ERSE
ENTIDADE REGULADORA
DOS SERVIÇOS ENERGÉTICOS



REPORT

ANALYSIS OF PORTUGAL-SPAIN INTERCONNECTION CAPACITY AND MONITORING COMPLIANCE WITH THE MINIMUM LEVELS OF CAPACITY AVAILABLE FOR CROSS-ZONAL TRADE

2025

October 2026

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1 INTRODUCTION

The current context of the energy transition and the deepening of the European internal electricity market make interconnection capacity a key element for the evolution and integration of energy systems.

The European Council of 23 and 24 October 2014 considered, in its conclusions[1], that the Commission, supported by the Member States, should take measures to ensure compliance with a minimum target of 10% of existing electricity interconnections by 2020, at least for those Member States that had not yet achieved a minimum level of integration into the internal power market. The European Council also stated that the Commission should report regularly to the European Council with the aim of achieving a target of 15% by 2030.

Furthermore, Article 16(8) of Regulation (EU) 2019/943[2] of the European Parliament and of the Council of 5 June 2019 on the internal market in electricity sets out the minimum interconnection capacity to be made available by transmission system operators (TSOs) for cross-zonal trade:

> "8. Transmission system operators shall not limit the volume of interconnection capacity to be made available to market participants as a means of solving congestion inside their own bidding zone or as a means of managing flows resulting from transactions internal to bidding zones. Without prejudice to the application of the derogations under paragraphs 3 and 9 of this Article and to the application of Article 15(2), this paragraph shall be considered to be complied with where the following minimum levels of available capacity for cross- zonal trade are reached:
>
> a) for borders using a coordinated net transmission capacity approach, the minimum capacity shall be 70 % of the transmission capacity respecting operational security limits after deduction of contingencies, as determined in accordance with the capacity allocation and congestion management guideline adopted on the basis of Article 18(5) of Regulation (EC) No 714/2009;
>
> b) […]

[1] https://www.consilium.europa.eu/en/meetings/european-council/2014/10/23-24/

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0943

The total amount of 30 % can be used for the reliability margins, loop flows and internal flows on each critical network element."

In turn, Article 59(1)(h) of Directive (EU) 2019/944[3] of the European Parliament and of the Council of 5 June 2019, on common rules for the internal market in electricity, as currently worded, provides that the regulatory authority of each Member State is responsible for "ensuring that transmission system operators make available interconnector capacities to the utmost extent pursuant to Article 16 of Regulation (EU) 2019/943;".

Accordingly, the purpose of this report is, on the one hand, to assess the development and current status of interconnection capacity between Portugal and Spain, and, on the other hand, to assess the extent to which the national transmission system operator complies with the minimum levels of available capacity for cross-zonal trade, as provided for in Article 16(8) of Regulation (EU) 2019/943. It is worth noting that the analysis of regulatory compliance may differ between the two neighbouring countries, as the responsibilities of each network in limiting the interconnection capacity offered to the market are assessed.

Pursuant to Articles 121 and 122 of the Code of Administrative Procedure, ERSE notified REN, in its capacity as the Portuguese TSO, to submit its comments, if it so wished, on the draft report entitled 'Analysis of Portugal-Spain interconnection capacity and monitoring of compliance with minimum levels of available capacity for cross-zonal trade in 2025'.

REN submitted its comments on the draft report on 17 September 2026.

ERSE took full note of REN's comments, which concerned matters of detail and accuracy in the text, and these have been incorporated into this final version of the report. The comments received did not justify any changes to the conclusions in this final version of the report.

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L0944.

2 ANALYSIS OF PORTUGAL–SPAIN INTERCONNECTION

2.1 FRAMEWORK

The management of interconnectors between Portugal and Spain is based on a model of implicit allocation of available capacity for commercial purposes, exclusively through the day-ahead and intraday markets, supplemented by the possibility of explicit use of financial mechanisms to hedge against the risk of price decoupling[4]. Congestion resolution utilises the market splitting mechanism[5].

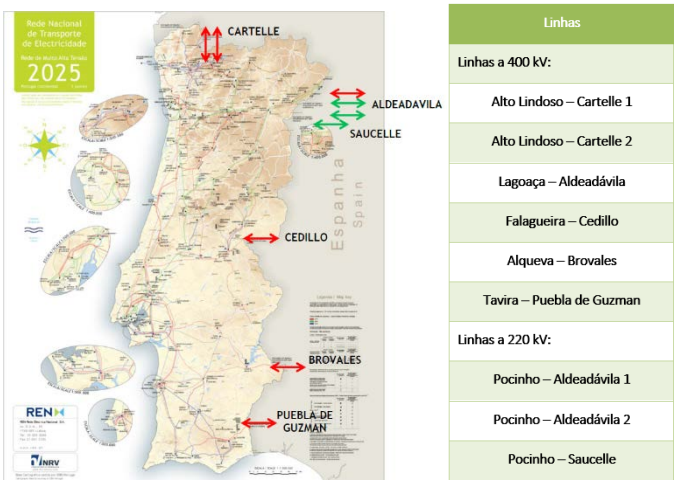
2.2 DEVELOPMENT OF INTERCONNECTION CAPACITY

As at 31 December 2025, the interconnection between Portugal and Spain consisted of six 400 kV lines and three 220 kV lines, making a total of nine interconnection lines, as identified below.

[4] The financial transmission rights (FTR) for interconnection capacity between Portugal and Spain are issued in auctions organised by the JAO (Joint Allocation Office), which operates as a Single Allocation Platform (SAP) in accordance with European legislation.

[5] Auction mechanism for the interconnection capacity between two systems (known as price zones – bidding zones), implicit in the offers that agents make in the daily market, and which presupposes the existence of a single market managed by a single market operator. When the interconnection capacity between the two systems is greater than the load flows resulting from the closing of the market, the interconnection is not congested and there is a single market price, the same for both systems. Otherwise, when the interconnection capacity is lower than the load flows resulting from the market closure, the interconnection is congested at its limit and the markets are separated in terms of price, which is higher in the import market and lower in the export market.

Figure 2-1 – Interconnection lines between Portugal and Spain



Source: REN

In terms of transmission capacity, these lines, which thermal limits depend on the ambient temperature and operating conditions applied by the operators of the interconnected networks, have the values shown in Table 2-1.

