

## ACER

# Report on the result of monitoring the margin available for cross-zonal electricity trade in the EU in 2021

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PLEASE CONTACT THE MARKET MONITORING TEAM (MARGIN AVAILABLE FOR CROSS-ZONAL CAPACITY)  
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MIGHT HAVE.

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## 1 ACER's findings on monitoring the margin available for cross-zonal trade for 2021

Maximising the cross-zonal electricity interconnection capacity offered to the market is necessary for a well-functioning European internal electricity market, as emphasised by the current energy crisis.

- (1) The development of rules for the calculation and allocation of cross-zonal capacities on electricity interconnectors is an integral step for the completion of the European Union's (EU) internal electricity market. Over the last decade, considerable progress has been made to improve the allocation of the capacity that is made available. Progress in maximising this capacity has been much slower.
- (2) To address this, the Clean Energy for All Europeans<sup>1</sup> Package sets a minimum level of capacity – also called margin available for cross-zonal trade (MACZT) – to be met by Transmission System Operators (TSOs), respecting operational security limits. This so-called 'minimum 70% target' took effect in 2020. The Electricity Regulation<sup>2</sup> allows Member States to adopt transitional measures – action plans or derogations – to gradually reach the minimum 70% target, by the end of 2025 at the latest.
- (3) The current energy crisis, resulting in unprecedentedly high gas and electricity prices, reminds the importance of maximising cross-zonal capacities. The European Commission tasked the European Union Agency for the Cooperation of Energy Regulators (ACER) with assessing the benefits and the drawbacks of the EU's current wholesale electricity market design and with providing recommendations for its improvement. ACER's final report<sup>3</sup> on the EU electricity market design calls for Member States to consider speeding up electricity market integration and implement what was already agreed. In it, ACER found that meeting the minimum 70% target would contribute to mitigate price volatility, enable efficient cross-border trade, enhance the integration of renewable sources, and increase the security of supply.
- (4) ACER produces this third edition of the present report in the context of its tasks to monitor the internal electricity market<sup>4</sup>. It presents, for 2021, the levels of MACZT compared to the minimum 70% target and transitional targets. ACER's analysis of the MACZT does not assess the legal compliance of TSOs' actions, which is a task assigned to national regulatory authorities (NRAs).

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<sup>1</sup> The Commission's Clean Energy for All Europeans legislative proposal covers energy efficiency, renewable energy sources generation, the design of the electricity market, security of electricity supply and governance rules for the Energy Union. Relevant material along with the adopted directives and legislation is available at: <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans>

<sup>2</sup> Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast), available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R0943&from=EN>

<sup>3</sup> ACER's Final Assessment of the EU Wholesale Electricity Market Design is available at: [https://extranet.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Publication/ACER's%20Final%20Assessment%20of%20the%20EU%20Wholesale%20Electricity%20Market%20Design.pdf](https://extranet.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER's%20Final%20Assessment%20of%20the%20EU%20Wholesale%20Electricity%20Market%20Design.pdf)

<sup>4</sup> Article 15(1) of the ACER 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, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0942>

## Key findings

- (5) In summary, ACER's monitoring of the minimum 70% target in 2021 led to the following findings:
- Compared to 2020, the MACZT remained mostly unchanged except for a few borders and regions. This is consistent with the observed year-on-year changes in tradable capacities (i.e., the Net Transfer Capacity, or NTC), which remained limited (see Figure 22). The main exceptions are highlighted below for both direct current (DC) and alternating current (AC) borders. In addition, tradable capacities increased in the Baltic, South East Europe (SEE) and Hansa regions. However, these increases are not primarily related to improvements in the MACZT, but rather relate to a reduced amount of interconnector outages and to the commissioning of new interconnection capacities.
  - On DC borders, the 70% target was met most of the time on a majority of borders but with some striking exceptions, notably Finland-Sweden<sup>5</sup>, Denmark1-Sweden<sup>3</sup>, Poland-Sweden<sup>4</sup> and Poland-Lithuania.
  - On AC borders, there is still a very diverse picture, with significant room for improvement to meet the 70% target for most regions and borders. The main improvements were observed in the South West Europe (SWE) region and in Slovenia.
  - As in 2020, derogations and/or action plans applied to most Member States. Compared to 2020, an increasing number of derogations included a transitional target. This imposes, temporarily, a minimum ambition level when the 70% target cannot be respected and allows monitoring the progress towards meeting the minimum target.
  - The quality of the data provided by TSOs to monitor the MACZT continued to improve in 2021. Quality issues remained for the Baltic region (still no data available for monitoring the MACZT), for Italy North region (for most of the year) and in Sweden.

## Harmonising the monitoring approaches is key for an effective implementation of the minimum 70% target.

- (6) Since 2020, ACER, and a number of NRAs and TSOs have published various reports that assess the level of the MACZT. Despite ACER's major efforts to ensure a harmonised monitoring approach across the EU<sup>6</sup>, most of these reports still relied on

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<sup>5</sup> For countries comprising of more than one bidding-zone, the number that follows the name of the country identifies the specific bidding-zone, e.g., Sweden3 is the bidding-zone number 3 in Sweden.

<sup>6</sup> Following numerous interactions with the European Commission, the European Network of Transmission System Operators for Electricity (ENTSO-E), NRAs and TSOs, ACER issued a recommendation to ensure a consistent approach to the implementation and monitoring of the MACZT, and to support legal compliance enforcement. ACER Recommendation No 01/2019 of 8 August 2019 on the implementation of the minimum margin available for cross-zonal trade pursuant to Article 16(8) of Regulation (EU) 2019/943 is available at: [https://www.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Recommendations/ACER%20Recommendation%2001-2019.pdf](https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Recommendations/ACER%20Recommendation%2001-2019.pdf)

heterogeneous monitoring approaches and metrics. Such differences raised concerns among market participants<sup>7</sup>.

- (7) To address stakeholders' concerns, ACER and NRAs agreed on a common approach, described in a practical note<sup>8</sup>, which includes a harmonised set of principles, metrics, and graphs to monitor the MACZT. The note also increases transparency on the monitoring of the MACZT at the national level. It describes the deviations from the common approach that persist in some Member States (significant deviations are observed in France, Germany, and Poland) and identifies the report(s), be it the NRA's<sup>9</sup>, the TSO's or the ACER's one, that each NRA intends to use when assessing compliance with the minimum 70% target.
- (8) ACER expects the common approach to be consistently applied across the various reports, starting with their forthcoming editions. Some results of the harmonisation efforts were already visible in the most recent publications at the national level<sup>10</sup>.

The quality of the data provided by TSOs to monitor the margin available for cross-zonal trade continued to improve in 2021. However, a few critical data quality issues remained and the relevant TSOs should tackle them urgently.

- (9) Table 2 and Table 4 include an overview of the quality of the data that TSOs provided to ACER to monitor the MACZT. Compared to 2020, ACER observed three main improvements. Firstly, the Nordic TSOs provided the requested data on time<sup>11</sup>. Secondly, the SWE TSOs and the Italy North<sup>12</sup> TSOs started to provide the requested data in a coordinated manner at the regional level. A coordinated provision of data is key to overcome completeness and consistency issues observed in past editions of this

<sup>7</sup> The concerns expressed by the associations of market participants can be found in the minutes of the Market Stakeholder Committee of 1 December 2021, available at:

[https://eepublicdownloads.azureedge.net/clean-documents/Network%20codes%20documents/MESC/2022%20MESC%20documents/211201\\_MESC%20Minutes\\_vFINAL.pdf](https://eepublicdownloads.azureedge.net/clean-documents/Network%20codes%20documents/MESC/2022%20MESC%20documents/211201_MESC%20Minutes_vFINAL.pdf)

<sup>8</sup> ACER and NRAs' practical note on monitoring the margin of capacity available for cross-zonal trade is available at:

[https://extranet.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Publication/ACER%20and%20NRAs%20practical%20note%20MACZT.pdf](https://extranet.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%20and%20NRAs%20practical%20note%20MACZT.pdf)

<sup>9</sup> For instance:

- the Belgian NRA's Study of compliance with the requirements related to the transmission capacity made available for cross-zonal trade in 2021 is available at: <https://www.creg.be/sites/default/files/assets/Publications/Studies/F2350EN.pdf>
- the German NRA's decision for 2021 is available at: <https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/HandelundVertrieb/EuropMarkt/kopplung/start.html>

<sup>10</sup> For instance:

- the Dutch TSO's report applied the common approach;
- the Belgian NRA's report applied the methodological principles of the common approach;
- the Austrian NRA informed ACER that it requested the TSO to follow the common approach from 2022 onwards alongside potential additional analysis.

<sup>11</sup> In 2020, the Nordic TSOs did not provide the data on time, and consequently ACER had to publish an ad-hoc monitoring report for the Nordic region in December 2021.

<sup>12</sup> In the case of Italy North, the joint submission started on 28 October 2021.

report. Thirdly, the Italian and Swedish TSOs started providing data to monitor the MACZT on their internal borders.

- (10) Nonetheless, critical quality issues remain, even if for a decreasing number of regions and Member States. Specifically, monitoring was not yet possible in the Baltic region. Additionally, before the start of the coordinated submission by the Italy North TSOs, the data for the whole region was fragmentary, leading to no monitoring possible for 59% of the year. In Sweden, data consistency checks by ACER were not possible due to the anonymised data provided by the Swedish TSO and the lack of merged grid models provided by the Nordic TSO(s). In addition, TSOs should improve the transparency on DC borders by providing information on the specific grid elements responsible for the capacity reduction. For example, the Swedish TSO reported in its request for derogation<sup>13</sup> the presence of congestions due to the so-called West Coast Corridor and East-West flows, which affects, among others, the tradable capacity between Denmark1 and Sweden3, and Finland and Sweden3.

On DC borders, the margin available for cross-zonal trade reached the minimum 70% target on many borders, with some noticeable exceptions.

- (11) On most DC borders the minimum 70% target continued to be reached for most of the hours (see Figure 1). Nonetheless, relative lower levels of the MACZT remained on the following DC borders:
- On Lithuania-Poland where the minimum 70% target was met less than 70% of the hours, and Poland-Sweden<sup>4</sup> where the minimum 70% target was only met around half the time. The low levels are mostly due to the application of allocation constraints<sup>14</sup> by the Polish TSO<sup>15</sup>.
  - On Denmark1-Sweden3 where the minimum 70% target was met 52% of the hours in the direction Denmark to Sweden, due to capacity reduction from the Swedish TSO<sup>16</sup>.
  - On Germany-Sweden<sup>4</sup>, where the minimum 70% target was met 61% of the hours in the direction of Germany to Sweden. The German TSO (TenneT) attributes the reductions of the capacity offered on this border to the presence of congestions at the distribution network level, on the German side<sup>17</sup>.
- (12) Compared to 2020, the main improvements were observed on the Dutch borders with Denmark1 and Norway<sup>2</sup>, where the minimum 70% target was met for almost all hours. However, lower MACZT values than in 2020 were observed on Finland-Sweden<sup>3</sup>, where the target was met only for 19% of the hours in the direction of Finland to Sweden, due

<sup>13</sup> The request for a derogation for the Swedish TSO for 2021 is available at:

<https://www.ei.se/download/18.6f9b6b2617714873b456fc88/1612855105921/Svensk-kraftn%C3%A4t-request-for-derogation-according-to-16-9-REG-2019-943.pdf>

<sup>14</sup> Pursuant to Article 23(3)(a) 36 of Regulation (EU) 2015/1222 ('CACM Regulation'), when constraints are needed to maintain the transmission system within operational security limits, and when such constraints cannot be transformed efficiently into capacity limit on network elements, TSOs may introduce additional constraints ('allocation constraints') to be respected during capacity allocation.

<sup>15</sup> For the direction Poland to Sweden<sup>4</sup>, Poland's action plan set a transitional target of 45% to be reached. This target was met 50% of the hours, considering allocation constraints.

<sup>16</sup> Sweden's derogation for 2021 did not set any target to be met by the Swedish TSO on this border.

<sup>17</sup> Germany's action plan set a transitional target of 46% to be met by the German TSO. This target was met 99% of the hours.

to limitations on the Swedish side. The levels of MACZT were also low on the Germany-Norway<sup>2</sup> border, although the 70% target does not yet apply on the borders with Norway<sup>18</sup>.

On AC borders, there was still a diverse picture of the levels of margin available for cross-zonal trade across EU. Compared to 2020, the progress was limited and significant room for improvement remained for most regions and borders in 2021.

- (13) On alternating current (AC) borders, there was still a very diverse picture, with significant room for improvement to meet the 70% target<sup>19</sup> for most regions and borders. Compared to 2020, there was not a clear trend that suggests a relevant overall increase in the MACZT across EU AC borders. Some exceptions are listed further below. The limited progress translates into small year-on-year increases in the tradable capacities made available in 2021 (see Figure 22).
- (14) In 2021, the highest levels of the MACZT across the EU were observed for the following cases:
  - In the Nordic region, where the TSOs met the minimum 70% target between 84% and 99% of the hours, depending on the border (see Figure 15).
  - In the SWE region, where the TSOs met the minimum 70% target for more than 70% of the hours for which sufficient information was available (see Figure 4).
  - On the Czech borders, where the Czech TSO met the minimum 70% target between 63% to 75% of the hours, depending on the border (see Figure 16).
  - On the border between Denmark<sup>1</sup> and Germany, where the Danish TSO met the minimum 70% target for 61% of the hours.
  - On the Slovene borders where the Slovenian TSO met the minimum 70% target between 34% and 85% of the hours, depending on the border.
  - On the Greek border with Bulgaria, where the Greek TSO met the minimum 70% target more than 60% of the hours when considering third-country flows<sup>20</sup>.
- (15) Compared to 2020, visible year-on-year improvements in the MACZT were observed for the following cases:
  - In Portugal, the TSO reached the minimum 70% target 56% of the time, compared to 30% in the second half of 2020. However, in the SWE region, the SWE TSOs were not able to identify the limiting element 16% of the hours during which monitoring was not possible. This was 4 percentage points higher than in 2020.
  - In Slovenia, considering all borders together, the TSO reached the minimum 70% target during the 66% of time, compared to 50% in the second half of 2020.

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<sup>18</sup> Yet, the German action plans set a target of 11.7% for Germany-Norway<sup>2</sup>, which was met 98% of the hours.

<sup>19</sup> For the countries with a derogation or an action plan, the comparison with the transitory target can be found in Table 6.

<sup>20</sup> In the report, the MACZT is calculated both with and without considering the influence of third countries (i.e., non-EU) flows. For Greece, which borders Albania, North Macedonia and Turkey, the impact of third countries on the results is significant.

- In Sweden, the TSO reached the minimum 70% target on the Nordic borders more than 90% of the hours, an increase of respectively 77 and 74 percentage points in the directions Finland to Sweden<sup>1</sup> and Sweden<sup>4</sup> to Denmark<sup>2</sup> compared to 2021. It remains unclear whether the improvement relates to an actual increase of the MACZT or to the calculation method used by the TSO when reporting to ACER. In particular, as mentioned in paragraph (10), data shortcomings prevented ACER from performing consistency checks on the data provided. The improvement on the border Denmark<sup>2</sup>-Sweden<sup>4</sup> does not seem consistent with the request for derogation from the minimum 70% target made by the Swedish TSO for 2022; such a derogation seems to imply that the TSO is not able to meet the minimum 70% target on its borders.
- (16) For the other AC borders in the EU, the levels of MACZT are lower. There was no or limited improvement observed in 2021 and significant efforts to meet the minimum 70% target are still needed. The lowest levels of the MACZT were observed in Bulgaria, Hungary, and Croatia (in the import direction).
- (17) In the Central West Europe (CWE) region (see Figure 6), where flow-based capacity calculation applies, significant efforts to meet the minimum 70% target are needed for all countries, especially Germany, followed by the Netherlands, Belgium, and France. Nonetheless, compared to 2020, there was a slight improvement for France and Belgium. This improvement is also illustrated in Figure 24 with the increase of the remaining available margin (RAM) offered by these two TSOs. In the CWE region, a minimum RAM of 20% on each network element has been imposed since April 2018. Before 2020, CWE TSOs mainly strived to meet this requirement. Since the introduction of the minimum 70% target, CWE TSOs have gradually improved some aspects of the capacity calculation, in particular the RAM validation process. Increasing the RAM is a necessary step towards meeting the minimum 70% target.

In 2021, most Member States still had an action plan or a derogation on at least one border. Compared to 2020, more derogations included a minimum transitional target to be reached by TSOs.

- (18) As of 2020, 17 Member States had an action plan and/or a derogation on at least one of their borders. In addition to Germany, Poland, and the Netherlands, where an action plan has been applied since 2020, Austria and Romania adopted an action plan in 2021, while Croatia and Hungary are currently in the process of adopting an action plan.
- (19) For 2021, 15 Member States approved a derogation from the minimum 70% target<sup>21</sup>. Out of these, only 6 (see paragraph (23)) did not include a minimum transitional target for at least one border covered by the derogation; this is an improvement compared to the 11 Member States that did not include any transitional target in their derogations for 2020.
- (20) Where a transitional target for an action plan or derogation was set for 2021, ACER analysed the MACZT against the transitional target (see Table 3 and Table 6). The results of the analysis are very diverse. While the transitional target was always met in

<sup>21</sup> The list and description of action plans and derogations for all countries is available at: [https://documents.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Publications%20Annexes/ACER%20Report%20on%20the%20result%20of%20monitoring%20the%20MACZT%20Generic/ACER%20Report%20on%20the%20result%20of%20monitoring%20the%20MACZT%20Derogations.pdf](https://documents.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publications%20Annexes/ACER%20Report%20on%20the%20result%20of%20monitoring%20the%20MACZT%20Generic/ACER%20Report%20on%20the%20result%20of%20monitoring%20the%20MACZT%20Derogations.pdf)

in the SWE region<sup>22</sup>, in the CWE region the transitional target for Belgium, the Netherlands and Germany was met between 40% and 60% of the hours, and less often than in 2020.

### Sufficient margin available for cross-zonal trade should also be made available intraday

- (21) In 2020 and 2021, the monitoring of the minimum 70% target focused on the day-ahead timeframe. The intraday timeframe was not yet monitored, because intraday coordinated capacity calculation methodologies were not yet implemented. For example, in the Core region, intraday coordinated capacity calculation is expected to be implemented in June 2023. To ensure a harmonised monitoring of the MACZT in the intraday timeframe ACER intends to update its Recommendation No 01/2019<sup>23</sup>. The upcoming amendment of the Capacity Allocation and Congestion Management (CACM) Regulation will also provide further clarity on the fulfilment of the minimum 70% target for the intraday timeframe.

### ACER advocates the following

- (22) **ACER calls on TSOs to:**

- **Resolve the quality issues** mentioned in paragraph (10) and in Table 4.
- **Ensure consistency when providing data** for ACER's monitoring of the MACZT. For example, following the upcoming go-live of flow-based capacity calculation in the Core region<sup>24</sup>, the TSOs belonging to this region should be able to provide jointly a consistent data set to ACER, or, alternatively, to align the data sets before submitting them to ACER.

- (23) **ACER calls on TSOs and NRAs to ensure that the derogations include a transitional target** on all borders covered. Such a target should allow to gradually increase the cross-zonal capacity offered to the market, with a view to meeting the minimum 70% target as soon as possible. Bulgaria, Greece, Hungary, Italy, the Netherlands, and Sweden did not include a transitional target on at least one of the borders in their derogation for 2021.

