recent climate years in the adequacy simulations → ***4***
- Improvements of the results' analysis (describe in comment below) → ***5***
- Increase of the number of target years → ***1***
- Improvements of the maintenance optimization methodology (describe in comment below) → ***2***
- Other → ***3***

Additional comments:

In general, it should be noted that many of the considerations above are required by the Electricity Regulation and/or ACER methodology. Eventually, several features mentioned above (recent climate years, inclusion of climate change, number of target years) will have to be integrated in future ERAA editions. Therefore, we encourage accelerating the integration and development of these elements before considering additional elements/improvements.

Regarding improvement of demand forecasting methodology, this is not specific to ERAA and part of the core business of TSOs. Unfortunately, we notice that in some countries such an approach is not fulfilled.
ERAA should also consider forced outages that are not known at the time of the Unit Commitment Economic Dispatch to introduce a disruptive component in the optimization algorithm. In fact, the ERAA should consider a situation of simultaneous shortage of generation capacity in Europe to correctly assess adequacy issues in importing bidding zones (e.g. bidding zone Italy North).

Lastly, we call for a better inclusion of external stakeholders in the development of the future ERAA, as established in Art. 27 of the Electricity Regulation.

13. What are in your opinion the most important features to be developed in future ERAA editions with regards to the Economic Viability Assessment (EVA)? Rank your answers from 1 (most important) to 7 (least important)

- Consideration of a combined multi-year EVA → ***1***
- Inclusion of additional technologies as investment candidates in the EVA (name technologies in comments) → ***7***
- Stochastic EVA, instead of current deterministic approach → ***4***
- Increased number of climate years (CY) for the EVA → ***5***
- Improvement in the methodology for CY scenario reduction for the EVA → ***3***
- Implementation of the EVA on a Flow-Based model instead of an Net Transfer Capacity model → ***6***

Additional comments:

The current EVA methodology (in particular, in the scenario without capacity mechanism - CM) is based on the addition/withdrawal of assets using an iterative economic optimality search process. Particularly, the EVA methodology does not consider some of the difficulties that market players face in the real world: market risks and the underlying uncertainties over the long term, regulatory risks (e.g. changes in energy policy, permitting), technology risks (e.g. which options will prove profitable over the long term), etc. Moreover, EVA does not consider additional revenue for the generating units besides the wholesale electricity market, i.e., revenues from district heating or ancillary services, which may also impact their economic viability.

Inclusion of additional technologies as investment candidates in the EVA: energy storage systems (especially batteries and pump hydro plants) should be considered as investments candidates in the EVA since their impact on the adequacy parameters can be significant considering the increasing penetration of non-programmable RES. Furthermore, electrolyzers should also be considered, taking into account their importance in reaching the EU 2030 climate and energy objectives.

Improvement in the methodology for CY scenario reduction for the EVA: we understand that only representative climate years are simulated in the EVA model due to computational cost. However, the selection of representative climate years should take into account the expected climate evolutions of the next decade in order to better represent the future climate conditions. To do that, representative climate years should be built considering the expected impact of climate change or, as a second best, significant past years (i.e. years characterized by high temperature) having climate characteristics similar to the ones expected in the Target Years can be considered as representative.

Implementation of the EVA on a Flow-Based model instead of a Net Transfer Capacity: the implementation of Flow-Based model should contribute to a better representation of the adequacy contribution of neighboring countries, which is important in particular for bidding zones heavily relying on imports.

14. In your opinion, which items should be prioritized for future ERAA editions including ERAA 2022? Rank your answers from 1 (highest priority) to 7 (lowest priority)

- Modelling and sizing of Implicit DSR → ***1***
- Modelling of Electrolysers → ***4***
- Causal analysis (as part of results' analysis) → ***2***

- Modelling of dynamic price caps → ***3***
- Consideration of shortage pricing → ***5***
- More granular Value of Lost Load (VoLL) values per bidding zone → ***6***
- Improvement of the demand regression model → ***7***

Additional comments:

Before contemplating the addition of new features/items in future ERAA editions, we believe that the current elements like stochastic multi-year EVA and FBMC should be further improved. The additional questions are whether the additional items would impact (i) the adequacy assessments and to which extent (first order / second order?), (ii) the economic viability assessments (first order / second order?). This should help find the trade-off between "must have" features and "nice to have" features, keeping in mind the nature of the ERAA exercise (prospective modelling, which will always have limitations on its own).

Modelling and sizing of implicit DSR is of importance, especially for the smart charging of EVs with view to the development of E-mobility.

Casual analysis is important to ensure consistency and coherence of the ERAA.

15. Which additional scenarios or sensitivities would you be interested to see in future ERAA editions? Rank your answers from 1 (most interested) to 6 (least interested).

- Sensitivities on the CO2 price assumptions → ***1***
- Different price cap → ***3***
- Scarcity pricing → ***5***
- Sensitivities on the demand levels → ***2***
- Extreme weather conditions → ***4***
- Other

Additional comments:

As highlighted in Q14, question is whether the additional scenarios or sensitivities are bringing added value in anticipating properly adequacy issues. Sensitivities on the CO2 price assumptions and on demand levels (test different levels of electrification for example, cf. TYNDP-2022 assumptions) would be very insightful.

