ACER
European Union Agency for the Cooperation of Energy Regulators

PUBLIC

DECISION No 17/2023 OF THE EUROPEAN UNION AGENCY FOR THE COOPERATION OF ENERGY REGULATORS

of 21 December 2023

on the alternative bidding zone configurations to be considered in the bidding zone review process for the Baltic region

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 (ACER)[1], and, in particular, Article 5(7) 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 14(5) thereof,

Having regard to the outcome of the consultation with transmission system operators (TSOs) and regulatory authorities,

Having regard to the outcome of the consultation with ACER's Electricity Working Group (AEWG),

Having regard to the favourable opinion of the Board of Regulators of 13 December 2023, delivered pursuant to Article 22(5)(a) of Regulation (EU) 2019/942,

Whereas:

1. INTRODUCTION

(1) Regulation (EU) 2019/943 of the European Parliament and the Council of 5 June 2019 on the internal market for electricity (the 'Electricity Regulation') laid down a range of requirements to address congestions and, in particular, to ensure an optimal

[1] OJ L158, 14.6.2019, p. 22.
[2] OJ L 158, 14.6.2019, p. 54.

configuration of bidding zones (BZs). These requirements include the need to carry out a BZ review (BZR).

(2) With regard to the BZR, pursuant to Article 14(5) of the Electricity Regulation, all relevant TSOs have to submit a proposal for the methodology and assumptions that are to be used in the BZR process and for the alternative BZ configurations to be considered ('BZR proposal') to the relevant regulatory authorities for approval. Then, the relevant regulatory authorities should take a unanimous decision on the proposal within three months of its submission. Where the regulatory authorities are unable to do so, ACER should, within an additional three months, decide on the methodology and assumptions and on the alternative BZ configurations.

(3) On 5 October 2019, all TSOs submitted a BZR proposal ('initial BZR proposal') to all regulatory authorities for approval, pursuant to Article 14(5) of the Electricity Regulation. That proposal, however, lacked alternative BZ configurations for a large part of the EU, namely for the BZR regions (BZRRs) of Central Europe (CE), Central-Southern Italy (CSI), Iberian Peninsula, Baltic and Ireland. By 7 April 2020, the TSOs submitted an updated version of the initial BZR proposal ('updated BZR proposal') to their respective regulatory authorities, following a request by the regulatory authorities, which referred to ACER for decision.

(4) In its Decision No 29/2020 of 24 November 2020[3], ACER:

a. adopted the methodology and assumptions that are to be used in the BZR process in accordance with Article 14(5) of Electricity Regulation, and

b. found that it needed additional information to take a decision on alternative BZ configurations to be considered and requested TSOs to submit additional information[4], mainly results from Locational Marginal Pricing (LMP) simulations, in three stages, the last one ending on 31 October 2021.

(5) By letter of 23 December 2020, the three Baltic TSOs[5] requested ACER to postpone their deadline for delivering the results of the LMP analysis required under Decision No 29/2020. According to the Baltic TSOs, the need for the postponement resulted mainly from the difficulties to perform a meaningful LMP simulation without first

[3] https://acer.europa.eu/Individual%20Decisions/ACER%20Decision%2029-2020%20on%20the%20Methodology%20and%20assumptions%20that%20are%20to%20be%20used%20in%20the%20bidding%20zone%20review%20process%20and%20for%20the%20alternative%20bidding%20zone%20configurations%20to%20be%20considered_0.pdf.

[4] On 17 December 2019, regulatory authorities had requested TSOs to provide a set of three data items, namely: i) data on historical congestions, ii) data on merged grid models, and iii) results derived from Locational Marginal Pricing (LMP) simulations, with a view to support the approval of the BZR proposal, including in the case of referral to ACER. Pursuant to this request, TSOs provided data items i) and ii), but they did not provide iii). For that reason, ACER reiterated the request on iii) in its Decision No 29/2020.

[5] This includes the Estonian TSO, Elering AS, the Latvian TSO, Augstsprieguma tīkls AS, and the Lithuanian one, Litgrid AB.

performing a set of dynamic stability studies related to the synchronisation between the Baltic and the Continental Europe synchronous areas; moreover, such studies would not be available on time for TSOs to conduct and finalise the LMP simulations by the date requested by Decision No 29/2020.

(6) By letter of 18 March 2021, ACER informed the Baltic TSOs that, in the absence of the LMP data, ACER would not be able to take a decision on alternative configurations to be studied for the Baltic BZRR, and required the Baltic TSOs to deliver the results of the LMP analysis as soon as the results of the dynamic studies would become available.

(7) Consequently, in its Decision No 11/2022 of 8 August 2022[6], ACER adopted the alternative BZ configurations to be considered in the BZR process for all EU Member States (MSs), except for those of the Baltic BZRR, namely Estonia, Latvia and Lithuania.

(8) In paragraph (236) of ACER Decision No 11/2022, ACER stressed the need for the Baltic TSOs to submit the LMP data as soon as feasible, i.e. once the necessary studies, described by the Baltic TSOs as a precondition to start the LMP analysis, are performed. ACER explained that it would be in position to decide on alternative BZ configurations also with respect to the Baltic BZRR once this data was delivered.

(9) The present Decision deals with the adoption of alternative BZ configurations for the Baltic region to be considered during the BZR that is carried out by TSOs. In the following, the specific part of the BZR that TSOs have to carry out pursuant to Article 14(6) of the Electricity Regulation is referred to as ‘BZR study’, to differentiate it from the overall ‘BZR process’ that includes further steps such as the launch of the BZR, the adoption of the BZR methodology (constituting Annex I of Decision No 29/2020) and the adoption of alternative BZ configurations to be considered.

2. PROCEDURE

(10) ACER entered into discussions with TSOs, regulatory authorities and stakeholders on the definition of alternative BZ configurations already during the proceedings leading to the adoption of ACER Decision No 11/2022. For a detailed summary of those interactions, reference is made to section 2 of that Decision. In the following, the proceedings related specifically to the submission of the requested information by the Baltic TSOs to ACER are summarised.

(11) On 18 December 2022, the Baltic TSOs informed ACER that the dynamic stability studies related to the synchronisation between the Baltic and the Continental Europe synchronous areas, which constituted the prerequisite for the Baltic TSOs to start the LMP simulations (see paragraph (5)), had been completed at the end of July 2022. In

[6] https://acer.europa.eu/Individual%20Decisions/ACER%20Decision%2011-2022%20on%20alternative%20BZ%20configurations.pdf.

the same correspondence, the Baltic TSOs expressed their intention to deliver the required LMP results to ACER by the end of January 2023.

(12) On 2 January 2023, the Baltic TSOs submitted the data requested by Decision No 29/2020. Between 2 January 2023 and 26 September 2023, ACER exchanged with the Baltic TSOs to address the quality issues identified on the provided dataset and to clarify some assumptions made in the study.

(13) On 12 October 2023, ACER issued a public notice and invited interested parties to submit observations.

(14) On 20 October 2023, ACER shared its preliminary position on the alternative BZ configurations with the regulatory authorities and with TSOs, and invited them to provide comments by 3 November 2023.

(15) On 3 November 2023, the three Baltic TSOs and the Lithuanian regulatory authority sent their feedback on ACER's preliminary position on the alternative BZ configurations. Complementary to its written observations, the Lithuanian regulatory authority requested an oral hearing.

(16) On 8 November 2023, ACER held an oral hearing to provide the Lithuanian regulatory authority with an additional opportunity to express its views on ACER's preliminary position.

(17) On 8 November 2023, ACER communicated the closure of the written and oral procedure to the concerned parties.

(18) On 13 November 2023, ACER submitted its draft Decision for consultation of the AEWG until 20 November 2023.

(19) On 23 November 2023, ACER received advice from the AEWG.

(20) On 13 December 2023, ACER's Board of Regulators issued a favourable opinion pursuant to Article 22(5)(a) of Regulation (EU) 2019/942.

