European Network of Transmission System Operators for Electricity

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Explanatory note to ENTSO-E's proposed amendments to the methodology for the European Resource Adequacy Assessment (ERAA)

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From: System Development Committee

Disclaimer

This document accompanies ENTSO-E's draft proposed amendments to the ERAA methodology and is provided for information purposes only.

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 40 member TSOs, representing 36 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 inter-connected 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.

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 contributions

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.

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EXECUTIVE SUMMARY

Proposed as a response to the energy crisis of 2021-2022, the Electricity Market Design Reform (EMDR) introduced targeted updates to the Electricity Regulation and the Electricity Directive which entered into force in July 2024. Among the several updates, the EMDR included an important review of the regulatory framework around resource adequacy, and in particular recognized capacity mechanisms (CMs) – previously considered temporary measures of last resort – as more structural elements of the European electricity market. Among other measures, the amended Electricity Regulation required the European Commission to (i) adopt a report assessing the possibilities of streamlining and simplifying the process of applying a capacity mechanism in order to address the adequacy concerns of Member States in a timely way, and (ii) give recommendations to ACER for amending the methodology for the European Resource Adequacy Assessment (ERAA).

On 3 March 2025, the Commission released its report on *"the assessment of possibilities of streamlining and simplifying the process of applying a capacity mechanism"* (COM(2025) 65 final), and on 16 April 2025 ENTSO-E received an official request from ACER to propose amendments to the ERAA methodology. ENTSO-E must now submit the final proposal to ACER by 16 October 2025 for approval or amendment.

Based on the lessons learned in performing four editions of the ERAA and taking into account the European Commission's recommendations reflected in ACER's formal request, **ENTSO-E is proposing several amendments to the ERAA methodology** aimed at improving the robustness of the study, streamlining and simplifying its implementation, and ultimately increasing its value for Member States.

The main proposals of ENTSO-E include:

- Requiring only a **subset of target years** in the 10-year ERAA horizon to be simulated explicitly;
- **Introducing a second central reference scenario** *'Trends and Projections'*, reflecting a slower pace of the energy transition and, in particular, of the deployment of renewable energy sources and other policy-driven capacity;
- Improving the modelling of **investor risk aversion** in the economic viability assessment (EVA) via explicit use of the 'hurdle rate' approach, while allowing for additional complementary approaches based on industry best practices;
- Clarifying how the **complementary role of the ERAA and National Resource Adequacy Assessments (NRAAs)** in identifying potential adequacy concerns is ensured;
- Introducing an **alternative implementation of the revenue-based approach in the economic viability assessment (EVA)** to allow for a computationally simpler, but more nuanced assessment of the likelihood of market exit and entry decisions compared to the current approach; and
- Focusing the EVA on the **relevant revenues** which play a key role in entry and exit decisions for different technologies and allowing simplifications for those revenues which cannot yet be quantified.

Stemming from the European Commission's adoption of a new simplified procedure for the approval of Member States' capacity mechanisms (as referred to in the *Clean Industrial State Aid Framework)*, ACER's letter of request to ENTSO-E to update the methodology also foresees that:

- ERAA should indicate the *capacity volumes* to be procured through potential capacity mechanisms for each modelled bidding zone with an identified adequacy concern, and
- ENTSO-E should submit to ACER robust *de-rating factors* derived from each ERAA for each Member State and relevant technology type.

Due to considerations around the scope and technical challenges of including these parameters in the ERAA, ENTSO-E has not included amendments regarding these parameters in the draft version of the revised methodology for consultation, and seeks stakeholder input on these open points during the consultation. In particular, any potential extension of the ERAA's scope should be carefully considered to ensure it remains proportionate to the objective of facilitating the simplified State aid procedure, without encroaching on the competencies of Member States to manage their security of supply. Moreover, identifying robust volume estimates suitable for use in national CMs within the ERAA framework for all Member States with an identified adequacy concern would present substantial methodological and implementation challenges. While these factors require careful consideration, ENTSO-E is committed to supporting the overall objective of the simplified State aid procedure. MSs and other stakeholders are encouraged to share their views on this and other topics during the public consultation so this feedback can be taken into account in further elaboration of the ERAA methodology.

ENTSO-E looks forward to working closely with ACER, the European Commission and other stakeholders to revise the ERAA methodology in a way that ensures analytical robustness and policy relevance for Member States, while also ensuring it can be delivered within the legal timeframe.

1. Introduction and background

Regulation (EU) 2019/943 recast (hereafter the "Electricity Regulation") mandates the European Network of Transmission System Operators for Electricity (ENTSO-E) to carry out the **European Resource Adequacy Assessment (ERAA)** on an annual basis.[1] The methodology for conducting the ERAA was adopted by the Agency for the Cooperation of Energy Regulators (ACER) in its decision of 2 October 2020 on the Methodology for the European Resource Adequacy Assessment (hereafter the "ERAA methodology").[2]

The ERAA holds key relevance for the 27 Member States (MSs) of the European Union (EU) and several other non-EU European states as:

- it provides a **pan-European assessment** of potential risks for resource adequacy in the coming 10 years;
- the methodology serves as a common methodological basis for Transmission System Operators (TSOs) (or other entities) to perform **national resource adequacy assessments (NRAA)**, at national level, to complement the ERAA;[3] and
- where existing and planned investments in capacity are not expected to lead to an adequate system, and where a MS has identified a resource adequacy concern in either the ERAA or a NRAA, Article 21 of the Electricity Regulation allows MSs to apply for State aid support in the form of a **capacity mechanism (CM)**.

Triggered by the energy crisis of 2022, the European Commission (EC) proposed an Electricity Market Design Reform (EMDR), which included targeted updates to the Electricity Regulation. During the legislative process, co-legislators agreed to recognise CMs as an integral part of the market design, and called for streamlining and simplifying their approval process. Therefore, in line with the EMDR updates provided that entered into force in July 2024, the Electricity Regulation (recast) now provides that:

- CMs are no longer last-resort nor temporary measures;[4]
- the EC had to adopt a report assessing the possibilities of streamlining and simplifying the process of applying a CM, and request that ACER amends the ERAA methodology;[5] and
- the EC had to submit proposals with a view to simplifying the process of assessing CMs.

1.1 The CM streamlining report and triggering of the ERAA methodology revision

On 3 March 2025 the EC released its report on *"the assessment of possibilities of streamlining and simplifying the process of applying a capacity mechanism"* (hereafter the CM streamlining report).[6] The report highlighted that in addition to the complexity of the CM approval process, some MSs had been critical about

[1] *Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity.*
[2] *ACER decision of the 2 October 2020 on the Methodology for the European resource adequacy assessment.*
[3] *As per Article 20 and 24 of the Electricity Regulation MSs may carry out NRAAs to complement the ERAA which should be based on the ERAA methodology.*
[4] *In particular Art. 21(1),(7),(8), and Art. 22(1) of the Electricity Regulation were updated, albeit still requiring approval for a period up to 10 years.*
[5] *Regulation (EU) 2024/1747 of the European Parliament and of the Council of 13 June 2024 amending Regulations (EU) 2019/942 and (EU) 2019/943 as regards improving the Union's electricity market design.*
[6] *EC (2025), COM/2025/65 final Report from the Commission to the European Parliament and the Council on the assessment of possibilities of streamlining and simplifying the process of applying a capacity mechanism.*

the complexity of the ERAA methodology. To address these concerns, the EC requested ACER to update and streamline the ERAA methodology in a number of areas to ensure the framework's robustness, ease its implementation by stakeholders (ENTSO-E at the EU level and TSOs or other entities at the national level), and reflect on the lessons learned from case practice.