In any case, the ERAA should include explanations on how these elements are considered in the methodology, what are the assumptions retained, and clarify the analysis (esp. any divergence between modeling and reality).

Other and Extreme weather conditions: future ERAA editions should consider a situation of simultaneous shortage of generation capacity in Europe to assess the impact on importing Member States.

Finally, Eurelectric underlines that the capacities used should reflect to the best possible extent the real capabilities of the network. It should not take into account artificial increases stemming from capacity calculation methodological aspects (e.g. the 70% threshold pursuant to Regulation 943/2019 or the thresholds resulting from national trajectories in MS with national action plans). Indeed, the resulting network constraints may have to be dealt with through cross-border remedial actions (e.g. countertrading) whose availability is not guaranteed in tense situations.

16. Being the first implementation of the ERAA methodology, ERAA 2021 assesses target years 2025 and 2030. The number of target years will increase in future editions in order to better represent the target 10-year time horizon. From the ranges listed below, which time frames do you find most important to model in ERAA? Rank your answers from 1 (most important) to 4 (least important).

- 1 to 3 years ahead → ***4***
- 4 to 5 years ahead → ***3***
- 6 to 7 years ahead → ***2***
- 8 to 10 years ahead → ***1***

Additional comments:

EVA should transition from a single-year to a multi-year assessment. The number of target years is insufficient and should include a year-per-year trajectory until 2030 (starting from 2022). Information for a single year is not that meaningful unless a complete picture is provided, because what is important for investment decisions is the trajectory.

The identification of short-term adequacy issues (e.g. in the next 3 years) are probably best dealt with by the national resource adequacy assessments made by TSOs or by short-term and seasonal adequacy assessments (see Regulation (EU) 2019/941).

It would be interesting to get more in-depth comparison between ERAA and NRAA exercises, both on the assumption side and on the result side. Some TSOs are already pointing out the quality of their NRAA analysis, but it would be good that their best practices would progressively be included in the ERAA.

17. Do you have additional suggestions or comments?

See also comments provided in our response to the ACER's consultation, and, in future, we would suggest sharing the results prior to the official publication.

Eurelectric pursues in all its activities the application of the following sustainable development values:

Economic Development

- Growth, added-value, efficiency

Environmental Leadership

- Commitment, innovation, pro-activeness

Social Responsibility

- Transparency, ethics, accountability

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Annex : National assessment ENTSO-E ERAA 2021

Belgium

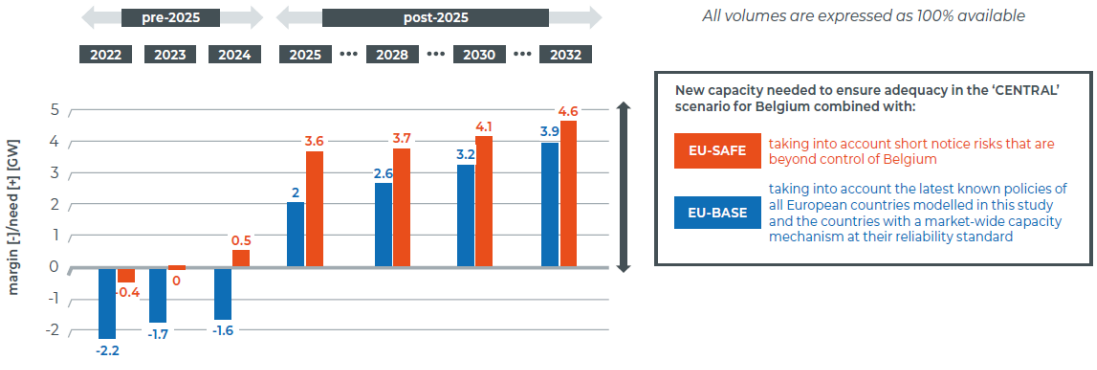
The risks of NIMBY are ever increasing and are becoming a serious threat to the development of interconnection infrastructure, new onshore wind and other major investments. We feel that this is not properly taken into account in the scenarios, this is risky, as a too optimistic approach on this issue could result in adequacy issues in the longer run.

Belgium is extremely well interconnected, which is as such a very beneficial situation, however, this also comes with additional risks. Given the high level of interconnections of Belgium, availability of firm dispatchable capacities in neighbouring coutries during stress events in the coming decade will have strong impact on Belgium's adequacy. For example, the uncertain level of actual availability of the existing firm dispatchable assets in France or the ambitions of the new government in Germany to reach a "zero carbon" economy by 2045 (i.e. phasing-out the contribution of lignite and coal in the German energy mix) could further stress the adequacy situation of Belgium. This explains why Belgium should probably not rely too much on Germany or France in the coming decade for its adequacy. In addition, we believe that meeting the MinRAM requirements is very challenging.

From the above, it is clear that **the "Central scenario" is too optimistic** when it comes to import capacity of Belgium. In its adequacy and flexibility study 2021 (covering the period 2022-2032), the Belgian TSO Elia is also modelling a 'EU-Safe' scenario, taking into account short notice risks that are beyond the control of Belgium and thus reducing x-border available capacity. Given the many uncertainties at EU level (availability of French firm dispatchable assets, new decommissioning announced, accelerated coal phase-out, risk on 70% minRAM requirement not reached, Brexit,...), the EU-Safe scenario is more representative than the central one but still only partially considering those external risks.