3. THE AGENCY'S COMPETENCE TO DECIDE ON ALTERNATIVE BZ CONFIGURATIONS

(21) Pursuant to Article 5(7) of Regulation (EU) 2019/942 of the European Parliament and of the Council establishing a European Union Agency for the Cooperation of Energy Regulators (the 'ACER Regulation'), ACER shall carry out its tasks related to the BZR pursuant to Article 14(5) of the Electricity Regulation.

(22) Pursuant to Article 14(5) of the Electricity Regulation, by 5 October 2019, all relevant TSOs shall submit a proposal for the methodology and assumptions that are to be used in the BZR process and for the alternative BZ configurations to be considered to the relevant regulatory authorities for approval. The relevant regulatory authorities shall take a unanimous decision on the proposal within three months of submission of the proposal and, where they are unable to reach a unanimous decision on the proposal

within that time frame, ACER shall, within an additional three months, decide on the methodology and assumptions and the alternative BZ configurations to be considered.

(23) Since the relevant TSOs submitted the updated BZR proposal to the regulatory authorities concerned by 7 April 2020 and the latter were unable to reach a unanimous decision on the proposal by 7 July 2020, referring it to ACER with effect of that date, ACER has become competent to decide on this proposal according to Article 5(7) of the ACER Regulation and Article 14(5) of the Electricity Regulation.

(24) By Decision No 29/2020 of 24 November 2020, ACER approved the updated BZR proposal with regard to the BZR methodology and assumptions subject to the necessary amendments included in the relevant annexes to the Decision. However, due to a lack of relevant information, ACER could not decide on the updated BZR proposal as far as the alternative BZ configurations to be considered were concerned. Thus, to effectively exercise its decision-making competence also with regard to the alternative BZ configurations to be considered, ACER requested TSOs to submit additional information, mainly results from LMP simulations.

(25) All TSOs, except for the Baltic TSOs, completed the submission of the data requested by ACER in its Decision No 29/2020 by 20 April 2022. Based on this information, with its Decision No 11/2022, ACER decided on the alternative BZ configurations to be considered in the BZR process for all EU MSs, except for those of the Baltic BZRR, namely Estonia, Latvia and Lithuania.

(26) Following the complete submission of the requested data for the geographical area of the Baltic TSOs by 26 September 2023, ACER considered to have the information necessary to exercise its decision-making competence, according to Article 5(7) of the ACER Regulation and Article 14(5) of the Electricity Regulation, also with regard to the alternative BZ configurations to be considered for the geographical area of the Baltic TSOs.

4. SUMMARY OF THE SUBMISSION

(27) As far as the definition of alternative BZ configurations is concerned, TSOs submitted the following elements to ACER:

a. On 7 April 2020, a list of proposed alternative BZ configurations that TSOs included in the updated BZR proposal submitted to regulatory authorities. This list covered the Nordic and the South East Europe (SEE) BZRRs. No alternative configurations were proposed for the other BZRRs. The list was accompanied by a document justifying the proposed alternative BZ configurations.

b. On 17 November 2021, ENTSO-E submitted a technical report on current BZs covering the years from 2018 to 2020, pursuant to Article 34 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (the 'CACM Regulation')[7] and Article 14(2) of the Electricity Regulation. Although this technical report is not specifically aimed at defining alternative BZ configurations for the BZR pursuant to Article 14(5) of the Electricity Regulation, TSOs considered that the information included in the report was relevant for the decision under that Article, and asked ACER to consider it accordingly.

c. By 26 September 2023, the Baltic TSOs completed the submission of the data requested by ACER in its Decision No 29/2020. In particular, in line with Article 11 of Annex I to ACER Decision No 29/2020, this data included:

   i. the nodal price for each node and market time unit (MTU), in €/MWh;
   ii. cleared generation, storage and demand volumes for each node and MTU, in MW;
   iii. flows on all considered network elements for each MTU, in MW;
   iv. active network constraints for each MTU if any;
   v. shadow prices associated to the active network constraints, in €/MW;
   vi. overall socio-economic welfare resulting from the optimization, in €;
   vii. network model(s) used for the simulations; and
   viii. geographical coordinates of all nodes included in the network model(s).

5. SUMMARY OF THE OBSERVATIONS RECEIVED BY THE AGENCY

5.1. Public consultation

(28) The responses to the public consultation launched on 6 July 2021 are compiled and evaluated in Annex IV to this Decision.

5.2. Public notice

(29) In response to its public notice of 12 October 2023, ACER received observations from two Baltic stakeholders.

(30) Both stakeholders expressed the view that a large majority of market participants active in the Baltic region strongly support the formation of a single BZ encompassing the three Baltic MSs. According to one of the two respondents, this would enable to decrease price fluctuations, foster competition, develop liquid financial electricity markets and develop offshore wind projects.

(31) ACER's feedback on these considerations is included in section 6.7.

[7] OJ L 197, 25.7.2015, p. 24.

5.3. Consultation on ACER's preliminary position

(32) During the hearing phase, held between 20 October 2023 and 8 November 2023, ACER received written comments from the three Baltic TSOs, which provided a joint submission, and from the Lithuanian regulatory authority. On top of the written observations, the Lithuanian regulatory authority provided additional inputs during the oral hearing held on 8 November 2023.

(33) The three Baltic TSOs expressed their agreement with ACER's preliminary conclusions that no alternative BZ configurations need to be considered in the BZR process for the Baltic region.

(34) The comments provided by the Lithuanian regulatory authority revolved around four aspects:

a. The request to receive the modelling assumptions and the input data provided by the Baltic TSOs to ACER;

b. The lack of proposed alternative BZ configurations, in particular mergers across MSs;

c. The possibility of mergers across MSs in future BZRs; and

d. The strong preference to see a merger of the three Baltic BZs implemented as soon as possible.

(35) A detailed description and assessment of the above-listed comments is included in section 6.7.

5.4. Consultation of the AEWG

(36) The AEWG provided its advice on 23 November 2023 and broadly endorsed the draft Decision.

(37) In its advice, the AEWG invited ACER to take note of the comments raised by the Lithuanian regulatory authority. Besides the feedback already provided on ACER's preliminary position, the Lithuanian regulatory authority added that a merger of the Baltic BZs would increase market liquidity in the concerned zones.

(38) These remarks are further described and discussed in section 6.7.

6. ASSESSMENT OF THE UPDATED BZR PROPOSAL WITH REGARD TO ALTERNATIVE CONFIGURATONS

6.1. Legal framework

(39) Article 14(5) of the Electricity Regulation sets out the key requirements of the BZR proposal. In terms of process, it requires all relevant TSOs to submit, by 5 October 2019, a proposal for the methodology and assumptions that are to be used in the BZR

process and for the alternative BZ configurations to be considered to the relevant regulatory authorities for approval. In terms of substance, it prescribes that the BZR methodology '*shall be based on structural congestions which are not expected to be overcome within the following three years, taking due account of tangible progress on infrastructure development projects that are expected to be realised within the following three years*'.

(40) More generally, with regard to BZs, Article 14(1) of the Electricity Regulation provides that '*Bidding zone borders shall be based on long-term, structural congestions in the transmission network. Bidding zones shall not contain such structural congestions unless they have no impact on neighbouring bidding zones or, as a temporary exemption, their impact on neighbouring bidding zones is mitigated through the use of remedial actions and those structural congestions do not lead to reductions of cross-zonal trading capacity in accordance with the requirements of Article 16. The configuration of bidding zones in the Union shall be designed in such a way as to maximise economic efficiency and to maximise cross-zonal trading opportunities in accordance with Article 16 [of the Electricity Regulation], while maintaining security of supply*'.