The EC outlines several proposals for European resource adequacy framework in its CM streamlining report. A key element is a new **simplified State aid approval procedure** for CM designs that follow pre-defined off-the-shelf models based on best practice and can therefore be expected to limit competition distortions. MSs can apply for this simplified process if they rely on the most recent (ACER-approved) ERAA report to demonstrate the necessity of the scheme, and the CM complies with several other criteria outlined in the EC's *Framework for State Aid Measures to Support the Clean Industrial Deal* (CISAF).[7] For the ERAA methodology, the most significant proposals are:

- a **new central reference scenario** reflecting a slower pace of the energy transition;
- allowing for only explicitly modelling **a subset of target years** (TYs) within the ten-year horizon of the ERAA;
- shifting to a so-called **'revenue-based' approach** in the economic viability assessment;
- sharpening the ERAA implementation towards considering **non-fossil flexible resources such as storage and demand-side response** (DSR); and
- to facilitate a **simplified State aid procedure** for CMs, (i) the ERAA methodology should include a post-process to enable directly identifying the **volume to procure** for each bidding zone linked to the adequacy gap identified in the model, and (ii) ENTSO-E should make available de-rating factors for different technologies.

On 16 April 2025, ENTSO-E received an official request from ACER to propose amendments to the methodology for the ERAA, based on the scope outlined in the CM streamlining report.[8] Accordingly, ENTSO-E shall submit to ACER a proposal for amending the ERAA methodology by 16 October 2025.

1.2 ENTSO-E's principles for amending the ERAA methodology

With the publication of the ERAA 2024 in April 2025, ENTSO-E has delivered four editions of the ERAA. In doing so, ENTSO-E has gained significant experience in implementing the ERAA methodology and identified several lessons learned. Several MSs have also performed NRAAs at the national level based on the ERAA methodology. With the experience and lessons learned to date, ENTSO-E has identified several areas of improvement for the future ERAA. In particular, the complexity of the current ERAA methodology creates significant challenges not only for ENTSO-E to deliver the ERAA report on a yearly basis as mandated by the Electricity Regulation, but also for TSOs (or other nominated entities) at the national level in performing NRAAs.

[7] *EC (2025). C/2025/3602 Communication from the Commission: Framework for State Aid measures to support the Clean Industrial Deal (Clean Industrial Deal State Aid Framework)*
[8] *ACER (2025), Request for a proposal for amendments to the methodology for the European resource adequacy assessment.*

Given the importance of the ERAA's timely delivery for national and EU stakeholders, it is vital that the new methodology is streamlined compared to the current one to ensure that it can be delivered in the required timeframe, enabling MSs and other stakeholders to use it for timely policy decisions regarding security of supply and as an input for national studies. An overly complex ERAA methodology risks significant delays and might prevent MSs being able to react swiftly to identified security of supply concerns, which would not be in the spirit of the EMDR. Thus, in proposing amendments to the ERAA methodology, the revision of the ERAA methodology needs to strike a suitable balance between **ensuring the robustness** of the study, **achieving significant simplifications** to ensure feasible delivery, and **enhancing the value of the ERAA for MSs** by simplifying the process of applying for a CM (**Error! Reference source not found.**).

Figure 1 - ENTSO-E's priorities for revising the ERAA methodology

On this basis, ENTSO-E has identified the following main principles for the future ERAA:

- The ERAA is a tool for identifying resource adequacy concerns.
- The ERAA is not a crystal ball, and key uncertainties that impact resource adequacy should be considered at the core of the ERAA.
- The number of reference scenarios, selection of target years and sensitivities are interdependent and should be carefully chosen to maximise the value for MSs, while ensuring that the ERAA is feasible to deliver in the mandated timeframe.
- The role of economic viability assessment (EVA) should evolve to further increase its robustness.
- The complementarity and equal importance of the ERAA and NRAAs in identifying resource adequacy concerns and the potential need for a CM should be clarified and affirmed.

Following these priorities and principles, ENTSO-E has developed a set of proposed amendments to the ERAA methodology, taking into account the recommendations from the CM streamlining report, ACER's formal amendment request, ENTSO-E's own experience from four editions of the ERAA, and the requirements stemming from the Electricity Regulation.[9] These proposals aim to:

[9] *ACER's request to ENTSO-E to propose amendments to the ERAA methodology is based on the scope outlined by the EC in the CM streamlining report. While most of ENTSO-E's proposals pertain to this scope, ENTSO-E also makes several other proposals to amend the ERAA methodology drawing on its experience and case practice according to Article 12(4) of the current ERAA methodology.*

- take into account the proposals of the EC streamlining report, while ensuring the ERAA remains feasible to deliver in the mandated timeframe;
- further streamline the ERAA methodology to reduce the risk of delays in its delivery, which is critical for timely national decision-making;
- increase the usefulness and value of the ERAA for MSs and other stakeholders;
- facilitate the preparation of complementary NRAAs at the national level, within the framework of the ERAA methodology; and
- improve the robustness of the ERAA.

The rest of this document is structured as follows:

- Chapter **Error! Reference source not found.** explains ENTSO-E's main proposed amendments to the ERAA methodology; and
- Chapter 0 outlines several considerations regarding the proposal to include additional parameters in ERAA to support the simplified State aid procedure.

2. ENTSO-E's proposed amendments to the ERAA methodology

This chapter outlines ENTSO-E's key proposed amendments to the current ERAA methodology in detail. **Error! Reference source not found.** provides an overview of the key proposed amendments, which are concentrated on the following aspects:

- the scenario framework;
- identifying a resource adequacy concern and complementarity between the ERAA and NRAAs;
- the economic viability assessment (EVA);
- aspects related to resource adequacy and data collection; and
- other proposed amendments.

Scenario framework (Article 3)	**Identification of adequacy concerns and complementarity between the ERAA and NRAAs** (Recital and Article 8)
– Introduction of a new central reference scenario (*'Trends and Projections'*) – Focus simulations on a subset of pivotal target years – Reassignment of the *'With CM'* scenario as a variant – Removal of the obligatory sensitivity regarding restrictions to wholesale price formation	– Illustration of the principle of complementarity between ERAA and NRAAs – Possibility for sensitivities to identify adequacy concerns
Economic Viability Assessment (Article 6)	**Resource Adequacy & Data Collection** (Articles 4 and 5)
– Introduction of an alternative form of revenue-based EVA, the Economic Viability Check (EVC) – Consideration of relevant revenues for EVA – Improvements to investor risk aversion approach – Introduction of construction period	– Considering reserve constraints separately to network constraints – Changes to ensure robustness of input data and reduce the risk of biased outputs – Additional flexibility in methodological approach for hydropower modelling – Flexibility modelling and ramping constraints – Improvements to robustness of adequacy convergence criteria
Other amendments	
– Definition of additional indicators to facilitate comparison of scenarios (Article 11) – Additional outputs as possible input for performing flexibility needs assessments (Article 11) – Implementation date of the new methodology, and extension of implementation period (Article 12) – Update of the Definitions and Recitals sections	

Table 1 – Overview of ENTSO-E's main proposed amendments to the ERAA methodology

2.1 Scenario Framework

Article 3 of the current ERAA methodology specifies the following main requirements for the scenario framework:

– The ERAA shall be based on projected demand and supply covering each year of the study time period.

– The ERAA currently relies on two central reference scenarios *'Without CMs'* and *'With CMs'*.