- (24) **ACER calls on NRAs to:**

- **Ensure that the common approach**, agreed between ACER and NRAs for the monitoring of the MACZT, **is followed**, starting with the forthcoming editions of the MACZT reports envisaged at the national level.
- Ensure that the data quality issues are resolved by TSOs.
- Take the necessary actions to **ensure that TSOs meet the minimum 70% target or transitional target at all times**.

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<sup>22</sup> When sufficient information was available to monitor the MACZT.

<sup>23</sup> See footnote 6.

<sup>24</sup> The flow-based market-coupling project in the Core region involves thirteen Member States of Central Europe. Project implementation has been facing recurrent delays, with another delay announced in April 2022.

## 2 How to interpret the charts and tables in this report

(25) The present report monitors the MACZT across the EU in line with the Recommendation<sup>25</sup>, the methodological paper<sup>26</sup>, and the practical note<sup>27</sup>. The main principles of calculation described in these three documents are:

1. The MACZT is monitored individually and separately for each critical network element with contingencies (CNEC).
2. The MACZT is the sum of the margin made available within coordinated capacity calculation (MCCC), and the flow induced by cross-zonal exchanges beyond coordinated capacity calculation – the margin from non-coordinated capacity calculation (MNCC).
3. The estimated MACZT focuses on the physical capacity offered for the long-term timeframes and the day-ahead timeframe. In the future, intraday capacity will also be monitored.
4. The influence of flows on bidding-zone borders between EU and non-EU countries is monitored separately.

(26) The charts are organised as follows:

- According to the type of interconnectors (AC/DC): the borders encompassing only high-voltage direct current (HVDC) interconnectors (“DC borders”) are presented separately from the borders encompassing only AC interconnectors or a combination of AC and DC interconnectors on the same border (“AC borders”).
- According to the level of coordination in capacity calculation and/or geographical area: NTC coordinated at the regional level (SWE, Italy North), coordinated flow-based (CWE), non-coordinated NTC (Nordics, and separately, all other non-coordinated bidding-zone borders).

(27) In each chart, the information is displayed per country, and per coordination area. A coordination area describes the set of bidding-zone borders within which capacity calculation is fully coordinated. A coordination area can be as small as one single border for a TSO, and up to several borders coordinated among all TSOs operating at the borders. In each coordination area, the obligation of meeting the minimum 70% target or transitional targets lies with the Member State’s TSO(s). Consequently, the results are displayed per country, in addition to per coordination area.

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<sup>25</sup> See footnote 6.

<sup>26</sup> The methodological paper complements the Recommendation, describing how to estimate in practice the MACZT and the main caveats underlying the estimation of the MACZT. It is available at:  
[https://www.acer.europa.eu/en/Electricity/Market%20monitoring/Documents/20201209%20Methodological%20paper%20MACZT\\_final.pdf](https://www.acer.europa.eu/en/Electricity/Market%20monitoring/Documents/20201209%20Methodological%20paper%20MACZT_final.pdf)

<sup>27</sup> See paragraph (7).

(28) The figures are in the next sections of the report. The Table 1 below lists the figures and provides additional consideration when relevant.

**Table 1: Detailed list of the charts and tables**

Item number	Title	Border type	Geographical scope	Granularity	Additional considerations
Table 2	Overview of completeness of the data provided by TSOs for the monitoring of the MACZT on DC borders – 2021	DC	All DC bidding-zone borders	Per bidding-zone border	<p>The table includes an overview of the data provided, including the country of the TSO that provided the values.</p> <p>The TSOs are asked to provide information on the element limiting the capacity that can be offered on the DC border. In many cases, the limiting element is the interconnector itself. However, the limiting element can also be an element inside the TSO's network. This was the case for Germany (on the border with Norway), and for Denmark, for which the TSOs provided this information.</p> <p>This information is missing for Sweden. The Swedish TSO communicated to ACER that an internal element was often limiting the capacity calculation on its DC borders, but they did not report on those elements. The TSO also declared in its request for derogation for 2021<sup>28</sup> that “congestion in the West Coast Corridor, [...] implies a need to reduce capacity on SE3-NO1, DK1-SE3, DK2-SE4, DE-SE4, PL -SE4 and LT-SE4”. In the absence of this information, the interconnector is considered to be the limiting element.</p> <p>The borders BE-DE and DE-NO2 went live towards the end of 2020 and are included in the chart for DC borders for the first time.</p>
Figure 1	Percentage of the time when the minimum 70% target was	DC	All DC bidding-zone borders	Per oriented bidding-zone border	The figure shows the percentage of hours for which the minimum 70% target was met. When the 70% target was not

<sup>28</sup> The request for derogation of the Swedish TSO for 2021 is available at:

<https://www.ei.se/download/18.6f9b6b2617714873b456fc88/1612855105921/Svensk-kraftn%C3%A4t-request-for-derogation-according-to-16-9-REG-2019-943.pdf>

	reached on DC borders – 2021 (% of hours)				<p>met, the figure indicates the bidding-zone(s) that did not meet the minimum 70% target.</p> <p>The MACZT was in general calculated on the interconnector itself, except in the few cases where the TSO reported that the limiting element was another element inside of the TSO's network. This was the case for:</p> <ul style="list-style-type: none"> <li>- Germany for Germany-Norway2. The limiting element was an internal element in 31% of the hours in the direction Germany to Norway2, and 89% of the hours in the direction Norway2 to Germany,</li> <li>- Denmark for Denmark1-Norway2. The limiting element was an internal element in 3% of the hours.</li> <li>- Denmark for Denmark1-Denmark2. The limiting element was an internal element in 0.4% of the hours.</li> <li>- Denmark for Denmark1-Sweden3. The limiting element was an internal element in 8% of the hours in the direction Denmark1 to Sweden3, and 13% of the hours in the direction Sweden3 to Denmark1.</li> </ul>
Figure 3	Percentage of the time when the margin made available is below 95% of the maximum admissible flow at the border – 2021 (% of hours)	DC	All DC bidding-zone borders	Per oriented bidding-zone border	The figure shows the percentage of hours for which at least one of the two TSOs made available less than 95% of Fmax on the border.
Figure 2	Percentage of the time when the minimum 70% target was reached on Polish DC borders, without considering allocation constraints – 2021 (% of hours)	DC	Poland DC bidding-zone borders	Per oriented bidding-zone border	When allocation constraints limit the exchanges with Poland, the interconnectors with Poland can still be used to accommodate exchanges between Sweden and Lithuania (via Poland); however, the application of the constraints effectively limits the trading possibilities with Poland. The figure shows what the MACZT would have been without the allocation constraints introduced by Poland.
Table 3	Comparison between the MACZT and the transitional target of Member States on DC borders – 2021	DC	Bidding-zone borders with a transitional target	Per oriented bidding-zone border	The table presents the DC borders that do not have to comply with the minimum 70% target yet because they have an action plan or a derogation in place. It presents the targets that the TSOs had to reach on these borders for 2021 (if any) and compares the levels of MACZT with these targets.

Table 4	Overview of the completeness and quality of the data provided by TSOs for the monitoring of the MACZT on AC borders – 2021	AC	All AC bidding-zone borders	Per coordination area and country	<p>The table provides a summary of completeness and quality of the data provided to ACER.</p> <p>TSOs were offered the possibility to perform themselves, partly or in full, the calculations of the MACZT and to provide the interim and/or final results to ACER. In this case, ACER required that the underlying calculations be performed in line with the Recommendation. ACER evaluated both the quality of the data and the alignment of TSOs' calculation with the Recommendation.</p> <p>The principal changes in the data provision compared to 2020 are the following:</p> <ul style="list-style-type: none"> <li>• The SWE TSOs started (from Q2 2021) providing the data jointly. This is very valuable to ensure full consistency in the data provided for the region.</li> <li>• The Italy North TSOs also started (from 28 October 2021) providing the data jointly. The benefits are not visible yet because this coordinated data was available only for the last two months of the year, but from the next year onwards it will increase the consistency and the completeness of the data provided. No data on CNECs was provided for 59% of the hours - that occurred before the start of the joint submission - therefore monitoring was not possible.</li> <li>• The Slovak TSO provided the limiting elements for both directions of its borders. In 2020, it had provided the necessary information only in the directions Slovakia&gt;Hungary, Poland&gt;Slovakia, and Czech Republic&gt;Slovakia.</li> <li>• Contrary to 2020, all Nordic TSOs provided the requested cross-border data on time and could therefore be included in the present report.</li> <li>• The Swedish and Italian TSOs both provided the data related to their internal bidding-zone borders, that could be included in the present report.</li> <li>• The Italian and Swedish TSOs provided part of their data significantly late. It put at risk the inclusion in the</li> </ul>
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					<p>report and significantly limited the time available to ACER to perform the necessary quality checks.</p> <p>In addition, the data provided by the Swedish TSO still lacks transparency. It provides only anonymized CNECs, and no grid models, thus not allowing ACER to perform consistency checks on the results.</p>
Table 5	Overview of the data used by ACER in the report and for the calculation when performed by ACER – 2021	AC	All AC bidding-zone borders	Per coordination area and country	The table presents the actual data used by ACER in the report to estimate the MACZT on AC borders, and related justifications when ACER was unable to directly use TSOs' calculations.
Figure 4	Percentage of the time when the minimum 70% target was reached in the SWE region – 2021 (% of hours)	AC	SWE	Per country and oriented bidding-zone border	The figure shows the percentage of hours for which the relative MACZT was above the minimum 70% target, or within a set of predefined ranges (50-70%, 20-50%, <20%). The information for the SWE region is displayed per country, and per border-direction. Despite the fact that the SWE region encompasses two borders, one limiting CNEC is determined per each border separately for each hour. The figure also indicates the percentage of hours for which the capacity calculation in SWE was not successful in identifying the limiting CNEC. In this case, TSOs reported that they were unable to provide information on the CNEC(s) that was/were limiting the capacity calculation, or would have limited it, should the capacity calculation process be successful. Finally, the figure describes the percentage of hours for which the limiting CNEC is, from the perspective of the country, located in the neighbouring country, and therefore the TSO had no limiting CNEC to report.
Figure 5	Percentage of the time when the minimum 70% target was reached in the Italy North region – 2021 (% of hours)	AC	Italy North	Per country	The figure shows the percentage of hours for which the relative MACZT was above the minimum 70% target, or within a set of predefined ranges (50-70%, 20-50%, <20%). The figure also indicates the percentage of hours when the capacity calculation is limited by Italy's allocation constraints. The Italian TSO did not report the limiting CNEC that would have been limiting, if the allocation constraints had not applied, though ACER requested this information. Finally, the figure describes the percentage of hours for which the limiting CNEC, or allocation

					<p>constraint, is, from the perspective of the country, located in the neighbouring country, and therefore the TSO had no limiting CNEC to report.</p> <p>The effective monitoring of the MACZT on CNECs was not possible for 59% of the hours, for which Italy North TSOs did not provide ACER with information on the limiting CNEC. TSOs declared that the allocation of cross-zonal capacity in the region was limited due to a variety of reasons, mainly reported as ‘capacity reduced by a TSO in the validation phase’ or ‘failure to report the limiting CNEC’.</p> <p>These 59% of the time with insufficient information occurred before the start of the joint data submission by Italy North TSOs.</p>
Figure 6	Percentage of the time when the minimum 70% target was reached in the CWE region – 2021 (% of hours)	AC	CWE	Per country	<p>The figure shows the percentage of hours for which the relative MACZT was above the minimum 70% target, or within a set of predefined ranges (50-70%, 20-50%, &lt;20%).</p> <p>In the CWE region, flow-based capacity calculation applies since 2015. The MACZT can be accurately calculated on all CNECs relevant in the capacity calculation, and not only on the limiting ones.</p> <p>In addition to defining CNECs, the TSOs may define other types of constraints to be considered in capacity calculation, that are not directly associated with CNECs. In the CWE region, the Belgian and Dutch TSOs apply constraints that limit the maximum total import and/or export values over their own bidding-zone. These constraints can reduce the flow-based domain offered for capacity allocation. As foreseen by the Recommendation, ACER assessed whether the allocation constraints would become relevant should the minimum 70% target be reached on all CNECs. The analysis showed that in 2021, had the minimum 70% target been reached on all CNECs in the country in question for all hours:</p> <ul style="list-style-type: none"> <li>- The allocation constraints applied by the Belgian TSO would have restricted the flow-based domain 21% of the time; and</li> </ul>

					- The allocations constraints applied by the Dutch TSO would have restricted the flow-based domain 54% of the time.
Figure 7	Density function of the lowest hourly relative MACZT per country, in the CWE region – 2021	AC	CWE	Per country	The figure shows the density of the hourly minimum relative MACZT on CNECs, per country, in the CWE region.
Figure 8	Density function of the relative MACZT for all CNECs in Austria for CWE region – 2021	AC	CWE Austria	Per country	The figure shows the density of the MACZT on all CNECs, across all hours, for the country indicated, in the CWE region.
Figure 9	Density function of the MACZT for all CNECs in Belgium for the CWE region – 2021	AC	CWE Belgium	Per country	The figure shows the density of the MACZT on all CNECs, across all hours, for the country indicated, in the CWE region.
Figure 10	Density function of the relative MACZT for all CNECs in France for the CWE region – 2021	AC	CWE France	Per country	The figure shows the density of the MACZT on all CNECs, across all hours, for the country indicated, in the CWE region.
Figure 11	Density function of the MACZT for all CNECs in the Netherlands for the CWE region – 2021	AC	CWE The Netherlands	Per country	The figure shows the density of the MACZT on all CNECs, across all hours, for the country indicated, in the CWE region.
Figure 12	Density function of the relative MACZT for all CNECs of Amprion in Germany for the CWE region – 2021	AC	CWE Germany (Amprion)	Per country	The figure shows the density of the MACZT on all CNECs, across all hours, for the country indicated, in the CWE region.
Figure 13	Density function of the relative MACZT for all CNECs of TenneT in Germany for the CWE region – 2021	AC	CWE Germany (TenneT)	Per country	The figure shows the density of the MACZT on all CNECs, across all hours, for the country indicated, in the CWE region.
Figure 14	Density function of the relative MACZT for all CNECs of TransnetBW in Germany for the CWE region – 2021	AC	CWE Germany (TransnetBW)	Per country	The figure shows the density of the MACZT on all CNECs, across all hours, for the country indicated, in the CWE region.
Figure 15	Percentage of the time when the minimum 70% target was	AC	Nordic	Per country and oriented	The figure shows the percentage of hours for which the relative MACZT was above the minimum 70% target, or within a set of predefined ranges (50-70%, 20-50%, <20%).

	reached in the Nordic region – 2021 (% of hours)			coordination area	
Figure 16	Percentage of the time when the minimum 70% target was reached for countries of Continental Europe where a coordinated capacity calculation is not yet implemented – 2021 (% of hours)	AC	Continental Europe where a coordinated capacity calculation is not yet implemented	Per country and oriented coordination area	<p>The figure shows the percentage of hours for which the relative MACZT was above the minimum 70% target, or within a set of predefined ranges (50-70%, 20-50%, &lt;20%).</p> <p>For Slovakia, following interactions between ACER and the Slovak TSO, it was determined that a single coordination area - instead of one coordination per border - was more suitable to depict the capacity calculation as done by the Slovak TSO. Contrary to other TSOs that also have a capacity calculation coordinated at national level, the Slovak TSOs does not consider in its capacity calculation a situation with export on all borders or import on all borders. They consider a situation of transit North to South or South to North, as reflected in the figure.</p>
Figure 17	Percentage of the time when the minimum 70% target was reached for the internal borders of Sweden – 2021 (% of hours)	AC	Sweden's internal borders	Per country and oriented coordination area	The figure shows the percentage of hours for which the relative MACZT was above the minimum 70% target, or within a set of predefined ranges (50-70%, 20-50%, <20%).
Figure 18	Percentage of the time when the minimum 70% target was reached for the internal borders of Italy – 2021 (% of hours)	AC	Italy's internal borders	Per country and oriented coordination area	<p>The figure shows the percentage of hours for which the relative MACZT was above the minimum 70% target, or within a set of predefined ranges (50-70%, 20-50%, &lt;20%). The figure also indicates the percentage of hours when the capacity calculation is limited by "other constraints".</p> <p>The TSO reported these "other constraints" as "dynamic stability", "voltage constraint" or "failure of the capacity calculation process".</p> <p>The Italian TSO started providing the values from 03 August 2021, which is the start date of the day-ahead capacity calculation of the Greece-Italy capacity calculation region (GR-IT CCR).</p> <p>Before this date, no information was provided by the TSO, thus monitoring was not possible.</p>

					The Italian does not calculate the impact from flows outside the coordination area (MNCC). In general, the MNCC is considered low on these borders.
Figure 19	Average margin available on elements where the minimum 70% target is not reached – 2021	AC	All AC bidding-zone borders	Per country and oriented coordination area	The figure shows the average relative MACZT over all the CNECs that do not meet the minimum 70% target, over all the hours. It indicates the remaining effort for the CNECs that do not meet the 70 % minimum target.
Figure 20	Share of CNECs with positive and negative MNCC as a % of all CNECs and respective average levels of MNCC as a % of Fmax – 2021 (% of CNECs)	AC	All AC bidding-zone borders	Per country and oriented coordination area	The figure presents, for each country and coordination area, among all CNECs declared by the TSOs, the share of CNECs with positive MNCC, and the share of CNECs with negative MNCC. MNCC represents the flow induced by cross-zonal exchanges beyond coordinated capacity calculation. Such a contribution may be negative, i.e., may free capacity on the CNEC. This additional capacity should then become available for trade on bidding-zone borders within the coordination area. The figure also shows the average levels, in percentage of Fmax, of the MNCC values when MNCC was positive, and when MNCC was negative. Overall, the figure gives insight into how and to what extent the flows from other coordination areas influence the capacity TSOs can offer on their CNECs. While the netting of flows opposite to congestion is legally required, it should be noted that such flows are computed based on forecasts, which have inherent uncertainties. MNCC values are expected to decrease in the future, e.g., following the implementation of the common grid model methodology and of the CCMs pursuant CACM Regulation.
Table 6	Comparison between the MACZT and the transitional target of Member States on AC borders – 2021	AC	Countries and coordination area with a derogation or action plan	Per country and (oriented when relevant) coordination area	<p>The table presents the AC borders that do not yet have to comply with the minimum 70% target, because they have an action plan or a derogation in place. It presents the targets that the TSOs had to reach on these borders for 2021 (if any) and compares the levels of MACZT with these targets.</p> <p>For all countries and borders that are not mentioned in the table, the minimum 70% target is applied for 2021, and results can be found in Figure 4, Figure 5, Figure 6, Figure 15, Figure 16, Figure 17 and</p>

					Figure 18.
Figure 21	Percentage of the time when the transitional target is met on all CNECs, for countries with a derogation or an action plan that stipulates a target per CNEC – 2021 (% of hours)	AC	Countries and coordination area with a transitional target stipulated at CNEC level	Per country and (oriented when relevant) coordination area	The figure presents the levels of MACZT compared to the target stipulated by the derogation or action plan, when the derogation and/or action plan sets the target for each CNEC.
Figure 22	Average NTC per cross-zonal border, aggregated per capacity calculation region – 2017-2021 (GW)	All	Europe	Per capacity coordination region	The figure presents the average cross-zonal DA NTC per capacity calculation region (CCR) from 2017 to 2021, based on hourly cross-zonal capacities made available across all timeframes and all borders of each CCR. The aim of the figure is to identify trends within regions rather than comparing absolute values across regions.
Figure 23	Share of active constraints in the CWE domain per TSO control area and category – 2021 (%)	AC	CWE	Per TSO	The figure presents the share of active constraints (i.e., the constraints that effectively limit the cross-zonal exchange), with and without considering shadow prices, per element type and TSO in the Core (CWE) region. The analysis excludes constraints triggered by ALEGrO, as they are external constraints that limit the capacity calculation and not capacity allocation.
Figure 24	Density function of the minimum hourly RAM over Fmax among all CNECs in the CWE region, per Member State – 2020–2021 (%)	AC	CWE	Per country	The figure presents the distribution of the minimum hourly RAM (remaining available margin which the equivalent in flow based of MCCC) over the maximum admissible flow (Fmax) among all CNECs in the CWE region, per Member State, in 2020 and 2021. The peak of each curve shows, for each Member State, the most frequently observed level of minimum hourly RAM among all CNECs. Except for 2 hours in the Netherlands, in all Member States, the RAM remained above 20% of Fmax for all CNECs at all times, in line with the 20% requirement that applies since April 2018 in the CWE region.
Table 7	List of coordination areas – 2021	All	All borders	Per country and coordination area	
Table 8	List of acronyms	N.A.	N.A.	N.A.	