(41) Furthermore, regarding the review of BZs, Article 14(3) of the Electricity Regulation lays down that the BZR '*shall identify all structural congestions and shall include an analysis of different configurations of bidding zones in a coordinated manner with the involvement of affected stakeholders from all relevant Member States, in accordance with the capacity allocation and congestion management guideline adopted on the basis of Article 18 (5) of Regulation (EC) No 714/2009. Current bidding zones shall be assessed on the basis of their ability to create a reliable market environment, including for flexible generation and load capacity, which is crucial to avoiding grid bottlenecks, balancing electricity demand and supply, securing the long-term security of investments in network infrastructure'*.

(42) In addition, Article 33 of the CACM Regulation includes a list of minimum criteria that a BZR must consider.

(43) With regard to the concept of 'structural congestions', the following definitions apply:

a. Pursuant to Article 2(4) of the Electricity Regulation, 'congestion' represents a situation in which all requests from market participants to trade between network areas cannot be accommodated because they would significantly affect the physical flows on network elements which cannot accommodate these flows.

b. Pursuant to Article 2(6) of the Electricity Regulation, 'structural congestion' means congestion in the transmission system that is capable of being unambiguously defined, is predictable, is geographically stable over time, and frequently reoccurs under normal electricity system conditions.

c. Pursuant to Article 2(18) of the CACM Regulation, a 'physical congestion' corresponds to any network situation where forecasted or realised power flows violate the thermal limits of the elements of the grid and voltage stability or the angle stability limits of the power system.

6.2. Implications of the lack of alternative BZ configurations proposed by TSOs for the Baltic BZRR

(44) As mentioned in paragraph (27), the updated BZR proposal submitted by TSOs did not include BZ configurations for the Baltic BZRR. As a consequence, ACER requested all TSOs to submit additional information, as described in paragraph (4).

(45) As ACER needs to take its Decision on alternative BZ configurations based on all relevant facts, the present Decision is based on the data requested by ACER and submitted by the Baltic TSOs.

6.3. Approach followed by ACER to identify alternative BZ configurations

6.3.1. <u>High-level approach</u>

(46) First, it is to note that Article 14 of the Electricity Regulation, while requiring a proposal of and a decision on the alternative BZ configurations to be considered for the BZR, does not provide a list of technical criteria for assessing and deciding on the alternative BZ configurations. However, the Electricity Regulation does refer to a set of principles and objectives that should be pursued when designing the configuration of BZs.

(47) Therefore, ACER's approach to identifying alternative BZ configurations is based on and aims to implement the principles and objectives envisaged by the Electricity Regulation for the configuration of BZs in the context of a BZR. In this respect, ACER identifies the following three stages that need to be distinguished for the BZR.

(48) First, structural congestions need to be identified and assessed. This is in line with Article 14(1) of the Electricity Regulation, which prescribes, inter alia, that *'Bidding zone borders shall be based on long-term, structural congestions in the transmission network. Bidding zones shall not contain such structural congestions unless they have no impact on neighbouring bidding zones, or, as a temporary exemption, their impact on neighbouring bidding zones is mitigated through the use of remedial actions and those structural congestions do not lead to reductions of cross-zonal trading capacity in accordance with the requirements of Article 16 [of the Electricity Regulation]'.* As described in paragraphs 63 to 66 of Decision No 29/2020, assessing structural congestions requires to identify the network areas between which there are energy exchanges that significantly contribute to structural physical congestions. In brief, it is not enough to identify the location of the physical congestions, but it is also necessary to identify the network areas between which there are energy exchanges that cause such physical congestions.

(49) Second, alternative BZ configurations need to be identified. Article 14(1) of the Electricity Regulation provides guidance on how the configurations of BZs in the Union are to be designed. In particular, it establishes that *'[t]he configuration of*

bidding zones in the Union shall be designed in such a way as to maximise economic efficiency and to maximise cross-zonal trading opportunities in accordance with Article 16 [of the Electricity Regulation], while maintaining security of supply'.

(50) Third, the alternative BZ configurations need to be analysed and TSOs are required to perform the BZR study. Article 14(3) of the Electricity Regulation describes how the analysis of different configurations of BZs is to be performed and requires such analysis to be in accordance with the CACM Regulation, of which Article 33 is particularly relevant here.

(51) The present Decision deals with the first two stages. The third stage is the BZR study, which is to be performed subsequently by TSOs according to the timeline laid down in Article 14(6) of the Electricity Regulation. Consequently, a distinction should be made between the aspects to be considered for the identification of alternative BZ configurations and the aspects to be considered during the BZR study.

(52) For the BZR study, referred to as 'the second step' in the CACM Regulation, the guidance on how to perform this study is given by Article 32(4)(b) of the CACM Regulation, which prescribes that *'In the second step, the TSOs participating in a review of bidding zone configuration shall assess and compare the current bidding zone configuration and each alternative bidding zone configuration using the criteria specified in Article 33 [of the CACM Regulation]'*.

(53) For the identification of alternative configurations, the guidance is provided by the objectives prescribed in Article 14(1) of the Electricity Regulation (see paragraph (49)), namely the following three: i) maximisation of economic efficiency; ii) maximisation of cross-zonal trading opportunities, and iii) the need to maintain the security of supply. The first two elements can be quantified and, as such, efficiently compared. The third objective (maintaining security of supply) is not, a priori, a distinctive element for the selection of alternative configurations, but rather a prerequisite to be met by any of them. In any case, assessing security of supply entails performing a complete market simulation, which requires additional information that will be only available at a later stage, i.e. during the BZR study. As security of supply is indeed one of the criteria required by the CACM Regulation to be assessed during the BZR study, the process ensures that security of supply is assessed before taking a decision on a potential reconfiguration.

(54) The importance of maximising cross-zonal trading opportunities is further reinforced by the so-called 'minimum 70% target' prescribed by Article 16(8) of the Electricity Regulation, requiring to make at least 70% of the transmission capacity available for cross-zonal trade. This minimum target is also relevant for the identification of

alternative BZ configurations. If it is not satisfied as of 1 January 2026[8], such situation could lead to a BZ change according to Article 15(5) of the Electricity Regulation.

(55) In sum, ACER's approach to identify and prioritise alternative BZ configurations is a step-wise one: first, the areas of the network between which there are energy exchanges that contribute the most to structural congestions are identified; second, alternative BZ configurations are sought within those network areas; and third, those configurations that tend to improve economic efficiency and cross-zonal trading opportunities the most are proposed for the BZR study.

6.3.2. Data and tools available to ACER

(56) As described in paragraph 150 of Decision No 29/2020, results derived from LMP simulations provide a good basis for the identification of structural congestions in line with the principles of the Electricity Regulation set out in section 6.3.1. In particular, LMP simulations deliver theoretically optimal market results for a given scenario, in this case for the target year of the BZR study. Pursuant to Article 14(5) of the Electricity Regulation, this target year corresponds to 2025. The results derived from the LMP simulations enable the performance of the following two analyses:

a. Flow decomposition: Flow decomposition techniques allow establishing a cause-effect relationship between physical congestions and the network areas between which there are energy exchanges that significantly contribute to such congestions. This points to network areas where alternative BZs should be sought with priority. Flow decomposition analyses also provide an indication on whether alternative BZ configurations tend to reduce the flows that do not result from capacity allocation, i.e. loop flows and internal flows. This is important because a decrease in these flows tends to result in an increase in the capacity available for cross-zonal trade; the Electricity Regulation aims at such increase.

b. Clustering of nodes into BZs: Starting from LMP simulation results, clustering techniques aim at grouping nodes of the network in new (alternative) BZs that better meet the objectives of the Electricity Regulation compared to the status quo. Specifically, clustering techniques can be designed to identify BZ configurations that tend to increase economic efficiency; the Electricity Regulation aims also at such increase.

(57) For the purpose of this Decision, ACER applied both techniques. To perform flow decomposition analyses, ACER used a commercial software that allows to perform flow decomposition in accordance with the methodology described in Annex I of

[8] The minimum 70% target is binding since 1 January of 2020; however, MSs are allowed to adopt transitory measures (action plans and/or derogations) to reach the target gradually by the end of 2025.