In this scenario, the structural need for new capacity in Belgium amounts to 3,6 GW in 2025 and gradually increases to reach 4,6 GW by 2023. Given that we observe structurally an even more important unavailability of foreign firm dispatchable assets than recommended to be considered by Elia, the GAP value is likely to increase at the 2025 horizon.

[FIGURE 6-1] — NEW CAPACITY REQUIRED IN THE 'CENTRAL' SCENARIO FOR BELGIUM TO MEET THE RELIABILITY STANDARD OVER THE COMING 10 YEARS



Generation: has the additional closure announcements been considered? (cf. Vilvoorde power plant and Seraing ST).

Demand: post Covid recovery and boost of electrification policies being put in place in Belgium is likely to increase the total demand & average peak demand; the electrification trends used in the ERAA are dated from end 2019: this is no longer up-to-date and does not integrate new policy announcements (cf. boost of EVs in Flanders and decision to make the large company cars' fleet greener).

RES: ambitions of the NECP (2019) are high; the start of the commercial operation of the second wind offshore zone is likely to be delayed compared to initial planning in 2026 (delay also expected in the infrastructure works). We also observe important NIMBY effects for wind onshore projects, putting the ambitions at risk (context especially difficult in Wallonia). Overall, the RES potential in Belgium is limited.

Demand Response: ambitions are also excessively high; we observe important participation of demand response in the last CRM auction for 2025-26 (around 350 MW derated -> low hanging fruit) but still far from the expectations of Elia and national authorities; the roll-out of smart meters will be key to unlock demand response at residential/SME level while the different regions have different paces. It is clear that Belgium has always been a front-runner in the development of demand response; however, the ambitions of Belgium are high compared to neighbouring countries.

Storage capacity: potential is also ambitious; due to improved conditions for future CRM auctions (better contribution to SoS via the derating factor), it's likely to attract new projects; but for the moment, only 40 MW of batteries have been contracted for the CRM year 2025-26 while the ambition was set initially around 1GW. V2G: the roll-out also depends on the technology to make EVs active market participants in the electricity market as well as the behaviour of the consumers.

Offshore: we assume that the most realistic scenario is to reach 3 GW by 2028 and 4,4 GW by 2030. To reach 4,4 GW major investments in grid infrastructure are required, which have still not begun, so there is a lot of uncertainty related to the feasibility of the deadlines.

Economic viability: we agree that the majority of the thermal fleet (also existing) will not be economically viable in the future in the absence of a capacity market (as recently introduced for Belgium).

France

Despite some shortcomings mentioned in Eurelectric feedback, UFE welcomes the results of the assessment for France, which seem to provide a vision of adequacy in line with the 2025 horizon for France.

Generally, UFE takes note that the report:

1) mentions a downward pressure on capacity in 2025 due to the effect of capacity mechanisms on availability of thermal generation, of new flexibility tools such as storage and demand response, able to respond to the sudden variation of demand and supply, and
2) underlines a risk of system inadequacy in many markets without intervention at the 2025 horizon (notably in CWE).

It illustrates that the existence of capacity mechanisms, such as it is the case in France, reduces that risk and brings countries closer to their reliability standard.

The 2030 horizon remains to be refined in the next editions of ERAA.

- **As regards to France, ERAA 2021 confirms the need for a capacity market by 2025 to reach the reliability standard set by the public authorities.** Indeed, these results seem to be in line with national elements published by the French TSO RTE in March 2021 and the capacity mechanism in place.
- **UFE welcomes that the country report annex highlights the differences in the methodological approaches between ERAA and national adequacy reports (NRAA)**, as well as the advice for many countries to read ERAA results in conjunction with these national reports, especially as some methodological aspects of ERAA need evolution and improvement. In addition, we would be interested if ENTSO-E could provide further analysis to help us understand why there exists major discrepancies between national results in ERAA, but also between ERAA and other NRAAs.

Italy

About TY 2025, the ERAA does not show any critical issues in the Northern zone, while the RA shows a LOLE between 5 and 10 hours. This happens with a thermo-base capacity that ERAA estimates to be just over 51 GW and the national RA around 54 GW (the values of renewable capacity are instead aligned). Therefore, despite almost 3 GW of lower installed thermoelectric capacity (half of that is conceivable in the northern zone), the ERAA shows a much lower LOLE (equal to 0) than that identified by Terna in the Rapporto Adeguatezza 2021 (RA). The only different hypothesis of calculating the import contribution (illustrated for example in par. 10 of Annex 5 "Country Comments") would not, therefore, seem to justify such a large deviation (having also lower thermal installed capacity in the ERAA analysis). As such, we ask to clarify whether this divergence is a consequence of additional factors / non-homogeneous assumptions between ERAA and RA (in addition to the different import models used).

A similar situation occurs for **TY 2030**. The ERAA - which assumes a thermo-base capacity value of approximately 51.5 GW - does not seem to highlight any critical issues. While the RA - which estimates a thermal base capacity of around 54 GW - does not see any critical issues provided that in 2025 we have 0.5 GW of new capacity available in Sardinia. Also, in this case, we call for further clarificationto justify this different view.