Table 2-1 - Thermal capacities of the interconnection lines between Portugal and Spain

Line	Minimum thermal capacity [MVA]
400 kV lines:	
Alto Lindoso – Cartelle 1	1 499
Alto Lindoso – Cartelle 2	1 499
Lagoaça – Aldeadávila	1 469
Falagueira – Cedillo	1 386
Alqueva – Brovales	1 280
Tavira – Puebla de Guzmán	1 386
220 kV lines:	
Pocinho – Aldeadávila 1	374
Pocinho – Aldeadávila 2	374
Pocinho – Saucelle	360
Total	9 627

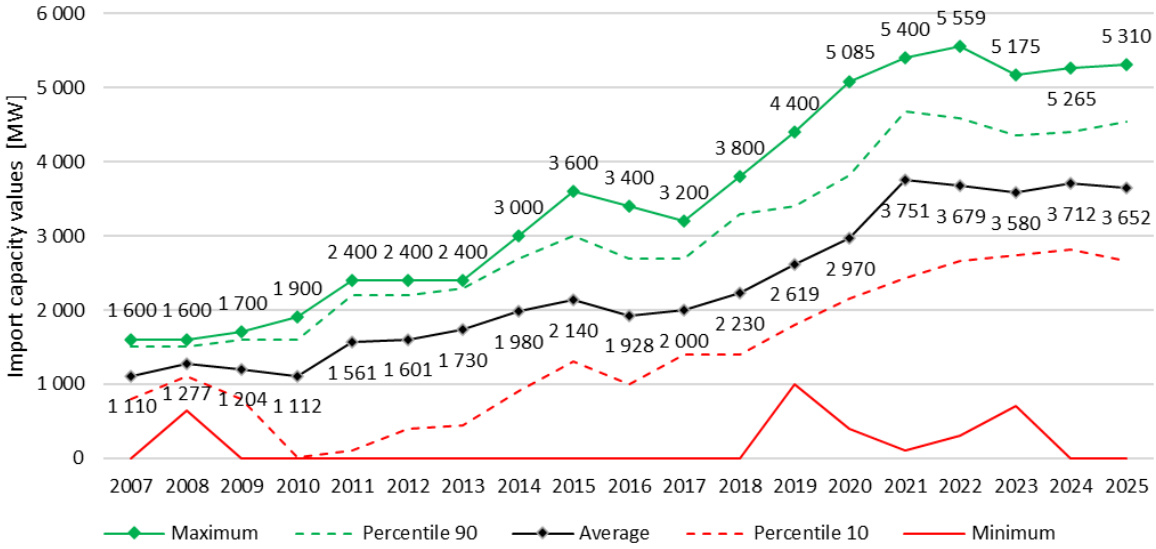
Source: REN – Interconnection Characterisation as of 31 December 2025

Thus, for the purposes of determining the interconnection capacity as of 31 December 2025, the sum of the minimum thermal capacities of the lines comprising the interconnection is 9627 MVA.

The following figures illustrate the evolution of the interconnection capacity available for commercial purposes, in both the import and export directions, between 2007 – the year in which the Iberian Electricity Market (MIBEL) came into operation – and 2025.

It should be noted that on 28 April 2025, at 11.33 – mainland Portugal time (12.33 CEST – *Central European Summer Time*, Spanish time) – a widespread blackout occurred in Portugal and Spain, affecting more than 36 million customers on the Iberian Peninsula's power system. This blackout had an impact on the Iberian power systems, particularly in terms of electricity interconnection capacity. Following the Iberian blackout of 28 April 2025, restrictions were imposed on the Portugal–Spain interconnection capacity, approved by the Portuguese Government for reasons of operational security, which lasted for several days. These restrictions had a direct impact on the results of the analyses set out below.

Figure 2-2 – Evolution of commercially available interconnection capacity – Imports

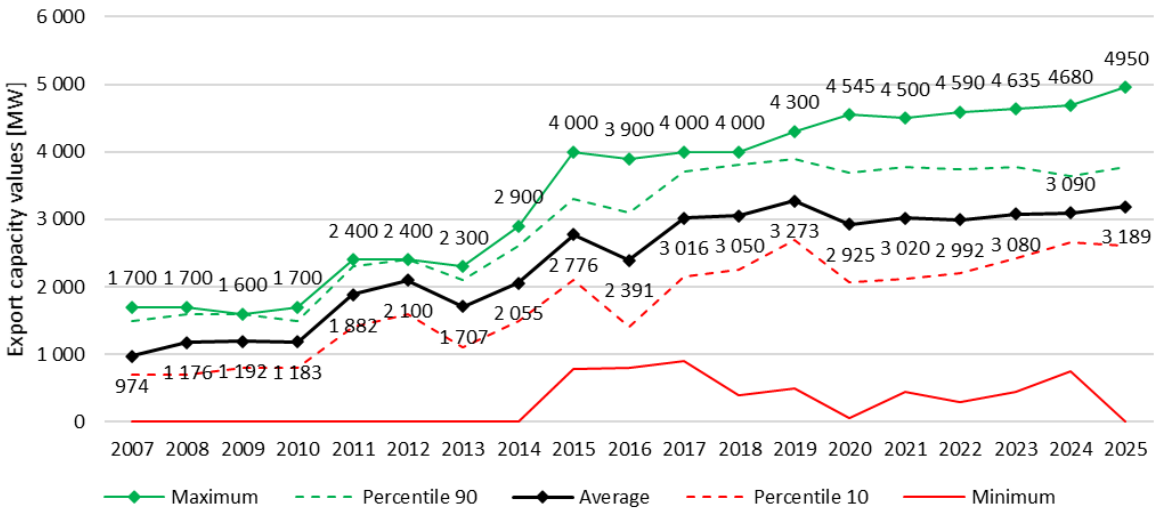


Source: REN data

During the period under review, with regard to peak values, there was a slight increase compared with 2024, with a value of 5310 MW recorded in 2025, which was nevertheless lower than the all-time high recorded in 2022 (5559 MW). In terms of average figures, the recorded value fell by 1.6% compared with

the previous year to 3652 MW, moving slightly away from the highest historical average, recorded in 2021, of 3751 MW. Nevertheless, average import capacity figures have stabilised since 2021. It should also be noted that, in virtually every year, there are instances of zero or near-zero values, despite the first decile being close to the average value.

Figure 2-3 – Evolution of available interconnection capacity for commercial purposes – Exports



Source: REN data

In terms of export capacity for commercial purposes, there was an increase in the average and maximum values compared with 2024, to 3189 MW (+3.2%) and 4950 MW (+5.8%), respectively. It should be noted that both the maximum and average values have been rising since 2022. In terms of the occurrence of zero values, this is less frequent than for imports, with the 1st decile remaining close to the average value.