Decision No 30/2020[9]. To cluster nodes into BZs, ACER requested a consultancy firm to provide ACER with clustering algorithms that incorporated, by design, the regulatory objectives described in paragraph (53). Additional information on the specific clustering algorithms used by ACER is provided in section 6.3.4.6.

(58) In terms of data, the following was made available by the Baltic TSOs to ACER:

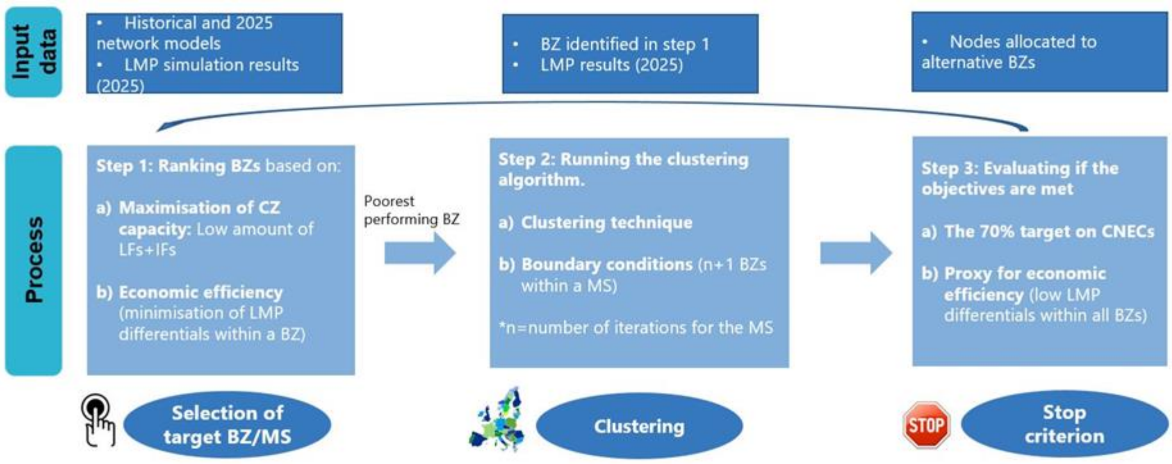
a. LMP simulation results for the target year 2025, with the level of detail described in paragraph (27).

b. Six merged network models for the target year 2025 used for the LMP simulations, two for each of the three considered climate years, encompassing the geographical area of the three Baltic MSs.

6.3.3. Detailed process to identify alternative BZ configurations

(59) In this section, the process for the definition of alternative BZ configurations in accordance with the principles set out in sections 6.3.1 and 6.3.2 is described in detail. As illustrated in Figure 1, the process applies the high-level approach, described in the previous section, in an iterative manner.

Figure 1: Approach for the definition of alternative BZ configurations



(60) Each of the iterations of the process comprises three steps, as displayed in Figure 1: i) the selection of the MS where to start searching for alternative BZs; ii) the application of clustering algorithms on the nodes of the MS identified in the previous step; and

[9] Decision No 30/2020 of 30 November 2020 on the Core CCR TSOs' proposal for the methodology for cost sharing of redispatching and countertrading, available at https://acer.europa.eu/Individual%20Decisions/ACER%20Decision%2030-2020%20on%20Core%20RDCT%20Cost%20Sharing_1.pdf.

iii) the stop criterion, i.e. a decision on when to interrupt the process without proceeding with the next iteration.

(61) An additional fourth step, that is not part of the iterations, is required to select or combine, the ('intermediate') alternative BZ configurations resulting from each iteration into the 'final' ones to be studied. This fourth step is described in section 6.3.4.7. In the following, each of the first three steps is presented in detail.

(62) The first step of each iteration is the 'selection of target BZ/MS'. It aims to select the target MS[10] within which the algorithm seeks alternative BZ delineations, for each iteration. Initially, the algorithm selects a BZ at each iteration; however, the whole MS comprising such BZ is considered as the relevant geographical scope for a BZ reconfiguration at a given iteration. This is an important feature of the process as it considers MS borders as a boundary condition to the process. The main consequence of this condition is that the process can lead to splitting BZs, to merging BZs, or to combining parts of them into new BZs, as long as the newly proposed BZs remain within existing MS borders[11]. Further considerations on this assumption are included in section 6.3.4.1.

(63) The identification of the target BZ is based on a ranking, built on the following two indicators:

a. Aggregated absolute loop flows and internal flows per BZ on relevant network elements; and

b. The standard deviation of LMPs within a BZ.

(64) The aim of indicator a) is to assess the extent to which a given BZ contributes to the objective of maximising cross-zonal capacity. Indicator b) aims to assess the extent to which a given BZ contributes to the objective of maximising economic efficiency. In both cases, the lower the values of the indicators for a BZ, the better the performance of the said BZ. Further details on how indicators a) and b) are computed can be found in sections 6.3.4.3 and 6.3.4.4, respectively.

(65) Then, based on the performance of each BZ for these two indicators, a ranking of BZs is built. The process to rank BZs based on these two indicators is described in section 6.3.4.5.

(66) Subsequently, the worst performing BZ according to the ranking is selected. The MS where such BZ is located is then the geographical area where alternative BZ configurations are sought in the next step of the iteration.

[10] Or the MS to which the BZ belongs when several BZs belong to the same MS, as further elaborated below.
[11] With the only exception of already existing BZs comprising more than one MS.

(67) The second step of the iteration corresponds to the application of clustering algorithms that group nodes into BZs within the MS selected in the first step. The immediate outcome of this step is a split of a MS into BZs. For a given iteration, the number of splits is determined by the number of times the relevant MS was selected for a reconfiguration[12]. Additional information on the clustering algorithms used in this step is provided in section 6.3.4.6.

(68) The outcome of the second step is cumulative in the sense that, after this step, a new 'intermediate' alternative BZ configuration can be built. Such 'intermediate' configuration comprises: i) the BZs of the status quo, except those that were subject to reconfiguration in any of the previous iterations; and ii) the BZs reconfigured by the clustering algorithms in previous iterations[13].

(69) The third step, the 'stop criterion', aims to determine whether the iterations for the identification of additional BZ configurations should continue or not. In light of the objectives envisaged in the Electricity Regulation, the iterations stop when the following two objectives are simultaneously met[14]:

a. For all the considered network elements across all merged network models considered in the analysis, the share of loop flows and internal flows taken together[15] is lower than a threshold[16] that allows to meet the 70% target in all network elements; and

b. For all considered BZs, the standard deviation is equal or below the standard deviation of the best performing BZ in the status quo configuration.

[12] When a MS is selected for the first time in step 1, even if it already comprises multiple BZs, then the algorithm seeks to identity two BZs within the MS. If the MS is selected again in a subsequent iteration, then the algorithm seeks to identify three BZs within the MS, and so on. This approach allows the possibility of considering mergers of BZs within MSs that currently comprise of more than one BZ.

[13] Where a MS was selected previously for a reconfiguration in step 1, the BZs to be considered within that MS are the ones corresponding to the latest iteration when the MS was selected, e.g. the three BZs proposed by the clustering algorithm if the MS was selected twice.

[14] In practice, the algorithm could also be stopped due to computational time constraints (see section 6.4 on the outcome of applying the algorithm).

[15] Contrary to the indicator used in step 1, this indicator is relative to the thermal capacities (Fmax) of the relevant network elements. This is because this indicator aims to assess how a specific alternative BZ configuration facilitates or not the fulfilment of the 70% target, and therefore a given configuration can be deemed as 'sufficient' with regard to the cross-zonal capacity criterion. The indicator used in step 1 assesses the extent to which loop flows and internal flows 'consume' cross-zonal capacity and therefore hinder the objective of maximising cross-zonal capacity.

