DECISION No 04/2023
OF THE EUROPEAN UNION AGENCY
FOR THE COOPERATION OF ENERGY REGULATORS

of 27 February 2023

on the European Resource Adequacy Assessment for 2022

THE EUROPEAN UNION AGENCY FOR THE COOPERATION OF ENERGY REGULATORS,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators[1], and, in particular, Article 9(1)(a) thereof,

Having regard to Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity[2], and, in particular, Article 23(7) and Article 27 thereof,

Having regard to the outcome of the consultation with the European Network of Transmission System Operators for Electricity,

Having regard to the outcome of the consultation with the Electricity Working Group,

Having regard to the favourable opinion of the Board of Regulators of 22 February 2023, delivered pursuant to Article 22(5)(a) of Regulation (EU) 2019/942,

Whereas:

1. INTRODUCTION

(1) The European Resource Adequacy Assessment (ERAA) is a pan-European monitoring assessment of power system resource adequacy of up to 10 years ahead aiming to model and analyse possible events which can adversely impact the balance between supply and demand of electric power. The European Network of

[1] OJ L 158, 14.6.2019, p. 22.
[2] OJ L 158, 14.6.2019, p. 54.

Transmission System Operators for Electricity (ENTSO-E) carries out ERAA on an annual basis.

(2) The purpose of annual ERAAs is to identify resource adequacy concerns, and to provide a robust and objective basis for policy decisions, in particular when assessing the need for capacity mechanisms. As such, ERAA is expected to have a major role in resource adequacy policies.

(3) Annual ERAAs must be based on the methodology for the European resource adequacy assessment (ERAA methodology),[3] which was developed by ENTSO-E under Article 23(3) of Regulation (EU) 2019/943 (Electricity Regulation), and approved by the European Union Agency for the Cooperation of Energy Regulators (ACER) on 2 October 2020. The ERAA methodology is expected to be fully implemented by ENTSO-E in ERAA 2024.

(4) On 30 November 2022, ENTSO-E submitted to ACER its assessment for 2022, comprising scenarios, sensitivities, assumptions and the results as required by Article 23(7) of the Electricity Regulation (collectively ERAA 2022).

(5) This Decision is issued following ACER's assessment of ERAA 2022, and is structured as follows, including annexes:

Section 2	**Procedure** describes the key steps leading to this decision, including engagement before the formal submission to ACER
Section 3	**ACER's competence to decide on ERAA 2022** sets out the legal basis for this Decision
Section 4	**Summary of the submission** lists the key elements of ENTSO-E's submission
Section 5	**Summary of the observations received by ACER** outlines the observations received by ACER during the decision-making procedure
Section 6	**Assessment of ERAA 2022 and recommendations for ERAA 2023** describes the applicable legal framework, ACER's assessment of ERAA 2022 against this framework followed by conclusions, as well as outlines ACER's key recommendations for ERAA 2023
Section 7	**Conclusion** summarises ACER's decision

[3] Annex I to ACER Decision No 24/2020.

The Decision contains a technical annex, Annex I, which supplements ACER's assessment in section 6 by providing a comprehensive technical review of specific elements of ERAA 2022.

(6) ERAA 2022 is the second of ENTSO-E's annual assessments carried out under Article 23 of the Electricity Regulation. The first assessment, ERAA 2021, was not approved by ACER. In its Decision 02/2022 of 12 February 2022 on ERAA 2021 (ERAA 2021 Decision), ACER reasoned why it cannot approve nor amend ERAA 2021 and provided recommendations to ENTSO-E to help advance subsequent annual assessments in order to implement the ERAA methodology by 2023.

2. PROCEDURE

2.1. Engagement with ENTSO-E and other parties concerned before the submission of ERAA 2022

(7) ACER started to engage with ENTSO-E on ERAA 2022 in autumn 2021. This scoping phase lasted until the formal submission of ERAA 2022 in November 2022, and involved numerous discussions and information exchanges between ACER and ENTSO-E. These discussions and information exchanges allowed ACER to provide input at an early stage of the ERAA development and also review key parts of the draft ERAA 2022 in preparation for its assessment following the formal submission.

(8) In parallel, ACER held regular discussions with the regulatory authorities about ERAA 2022 in the context of ACER's related Task Force. In particular, ACER and the regulatory authorities developed a set of detailed recommendations for ERAA 2022, and included them in the ERAA 2021 Decision. These recommendations reflected ACER's and the regulatory authorities' key expectations for progressive alignment of the assessment with the methodological framework. Their main purpose was to support the prioritisation of tasks for ERAA 2022 and to provide guidance on how to avoid the same or similar shortcomings as identified in the ERAA 2021 Decision.

2.2. Proceedings following the submission of ERAA 2022

(9) On 30 November 2022, ENTSO-E submitted ERAA 2022 to ACER for approval.

(10) On 7 December 2022, ACER issued a public notice and invited interested parties to submit observations by 30 December 2022.

(11) Between 12 December 2022 and 6 January 2023, ACER had exchanges with ENTSO-E, seeking additional information and clarifications on the submitted documents.

(12) On 12 December 2022, ACER shared its draft preliminary assessment of ERAA 2022 with the regulatory authorities participating in ACER's Task Force, and invited comments by 16 December.

(13) On 11 January 2022, ACER notified ENTSO-E, the regulatory authorities, via ACER's Electricity Working Group (AEWG), and the Member States, via the Electricity Coordination Group (ECG), of its preliminary position, by sharing the draft Decision and the draft technical annex for review and comments. The consulted parties had an opportunity to provide their views by 27 January 2023 and request an oral hearing. ENTSO-E requested an oral hearing which took place on 27 January 2023. The views on ACER's preliminary position are summarised in section 5.2.

(14) The AEWG was consulted on the draft ACER Decision on ERAA 2022 and provided its advice on 9 February 2023 (see section 5.3).

(15) On 22 February 2023, ACER's Board of Regulators issued a favourable opinion pursuant to Article 22(5)(a) of Regulation (EU) 2019/942.

3. ACER'S COMPETENCE TO DECIDE ON ERAA 2022

(16) Article 9(1)(a) of Regulation (EU) 2019/942 states that ACER shall approve and amend, where necessary, the proposals for calculations related to ERAA pursuant to Article 23(7) of the Electricity Regulation.

(17) Pursuant to Article 23(7) of the Electricity Regulation, ERAA's scenarios, sensitivities, assumptions and results shall be subject to the prior consultation of Member States, the ECG and relevant stakeholders, and approval by ACER under the procedure set out in Article 27 of the Electricity Regulation. As specified in Article 27, ACER has three months to either approve or amend ERAA. In the latter case, ACER shall consult ENTSO-E before approving the amended ERAA.

(18) On 30 November 2022, ENTSO-E submitted ERAA 2022 (including scenarios, sensitivities, assumptions and results) to ACER for approval. ACER is competent to decide on ERAA 2022 based on Article 9(1)(a) of Regulation (EU) 2019/942 and Article 23(7) of the Electricity Regulation.

4. SUMMARY OF THE SUBMISSION

(19) ENTSO-E submitted ERAA 2022 to ACER on 30 November 2022. The submission consisted of an Executive Summary describing the purpose of the assessment and its main findings, ERAA 2022's input dataset and related guidelines along with a number of annexes (altogether the Report), including:

Annex 1	Assumptions
Annex 2	Methodology
Annex 3	Detailed results
Annex 4	Country comments
Annex 5	Definition and glossary

(20) The Report, additional methodological documentation and data are available on ENTSO-E's website.[4] ENTSO-E published the Report on its website on 6 December 2022.

5. SUMMARY OF THE OBSERVATIONS RECEIVED BY ACER

5.1. Observations from interested parties

(21) In response to its public notice of 7 December 2022, ACER received observations from two stakeholders, Électricité de France and Iberdrola. Paragraphs (22) to (26) summarise stakeholders' main comments, grouped per topic.

(22) Both stakeholders emphasised the lack of transparency concerning the assumptions, methodology and results of ERAA 2022 as a key issue in being unable to fully understand the assessment. The stakeholders highlighted several areas lacking information, such as the state of the network for the modelled years and the flow-based market coupling modelling, assumptions and modelling of demand-side response (DSR) and information on the profitability of different resources based on the ERAA 2022 results. One stakeholder highlighted that more information is needed to understand the consistency between the assumptions and results, and another recommended more explanations on the improvements between successive ERAA editions and a webinar on the detailed economic viability assessment (EVA) and assessment results for future ERAAs. Both stakeholders also highlighted that the assessment still requires significant methodological improvements.

(23) Regarding the EVA, both stakeholders highlighted the need for further improvements, such as undertaking the optimisation over the entire modelled period, instead of shorter time steps. Moreover, both stakeholders consider the limited number of climate years in the EVA as a significant shortcoming of the assessment. Also in relation to climate years, one respondent commented that the methodology for selecting representative climate years needs to consider representativeness for all bidding zones across the assessment's geography. One respondent commented that the EVA should consider market failures and uncertainties. One respondent welcomed the ERAA 2022 improvements regarding the maximum clearing price modelling.

(24) In relation to the scenario framework, both stakeholders noted the lack of a scenario with capacity mechanisms. Furthermore, both stakeholders recommended to consider additional sensitivities to better understand the significance of different parameters, such as commodity prices, demand and DSR levels, and their impact on the assessment's results. One stakeholder recommended that the ERAA should include

[4] See ENTSO-E's European Resource Adequacy Assessment 2022 Edition.

out-of-market measures when assessing resource adequacy concerns and the results should be compared with the established reliability standard in a Member State.

(25) One stakeholder suggested that the ERAA should reflect the real capabilities of the network to the best possible extent, instead of taking into account forward-looking policies, such as the minimum 70% cross-border capacity target required by Article 16(8) of the Electricity Regulation, the so-called 'minimum 70% target'.[5]

(26) Regarding DSR, both respondents highlighted the risk of DSR overestimation. One respondent suggested to be prudent when considering explicit and implicit DSR to avoid any double-counting and that an availability factor should apply to DSR. In relation to implicit DSR in particular, it was observed that ERAA should consider the share of fixed-price contracts.

5.2. Consultation on ACER's preliminary position

(27) This section summarises the views of ENTSO-E, the regulatory authorities and the Member States consulted on ACER's preliminary position.

5.2.1. Feedback from ENTSO-E

(28) ENTSO-E highlighted that its views on ACER's preliminary position reflect mainly on the need and value of ERAA 2022 to ensure policy makers and other stakeholders have a reference tool for decision-making.

(29) Regarding the value of ERAA, ENTSO-E commented that the current energy crisis highlights and reinforces the need for relevant and fit-for-purpose resource adequacy assessments for the interconnected European power system. In ENTSO-E's view, ERAA 2022 is a key support tool which provides an assessment of risks and solutions to meet energy and climate targets. ENTSO-E considers that ERAA 2022 can facilitate decision-making of national stakeholders, particularly in the current context. In ENTSO-E's view, ACER's decision should recognise the value of ERAA 2022, its conclusions and the potential value of ERAA going forward as ENTSO-E implements further improvements.

(30) Moreover, it is important for ENTSO-E that ERAA is not assessed in a narrow legal framework, specifically in relation to ERAA's role in decisions on capacity

[5] Maximising cross-zonal trading opportunities is a core element to ensure an efficient internal electricity market. It is also important for meeting a number of future challenges in Europe's energy trajectory, including the decarbonisation targets. The Clean Energy Package set a binding minimum 70% target for electricity interconnector capacity to be available for cross-zonal trading, to be met by all EU Transmission System Operators while respecting operational security limits. For more information, see ACER's monitoring of the minimum 70% target.

mechanisms, but considers larger trends and uncertainties.[6] In this sense, ENTSO-E suggested that the key conclusions of ERAA 2022 are valid also in the evolving context, namely that substantial capacity is at risk of decommissioning on economic grounds and that more flexible resources will be needed by 2030.

(31) Regarding ACER's detailed assessment of ERAA 2022, ENTSO-E welcomed ACER's recognition of progress on methodological aspects, such as the EVA and DSR, and enhanced stakeholder engagement.

(32) ENTSO-E took note that three of the elements in ACER's preliminary position were assessed as inacceptable simplifications, and disagreed with ACER's assessment.

(33) Regarding the alignment of ERAA 2022 with the EU's policy targets, ENTSO-E agreed with ACER that the 'fit-for-55' underpins the relevant legal framework. However, ENTSO-E expressed its view that an ERAA must serve as a robust risk assessment for the decade ahead. For this reason, ENTSO-E believes that the ERAA central reference scenarios must be based on best available projections and not the set policy targets, particularly when there are deviations between the latter and realities. ENTSO-E highlighted that ERAA 2022 considers the latest available national data to the extent possible, and that this was achieved by running a public consultation, directed particularly towards Member States, and close cooperation between the Transmission System Operators (TSOs) and national authorities.

(34) Related to the robustness of the EVA and consistency with the economic dispatch (or simply 'risk model'), ENTSO-E highlighted that a pan-European, probabilistic, multi-year EVA is a very complex task and that one needs to strike a balance between accuracy and computational feasibility. ENTSO-E acknowledged that ideally, the EVA and risk models are performed in an integrated model, which would ensure consistency. ENTSO-E believes that the purpose of EVA is different however, to that of the risk model. In ENTSO-E's view, the role of EVA is to test the assumptions of a scenario and understand investors' risks, while the role of the risk model is to assess detailed adequacy metrics. In light of this, ENTSO-E highlighted it is appropriate to apply different but relevant approaches in the two and that a comparison of the adequacy indicators between the EVA and risk model is not necessarily reliable. ENTSO-E acknowledged that revenues at times of scarcity are important for EVA, however, noted that other aspects are important too (e.g. risk perception).