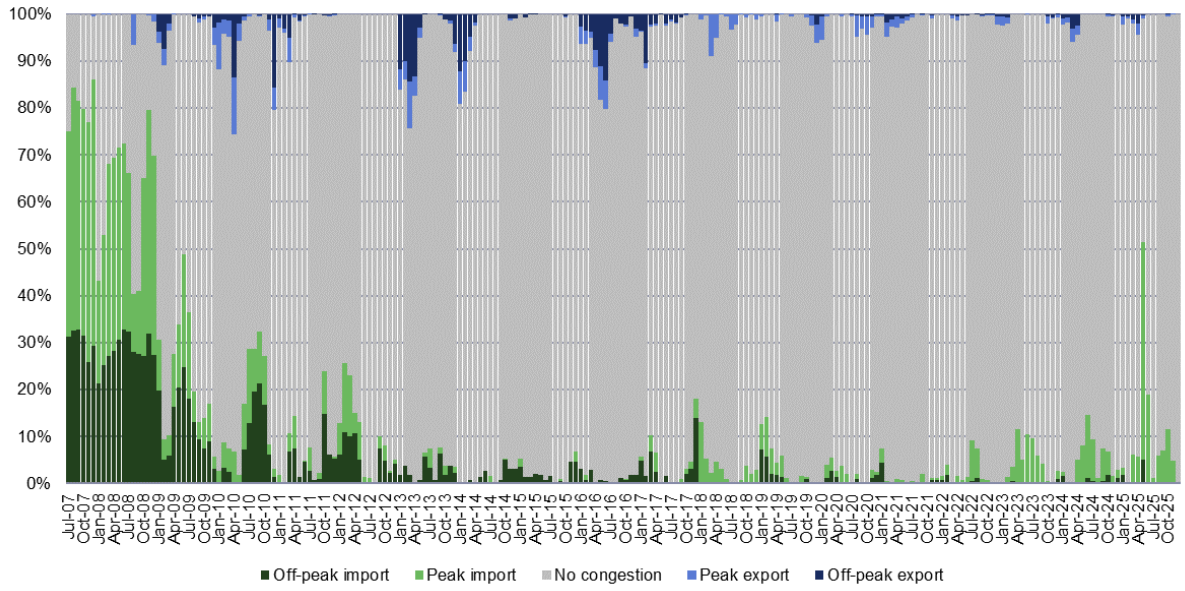
2.3 EVOLUTION OF CONGESTION AND CONGESTION RENTS

In 2025, congestion income from the electricity interconnections between Portugal and Spain, resulting from the difference in zonal prices following the implementation of market splitting, totalled 16.96 million euros, a figure lower than that recorded in 2024 (20.99 million euros). Despite the increase in the number congested hours, from 547 to 938, the reduction in congestion income is due to the continued low average spread of 0.88 EUR/MWh, combined with a reduction in capacity values during hours of congestion.

In terms of the total number of congested hours, the increase from 547 hours in 2024 to 938 hours in 2025 (in both directions of the interconnector) is largely due to the introduction of capacity restrictions on the Portugal–Spain interconnection, approved by the Portuguese Government for reasons of operational security, following the Iberian blackout of 28 April 2025. As shown in the figure below, these capacity restrictions mainly affected the import direction (in May and June 2025). Nevertheless, despite the limitations observed, the interconnection's performance continues to reflect a high degree of integration of the Iberian markets.

The following figure illustrates the use of available commercial capacity in both directions on the Portugal–Spain interconnection, from July 2007 (start of MIBEL) to December 2025.

Figure 2-4 – Monthly percentage of congestion hours on the Portugal-Spain interconnection, 2007 to 2025