### 3 Results of monitoring the margin available for cross-zonal trade on DC bidding-zone borders

**Table 2: Overview of completeness of the data provided by TSOs for the monitoring of the MACZT on DC borders – 2021**

DC Border	Fmax	NTC values as calculated by each TSO		Allocation constraints	Limiting AC CNECs
BE-DE	BE, DE	BE	DE		
DE-DK2	DE, DK	DE	DK		
DE-NO2	DE	DE	NO		DE
DE-SE4	Baltic cable TSO	DE	SE		SE
DK1-DK2	DK	DK			DK
DK1-NL	NL	DK	NL		
DK1-NO2	DK	DK	NO		DK
DK1-SE3	DK	DK	SE		DK   SE
EE-FI	FI	EE	FI		
FI-SE3	FI	FI	SE		SE
GR-IT	GR	GR	IT		
LT-PL	LT, PL	LT	PL	PL	
LT-SE4	LT	LT	SE		SE
NL-NO2	NL	NL	NO		
PL-SE4	PL	PL	SE	PL	SE

	The data was provided as requested.
	The data was not provided. Fallback data was used.
	The data item does not apply to the specific border (e.g. if allocation constraints are not applied), the relevant TSO did not have to provide the data (e.g. the Norwegian TSO) or the data was not provided and no fallback data can be used.

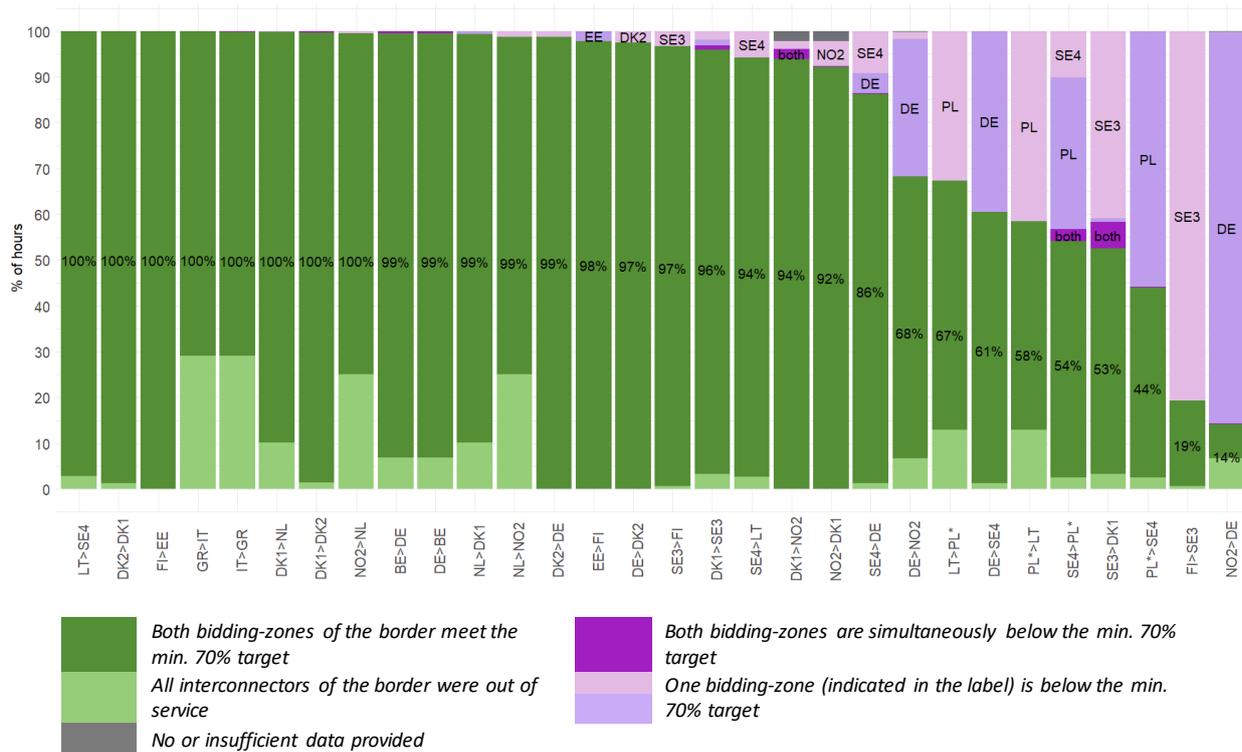
Source: ACER analysis based on TSO data .

Note 1: The country indicated in the columns refers to the entity (TSO or cable operator) or the country of the entity that provided the data item.

Note 2: Calculations of NTC values on DC borders are currently not coordinated, except on the GR-IT border. Each TSO usually calculates its own NTC value, considering only its own network constraints. The minimum of the two calculated NTC values is offered to the market. The NTC values used in MACZT monitoring are the capacity offered by the TSO, before alignment with the neighbouring TSO.

Note 3: The Swedish TSO declared that in 2021 elements inside the Swedish grid were often limiting the capacity offered on its DC borders. Yet, the TSO did not report those limiting elements. In the absence of this information, it was considered that the limiting element was the interconnector.

**Figure 1: Percentage of the time when the minimum 70% target was reached on DC borders – 2021 (% of hours)**



Source: ACER calculation based on TSO data.

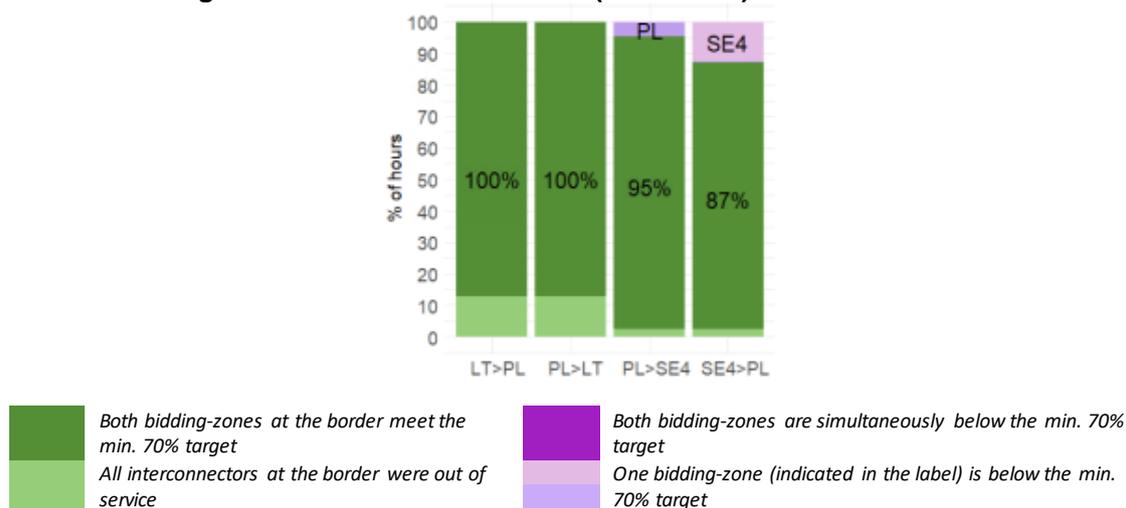
Note 1: The MACZT is calculated on the element declared by the TSO as the element limiting the capacity on the border. This element is the interconnector itself most of the time but can also be an element inside the TSO’s network.

Note 2: The DC borders with Norway where the minimum 70% target does not yet apply, are shown when the information was provided by the neighbouring TSO. Information from Norway was not requested. Therefore, the indication of the countries that are below 70% is based solely on the information provided by the neighbouring TSO or information from the ENTSO-E Transparency Platform.

Note 3: The Swedish TSO declared that in 2021 elements inside the Swedish grid were often limiting the capacity offered on its DC borders. Yet, the TSO did not report those limiting elements. In the absence of this information, it was considered that the limiting element was the interconnector.

\* On the Polish borders with Sweden and Lithuania, the calculations consider the impact of allocation constraints limiting the total import (or export) capacity from (or to) Poland. When allocation constraints apply, the interconnectors with Poland can be used to accommodate exchanges between Sweden and Lithuania (via Poland); however, the application of the constraints effectively limits the trading possibilities with Poland.

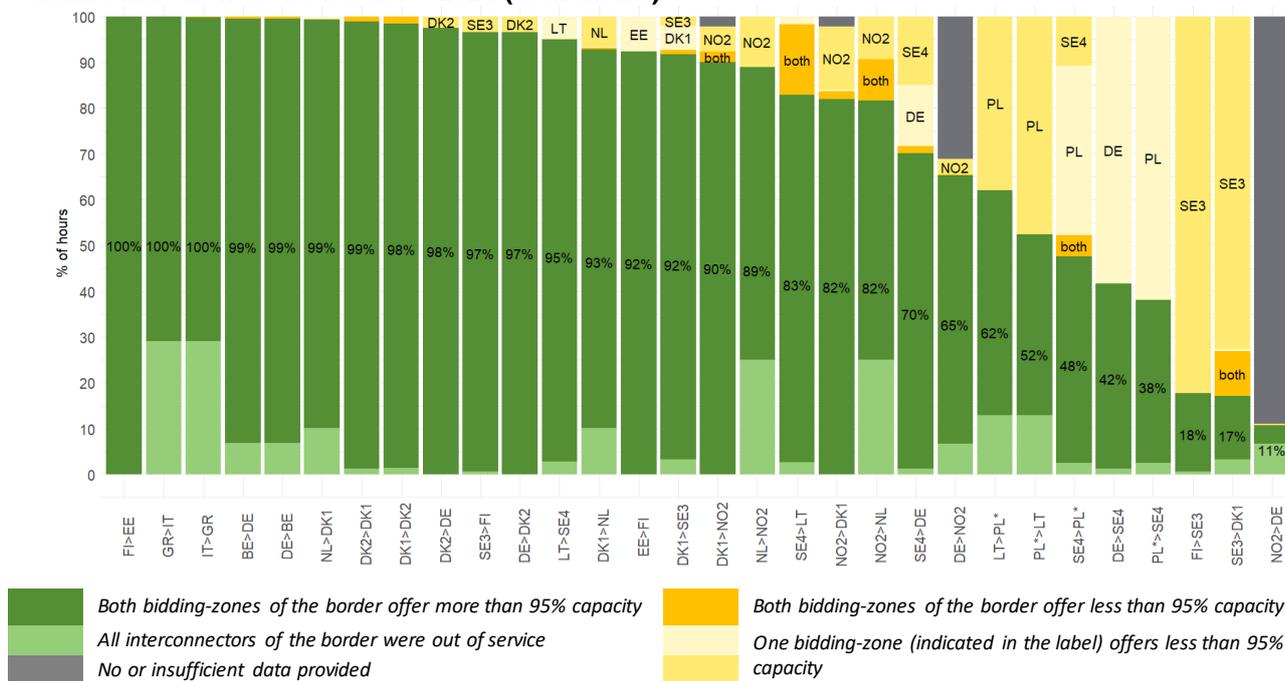
**Figure 2: Percentage of the time when the minimum 70% target was reached on Polish DC borders, without considering allocation constraints – 2021 (% of hours)**



Source: ACER calculation based on TSO data.

Note: Results considering the impact of Polish allocation constraints are shown in Figure 1.

**Figure 3: Percentage of the time when the margin made available is below 95% of the maximum admissible flow at the border – 2021 (% of hours)**



Source: ACER calculation based on TSO data.

Note: The DC borders with Norway where the minimum 70% target does not yet apply, are shown when the information was provided by the neighbouring TSO. Information from Norway was not requested. Therefore, the indication of the countries that are below 70% is based solely on the information provided by the neighbouring TSO or information from the ENTSO-E Transparency Platform.

\* On the Polish borders with Sweden and Lithuania, the calculations consider the impact of allocation constraints limiting the total import (or export) capacity from (or to) Poland. When allocation constraints apply, the interconnectors with Poland can be used to accommodate exchanges between Sweden and Lithuania (via Poland); however, the application of the constraints effectively limits the trading possibilities with Poland.

**Table 3: Comparison between the MACZT and the transitional target of Member States on DC borders – 2021**

Member State	DC border	Direction	Target for 2021	Comparison between the MACZT and the transitional target
DE	BE-DE	Both	21.3%	Target met 100% of the hours.
	DE-SE4	Export	46.2%	Target met 99% of the hours.
		Import		Target met 100% of the hours.
DE, DK	DE-DK2	Both	The European Commission granted a ten-year derogation on Kriegers Flak Combined Grid Solution. TSOs shall offer the remaining interconnector capacity after deduction of the wind feed-in forecast of offshore wind farms. Consequently, the maximum capacity of the interconnector considered is thermal capacity minus the wind forecasts. In addition, the action plan set a target of 11.7% on this cable.	Results displayed in Figure 1.
PL	PL-SE4	PL>SE4	45%	Target met 50% of the hours.*
NL	DK1-NL	Both	The derogation does not set any target.	N.A.
SE	DK1-SE3	Both	The derogation does not set any target.	N.A.
	DE-SE4	Both		N.A.
	PL-SE4	Both		N.A.
	LT-SE4	Both		N.A.

Note: The table presents only the Member States and DC borders with a derogation or an action plan in 2021. For all other borders, the minimum 70% target applies. Results are presented in Figure 1.

\* On the Polish borders with Sweden, the results consider the impact of allocation constraints limiting the total import (or export) capacity from (or to) Poland. Without considering allocation constraints, the target was met 97% of the hours.

## 4 Results of monitoring the margin available for cross-zonal trade on AC bidding-zone borders

**Table 4: Overview of the completeness and quality of the data provided by TSOs for the monitoring of the MACZT on AC borders – 2021**

CCAs	Member State	TSO	Overall ACER's assessment of data completeness and quality	Observations	
CWE	AT	APG			
	BE	Elia		The MNCC values provided without third countries did not exclude Norway.	
	DE	TenneT			The MNCC values provided were not calculated in line with the Recommendation. ACER recalculated them.
		Transnet			
		Amprion			
FR	RTE				
NL	TenneT				
Italy North	AT	APG		No information on CNECs was provided for 59% of the hours of the semester. ACER could not monitor the MACZT in line with the Recommendation for these hours.	
	FR	RTE			
	IT	TERNA			
	SI	ELES			
SWE	ES	REE			
	FR	RTE			
	PT	REN			
AT-CZ, AT-HU, AT-SI	AT	APG			
Internal borders	IT	TERNA		Data was provided only from 03/08/2021. The TSO did not calculate MNCC. The impact on results is likely limited.	
BG-GR	BG	ESO			
BG-RO					
AT-CZ, CZ-DE, CZ-PL, CZ-SK	CZ	CEPS			
DE-CZ and DE-PL	DE	TenneT		The MNCC values provided were not calculated in line with the Recommendation. The MCCC values provided did not take into account the technical profile in line with the Recommendation. ACER recalculated them.	
		50Hz			
DE-DK1		TenneT		The MNCC values provided were not calculated in line with the Recommendation. ACER recalculated them.	
DE-DK1	DK	Energinet			
DK2-SE4					
FI-SE1	FI	Fingrid			
BG-GR	GR	IPTO			
HR-HU	HR	HOPS			
HR-SI					
	LU	CREOS	Not applicable	Luxembourg is part of the DE/LU bidding-zone.	
AT-HU	HU	MAVIR			
HR-HU					
HU-RO					
HU-SK					
EE-LV	EE	Elering		No grid model and no CNECs were provided; no monitoring was possible.	
LT-LV	LT	Litgrid		No grid model and no CNECs were provided; no monitoring was possible.	
EE-LV, LT-LV	LV	AST		No grid model and no CNECs were provided; no monitoring was possible.	
CZ-PL, CZ-DE, CZ-SK	PL	PSE		The MCCC and MNCC values provided were not calculated in line with the Recommendation. ACER recalculated them.	
BG-RO, HU-RO	RO	Transelectrica			
DK2-SE4	SE	SVK		The list of critical network elements (CNECs) has been anonymised by the TSO and no grid models were shared with ACER. This prevents ACER from performing a certain number of consistency checks. In particular, ACER noticed discrepancies with neighbouring TSO in the PTDfS, which could not be verified.	
FI-SE1					
Internal borders					
AT-SI	SI	ELES			
HR-SI					
CZ-SK, HU-SK, PL-SK	SK	SEPS			

-  All the data was provided as requested.
-  Most or all the data was provided. Some non-critical elements were missing or the provision of data was not fully in line with the Recommendation. The impact on the MACZT results was limited and/or fallback data could be used.
-  Most or all the data was provided. Some essential elements were missing or the provision of data deviated significantly from the Recommendation. The impact on the MACZT results was relevant and/or using fallback data was not always possible.
-  No or insufficient data provided. Monitoring the MACZT was not possible at all, or only very limited.
-  The data was provided late by the TSO. It put at risk the inclusion in the report and significantly limited the time available to ACER to perform the necessary quality checks.