(35) Regarding cross-zonal capacities, ENTSO-E commented it aims to expand the implementation of flow-based modelling in other parts of ERAA, based on projections for grid capacity which are relevant from a risk assessment perspective.

[6] These points essentially reiterate ENTSO-E's views that the current energy crisis highlights an unprecedented need for the industry and decision makers to have a European resource adequacy assessment in coming years as expressed in a letter to ACER, dated 15 July 2022.

5.2.2. Feedback from other concerned parties

(36) ACER received feedback from one Member State, Germany, on its preliminary position. Germany supported ACER's findings and comments on ERAA 2022 and its conclusions for the decision.

(37) Germany welcomed the methodological improvements in ERAA 2022 that were implemented against the backdrop of a strong political interest in more sophisticated and in-depth seasonal adequacy assessments. Despite these developments, it noted that ERAA 2022 encompasses significant methodological deficits which limit the value of its results and hampers their comparison with national resource adequacy assessments.

(38) Germany commented that its own analysis of ERAA 2022 came to similar conclusions to ACER's, especially regarding the shortcomings between the EVA and the risk model, and the modelling of cross-zonal capacities and grid expansion. Germany named the following elements as more critical regarding the differences between the EVA and the risk model: i) the different market coupling approaches, ii) the different consideration of grid expansion, iii) the consideration of curtailment sharing in the risk model only, and iv) the differences in the consideration of climate years. Moreover, Germany suggested that the harmonised maximum clearing price of the intraday market would appear more suitable for the maximum clearing price in ERAA 2022 than ENTSO-E's assumptions.

(39) Finally, Germany considered there is room for improvement of ERAA in terms of its robustness, quality and usability. More specifically, Germany asked for enhanced transparency, both in terms of the assessment's assumptions and methodology, and a robust cross-check of the results to enable their better understanding. Germany suggested that ERAA should be transparent where there are differences between ERAA and a Member State's assumptions underpinning its reliability standard.

(40) ACER also received feedback from the Swedish regulatory authority, Energimarknadsinspektionen, explicitly supporting ACER's preliminary position.

5.3. Consultation of ACER's Electricity Working Group

(41) The AEWG endorsed the draft ACER Decision on ERAA 2022.

6. ASSESSMENT OF ERAA 2022

6.1. Legal framework

(42) The relevant provisions governing ERAA, and therefore also ERAA 2022, are set out in the Electricity Regulation and the ERAA methodology. Section 6.1.1 describes the intended purpose of ERAA based on the recitals and Chapter IV of the Electricity Regulation. ERAA's role must be also read in light of the Electricity Regulation's objectives and key principles. Sections 6.1.2 and 6.1.3 outline substantive and

procedural requirements for ERAA provided in Article 23 of the Electricity Regulation and further specified in the ERAA methodology.

6.1.1. Purpose of ERAA

(43) Pursuant to Recital (43) and Recital (44) of the Electricity Regulation, ENTSO-E should carry out a robust ERAA to provide an objective basis for the assessment of resource adequacy concerns. ERAA is mainly used to identify resource adequacy concerns and to assess the need for capacity mechanisms. As such, adequacy concerns to be addressed by capacity mechanisms should be primarily identified in ERAA, but ERAA may be complemented by national resource adequacy assessments. Accordingly, Article 20(1) of the Electricity Regulation requires Member States to monitor resource adequacy within their territory on the basis of ERAA, and allows them to carry out their national assessments to complement ERAA.

(44) Pursuant to Article 20(2) and Article 20(3) of the Electricity Regulation, where ERAA or a national assessment identifies a resource adequacy concern, the Member State concerned shall identify any regulatory distortions or market failures that caused or contributed to the emergence of the concern, and then develop and publish an implementation plan with a timeline for adopting measures to eliminate any identified regulatory distortions or market failures as a part of the State aid process. When addressing resource adequacy concerns, the Member States shall in particular take into account market operation principles listed in Article 3 of the Electricity Regulation, and shall consider the following measures:

(a) removing regulatory distortions;

(b) removing price caps in accordance with Article 10 of the Electricity Regulation;

(c) introducing a shortage pricing function for balancing energy as referred to in Article 44(3) of Regulation (EU) 2017/2195;

(d) increasing interconnection and internal grid capacity with a view to reaching at least their interconnection targets as referred in point (d)(1) of Article 4 of Regulation (EU) 2018/1999;

(e) enabling self-generation, energy storage, demand side measures and energy efficiency by adopting measures to eliminate any identified regulatory distortions;

(f) ensuring cost-efficient and market-based procurement of balancing and ancillary services;

(g) removing regulated prices where required by Article 5 of Directive (EU) 2019/944.

(45) Article 21(4) of the Electricity Regulation provides that Member States shall not introduce capacity mechanisms where both ERAA and the national assessment, or just ERAA in the absence of a national assessment, have not identified a resource adequacy concern.

(46) Article 21(6) of the Electricity Regulation requires that no new contracts are concluded under the existing capacity mechanisms in case both ERAA and the national assessment, or just ERAA in the absence of a national assessment, have not identified a resource adequacy concern.

(47) Pursuant to Article 24(1) and Article 24(3) of the Electricity Regulation, national assessments shall be based on the ERAA methodology. In case a national assessment identifies a resource adequacy concern that was not identified in ERAA, the Member State shall justify the divergence between the two assessments, and ACER shall provide an opinion on whether the divergence is justified.

(48) The role of ERAA in monitoring resource adequacy and identifying adequacy concerns should be understood in the context of broader EU objectives listed in Article 1 of the Electricity Regulation. In particular, the Electricity Regulation aims to set the basis for an efficient achievement of the 2030 climate and energy framework by enabling market signals to be delivered for increased efficiency, higher share of renewable energy sources, security of supply, flexibility, sustainability, decarbonisation and innovation. ERAA is expected to provide insights for decisions relevant for achieving these objectives.

(49) The purpose of ERAA should also be understood in the context of the market operation principles listed in Article 3 of the Electricity Regulation. In fact, ERAA should consider the relevant market trends which are and will be driven by these principles, such as market integration, free price formation, decarbonisation of the electricity system through the deployment of renewable energy and energy efficiency, increased system flexibility and development of DSR including consumer empowerment.[7] ERAA should also consider that pursuant to these principles, barriers to cross-zonal electricity flows will progressively be removed.[8] Finally, according to these principles, market entry and exit should be based on undertakings' assessments of the economic and financial viability of their operations.[9]

6.1.2. Substantive requirements for ERAA

(50) Pursuant to Article 23(1) of the Electricity Regulation, first sentence, ERAA shall identify resource adequacy concerns by assessing the overall adequacy of the electricity system to supply current and projected demands for electricity at Union level, at the level of the Member States, and at the level of individual bidding zones, where relevant. This requirement is reflected in Article 1 of the ERAA methodology.

(51) Pursuant to Article 23(1) of the Electricity Regulation, second sentence, ERAA shall cover each year within a period of 10 years from the date of the assessment. This

[7] Points (c), (d), (e), (f), (g), (j), (l) and (m) of Article 3 of the Electricity Regulation.
[8] Point (h) of Article 3 of the Electricity Regulation.
[9] Point (n) of Article 3 of the Electricity Regulation.

requirement is reflected in Article 4 of the ERAA methodology defining the study time period.

(52) Pursuant to Article 23(5) of the Electricity Regulation, ERAA shall be based on the ERAA methodology, which shall be transparent and ensure that the assessment:

(a) is carried out on each bidding zone level covering at least all Member States;

(b) is based on appropriate central reference scenarios of projected demand and supply including an economic assessment of the likelihood of retirement, mothballing, new-build of generation assets and measures to reach energy efficiency and electricity interconnection targets and appropriate sensitivities on extreme weather events, hydrological conditions, wholesale prices and carbon price developments;

(c) contains separate scenarios reflecting the differing likelihoods of the occurrence of resource adequacy concerns which the different types of capacity mechanisms are designed to address;

(d) appropriately takes account of the contribution of all resources including existing and future possibilities for generation, energy storage, sectoral integration, demand response, and import and export and their contribution to flexible system operation;

(e) anticipates the likely impact of the measures referred to in Article 20(3) of the Electricity Regulation (listed in paragraph (44) above);

(f) includes variants without existing or planned capacity mechanisms and, where applicable, variants with such mechanisms;

(g) is based on a market model using the flow-based approach, where applicable;

(h) applies probabilistic calculations;

(i) applies a single modelling tool;

(j) includes at least the indicators referred to in Article 25 of the Electricity Regulation, i.e. expected energy not served (EENS) and loss of load expectation (LOLE);

(k) identifies the sources of possible resource adequacy concerns, in particular whether it is a network constraint, a resource constraint, or both;

(l) takes into account real network development;

(m) ensures that the national characteristics of generation, demand flexibility and energy storage, the availability of primary resources and the level of interconnection are properly taken into consideration.

(53) The requirements for ERAA from Article 23(5) of the Electricity Regulation are further specified in the ERAA methodology, in particular:

(a) Article 4 defines the spatial granularity of the modelled zones and Article 1 requires that explicitly modelled systems are those covering at least the region composed of the EU TSOs, in line with Article 23(5)(a) of the Electricity Regulation;

(b) Article 3 sets out the scenario framework and defines central reference scenarios and sensitivities. In particular, it requires that the baseline data for ERAA is based on national forecasts reflecting national policies and that the EVA is carried out for each central reference scenario. Article 6 specifies how to perform the EVA, implementing the requirement of Article 23(5)(b) of the Electricity Regulation;

(c) Article 3 defines two types of central reference scenarios, with and without capacity mechanisms, in consistency with Article 23(5)(c) of the Electricity Regulation. In addition, it allows for additional scenarios and/or sensitivities with EU relevance.

(d) Article 4 specifies requirements for modelling of supply, demand and the network, in line with Article 23(5)(d) of the Electricity Regulation;

(e) Article 3 requires that the assumptions of the central reference scenarios are aligned with the measures and actions defined by the Member States pursuant to Article 10(5) of Electricity Regulation and with the national implementation plans, reflecting the requirement of Article 23(5)(e) of the Electricity Regulation;

(f) Article 3 requires that ERAA is based on two central reference scenarios, with and without existing or planned capacity mechanisms, in line with Article 23(5)(f) of the Electricity Regulation;

(g) Article 4 relates to capacity calculation. In particular, it specifies the requirements for computations based on flow-based approach, where applicable, in line with Article 23(5)(g) of the Electricity Regulation.

(h) Article 4 requires ERAA to use probabilistic calculations as specified therein, in line with Article 23(5)(h) of the Electricity Regulation.

(i) Article 4 requires that the assessment is based on a single modelling tool, in line with Article 23(5)(i) of the Electricity Regulation.

(j) Article 4 requires that resource adequacy is assessed using EENS and LOLE and further defines the two indicators, in line with Article 23(5)(j) of the Electricity Regulation.[10]

[10] According to the ERAA methodology, for a given modelled zone and for a given time period, LOLE is the expected number of hours in which resources are insufficient to meet the demand; Energy not served (ENS) means, for a given market time unit (MTU) and modelled zone, the energy which is not supplied due to insufficient resources to meet demand, while EENS is the expected ENS in a given modelled zone and in a given time period.

(k) Article 8 requires that ENTSO-E identifies the possible source (or sources) of each resource adequacy concern identified in ERAA and specifies how these should be assessed, in line with Article 23(5)(k) of the Electricity Regulation.

(l) Article 3 specifies that ERAA's baseline data come from TSOs' national outlooks. The latter include estimates regarding the state of national networks, taking into account ENTSO-E's ten-year network development plan (TYNDP) and the most recent national network development plans, which is in line with Article 23(5)(l) of the Electricity Regulation.

(m) Article 4 sets out a number of requirements relating to demand, supply, energy storage and network, which ensure that the national characteristics of generation, demand flexibility and storage, as well as the availability of primary resources and the level of interconnection are properly taken into consideration in ERAA, in line with Article 23(5)(m) of the Electricity Regulation.

6.1.3. Procedural requirements for ERAA

(54) Pursuant to Article 23(2) and the second subparagraph of Article 23(4) of the Electricity Regulation, ERAA shall be conducted by ENTSO-E on an annual basis. Article 10 of the ERAA methodology specifies that ERAA is submitted to ACER by 1 November each year.

(55) Pursuant to the first subparagraph of Article 23(4) of the Electricity Regulation, the TSOs shall provide ENTSO-E with the data it needs to carry out ERAA. Pursuant to the second subparagraph of Article 23(4) of the Electricity Regulation, producers and other market participants shall provide the TSOs with data regarding expected utilisation of the generation resources, taking into account the availability of primary resources and appropriate scenarios of projected demand and supply. The data collection process is further specified in Article 5 of the ERAA methodology, listing the obligations of the TSOs and market participants.

(56) Pursuant to Article 23(7) of the Electricity Regulation, ERAA's scenarios, sensitivities and assumptions on which they are based, and the results shall be subject to the prior consultation of Member States, the ECG and relevant stakeholders and approval by ACER under the procedure set out in Article 27 of the Electricity Regulation.