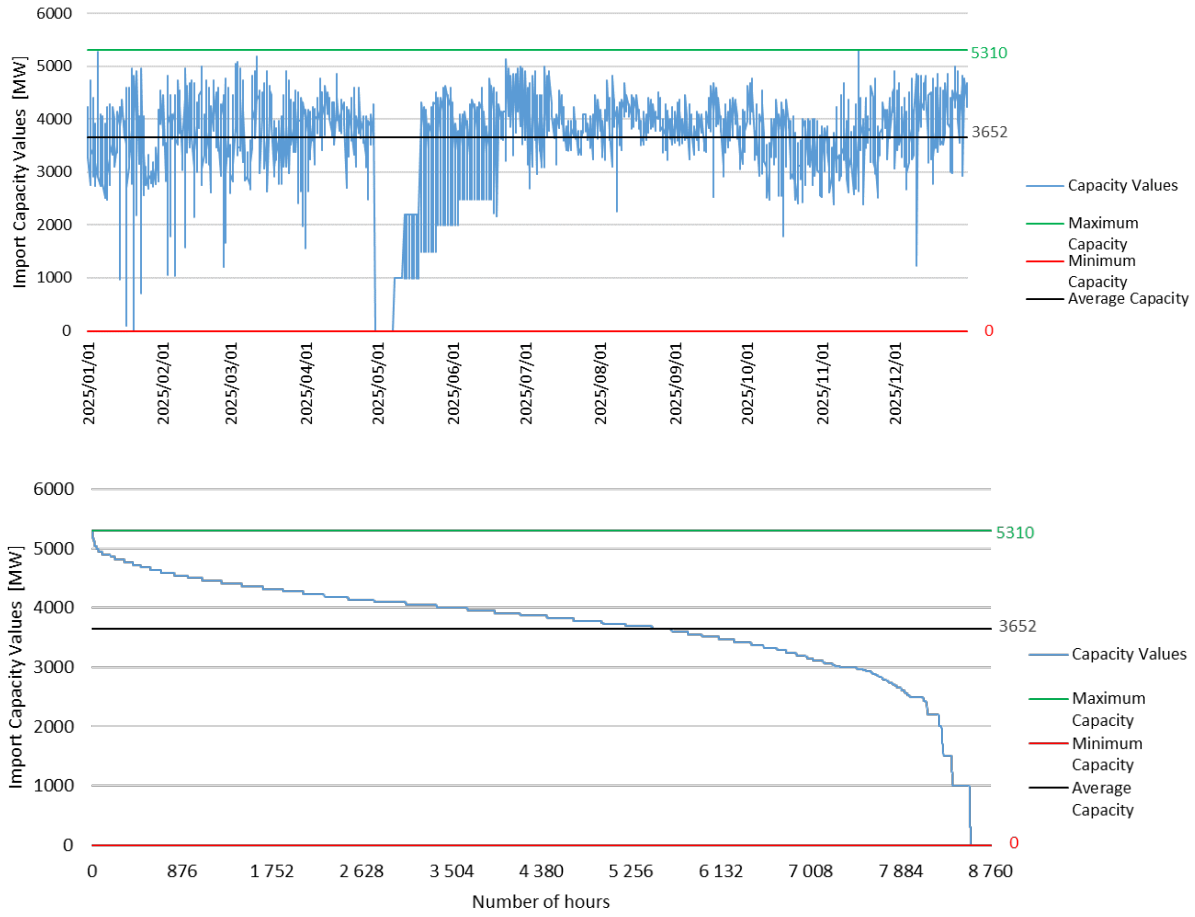


Source: REN and OMIE data

2.4 ANALYSIS FOR THE YEAR 2025

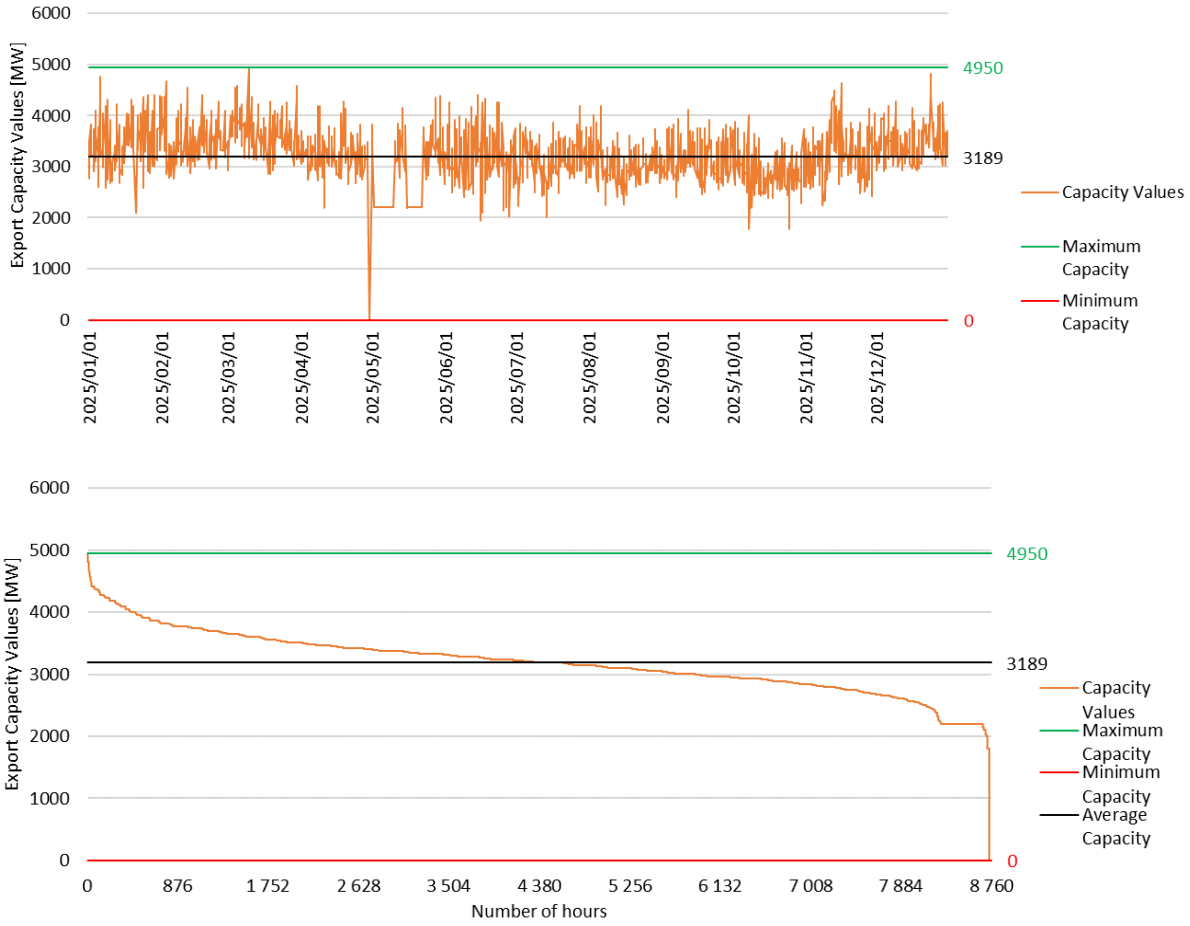
In 2025, the hourly interconnection capacity values made available to the market operator for commercial purposes were those shown in the following figures.

Figure 2-5 – Hourly interconnection capacity values available for commercial purposes in 2025 – Import



Source: REN data

Figure 2-6 – Hourly interconnection capacity values available for commercial purposes in 2025 – Export



Source: REN data

An analysis of these figures shows that the values naturally cluster around their average, which stands at around 3652 MW for imports and 3189 MW for exports. The months of May and June stand out, as they reflect the impact of the limitations mentioned above.

2.4.1 ANALYSIS OF INTERCONNECTION CONGESTION

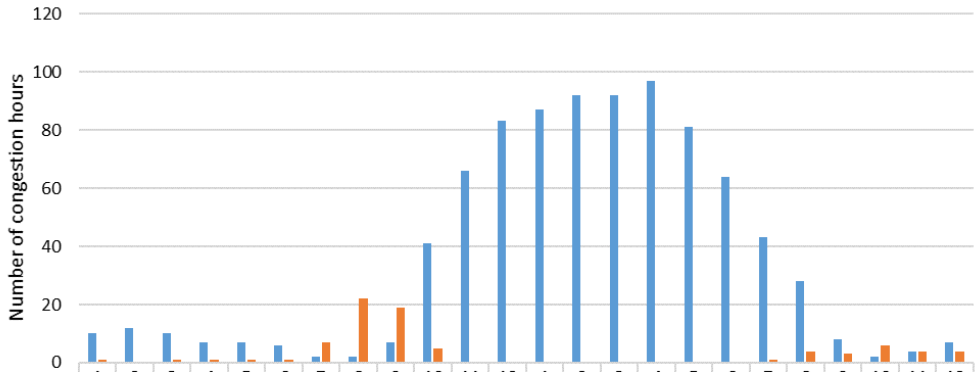
One of the most relevant indicators for assessing interconnection performance is the number of hours of congestion recorded.

An analysis of the data available[6] revealed that, in 2025, congestion occurred on the interconnection for 938 hours out of a total of 8760 hours, representing 10.7% of the total.

Analysing by time of day, a higher number of hours of congestion was observed between H10[7] and H19, with the highest incidence at H16 (97 hours of congestion in 2025). It should be noted that, during this period, congestion occurred almost entirely in the import direction. High levels of solar generation in Spain lead to low market prices in the Spanish part of MIBEL, which explains the number and pattern of congestion hours during these periods, coinciding with the solar generation profile.

When it comes to total figures, 91% of congestion hours occurred in the import direction. Nevertheless, it is important to note that in the early morning, between H7 and H9, congestion on the interconnection occurred predominantly in the export direction.