[16] Assuming a reliability margin of 10%, this threshold should be a priori set at 20% as this would be the maximum share of loop flows and internal flows compatible with the 70% cross-zonal capacity target. However, such target is expected to be slightly lower in some MSs applying an action plan for the target year 2025. To reflect these slightly lower targets, a 30% threshold was used, which is equivalent to assuming no reliability margin or a reliability margin considerably lower than 10% (the latter, in case of an action plan).

(70) If the stop criteria are not met, then a new iteration starts from the first step. This means that a new ranking of BZs is built to select a new target MS where to look for alternative BZ delineations. For each iteration, the 'intermediate' BZ configuration resulting from the previous iteration is then used as an input.

6.3.4. Relevant features of the iterative approach

6.3.4.1. Consideration of MS borders

(71) Ideally, the identification of alternative BZs should not be constrained by existing political (i.e. MS) borders; instead, it should aim to seek BZ borders leading to the most efficient management of congestions. Thus, the possibility for mergers of BZs beyond MS borders should not be, a priori, excluded in a generic BZR process. However, for this specific BZR, ACER considered that the best approach was to focus on reconfigurations (splits) within a MS rather than on possible combinations of BZs (mergers) across MS borders[17], for the reasons described below.

(72) First, such approach allows to tackle the primary goal of a BZR, which is to eliminate or reduce structural congestions within BZs, as envisaged in Article 14(1) of the Electricity Regulation. Second, it leads to propose configurations that face less implementation challenges, in the sense that the implementation challenges remain within a single jurisdiction. And third, it does not exclude the possibility of future mergers across MSs, once the main structural congestions are efficiently managed.

(73) Finally, in response to the public consultation, several stakeholders expressed concerns about the algorithm being constrained by political borders; in their view, this would impede the possibility of merging MSs into one BZ, hindering possible improvements in market liquidity. While ACER considers that the arguments provided in the previous paragraph remain valid, ACER investigated how to accommodate stakeholders' concerns. In particular, ACER explored the possibility to include a 'greenfield'[18] alternative configuration (see more details on the process to select the 'final' configurations in section 6.3.4.7).

6.3.4.2. Consideration of the relative size of BZs

(74) During the discussions between ACER, regulatory authorities and TSOs prior to the consultation, the issue of the relative size of BZs was discussed. ACER's initial view was that the size of BZs, e.g. in terms of total generation and consumption, should not be too different across BZs. This would be needed to mitigate the issue related to the so-called 'flow-factor competition', as further elaborated below.

[17] See footnote 11.

[18] A 'greenfield' BZ configuration refers to an alternative BZ configuration where MS borders are not considered as a constraint, and therefore a given BZ of such configuration may comprise of parts of multiple MSs.

(75) The competitive position of one BZ with respect to other BZs in the access to cross-zonal capacity is strongly linked to the Power Transfer Distribution Factors (PTDFs)[19]. A flow-factor competition issue arises whenever zone-to-zone PTDFs between two BZs are systematically larger than between any other pair of BZs. In those circumstances, the concerned BZs (with larger PTDFs) have fewer chances to access the available cross-zonal capacity and, under scarcity circumstances, this could in turn lead to security of supply issues. This effect has been recognised by e.g. all Central Western Europe (CWE) regulatory authorities in a 'Position Paper of CWE regulatory authorities on Flow-Based Market Coupling'[20]. The paper acknowledged that, in the absence of interventions in the market coupling algorithm[21], welfare may be 'lost in the smaller areas in favour of the bigger areas in a structural manner'.

(76) In the course of the public consultation, several stakeholders expressed concerns about using the BZ size as a criterion for the identification of BZs. Among other arguments, these stakeholders claimed that the size of BZs is not explicitly mentioned in the legislation and that considering such a criterion would raise questions such as how size would be defined and what size is considered as optimal.

(77) While ACER considers that the issue of similar size of BZs is a relevant criterion, ACER acknowledges that introducing such criterion would require to make an arbitrary choice on an 'adequate' BZ size, which is difficult to agree upon. Furthermore, the issue of similar sizes is partly addressed by the fact that larger BZs often tend to contribute to structural congestions the most and therefore are more likely to be split into smaller BZs; this implicitly contributes to a more homogeneous size of BZs. This could also be a plausible outcome from applying ACER's high-level approach. In sum, alternative BZ configurations with a more homogenous size of BZs could be an expected outcome of the present Decision, without the need to impose a discretional value for the BZ size.

(78) As a result, the condition to have BZs of similar size was finally disregarded as a constraining parameter for the clustering algorithms used by ACER to identify alternative BZ configurations. Notwithstanding this, a technical minimum threshold for the size of the BZs[22] was included in the clustering algorithms.

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[19] The PTDFs describe the impact of an incremental exchange between BZs in the power flow on a critical network element.

[20] See page 13 of the position paper available at https://www.cre.fr/content/download/13078/file/150326_position_paper_flow_based.pdf.

[21] This does not imply that interventions in the market coupling algorithm address the issue in an efficient manner; in fact, the paper acknowledges that interventions in the market coupling algorithm to address structural differences in BZ sizes, such as the so-called flow-based intuitive (FBI) method, may reduce global welfare.

[22] To avoid that the algorithm could identify an extremely small BZ, e.g. smaller than a city, which would unlikely be implemented, a threshold that refers to the minimum number of nodes comprised in a 'new' BZ was introduced as a constraint. This minimum threshold was made dependent on the number of BZs that are considered for a MS, as follows: 10% of the total of number of nodes in the MS when the MS is split into two BZs, 9% for three BZs,

6.3.4.3. Indicator used to assess how BZs and BZ configurations may contribute to maximise cross-zonal capacity

(79) As explained in section 6.3.3, in order to assess how the BZs delineation contributes to maximise cross-zonal capacity, an indicator on the amount of flows that do not result from capacity allocation, i.e. loop flows and internal flows, is used. The indicator is relevant because a decrease in these flows tends to result in an increase in the capacity available for cross-zonal trade, without the need of applying remedial actions. The lower the amount of loop flows and internal flows on network elements originated in a given BZ, the higher the BZ scores with regard to this indicator.

(80) The indicator is derived from a flow decomposition analysis[23] and, more specifically, it is computed as follows:

"The aggregated absolute value of loop flows and internal flows, originated in each BZ, on the set of network elements used in capacity calculation[24]"

(81) The calculation of this indicator covers historical network models[25] as well as the network models for the target year of the BZR study, i.e. 2025.

(82) The indicator is used in the process in two different ways:

a. First, it is one of the indicators to rank BZs (see section 6.3.4.5) with a view to select the target MS in step 1 of each iteration as described in ACER's high-level approach.

b. Second, it is one of the two indicators used to rank the BZ changes (one BZ change is the result of each iteration) that lead to the highest improvements. To this end, the aggregation of the absolute value of loop flows and internal flows for all BZs taken together is calculated.

8% for four BZs and 7% for five BZs. Such a constraint should not have a relevant impact on the delineation of BZs per se.

[23] See footnote 9.

[24] As a list of network elements used in capacity calculation is not available to ACER, ACER used a proxy for their identification. Such a proxy consists of a set of network elements comprising the following two sub-sets: i) all interconnectors, and ii) all network elements (without contingencies) having at least one zone-to-zone PTDF larger than or equal to 5%. This selection is driven by computational constraints, while ensuring a sufficiently large and representative set of network elements for the analysis.

[25] Historical network models are relevant because, pursuant to Article 14(2) and Article 14(7) of the Electricity Regulation, the presence of structural congestions is a trigger for a BZR. The latest EU-wide report on structural congestions was the report for the period 2018-2020, submitted by ENTSO-E to ACER on 17 November 2021 (see paragraph (27)). In line with this reporting period, historical network models for the period 2018-2019 (2020 ones were not available to ACER) were used, as they provide information on the structural congestions that are expected to be resolved through a potential BZ reconfiguration. The network models of the target year, i.e. 2025, provide information on the congestions that, with a degree of uncertainty, are expected to remain in the future. Both set of network models are therefore relevant for the analysis supporting the delineation of alternative BZ configurations.