(57) Pursuant to Article 27(2) in joint reading with Article 23(7) of the Electricity Regulation, before the submission of ERAA to ACER, ENTSO-E shall carry out a consultation involving all relevant stakeholders, including regulatory authorities and other national authorities. It shall duly take the results of that consultation into consideration.

(58) Article 41(2) of the Electricity Regulation requires that ENTSO-E operates in full transparency towards stakeholders and the general public. Article 31, in joint reading with Article 30(1)(c) of the Electricity Regulation, specifies consultation requirements for ERAA. ENTSO-E shall conduct an extensive consultation process which enables it to accommodate stakeholder comments before the final adoption of ERAA and in

an open and transparent manner, involving all relevant stakeholders. ENTSO-E's consultation shall also involve regulatory authorities and other national authorities, supply and generation undertakings, system users including customers, distribution system operators, including relevant industry associations, technical bodies and stakeholder platforms. It shall aim at identifying the views and proposals of all relevant parties during the decision-making process. Pursuant to Article 31(2) of the Electricity Regulation, ENTSO-E shall make public all the documents and minutes related to its consultation. Pursuant to Article 31(3) of the Electricity Regulation, before adopting ERAA, ENTSO-E shall indicate how the observations received during the consultation have been taken into consideration, and provide reasons where observations have not been taken into account. The degree of stakeholder involvement required for each ERAA is further specified in Article 9 of the ERAA methodology, including the establishment of adequate stakeholder interaction channels at different stages of ERAA's development process.

(59) Pursuant to Article 27(3) in joint reading with Article 23(7) of the Electricity Regulation, ACER has three months from the submission date to either approve or amend ERAA. In the latter case, ACER shall consult ENTSO-E before approving the amended ERAA. ACER shall publish the approved ERAA on its website within three months of the date of receipt of the submission.

6.1.4. Implementation of the ERAA methodology

(60) Article 12 of the ERAA methodology allows for a progressive implementation of the methodology until the end of 2023. In particular, as stated in Article 12(2), the ERAA methodology may be implemented through a gradual process, whereby 'proof of concept' testing and impact assessment of the different methodological elements should ensure that they are mature enough before they become an integral part of ERAA. Such an approach strikes a balance between accuracy and feasibility of the targeted improvements.

(61) As explained in Recital 12 of the ERAA methodology, this gradual approach is intended to allow for some temporary (and properly justified) methodological simplifications during the implementation phase, in order to help ENTSO-E to continuously learn and gain experience over time ensuring efficient implementation of the ERAA methodology in the longer run.

6.2. Assessment of ERAA 2022

6.2.1. Introduction – ERAA 2022 in the current context

(62) ERAA 2022 was developed in the context of an unprecedented energy crisis which has wide-ranging effects on the evolution of the electricity sector.

(63) First of all, the energy crisis is expected to slow down the economy and consequently, to lower electricity demand. The Russian invasion of Ukraine has pushed up electricity prices to unparalleled levels causing, in combination with other factors, high inflation. This has in turn put households and businesses under severe financial stress. Economic

growth has slowed down significantly from the high-levels driven by the post-Covid recovery in 2021 and first part of 2022. The economy is currently projected to continue growing slowly for the next couple of years, and possibly enter a recession in 2023,[11] and affect electricity demand.[12] Based on first estimates, EU electricity demand dropped by around 4.7% in 2022, compared to 2021.[13] While the reasons for the electricity demand drop are not fully clear yet, this reduction is attributed to the slowdown of the economy at instances.[14]

(64) Secondly, the current energy crisis is expected to accelerate the energy transition. The invasion of Ukraine has triggered a strong and coordinated response by the European Union (EU) with the aim to increase the EU's independence from Russian fossil-fuel imports. To achieve this goal, national governments and the European Commission have agreed to adopt the REPowerEU plan[15] which aims at fostering the deployment of energy efficiency measures, renewable energy and electrification of the EU economy, among other goals. The REPowerEU plan is expected to impact the evolution of the power sector both in the short term, i.e. in the next couple of years, and the long term, i.e. out to 2030. Evidence from the ground suggests that the energy transition has gained speed in response to the current crisis.[16]

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[11] The European Commission projected in 2022 that the Eurozone economy and most Member States would enter into recession in the last quarter of 2022. The Commission also projected that the Gross Domestic Product (GDP) of the EU and Eurozone economy will grow by 0.3% in 2023, and 1.6% and 1.5% respectively in 2024. For more information, see the European Commission's Autumn 2022 Economic Forecast: The EU economy at a turning point.
Similarly, the Internal Monetary Fund (IMF) has communicated it expects several Member States to enter into a technical recession in winter 2022-2023 and, following the Russian invasion of Ukraine, has revised its projections downwards. For more information, see for example: Europe Must Address a Toxic Mix of High Inflation and Flagging Growth.

[12] Historically, electricity demand closely mirrored the health of the economy. Even though economic growth and electricity demand have decoupled to some extent over the past two decades (mostly due to the implementation of energy efficiency measures), economic growth remains a key driver of electricity demand. This was evident during the recent Covid-19 pandemic, when electricity demand across the European Union dropped by around 4% in 2020 as a result of lockdowns and the drop in economic activity.

[13] ACER estimates that total annual demand for EU-27 dropped from 2631 TWh in 2021 to 2512 TWh in 2022, based on data from ENTSO-E's Transparency Platform.

[14] For example, the November update of the French TSO's (Réseau de Transport d'Electricité or RTE) winter outlook suggested that weather-corrected electricity demand for the period October to mid-November was 5-7% lower than the average demand over 2014-2019. RTE believes that this reduction was primarily caused by lower industrial activity caused by higher energy prices. For more information, see RTE's Réactualisation des perspectives pour le système électrique pour l'automne et l'hiver 2022-2023 (Novembre 2022 ; French only).
Other reasons for the drop in electricity demand might include the weather conditions and the implementation of energy efficiency measures. ACER highlights that this reduction happened despite the accelerated electrification of the energy system, for example in the transport and heating sectors.

[15] For more information, see the European Commission's REPowerEU plan.

[16] For example, the sales of solar panels and heat pumps has increased substantially in the EU after Russia's invasion of Ukraine. For more information, see e.g. Politico's Putin's war accelerates the EU's fossil fuel detox.
The International Energy Agency (IEA) has revised upwards its projections for the expansion of renewable energy capacity in Europe by around 35% compared to last year, and now expects Europe to install twice as much

(65) Finally, the current crisis may also bring changes to the EU energy market design. A sudden drop in natural gas imports from Russia have caused natural gas prices and, subsequently, electricity prices to skyrocket. In response, the EU has adopted a number of emergency measures to mitigate the impacts of high energy prices on consumers while, at the same time, securing sufficient gas supplies for the Union. The current situation has also triggered a debate about the suitability of the current market design to deliver on the Energy Union's goals, particularly in relation to affordable energy prices. To this effect, the European Commission launched a consultation on possible changes to the design of the electricity market and is expected to propose reforms in early 2023.[17] Any market design changes may further impact the power sector outlook.[18]

(66) ACER recognises that ENTSO-E could not have foreseen and model the impacts of these processes during the development of ERAA 2022, as they continue unfolding.[19] ACER's assessment is also based on the current regulatory framework and legal requirements as they apply today. Having said that, the ongoing processes cannot be ignored and where relevant, their potential impacts are recognised in ACER's assessment.

6.2.2. Overview of ACER's assessment of ERAA 2022

(67) This section sets out ACER's assessment of ERAA 2022 in light of the applicable legal framework described in section 6.1. This assessment covers both content-related (i.e. substantive) and procedural aspects and, for ease of reading, groups them into thematic categories listed in the first column of Table 1. Each category is then discussed in more details in subsections 6.2.3.1 to 6.2.4.3 and some of them are further developed in the technical annex (i.e. Annex I to this Decision).

(68) Article 23 of the Electricity Regulation defines the purpose of the annual ERAAs and sets out high-level requirements for their content and development. The ERAA methodology details what these requirements mean in technical terms in order for ERAA to serve its intended purpose, i.e. to become an exemplary monitoring assessment for objective, evidence-based decision-making. ACER acknowledges the complexity and the level of effort involved in producing an ERAA that would meet

renewable capacity in the period 2022-2027, compared to 2016-2021. For more information, see the IEA's Renewables 2022.

[17] The European Commission consulted on the possible reform of the EU's electricity market design between 23 January and 13 February 2023. More information is available on the European Commission's consultation webpage.

[18] ACER acknowledges that uncertainty around the future market design can harm investors' confidence. Visibility of any structural reforms on the electricity market design is important for investors' certainty.

[19] ENTSO-E has reflected the impact of the energy crisis on ERAA 2022 to a limited extent. For example, ERAA 2022 uses long-term gas prices as provided for in the European Commission's REPowerEU Communication of May 2022, which considered the effects of Russia's invasion of Ukraine on gas prices. On the other hand, ERAA 2022 does not consider the effects of the energy crisis on for example electricity demand or the deployment of renewable capacity and energy efficiency measures. For more information, see also section 6.2.3.4.

this high methodological standard. With this in mind, ACER has allowed for a gradual implementation of the ERAA methodology by 2023, expecting that the first assessments demonstrate progressive implementation of the methodological framework, reaching the required standard in ERAA 2024 at the latest. However in any case, even if only gradual, the implementation of the ERAA methodology has to be consistent with the legal purpose of annual ERAAs and the high-level legal requirements for their content and development process. ERAA to be conducted by ENTSO-E in accordance with the ERAA methodology has to be assessed in light of this purpose and those high-level requirements.

(69) Similar to last year's decision, ACER recognises that ENTSO-E is still in the four-year phase to gradually implement the ERAA methodology by the end of 2023 and as such, certain methodological simplifications are still unavoidable in ERAA 2022. For this reason, ACER follows the same approach as last year, i.e. checks whether ERAA 2022 considers all high-level requirements of Article 23 of the Electricity Regulation and meets the intended purpose of an ERAA.[20]

(70) While simplifications in ERAA 2022 are expected, and in many cases ACER considers those applied by ENTSO-E as justified and acceptable, they inevitably affect, to some degree, the quality of the assessment and the robustness of its results. ACER recognises the salient role of ERAA in monitoring resource adequacy in Europe and, in particular, in providing robust and objective findings for important policy decisions pursuant to Chapter IV of the Electricity Regulation (see section 6.1). In particular, ERAA is expected to support decisions regarding capacity mechanisms and market reforms envisaged in the national implementation plans. Given the role of ERAA in decision-making, it is necessary to carefully assess whether, and to what extent, such simplifications, or even deviations from the methodological framework, may actually undermine the purpose of ERAA as intended in Chapter IV of the Electricity Regulation. Therefore, in case of simplifications or deviations, ACER considers their potential impacts on the functionality of the assessment in terms of its relevance for policy-making. In particular, ACER examines whether such simplifications or deviations compromise the robustness of the assessment to the extent that they would materially affect the accuracy and reliability of its results, leading to incorrect findings of resource adequacy concerns and by extension, incorrect policy decisions.

(71) Considering the above, ACER has assessed ERAA 2022 against the applicable legal framework based on a combination of three factors: (1) ERAA 2022 should have regard to the objectives and requirements of the Electricity Regulation, in particular it should reflect the requirements of Article 23; (2) certain methodological simplifications may be allowed in this period; and (3) any such simplifications may

[20] The framework may evolve for future ERAA approvals, in line with the progressive implementation of the ERAA methodology.

not however render the assessment unfit for its intended purpose. The conclusions from ACER's assessment are provided in the fourth column of Table 1 and the colours used are explained below. For informational purposes, ACER also assesses how ERAA 2022 compares with ERAA 2021 against the applicable legal requirements; the results of this comparison are summarised in the fifth column of Table 1.[21]

Table 1: Summary of ACER's assessment of ERAA 2022

Colour coding:

Compliance with the applicable requirements.

Simplification acceptable in 2022 given that impacts on ERAA's purpose are limited.

Simplification or deviation not acceptable given material impacts undermining ERAA's purpose.

Unable to assess due to limited information available.

Aspect of ERAA 2022 (relevant section)	Applicable requirements (ER[22], ERAAM[23])	Compliance with requirements[24]	ACER's assessment	Comparison with ERAA 2021
Geographical scope (section 6.2.3.1)	Art. 23(1) ER Art. 23(5)(a) ER Art. 1 ERAAM Art. 4 ERAAM	YES	Compliant with the requirements.	No change.
Temporal scope (section 6.2.3.2)	Art. 23(1) ER Art. 4 ERAAM	NO	Simplification acceptable in ERAA 2022. Impact: key target years for decisions on capacity mechanisms are included, i.e. 2025 and 2027.	Improvement. ERAA 2022 models an additional year which is key year for decisions on capacity mechanism (2027).
Scenario framework (section 6.2.3.3)	Art. 23(5)(b) ER Art. 23(5)(f) ER Art. 23 (5)(c) ER Art. 3 ERAAM	NO	Simplification acceptable in 2022. Impact: while ERAA 2022 contains no scenario with capacity mechanisms, it can still be used for the identification of resource adequacy concerns.	ERAA 2022 can be used to identify adequacy concerns and inform decision-making for key years, as opposed to ERAA 2021 that could be used for one year only.