Figure 2-7 – Number of congested hours, by hour of the day, in 2025



	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	12 AM
Import [h]	10	12	10	7	7	6	2	2	7	41	66	83	87	92	92	97	81	64	43	28	8	2	4	7
Export [h]	1	0	1	1	1	1	7	22	19	5	0	0	0	0	0	0	0	0	1	4	3	6	4	4
Total [h]	11	12	11	8	8	7	9	24	26	46	66	83	87	92	92	97	81	64	44	32	11	8	8	11

Carrying out a similar analysis by month of the year reveals that congestion hours were mainly concentrated in the spring and summer months, with the highest number of congestion hours recorded in May and June

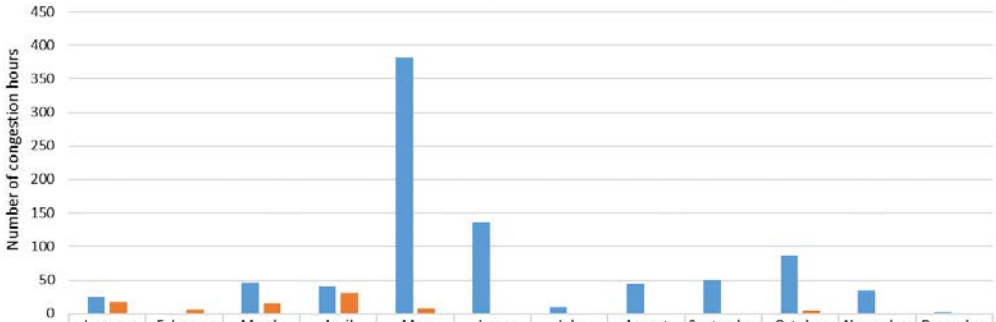
[6]Data available at:
https://mercado.ren.pt/PT/Electr/Explora%C3%A7%C3%A3odosistema/Interlig/CapProg/Paginas/Mercado.aspx .

[7] H#: Notation used to designate hour "#" of the day-ahead market, with reference to Spanish time.

(389 hours and 136 hours respectively). One reason for this is the seasonal pattern typically observed[8], linked to the increase in solar power generation during this period, which, in 2025, was compounded by the aforementioned restrictions introduced following the Iberian blackout of 28 April.

Breaking down these figures by import and export situations, it was found that, in February, congestion occurred only in the export direction. In the remaining months, congestion occurred mainly in the import direction.

Figure 2-8 – Number of hours of congestion, per month, in 2025



	January	February	March	April	May	June	July	August	September	October	November	December
Import [h]	25	0	46	41	382	136	9	44	51	87	35	2
Export [h]	17	6	14	31	7	0	0	0	0	4	1	0
Total [h]	42	6	60	72	389	136	9	44	51	91	36	2

2.4.2 ANALYSIS OF PRICE DIFFERENCES IN CONGESTION SITUATIONS (*MARKET SPLITTING*)

Analysing the price differences between Portugal and Spain[9], which occurred during periods of congestion, it can be seen that the largest price difference in the import direction (the price in Portugal being higher than the price in Spain) was 63.39 €/MWh, recorded at H20 on 6 May 2025. Conversely, the largest price difference in the export direction (the price in Spain being higher than the price in Portugal) was 113.81 €/MWh, recorded at H8 on 30 April 2025. These figures represent a decrease in the maximum price difference compared with 2024 for imports (96.77 €/MWh in 2024) and an increase for exports (68.79 €/MWh in 2024).

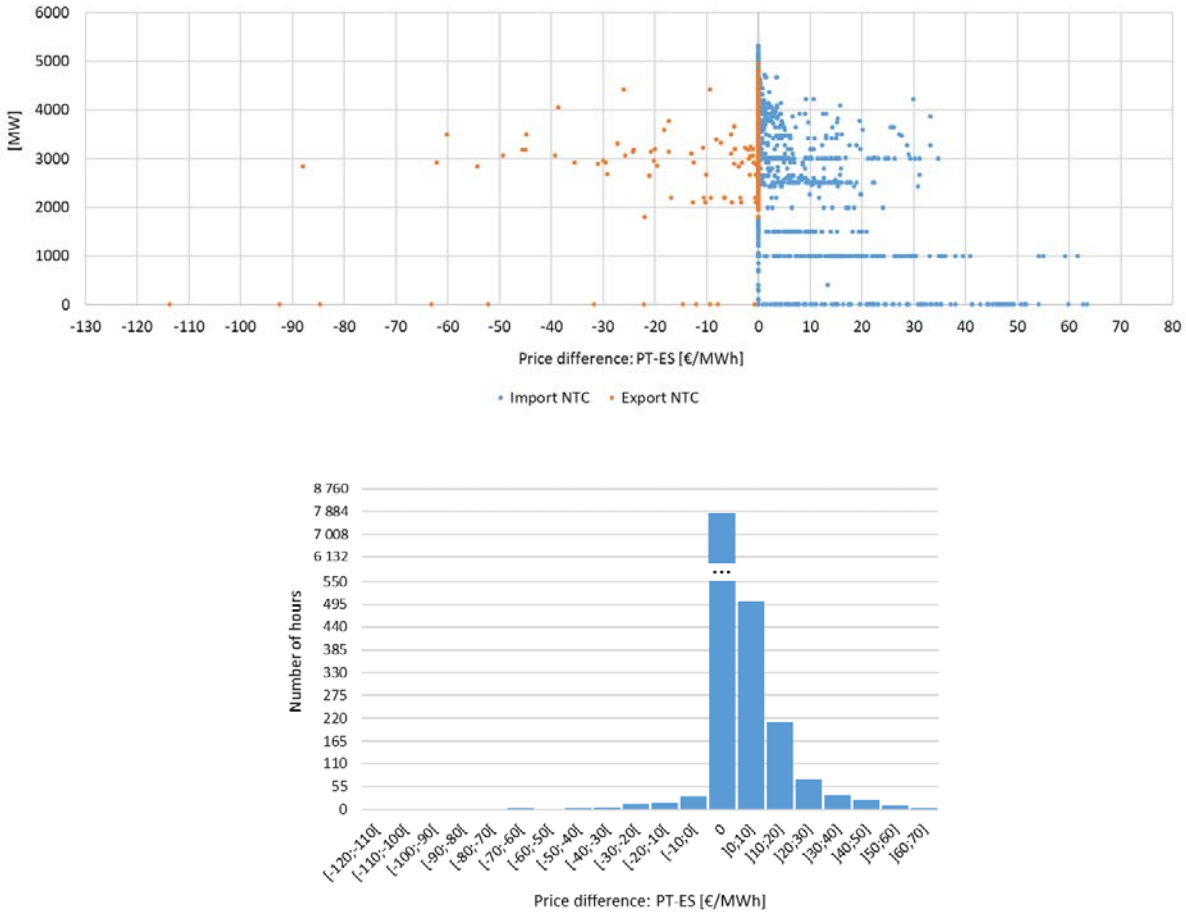
[8] For example, in 2024, the months with the highest number of hours of price separation were June, July, May and September.