Moreover, we believe that **national adequacy reports and the ERAA** should be based on the same database and assumptions to compare their results. Taking into account, as an example, regarding the adequacy assessment of Italy, the thermoelectric installed capacity in 2025 and 2030 in the ERAA 2021 is around 51,4 GW while the national adequacy assessment published by the Italian TSO estimates 55 GW (the values of renewable installed capacity are instead aligned). Therefore, we ask to clarify the rationale for this difference. This kind of discrepancies should be duly justified.

About flow-based analysis: while the flow-based analysis is not relevant for all countries, in some cases, a more in-depth analysis is necessary. For example, in Italy (especially in Italy North bidding zone), the adoption of the Flow-Based Market Coupling model could be important to better assess adequacy contribution from neighboring bidding zones.

Finally, in our view, a **greater coordination with TSOs is essential**: national adequacy reports and the ERAA should be based on the same database and assumptions to compare their results. In fact, as previously reported, we note that the Italian thermoelectric installed capacity in 2025 and 2030 in the ERAA 2021 is about 51,4 GW while the national report estimates 55 GW. Moreover, discrepancies should be duly justified in the Country Comments Annex.

Poland

ERAA 2021 Economic Viability Assessment results and conclusions:

- CO2 forecasts for 2025 and 2030 seems very conservative in the light of current trends and prices.
- The capacities used should reflect to the best possible extent the real capabilities of the network. It should not take into account artificial increases stemming from capacity calculation methodological aspects (e.g. the 70% threshold pursuant to Regulation 943/2019 or the thresholds resulting from national trajectories in MS with national action plans). Indeed, the resulting network constraints may have to be dealt with through cross-border remedial actions (e.g. countertrading) whose availability is not guaranteed in tense situations.

ERAA 2021 Flow Based Market Coupling proof of concept results and conclusions:

- To achieve consistency with real network development as required by the Electricity Regulation, ERAA should consider projects in development phase only. Indeed, a conservative approach would facilitate the assessment of resource adequacy issues that would be solved by a subsequent development of planned-only projects and other resources. To this extent, we should highlight that new interconnection projects are only a way to solve potential adequacy issues, among several other measures/assets (e.g. storage, DSR, new generation, CRMs).

Portugal

For the EVA analysis, the taxes at national levels supported by power plants should also be considered. In case of Portugal, we have: i) the social tariff (~90M€/year) that is borne by producers in the ordinary regime; ii) CESE (Special Contribution of the Energy Sector), with ~40M€ mostly supported also by producers in the ordinary regime; iii) variable taxes, such as the clawback (which varies every year and depends if the 7% tax and the green tax in Spain are in place). These taxes, which mostly represent fixed annual costs, have a significant weight in the annual costs of power plants and should be considered in the EVA analysis.
In Annx I, page 43, it is written that for Portugal "Medium/long-term NTC values do not consider the 70% minRAM requirement yet. The available values were calculated in joint studies with the neighbouring TSO previous to the publication of this rule." We think it should be clear what were the NTC availability levels that were considered.

Furthermore, there is **no data presented in the file "PEMMBD National Estimates"** regarding the derating factors of capacity in Portugal.
The **wholesale market cap of 15k€/MWh does not apply to Portugal, where** the maximum price is 3k€/MWh. We consider that this 3k€/MWh should be considered in the basis scenario, and not as a sensitivity analysis.

In the **latest RMSA,** it was considered 100 MW of battery storage in 2025 and 200 MW in 2030, in the "Ambition scenario" (table 4), which is the one considered for the ERAA, but no capacity from batteries was considered in the scenarios in ERAA.

In the **scenario "Low thermal capacity 2025/30"**, it should be considered the closure of 990 MW in 2024, which correspond to Turbogas power plant, which has a PPA contract that ends in 2024 – in the stress test of RMSA-E scenario, this plant also closes in 2024. By the way, we think it should become clearer what was the methodology for the TSOs to define the amount of lower thermal capacity.

Regarding **demand estimates**, the yearly demand for 2025 ranges between 50.7-51.5 TWh and for 2030 between 55.4-56.2 TWh. The scenarios from RMSA have a higher range: between 50.2 TWh and 53.6 TWh for 2025 and between 52.5 and 59.8 TWh for 2030. This difference can also explain why, as noted in Annex 5 of the ERAA, the RMSA sees a security of supply issue for 2025 with the decommission of 990 MW of thermal capacity in Portugal.
Regarding **the excel "PEMMBD National Estimates", Sheet "Forced Outage rates"**: it appears that coal capacity has been considered in PT in 2025 and 2030, when Portugal is already today free from coal. Furtheremore, for Portugal and Spain, the capacity for #Forced outage rates" appears constant for 2025 and 2030, which is not coherent with figures in the sheets "National estimates". We would welcome clarifications on those two points and whether we have the correct understanding.

Spain

In **the case of Spain, the scenario planned in the National Energy and Climate Plan 2025 is unrealistic**. Meanwhile NECP 2030 scenario remains very challenging, since it will require to significantly accelerate investments in renewable energies and to enable investments in flexible and firm capacity as batteries and hydro pumping storage and demand-side management.

The ERAA scenario, taken from NECP 2025, assumes a total of 21,900 MW of additional renewable capacity – 11,750 MW wind, 7,670 MW solar PV and 2,500 MW solar thermal generation (CSP with 8 hours of storage) in addition to 850 MW new hydro pumping storage and 500 MW new batteries, all this to be built and fully operational in just 4 years and the whole fleet of CCGT.