[21] For simplicity and recognising their overlapping nature, ACER considers energy efficiency measures and measures to increase the penetration of renewable energy under one single category of 'greenhouse gas emissions reduction targets'. Similarly, ACER discusses the modelling of interconnection and planned network development together with cross-zonal capacity calculation under one broader category of 'cross-zonal capacities'. These are solely presentational changes compared to the ERAA 2021 Decision and do not impact the scope of ACER's assessment.
[22] Applicable paragraphs of Article 23 of the Electricity Regulation.
[23] Applicable provisions of the ERAA methodology which implement a given requirement of the Electricity Regulation.
[24] Compliance with all the applicable legal requirements is expected by ERAA 2024.

Greenhouse gas emissions reduction targets (section 6.2.3.4)	Art. 23(5)(b) ER Art. 3 ERAAM	NO	Deviations in ERAA 2022 not acceptable. Impact: significant deviations from policy targets undermine the validity of the scenarios and subsequently of the results.	Improvement. Fit-for-55 policy targets are partially considered. Enhanced information and additional data on energy efficiency measures.
Economic viability assessment (EVA) (section 6.2.3.5)	Art. 23(5)(b) ER Art. 23(5)(d) ER Art. 3 ERAAM Art. 4 ERAAM Art. 6 ERAAM Art. 7 ERAAM	NO	Simplifications in ERAA 2022 not acceptable. Impact: significant inconsistencies between the investment (EVA) and risk (economic dispatch) models. The EVA fails to adequately reflect risks and opportunities, leading to overestimation of resource adequacy risks.	Improvement. Significant methodological improvements compared to ERAA 2021.
Storage (section 6.2.3.6)	Art. 23(5)(d) ER Art. 23(5)(m) ER Art. 4 ERAAM	NO	Simplification acceptable in 2022 as it is broadly consistent with the applicable framework. Impact: any potential impacts on the purpose of ERAA are expected to be limited.	No change.
Cross-zonal capacities (section 6.2.3.7)	Art. 23(5)(b) ER Art 23(5)(d) ER Art. 23(5)(g) ER Art. 23(5)(l) ER Art. 23(5)(m) ER Art. 3 ERAAM Art. 4 ERAAM	NO	Simplifications in ERAA 2022 not acceptable. Impacts: the restrictive introduction of flow-based capacity calculation (only in the risk model and ignoring network developments beyond 2025) leads both to inconsistencies and overestimation of risks. This is exacerbated by the insufficient consideration of the minimum 70% target.	Implementation of flow-based capacity calculation for the Core capacity calculation region in the risk model represents a methodological improvement in ERAA 2022.
Demand-side response and sectoral integration (section 6.2.3.8)	Art. 23(5)(d) ER Art. 23(5)(m) ER Art. 4 ERAAM	NO	Simplifications acceptable in ERAA 2022. Conservative approach to implicit DSR. Area of significant uncertainty in the current context.	Improved assumptions and methodology compared to ERAA 2021.
Implementation plans (section 6.2.3.9)	Art. 23(5)(e) ER Art. 3 ERAAM	?	Unable to assess due to limited information available.	No change.
Probabilistic assessment (section 6.2.3.10)	Art. 23(5)(h) ER Art. 23(5)(j) ER Art. 4 ERAAM	NO	Minor simplifications of the applicable requirements, acceptable in 2022. Impact: simplifications expected to have limited impact on the accuracy of the results.	No change.
Single modelling tool (section 6.2.3.11)	Art. 23(5)(i) ER Art. 4 ERAAM	YES	Compliant with the requirement.	No change.
Out-of-market capacity resources (section 6.2.3.12)	Art. 23(5)(d) ER Art. 7 ERAAM Art. 8 ERAAM	NO	Simplification acceptable in ERAA 2022. Impact: Some limited impact on the accuracy of the results as ignoring out-of-market measures overestimates the risks of consumer disconnections.	Minor improvement compared to ERAA 2021, by considering limited out-of-market capacity resources.
Identification of sources of resource adequacy concerns (section 6.2.3.13)	Art. 23(5)(k) ER Art. 8 ERAAM	NO	Simplification acceptable in ERAA 2022. Impact: Useful analysis to understand key elements driving adequacy concerns, even though incomplete.	Improved and more comprehensive analysis compared to ERAA 2021.

Transparency (section 6.2.3.14)	Art. 41 ER Art. 11 ERAAM	NO	Level of transparency acceptable for ERAA 2022. Impact: ERAA 2022 contains description of overall methodology, detailed data on assumptions and results and high-level interpretation of results. However, explanation of methodologies and assumptions are often lacking, particularly at the national level, and the explanation of results is not comprehensive.	Enhanced transparency compared to ERAA 2021, including more information on the methodology and additional data.
Timeline for submission (section 6.2.4.1)	Art. 23(4) ER Art. 10 ERAAM	NO	Slightly delayed submission had limited impact on this year's assessment, and is therefore acceptable.	No change.
Data collection (section 6.2.4.2)	Art. 23(4) ER Art. 5 ERAAM Art. 10 ERAAM	YES	Compliant with the requirements.	No change.
Stakeholder engagement (section 6.2.4.3)	Art. 31 ER Art. 23(7) ER Art. 27 ER Art. 9 ERAAM Art. 10 ERAAM	NO	Considerable stakeholder engagement throughout the process for developing ERAA 2022. Lack of consultation with the ECG on preliminary results driven by the exceptional circumstances for winter 2022-2023.	Significantly enhanced stakeholder engagement compared to ERAA 2021.

(72) ACER was able to assess 16 out of 17 aspects of ERAA 2022 listed in Table 1. Due to limited information available, ACER was not in a position to assess how ERAA 2022 considers the national implementation plans. Out of the remaining 17 aspects:

a) **three aspects are marked "green"**, indicating that they comply with the applicable requirements. These aspects include: (1) geographical scope, (2) single modelling tool and (3) data collection.

b) **ten aspects are marked "yellow"**, indicating that they represent acceptable methodological simplifications or deviations for this year's ERAA. Their impacts are limited enough not to undermine ERAA's application in decision-making. These aspects include: (1) temporal scope, (2) scenario framework, (3) storage, (4) demand-side response and sectoral integration, (5) probabilistic model, (6) out-of-market capacity resources, (7) identification of sources of resource adequacy concerns, (8) transparency, (9) timeline for submission, and (10) stakeholder engagement.

c) **three aspects are marked "red"**, indicating that they do not comply with the applicable legal requirements and represent a deviation from the methodological framework or a simplification which cannot be accepted by ACER due to its material impacts on the functionality of ERAA (and the accuracy and reliability of its results, in particular) to the extent that it undermines the purpose of the assessment. These aspects include: (1) greenhouse gas emissions reduction targets, (2) economic viability assessment, and (3) cross-zonal capacities.

(73) ACER's assessment of the above aspects is discussed in more detail in the next sections. Where applicable, ACER refers to the technical annex for further details.

6.2.3. Assessment of substantive requirements

6.2.3.1. Geographical scope of ERAA 2022

(74) Article 23(1) of the Electricity Regulation provides that adequacy is assessed at Union level, at the level of the Member States, and at the level of individual bidding zones, where relevant. Article 23(5)(a) of the Electricity Regulation further requires that ERAA is carried out on each bidding zone level covering at least all Member States. This requirement is further specified in Article 1 and Article 4 of the ERAA methodology.

(75) ERAA 2022 includes all EU-27 Member States based on the current bidding zone delineation, and provides results for individual Member States and bidding zones. In this respect it complies with the applicable requirements. As with last year's assessment, ERAA 2022 also considers a larger geography, covering the entire area of ENTSO-E's membership.

6.2.3.2. Temporal scope of ERAA 2022

(76) Article 23(1) of the Electricity Regulation requires that ERAA covers each year within a period of ten years from the date of that assessment; this essentially means the period 2023-2032 for ERAA 2022. Article 4 of the ERAA methodology implements this requirement by defining the study time period and requiring to simulate each target year in this period.

(77) ERAA 2022 models three target years within the study time period, namely: 2025, 2027 and 2030. This represents an incremental improvement compared to last year's assessment that modelled two target years.[25]

(78) This simplification has a certain impact on the functionality of ERAA 2022. Under the current legal framework, a Member State may only introduce a capacity mechanism or sign new contracts in an existing mechanism, if ERAA or a national assessment identifies a resource adequacy concern for this Member State (see section 6.1.1). Pursuant to Article 8(1) of the ERAA methodology, a resource adequacy concern is identified for a given target year if the resource adequacy risk is greater than the reliability standard set by the Member State. Therefore, ERAA 2022 can only identify resource adequacy concerns for the three years modelled in detail, but cannot

[25] ENTSO-E originally intended to model four years in ERAA 2022, including year 2024 as recommended by ACER (see ERAA 2021 Decision). However, ACER understands that 2024 was eventually not modelled because ENTSO-E had to shift its resources to the seasonal outlook, to address the increased uncertainty following the Russian invasion of Ukraine.

do so for the remaining years. Having said that, ERAA 2022 covers two key years relevant for taking decisions on capacity mechanisms, both in the short term (i.e. 2025) and in the medium term (i.e. 2027).[26] The omission of other years has no impact on the accuracy of the results for the target years.[27] Therefore, ACER considers that this simplification is acceptable for ERAA 2022.

6.2.3.3. Scenario framework

(79) Article 23(5) of the Electricity Regulation requires that ERAA is based on appropriate central reference scenarios and that it contains separate scenarios reflecting the differing likelihoods of the occurrence of resource adequacy concerns which the different types of capacity mechanisms are designed to address. It is also required that ERAA includes variants without existing or planned capacity mechanisms and, where applicable, variants with such mechanisms (see section 6.1.2). These requirements are reflected in Article 3 of the ERAA methodology, which specifies, in particular, that ERAA must rely on two central reference scenarios, without and with capacity mechanisms.

(80) ERAA 2022 only considers one central reference scenario for the target years, i.e. scenario without capacity mechanisms.[28] Contrary to the applicable requirements, ERAA 2022 fails to consider the scenario with capacity mechanisms for any of the target years. The omission of the central reference scenario with capacity mechanisms does not affect the results of the central reference scenario without capacity mechanisms.

(81) ACER considers that this simplification is acceptable in ERAA 2022 as the assessment can still be used to identify adequacy concerns (for the target years) since for their identification suffices that the reliability standard is not met for at least one central reference scenario.[29, 30] Having said that, the lack of this scenario impacts the full functionality of ERAA. As demonstrated in ERAA 2021, the benefits of additional capacity brought forward through already approved capacity mechanisms in one

[26] For example, the modelled year 2027 is important for the introduction of new market-wide capacity mechanisms or the signing of contracts for existing market-wide capacity mechanisms. Market-wide capacity mechanisms usually consist of a main auction four years in advance of delivery (the so-called T-4 auction) and a complementary auction one year in advance of delivery (the so-called T-1 auction).
[27] Unlike ERAA 2021, ERAA 2022 considers the intertemporal scope of ERAA within the EVA to some extent. This point is further discussed in section 6.2.3.5.
[28] The scenario without capacity mechanisms is without prejudice to any already awarded capacity mechanism contracts.
[29] Article 8(1)(b) of the ERAA methodology. An additional pre-condition for the identification of a resource adequacy assessment is that a Member State has set its reliability standard pursuant to Article 25 of the Electricity Regulation and in line with the ACER approved methodology for calculating the value of lost load, the cost of new entry, and the reliability standard (ACER decision 23/2020).
[30] Despite the lack of a scenario with capacity mechanisms, ERAA 2022 represents an improvement to ERAA 2021 that could only be used for one year (i.e. 2025) to identify resource adequacy concerns.

Member State extend to other Member States.[31] As such, ERAA 2022 fails to capture the benefits from the implementation of existing capacity mechanisms across the geography of the assessment.

6.2.3.4. Greenhouse gas emissions reduction target

(82) Article 23(5) of the Electricity Regulation requires that ERAA is based on appropriate central reference scenarios of projected demand and supply, including measures to reach energy efficiency targets. Article 3 of the ERAA methodology further specifies that the central reference scenarios must be in line with national objectives and targets, and the National Energy and Climate Plans (NECPs).

(83) The current EU greenhouse gas emissions target for 2030 is to reduce emissions levels by at least 55% from 1990 levels (the so-called 'fit-for-55'). This target was introduced by the European Climate Law and entered into force in July 2021,[32] before ENTSO-E started working on ERAA 2022. Even though the details of fit-for-55 are still being negotiated by the European institutions, it is clear that this new binding target will have a significant impact on the EU electricity system.[33] Moreover, the European institutions are currently considering a further increase of the emissions reduction target as part of the REPowerEU Plan. In this context, the European Commission has recommended to increase the targets for renewable energy and energy efficiency.[34] The European Commission and Member States have also passed new emergency legislation to facilitate, in the short-term, an accelerated deployment of renewables and other technologies, such as heat pumps.[35] In this context, ACER notes that the current version of Member States' NECPs was adopted before the

[31] The scenario with capacity mechanisms for 2025 leads to an additional 5 GW of firm capacity for 2025 in ERAA 2021. The report concludes that the additional capacities "have a reducing effect on the LOLE values of neighbouring countries, e.g. Germany". For more information, see ENTSO-E's European Resource Adequacy Assessment 2021 edition.

[32] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'), OJ L 243, 9.7.2021, p. 1.