**Table 5: Overview of the data used by ACER in the report and for the calculation when performed by ACER – 2021**

CCAs	Member State	TSO	Results			Data used by ACER for calculation					Comments
			MCCC	MNCC	MNCC with third countries	CNECs	PTDFs	NTC	Forecast sched.	Alloc. const.	
CWE	AT	APG	TSO	TSO	TSO						
	BE	Elia	TSO	TSO	TSO					TSO	
	DE	TenneT	TSO	ACER	ACER	TSO	TSO		EE-TP		See Note 1.
		Transnet	TSO	ACER	ACER	TSO	TSO		EE-TP		
		Amprion	TSO	ACER	ACER	TSO	TSO		EE-TP		
	FR	RTE	TSO	TSO	TSO						
NL	TenneT	TSO	TSO	TSO					TSO		
Italy North	AT	APG	TSO	TSO	TSO						See Note 4.
	FR	RTE	TSO	TSO	TSO						
	IT	TERNA	ACER/TSO	ACER/TSO	ACER/TSO						
	SI	ELES	TSO	TSO	TSO						
SWE	ES	REE	TSO								
	FR	RTE	TSO								
	PT	REN	ACER/TSO	ACER	ACER	TSO	ACER	TSO	EE-TP		See Note 5.
AT-CZ, AT-HU, AT-SI	AT	APG	TSO	TSO	TSO						
Internal	IT	TERNA	TSO								
BG-GR	BG	ESO	ACER	ACER	ACER	TSO	ACER	TSO/EE-TP	EE-TP		
BG-RO			ACER	ACER	ACER	TSO	ACER	EE-TP	EE-TP		
AT-CZ, CZ-DE, CZ-PL, CZ-SK	CZ	CEPS	TSO	TSO	TSO						
DE-CZ and DE-PL	DE	TenneT	ACER	ACER	ACER	TSO	TSO	TSO	EE-TP	TSO	See Notes 1 and 2.
		50Hz	ACER	ACER	ACER	TSO	TSO	TSO	EE-TP	TSO	
DE-DK1	DK	TenneT	TSO	ACER	ACER	TSO	TSO		EE-TP		See Note 1.
DE-DK1		Energinet	ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
DK2-SE4			ACER			TSO	TSO	TSO			
FI-SE1	FI	Fingrid	TSO								
BG-GR	GR	IPTO	ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
HR-HU	HR	HOPS	ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
HR-SI			ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
	LU	CREOS									
AT-HU	HU	MAVIR	ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
HR-HU			ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
HU-RO			ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
HU-SK			ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
EE-LV	EE	Elering									
LT-LV	LT	Litgrid									
EE-LV, LT-LV	LV	AST									
CZ-PL, CZ-DE, CZ-SK	PL	PSE	ACER	ACER	ACER	TSO	TSO	TSO	TSO	TSO	See Notes 2 and 3.
BG-RO, HU-RO	RO	Transelectrica	ACER	ACER	ACER	TSO	ACER	EE-TP	EE-TP		
DK2-SE4	SE	SVK	ACER	ACER	ACER	TSO	TSO	TSO	EE-TP		
FI-SE1			ACER	ACER	ACER	TSO	TSO	TSO	EE-TP		
Internal			ACER	ACER	ACER	TSO	TSO	TSO	EE-TP		
AT-SI	SI	ELES	ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
HR-SI			ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		
CZ-SK, HU-SK, PL-SK	SK	SEPS	ACER	ACER	ACER	TSO	ACER	TSO	EE-TP		

ACER	ACER calculation		Data not provided and/or calculations not possible
TSO	Data provided by the TSO		Data not applicable or not used for the calculations
EE-TP	Data from the ENTSO-E Transparency Platform		

Source: ACER elaboration

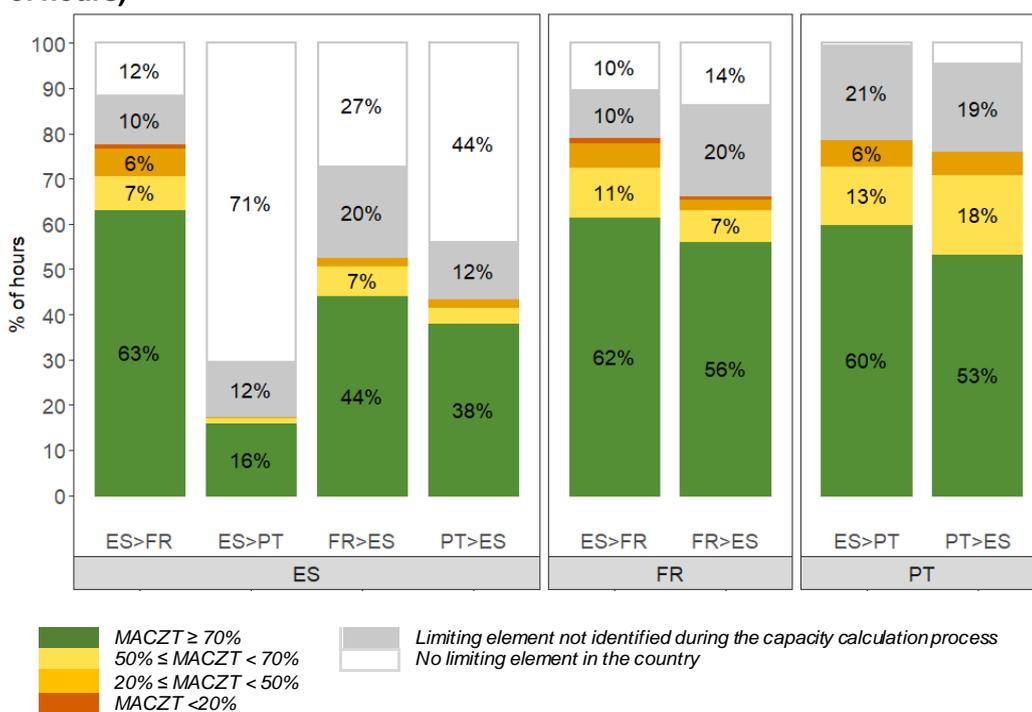
Notes referred to in the table:

- Note 1: ACER estimated the MNCC values because the MNCC estimations provided by TSOs considered full simultaneous NTC on the borders beyond the coordination area, which is not in line with the Recommendation.

- Note 2: ACER estimated the MCCC values because the estimations provided by the TSO did not consider the technical profile in line with the Recommendation and/or the allocation constraints that further limit cross-zonal capacity.
- Note 3: ACER estimated the MNCC values because the estimations provided by the TSO did not consider the case when MNCC is negative.
- Note 4: From 28 October 2021, the Italy North TSOs provided the data jointly. Before this date, ACER calculated the PTDFs for the Italian.
- Note 5: From Q2 2021, the SWE TSOs provided the data jointly, including PTDFs and MCCC. Before this date, ACER calculated the PTDFs for the Portuguese TSO.

#### 4.1 South West Europe region

**Figure 4: Percentage of the time when the minimum 70% target was reached in the SWE region – 2021 (% of hours)**



MACZT = margin available for cross-zonal trade

Source: ACER calculation based on TSOs data.

Note 1: ‘No limiting element in the country’ means that the limiting element was in the network of the neighbouring TSO.

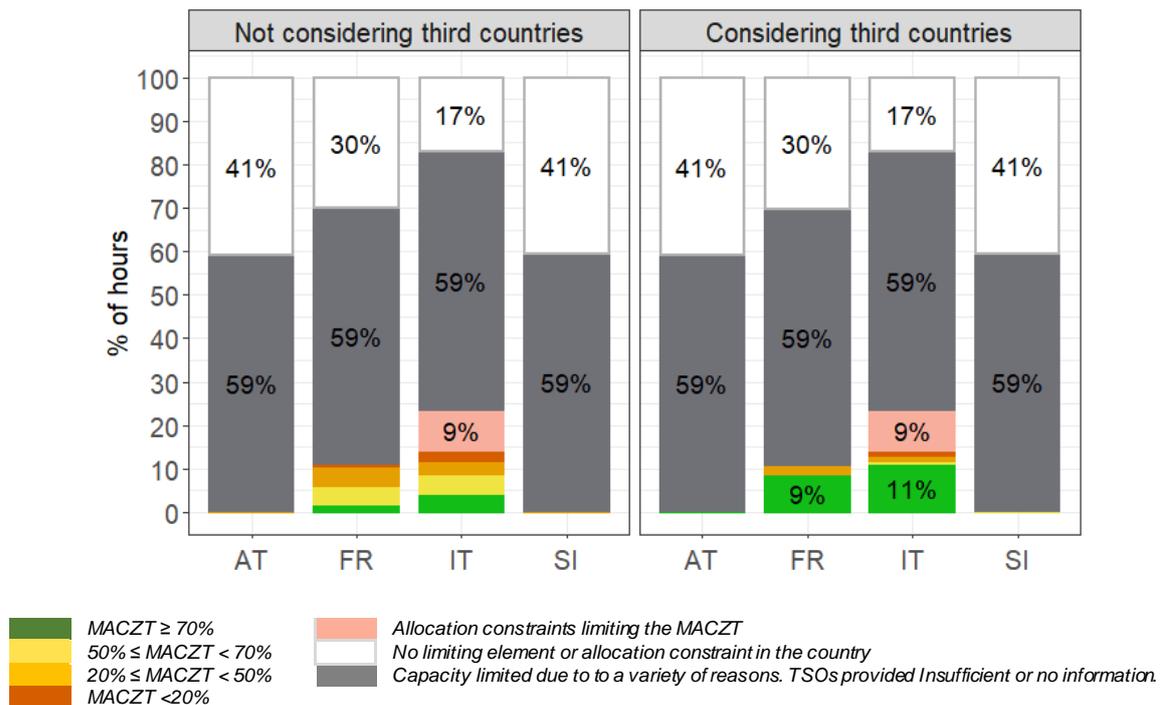
Note 2: When the limiting element was an interconnector, it may be declared by the two TSOs on each side of the border. Therefore, the overall percentage of the time when limiting elements are reported on a given border-direction, considering the two TSOs taken together, is above 100%.

Note 3: ‘Limiting element not identified during the capacity calculation process’ refers to hours for which the capacity calculation process was not successful in calculating a NTC value (in this case, TSOs used default capacity parameters to define the level of capacity made available to the market) or identifying the limiting element. The reasons reported by TSOs were information system failure, load-flow divergence or insufficient GLSKs.

Note 4: The figure does not consider the influence of exchanges with third (non-EU) countries. For Portugal, this impact could be estimated for a part of the year but was limited. For France and Spain, the necessary information to estimate this impact was not available. For these reasons, no additional figure considering exchanges with third countries was produced.

### 4.2 Italy North region

**Figure 5: Percentage of the time when the minimum 70% target was reached in the Italy North region – 2021 (% of hours)**



MACZT = margin available for cross-zonal trade

Note 1: ‘No limiting element or allocation constraint in the country’ means that the limiting element or allocation constraint was in the network of another TSO in the region.

Note 2: The Italian NRA informed ACER about an agreement between Italy North TSOs and the Swiss TSO, in place since 28 October 2021, and that the NRA considered this agreement to be in line with the guidance provided by the European Commission in its letter sent to NRAs on 16 July 2019. Such agreement would allow considering the flows derived from exchanges with Switzerland in the same manner than exchanges between EU countries (as opposed to exchanges with third countries) when monitoring the MACZT.

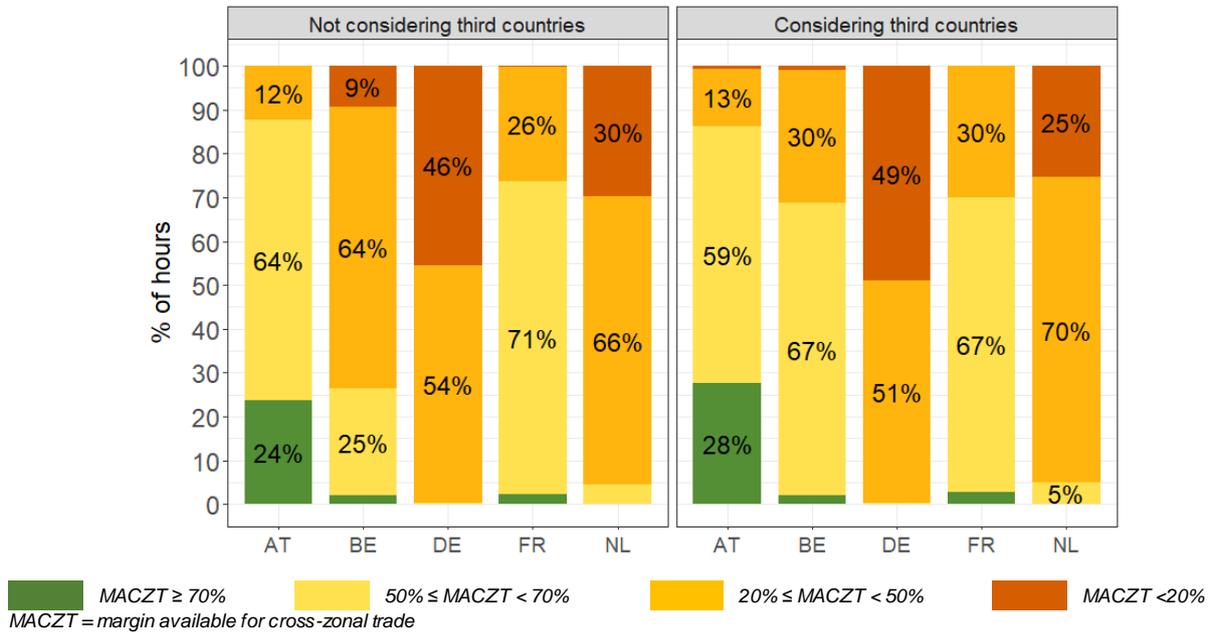
### 4.3 Central West Europe region

Notes for all figures:

- The figures present the level of the MACZT, which is different from the ‘RAM’ as described in the Core and CWE flow-based capacity calculation methodologies.
- The current flow-based capacity calculation methodology does not offer a way to account for long-term capacities in the MACZT of physical CNECs. LTA (long-term allocation) has been considered differently by the CWE TSOs: either the TSOs filtered out the CNECs overwritten by LTA (Austria, Belgium, Germany) or the TSOs included the LTA corners (France, the Netherlands).
- The MACZT for Belgium includes the impacts of exchanges between the EU and Norway. This note is relevant for all figures presenting the MACZT in Belgium.
- Belgium and the Netherlands declared allocation constraints limiting total exchanges from and/or to these two countries. Allocation constraints are monitored separately and thus not considered in the figures. Their impact is studied in Table 1.

- A failure in the CWE capacity calculation process on 11 March (all hours), 13 March (5 hours) and 10 November (all hours) led to no data reported for those hours.
- On 5 January, 11 August, 6, 13 and 14 September, 15 and 21 October and 27 November, failure in the Belgian TSO's local tooling led the TSO to apply a proxy target of 70% instead of the target normally determined by the derogation, which prevented them from calculating the MNCC. The MCCC is thus measured against this 70% target.

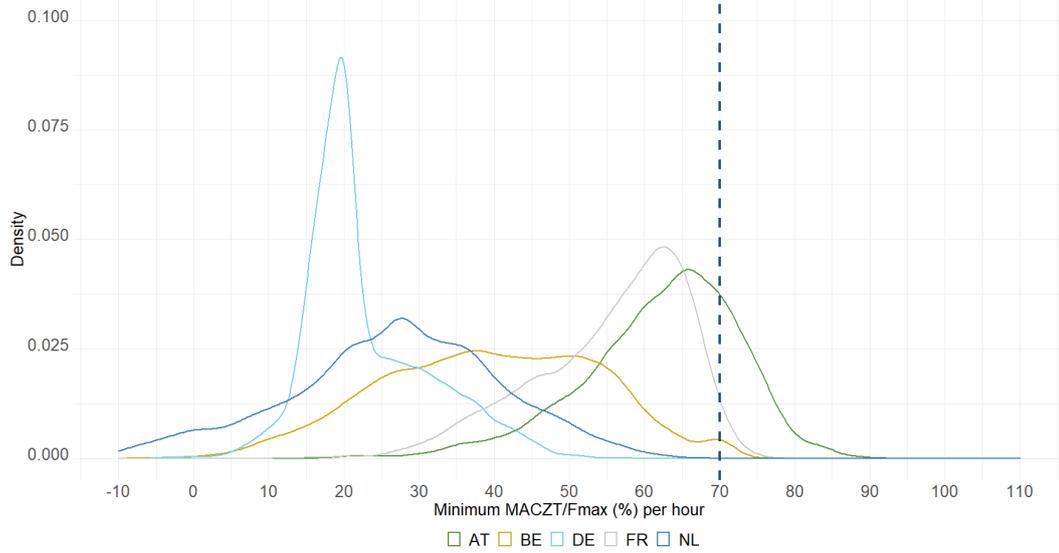
**Figure 6: Percentage of the time when the minimum 70% target was reached in the CWE region – 2021 (% of hours)**



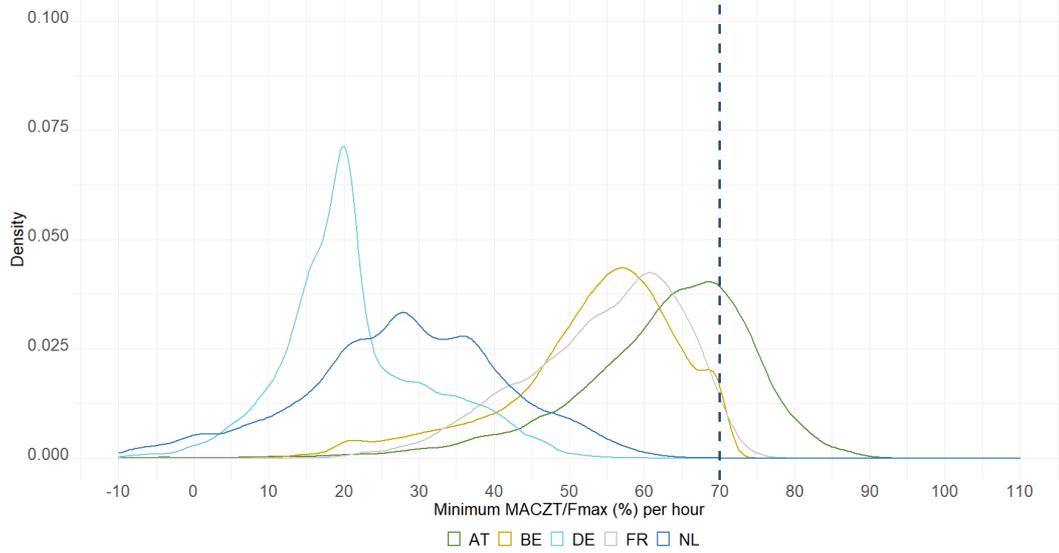
Source: ACER calculation based on TSO data.