Experience over the last four ERAA editions shows that the current scenario framework has several drawbacks and limitations. Firstly, the requirement to perform detailed adequacy simulations for each of the 10 years of the study period imposes a significant computational burden without delivering commensurate added value in identifying adequacy concerns as key scenario assumptions (demand, fuel prices, technology costs, policy frameworks, etc.) become increasingly speculative beyond the near term, and the exact timing of capacity additions or retirements (e.g. a new combined cycle power plant (CCGT) or a coal plant retiring) is often uncertain within a ±1–3 year window, limiting the value of precise year-on-year modelling. Secondly, the fact that there is only one baseline scenario that assumes full achievement of MSs National Energy and Climate Plans (NECPs) entails a risk that the real pace of the energy transition is not reflected, and neglects the risk that policies might not be fully effective in achieving their goals. Finally, with the EC's proposal of introducing a new central reference scenario, the current framing of *'With CM'* and *'Without CM'* scenarios is no longer fit for purpose as it would require four separate central reference scenarios in the new methodology, which would be impractical. Moreover, the name of the *'Without CM'* scenario is misleading as this scenario actually includes all existing CMs approved in accordance with the Union State aid rules and applicable at the time of the assessment. For these reasons, ENTSO-E proposes the following main amendments to the current scenario framework:

– Adequacy simulations should be focused on a subset of pivotal target years;

– A new '*Trends and Projections*' central reference scenario should be introduced, and

– The current *'With CM*' scenario should be reassigned as a variant.

These proposed amendments are explained below.

2.1.1 Focused adequacy simulations on a subset of pivotal target years

In order to streamline the ERAA, **ENTSO-E proposes performing detailed adequacy simulations for a subset of pivotal target years in each edition** while covering the ten-year horizon as mandated by the Electricity Regulation. The selection of these pivotal target years should be decided in each ERAA edition by ENTSO-E in consultation with ACER based on the needs of MSs. In order to ensure a robust assessment of adequacy risks across the analysed horizon, the selected pivotal target years should cover:

– the short term (2 to 3 years ahead), to provide guidance on attention points in the near-term future;

– the medium term (5 to 7 years ahead), to support decision-making around policies with a longer implementation period such as CMs; and

– the long term (8 to 10 years ahead), to monitor longer term trends and/or inform policymaking with (very) long-term implementation timeframes.

As various energy policy frameworks and plans typically outline milestones in years such as 2030 and 2035, ENTSO-E proposes that years that are multiples of five should be included as pivotal TYs by default, to facilitate the comparability of results in key years over ERAA editions.

A reduced number of TYs would simplify the assessment without reducing its robustness, potentially allowing resources to be allocated to additional scenarios (and sensitivities), which is an important added value to make informed decisions. The methodology should also allow for fewer TYs to be considered for some scenarios than for others to reflect that uncertainty in future developments is significantly higher in the long term than in the short term.

2.1.2 Introduction of a new central reference scenario

It is essential that the ERAA accounts for the inherently uncertain future of the electricity system when assessing resource adequacy across Europe. The Electricity Regulation allows the ERAA to consider uncertainty by simulating a wide range of climate years, modelling stochastic forced outage events, and analysing scenarios, sensitivities, and variants. However, to date the ERAA has only included one baseline NECP-compliant scenario. As the key pan-EU tool for monitoring resource adequacy, it is important that the ERAA considers uncertainty in how the future electricity market could develop to enable MSs to take adequate measures in a timely manner. In line with the EC's proposal, ENTSO-E thus proposes introducing a **second central reference scenario in the ERAA methodology**, reflecting a situation where the policy ambitions laid out by MSs in their NECPs – taken as given in the current ERAA central reference scenario – are not fully achieved as intended, leading to a slower pace of the energy transition. This additional *'Trends and Projections'* scenario should primarily focus on assessing additional risks to resource adequacy of both policy and real-world deployment risks in commissioning new (non-CM driven) policy driven capacity (see **Error! Reference source not found.**) with respect to the NECP targets included in the current baseline central reference scenario as well as other national policies. To better distinguish these two scenarios, ENTSO-E proposes renaming the current NECP-compliant scenario as *'National Plans'*.[10] Both scenarios together can deliver useful and complementary information to policymakers by identifying possible measures to achieve the national targets set for the electrification and decarbonisation of electricity supply.

However, it is necessary to balance the added value of introducing an additional scenario to the ERAA methodology with the extra complexity that it could add to the assessment when performed at the EU as well as the national levels. To ensure that this scenario can be accommodated and ensure the feasibility of the ERAA and NRAAs, ENTSO-E proposes:

[10] *This is to reflect that this scenario is consistent with National Energy and Climate Plans (NECPs).*

– Considering supply-side deviations from the *'National Plans'* scenario as minimum requirement, such as lower deployment of renewable energy sources (RES), battery storage, hydropower, and other (low-carbon) thermal capacity. Other dimensions such as load and cross-border capacity may also be considered.[11]

– Requiring a minimum of one central reference scenario (or variant) to be performed in any given assessment, which would allow ENTSO-E (and MSs at the national level) to consider an additional central reference scenario without the obligation to assess both in every edition, which would be very demanding.[12]

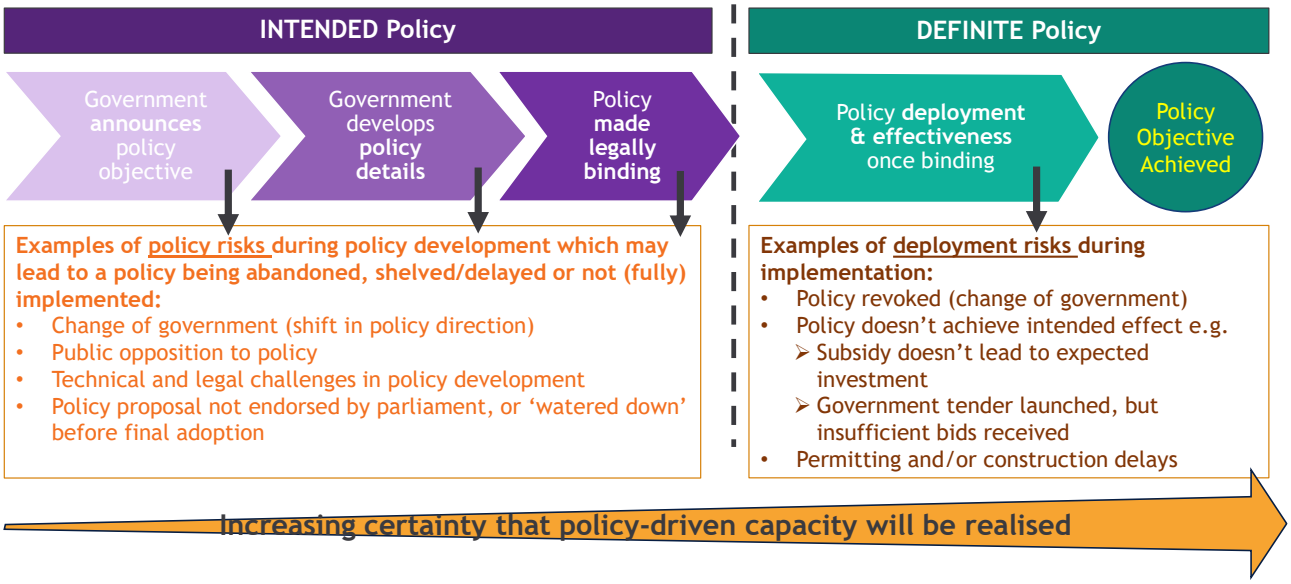

Figure 2 - Examples of real-world policy and deployment risks that can result in both intended and definite policies not fully achieving their goals