6.3.4.4. Indicator used to assess how BZs and BZ configurations may contribute to maximise economic efficiency

(83) As explained in section 6.3.3, in order to assess how the BZs delineation may contribute to maximise economic efficiency, the following indicator is used:

"The standard deviation of LMPs within a BZ[26]"

(84) While economic efficiency will be more accurately modelled in the BZR study itself, this indicator can be considered a proxy for economic efficiency when defining alternative BZ configurations. In particular, a more efficient dispatch is expected to be attained when there are no or very limited LMP differentials within a BZ. This is because the absence of LMP differentials suggests that intra-zonal congestions are not expected to severely constrain the results of the market. This indicator is used in the process in two different ways:

a. First, it is one of the indicators used to rank BZs (see section 6.3.4.5) with a view to select the target MS in step 1 of each iteration as described in ACER's high-level approach. To allow comparability and alignment with the principle of maximising overall welfare at the European Union (EU) level, the indicator needs to be weighted because, all else being equal, the overall economic efficiency gains tend to be proportional to the amount of supply (generation) and demand (load) involved. Consequently, to rank BZs, the indicator on 'standard deviation of LMPs within a BZ' is weighted with the factor '*(generation+load)/2*' for each BZ.

b. Second, it is one of the two indicators used to rank BZ changes (one BZ change is the result of each iteration) according to the improvements expected from a BZ change. As explained in paragraph a, to better capture the improvements at each iteration, the indicator on 'standard deviation of LMPs within a BZ' is weighted with the factor '*(generation+load)/2*' for each BZ.

6.3.4.5. Process to rank BZs in order to select the target MS for each iteration

(85) To rank BZs at each iteration, a multi-criteria decision method is used. Specifically, the so-called Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) is followed. Such a technique allows to take decisions on multi-objective problems, in this case the objectives being the maximisation of economic efficiency and cross-zonal capacity. TOPSIS is a widely used method in scientific applications[27]. The theoretical background and the application of this technique is described in Annex I to this Decision.

[26] To estimate the standard deviation, each node is weighted with the factor '(generation+load)/2', based on the generation and load cleared at each node.

[27] Over 170 Institute of Electrical and Electronics Engineers (IEEE) journal articles written from 2018 onwards are available in the IEEE Xplore repository, in over 40 of which the word 'TOPSIS' appears in the article title.

6.3.4.6. Clustering algorithms

(86) Three different clustering algorithms to group nodes into new BZs were used. The algorithms aim to identify nodes with similar prices, therefore reducing price dispersion within a BZ in line with the indicator on price dispersion set out in section 6.3.4.4, related to the objectives of the Electricity Regulation set out in section 6.3.1. Moreover, when the price differentials within a BZ reduce, the amount of exchanges within BZs that affect physically congested network elements is expected to decrease, which ultimately contributes to increase cross-zonal capacity. The clustering algorithms are described in Annex II to this Decision.

6.3.4.7. Fourth step: Process to select the 'final' alternative BZ configurations to be considered for the BZR

(87) The Electricity Regulation does not prescribe the number of alternative BZ configurations to be selected, nor the process to rank and/or combine configurations into the 'final' ones. The process to select the 'final' alternative BZ configurations requires a number of decisions to be taken, including on the number of configurations, how to rank them and how to combine them into the 'final' ones. In this respect, the following feedback was received from stakeholders during the public consultation.

(88) Some stakeholders, including TSOs, mentioned that the number of configurations per BZRR should not be 'too high' to ensure the feasibility of the subsequent BZR study within the timeline set out in the Electricity Regulation. During the preliminary discussions between ACER and TSOs prior to the formal consultation, ten BZ configurations were mentioned as a reasonable maximum.

(89) Some stakeholders mentioned that the analysis should focus on BZ configurations with high potential benefits, while others, including TSOs, mentioned that the alternative BZs should be practically implementable, e.g. that they would preferably not affect too much the boundaries of the existing control areas of the TSOs.

(90) ACER's interpretation of these views is that there are two opposing objectives, one is the objective of maximising benefits and the other is the practical need of finding alternative configurations with a limited number of BZ changes as opposed to many changes. In view of this, ACER finds it relevant to prioritise configurations that deliver high benefits with a limited number of BZ changes, e.g. that each alternative configuration only affects one or few MSs.

(91) Finally, during the workshop held on 11 May 2022 in the context of the proceedings of ACER Decision No 11/2022, some TSOs mentioned that there should be a balance between configurations including individual changes and configurations including a combination of individual ones. Moreover, following this workshop, TSOs expressed that combinations of configurations involving substantial changes should be avoided, based on the understanding that the EU-wide benefits that can be achieved by an additional increase in number of BZs are significantly reduced. Concerning the selection of configurations combining individual changes, in the framework of the AEWG meeting held on 18 May 2022 in the context of the proceedings of ACER

Decision No 11/2022, regulatory authorities expressed that it would be difficult to select, ex-ante, the combinations that are worth studying, without previously carrying out a welfare analysis. These regulatory authorities expressed that it would be preferable to select few or even only one combination (with the highest potential improvements) as opposed to many.

(92) To be able to identify configurations that deliver high potential benefits with a limited number of changes, ACER built a list of potential alternative configurations comprising only individual BZ changes. Such a list was built as follows:

a. An individual BZ change refers to an alternative BZ configuration where only one MS is affected, e.g. a split of a given MS into more than one BZ.

b. The list included, initially, as many individual configurations as iterations were performed pursuant to the steps 1 to 3, described in section 6.3.3.

c. ACER enriched the initial list by using three different clustering algorithms. For example, for a given split of a MS into two BZs, three different splits into two BZs were identified. This enlarged the list of potential configurations by a factor three.

d. For each individual configuration, ACER estimated the improvement for each of the two indicators defined in section 6.3.4.3 and section 6.3.4.4, compared to the status quo.

e. Based on the improvements for each indicator, the individual configurations were ranked. For the ranking, the TOPSIS decision method was applied (see section 6.3.4.5 and Annex I).

(93) Based on the list of individual configurations, ranked based on their potential benefits, and considering the arguments described in paragraphs (90) and (91) and section 6.3.4.1[28], ACER decided to take the following approach when selecting the alternative BZ configurations to be considered for each BZRR:

a. Select a maximum of ten alternative BZ configurations per BZRR. By way of comparison, this number is in line with the number of configurations analysed in recent BZRs in Europe[29].

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[28] Regarding stakeholders' feedback on the consideration of MS borders (see section 6.3.4.1).

[29] For example, the first BZR affecting several MSs pursuant to the CACM Regulation, which was completed in 2018, considered four alternative BZ configurations. The Italian BZR, undergone in 2018, considered five alternative BZ configurations. Given that the geographical scope of these two BZRs is considerably smaller than the current one, considering a maximum of ten alternative configurations per BZRR for the current review can be considered to be in line with these two recent BZRs; in particular, such a maximum appears to be relevant for the CE BZRR, being the largest region defined by TSOs for this BZR.

b. Prioritise alternative configurations that potentially deliver high benefits with a limited number of BZ changes. This corresponds e.g. to the individual configurations that rank the highest in the list of potential configurations built as above described.

c. Include at least one configuration that combine individual configurations.

d. For those BZRRs where alternative configurations for more than one MS are proposed, ACER identified a possible 'greenfield' configuration (see section 6.3.4.1)[30].