**Figure 7: Density function of the lowest hourly relative MACZT per country, in the CWE region – 2021**

*Not considering third countries*



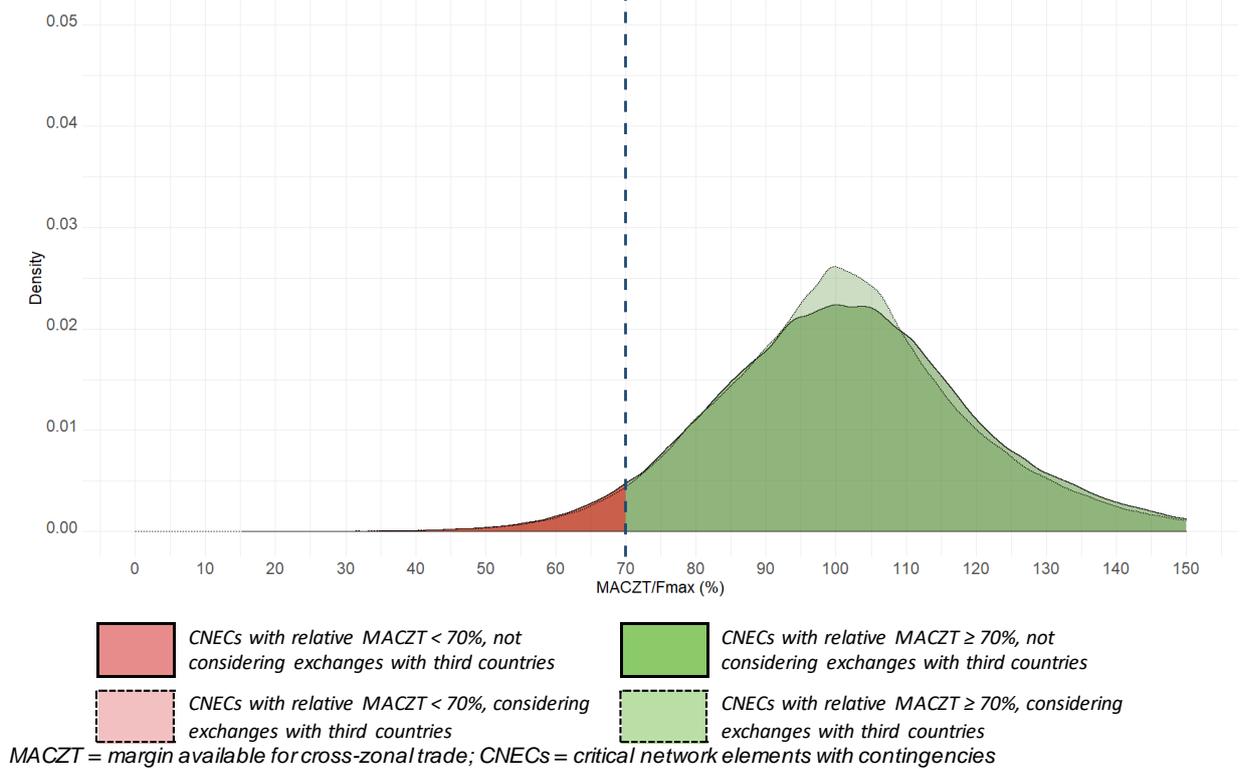
*Considering third countries*



MACZT = margin available for cross-zonal trade

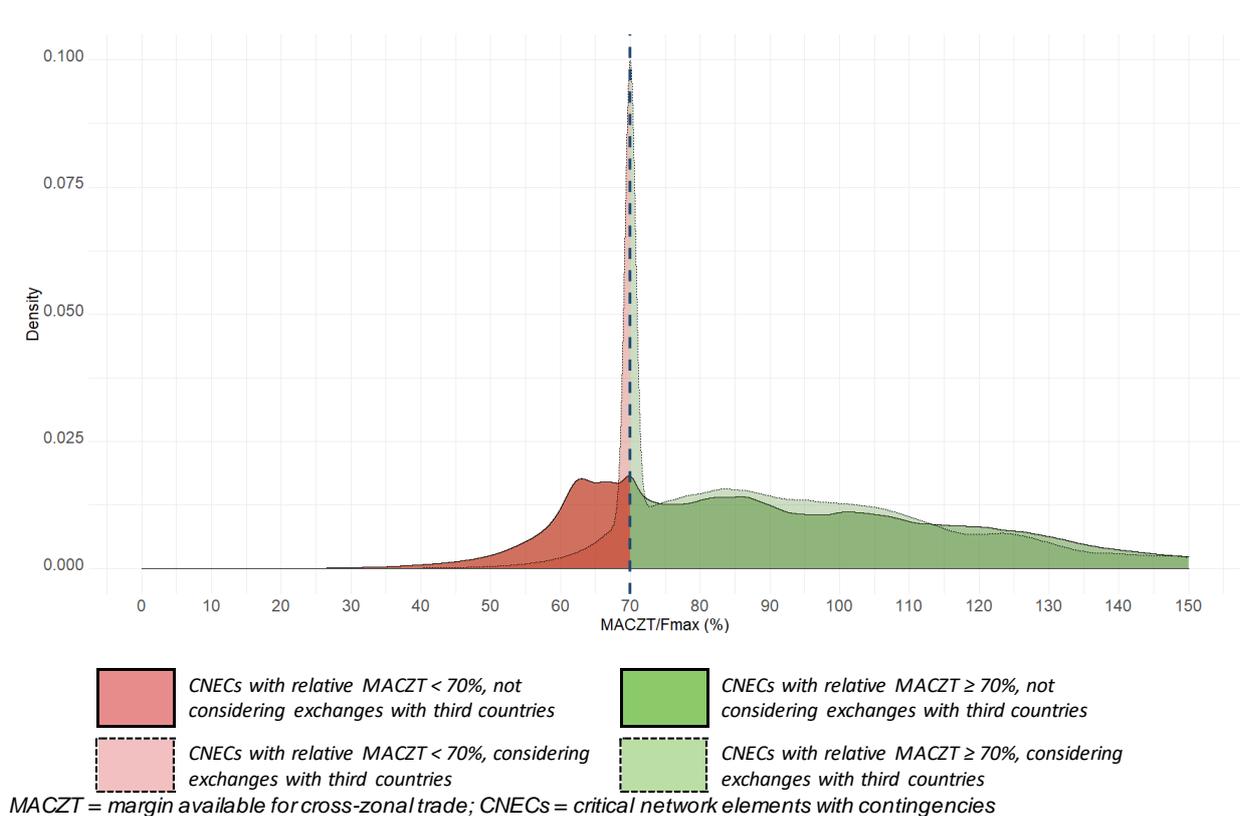
Source: ACER calculation based on TSO data.

**Figure 8: Density function of the relative MACZT for all CNECs in Austria for CWE region – 2021**



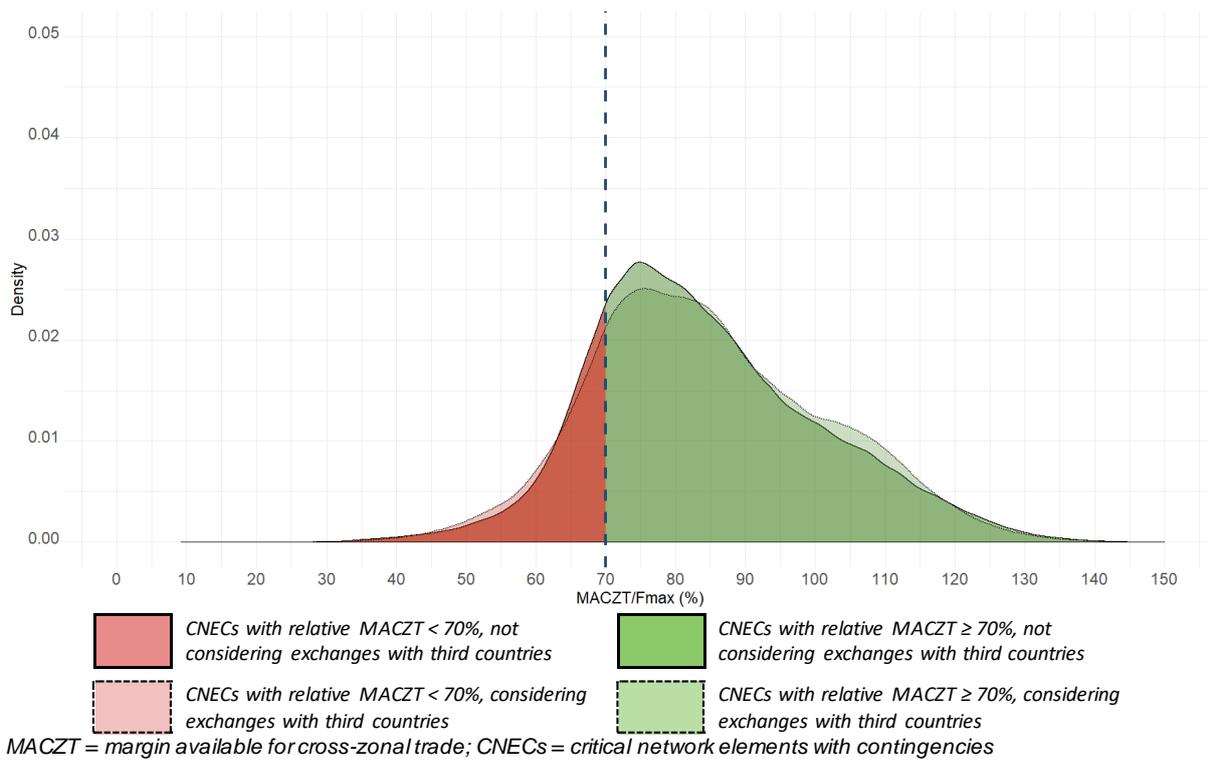
Source: ACER calculation based on TSO data.

**Figure 9: Density function of the MACZT for all CNECs in Belgium for the CWE region – 2021**



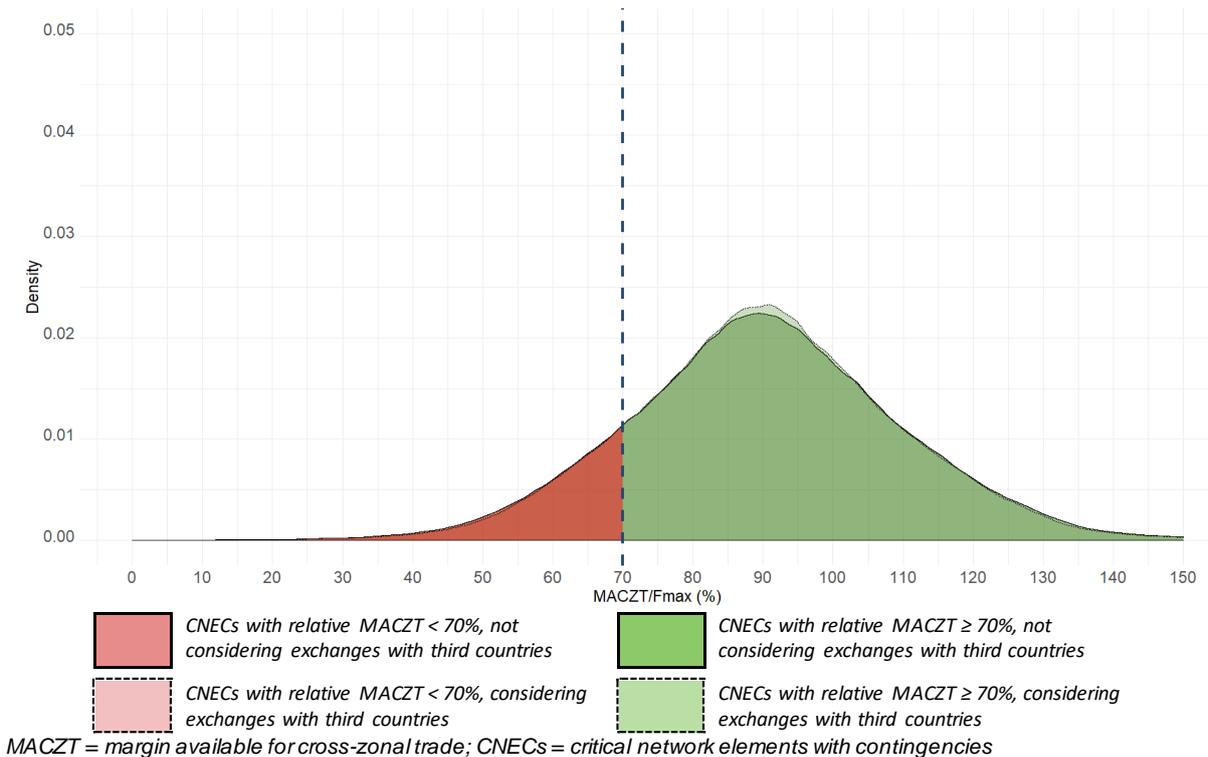
Source: ACER calculation based on TSO data.

**Figure 10: Density function of the relative MACZT for all CNECs in France for the CWE region – 2021**



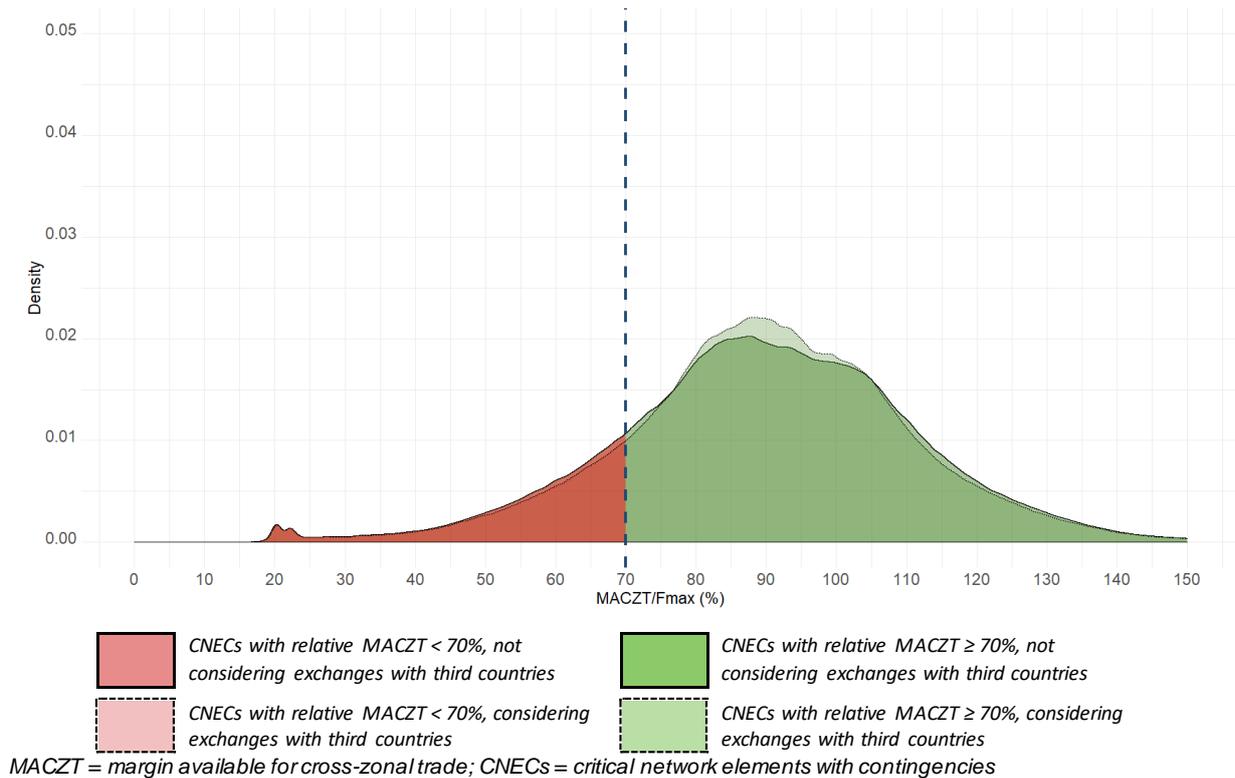
Source: ACER calculation based on TSO data.

**Figure 11: Density function of the MACZT for all CNECs in the Netherlands for the CWE region – 2021**



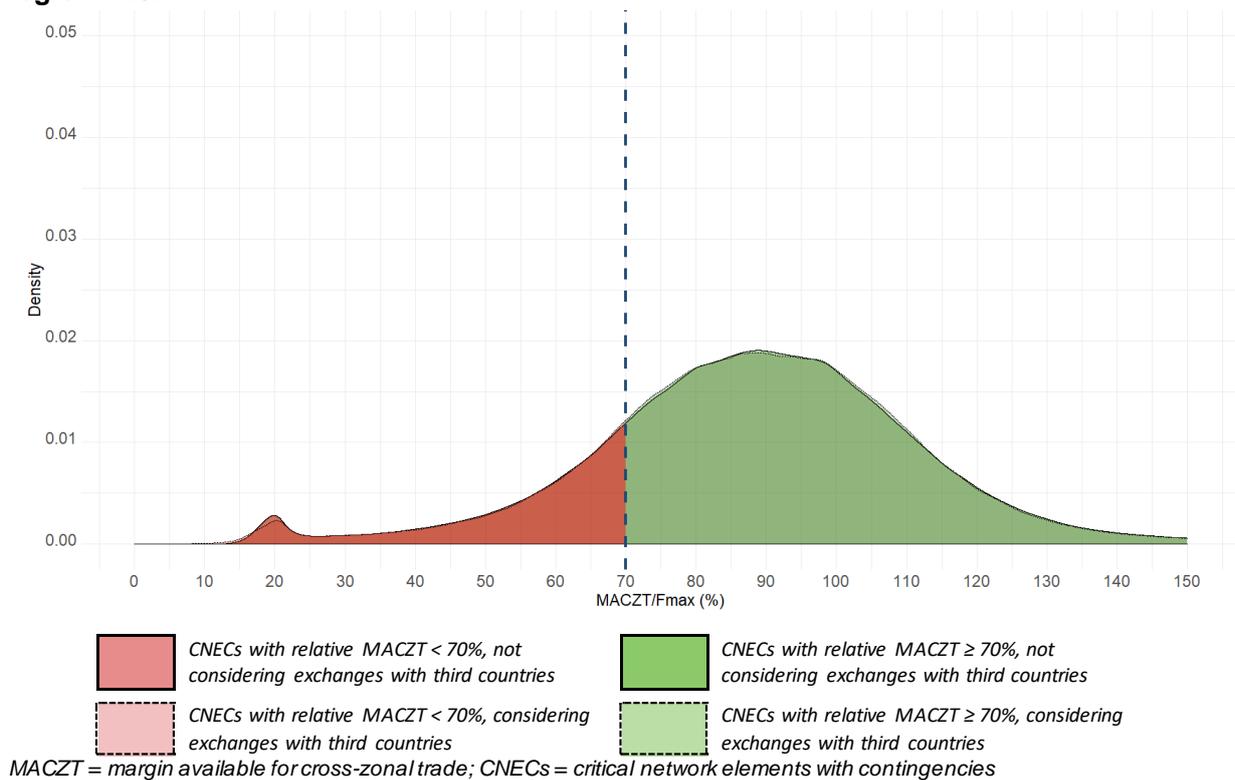
Source: ACER calculation based on TSO data.

**Figure 12: Density function of the relative MACZT for all CNECs of Amprion in Germany for the CWE region – 2021**



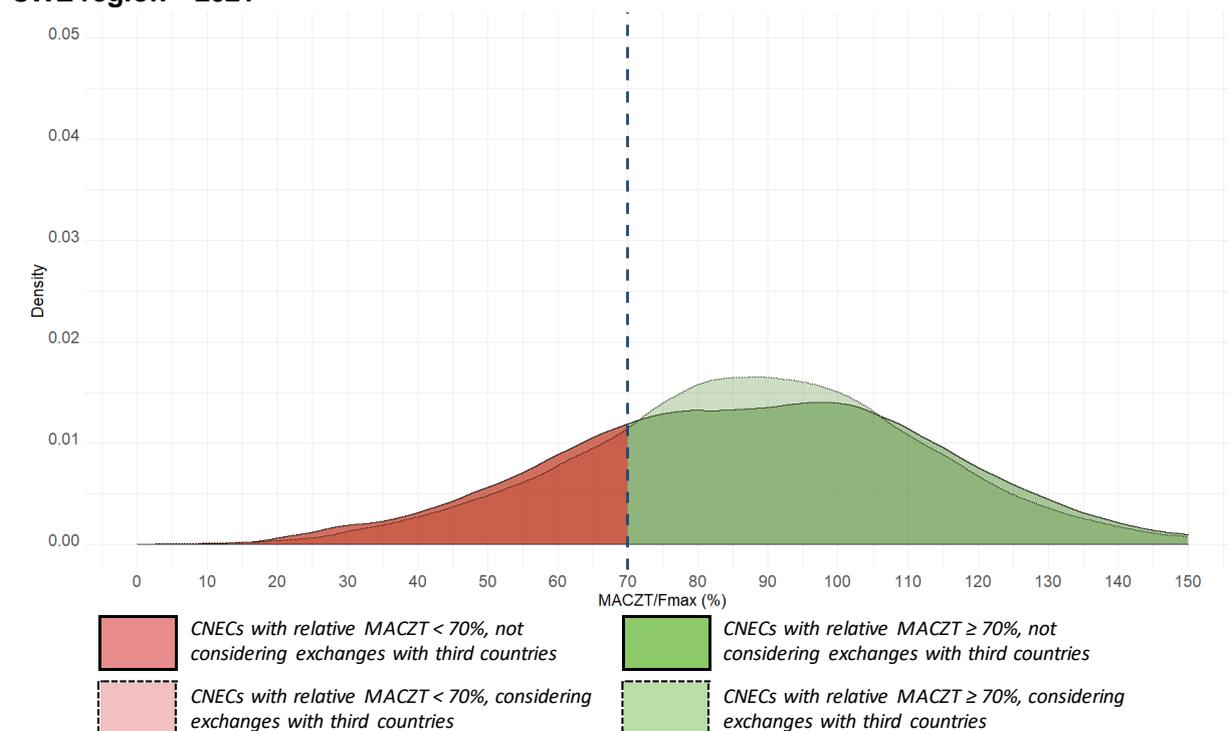
Source: ACER calculation based on TSO data.