[33] Among other goals in the fit-for-55 package, the European Commission has proposed to increase the EU-wide: i) renewable energy target in the overall energy mix to at least 40% by 2030 (from the existing target of 32%); and ii) energy efficiency targets to 36% and 39% for final and primary energy consumption respectively (from the existing target of 32.5%), which is equivalent to a 9% reduction in energy consumption by 2030, compared to the European Commission's baseline projections.
For more information, see for example the European Commission's Communication on 'Fit for 55' (COM/2021/550 final).

[34] The European Commission has proposed to increase the 2030 renewable energy target from the current 40% to 45% and the EU-wide efficiency target from 9% to 13% reduction in energy consumption by 2030. For more information, see the European Commission's REPowerEU plan.

[35] For more information, see: COUNCIL REGULATION (EU) 2022/2577 of 22 December 2022 laying down a framework to accelerate the deployment of renewable energy.

agreement on fit-for-55 and therefore does not reflect the applicable EU-wide objective in principle.[36]

(84) Regarding renewable energy, ERAA 2022 only partially considers fit-for-55 in the central reference scenario. The Report and ACER's analysis show that the scenarios are aligned with fit-for-55 for only a few Member States regarding the development of renewable energy. For a significant number of Member States, the scenarios only partially reflect fit-for-55. For some Member States, ERAA 2022 projections are either the same or even lower than in ERAA 2021, which did not consider fit-for-55.[37]

(85) Regarding energy efficiency, the Report suggests that the central reference scenario does not consider the effects of enhanced deployment of energy efficiency measures in line with fit-for-55. The Report contains qualitative information about how energy efficiency measures are considered across the transport, heating and building sectors in the form of a survey with the TSOs. The survey responses suggest that the TSOs have generally considered the Member States' NECPs, but largely or partially omitted the effects of additional energy efficiency measures associated with fit-for-55.

(86) It is nevertheless to note that the latter aspect of the assessment (i.e. energy efficiency) is more transparent in this year's Report than it was last year.[38] On top of the aforementioned qualitative information, the Report offers partial quantitative information about the impacts of energy efficiency measures on the assumptions. On the one hand, the Report contains quantitative information about electricity demand associated with the uptake of electric vehicles and heat pumps. Energy efficiency measures in these two sectors are expected to increase electricity demand (e.g. substitution of internal combustion engine vehicles by electric vehicles or gas boilers by electric heat pumps).[39] On the other hand, the Report lacks quantitative information about the impact of efficiency measures in the buildings sector. These measures are expected to reduce electricity demand.[40] ACER notes that the buildings sector is widely recognised as a key sector where energy efficiency measures can deliver substantial energy savings.[41]

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[36] It is possible that a Member State had already set objectives that were higher than the former EU-wide emissions reduction target and in line with fit-for-55. Member States are required to submit draft updated NECPs to the Commission by 30 June 2023. ACER expects that the draft updated NECPs will consider the current EU-wide objectives.

[37] The new binding target was set late in the process for developing ERAA 2021 and as such it could not have been taken into account in the assessment.

[38] See ERAA 2021 Decision, Recitals 82-84.

[39] Detailed data is provided under the Demand Dataset of the Report.

[40] Similarly with last year, the information provided is restricted to TSO statements that energy efficiency measures are considered in the projections for electricity demand. It is unclear how and whether energy efficiency measures are considered for all Member States.

[41] According to the European Commission, buildings in the EU are responsible for 40% of energy consumption and 36% of greenhouse gas emissions, while the bulk majority of them, around 75%, is energy inefficient as of

(87) Not appropriately considering fit-for-55 is, in ACER's view, a significant deviation from the applicable requirements, with material impacts undermining ERAA's purpose. ERAA 2022's scenarios of projected demand and supply are significantly misaligned with the EU climate and energy objectives for a large number of Member States. This misalignment has a significant impact on the validity of the scenarios and results, and as such it is not acceptable.[42, 43]

(88) ACER acknowledges ENTSO-E's and the TSOs' efforts to provide assumptions which align with the fit-for-55 for the central reference scenario and that the use of national data is the preferred option to meet the requirements of the ERAA methodology.[44] Feedback from the TSOs shows that the misalignment of national assumptions with the fit-for-55 objectives is largely driven by a lack of, or incomplete, updates of the NECPs and targets at the national level.[45] The latter suggests that such misalignment may be addressed by adapting the outdated information for the purpose of the ERAA.[46] For example, where the Member States and the relevant national authorities had not updated their targets at the time of developing the scenarios, ACER recommended in the ERAA 2021 Decision that ENTSO-E and the TSOs use the European Commission's fit-for-55 scenarios as an acceptable simplification.[47, 48] Further details on ACER's assessment of ERAA 2022 in terms of the greenhouse gas emissions targets are provided in the technical annex.

2020. The IEA "calls energy efficiency the "first fuel" of all energy transitions". Understandably, the European Commission and Member States have determined energy efficiency as one of the key pillars to achieve the energy transition in its Green Deal. In the current context, energy efficiency measures for vulnerable consumers is all the more important to ensure affordable energy for all.

[42] The divergence of the central reference scenario from fit-for-55 can have widespread and diverse impacts on the risk indicators. Other things equal and assuming no market response, lower deployment of renewable energy capacity and energy efficiency measures in buildings (or equivalently, higher electricity demand) results in higher risks, while slower electrification rates (or equivalently lower electricity demand) result in lower risks. It is not possible to assess how the divergence from fit-for-55 impacts the risk indicators as a whole, i.e. whether it leads to lower or higher risks.

[43] ACER highlights that the recently adopted framework guidelines on scenarios for network development planning require that the TYNDP scenarios are in line with the EU's climate and energy objectives, including the fit-for-55. For more information, see ACER's TYNDP Scenarios Guidelines.
Using different scenarios between the different European assessments can lead to sub-optimal and inconsistent conclusions and subsequently inefficient solutions to the detriment of consumers.

[44] For example, ENTSO-E run a public consultation on the preliminary input assumptions targeting Member States' feedback in particular. For more information, see section 6.2.4.3 on stakeholder engagement.

[45] For more information see Annex 1 of the Report on the input data (Appendix 1: TSO survey on scenario assumptions).

[46] The misalignment of the ERAA 2022 central reference scenario with fit-for-55 essentially assumes that national targets and policies will not be sufficient to meet the EU's objectives. In any event, where realities on the ground suggest that a Member State cannot meet its contribution to the EU's objectives, these should be properly documented alongside the reasons for them.

[47] For more information on the scenarios underpinning the European Green Deal and fit-for-55, see the European Commission's Policy scenarios for delivering the European Green Deal.

[48] For more information, see ERAA 2021 Decision, Recital 148.

(89) For the avoidance of doubt, ERAA 2022 is not required to align with the REPowerEU Plan, as the new goals and initiatives were agreed or proposed too late to be considered in the development of ERAA 2022. It is expected, however, that the updated goals and related proposed legislation will have a considerable impact on the evolution of the power system across the period of the assessment.

6.2.3.5. Economic viability assessment

(90) Article 23(5) of the Electricity Regulation requires that the central reference scenarios include an EVA of generation and that ERAA appropriately considers the contribution of all existing and potentially future resources. The EVA-related requirements are further specified in Articles 3 to 7 of the ERAA methodology.

(91) Similarly to ERAA 2021, ERAA 2022 follows a simplified approach of minimising overall system costs, in line with Article 6(2)(b) of the ERAA methodology. Compared with last year's assessment, ENTSO-E implemented a number of improvements in the EVA model, to further align with the legal requirements. While ACER acknowledges the significant efforts made by ENTSO-E in this respect, a number of important concerns remain.

(92) As an improvement, the EVA model is formulated for the first time as a stochastic model, i.e. the model seeks to minimise the total system cost as a probabilistic formulation of the costs incurred in all examined years. This approach provides a much better approximation of market players' economic decisions compared to a deterministic approach with annual decision horizons. Concerning the length of the period analysed, the EVA covers all years between 2024 and 2030,[49] as opposed to only the target years (i.e. 2025, 2027 and 2030) considered in the risk model. However, when simulating investment decisions, the EVA breaks down the time horizon into shorter time periods of two or three years. This leads to a myopic assessment, as the economic decisions during a given time period are independent from the characteristics of the subsequent ones.

(93) Concerning the need to consider a representative set of climate years, the EVA applies an improved clustering method to identify the most relevant years based on their impact on the total system costs.[50] While the new clustering method constitutes a considerable improvement, it still has some drawbacks. Using total system costs as a proxy means that bigger bidding zones weight more in the choice of the climate years

[49] The selection of target years is discussed in Annex 2, Section 10.1.8 of the Report. ENTSO-E collects complete data for the years 2024, 2025, 2027 and 2030. For the intermediate years 2026, 2029 and 2029 and for unavailable data (NTC, CHP revenues and hydro inflows), the EVA uses either data from the latest year available or through linear interpolation.

[50] For the EVA in ERAA 2022 the clustering methodology produced three representative climatic years 1985, 1988, 2003 with a weight -probability- in the objective function of 2.8%, 5.7% and 91.5% respectively.

than smaller bidding zones. This may result in unreliable results for smaller bidding zones.

(94) Compared to ERAA 2021, ERAA 2022 considers additional decision options to commissioning and decommissioning of generation resources, namely mothballing and de-mothballing, as well as life extension for some coal and gas fired assets. The model also includes commissioning of new storage and decommissioning of cogeneration units based on economic criteria.

(95) ERAA 2022 introduces two features of the market-coupling algorithm, namely local matching and curtailment sharing.[51] These options are incorporated in the market-coupling algorithm to account for a more realistic representation of the exchanges between bidding zones during scarcity events, for example by not allowing exports from a bidding zone prior to meeting domestic demand. The introduction of these features in ERAA 2022 is in line with Article 7(9)(d) of the ERAA methodology.

(96) Analysis of the results of the risk model with and without local matching and curtailment sharing shows that the overall risks increase significantly with the introduction of these two features.[52] However, the EVA does not include these two additional features. As a result, the risk indicators between the EVA and the risk model diverge significantly.

(97) In addition to the aforementioned methodological elements, ACER considers that the definition of the maximum clearing price in ERAA 2022, which is set equal to the technical bidding limit in the day-ahead market, is misaligned with the applicable regulatory framework and the spirit of the Electricity Regulation. In ACER's view, the maximum clearing price should consider the technical bidding limits of the day-ahead and intra-day markets in conjunction. The maximum clearing price used in the ERAA should be equal to the higher bidding limit in these two timeframes.

(98) Overall, despite the improved modelling, ACER observes that the adequacy risks identified in the EVA tend to be, as in ERAA 2021, significantly lower than the risks identified in the risk model and reported as an outcome of ERAA 2022. This indicates that the EVA continues to underestimate the expected revenues of the resources or, in other words, the resources that are expected to be economically viable and remain in, or enter, the system. This in turn leads to an overestimation of the resource adequacy risks in ERAA 2022. In light of this, ACER considers that the implementation of the EVA in ERAA 2022 is still not acceptable. Further details on ACER's assessment of the EVA are provided in the technical annex.

[51] Local matching ensures that zones in deficit do not export energy. Curtailment sharing redistributes cross zonal exchanges during hours of scarcity to reach a more realistic configuration of the system. This redistribution may lead to a sharing of the deficit of one zone by more, usually neighbouring, zones, thus increasing the overall adequacy risks.

[52] For example for Germany the LOLE values doubled for all three studied years.

6.2.3.6. Storage

(99) Article 23(5)(d) of the Electricity Regulation requires that the assessment appropriately takes account of the contribution of energy storage, including its contribution to flexible system operation. Article 23(5)(m) of the Electricity Regulation also requires that the national characteristics of energy storage are properly taken into consideration. These requirements are reflected in Article 4 of the ERAA methodology.

(100) ERAA 2022 considers pumped-storage hydro and battery storage,[53] in line with Article 4(5) of the ERAA methodology. As with last year's assessment, ERAA 2022 aims at dispatching storage when electricity prices are expected to be high and storing energy when prices are expected to be low, reflecting storage flexibility. Overall, the approach to optimising the use of storage is broadly consistent with the Electricity Regulation. ACER considers that ERAA 2022 sufficiently reflects the applicable requirements of the Electricity Regulation regarding the consideration of storage in the assessment.[54]

6.2.3.7. Cross-zonal capacities

(101) According to Article 23(5) of the Electricity Regulation, ERAA must properly take into consideration the level of interconnection, interconnection targets, and real network development, and ERAA needs to be based on a market model using the flow-based capacity calculation approach, where applicable. Article 23(5) of the Electricity Regulation further requires that ERAA appropriately takes into account the contribution of imports and exports to adequacy, by accurately reflecting the capacity calculation approach used on each bidding zone border. These requirements are further specified in Articles 3 and 4 of the ERAA methodology.

(102) Regarding interconnectivity and network developments, ERAA 2022 continues to offer limited information for the target years. The Report does not elaborate on the future state of the network, interconnectivity levels and ERAA's consistency with the relevant plans.[55] In addition, the flow-based calculation for the Core capacity

[53] ERAA 2022 differentiates between reservoir hydro plants, including run-of-river plants with limited storage capabilities (or pondage hydro plants), and pumped-storage hydro plants. Pumped-storage hydro plants are further split into open- and closed-loop plants, to distinguish between basins with and without natural inflows respectively. Battery storage is categorised between in-the-market (or commonly referred to as grid-connected) and out-of-market (or commonly referred to as behind the meter) battery storage. Out-of-market battery storage is treated on the demand side.