2.1.3 Reassignment of the *'With CM'* scenario as a variant

As set out in Article 23 of the Electricity Regulation, the objective of the ERAA is to identify resource adequacy concerns, which can then be used as a basis for MSs to apply for a CM. In line with this objective, ENTSO-E's view is that the starting point for any adequacy assessment should be scenarios where only CM contracts already awarded at the time of the assessment are included. This capacity (existing or new-build) has the highest certainty of being available in the future for supporting adequacy, in contrast to additional hypothetical capacity that could potentially be contracted in the future by MSs under approved CMs to achieve their reliability standard (RS). Focusing the ERAA adequacy simulations primarily on a scenario with additional hypothetical capacity – on top of additional investments that might result from the EVA – risks being too optimistic in the assessment of resource adequacy at the pan-EU level.[13] For this reason, the

[11] *Simply delaying all developments by the same extent could essentially be the same as simulating an earlier target year, which would add no additional value for MSs.*
[12] *If the minimum requirement is one central reference scenario, ENTSO-E would be able to perform the 'Trends and Projections' scenario considering all dimensions (e.g. supply, load and cross-border capacity). In the longer term ENTSO-E may be able to consider multiple central reference scenarios in the same edition.*
[13] *Moreover, having a CM does not guarantee that a MS will be able to contract all the necessary capacities to meet its reliability standard.*

baseline data to be considered for the *'National Plans'* and *'Trends and Projections'* scenarios should only include CM contracts that are already awarded at the time of the assessment, and this should remain the priority scenario considered in the ERAA.

Nevertheless, the (combined) impact of multiple CMs on European resource adequacy could be assessed via an optional **variant** to the central reference scenarios to allow for the possibility to consider a future situation where MSs with an approved CM contract additional capacity required to reach their RS, in an ERAA with multiple central reference scenarios. While this variant may be performed after the baseline analysis has been conducted for that scenario, ENTSO-E's experience in modelling a similar scenario in ERAA 2021 showed that a *'With CM'* variant is very complex to perform within a one-year period, and highlighted several methodological and practical concerns. For example, in a highly interconnected pan-EU electricity system where multiple MSs have different RSs and different types of CMs, there might be multiple possible solutions in which capacity is located (hence the result is arbitrary) or potentially even no solution where all countries with a CM are at their RS. Thus, ENTSO-E considers that this variant should only be considered under certain conditions to ensure the technical robustness of the results obtained, minimising of detrimental effects on the timely submission of the ERAA. Moreover, to ensure technical feasibility, if the ERAA includes more than one central reference scenario in a given ERAA edition in the future, this variant would not necessarily performed for all scenarios and all pivotal TYs. It should also be recognised that a scenario variant where all MSs with CM are presumed to be at their RS adds limited value for those MSs as an assessment of resource adequacy, if they are presumed to be adequate by default.

2.1.4 Removal of sensitivity regarding restrictions to wholesale price formation

Article 3 of the current ERAA methodology includes a requirement to perform a sensitivity on the restriction to wholesale price formation in case an adequacy concern is identified and if indirect restrictions to wholesale price are formally modelled in the ERAA. This sensitivity has never been performed in previous editions of the ERAA for several reasons, including a lack of data, modelling complexity, and insufficient time to perform within the one-year timeframe of the ERAA. Moreover, such sensitivity has not been considered a relevant priority by the EC and ACER. ENTSO-E therefore proposes to remove this sensitivity to allow for the ERAA to focus on main priorities. This update concerns Articles 3, 5, 8, and 11.

2.2 Identification of adequacy concerns and complementarity between the ERAA and NRAAs

In order to clarify and ensure the complementarity between the ERAA and NRAAs provided in Article 20(1) of the Electricity Regulation, ENTSO-E proposes to clarify the principle of complementarity between the ERAA and NRAAs as a non-prescriptive provision of the methodology, in the recital section. Furthermore, it is proposed to refer to the explicit possibility for sensitivities to identify resource adequacy concerns in the ERAA methodology (in addition to central reference scenarios) in the corpus of the methodology, by modifying Article 8. This proposal stems from a potential inconsistency identified in the framework, as explained below.

Articles 20, 23 and 24 of the Electricity Regulation provide that MSs can conduct an NRAA to complement the ERAA when monitoring resource adequacy within their territory. Either assessment – conducted in line with the ERAA methodology – can be used to identify resource adequacy concerns. The specific requirements for identifying a resource adequacy concern are defined in the ERAA methodology (Art 8.1(b)). Under the current ERAA methodology, a resource adequacy concern can only be identified if the RS in a MS is exceeded in *"at least one central reference scenario".* The requirements for NRAAs in Article 24 of the Electricity Regulation state that NRAAs shall *"contain the [ERAA] reference central scenario(s)"* and *"may take into account additional sensitivities"*, which does not exclude the possibility of NRAAs considering other central reference scenarios.

Moreover, Article 24(3) of the Electricity Regulation provides that, when an NRAA identifies a resource adequacy concern not previously identified in the ERAA, that MSs shall publish their NRAA (including details on the reasons for the divergence with the ERAA) and submit it to ACER, which shall provide an opinion on whether the differences between the ERAA and the NRAA are justified. ACER's approval of ERAA 2023 highlighted a potential inconsistency in the framework for identifying adequacy concerns which may need to be addressed. Before there was an ACER-approved ERAA, there were technically no ERAA central reference scenarios with legal weight, and the EC deemed Article 24(3) of the Electricity Regulation – covering divergence of NRAAs with the ERAA – as not applicable.[14] Since ACER approved the ERAA 2023, these central reference scenario(s) have legal weight and the requirements of Article 24(3) can apply.[15]

Given that a replication of the ERAA central reference scenarios in an NRAA would add no value from an adequacy perspective, and the Electricity Regulation intends that NRAAs can identify adequacy concerns which are not identified in ERAA in accordance with the complementarity between the two assessments, it appears to imply that NRAAs must either (i) be able to perform sensitivities which deviate from the ERAA central reference scenarios (e.g. by considering more updated data, more detailed modelling of certain power system aspects, or other country-specific risks) that can identify adequacy concerns, and/or (b) that NRAAs can elaborate their own additional central reference scenarios which can identify adequacy concerns as per the existing provisions of the ERAA methodology in Article 8.1(b).

[14] *See recital 182 of Commission Decision State Aid SA.104336 (2023/N) Belgium Amendments to the capacity remuneration mechanism.*
[15] *ACER has already issued opinions on the NRAAs of Estonia and Poland.*

ENTSO-E thus proposes adding a recital in the ERAA methodology illustrating the mutual complementarity between the ERAA and NRAAs and the ways resource adequacy concerns can be identified:

1. **ERAA results** can be **used directly** to identify a resource adequacy concern.
2. Starting with the latest ERAA data and models, MSs can perform an **NRAA that includes additional sensitivities** to assesses the most important country-specific and relevant risk(s) and uncertainties, of either a national, regional, or pan-EU nature.
3. Starting from the latest ERAA data and models, MSs can perform an **NRAA that fully updates the ERAA central reference scenarios** based on more recent data and assumptions **or even elaborates additional central reference scenarios** (and sensitivities on these scenarios) to assesses the most important country-specific and relevant risk(s) and uncertainties of either a national, regional, or pan-EU nature. These additional central reference scenarios should also be considered as a valid basis to identify adequacy concerns.