**Figure 13: Density function of the relative MACZT for all CNECs of TenneT in Germany for the CWE region – 2021**



Source: ACER calculation based on TSO data.

**Figure 14: Density function of the relative MACZT for all CNECs of TransnetBW in Germany for the CWE region – 2021**



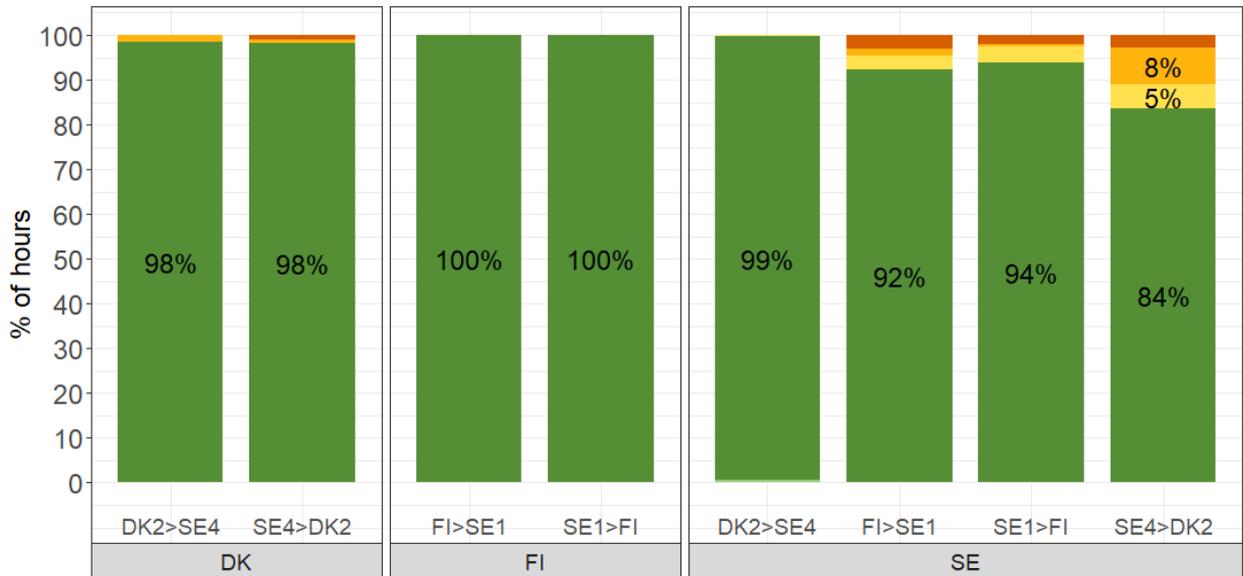
MACZT = margin available for cross-zonal trade; CNECs = critical network elements with contingencies

Source: ACER calculation based on TSO data.

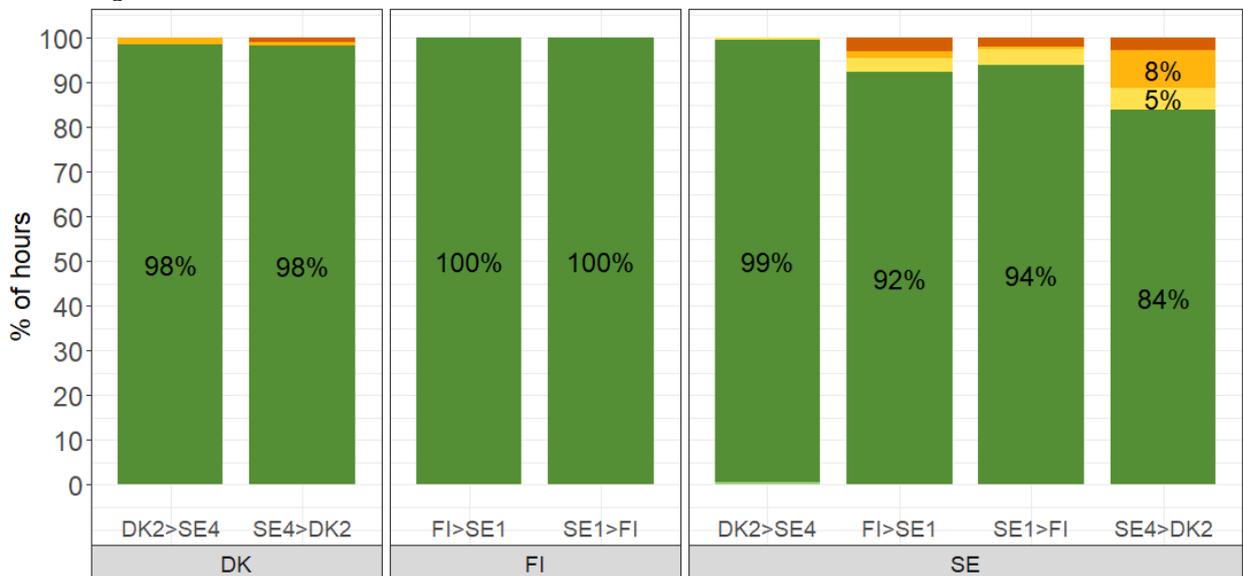
### 4.4 Nordic region

**Figure 15: Percentage of the time when the minimum 70% target was reached in the Nordic region – 2021 (% of hours)**

Not considering third countries



Considering third countries



MACZT ≥ 70%    
  50% ≤ MACZT < 70%    
  20% ≤ MACZT < 50%    
  MACZT < 20%

MACZT = margin available for cross-zonal trade

Source: ACER calculation based on TSO data.

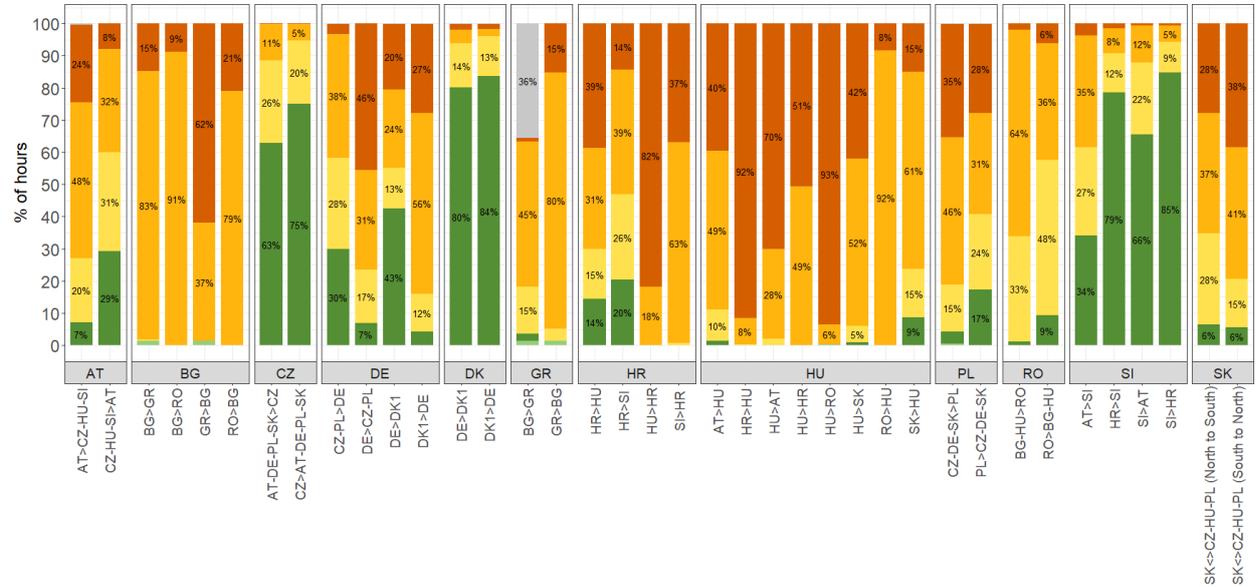
Note 1: Danish and Finnish TSOs did not consider the influence of third countries, therefore the charts not considering and considering third countries are identical for these two countries.

Note 2: The list of critical network elements (CNECs) has been anonymised by the Swedish TSO and no grid model was shared with ACER. This prevents ACER from performing certain consistency checks. In particular, ACER noticed discrepancies with neighbouring TSO in the PTDFs, which could not be verified.

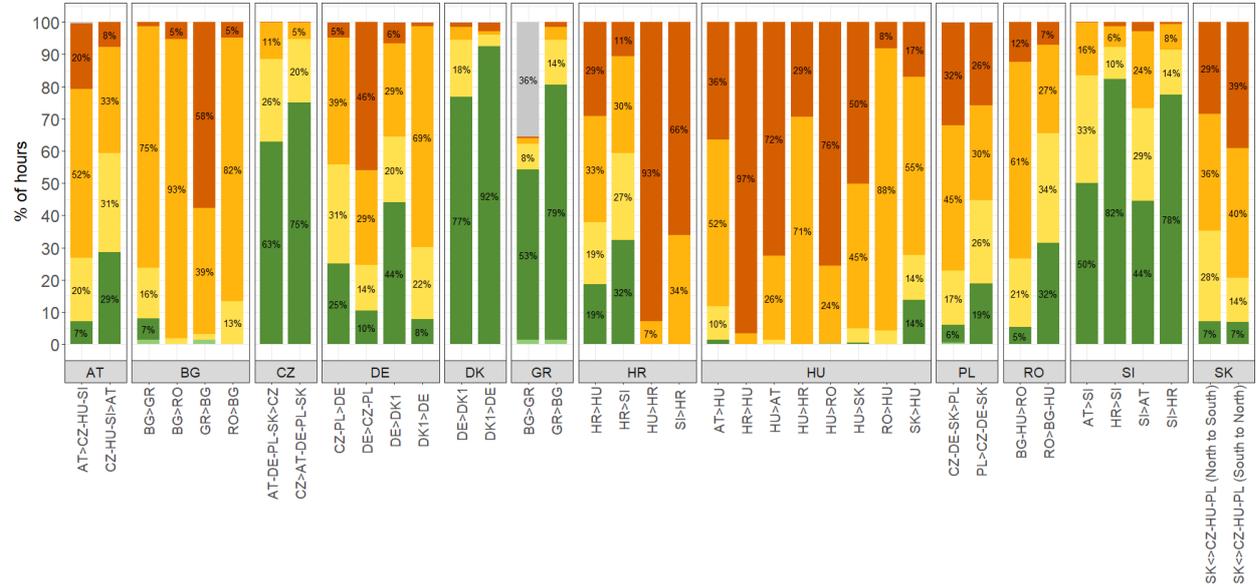
### 4.5 Other countries and coordination areas of Continental Europe

**Figure 16: Percentage of the time when the minimum 70% target was reached for countries of Continental Europe where a coordinated capacity calculation is not yet implemented – 2021 (% of hours)**

Not considering third countries



Considering third countries



MACZT ≥ 70%      50% ≤ MACZT < 70%      20% ≤ MACZT < 50%      MACZT < 20%  
 All interconnectors of the coordination area are out of service      No or insufficient data provided or calculation not possible  
 MACZT = margin available for cross-zonal trade

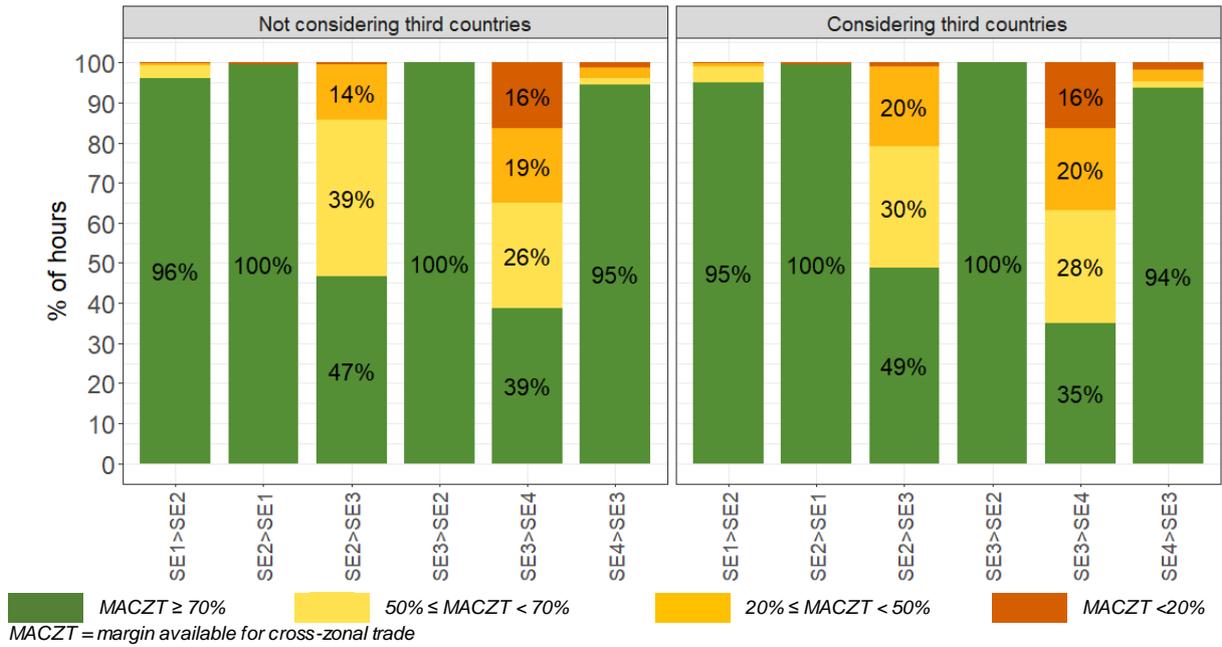
Source: ACER calculation based on TSO data.

Note 1: The figure considers the impact of the technical profiles of Poland (Polish borders with the Czech Republic, Germany, and Slovakia), after considering allocation constraints, and the technical profile of Germany (German borders with the Czech Republic and Poland).

Note 2: For 36% of the hours in the direction BG>GR, the Greek TSO declared that the CNEC was the interconnector between Greece and Turkey. Turkey is not modelled in the Continental Europe grid model; therefore, ACER could not calculate the MACZT on these CNECs.

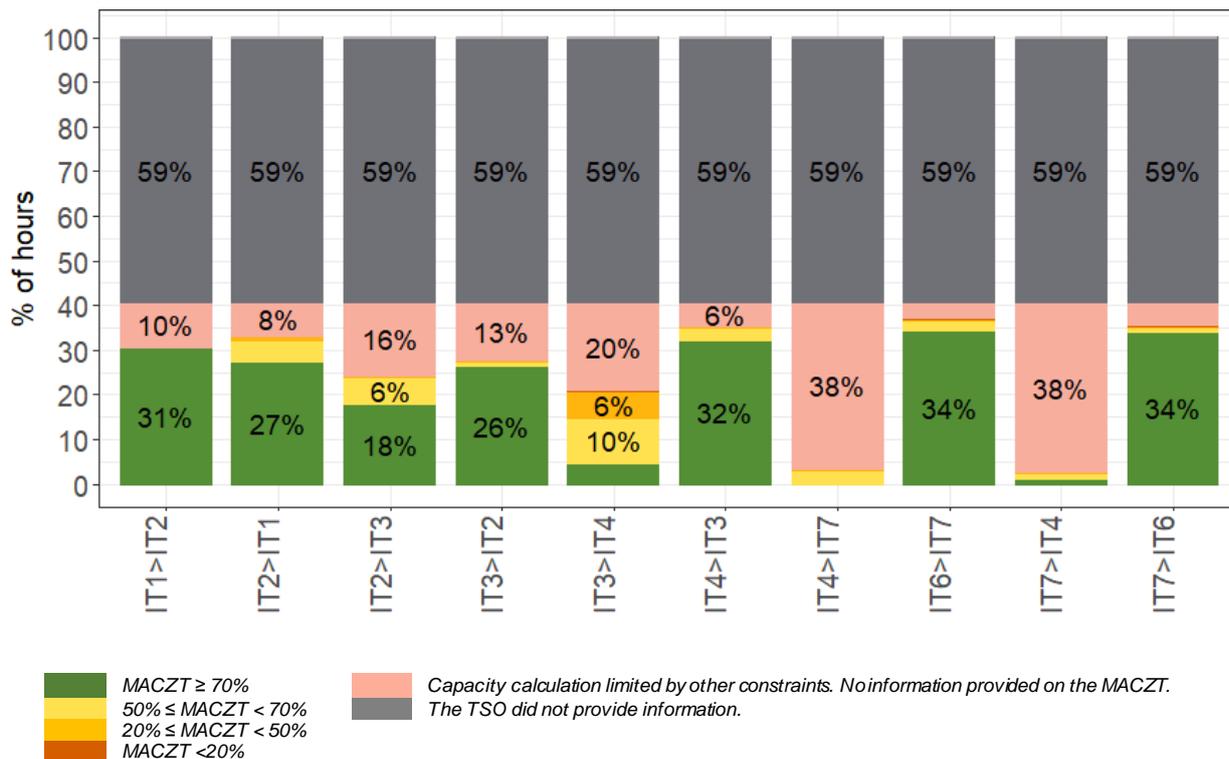
### 4.6 Bidding-zone borders within Sweden and Italy

**Figure 17: Percentage of the time when the minimum 70% target was reached for the internal borders of Sweden – 2021 (% of hours)**



Source: ACER calculation based on TSO data.

**Figure 18: Percentage of the time when the minimum 70% target was reached for the internal borders of Italy – 2021 (% of hours)**



MACZT = margin available for cross-zonal trade

Source: ACER calculation based on TSO data.

Note 1:

IT1	Italy North
IT2	Italy Centre North
IT3	Italy Centre South
IT4	Italy South
IT6	Italy Sicily
IT5	Italy Sardinia
IT7	Italy Calabria

Note 2: The Italian TSO started providing information only from 3 August 2021 (entry into force of the capacity calculation methodology), thus no information is available for 59% of the hours.