[54] In ACER's view and in line with ACER's comments in the ERAA 2021 Decision, ERAA 2022 could explain in more detail how storage optimisation in the model reflects operational practices, and how the assessment considers environmental constraints (e.g. on potable and agriculture uses) at a more granular level.

[55] Limited information about new network developments is scattered across different sections of the Report. For example, under Appendix 1 of Annex 1 of the Report on the Input Data and Assumptions, the Finnish TSO states that the new Aurora line between Finland and Southern Sweden bidding zones is assumed to finish by the end of

calculation region (CCR) uses the assumed network grid for 2025 from ERAA 2021, to derive the domains for all target years. This approach omits any new developments expected to be commissioned in the period 2025-2030 for the central reference scenario in 2027 and 2030. ACER's analysis of ENTSO-E's TYNDP 2022 shows that a significant amount of new network capacity is expected to come online between 2025 and 2030.[56] Not considering this new capacity in ERAA 2022 has a material impact on the results for the Core CCR as it leads to an underestimation of the available cross-zonal capacities for the target years (2027, 2030), and consequently to an overestimation of the risks to resource adequacy. Moreover, disregarding network developments in the period 2025-2030 is at odds with other European studies that are currently being conducted by the TSOs and ENTSO-E, such as the bidding zone review study pursuant to article 14(8) of the Electricity Regulation.[57]

(103) Regarding the consideration of the flow-based capacity calculation approach, the Core and the Nordic CCRs are expected to apply it in the period considered in ERAA 2022. For the Core CCR, the central reference scenario of ERAA 2022 reflects the flow-based approach for the risk model. However, as in ERAA 2021, the EVA relies on the net transfer capacity (NTC) approach. Regarding the Nordic CCR, the central reference scenario of ERAA 2022 relies on the NTC approach for both the EVA and risk model. Compared to the NTC approach, the flow-based approach allows to better capture situations of simultaneous scarcity among bidding zones, and would likely affect the EVA.

(104) ACER acknowledges that the introduction of flow-based capacity calculation for the Core CCR in ERAA 2022 is an important step forward. Another relevant improvement is that ENTSO-E clarified how flow-based calculations respect the minimum 70% target. These improvements are however insufficient for at least two key reasons. First, applying flow-based capacity calculation in the risk model but using the NTC approach in the EVA creates inconsistencies and does not provide a solid basis for the estimation or risks.[58] Second, using target year 2025 to estimate the flow-based domains for the entire study period leads to an underestimation of the available cross-

2025. Under Annex 4 - Country Comments of the Report, the Italian TSO states that the new HVDC interconnection between Sardinia, Sicily and mainland will enter into operation in the mid-term (2027-2028).

[56] ACER estimates that the transfer capacity within the Core CCR and between bidding zones of the Core CCR and adjacent bidding zones, is expected to increase by around 29 GW between 2025 and 2030. The majority of new developments, around 17 GW, is expected to come online before 2027. For more information see the technical annex.

[57] In the context of the bidding zone review, TSOs considered that one of the most relevant sensitivities for the period 2025-2028 is the inclusion of the additional infrastructure projects in Central Europe for 2028 when compared to 2025. For more information, see ENTSO-E's Bidding Zone Review.

[58] ENTSO-E has communicated to ACER that the NTC approach within the EVA does not affect significantly the overall results, but can lead to differences in the resource mix of individual bidding zones. This assessment is based on the performance of test model runs undertaken for the purposes of ERAA 2022. ENTSO-E has used this simplification, due to the additional computational complexity pertaining to the inclusion of the flow-based approach in the EVA.

zonal capacities for future years, thus overestimating risks. This is further compounded by the fact that the NTC approach used within the EVA appears to consider new network developments.[59]

(105) Regarding NTC-based calculations, as with ERAA 2021, ACER considers that the approach used in ERAA 2022 does not appropriately reflect the minimum 70% target. The approach likely underestimates the volume of capacity available for cross-zonal trade. In addition, as with last year's assessment, the lack of transparency in the calculation of NTC assumptions in ERAA 2022 remains a critical issue.

(106) Overall, ERAA 2022 does not meet the relevant requirements of the Electricity Regulation related to the appropriate consideration of cross-zonal capacities. Despite some improvements compared to last year's assessment, the ERAA 2022 approach is still not acceptable. It leads to incorrect description of the characteristics of adequacy risks and an overestimation of such risks. The impact on the purpose of ERAA is therefore material. Moreover, ACER is unable to evaluate network development and the level of interconnection considered in other modelled regions than the Core CCR post-2025, as the Report provides limited information in this respect.[60] Further details on ACER's assessment of ERAA 2022 in terms of capacity calculation are provided in the technical annex.

6.2.3.8. Demand-side response and sectoral integration

(107) Article 23(5) of the Electricity Regulation requires that the assessment appropriately takes account of the contribution of all resources including DSR, and properly reflects national characteristics of demand flexibility. Article 4 of the ERAA methodology further specifies these requirements. In particular, Article 4(3) of the ERAA methodology requires that ERAA considers both implicit and explicit DSR. In addition, Article 23(5) of the Electricity Regulation requires that the assessment appropriately takes account of the contribution of sectoral integration, including its contribution to flexible system operation.

[59] For example, the total import NTC for Germany increases from around 33 GW in 2025 to 41 GW in 2030. In the absence of any information in ERAA 2022, ACER expects that this increase is driven by new network developments. Figure 8 of Annex I of ERAA 2022 provides a high-level overview of the changes in NTC capacity for each Member State across the modelled period. It is evident from this graph that a significant increase of cross-zonal capacity can be expected for the Core CCR during the modelled period.
Considering a higher level of cross-zonal capacities in the EVA compared to the risk model means that a Member State can rely on more imports to address scarcity situations, thus dampening the signals for additional domestic resources. However, these imports cannot be realised in the risk model, likely resulting in an artificially higher level of risk as the final result.

[60] More broadly, ERAA 2022 does not provide information about whether and how it considers interconnection targets, such as the minimum 15% electricity interconnection target by 2030, in line with the Electricity Regulation and Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action (OJ L 328, 21.12.2018, p. 1).

(108) The approach for considering the contribution of DSR in ERAA 2022 has improved significantly compared to last year, both for explicit and implicit DSR. A key improvement regarding the consideration of explicit DSR is the use of data from detailed national studies, where these are available.[61] Detailed national studies can provide better projections of the potentials and costs associated with the development of DSR. As a backup, and where national resources are unavailable, ENTSO-E uses an improved, centralised approach to incorporate explicit DSR in the assessment.[62] Overall, the approach for explicit DSR is acceptable for ERAA 2022, with limited exceptions for national assumptions.[63]

(109) Regarding implicit DSR and sectorial integration, a key improvement in ERAA 2022 is the development of a modelling approach to account for the flexible use of electric vehicles and heat pumps.[64] This modelling approach assumes that some consumers ('flexible consumers') respond to wholesale prices, thereby shifting the charging of their electric vehicles or use of heat pumps to hours of relative lower prices, within certain boundaries.[65, 66] Despite the improved methodology for the contribution of sectoral integration to flexible system operation, the overall approach remains conservative as the majority of the TSOs have assumed that only a small portion of consumers, or no consumers at all, will be flexible in the future.[67] Moreover, ERAA 2022 does not consider the potential for additional implicit DSR, compared to recent historical levels, from other uses.

[61] Where available, the preferred option for deriving the assumptions on DSR is a national CONE study that include DSR as a reference technology. As an alternative, TSOs use other detailed national studies on DSR. The use of national CONE studies is in line with the ERAA methodology.

[62] The simplified, centralised approach relies on data from the aforementioned national CONE studies to derive some assumptions, such as capital costs for new DSR. In addition and contrary to ERAA 2021, national TSOs could not override the results of the centralised approach. These changes represent additional improvements compared to the approach followed in ERAA 2021.

[63] For more information, see the technical annex. ACER expects that the amendment of specific national assumptions would have a limited impact at most on the results of ERAA 2022.

[64] On top of electric vehicles and heat pumps, ERAA 2022 includes the modelling of electrolysers in a simplified way. The modelling approach ensures that electrolysers do not produce hydrogen at times of high electricity prices, including scarcity periods. Electrolysers produce hydrogen when electricity prices are below a certain threshold, which varies between 71 and 87 €/MWh depending on the modelled year and assumed electrolyser efficiency. For more information, see Annex 2 of the Report.

[65] For electric vehicles in particular, some level of flexibility is considered already in the exogenously determined charging profiles, as in ERAA 2021. The flexible consumers modelling approach applies on top of these exogenous charging profiles.

[66] ERAA 2022 follows the same approach for behind-the-meter storage.

[67] ACER highlights that exploiting the inherent flexibility of new loads such as electric vehicles and heat pumps can deliver significant benefits for security of electricity supply and lower the electricity bills of consumers by decreasing the needs for new investments in resources. These benefits are much broader than resource adequacy. For example, decreasing demand peaks through smart charging of electric vehicles, lowers the needs for new infrastructure, thus delivering greater economic savings to consumers. Achieving economic efficiency appears all the more important in the current context of high electricity prices and the concerns raised across consumers, policymakers and other stakeholders.

(110) Despite these drawbacks, ACER considers that the level of simplifications is acceptable for ERAA 2022. ACER in particular recognises the current significant uncertainty about the future levels of DSR. In the context of short-term emergency measures, a key target of the European Commission and Member States is to unlock demand side flexibility at peak demand hours with the aim to reduce electricity prices.[68] On the other hand, several Member States have introduced or are intending to introduce measures to limit the exposure of consumers, particularly on the residential sector but not only, on high and variable electricity prices. Depending on their design, such measures can have a dampening effect on the development of demand side flexibility.[69]

6.2.3.9. National implementation plans

(111) Article 23(5) of the Electricity Regulation requires that ERAA anticipates the likely impact of the measures referred to in Article 20(3) of the Electricity Regulation, which are set out in the national implementation plans (see paragraph (53) above).[70] Article 3 of the ERAA methodology specifies that the assumptions of the central reference scenarios must be aligned with the actions and measures taken to eliminate restrictions to wholesale price formation and with the national implementation plans.[71]

(112) At the outset of the work for ERAA 2022, a significant number of Member States had already adopted their implementation plans or published draft versions of them. Overall, 10 Member States had adopted an implementation plan or developed a draft one by late 2021. Two Member States adopted their implementation plans in the course of ERAA 2022's development, replacing their draft plans.[72, 73]

(113) ERAA 2022 provides limited information about the consideration of these implementation plans and only represents a marginal improvement to ERAA 2021

[68] Member States have agreed on an obligation to reduce electricity demand by 5% during peak price hours. While the main goal of this emergency measure is to reduce electricity prices, it can have simultaneous benefits from a security of supply perspective, as peak price periods are highly likely to correlate with system tightness (see also section 6.2.3.13). For more information on the measure, see for example the European Commission's EU action to address the energy crisis.

[69] Overall, ACER expects that the energy crisis may provide useful evidence about the levels of DSR, both explicit and implicit (e.g. related to the 5% target of electricity demand reduction during peak prices).

[70] Information on the implementation plans pursuant to Article 20(3) of the Electricity Regulation is available on the European Commission's webpage on capacity mechanisms.

[71] These measures and actions are defined by the Member States pursuant to Article 10(5) of Electricity Regulation, and aim to eliminate or mitigate those measures or policies which restrict wholesale price formation.

[72] Belgium, Finland, Ireland, Italy, Lithuania and Poland had already adopted their market implementation plans and Bulgaria and Greece had developed draft plans, before work for ERAA 2022 commenced. Germany and France adopted their implementation plans in January and August 2022 respectively, having already developed their draft plans in time to be considered in ERAA 2022.

[73] The European Commission has published its first opinion on the relevant Member States' annual monitoring reports of their implementation plans. More information available on: Commission Opinion on monitoring reports submitted by Belgium, Ireland, Lithuania and Poland.

vis-à-vis this requirement. It is generally unclear which of the implementation plans are reflected at all in the ERAA 2022 assumptions, and how.[74] The Report does not provide any quantification of the impacts of the national implementation plans on the assumptions.

(114) Based on the limited information set out in the submitted documentation,[75] ACER is unable to appropriately assess whether ERAA 2022 complies with the applicable requirements, even in a simplified manner.

6.2.3.10. Probabilistic assessment

(115) Article 23(5) of the Electricity Regulation requires that ERAA applies probabilistic calculations and includes at least the two indicators – LOLE and EENS. These requirements are further specified in Article 4 of the ERAA methodology.

(116) ERAA 2022 uses the same probabilistic approach to assess the risks to resource adequacy as ERAA 2021. The approach aims at capturing the uncertainty associated with future weather conditions and the availability of generation and interconnection assets, though the Monte-Carlo simulations. A key output of these simulations are the probabilistic risk indicators of LOLE and EENS. As with last year, ERAA 2022 uses a simplified method to ensure the convergence of these simulations or, in other words, that the results of the model are stable enough.[76]

(117) ACER considers that the minor simplifications of the probabilistic assessment are acceptable in ERAA 2022, as they are expected to have a limited impact on the accuracy of the results.

6.2.3.11. Single modelling tool

(118) Article 23(5) of the Electricity Regulation requires that the assessment applies a single modelling tool, which is then reflected in Article 4 of the ERAA methodology.

(119) ERAA 2022 uses the same modelling tool for the central reference scenario without capacity mechanisms for all target years. As such, ERAA 2022 meets the requirement of the Electricity Regulation for a single modelling tool.