Capacity mix (MW) foreseen in ERAA National Estimates Scenarios versus PNIEC

	2021	2025		2030		
		National Estimates EERA	PNIEC	National Estimates EERA	PNIEC	**New investments (2022-2025)**
Nuclear	7,117	7,117	7,117	3,040	3,050	
Coal	4,643	1,998	2,085	0	0	
CCGT	24,562	24,499	24,560	24,499	24,560	
Hydro(+pumping)	20,423	21,272	21,260	24,162	24,140	850
Wind	27,480	39,226	39,226	48,550	48,550	11,750
Solar (PV)	13,399	21,063	21,064	38,404	38,404	7,670
Solar (Thermal)	2,304	4,801	4,800	7,300	7,300	2,500
Others renewable	1,219	1,090	1,090	1,730	1,730	
Others non-renewable	5,999	4,825	4,825	3,980	3,980	
Batteries	0	500	500	2,500	2,500	500

Data 2021: monthly newsletter for October 2021, System Operator (REE)

Such capacity mix is very unlikely:

- It is unrealistic the consideration of 2,000 MW coal generation in 2025, since the closure of all coal units (except Aboño 900 MW) has already been approved. At the end of 2021 there are only 4,890 MW of active coal plants.

Central	MW
Soto 3	346,25
LaRobla2	355,10
Guardo 2	342,43
PGR	1.403,19
Lada 4	347,70
Narcea3	347,47
Puentenuevo3	299,76
Los Barrios	570,05
Aboño 1	341,79
Aboño 2	535,87
Total	4.889,61

and PGR has already applied for the decommissioning authorization, which should be awarded in early 2022. By 2025, coal capacity in Spain will be just 877 MW (Aboño 1 and 2) and not even that, since this power plant is expected to be retrofitted to burn steel gas reducing their capacity to 200 MW.

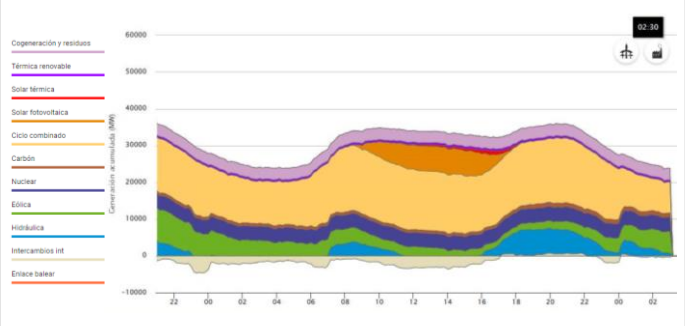
- It is uncertain how the forecasted 850 MW hydro pumping storage will be achieved in 2025 since at this moment there are no projects under construction or advanced permitting, neither market nor regulatory conditions to undertake them.
- There are no battery storage projects being developed or planned, and not even the necessary regulatory development is completed. However ERAA assumes there will be 500 MW in place as of 2025 even when neither market nor regulatory conditions incentivize their deployment.
- Regarding the entrance of renewable energies, in recent years most of it is taking place via auctions (since 2015 15,024 MW have been awarded a remuneration scheme in 5 auctions, out of which 8,837 MW have entered operation); additionally, in the most updated same period, 5,156 MW of merchant capacity have entered the system purely on market signals, without participating in any auction or receiving any specific remuneration). In this period, there have been 859 MW of new merchant RES capacity per year. It is unclear whether the same rhythm of merchant capacity growth can be maintained between now and 2025, since investor's confidence has been impacted by the regulatory instability as a consequence of recent interventions in the market. However, we will assume that a pace of 1,000 MW/year can be maintained. According to the most updated calendar of auctions published by the Government in December 2020:
    - Wind: there are 27,500 MW installed wind capacity as of November 2021. We can expect an addition of 4,700 MW to be fully operational in 2025. This figure comes from the 3,200 MW with remuneration already granted in the last two auctions (Jan. 2021 and Oct. 2021) and another 1,500 MW to be auctioned in 2022. Even assuming an extra 2,000 MW of merchant wind capacity (a very optimistic assumption), that makes 34,200 MW in total to be operational in 2025. However, ERAA (and NECP) considers 39,200 MW. In any case, the key to approximate the ambitions on new renewable stands on good investment climate, which allows the merchant projects to reach their potential.
    - Solar PV: there are 13,400 MW installed PV capacity as of November 2021. We can expect an addition of 4,600 MW to be fully operational in 2025. This figure comes from 2,800 MW already granted in the last two auctions (Jan. 2021 and Oct. 2021) and another 1,800 MW to be auctioned in 2022. Even assuming an extra 2,000 MW of merchant PV capacity, that makes 20,000 MW in total to be operational in 2025. However, ERAA (and NECP) considers 21,100 MW. As addressed for wind, good investment climate is necessary to reach ambitions and with participation of merchant projects.
    - Solar thermal: there are 2,300 MW installed CSP capacity as of November 2021. Considering 3-years' time for permitting and construction, and according to the schedule of auctions up to 2025, included by the government in Orden 1161/2020, a total of 200 MW CSP – 8 hours of storage may be expected to be fully operational in 2025. That makes 2,500 MW in total in 2025. However, ERAA (and NECP) considers 4,800 MW. It should be noted that no auction has been organized so far for CSP in Spain and CPS is at present a technology with high costs and low efficiency compared to other options, like pumping. No merchant CSP capacity has entered the Spanish system so far.