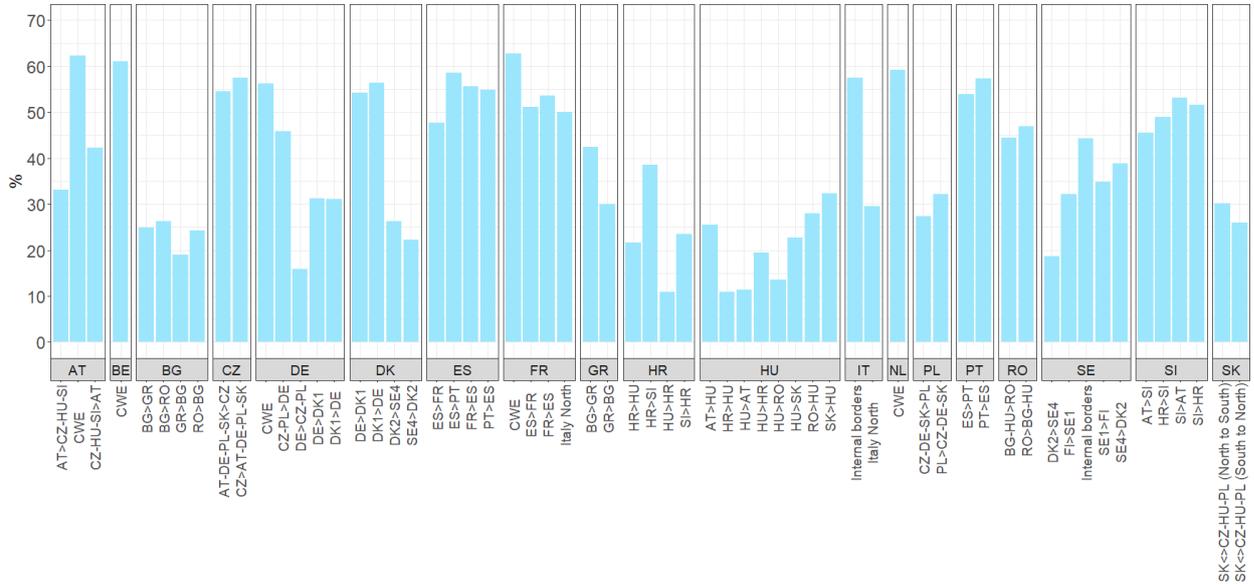
Note 3: The “other constraints” were reported by the Italian TSO as “dynamic stability”, “voltage constraint” or “failure of the capacity calculation process”.

Note 4: The figure does not consider the influence of exchanges with third (non-EU) countries. The necessary information to estimate this impact (considered limited) was not made available by the TSO, so no additional figure considering exchanges with third countries was produced.

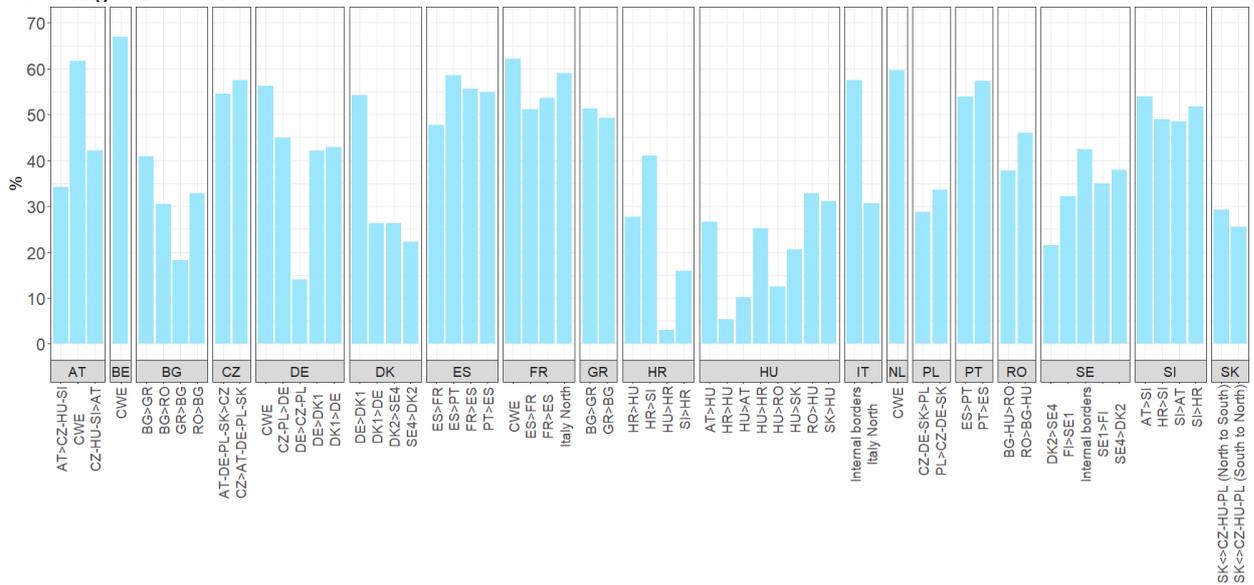
### 4.7 All countries and coordination areas in the EU

**Figure 19: Average margin available on elements where the minimum 70% target is not reached – 2021**

*Not considering third countries*



*Considering third countries*

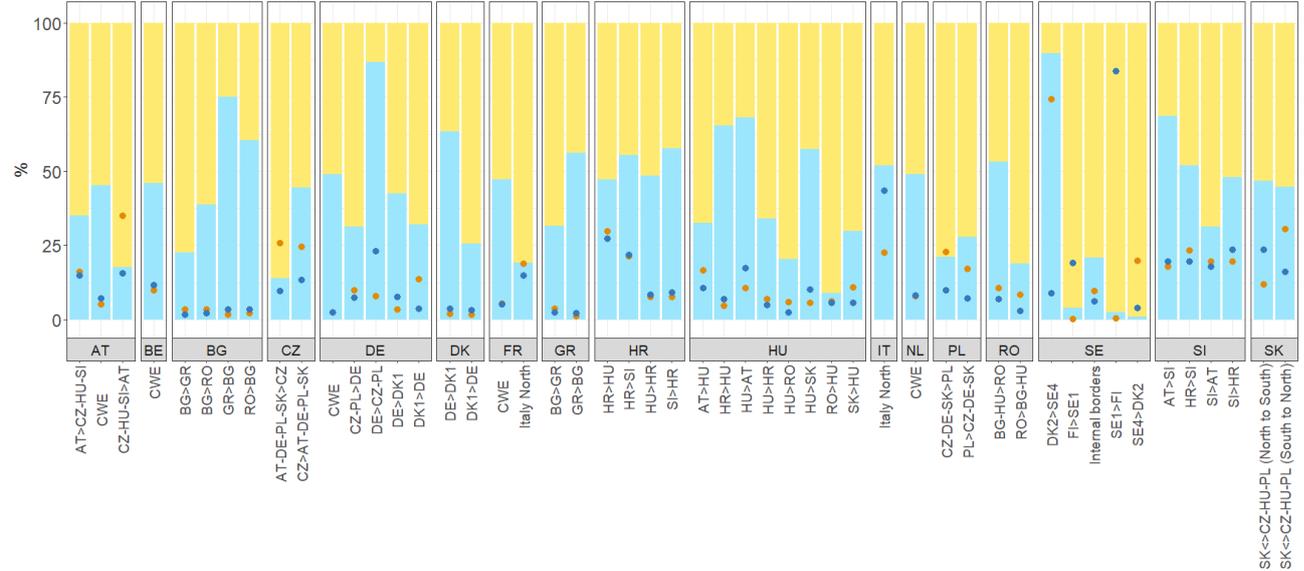


Average relative MACZT (margin available for cross-zonal trade) on elements where the minimum 70% target is not reached  
 MACZT = margin available for cross-zonal trade

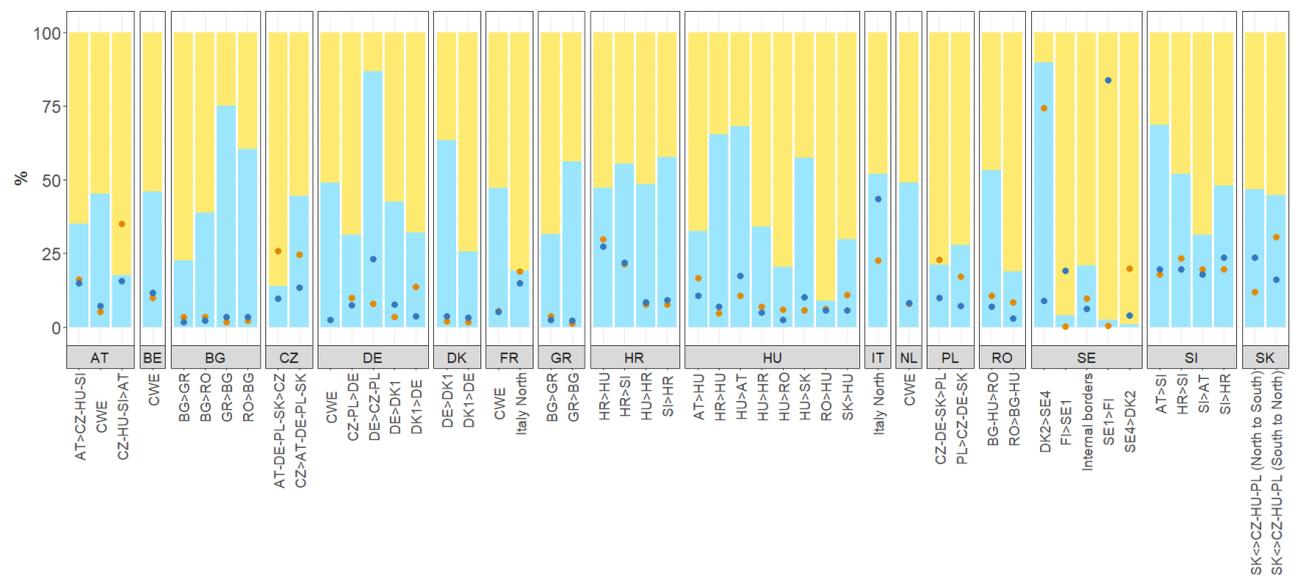
Source: ACER calculation based on TSO data.

**Figure 20: Share of CNECs with positive and negative MNCC as a % of all CNECs and respective average levels of MNCC as a % of Fmax – 2021 (% of CNECs)**

Not considering third countries



Considering third countries



% of CNECs with MNCC ≥ 0
  % of CNECs with MNCC < 0
  Average MNCC relative to Fmax, when MNCC ≥ 0
  Average MNCC relative to Fmax, when MNCC < 0

MACZT = margin available for cross-zonal trade; CNECs = critical network elements with contingencies

Source: ACER calculation based on TSO data.

Note: The SWE region, Finland, Italy's internal borders and the border DK2-SE4 for Denmark are not part of this figure, because the TSOs did not calculate the MNCC. In general, the MNCC is considered low on these borders.

**Table 6: Comparison between the MACZT and the transitional target of Member States on AC borders – 2021**

Member State	Coordination area(s)	Direction	Target for 2021	Comparison between the MACZT and the transitional target	
				Not considering third countries	Considering third countries
AT	CWE	N.A.	01/01/2021-27/07/2021: No target stipulated by the derogation.	N.A.	N.A.
			From 28/07/2021: target per CNEC stipulated by the derogation and the action plan.	Target met 100% of the hours of the period concerned.	Target met 99.6% of the hours of the period concerned.
	AT<->CZ-HU-SI	Both	01/01/2021-30/06/2021: No target stipulated by the derogation.	N.A.	N.A.
		Export	From 01/07/2021: target per CNEC stipulated by the derogation and the action plan.	Target met 99.5% of the hours of the period concerned.	Target met 99.5% of the hours of the period concerned.
		Import		Target met 100% of the hours of the period concerned.	Target met 100% of the hours of the period concerned.
	Italy North	Both	01/01/2021-28/10/2021: No target stipulated by the derogation.	N.A.	N.A.
Both		29/10/2021: target per CNEC stipulated by the derogation and the action plan.	No limiting CNEC declared by the TSO for this period.	No limiting CNEC declared by the TSO for this period.	
BE	CWE	Both	Target per CNEC stipulated by the derogation.	Target met 2% of the hours.	Target met 62% of the hours. <sup>29</sup>
BG	BG-GR, BG-RO	Both	No target stipulated by the derogation.	N.A.	N.A.
CZ	AT-CZ, CZ-DE, CZ-PL, CZ-SK	Export	The derogation stipulates that a target of 60% must be met on at least 90% of the hours "without outage".	The Czech TSO declared that the hours without outages represent 69% of the year. Target met 92% of the hours of the period concerned.	The Czech TSO declared that the hours without outages represent 69% of the year. Target met 92% of the hours of the period concerned.

<sup>29</sup> Further analysis of the hours when the target is not met can be found in the Belgian NRA's report (see footnote 9).

Member State	Coordination area(s)	Direction	Target for 2021	Comparison between the MACZT and the transitional target		
				Not considering third countries	Considering third countries	
		Import	The derogation stipulates that a target of 40% must be met on at least 90% of the hours "without outage".	The Czech TSO declared that the hours without outages represent 69% of the year. Target met 97% of the hours of the period concerned.	The Czech TSO declared that the hours without outages represent 69% of the year. Target met 97% of the hours of the period concerned.	
DE <sup>30</sup>	CWE	N.A.	Target per CNEC stipulated by the action plan (21.3%)	Target met 42% of the hours.	Target met 40% of the hours.	
	DE-DK1	Export	Target per CNEC stipulated by the action plan (31.6%)	Target met 68% of the hours.	Target met 82% of the hours.	
		Import		Target met 47% of the hours.	Target met 88% of the hours.	
	DE-CZ, DE-PL	Export	Target per CNEC stipulated by the action plan (21.3%)	Target met 53% of the hours.	Target met 52% of the hours.	
		Import		Target met 96% of the hours.	Target met 94% of the hours.	
	ES	SWE (ES-FR)	Export	The derogation stipulates that the 70% target must be met at least 70% of the hours.	70% target met 63% of the hours of the year and 81% of the hours when there is a limiting CNEC declared in the country.	N.A.
Import			70% target met 44% of the hours of the year and 84% of the hours when there is a limiting CNEC declared in the country.		N.A.	
SWE (ES-PT)		Export	70% target met 16% of the hours of the year and 93% of the hours when there is a limiting CNEC declared in the country.		N.A.	
		Import	70% target met 38% of the hours of the year and 88% of the hours when there is a limiting CNEC declared in the country.		N.A.	
FR		SWE (ES-FR)	Export		70% target met 56% of the hours of the year and 85% of the hours when there is a limiting CNEC declared in the country.	N.A.

<sup>30</sup> The methodology used to calculate the linear trajectory of the German action plan differs from the common approach described in the ACER and NRAs' practical note. The differences and their impact on the monitoring are further explained in paragraph (100) of ACER's MACZT report for S1 2020.

Member State	Coordination area(s)	Direction	Target for 2021	Comparison between the MACZT and the transitional target	
				Not considering third countries	Considering third countries
		Import		70% target met 62% of the hours of the year and 78% of the hours when there is a limiting CNEC declared in the country.	N.A.
GR	BG-GR	Both	No target set by the derogation.	N.A.	N.A.
HR	HR-HU	Both	The derogation stipulates that the average MACZT over the year should be higher than 9.7%.	The average MACZT over the year is 21%, i.e. above the target.	The average MACZT over the year is 21%, i.e. above the target.
	HU-SI	Both	The derogation stipulates that the average MACZT over the year should be higher than 5.6%.	The average MACZT over the year is 36%, i.e. above the target.	The average MACZT over the year is 36%, i.e. above the target.
HU	AT-HU	Export	No target set by the derogation.	N.A.	N.A.
		Import	Target per CNEC stipulated by the derogation (25%)	Target met 48% of the hours.	Target met 51% of the hours.
	HR-HU	Export	No target set by the derogation.	N.A.	N.A.
		Import	Target per CNEC stipulated by the derogation (10%)	Target met 55% of the hours.	Target met 28% of the hours.
	HU-RO	Both	No target set by the derogation.	N.A.	N.A.
	HU-SK	Export	No target set by the derogation.	N.A.	N.A.
Import		Target per CNEC stipulated by the derogation (10%)	Target met 98% of the hours.	Target met 97% of the hours.	
IT	Italy North	Import	01/01/2021-27/10/2021: No target set by the derogation.	N.A.	N.A.
		Import	From 28/10/2021: No target set by the derogation when an allocation constraint applies. The 70% target applies for the hours without allocation constraint.	The hours without allocation constraints during the period concerned represented 7% of the hours of the year. The 7% target was met 28% of the hours concerned. <sup>31</sup>	The hours without allocation constraints during the period concerned represented 7% of the hours of the year. The 7% target was met 99% of the hours concerned.

<sup>31</sup> The Italian NRA informed ACER about an agreement between Italy North TSOs and the Swiss TSO, in place since 28 October 2021, and that the NRAit considered this agreement to be in line with the guidance provided by the European Commission in its letter sent to NRAs on 16 July 2019. Such agreement would allow considering the flows derived from exchanges with Switzerland in the same manner than exchanges between EU countries (as opposed to exchanges with third countries) when monitoring the MACZT. More information about the guidance letter can be found in ACER Recommendation No 01/2019, section 4.1.

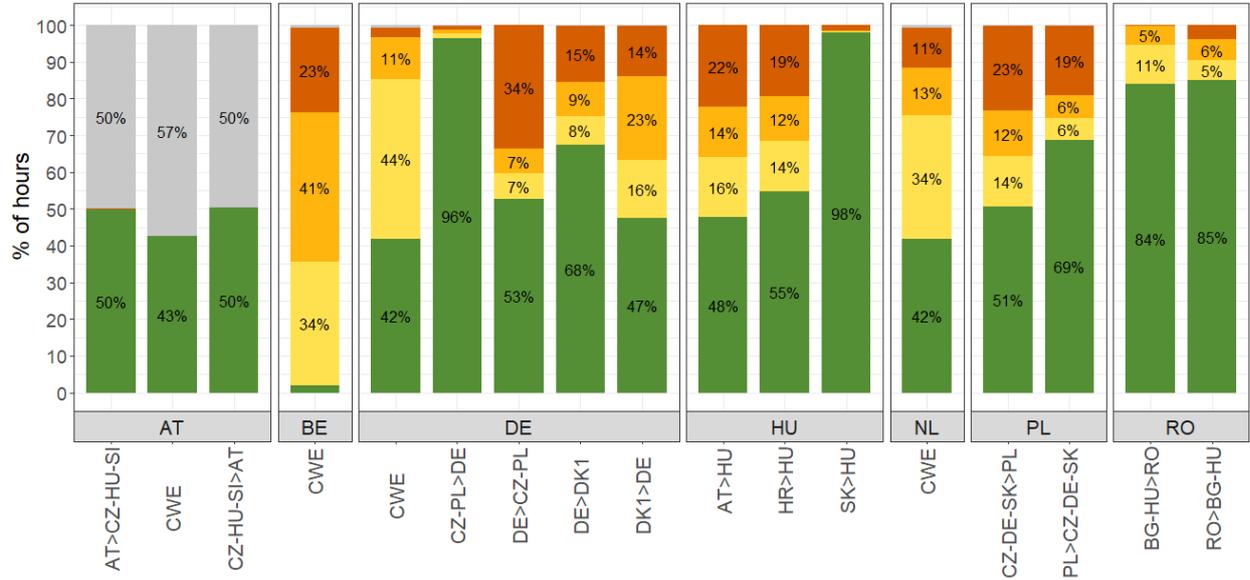
Member State	Coordination area(s)	Direction	Target for 2021	Comparison between the MACZT and the transitional target	
				Not considering third countries	Considering third countries
NL	CWE	N.A.	Target per CNEC stipulated by the derogation and the action plan.	Target met 42% of the hours.	Target met 46% of the hours.
	DK1-NL	Both	No target set by the derogation.	N.A.	N.A.
PL	CZ-PL, CZ-DE, CZ-SK	Export	Target per CNEC stipulated by the derogation and the action plan.	Target met 69% of the hours.	Target met 71% of the hours.
		Import		Target met 51% of the hours.	Target met 55% of the hours.
PT	SWE (ES-PT)	Export	The derogation stipulates that the 70% target must be met at least 70% of the hours.	70% target met 53% of the hours of the year and 76% of the hours when there is a limiting CNEC declared in the country.	N.A.
		Import		70% target met 60% of the hours of the year and 70% of the hours when there is a limiting CNEC declared in the country.	N.A.
RO	BG-RO, HU-RO	Export	Target per CNEC stipulated by the action plan (33%)	Target met 85% of the hours.	Target met 85% of the hours.
		Import		Target met 84% of the hours.	Target met 65% of the hours.
SE	SE3-DK1, SE4-DK2, SE4-DE, SE4-PL, SE4-LT	Both	No target set by the derogation.	N.A.	N.A.
SK	CZ-SK, HU-SK, PL-SK	Transit North to South	The derogation stipulates that a target of 30% must be met at least 80% of the hours on the cross-border lines.	The limiting CNEC was a cross-border line 86% of the hours of the year. Target met 74% of the hours of the period concerned.	The limiting CNEC was a cross-border line 86% of the hours of the year. Target met 75% of the hours of the period concerned.
		Transit South to North		The limiting CNEC was a cross-border line 71% of the hours of the year. Target met 42% of the hours of the period concerned.	The limiting CNEC was a cross-border line 86% of the hours of the year. Target met 40% of the hours of the period concerned.