[9] https://mercado.ren.pt/PT/Electr/InfoMercado/InfOp/MercOmel/Paginas/Precos.aspx

Figure 2-9 compares the recorded price differences with the values of capacity made available for commercial purposes (NTC – *Net Transfer Capacity*) in the import and export directions.

It can be seen that congestion occurred for NTC values ranging from 0 MW to 4950 MW. Analysing the available data, it is clear that there is no significant correlation between the values of capacity made available for commercial purposes and interconnection congestion; in other words, the highest number of congestion events (and even some of the highest price differences) did not occur at the lowest levels of interconnection capacity. It is important to emphasise once again that, in 2025, interconnection performance was heavily influenced by the restrictions imposed in the wake of the Iberian blackout of 28 April. The following figure shows, for example, a large number of congestion events resulting from the imposition of limits on import capacity (0 MW, 1000 MW and 1500 MW).

Figure 2-9 – Comparison between available capacities (NTC) and price differences in the market



Source: REN and OMIE data

3 MONITORING OF COMPLIANCE WITH THE MINIMUM LEVELS OF AVAILABLE CAPACITY FOR CROSS-ZONAL TRADE (ARTICLE 16(8) OF REGULATION (EU) 2019/943)

3.1 FRAMEWORK

3.1.1 LEGAL CONTEXT

The obligation to monitor compliance with minimum levels of available capacity for cross-zonal trade falls within the legal and regulatory framework already referred to in Chapter 1.

3.1.2 REQUESTS FOR DEROGATIONS

With a view to facilitating Member States' gradual compliance with the aforementioned levels of available capacity for cross-zonal trade, Article 16(9) of Regulation (EU) 2019/943 allows regulatory authorities to grant a derogation from the requirement set out in paragraph 8 of that Article in relation to the minimum interconnection capacity offered, upon request from transmission system operators.

On 26 November 2024, ERSE received from REN, in its capacity as the Portuguese TSO, the sixth request for a one-year derogation regarding compliance, in 2025, with the minimum MACZT levels[10].

This new request for a derogation was justified on the basis of system operational security issues and the additional risks introduced by new processes and tools designed to make higher interconnection capacities available to the market.

According to REN, in terms of processes, the difficulties were mainly related to the more frequent use of costly remedial actions, given the lack of operational experience in processes that make intensive use of such actions, which could lead to operational security risks.

With regard to the new tools to be developed and used, REN noted that by the end of 2024 the new IT tool for capacity calculation, based on a different technology, would come into operation, replacing the current

[10] MACZT – Margin Available for Cross-Zonal Trade.

tool and thus enabling better alignment with the capacity calculation methodology established in the SWE Region[11]. However, despite these advances, REN considered that further fine-tuning of this new IT tool would still be necessary during 2025.

The request for a derogation for the year 2025 included the following clauses:

a) REN undertook to provide at least the minimum capacity necessary to ensure compliance with the minimum MACZT levels for 87.5% of the hours in the year covered by the derogation, disregarding cases where the minimum levels are not achieved due to capacity reductions not introduced by REN;

b) During the derogation period, the RCC and the TSOs in the SWE Region were to:

   i. Complete the final adjustments to the new CCR capacity calculation software that uses a different technology;

   ii. Complete the implementation of the second Intraday Capacity Calculation;

   iii. Complete the implementation of the Long-Term Capacity Calculation;

   iv. Continue to develop the Coordinated Security Analysis and Capacity Calculation processes for the Balancing Period.

Following an analysis of the derogation request[12] described above, it was approved by ERSE on 30 December 2024.

3.1.3 METHODOLOGY FOR MONITORING COMPLIANCE WITH MINIMUM MACZT LEVELS

To monitor compliance with the minimum MACZT levels, this report used the methodology described in detail in the ERSE report 'Analysis of Portugal-Spain interconnection capacity and monitoring of compliance

[11] South-West Europe Region: The South-West Europe Region comprising Portugal, Spain and France.

[12] Reports analysing the Portugal–Spain interconnection capacity and monitoring compliance with the minimum limits for Margin Available for Cross-Zonal Trade (MACZT), and ERSE decisions regarding requests for derogations: http://www.erse.pt/atividade/regulamentos-eletricidade/acesso-as-redes-e-as-interligacoes/relatorios-maczt-e-pedidos-de-derrogacao/.

with the minimum level of margin available for cross-zonal trade in 2020"[13], based on ACER Recommendation 01/2019[14].

In this report, ERSE also follows, where applicable, the provisions of the ACER Practical Note on the Monitoring of Available Capacity for Cross-Zonal Trade[15].

3.1.4 PERIOD ANALYSED

As mentioned above, on 28 April 2025, a widespread blackout occurred in Portugal and Spain, which had an impact on the Iberian power systems, particularly in terms of electricity interconnection capacities. Whilst the exceptional nature of this blackout is acknowledged, as are the resulting impacts on the interconnection capacity figures made available to the market in the days that followed – due to limitations imposed for operational security reasons – for the purposes of monitoring compliance with MACZT levels, it was decided to consider the whole of 2025[16].

As mentioned in section 3.1.2, ERSE accepted a derogation request from REN regarding compliance with the minimum MACZT levels, with the derogation period granted being one year.

In this context, ERSE is responsible for tracking and monitoring developments in the levels of interconnection capacity made available for cross-zonal trade and progress towards compliance with the established minimum levels, as well as for assessing compliance with the objectives of the derogation.

[13] https://www.erse.pt/media/tjxbitoz/relat%C3%B3rio-interliga%C3%A7%C3%A3o-e-maczt-2020.pdf.

[14] https://www.acer.europa.eu/sites/default/files/documents/Official_documents/Acts_of_the_Agency/Recommendations/ACER%20Recommendation%2001-2019.pdf.

[15] https://extranet.acer.europa.eu//Official_documents/Acts_of_the_Agency/Publication/ACER%20and%20NRAs%20practical%20note%20MACZT.pdf.

[16] In this context, bearing in mind that this exercise considers the interconnection capacity figures published for the following day (day-ahead), it should be noted that the data provided for the purpose of monitoring compliance with the minimum MACZT levels include capacity figures, unaffected by any constraints, for all hours on 28 and 29 April 2025, and that these were taken into account in the analysis.

3.1.5 DATA USED

This report uses data resulting from calculations carried out by Coreso[17], which were made available by REN.

3.2 RESULTS

Figure 3-1 illustrates the level of compliance with the minimum MACZT levels ($\frac{MACZT}{Fmax}$[18] $\geq 70\%$) in 2025[19] .