Given that MSs have the ultimate responsibility to monitor and ensure security of supply at their desired level in accordance with Article 194(2) of the Treaty on the Functioning of the European Union, they should possess a robust and broad spectrum of adequacy results that complement each other, all based on a consistent and coherent ERAA methodology. In this context the role of NRAAs in complementing the ERAA is important given the following considerations:

- **National specific risks**: Adequacy risks (and their drivers) can significantly vary among MSs. In particular, cross-border capacity developments are especially important for countries particularly dependent on (or sensitive to) imports. Risks of short notice changes to power plant availability beyond a MS's control are also important to consider.
- **The pan-EU scope of the ERAA:** Not all national-specific risks (drivers) can be included in the ERAA, as the pan-EU nature and requirement for annual delivery does not allow for computing these individual risks as individual scenarios/sensitivities. At the same time, considering all potential national sensitivities simultaneously in a single scenario would likely be unrealistic.
- **Specific national requirements**: NRAAs might be required to consider certain risks or additional analysis by national regulations.
- **Include more recent developments**: As the energy landscape is dynamic, NRAAs can include more up-to-date assumptions based on latest developments (even in the ERAA central reference scenarios).
- **Additional detail and granularity**: NRAAs – which are not bound by the pan-EU geographic scope and annual delivery timeline as the ERAA – can consider more detailed modelling of (national) power system characteristics that cannot be captured in the ERAA.
- **Robustness and benchmarking**: Modelling is not a crystal ball. Using complementary tools enables benchmarking results from one tool with others, thereby providing the means to identify bugs/errors in tools and capturing model uncertainty.

2.3 Economic Viability Assessment

The Electricity Regulation (Article 23(5)) states that the ERAA should be based on appropriate central reference scenarios of projected demand and supply, including an *economic assessment* of the likelihood of retirement, mothballing, and new-build of generation assets. This Economic Viability Assessment (EVA) step is performed on the baseline scenario data provided by TSOs and updates the data to reflect potential market-based exit and entry of capacity, before the adequacy indicators are calculated. The current ERAA methodology allows two approaches to perform the EVA: (a) a "revenue-based" approach where viability is assessed by comparing the expected revenues of power plants with expected costs, and (b) a "system cost minimisation" approach.

ENTSO-E has gained significant experience in performing an EVA in the previous editions of the ERAA. While the EVA has significantly improved in every submission year, experience also shows that the current EVA implementation faces several challenges and drawbacks, including the following:

- Investment modelling is computationally complex, and sensitive to input assumptions.
- This complexity creates a bottleneck in the ERAA modelling process, reducing the number of scenarios, sensitivities, and climate years (CYs) that can be considered in a given ERAA cycle.[16]
- The EVA model outcomes are currently taken as certain (i.e. "crystal ball"), while the objective of the EVA as described in the Electricity Regulation is to assess the likelihood of retirement and investment decisions.
- While uncertainty in plant revenues is assessed (e.g. via different climate and outage scenarios), the fixed costs of plants are treated as certain and uniform across all plants of the same type.[17]
- The complexity of the EVA might disadvantage smaller MSs in conducting their NRAAs as they might not have the resources nor computational infrastructure available to perform an EVA of the same scope and complexity as that performed by ENTSO-E in the ERAA.

Moreover, the current implementation of the EVA as a complex investment model aims to emulate a proxy of the electricity market over the coming 10 years. It naturally needs to rely on a set of simplifying assumptions, including:

[16] *When assessing resource adequacy it is prudent to model a sufficiently large number of CYs to ensure that climate variability is appropriately captured and challenging situations for resource adequacy (e.g. severe dunkelflautes) are accounted for in the adequacy indicators (e.g. LOLE, ENS). For this reason roughly ~35 CYs are typically considered in the ERAA adequacy simulations. However, the responses to the investor survey suggest the plurality of investors consider relatively few CYs (e.g. 2 to 10) when making retirement and investment decisions, and tend to leave aside extreme climate events due to their unlikeliness.*

[17] *Fixed costs can significantly vary between individual power plants depending on e.g. their size, age, maintenance state, and country-specific factors (e.g. gas and electricity grid fees, wages). Neither TSOs nor ENTSO-E have these commercially sensitive data available at the plant level, which is why approximate 'reference' values are typically used.*

– investors have perfect foresight of future market developments over the modelled horizon (e.g. fuel and carbon prices, deployment of RES are known);

– investment and retirement decisions are coordinated;

– no barriers to market entry and exit exist; and

– the electricity market is at (pseudo) long-term equilibrium.[18]

However, as shown in the examples in **Error! Reference source not found.**, some of these assumptions might not be fully suitable for a comprehensive viability risk assessment, especially in the short term.

Ideal market assumptions	Features of real-world markets
Perfect foresight	• Conditions can change quickly and unexpectedly (e.g. energy crisis)
Coordinated investments	• Investors make their own decisions without full knowledge of competitor plans
No barriers to market entry or exit	• Long permitting processes for environmental and construction permits, local opposition ("NIMBY"), delays in receiving grid connection • Regulations requiring notification periods before capacity can be taken offline • Access to capital might be limited
Market is at pseudo long-term equilibrium	• Dynamic policy and economic landscape • Subsidies affect equilibrium conditions • Barriers to entry/exit prevent equilibrium being reached • Equilibrium might take longer to achieve than the modelled horizon

Table 2 - Features of real-world markets that might deviate from theoretical ideal markets

Following several stakeholders' concerns that the EVA might potentially be too optimistic on investment behaviour and special attention should also be devoted to the investment decision-making process,[19] in May 2025 ENTSO-E conducted a survey to gain insights into how investors make their business decisions, and identify whether certain aspects of the modelling of retirement and investment decisions could be improved in the EVA.[20] The preliminary outcomes of the survey have been considered when drafting the proposal for the updated methodology, in particular trying to capture the uncertainty in factors that characterise long-term investment decisions, and where further simplifications could be made without compromising the robustness of the assessment.

2.3.1 Introduction of an alternative form of the revenue-based EVA

ENTSO-E proposes introducing an alternative form of the revenue-based EVA where the outcome is not a set of pre-supposed investment and retirement decisions but rather an assessment of the *likelihood* of these decisions. This alternative approach – referred to hereafter as an '**Economic Viability Check**' (EVC) – would be an implementation choice providing for a complementary view of the economic viability of capacities. It would differ from the current EVA approach implementation in the ERAA in the following main ways:

[18] *Long-term equilibrium implies that all generators recover their (risk-adjusted) costs over time, and no capacity has an incentive to either enter or exit the market.*
[19] *These concerns were also mentioned by the EC in the CM streamlining report, and the importance of robustly modelling real-word investor behavior was also highlighted by ACER in a letter to ENTSO-E in the context of ERAA 2024.*
[20] *The results of the investor survey can be found here.*

– it could consider **individual TYs separately**, reflecting that real-world investors do not have perfect forecast of all future market developments;

– it could reflect scenarios where the market is **not necessarily at long-term equilibrium** conditions, being more representative of the real-world market;

– it could consider **additional economic and non-economic barriers to market entry and exit**, which cannot be fully captured or modelled using standard risk aversion approaches such as hurdle rates; and

– it could consider **uncertainties in the fixed costs** of capacity resources, which are treated as certain and based on a single standard value for plants within a given plant category in the current approach.

This alternative implementation could:

– enable a **more detailed** assessment of economic viability, particularly in the shorter term by incorporating market data where available (e.g. futures prices, ancillary services volume/prices);

– be applied either as a **complementary step** or **robustness check of the post-EVA scenarios** resulting from the current EVA results, or directly on a set of bottom-up scenario data to satisfy the requirements of performing an EVA on central reference scenarios (also in NRAAs);

– allow a **more computationally simplified** yet robust assessment of the likelihood of retirement, (de)mothballing, life extension and investment in capacity that could be applied by ENTSO-E (or MSs in their NRAA); and

– provide **more insights and transparency** regarding the viability of power plants by indicating the potential likelihood of retirement and investment decisions, rather than a set of pre-supposed decisions.