Note 1: The table presents only the Member States and AC coordination areas with a derogation or an action plan in 2021. For all other Member States and coordination areas, the minimum 70% target applies.

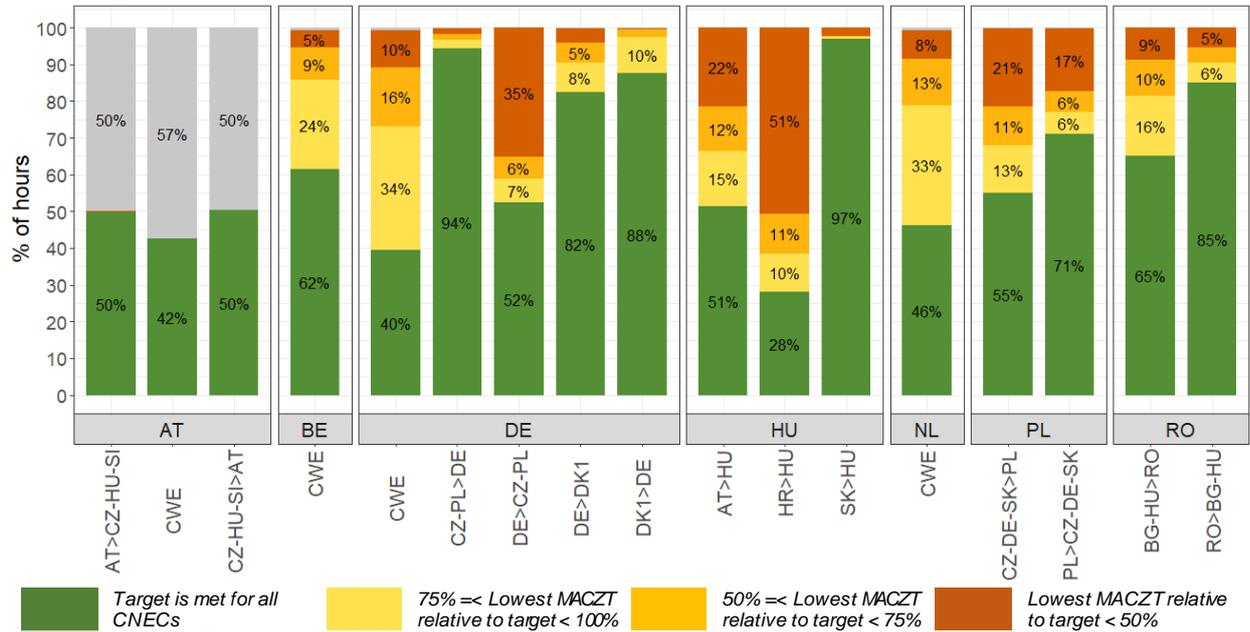
Note 2: For Poland, the allocation constraints are considered.

**Figure 21: Percentage of the time when the transitional target is met on all CNECs, for countries with a derogation or an action plan that stipulates a target per CNEC – 2021 (% of hours)**

Not considering third countries



Considering third countries



MACZT = margin available for cross-zonal trade; CNECs = critical network elements with contingencies

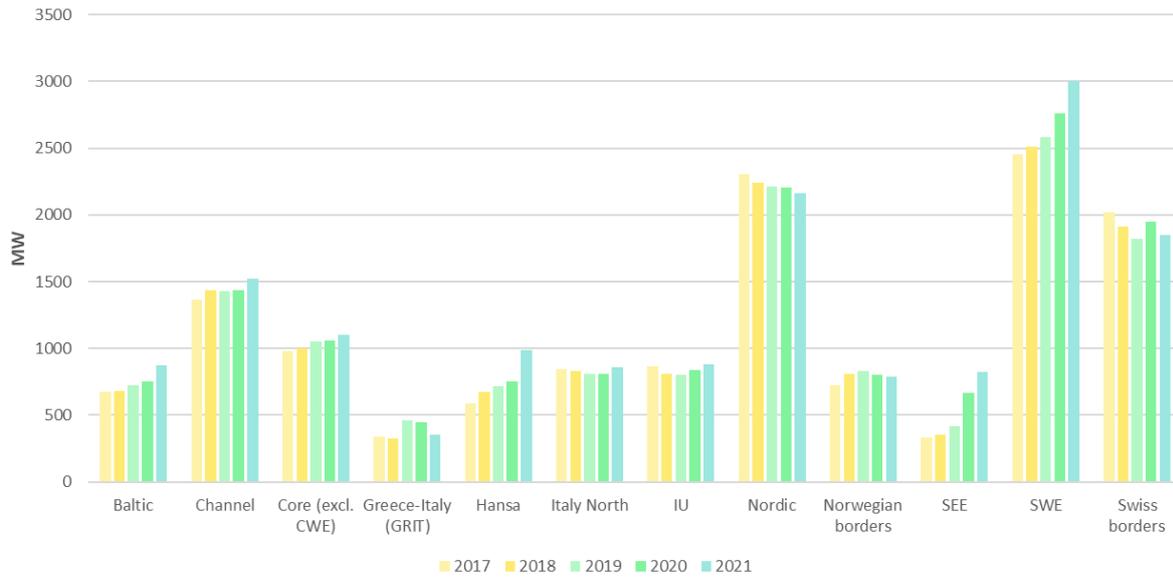
Source: ACER calculation based on TSO data.

Note 1: The figure considers the impact of the technical profiles of Poland (Polish borders with Czech Republic, Germany, and Slovakia), after considering allocation constraints, and the technical profile of Germany (German borders with Czech Republic and Poland).

Note 2: The methodology used to calculate the linear trajectory of the German action plan differs from the common approach described in the ACER and NRAs' practical note.

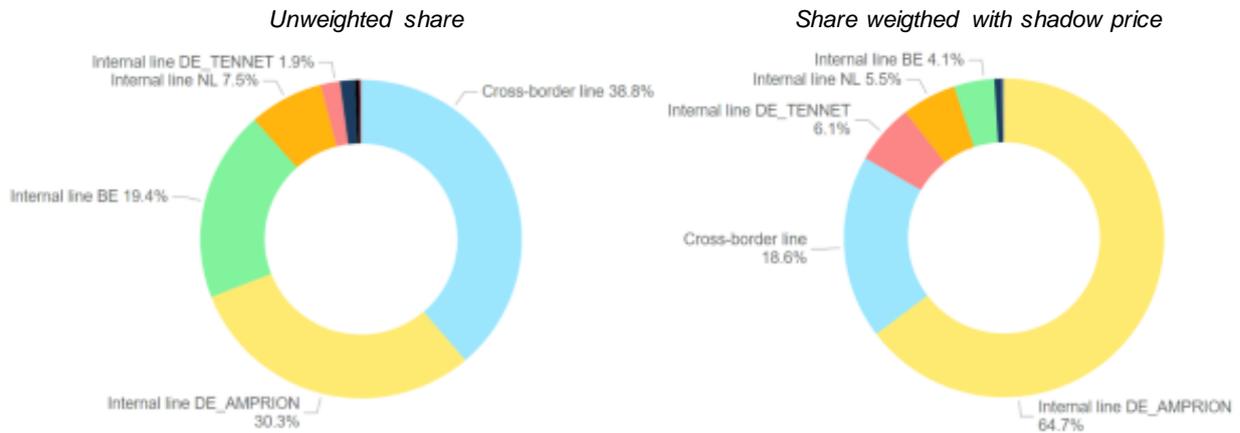
## 5 Evolution of cross-zonal capacities

**Figure 22: Average NTC per cross-zonal border, aggregated per capacity calculation region – 2017-2021 (GW)**



Source: ACER calculations based on ENTSO-E data.

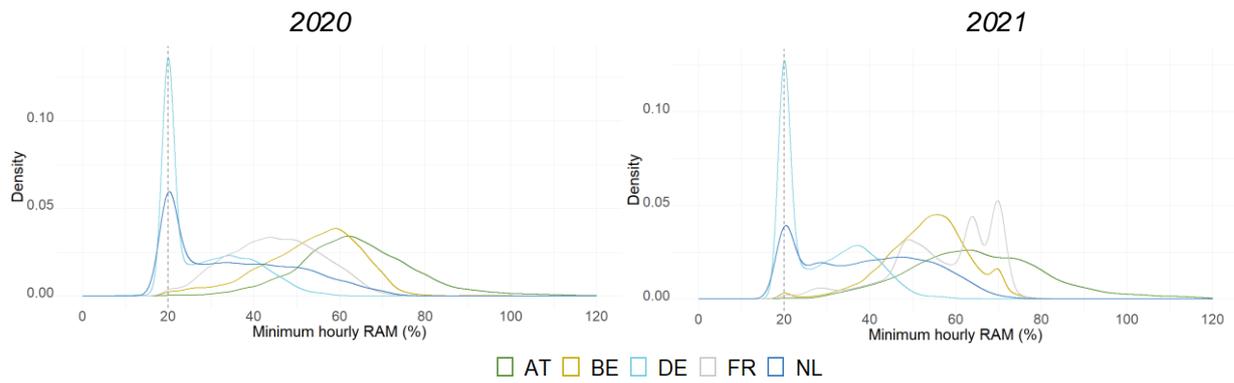
**Figure 23: Share of active constraints in the CWE domain per TSO control area and category – 2021 (%)**



Source: ACER calculations based on ENTSO-E data.

Note: Constraints induced by ALEGrO are excluded.

**Figure 24: Density function of the minimum hourly RAM over Fmax among all CNECs in the CWE region, per Member State – 2020–2021 (%)**



Source: ACER calculations based on ENTSO-E data.

Note: The dashed lines mark 20% (minimum RAM requirement as of April 2018).

## 6 Annexes

Table 7: List of coordination areas – 2021

Bidding - zone border	Side(s)	Coordination area	Calculation type
AT-CZ	AT	AT-CZ_HU_SI (AT side)	UNILATc
AT-CZ	CZ	CZ borders	UNILATc
AT-DE	Both	CWE	FB
AT-HU	AT	AT-CZ_HU_SI (AT side)	UNILATc
AT-HU	HU	AT-HU (HU side)	UNILAT
AT-IT	Both	North Italy	NTC
AT-SI	AT	AT-CZ_HU_SI (AT side)	UNILATc
AT-SI	SI	AT-SI (SI side)	UNILAT
BE-FR	Both	CWE	FB
BE-GB	BE	BE-GB (BE side)	UNILAT
BE-GB	GB	GB-BE_FR_NL (GB side)	UNILATc
BE-NL	Both	CWE	FB
BG-GR	BG	BG-GR_MK (BG side)	UNILATc
BG-GR	GR	North GR borders (GR side)	UNILATc
BG-RO	BG	BG-RO_RS (BG side)	UNILATc
BG-RO	RO	RO borders	UNILATc
CZ-DE	CZ	CZ borders	UNILATc
CZ-DE	DE	DE-CZ_PL	UNILATc
CZ-PL	CZ	CZ borders	UNILATc
CZ-PL	PL	PL-CZ_DE_SK	UNILATc
CZ-SK	CZ	CZ borders	UNILATc
CZ-SK	SK	SK-CZ_HU_PL	UNILATc
DE-DK1	DE	DE-DK1_NO2 (DE side)	UNILATc
DE-DK1	DK	Hansa	UNILATc
DE-DK2	DE	DE-DK2 (DE side)	UNILAT
DE-DK2	DK	Hansa	UNILATc
DE-FR	Both	CWE	FB
DE-NL	Both	CWE	FB
DE-NO	DE	DE-DK1_NO2 (DE side)	UNILATc
DE-PL	DE	DE-CZ_PL	UNILATc
DE-PL	PL	PL-CZ_DE_SK	UNILATc
DE-SE4	DE	DE-SE4 (DE side)	UNILAT
DE-SE4	SE	DE-SE4 (SE side)	UNILAT
DK1-DK2	Both	Nordic	UNILATc
DK1-NL	NL	DK1-NL (NL side)	UNILAT
DK1-NL	DK	Hansa	UNILATc
DK1-SE3	SE	DK1-SE3 (SE side)	UNILAT
DK1-SE3	DK	Nordic	UNILATc
DK2-SE4	SE	DK2-SE4 (SE side)	UNILAT
DK2-SE4	DK	Nordic	UNILATc
EE-FI	EE	EE-FI (EE side)	UNILAT
EE-FI	FI	EE-FI (FI side)	UNILAT
EE-LV	Both	EE-LV	NTC

Bidding - zone border	Side(s)	Coordination area	Calculation type
ES-FR	Both	SWE	NTC
ES-PT	Both	SWE	NTC
FI-SE1	FI	FI-SE1 (FI side)	UNILAT
FI-SE1	SE	FI-SE1 (SE side)	UNILAT
FI-SE3	FI	FI-SE3 (FI side)	UNILAT
FI-SE3	SE	FI-SE3 (SE side)	UNILAT
FR-GB	FR	FR-GB (FR side)	UNILAT
FR-GB	GB	GB-FR_NL_BE (GB side)	UNILATc
FR-IT	Both	North Italy	NTC
GB-NL	GB	GB-FR_NL_BE (GB side)	UNILATc
GB-NL	NL	GB-NL (NL side)	UNILAT
GB-SEM	GB	GB-SEM	UNILAT
GB-SEM	SEM	GB-SEM	UNILAT
GR-IT	GR	GR-IT (GR side)	UNILAT
GR-IT	IT	GR-IT (IT side)	UNILAT
HR-HU	HR	HR-HU (HR side)	UNILAT
HR-HU	HU	HR-HU (HU side)	UNILAT
HR-SI	HR	HR-SI (HR side)	UNILAT
HR-SI	SI	HR-SI (SI side)	UNILAT
HU-RO	HU	HU-RO (HU side)	UNILAT
HU-RO	RO	RO borders	UNILATc
HU-SK	HU	HU-SK (HU side)	UNILAT
HU-SK	SK	HU-SK (SK side)	UNILATc
IT1-IT2	Both	Italy Internal (IT1-IT2)	NTC
IT2-IT3	Both	Italy Internal (IT2-IT3)	NTC
IT3-IT4	Both	Italy Internal (IT3-IT4)	NTC
IT2-IT5	Both	Italy Internal (IT2-IT5)	NTC
IT3-IT5	Both	Italy Internal (IT3-IT5)	NTC
IT4-IT7	Both	Italy Internal (IT4-IT7)	NTC
IT6-IT7	Both	Italy Internal (IT6-IT7)	NTC
IT-SI	Both	North Italy	NTC
LT-LV	Both	LT-LV	NTC
LT-PL	LT	LT-PL (LT side)	UNILAT
LT-PL	PL	LT-PL (PL side)	UNILAT
LT-SE4	LT	LT-SE4 (LT side)	UNILAT
LT-SE4	SE	LT-SE4 (SE side)	UNILAT
PL-SE4	PL	PL-SE4 (PL side)	UNILAT
PL-SE4	SE	PL-SE4 (SE side)	UNILAT
PL-SK	PL	PL-CZ_DE_SK	UNILATc
PL-SK	SK	SK-CZ_HU_PL	UNILATc
SE1-SE2	Both	SE1-SE2	UNILAT
SE2-SE3	Both	SE2-SE3	UNILAT
SE3-SE4	Both	SE3-SE4	UNILAT

Note 1: A coordination area describes a set of bidding-zone borders within which capacity calculation is fully coordinated. Until capacity calculation methodologies pursuant to the Capacity Allocation and Congestion Management (CACM) Regulation are implemented, such coordination areas will normally remain smaller than capacity calculation regions defined across the EU.

Note 2: Coordination level of DA capacity calculation is defined as follows:

- FB: flow-based capacity calculation.
- NTC: fully coordinated NTC calculation.
- UNILAT: unilateral capacity calculation, i.e., not coordinated on either side of a border (half bidding-zone border coordination).

- *UNILATc: coordinated unilateral capacity calculation on several half bidding-zone borders.*

*Note 3: Cyprus is not interconnected. Luxembourg is interconnected but is part of the German bidding-zone; therefore, it does not have any bidding-zone border. Therefore, no bidding-zone borders were reported for these two Member States.*

**Table 8: List of acronyms**

<b>Acronym</b>	<b>Meaning</b>
<b>AC</b>	Alternating current
<b>ACER</b>	Agency for the Cooperation of Energy Regulators
<b>CACM</b>	Capacity Allocation and Congestion Management (electricity)
<b>CCM</b>	Capacity calculation methodology
<b>CCR</b>	Capacity calculation region
<b>CEP</b>	Clean Energy (for all Europeans) Package
<b>CNEC</b>	Critical network element with contingencies
<b>CWE</b>	Central West Europe (electricity region)
<b>DC</b>	Direct current
<b>EC</b>	European Commission
<b>EEA</b>	European Economic Area
<b>ENTSO-E</b>	European Network of Transmission System Operators for Electricity
<b>EU</b>	European Union
<b>Fmax</b>	Maximum flow on critical network elements, respecting operational security limits
<b>HVDC</b>	High-voltage direct current
<b>IT</b>	Information technology
<b>IU</b>	Ireland and United Kingdom (electricity region)
<b>MACZT</b>	Margin available for cross-zonal trade
<b>MCCC</b>	Margin from coordinated capacity calculation
<b>MNCC</b>	Margin from non-coordinated capacity calculation
<b>NTC</b>	Net Transfer Capacity
<b>PTDF</b>	Power transfer distribution factor
<b>RAM</b>	Remaining available margin
<b>SEM</b>	Irish Single Energy Market (comprising Northern Ireland and the Republic of Ireland)
<b>SWE</b>	South West Europe (electricity region)
<b>TSO</b>	Transmission system operator