Taking all this into account, the ERAA assumes 21,900 MW of additional renewable generation above the current value, while an already ambitious value based on recent trends would lead to 13,500 MW. And it considers 1,350 MW of storage and hydro pumping by 2025, while a realistic figure would rather be zero. At the same time, it assumes 2,000 MW of coal generation, while by 2022 there will be just 877 MW. In total, the ERAA is built on a scenario that includes 10,881 MW of capacity, with different degrees of firmness, above what can be reasonably expected. There is no analysis of the economic viability of all this extra capacity.

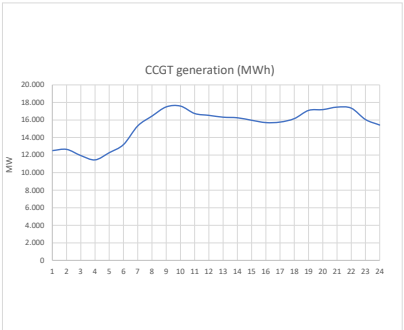
MW	nov-21	ERAA as of 2025	Increase 2025	Realistic increase 2025	Difference
Coal	4.890	1.998	-2.892	-4.013	1.121
Hydro pump storage	5.950	6.800	850	0	850
Batteries	0	500	500	0	500
CSP	2.300	4.800	2.500	200	2.300
Wind	27.480	39.226	11.746	6.700	5.046
Solar PV	13.399	21.063	7.664	6.600	1.064
Total			20.368	9.487	10.881

In case Spain does not achieve the ERAA National Estimates for Spain in 2025, there is a serious risk of security of supply if 14,643 MW of CCGT are decommissioned

Electricity generation (MWh) to cover demand on the 30th November 2021



CCGT generation (MWh) to cover demand on the 30th November 2021



The ERAA assumptions on the economic viability of DSR in Spain

It is particularly surprising that in the case of Spain, the ERAA National Estimates foresees the incorporation of 0 MW of Demand Side Response (DSR) in 2025 while the economic viability study (EVA) suddenly increases DSR in Spain in 2025 up to 719 MW, which more than doubles the total DSR emerging from EVA throughout Europe. In Spain no MW of DSR is yet active since there is no business case yet for this technology without a CRM.

The ERAA should extend its analysis to 2030. Limiting the analysis to 2025 gives no time to react in case generation adequacy is at risk.

In the case of Spain, the time horizon 2025-2030 is of special relevance since in those years most of the nuclear portfolio will be decommissioned (4,160 MW). That makes the year 2030 critical in terms of security of supply.

Calendar agreed with the Spanish Government for final shutdown of nuclear power plants

Plant	Capacity (MW)	Final shutdown date
Almaraz I	1049	2027
Almaraz II	1052	2028
Ascó I	1032	2029
Ascó II	1027	2030
Cofrentes	1092	2033
Vandellós II	1087	2034
Trillo	1066	2035

The ERAA assumptions in terms of acceptable levels of security of supply do not seem consistent with the TSOs usual practice

System Operators must ensure security of supply, even in the event of non-favorable scenarios. To this end, the maximum accepted hours of Loss of Load Expectation (LOLE) should be unlikely to be exceeded. That means that the most appropriate adequacy results should be in terms of hours of LOLE at 95th percentile of Loss of Load Duration (LLD) rather than at average LLD when compared to reliability standards.

Results from the ERAA show very different hours of LOLE considering an average scenario, 50th percentile and 95th percentile scenario.

LOLE at average, 50th and 95th percentile LLD for some countries. Scenario without CM, 2025

	Average	P50	P95
BE00	4.15	0.00	20.05
DE00	6.79	3.00	22.05
ES00	1.14	0.00	6.00
FR00	4.28	0.00	22.05

This metric of ERAA is inconsistent with recent reports from the Spanish TSO regarding the closure of some coal plants. In recent reports regarding the closure of Compostilla and Teruel coal plants, in 2019 which amount to a total of 2,100 MW, the Spanish TSO highlighted that the closure of these plants was only compatible with security of supply and security of the system if Naturgy´s mothballing request of 2,000 MW CCGTs was only partially accepted. This opinion from Spanish TSO contradicts the conclusion of the EVA that more than 14,000 MW of CCGTs can be

decommissioned in Spain while maintaining security of supply within acceptable levels (LOLE close to 1 hour).

A lack of coherence raises also when comparing ERAA 2021 results with the national adequacy analysis undertaken by the Spanish TSO as of September 2020 with 2030 horizon. Using Spanish NECP as a reference, the TSO did not detect any adequacy concern but enhanced the fact that the loss of 7 GW of thermal capacity could entail difficulties in terms of adequacy.

It seems clear that, if 7 GW of thermal capacity must not be lost in 2030 to ensure security of supply, 15 GW of thermal capacity cannot be decommissioned in 2025 without creating a serious adequacy issue both in 2025 and later on in 2030.

Assuming the TSO's position on not decommissioning such a volume of gas, and taking into account the increase in RES penetration, the operating profile of CCGTs is estimated to become increasingly flexible with a higher number of start-ups occurring at these plants. As a consequence, there would be a significant increase in both O&M costs and investments. This point is linked to one of the limitations of the ERAA methodology on the optimization of planned maintenance of thermal assets to be taken into account with the increased penetration of renewables.