By highlighting the different risks, decisions and purpose associated with an economic assessment when performed in the short term compared to the medium term and long term and especially within the new EVC approach, the ERAA methodology shall allow as an implementation choice utilising either one or a combination of the approaches prescribed by the methodology depending on specific needs and the evolution of underlying system peculiarities and technologies assessed. Such flexibility would allow either assessing the whole horizon as an integrated multi-year investment modelling exercise – thus allowing for coordinated and simultaneous relevant (dis)investment decisions in all pivotal years – or introducing a "split" of the modelled horizon and separately assessing the likelihood of capacity viability in the different time horizons (short, medium and long term). This latter option would allow the ERAA (or NRAAs) to enhance focus and accuracy on specific elements as highlighted above.

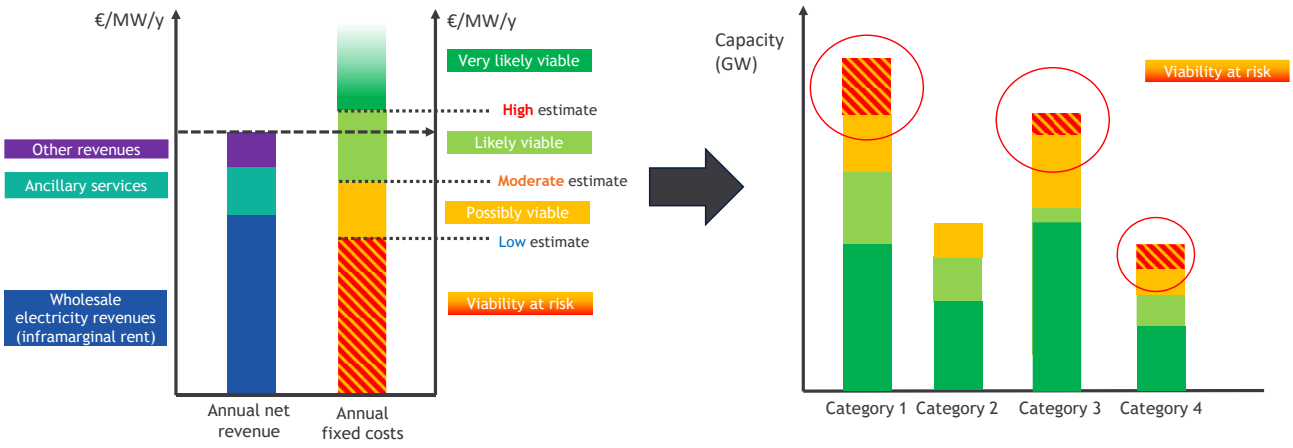

Figure 3 - Illustrative example of the results of an economic viability check (EVC)

2.3.2 Consideration of relevant revenues for EVA

The current ERAA methodology (Article 6(9)) stipulates that the revenues of a capacity provider shall be equal to the sum of all revenues expected to be collected by the capacity resource, including (a) revenues from the wholesale electricity market, (b) other electricity-related services (e.g. reserves), (c) revenues from services outside the electricity sector (e.g. heat/steam), (d) revenues from subsidies, and (e) revenues from CM, for that capacity provider. However, not all of these different revenue streams are necessarily as relevant for some technologies as others, and mandating the quantification of all revenue types would add significant complexity without necessarily enhancing the robustness of the EVA. Thus, ENTSO-E proposes the following amendments to keep the EVA tractable:

- **Only the relevant revenues** for a specific technology should be considered in the EVA. The relevant revenues might vary between different technologies and economic decisions[21].
- If certain relevant revenues are expected to ensure the economic viability of a given technology (or unit), **that capacity can be excluded from the EVA as a simplification**. For example, rather than estimating potential CM market revenues, capacities with an awarded CM contract can be excluded from the EVA altogether.

Even if certain revenues that are not already included in the EVA are deemed relevant, the possibility to include these would need to be investigated incrementally over time to assess whether they are feasible to include or not, might necessitate further simplifications in other aspects, and should only be considered if the benefits outweigh the trade-offs for the study.

[21] *This concept is reflected in the results of the investor survey, where respondents indicated that for some technologies certain revenues are more important than others for different economic decisions (e.g. for a CCGT forwards/futures and day ahead revenues are more important than intraday or optionality value), while for other technologies (and decisions) potential revenue streams have similar importance.*

2.3.3 Improvements to the investor risk aversion approach

Given the strong importance of risk aversion and reflecting appropriate investor behaviour when performing and economic viability assessment – as highlighted by several stakeholders during public webinars and in the consultation phase of past ERAA editions – ENTSO-E has expanded and further reflect on these elements in a separate paragraph in Article 6. While giving relevance and importance to technology-specific "hurdle premiums" in line with the CM streamlining report and ACER request, this new paragraph includes additional complementary approaches as examples of best practices in risk aversion modelling, such as "value at risk". The inclusion of new risk aversion techniques and the possibility to use them as a combination of approaches would ensure that the EVA can properly capture all multi-faceted aspects of risk aversion which are not fully captured by the use of "hurdle premiums" alone, based on feedback from investors.[22] Additionally, to mitigate the risk that price spikes resulting from the model do not lead to unrealistic levels of investment that are inconsistent with expected investor behaviour, ENTSO-E proposes introducing the possibility of addressing this issue explicitly in the EVA (e.g. discount factors, revenue caps, or other mitigating techniques).

2.3.4 Introduction of construction period

To avoid the risk of unrealistic deployment rates of new capacity in the EVA model, ENTSO-E proposes introducing new asset construction time as an additional constraint in Article 6. In ENTSO-E's proposal, it is explicitly stated the importance of taking into account the time technically needed by the entry of new capacity in the system. This should include not only the time required for construction and commissioning after a final investment decision (FID) has been reached but also the time required for feasibility studies, design, permitting, and gaining grid connection before the FID is reached. This would avoid the risk of "overnight expansion", which would see the appearance of the new capacity as soon as favourable market conditions manifest themselves. The construction period can be modelled explicitly as a constraint, or alternatively embedded implicitly in the methodology employed to perform the analysis itself (e.g. only allowing investments in specific technologies after a certain TY).

2.3.5 Retain and enhance flexibility in EVA approaches

A revenue-based EVA approach offers several advantages of the system cost minimisation approach, supporting a better understanding of investment decisions. In addition, it can potentially increase the consistency of the EVA and Economic Dispatch (ED) steps as it leverages the same models in an iterative calculation. After the case study published as part of ERAA 2024, ENTSO-E plans to further refine and adopt this approach in future ERAAs as an alternative to the current cost-minimisation EVA approach. Nevertheless, the system cost minimisation approach should remain in the methodology as an alternative option to apply in the ERAA, or at national level in an NRAA.

Moreover, ENTSO-E considers that there could be further benefits in applying both system cost minimisation and revenue-based approaches in a complementary way, drawing on the strengths of both approaches to

[22] *In the investor survey, market parties shared their main approaches used for accounting for price and revenue risk in entry and exit decisions. The results showed that hurdle rates are the most common approach. However, respondents also indicated that other approaches are also used, such as Value at Risk. Moreover the plurality of respondents indicated that methods such as hurdle rates alone are not sufficient to fully capture all investment risks.*

enhance the robustness and accuracy of the assessment results. For example, a revenue-based approach could be implemented in the shorter term incorporating additional market-related data, with a system cost approach in the longer term. ENTSO-E thus proposes amending Article 6(2) to allow the possibility for either or a combination of EVA approaches to be considered, if deemed relevant.