[74] In one case, Italy, the Report explicitly states that the implementation plan is reflected in the assumptions, without providing any further information and in another case, Finland, the Report explicitly states that the planned reforms were not considered. The majority of the TSOs of Member States with adopted or draft implementation plans in place did not provide any relevant information in response to the ENTSO-E survey on this topic (e.g. the German TSOs responded they could not provide any information and the Belgian TSO provided information, which is irrelevant to the adopted implementation plan and relates to general market rules).
[75] For more information, see Annex I of ERAA 2022 on the input data (section 8.1.8).
[76] The Report suggest that ERAA 2022 has reached a satisfactory degree of convergence. For more information, see section 3.2.5 of Annex 3 of the Report.

6.2.3.12. Out-of-market capacity resources

(120) Article 23(5) of the Electricity Regulation requires that the assessment appropriately considers the contribution of all resources. In this respect, Article 7(10) of the ERAA methodology requires that the assessment projects the risks in the absence of any out-of-market capacity resources and after their activation.[77] Moreover, pursuant to Article 8(1) of the ERAA methodology, the assessment can only identify resource adequacy concerns after considering the impacts of out-of-market resources.

(121) Similarly with last year, the Report provides information about relevant resources and measures that the TSOs have at their disposal when dealing with scarcity in real-time.[78] ACER considers that the list of out-of-market measures is incomplete, however.[79]

(122) ERAA 2022 only considers out-of-market resources contracted in the context of capacity mechanisms. This is essentially confined to resources contracted through the strategic reserve in Sweden and the market-wide capacity market in Poland, for 2025.[80] On the other hand, ERAA 2022 fails to consider any other out-of-market resources, despite an expectation that these would be used prior to implementing load shedding in case of scarcity. This includes, for example, emergency power generation and interconnector assistance (e.g. emergency power generation in Estonia and Malta, interconnector assistance in France), temporary use of frequency replacement reserves and other temporary measures such as voltage reduction that is widely available to the TSOs. The Report does not provide an adequate explanation for the omissions of these resources.[81]

[77] Out-of-market capacity resources are resources that lie outside the market, i.e. do not participate in the wholesale market, and TSOs would only use as a last resort if the market fails to meet electricity demand.
[78] These measures include, for example, strategic reserves (i.e. type of capacity mechanism where resources are kept outside the market), voltage regulation, a common TSO operational practice, as well as bilateral emergency contracts between TSOs. For details, see section 1.2 and Appendix 1 of Annex 1 of the Report.
[79] For example, the German TSOs can use a large share of the Frequency Restoration Reserves (FRR) prior to resorting to other measures, such as the use of strategic reserves and eventually consumer disconnections. This consists of 100% of manual FRR and 60% of automatic FRR. For more information, see the German government's report on the Effects of the German capacity reserve on neighbouring member states. In addition, it is unclear why voltage reduction is available for some TSOs but not for others.
[80] The out-of-market capacity resources in Poland relate to contracts awarded to DSR in the market-wide capacity market. The national TSO, Polskie Sieci Elektroenergetyczne, has communicated this is because the current market rules essentially do not allow DSR from participating in the wholesale market. Polish authorities expect that changes to the market rules, for example reform of the balancing market as stipulated in the Member State's market implementation plan, will enable DSR to participate directly in the wholesale market. ACER notes that the non-participation of DSR in the wholesale market effectively distorts the formation of electricity prices when DSR is called to deliver, as essentially their contribution is priced at zero cost.
[81] For example, RTE has communicated it is planning to use out-of-market measures in winter 2022-2023, such as voltage reduction, prior to resorting to controlled, demand disconnections. For more information, see RTE's Perspectives pour le système électrique pour l'automne et l'hiver 2022-2023 (French only).

(123) Overall, the approach to including out-of-market resources has marginally improved since last year's assessment and is considered acceptable for ERAA 2022. However, ACER notes that the assessment underestimates the amount of out-of-market capacity resources and as a result overestimates the risks to customer disconnections. Out-of-market resources could be impactful during hours when scarcity is limited, because the nature of these measures is often temporary and of limited size. In any case, out-of-market measures provide an additional layer of protection for consumers and their consideration may affect the identification of resource adequacy concerns.[82]

6.2.3.13. Identification of sources of resource adequacy concerns

(124) Article 23(5) of the Electricity Regulation requires that the assessment identifies the sources of possible resource adequacy concerns, in particular whether it is a network constraint, a resource constraint, or both. Article 8 of the ERAA methodology elaborates on the potential drivers to be assessed, including methodological approaches for carrying out the assessment.

(125) ERAA 2022 includes several analyses to assess the sources of adequacy concerns and provides useful information to better understand the main drivers of scarcity. For example, the analysis indicates that winter months are the riskier months from a resource adequacy perspective, while there are barely any risks for the rest of the year, including summer months.[83] Further analysis highlights how times of scarcity in selected Member States or bidding zones correlate with demand, generation and net imports. From this analysis, it is evident for example that for certain Member States, electricity demand is a significant driver of scarcity (i.e. a scarcity situation would most likely occur when demand is very high, likely associated with weather conditions). The analysis also suggests that scarcity situations tend to occur when a combination of adverse conditions occur simultaneously, such as high demand and low generation availability.

(126) ACER considers the simplifications for the identification of sources of resource adequacy concerns acceptable for ERAA 2022, as they have no material impact on the results themselves. The current analysis can provide useful insights to policymakers for the development of solutions to address potential situations of adequacy risks in their system. It can be used as the basis to further augment the scope of this work going forward.[84]

[82] This would be the case for hours when the expected non-served energy is lower than the size of the out-of-the-market capacities; in such cases, considering such capacities would reduce the overall LOLE.
[83] For more information, see: Annex 3 – Detailed Results of the Report, section 3.2.2. on scarcity events description.
[84] For example, the analysis can be enhanced by examining the simultaneity of scarcity situations between neighbouring modelled zones and modelled zones within the selected regions in line with Article 11 of the ERAA methodology.

6.2.3.14. Transparency

(127) Article 41(2) of the Electricity Regulation requires that ENTSO-E operates in full transparency towards its stakeholders. Article 11 of the ERAA methodology sets out requirements ensuring that ERAA is a transparent assessment and that the Report facilitates stakeholders' understanding of the assessment, including inputs, data, assumptions and scenario development.

(128) Overall, transparency improved significantly in ERAA 2022 compared to last year, both during the process of developing the assessment (for more information, see section 6.2.4.3 on stakeholder engagement) and in the Report itself. Even so, ACER believes there is still considerable scope to enhance the assessment's transparency going forward.

(129) In terms of data availability, ERAA 2022 meets the transparency requirements to a significant degree, similarly with last year's assessment. For example, the Report contains the Pan-European Climate Database, the high-level scenario assumptions, such as fuel and CO_2 prices, and the aggregate LOLE and EENS results. In addition, the Report contains additional data compared to last year, such as detailed consumption data assumptions for electric vehicles and heat pumps. On the other hand, ENTSO-E has not published certain required data items,[85] or has published them with a different (lower) level of granularity.[86]

(130) Regarding the level of information provided in the Report, ERAA 2022 represents an incremental improvement. The Report provides a description of the centralised ENTSO-E methodology for the different aspects considered in the assessment. For example, the Report explains the methodology for the EVA (e.g. the optimisation across the time horizon of the EVA) and flow-based calculation (e.g. the definition of critical network elements) approaches. In addition, the Report describes how certain assumptions are derived (e.g. the assumptions for the centralised approach to estimate explicit DSR potentials).

(131) At the same time however, the Report fails to provide essential information to enable a comprehensive understanding of the assessment, particularly in relation to national methodologies and assumptions. For example, ERAA 2022 does not sufficiently explain the methodologies followed by the TSOs to calculate cross-zonal capacities with the exception of the flow-based approach for the Core CCR. Similarly, the Report does not explain how to interpret national assumptions (e.g. the TSOs' best estimates for explicit DSR) or how the TSOs derive certain critical assumptions for the

[85] For example, ENTSO-E has not published the assumptions underlying the measures pursuant to Article 20(3) of the Electricity Regulation, nor a list of the measures associated with the market implementation plans that are expected to significantly impact resource adequacy concerns but not considered in the Report, pursuant to Article 11(6)(c) of the ERAA methodology. The Report does not contain the distribution of LOLE and EENS across all Monte Carlo simulations pursuant to Article 11(4)(e) of the ERAA methodology either.
[86] Such as simultaneous ENS situations between neighbouring modelled zones.

assessment (e.g. the proportion of "flexible consumers" of electric vehicles and heat pumps).

(132) Finally, regarding the results, the Report contains an executive summary, describing the general trends observed in the results of ERAA 2022, and a more detailed annex with additional information on the assessment's results (e.g. including an analysis of scarcity events and curtailment of renewable energy). The provided information is not sufficient for stakeholders to fully understand the results of ERAA 2022. For example, the Report does not explain the effects of the consideration of local matching and curtailment sharing on the risk indicators. Similarly, ERAA 2022 does not explain why the analysis decommissions such a significant number of thermal plants, despite the significant risks identified. ACER regrets that the Report does not contain the risk indicator results of the EVA, nor discusses the significant differences in the risk indicators between the EVA and risk models.

(133) ACER welcomes the increased transparency in ERAA 2022 and notes that the assessment was developed under exceptional circumstances and increased risks for winter 2022-2023 that necessitated the shift of ENTSO-E's and the TSOs' resources towards seasonal outlooks. On this basis, ACER considers the level of transparency acceptable for ERAA 2022. In light of ENTSO-E's obligation to operate in full transparency towards stakeholders and the general public,[87] ACER considers that the level of transparency in the annual ERAAs should increase in the future editions. This concerns especially the data and assumptions provided by the TSOs, but not only.

6.2.4. Assessment of the procedural requirements

6.2.4.1. Timeline for submission

(134) ERAA 2022 complies with Article 23(2) of the Electricity Regulation, requiring assessments on an annual basis. ENTSO-E submitted ERAA 2022 30 days after the deadline of 1 November set out in Article 10(2) of the ERAA methodology. This is not a substantial delay, and was caused by the exceptional circumstances for winter 2022-2023 and the need to undertake extensive analysis for the associated seasonal outlook. Moreover, ENTSO-E communicated its plan to delay the submission of ERAA 2022 to ACER with sufficient notice. Therefore, ACER considers this delay as acceptable.

6.2.4.2. Data collection requirements

(135) Article 23(4) of the Electricity Regulation requires the TSOs to provide ENTSO-E with the data it needs to carry out ERAA. Article 5 and Article 10 of the ERAA methodology specify that ENTSO-E must provide the TSOs with data collection guidelines to ensure coherency of the input data across the assessment and publish

[87] Article 41(2) of the Electricity Regulation.

these guidelines. As with last year, ENTSO-E has collected data from the TSOs for ERAA 2022, as for example evidenced by the surveys run on the assumptions of the assessment with the TSOs, and has published the data collection guidelines alongside the Report. ERAA 2022 is therefore in line with these requirements.

6.2.4.3. Stakeholder engagement

(136) Article 31 in joint reading with Article 30(1)(c) of the Electricity Regulation requires that ENTSO-E conducts an extensive consultation process and takes into consideration stakeholders' comments when finalising the annual ERAAs. Article 23(7) of the Electricity Regulation requires that ERAA is subject to the prior consultation of Member States, the ECG and relevant stakeholders before it is submitted to ACER for approval. Article 27 of the Electricity Regulation requires ENTSO-E to consult relevant stakeholders, including regulatory authorities and other national authorities. ENTSO-E shall duly take the results of that consultation into consideration. The requirements are further specified in Article 9 of the ERAA methodology. In particular, ENTSO-E is required to establish adequate interaction channels (such as public consultations, workshops and webinars) to enable stakeholders to contribute at every step of developing ERAA in a way that is transparent, open, accessible, inclusive, efficient and well-structured.

(137) Overall, ENTSO-E significantly enhanced its stakeholder engagement for ERAA 2022 compared to the first ERAA. At first, ENTSO-E consulted on ERAA 2021 at the end of the process, with the aim of incorporating stakeholders' feedback in the development of ERAA 2022. Following this first broader consultation, ENTSO-E consulted the stakeholders, including Member States and the ECG, on the preliminary scenario assumptions for ERAA 2022. This public consultation lasted 4 weeks (between 9 March and 4 April 2022) and included the initial assumptions on the available resource mix, fuel and emission prices, among others. Based on the feedback received, ENTSO-E and the TSOs refined the assumptions for a number of Member States. In parallel and subsequently, ENTSO-E held public webinars to inform stakeholders about the scenarios, methodological approaches and developments for ERAA 2022. In total, ENTSO-E held three public webinars to inform stakeholders and seek feedback.[88] ACER also commends the enhanced ENTSO-E engagement with ACER throughout the development process of ERAA 2022.

(138) On the contrary and unlike ERAA 2021, ENTSO-E did not consult on the preliminary ERAA 2022 results with the ECG, prior to its submission to ACER. However, ACER notes that the ECG was heavily concerned with the exceptional circumstances associated with the energy crisis and the heightened security of supply risks for winter

[88] For more information, on ENTSO-E's stakeholder engagement activities, see ENTSO-E's dedicated webpage on ERAA.

2022-2023. As such, ACER considers that the lack of engagement with the ECG in the latter stages of ERAA 2022 was driven by the exceptional circumstances.