Sweden

We note that ENTSO-e has assumed that the 70% requirement on minimum interconnection capacity is fulfilled within the Nordics. However, during 2021 the available cross-zone and cross-border capacities have been below, or far below, 70 percent for several connections. According to the Swedish TSO Svenska Kraftnät, there is no quick fix and this will be a problem for the coming ten years. Thus, the results for primarily SE3 and SE4 (southern Sweden) are non-conservative and could be misleading.

For upcoming issues of the ERAA we recommend the inclusion of sensitivity studies on the 70% rule. This would indicate the difference if the rule is met or not.

Is is assumed that the capacity SE2->SE3 will increase from 7300 MW to 8100 MW from 2024 and SE3->SE4 to 6800 MWE from 2026. We question the actual consequence of these increases. SE2->SE3 has not met its current 7300 MW limit since 2017 and SE3->SE4 operated at 40% capacity, at the lowest, this summer. Without access to remedial actions, it will be difficult to increase the market allocated capacity even when the installed capacity has increased. Thus, we are concerned that the results for 2030 might be too optimistic.

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powering people

ACER Consultation on ENTSO-E ERAA 2021

A Eurelectric response paper

December 2021

Eurelectric represents the interests of the electricity industry in Europe. Our work covers all major issues affecting our sector. Our members represent the electricity industry in over 30 European countries.

We cover the entire industry from electricity generation and markets to distribution networks and customer issues. We also have affiliates active on several other continents and business associates from a wide variety of sectors with a direct interest in the electricity industry.

We stand for

The vision of the European power sector is to enable and sustain:
- A vibrant competitive European economy, reliably powered by clean, carbon-neutral energy
- A smart, energy efficient and truly sustainable society for all citizens of Europe

We are committed to lead a cost-effective energy transition by:

investing in clean power generation and transition-enabling solutions, to reduce emissions and actively pursue efforts to become carbon-neutral well before mid-century, taking into account different starting points and commercial availability of key transition technologies;

transforming the energy system to make it more responsive, resilient and efficient. This includes increased use of renewable energy, digitalisation, demand side response and reinforcement of grids so they can function as platforms and enablers for customers, cities and communities;

accelerating the energy transition in other economic sectors by offering competitive electricity as a transformation tool for transport, heating and industry;

embedding sustainability in all parts of our value chain and take measures to support the transformation of existing assets towards a zero carbon society;

innovating to discover the cutting-edge business models and develop the breakthrough technologies that are indispensable to allow our industry to lead this transition.

Dépôt légal: D/2021/12.105/55

WG Wholesale Market Design & Investment Frameworks

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Eurelectric welcomes the methodological improvements in the first European Resource Adequacy Assessment (ERAA 2021) and the work carried out by ENTSO-E. **We particularly appreciate the integration of the Economic Viability Assessment (EVA)**, which we have been asking for for several years.

The assessment of adequacy heavily relies on the future capacity mix. T**o ensure that generation assets included in the scenarios are economically viable to operate (or invest in for new assets) and that the results of the economic viability assessment are not distorted**, Eurelectric raises some considerations below and would suggest at least the following improvements.

First of all, as a general remark, Eurelectric regrets the short time for the two consultations established by ACER and ENTSO-E and their order (i.e. the ACER one closing before ENTSO-E's). In our view, this order is problematic: ACER will need to express an opinion on a version of ERAA 2021 that does not include ENTSO-E's views on comments received in their consultation. In practice, the ENTSO-E consultations could potentially raise questions and recommendations for further adjustments, and this would be an interesting input for ACER assessment. Therefore, such a short ACER consultation seems ineffective in fully gathering the stakeholders' views and feedback on ERAA 2021. More detailed feedback will be submitted in the context of the ENTSO-E consultation.

- **Overall, Eurelectric notes that, regarding the national results, the appreciation is different. In some cases, results for specific countries seem more acceptable than others. Eurelectric will provide more detailed comments in this regard in the ENTSO-E consultation.**

- **About the methodology, ERAA 2021 should strive to align with the requirements of the electricity regulation and ACER methodology to ensure better reliability of assessment results. Indeed, while the full methodology is expected to be deployed in 2024, there is still room for improvements even if the implementation challenges of the methodology should not be underestimated.** As important attention points, Eurelectric calls on ENTSO-E to:
    - Ensure that an economic viability assessment is properly devised in the methodology, implemented in the ERAA modelling framework and used consistently in the scenarios and sensitivities.
    - Define sufficient alignment and comparability of national TSO input data and assumptions and ensure that they are realistic, robust and forward-looking.
    - Define a correct delineation of the different scenarios and sensitivities: for example, the treatment of capacity mechanisms (i.e. strategic reserves and capacity markets) and the impact of decarbonisation targets (e.g. emission performance standards).

Regarding methodology, Eurelectric stresses the need for rapidly assessing the sensitivity of the results to some key assumptions taking into consideration Flow-Based Market Coupling and its underlying dataset (e.g. list of CNEC to consider) and modelling (e.g. adequacy patch to tackle the Flow Factor Competition) .. Eurelectric will provide further explanation and justification regarding this point as part of the ENTSO-E consultation.