2.4 Resource adequacy and data collection

ENTSO-E proposes several amendments to Articles 4 and 5 related to the resource adequacy assessment and data collection, respectively. These proposals are mostly aimed at simplifying and streamlining the methodology and improving robustness based on lessons learned in previous editions.

2.4.1 Considering reserve constraints separately from network constraints

Article 6(8) of the current ERAA methodology provides that reserve requirements (e.g. FCR, mFRR, aFRR) – as defined in Article 4(6)(g) – should be considered along with other network constraints as part of the EVA. However, reserve constraints should not be treated in the same way as other network constraints in the EVA investment model as they are not directly linked to transmission capacities, nor are they computed on a flow-based or an NTC basis. Including them as constraints might also distort the results of the EVA. For example, considering reserve capacity requirements as "hard constraints" could result in new capacity being invested solely to provide reserves, which might not be economically viable. Similarly, unviable capacity might be kept online by the model solely to satisfy reserve constraints. This behaviour would not be reflective of real-world market operations where market parties are free to offer balancing capacity and other ancillary services, but there is no guarantee that TSOs can procure sufficient reserve capacity. Thus, for clarity, ENTSO-E proposes moving the reserve requirements under a separate paragraph.

2.4.2 Changes to ensure the robustness of input data and reduce the risk of biased outputs

Articles 5(9) and 5(10) of the current ERAA methodology have been expanded to ensure a more robust and up-to-date data collection for each ERAA cycle, specifically for key input data such as the general economic parameters (e.g. fuel and carbon prices) and the economic and technical data to perform the EVA. The construction period as well as WACC and discount rates have been properly highlighted among the key data items to be estimated. While consistency of commodity prices with TYNDP scenarios is recommended, more up-to-date data can be used when available and deemed more appropriate (e.g. as an outcome of the public Call for Evidence on input data with stakeholders). The EVA shall also consider all relevant reference technologies and renewals/prolongations of capacity considered in compliance with the RS methodology. The economic and technical data can be based on the latest available best estimate used in the most recent CONE and CORP calculations pursuant to the CONE and RS methodologies, provided that such estimates are up to date, verifiable, and accompanied by the underlying set of assumptions. These amendments would ensure the consistency and robustness of EVA results over the modelled perimeter and horizon, minimising the risk of exogenous biases and inconsistencies, as showcased by the experience matured and reported in Annex 3 of the ERAA 2024.[23]

2.4.3 Additional flexibility in methodological approach for hydropower modelling

A change is proposed to Article 4.5(a) of the current ERAA methodology on hydro storage modelling. The new formulation does not prescribe specific technology types (e.g. closed loop, versus open loop pump storages), thus leaving more flexibility for future changes in the power plant classification and data provision, should

[23] *ENTSO-E ERAA 2024 Annex 3: Detailed Results, Chapter 3: EVA comparisons related to CONE for gas investments*

more accurate or additional technology types (and data) become available. The methodology has also been updated and generalised to allow a broader diversity in possible technical modelling solutions and constraints.

2.4.4 Flexibility modelling and ramping constraints

The current simplification of flexibility constraints in the ERAA is both reasonable and necessary as it has a negligible impact on adequacy indicators (e.g. LOLE, ENS) and ensures reasonable computational times. Including all flexibility constraints in the dispatch model would likely lead to a tenfold increase in simulation times and render the ERAA unachievable without improving the quality of the final adequacy results. Incremental refinements could be investigated over time to better reflect flexibility limitations and additional (ancillary service) revenues in the EVA, although these would necessitate further simplifications in other aspects and thus should only be considered if the benefits outweigh the trade-offs. The possibility to consider additional ramping constraints is also provided for in the proposed methodology for the flexibility needs assessment.

2.4.5 Improvements to three robustness of adequacy convergence criteria

The convergence of the Monte Carlo method is assessed by the coefficient of variation (α) defined in Article 4.2(e) of the current ERAA methodology. A refined definition is proposed for the coefficient of variation, whose numerator shall include the square root of the variance of ENS (i.e. its standard deviation) rather than expected energy not served (EENS). The original formulation included an implicit 1/N bias to the convergence of the expected value of the ENS metric (i.e. EENS), where N is the increasing number of assessed Monte Carlo years. The new coefficient allows more precise and unbiased monitoring of the convergence of the EENS metric.

2.5 Other proposed amendments

This section covers proposed amendments to e.g. additional ERAA outputs, the overall ERAA process, as well as (minor) proposals not covered under the previous topics.

2.5.1 Definition of additional indicators to facilitate comparison of scenarios

In order to ease the comparison of scenarios, either within a same ERAA edition or between different ERAA editions, a paragraph on transparency has been added under the Article 11. ENTSO-E will publish indicators that shall include at least the total demand targets and peak demand, including their compound annual growth rate over the modelled pivotal years, as well as the evolution of nominal generation capacities at least by technology type (including DSR) and their storage size when relevant.

2.5.2 Additional outputs as possible input for performing flexibility needs assessments

To facilitate MS in performing flexibility needs assessment (FNA) should they choose to use the hourly dispatch results from ERAA as the basis for their national FNA, ENTSO-E proposes an amendment to Article 11 to ensure that the necessary data required for performing FNA is provided to the TSO (or another entity performing the FNA). As publishing all necessary hourly data for all MSs would be very onerous (and might not even be used if MSs choose another study), this data should only need to be provided to those MSs that specifically request it.

2.5.3 Extension of the implementation period and entry into force of the new methodology

The current ERAA methodology (Article 12) includes an implementation period to ensure that new developments are implemented through a gradual process, whereby proof-of-concept testing and impact assessment of the different methodological elements should ensure that they are sufficiently mature before becoming an integral part of the ERAA. Such an approach strikes a balance between the accuracy and feasibility of the targeted improvements. As the current implementation period ended in 2023 while several significant changes are proposed by the EC and ACER for the new methodology, ENTSO-E proposes extending the implementation period (Article 12(2)) until the fourth edition after a revised version of the ERAA methodology is applicable. At the same time, to ensure that an ERAA that has already started (and for which data has been collected) does not become subject to different requirements when ACER approves or amends ENTSO-E's proposal, ENTSO-E proposes that the revised methodology should only be applicable to the first edition of the ERAA started following the approval of the revised methodology by ACER.

2.5.4 Update of definitions and recitals

Several amendments are proposed for Article 2 of the ERAA methodology on "definitions" to introduce new concepts introduced in the repurposed methodology (e.g. pivotal target years, variants, construction period), as well as other terms that are missing in the current methodology and should be added for clarity or completeness (e.g. reliability standard).

Moreover, the recital of the methodology has also been updated to incorporate the proposed text clarifying the mutual complementarity between the ERAA and NRAAs (as explained in section 0), as well as updating references to applicable legislation.

3. Additional parameters to support the simplified State aid procedure

Regarding the simplified State aid procedure for CM approval outlined in the CISAF, ENTSO-E would like to invite stakeholders to take into account several technical considerations. It is important to consider the technical modelling framework and boundaries of the ERAA, while facilitating MSs in addressing their needs to ensure security of supply in an efficient way. ENTSO-E welcomes stakeholders' input as to how to best contribute to the streamlined approval of CMs under the simplified State aid procedure set out in CISAF.