(139) In summary, ACER recognises ENTSO-E's efforts to improve stakeholder engagement and considers it acceptable for ERAA 2022.

6.3. ACER's conclusions

(140) This section provides ACER's conclusions in light of its assessment described in the previous section.

(141) Article 27(3) in joint reading with Article 23(7) of the Electricity Regulation provides that within three months of the date of receipt of ERAA 2022, ACER either approves it, or amends it and, following a consultation of ENTSO-E, approves the amended ERAA 2022. Considering these options, ACER has come to the conclusion that it cannot approve ERAA 2022 as submitted, nor can assert that amending ERAA 2022 could be feasible within a reasonable timeline. ACER also considers than an amended ERAA 2022 would be of limited value in the current, fast-evolving context, while significantly affecting the timeline for developing future ERAAs.

6.3.1. ACER cannot approve ERAA 2022

(142) ERAA 2022 has been developed in the context of an unprecedented energy crisis in Europe following the Russian invasion of Ukraine. It would not have been possible to anticipate the evolution of the war and capture the potential impacts associated with it (e.g. the unfolding gas supply crisis and its repercussions on the economy of the EU). As described in section 6.2.1, it is expected that the current context will have considerable effects on the evolution of the European power sector.

(143) Despite these circumstances, ERAA 2022 represents an evolutionary step towards the full implementation of the methodology by the end of 2023.[89] Overall, it is a more significant step forward compared to ERAA 2021, with significant improvements of the EVA and enhanced stakeholder engagement. In particular, ACER acknowledges that the development of a stochastic EVA covering the geography of the assessment is a complex endeavour. The increased stakeholder engagement improves the transparency of ERAA and enables stakeholders to input in the development of the study, improving its quality. The implementation of the flow-based approach for the Core region in the central reference scenario and further development of the approach for considering DSR in the study also represent important evolutions.

(144) At the same time, some elements did not evolve adequately or at all in ERAA 2022 and some of the shortcomings identified in ERAA 2021 persisted despite

[89] As noted in the ERAA 2021 Decision, the ERAA methodology has a four-year implementation period. As such, the intermediate ERAAs are not expected to fully comply with the methodology and methodological simplifications should be allowed in this period.

implementation improvements. In particular, ACER considers that the inconsistency between the EVA (investment model) and the economic dispatch (risk model) undermines the robustness of the results, leading to a general overestimation of risks. Moreover, insufficient consideration of fit-for-55, compounded by the current context whereby the Member States and the European Commission aim at accelerating the energy transition, significantly undermine the validity of the scenarios. Some shortcomings, such as insufficient consideration of appropriate cross-zonal capacities, have persisted since last year for certain regions in ERAA 2022 and remain inconsistent with the legal framework, e.g. the minimum 70% target. In ACER's view, using ERAA 2022 for its intended purpose, i.e. to identify adequacy concerns for informing decisions on capacity mechanisms, would thus be inappropriate.

(145) In view of the above, on balance, ACER cannot approve ERAA 2022 as submitted.

6.3.2. ACER cannot amend ERAA 2022 and approve an amended ERAA 2022

(146) Amending ERAA 2022 would require, as a minimum, rectifying the 'red' aspects of Table 1. Some of these aspects relate to the assumptions used in ERAA 2022 and others to methodological considerations. While the amendment of some of the assumptions would be straightforward (e.g. assumption on maximum clearing price), others would require considerable additional efforts (e.g. reflecting fit-for-55 in the central reference scenario). Moreover, amending aspects associated with the methodology would require significant additional analysis. For example, amending the EVA to achieve a greater level of consistency with the risk model, would require methodological improvements that would most likely necessitate efforts and time going well beyond ACER's three-month deadline to adopt a decision.[90]

(147) Even if ACER was to disregard the prescribed three-month decision-making period, ACER considers it unlikely that it could deliver, with ENTSO-E's necessary involvement, an improved ERAA 2022 within a period that would be still feasible to use the yearly ERAA for its purpose. ACER also considers that amending ERAA 2022 would be of limited value given that ERAA 2022's scenarios are becoming increasingly outdated in the current, fast-evolving context.[91]

(148) Amending ERAA 2022 would also require shifting attention and resources from the development of ERAA 2023.[92] This would be in a context of already tight resources for ENTSO-E and the TSOs, as significant attention has shifted towards the seasonal

[90] ENTSO-E has communicated that re-running ERAA 2022 with updated assumptions alone would require around two months, and possibly longer, including validation of the results. This is without any additional elements, such as amendments to the methodology.
[91] See section 6.2.1. For example, ERAA 2022 considers a future of strong economic recovery across the EU, post Covid-19 pandemic. The current economic outlook however, points towards subdued economic growth over the next couple of years. Lower economic growth can be expected to lead to lower electricity demand for future years.
[92] The ERAA 2023 development process has already started with the collection of data from the TSOs that was completed in late 2022.

adequacy assessments, given the increased risks to security of supply for the short-term. Hence, putting efforts to amend ERAA 2022 would significantly undermine the delivery and quality of ERAA 2023, and thereafter the full implementation of the methodology by the end of 2023.

(149) Accordingly, ACER is unable to assure that an amended, fit-for-purpose ERAA 2022 could be feasible within a reasonable timeline, nor finds adequate value in pursuing the amendment of ERAA 2022.

6.4. Recommendations for ERAA 2023

(150) This section contains a set of recommendations, intended as guidance for ENTSO-E to help prepare the next edition of ERAA, i.e. ERAA 2023. While following these recommendations might still not ensure the full implementation of the ERAA methodology, it would at least resolve the key shortcomings identified by ACER in ERAA 2022.

(151) Firstly, ENTSO-E should ensure that the central reference scenarios of ERAA 2023 reflect the policy objectives set at the European level and, by extension, national level. ACER expects that ERAA 2023 aligns with the new emissions reduction target, and reflects the REPowerEU Plan. The TSOs should strive to provide data that reflects the policy objectives of fit-for-55, both on the supply and demand side. This includes the use of the updated NECPs as soon as they become available or, if these are not yet available, best available estimates.[93] In addition, ACER expects ERAA 2023 to take into account the effects of the energy crisis on the economy and thereby electricity demand, as well as the latest decisions by Member States related to generation and other resources (e.g. delays of phase-outs, new investments in storage capacity).

(152) Secondly, a key area of concern in the first two ERAAs has been the EVA and its consistency with the risk model. ACER understands that ENTSO-E intends to use the same simplified approach for the EVA in ERAA 2023, which aims at minimising the total system costs. If this is the case, ENTSO-E should strive to ensure consistency between the EVA and risk model to the maximum extent possible. This may involve increasing the number of climate years and extending the time horizon of the optimisation problem in the EVA, among others. ENTSO-E may also consider modifying the clustering method so that the resulting set of climate years is representative for all modelled zones. ACER expects that ERAA 2023 applies consistent assumptions of cross-zonal capacities between the EVA and risk model. Introducing features in only one of the two models, the EVA or risk model, should be avoided as it may lead to material discrepancies between the two models (as in the

[93] Member States are required to submit the draft updated NECPs to the Commission by 30 June 2023. ACER expects that updated information will be available in time to be considered in ERAA 2023. For more information see the European Commission's webpage on the NECPs.
In the absence of timely updated information at the national level, the TSOs could utilise best available estimates such as the European Commission's scenarios underpinning the European Green Deal and fit-for-55.

case of local matching and curtailment sharing features in ERAA 2022). The intended gains in accuracy in one model can be more than offset by the loss of consistency. Therefore, if the simultaneous introduction of a relevant feature in both models cannot be guaranteed for a given ERAA, ACER considers that the introduction of such a feature should be postponed until such a simultaneous introduction is technically feasible.

(153) Ultimately, the risks perceived by the EVA should align with those perceived by the risk model. Failure to do so would undermine the robustness of the ERAA results and its purpose. ACER invites ENTSO-E to undertake an ex-post evaluation of the profitability of the resource mix (based on the risk model results and considering all revenues as per Article 6(9) of the ERAA methodology) to assess the robustness of the EVA results, as in ERAA 2021.

(154) A third persisting issue in the first two ERAAs relates to the consideration of cross-zonal capacities in the assessment. ACER expects that ERAA 2023 will consider any planned new network developments throughout the modelled period, in line with the applicable framework. Moreover, ACER expects the TSOs and ENTSO-E to report transparently on any network developments considered in the assessment and any deviations from the TYNDP and national network development plans.

(155) In line with ACER's recommendations for ERAA 2022, ACER expects ERAA 2023: i) to reflect the impact of the minimum 70% target on cross-zonal capacities, i.e. cross-zonal capacities should reflect the minimum target and expected action plans and derogations for each modelled year;[94] and ii) to fully apply the flow-based approach across all target years and for the Core and Nordic CCRs. This expectation also relates to the importance of consistent implementation of methodological features as explained in paragraph (152). Finally and as highlighted above, ENTSO-E should ensure consistent assumptions of cross-zonal capacities in the EVA and the risk models.

(156) Fourthly, ACER considers there is still significant scope to enhance the assessment's transparency, in terms of the methodology, assumptions and interpretation of the results. This is supported by the observations received by ACER (see section 5.1 and 5.2.2), whereby stakeholders have highlighted the lack of information and transparency as detrimental to their understanding of ERAA 2022. ACER urges ENTSO-E and the TSOs to enhance transparency of their assessment in ERAA 2023, both throughout the stakeholder engagement process and in the final report.

(157) In relation to stakeholder engagement, ERAA 2022 already represents a significant, incremental improvement. Going forward, ACER sees scope for more targeted engagement (e.g. on complex, technical problems associated with the implementation

[94] ACER also expects full transparency about the methodologies that the TSOs and ENTSO-E use to model the minimum 70% target.

of the ERAA methodology, such as the EVA), on top of the current level of stakeholder engagement (e.g. consultation on preliminary assumptions).

(158) ACER notes that ERAA 2022 represents a substantial effort aimed at providing high-level directions to stakeholders. The current energy crisis has further underlined the significance of a robust ERAA that can be used to assess resource adequacy risks and identify adequacy concerns across the EU. A robust ERAA can be used to understand the main drivers of adequacy concerns, which can be used as the basis for developing appropriate solutions to address these concerns.

(159) It is imperative therefore that ENTSO-E should dedicate, and be provided with, sufficient resources to deliver a fit-for-purpose ERAA 2023, in line with ACER's recommendations. Where ERAA 2023 cannot meet one of these recommendations, ACER invites ENTSO-E to clearly explain the reasons and challenges faced, and justify the alternative approach taken, alongside its implications on the purpose of the ERAA. ACER will engage closely with ENTSO-E to determine appropriate solutions where challenges arise in implementing the recommendations for ERAA 2023.

7. CONCLUSION

(160) ERAA 2022 was developed in the context of an unprecedented energy crisis which has wide-ranging effects on the evolution of the electricity sector. Despite these circumstances, ERAA 2022 represents an evolutionary step towards the full implementation of the methodology, and a more significant step forward compared to ERAA 2021. ACER in particular acknowledges ENTSO-E's substantial efforts for ERAA 2022, against the backdrop of strong political interest in the short-term security of supply outlook that required a shift of ENTSO-E's and the TSOs' resources towards the seasonal adequacy assessments.

(161) While ERAA 2022 constitutes an undeniable improvement, certain simplifications or deviations from the methodological framework compromise, in ACER's view, the robustness of the assessment to an extent that materially affects the accuracy and reliability of its results, leading to incorrect identification of resource adequacy concerns. This undermines the purpose of the ERAA as envisaged in Chapter IV of the Electricity Regulation. Relying on ERAA 2022 could lead to incorrect policy decisions, in particular regarding capacity mechanisms, and would be inconsistent with the Electricity Regulation's objectives. For this reason, ACER cannot approve ERAA 2022.

(162) Amending ERAA 2022 to deliver a fit-for-purpose assessment would most likely necessitate efforts and time going well beyond ACER's three-month deadline to adopt a decision, while being detrimental to the delivery and quality of ERAA 2023 and beyond. ACER is unable to assure that an amended, fit-for-purpose ERAA 2022 could be feasible within a reasonable timeline. In addition, ACER considers that amending ERAA 2022 would be of limited value given that ERAA 2022's scenarios are becoming increasingly outdated in the current, fast-evolving context.

(163) Finally, ACER considers it appropriate to provide recommendations on how to eliminate these shortcomings in the following assessment, i.e. the last one to be carried out during the implementation phase of the ERAA methodology. ACER invites ENTSO-E to follow the recommendations for ERAA 2023 to facilitate next year's approval process,

HAS ADOPTED THIS DECISION:

Article 1

ACER does not approve ERAA 2022 as submitted, nor is able to amend it and approve an amended ERAA 2022.

Article 2

This Decision is addressed to ENTSO-E.

Done at Ljubljana, on 27 February 2023.

- SIGNED -

For the Agency
The Director

C. ZINGLERSEN

Annexes:

Annex I – Technical annex

In accordance with Article 28 of Regulation (EU) 2019/942, the addressees may appeal against this Decision by filing an appeal, together with the statement of grounds, in writing at the Board of Appeal of the Agency within two months of the day of notification of this Decision.

In accordance with Article 29 of Regulation (EU) 2019/942, the addressees may bring an action for the annulment before the Court of Justice only after the exhaustion of the appeal procedure referred to in Article 28 of that Regulation.