Moreover, Eurelectric underlines that the capacities assumed in the scenarios should reflect, to the best possible extent, the real capabilities of energy networks. It should not take into account artificial increases stemming from capacity calculation methodological aspects

(e.g. the 70% threshold under Regulation 943/2019 or the thresholds resulting from national trajectories in MS with national action plans). Indeed, the resulting network constraints may have to be dealt with through cross-border remedial actions (e.g. counter trading) whose availability, in practice, is not guaranteed in tense situations.

- **Assumptions based on the modelling of the realisation of new capacity should be complemented with clarification of uncertainties. Moreover, it is important to ensure full transparency on the assumptions around installed capacity that are considered as existing for any given target year;** the assessment should only indicate what new capacities would be required, while clearly highlighting the uncertainties. **ERAA 2021 initial hypothesis is questionable as it assumes that reference scenarios in 2025** – the so-called National Estimates, which are based on the National Energy and Climate Plans (NECPs) of Member States – **will be successfully achieved.**

In this context, the EVA should question both the existing and new generation capacities considered in the NECPs. Just as the existing generators may see their operation compromised if not economically viable, the expected new generation capacity (at least non-renewable capacity), should not be incorporated into the system if they are not considered profitable in the scenario for their assumed lifetime.

ERAA and the EVA should extend their analysis to 2030 and include a trajectory year by year until 2030. Limiting the EVA analysis in 2025 cannot accommodate the investment/divestment decisions and the system needs in terms of adequacy, thus ultimately affecting the expected system adequacy assessment in 2030. In practice, economic viability assessments are only realistic enough if they consider the remaining lifetime of the concerned assets and therefore a set of consecutive years. In addition, the current ERAA assumes that the plants included in the national estimates remain operational until 2025 and analyses whether they will close in that year. But the reality is that some plants have incentives to close as early as 2022.

Eurelectric believes that the analysis of security of supply cannot be limited to observation of next TY 2025. This approach is insufficient if generation adequacy is at risk and should be anticipated each year starting the following year (2022, for ERAA 2021) to capture market dynamics appropriately. Once an adequacy risk is detected, the appropriate solution should be designed, national and European authorities need to approve the appropriate adequacy mechanism (e.g. Capacity Mechanism), auctions should be organised, etc. In practice, once the capacity mechanism is in place there is at least a 3-year timeframe to develop the new firm capacities needed. Therefore, the current timeframe and scope of the ERAA are too narrow.

- **We note some inconsistencies regarding LOLE/ENS indicators and expected net revenues, which should be analysed and further explained in the overall EVA results.** Eurelectric will provide further explanations and justification regarding this point as part of the ENTSO-E consultation

- **About the methodology used for performing EVA, the economic viability assessment is based on an iterative process where multiple adequacy runs are solved to account for successive additions/removals of capacity. Eurelectric believes that such an iterative process is inadequate and inefficient:** this approach does not take any advantage of the efficiency of mathematical programming solvers

or the computational capabilities of advanced servers in the field. Indeed, the decisions around asset management (investments, lifetime extension, reconversion, mothballing, decommissioning, etc.) could be directly embedded into the mathematical problem to be solved. Using such a formulation extended to asset management would provide with only one call to the solver (= one adequacy run) the optimal dispatch and asset management decisions without relying on an iterative process.

- **Considerations on Demand Side Response (DSR) to be economically viable in 2025 should be well justified in ERAA and EVA analysis. More details are needed to better understand the fundamentals behind the forecasts,** in particular on the assumption taken for DSR & storage potential, (e.g. estimated duration).

- **We would welcome clarifications on the assumptions related to scarcity prices. Scarcity prices of 15,000 €/MWh are higher than the price cap established for the EU, i.e., 3,000€/MWh and 9,999 €/MWh for day-ahead and intraday markets respectively.** Consideration of such a high scarcity price should be justified. Indeed, scarcity prices and their impacts on costs for consumers are a politically sensitive issue in many Member States, esp. in the current context of high energy prices.

- **System Operators must ensure the security of supply, even in the event of non-favourable scenarios. To this end, the maximum accepted hours of Loss of Load Expectation (LOLE) should be unlikely surpassed. That means the most appropriate adequacy results should be in terms of Loss Load Duration (LLD) at the 95th percentile rather than at average LLD (= LOLE) when compared to reliability standards.**

In many cases, System Operators accept at most a 1% probability of not facing unplanned outages. This restriction provides System Operators with comfortable security margins that cover them from rare events up to 99% probability. This metric opposes the permitted hours of lost load at average LLD in ERAA. That means a very high chance of facing a higher occurrence of losses of load. It should be verified and justified that system reliability standards can accept that risk. Results from ERAA show very different numbers of lost load considering an average scenario, 50th percentile (median) and 95th percentile scenario. For some countries, this should be verified against the national framework and reliability standards. This also explains why it is important to report the full distributions of lost load and energy not served for each country and scenario/sensitivity.

- **Sensitivity analysis of Low Thermal Capacity is lacking a real ambition and should consider the 2030 goals, the impact of the Fit for 55 package and the recent pledges for earlier phase-out of coal/lignite units.**

Eurelectric pursues in all its activities the application of the following sustainable development values:

Economic Development

- Growth, added-value, efficiency

Environmental Leadership

- Commitment, innovation, pro-activeness

Social Responsibility

- Transparency, ethics, accountability

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