While ENTSO-E welcomes the objective of the simplified State Aid process, there are a number of important considerations regarding certain elements of the EC's proposals for the ERAA to facilitate the simplified State aid procedure. These considerations relate to the proposals from the CM streamlining report that (i) the ERAA methodology should include a post-process to enable the direct identification of the volume to procure for each bidding zone linked to the 'adequacy gap' identified in the model, and (ii) ENTSO-E should make available de-rating factors for different technologies (with ACER oversight). Following a detailed assessment, at this stage ENTSO-E has not included amendments on these aspects in the current draft of the revised ERAA methodology, and is seeking views from stakeholders on the expectations and development of these parameters as part of the public consultation. In this context, ENTSO-E would like to highlight the following considerations:

- Under the existing regulatory framework, the purpose of the ERAA is to assess and identify potential resource adequacy concerns across Europe. Any potential extension of the ERAA's scope should be carefully considered to ensure it remains proportionate to the objective of facilitating the simplified State aid procedure, without encroaching on the competences of MSs to manage and decide on measures to address their security of supply; and
- From a technical and practical perspective, identifying robust volume estimates suitable for use in national CMs within the ERAA framework for all MSs with an identified adequacy concern would involve substantial methodological and implementation challenges.

These considerations are further explained in the following sections. Note that these considerations are not concerns regarding the simplified State aid procedure itself, but rather points of attention to take into account to ensure the final implementation achieves the intended goal of bringing additional value for MSs, while ensuring the ERAA remains achievable to deliver. ENTSO-E encourages MSs and other stakeholders to share their views on this topic during the public consultation so this feedback can be taken into account in further elaboration of the ERAA methodology before submission to ACER.

3.1 Considerations regarding the scope of the ERAA

As defined in the Electricity Regulation (Article 23), the ERAA is a tool to identify adequacy concerns by assessing the overall adequacy of the energy system at the pan-European level, based on a quantification of the two key adequacy indicators of loss of load expectation (LOLE) and expected energy not served (EENS). If adequacy concerns are identified in either the ERAA or an NRAA, under Article 20 of the Electricity Regulation it is the prerogative of MSs to take steps to address these concerns by identifying any regulatory distortions or market failures, developing an implementation plan and – if residual concerns remain – assessing the potential need for market interventions such as a CM.

The experience of TSOs shows that it is important to differentiate between the tool used for assessing the resource adequacy needs (e.g. ERAA, NRAA), and the tool(s) used for designing the parameters for any potential CM. Depending on the national legal framework, they will not only have a different aim and scope, but also governance processes. Thus, while the ERAA could be used to further support MSs in their task of monitoring security of supply, any potential extension of the ERAA's scope should be considered carefully to ensure it goes no further than necessary in order to facilitate the simplified State aid procedure, without encroaching on the competencies of MSs. This principle is also reflected in a recent communication by the EU Energy Council, where the Presidency of the Council called on the EC to "*support Member States in addressing their resource adequacy needs in a timely manner, in particular by streamlining the approval processes of capacity mechanisms while respecting Member States' competences to manage their security of supply*".[24]

[24] *Council of the European Union, 16 June 2025, Presidency conclusions on strengthening the Energy Union through reinforcing energy security*

3.2 Practical and technical considerations

Identifying volumes to procure under potential CMs is a fundamentally different and more complex exercise than estimating an 'adequacy gap' i.e. the volume of additional firm capacity a MS with adequacy concerns would need to reach its RS. While there are simplified ways to estimate the adequacy gap (e.g. based on ENS results), such simplified estimates do not represent the necessary volumes to directly procure in potential CM auctions for several reasons.

– The volume to procure in a mechanism depends on the type of CM (e.g. strategic reserve or market-wide CM) and its design as defined in national regulations. For example, certain power plants that can provide firm capacity may be excluded from participating in capacity auctions by the design rules of the CM, or may choose to exclude themselves from participating in auctions. This capacity needs to be accounted for in any auction sizing, and requires significant (potentially confidential) national data not available to ENTSO-E.

– Particularly in the case of a market-wide CM, it is necessary to estimate the Maximum Entry Capacity (MEC) of cross-border capacity so that this can be taken into account in the sizing of auctions. However, under the current framework, it is the responsibility of Regional Coordination Centres (RCCs) to calculate the MEC based on the results of the latest available ERAA or another recent resource adequacy study.[25] As official MEC values only become available after the publication of the ERAA (or other adequacy study), they would not be available to ENTSO-E during the ERAA study itself.

From ENTSO-E's understanding of the CISAF (Annex I [26]), it is not required that volumes to procure under potential CMs and de-rating factors necessarily need to be computed by ENTSO-E within the ERAA process.[27] In this context, other ways of facilitating the simplified State aid procedure could be considered. For example, upon the explicit request of a MS[28], ENTSO-E could liaise with the national TSO(s) to provide the necessary ERAA results that could be used by the MS as input – together with other national data – to estimate the relevant indicators themselves, or by another entity designated by the MS. In addition, to facilitate MSs in this process, ENTSO-E could develop some (non-binding) guidelines for performing the calculations. Given the current guidance offered by CISAF and stakeholder input, ENTSO-E will assess how MSs wishing to make use of the simplified process based on ERAA results could do so in the most efficient way,.

In the context of CMs, de-rating factors reflect the statistical degree to which the installed capacity of a technology is expected to contribute to resource adequacy in scarcity periods.[29] These parameters play an

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[25] Specifically Electricity Regulation (Article 23(7)), and the ACER Decision of 22 December 2020 on technical specifications for cross-border participation in capacity mechanisms (Annex I)

[26] ANNEX 1 (1) b) "all parameters calculated to assess availability, such as any de-rating factors, must be in line with the ERAA assumptions and results" and (9) "The maximum target demand to be auctioned should be calculated based on ERAA central reference scenario results so that the reliability standard, determined as described in criterion 1, is reached."

[27] EC (2025). C/2025/3602 Communication from the Commission: Framework for State Aid measures to support the Clean Industrial Deal (Clean Industrial Deal State Aid Framework)

[28] Under the new framework a MS with an identified adequacy concern wishing to apply for a CM can choose to follow either the new simplified State aid procedure, or follow the existing Climate, Energy and Environmental Aid Guidelines (CEEAG). In that context the relevant data could be provided only to those MSs which request it.

[29] For example, a gas CCGT plant with 1000 MW nameplate capacity and de-rating factor of 90% is expected to generate 900 MW during hours with ENS. This definition of de-rating factors is based on ACER Decision 23-2020 on the Methodology for Calculating the Value of Lost Load, the Cost of New Entry and the Reliability Standard. Note that de-rating factors in the context of CMs should not be confused with de-rating 'ratios' mentioned in Article 4(4)(f) of the ERAA methodology, which are input data used to account for e.g. non-modelled constraints in the dispatch simulations.

important role not only in calculating the volumes to procure in potential CMs, but also a contractual rule in determining how much capacity providers can offer in a CM auction and defining performance obligations. While there are relatively simple approaches to estimate them (e.g. average load factors during hours with ENS) it should be considered that de-rating factors for many technologies are in principle country-, target year- and scenario-specific, and the de-rating factors used by a MS should be consistent with the reference scenario the MS chooses as the basis for setting their CM parameters. This is especially relevant in the context of a future ERAA with multiple central reference scenarios and potential *'With CM'* variants.

Thus, while ENTSO-E welcomes the introduction of a simplified State aid procedure and enhancing the value of the ERAA for MSs where possible, it is important that any additional indicators based on ERAA are of real value for MSs, go only as far as needed, and their estimation does not introduce a new complex step in the ERAA that would endanger timely delivery. The latter would be counterproductive to the overall goal of streamlining and simplifying the process for stakeholders, and increase the risk of delays in delivering the ERAA results to MSs.