- In 81.5% of the MTUs[20] with a limiting CNEC[21] in Portugal, the minimum MACZT levels[22] were met (the green area in the figure, MACZT≥ 70%).
- In 13.7% of the MTUs with a limiting CNEC[23] in Portugal, the minimum MACZT levels were not met.
- In 3.7% of the MTUs, the identified CNEC did not belong to the Portuguese power system (white area in the figure).
- In 1.1% of the MTUs, it was not possible to identify the limiting CNEC, which made it impossible to monitor compliance with the minimum MACZT levels (grey area in the figure).

[17] Coreso is the RCC, Regional Coordination Centre (from the English acronym Regional Coordination Centre), responsible for calculating interconnection capacity in the SWE region.

[18] Fmax – Represents the capacity at a CNE, taking into account safety limits and contingencies, pursuant to Article 16(8) of Regulation (EU) 2019/943, and applies equally to the Flow-Based and Coordinated NTC approaches.

[19] Given the characteristics of the Portuguese power system's interconnections with its neighbours, as well as the specific characteristics of the system itself, the calculation of these general results taking into account the influence of third-country flows or capacity allocation restrictions referred to in point 4 of ACER Recommendation 01/2019 is not considered applicable.

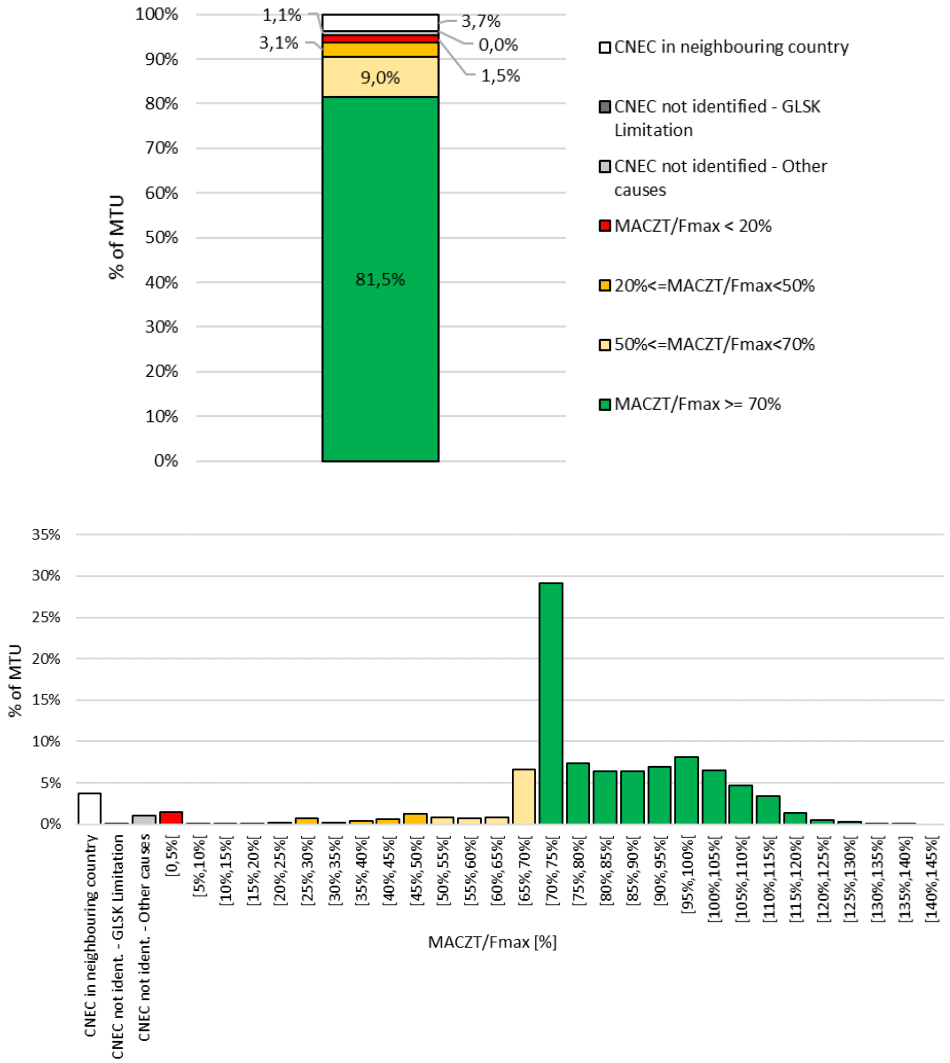
[20] MTU – Market Time Unit. In this context, it also represents a specific time and direction of the border under consideration.

[21] CNEC – Represents a critical network element with a contingency that is used in capacity calculations (from the English, *Critical Network Element with Contingency*).

[22] The assessment of compliance with the minimum MACZT levels is carried out for the MTU, separately in both directions of the border in question; in other words, the number of cases expected to be assessed is equal to 2 × the number of hours in the period under consideration.

[23] CNEC – Represents a critical network element with a contingency that is used in capacity calculations (from the English, *Critical Network Element with Contingency*).

Figure 3-1 – Compliance with minimum MACZT levels by the Portuguese TSO in 2025 at the PT-ES border in both directions



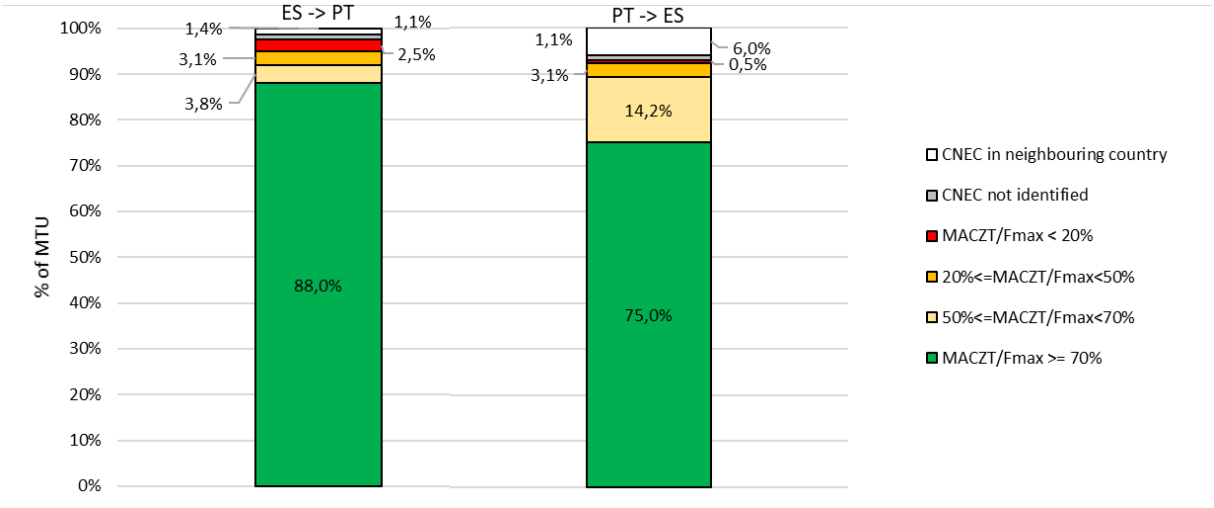
Analysing the results in greater detail, it can be seen that of the 13.7% of MTUs in which the minimum MACZT levels were not met, 9% relate to cases where the MACZT values were between 50% and 70% of Fmax. This finding suggests that an increase – in some cases a slight one – in the capacity made available to the market would enable compliance with the minimum MACZT levels in these MTUs.