6.4. Assessment of the alternative BZ configurations for the Baltic BZRR

(94) Article 11(1) of Annex I to ACER Decision No 29/2020 prescribes that *"[...] TSOs may decide to perform the LMP analysis separately for each of the synchronous areas that are expected to exist in Europe for the target year*". Given that the target year of the BZR is 2025 and in that year the Baltic and the Continental Europe synchronous areas will be merged into one synchronous area[31], the Baltic TSOs should have performed the LMP analysis jointly with the TSOs of Continental Europe.

(95) This implies that, even if the LMP results of the Baltic region are now analysed separately due to their delayed delivery, for the sake of consistency with the approach taken for Continental Europe and the Nordics (see paragraph (74) of ACER Decision No 11/2022), the performance of the Baltic MSs shall be assessed jointly with the other MSs in Continental Europe in order to consider the merged synchronous area as per 2025. In practice, this means that, when building the ranking described in section 6.3.4.5, this ranking should encompass both the status quo BZs in the Baltic region as well as the status quo BZs in the rest of Continental Europe.

(96) In its Decision No 11/2022 (see in particular paragraph (234)), ACER acknowledged that suspending the decision-making process for the entire EU, while waiting for the results of the LMP analysis for the Baltic region, would not have been appropriate for the following two reasons: i) given the delay already incurred in this BZR process, it was not reasonable to delay the entire process where a decision on alternative BZ configurations concerning the other MSs of the EU can be taken; and ii) such decision could indeed be taken without taking into account the Baltic BZRR, because the regional approach that TSOs set out for this BZR implied that the progress with the

[30] Following the presentation of ACER's preliminary findings on alternative configurations at the workshop of 11 May 2022, TSOs informed that it would be difficult for them to assess a 'greenfield' configuration within the timeline of the BZR. In view of this, ACER did not include any 'greenfield' configuration in its preliminary position related to ACER Decision No 11/2022.

[31] According to the latest public information, the Baltic electricity system will be synchronised to the Continental European grid in February 2025. See https://energy.ec.europa.eu/news/estonia-latvia-lithuania-agree-synchronise-their-electricity-grids-european-grid-early-2025-2023-08-03_en#:~:text=This%20deadline%20is%20now%20being,achievement%20of%20the%20Energy%20Union.

BZR in a given BZRR (or the rest of Europe in this case) was not essentially affected by the progress in a specific BZRR (such as the Baltic one). The latter is true irrespective of the need for modelling the exchanges between the Baltic BZRR and the neighbouring BZRRs undergoing the BZR. Therefore, the approach to analyse alternative BZ configurations for the Baltic BZRR is in line with the one taken under Decision No 11/2022.

(97) As a result of applying the iterative approach described in section 6.3.3 to the synchronous area of Continental Europe in 2025 (i.e., the current geographical area of Continental Europe and the Baltic BZRR), the MSs within which the algorithm seeks alternative BZ delineations, before the stop criteria are met[32], are Germany, France, Italy and the Netherlands. Hence, the Baltic MSs are not identified as network areas where alternative BZs should be sought with priority. Table 1 below shows the sequence of the iterations.

Table 1: MSs selected as geographical areas within which to seek alternative BZ configurations in the synchronous area of Continental Europe in 2025 as an outcome of ACER's iterative approach

Iteration	MS	Number of BZs
1	DE	2
2	FR	2
3	DE	3
4	FR	3
5	FR	4
6	DE	4
7	FR	5
8	DE	5
9	FR	6
10	FR	7
11	FR	8
12	DE	6
13	DE	7
14	DE	8
15	IT North	2
16	NL	2

(98) Annex III presents the values of the most relevant quantitative elements considered in the assessment, for each BZ, in the status quo configuration. Each quantitative element can be associated with one of the two indicators used to rank BZs and alternative BZ configurations, as described in section 6.3.4.3 and section 6.3.4.4.

[32] The first stop criterion to be met was the computational time limit; this limit was set to four days, as this was the maximum amount of time compatible with the required timeline for this Decision, considering that the iterative process had to be repeated several times, e.g. following several corrections of the input data made by TSOs.

(99) Based on the above, no alternative BZ configurations for the Baltic region were proposed in ACER's preliminary position shared with TSOs and regulatory authorities on 20 October 2023.

6.5. Caveats related to the iterative process to define alternative BZ configurations

(100) When applying the methodology described above, the following caveats and considerations related to the flow decomposition analysis, performed in step 1 of each iteration, apply.

(101) First, the flow decomposition analysis assumes that the market outcome[33] remains unchanged after each iteration; however, in reality, the market outcome may evolve after a change in BZ configurations. This assumption is necessary because re-evaluating the market outcome would require to perform a full market simulation after each iteration; the time necessary for such a market simulation would not be compatible with the timeline of the present Decision. Moreover, the assumption of unchanged market outcome was acknowledged to be reasonable during a workshop among the regulatory authorities, TSOs and ACER held on 8 January 2020[34].

(102) Second, the flow decomposition analysis relies, among other parameters, on the so-called Generation Load Shift Keys (GLSKs). They define how a change in the net (importing or exporting) position of a BZ is mapped to the output of generating units. The load-flow software used by ACER considers GLSKs that are proportional to the generation or load in the merged network model. This may not be fully aligned with the GLSKs used during capacity calculation by TSOs. However, in the absence of more detailed information on the actual GLSKs, using proportional GLSKs is a regular practice for simulations[35].

(103) Third, the methodology implemented in the commercial software used by ACER to perform the flow decomposition analysis is based on the methodology described in Annex I of Decision No 30/2020 (see paragraph (57)), except for the fact that a Direct Current (DC) load flow is performed instead of an Alternating Current (AC) one.

(104) Fourth, the merged network models considered for the flow decomposition analysis are updated to switch on all interconnectors, in order to avoid that a maintenance affecting a specific MTU is assumed to be a recurrent feature of the simulated year.

[33] For the current Decision, this market outcome is a dispatch resulting from the LMP results for the year 2025.
[34] In particular, TenneT TSO B.V. presented a case study that used flow decomposition for different alternative configurations. In light of the time constraints, the case study assumed an unchanged market outcome for the different configurations.
[35] See e.g. ACER's Methodological paper on estimating the margin available for cross-zonal trade pursuant to ACER Recommendation 01/2019 in light of Article 16(8) of Regulation (EU) 2019/943, available at https://acer.europa.eu/en/Electricity/Market%20monitoring/Documents/20201209%20Methodological%20paper%20MACZT_final.pdf.

This is also a regular practice for simulations when only a limited sample of network models is available[36].

(105) Fifth, to assess the impact of loop and internal flows generated by the Baltic MSs on network elements belonging to the current geographical area of Continental Europe (and vice versa), merged network models encompassing both regions are needed. However, since the LMP analysis was carried out separately for the two regions, those merged network models were not submitted by TSOs and hence are not available to ACER. This implies that the cross-regional impact of loop and internal flows is neglected in the analysis. Nonetheless, given that in 2025 there will be only one AC interconnector between the Baltic MSs and the rest of Continental Europe[37], it can be reasonably assumed that this simplification does not have any impact on the outcome of the analysis.

(106) Sixth, the number of merged network models considered in the assessment carried out for Continental Europe in ACER Decision No 11/2022 is eight (see paragraph (112) of that Decision), whereas the Baltic TSOs submitted only six network models (see paragraph (58)). To compare both regions on equal basis, the total amount of internal and loop flows calculated for the three Baltic BZs was thus scaled up by a factor 8/6.

6.6. Consideration of the technical report submitted by ENTSO-E

(107) As explained in paragraph (27), TSOs asked ACER to consider the information included in their latest technical report when deciding on alternative BZ configurations.

(108) Among other elements, the report includes a list of the most relevant physical congestions, including their location and frequency, in the period 2018-2020. However, the report does not provide an assessment of those areas between which there are energy exchanges that significantly contribute to structural physical congestions.

(109) Therefore, while the report can be used as a basis to identify the presence of historical physical congestions and where they occur, it cannot be directly taken as a reference to identify the areas of the network where alternative configurations should be studied with priority. In ACER's view, to identify such areas of the network, the technical report would have to be complemented with a flow decomposition analysis. In the absence of such an analysis, ACER concluded that it could not meaningfully use the technical report as a conclusive basis for this Decision.

[36] See footnote 35.

[37] As the flow on High Voltage Direct Current (HVDC) interconnectors is fully controllable and solely driven by commercial exchanges, HVDC lines do not carry any loop nor internal flows.

6.7. Assessment of the feedback provided by the Lithuanian regulatory authority and by Baltic stakeholders

6.7.1. On the request to receive the modelling assumptions and the input data provided by the Baltic TSOs to ACER

(110) In its written response to ACER's preliminary position, to better understand the reasoning behind ACER's preliminary conclusions, the Lithuanian regulatory authority requested full details of the modelling assumptions and the input data provided by the Baltic TSOs to ACER. ACER checked with the Baltic TSOs whether they had any objections in ACER fulfilling this request. Upon their positive response, ACER shared the requested information with the Lithuanian regulatory authority on 7 November 2023.

(111) Furthermore, during the oral hearing, ACER provided additional details on the iterative approach followed by ACER in its Decision No 11/2022 and emphasised that it followed the exact same approach also in the present Decision.

6.7.2. On the lack of proposed alternative BZ configurations, in particular mergers across MSs

(112) The Lithuanian regulatory authority questioned the lack of alternative BZ configurations for the Baltic region, in particular regarding a merger of the Latvian and Lithuanian BZs or a merger of the Estonian, Latvian and Lithuanian BZs.

(113) ACER deems that the rationale for which no mergers across MSs were considered in the present Decision is extensively described in section 6.3.4.1.

6.7.3. On the possibility of mergers across MSs in future BZRs

(114) The Lithuanian regulatory authority shared its concerns about the wording of the preliminary conclusions of ACER's preliminary position, objecting that it should not exclude the possibility of a merger of the Baltic BZs in the future.

(115) ACER considers that the possibility to investigate mergers across MSs in future BZRs is explicitly acknowledged in section 6.3.4.1. In that respect, ACER invites the Lithuanian regulatory authority to avail itself of the options laid down under Article 14 of the Electricity Regulation and Article 32 of the CACM Regulation to assess economic efficiency and cross-zonal trading opportunities of the Baltic BZ configuration, including possible mergers.

6.7.4. On the strong preference to see a merger of the three Baltic BZs implemented as soon as possible

(116) The Lithuanian regulatory authority expressed its strong preference to see a merger of the three Baltic BZs implemented as soon as possible. In its view, given that the average difference in wholesale electricity day-ahead price among the Baltic BZs, over a period of one year, is generally very small, it is hard to explain to market

participants why a merger of the three Baltic BZs cannot be already considered in the present Decision.

(117) ACER finds that the intention of the Lithuanian regulatory authority to propose a merger of the three Baltic BZs at this stage may not be sufficiently grounded, for the following reasons.

(118) First, ACER considers that a high degree of price convergence in day-ahead wholesale electricity prices across a given set of BZs does not imply that a merger of such BZs would allow to maximise economic efficiency and cross-zonal trading opportunities, in accordance with the objectives listed in Article 14(1) of the Electricity Regulation. Even if price convergence is achieved for a very large share of hours, the loss of economic efficiency that occurs in the remaining portion of hours may completely offset all the potential benefits attained during the hours of price convergence.

(119) Second, due to data unavailability, ACER is not yet able to monitor the fulfilment of the minimum 70% target in the Baltic region[38]. As long as the Baltic TSOs do not provide data of how they comply with this minimum requirement, it is not possible to conclude whether congestions are efficiently managed in the Baltic region.

6.7.5. On the increase in market liquidity and the development and integration of renewable energy sources

(120) According to the feedback provided by one Baltic stakeholder in response to the public notice, which is supported by the Lithuanian regulatory authority, a merger of the Baltic BZs would bring significant benefits in terms of market liquidity and would foster the development and integration of renewable energy sources, in particular offshore wind, in the Baltic region.

(121) ACER observes that market liquidity and integration of renewable energy sources are two of the criteria that are to be assessed in the BZR launched pursuant to Article 14(5) of the Electricity Regulation, as included in Annex I to ACER Decision No 29/2020. While the outcome of any BZR cannot be pre-empted, ACER notes that a BZR must also consider potential negative effects of a merger, including a drop in short-term market liquidity and the emergence of new congestions due to changes in the electricity system. In case such congestions were to appear, a merger of BZs would generally be less suitable for managing these congestions efficiently.

7. CONCLUSION

[38] See footnote 32 of "ACER Report on the result of monitoring the margin available for cross-zonal electricity trade in the EU in the second semester of 2020", accessible at the following link: https://acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%20MACZT%20Report%20S2%202020.pdf.

(122) In light of the assessment made in sections 6.1 to 6.7, with its focus on reconfigurations within a MS rather than on possible combinations of BZs across MS borders, and in view of the consultation with TSOs and regulatory authorities, ACER concludes that no alternative BZ configurations are to be considered by the Baltic TSOs in the BZR study pursuant to Article 14(5) of the Electricity Regulation. This conclusion does not preclude the possibility to investigate potential mergers of the Baltic BZs in future BZRs,

HAS ADOPTED THIS DECISION:

Article 1

No alternative bidding zone configurations shall be considered in the bidding zone review process according to Article 14(5) of Regulation (EU) 2019/943 for the EU Member States in the Baltic bidding zone review region.

Article 2

This Decision is addressed to:

50Hertz - 50Hertz Transmission GmbH
Amprion - Amprion GmbH
APG - Austrian Power Grid AG
Augstsprieguma tïkls - AS Augstsprieguma tïkls
BritNed - BritNed Development Limited
ČEPS - ČEPS a.s.
Creos Luxembourg S.A.
EirGrid - EirGrid plc
Eirgrid Interconnector - Eirgrid Interconnector DAC
ElecLink - ElecLink Ltd
Elering - Elering AS
ELES - ELES, d.o.o. Sistemski operater prenosnega elektroenergetskega omrežja
Elia - Elia Transmission Belgium SA/NV
Energinet – Energinet
ESO - Electroenergien Sistemen Operator EAD
Fingrid - Fingrid Oyj
HOPS - Croatian Transmission System Operator Ltd
Independent Power Transmission Operator S.A. ("IPTO" or “ADMIE”)
Kraftnät Åland - Kraftnät Åland Ab
LITGRID - Litgrid AB
MAVIR Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság
Moyle Interconnector - Moyle Interconnector Ltd
National Grid ESO - National Grid ESO
National Grid Interconnectors - National Grid Interconnectors Ltd

PSE - Polskie Sieci Elektroenergetyczne S.A.
REE - Red Eléctrica de España S.A.
REN - Rede Eléctrica Nacional, S.A.
RTE - Réseau de Transport d'Electricité, S.A
SEPS - Slovenská elektrizačná prenosovú sústava, a.s.
SONI - System Operator for Northern Ireland Ltd
Svenska Kraftnät - Affärsverket svenska kraftnät
TenneT GER - TenneT TSO GmbH
TenneT TSO - TenneT TSO B.V.
Terna - Terna Rete Eletrica Nazionale S.p.A.
Transelectrica - National Power Grid Company Transelectrica S.A.
Transmission System Operator – Cyprus
TransnetBW -TransnetBW GmbH
VUEN - Vorarlberger Übertragungsnetz GmbH

Done at Ljubljana, on 21 December 2023.

- SIGNED -

For the Agency
The Director

C. ZINGLERSEN

Annexes:

Annex I – Description of the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), used to prioritise alternative bidding zone configurations

Annex II – Description of the clustering algorithms

Annex III – Values of the indicators underlying the ranking of alternative bidding zone configurations

Annex IV – Evaluation of responses to the public consultation (for information only)

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.