This analysis also revealed that the number of MTUs in which it was not possible to identify the limiting CNEC (1.1%) contributes to non-compliance with the minimum levels, as this prevents the quantification of the MACZT value and the application, where necessary, of additional NTC.

These 1.1% of MTUs in which it was not possible to identify the CNEC are classified as cases in which IT problems, convergence issues in the capacity calculation tool and situations in which the maximum generation is reached without a limiting CNEC having been found (GLSK limitation) occurred.

Compliance with minimum MACZT levels is assessed for each MTU, in each direction of the border considered. Analysing the two directions separately (ES → PT and PT → ES), for the total number of MTUs in 2025, it can be seen that performance was better in the ES → PT direction, with the minimum MACZT levels being met in 88% of MTUs (75 per cent in the PT → ES direction).

Figure 3-2 - Compliance with minimum MACZT levels in 2025 in the ES → PT and PT → ES directions



With regard to the MTUs in which the minimum MACZT levels were not met, it can be seen from Figure 3-3 that the average MACZT/Fmax value was 52.5% across all MTUs. Breaking this down by direction, it can be seen from Figure 3-4 that the average value was 36.1% in the ES → PT direction and 61.2% in the PT → ES direction.

Figure 3-3 – Average MACZT/Fmax value for the total number of MTUs where the minimum MACZT levels were not met in 2025

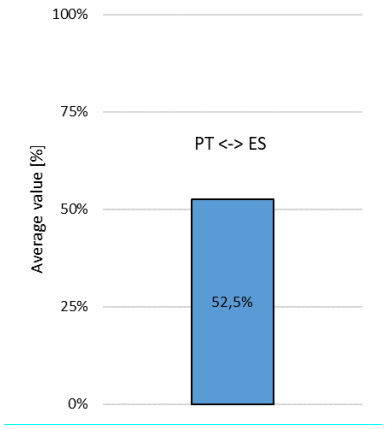
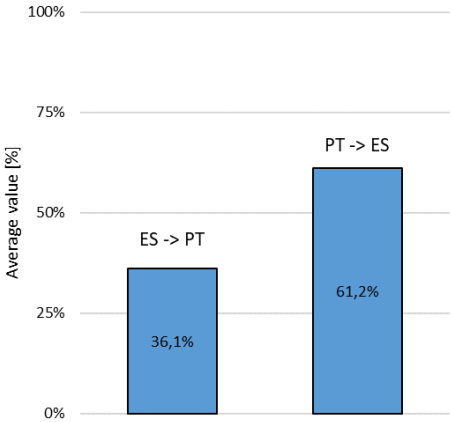


Figure 3-4 – Average MACZT/Fmax value for MTUs where MACZT levels were not met, by direction, in 2025



Using the data provided, it is also possible to check which CNE[24] has been identified for each MTU and thus break down the results by CNE.

Table 3-1 lists the 12 CNEs identified as falling under the responsibility of the Portuguese power system.

[24] CNE – Critical Network Element.

In fact, two of the identified CNEs, 10T-ES-PT-10004U (400 kV Alto Lindoso - Cartelle 1 interconnection line) and 10T-ES-PT-00008S (400 kV Lagoaça–Aldeadávila interconnection line), accounted for 89% of the MTUs in which a limiting CNE could be identified, and were therefore those that contributed most to the overall result. These two CNEs performed very well, complying with the minimum MACZT levels in at least 84% of the MTUs.

Considering only the data for the MTUs in the table below, it can be seen that the CNE was an internal element of the Portuguese power system in 3% of the MTUs, with the minimum MACZT levels being met in 97% of these situations, and that the CNE was an interconnection in 97% of these MTUs, with the minimum MACZT levels being met in 85% of these situations.

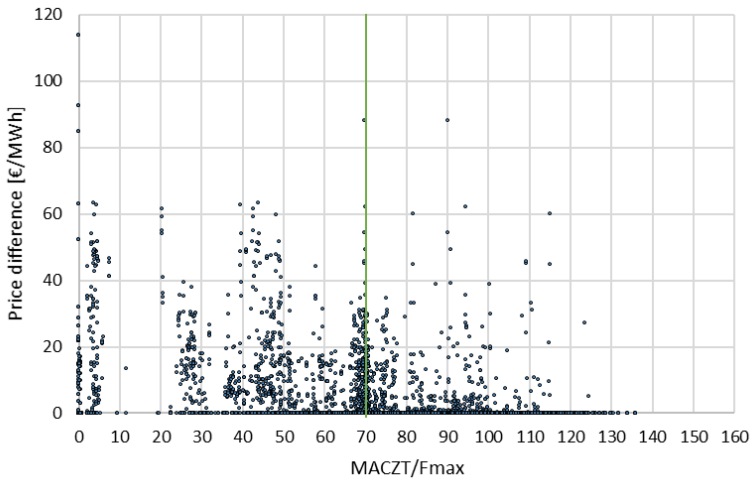
Table 3-1 – Breakdown of results by CNE identified as the responsibility of the Portuguese power system

CNE		No. CC MTU	% of total CC MTU	MACZT ≥ 70% Fmax	MACZT < 70% Fmax
10T-ES-PT-000023	Pocinho - Aldeadávila 1 220 kV	57	0,33%	100%	0%
10T-ES-PT-000031	Alqueva - Brovales 380 kV	236	1,37%	68%	32%
10T-ES-PT-00005Y	Alto Lindoso - Cartelle 2 380 kV	230	1,34%	84%	16%
10T-ES-PT-00006W	Falagueira - Cedillo 400 kV	346	2,01%	86%	14%
10T-ES-PT-00007U	Pocinho - Saucelle 220 kV	20	0,12%	65%	35%
10T-ES-PT-00008S	Lagoaça - Aldeadávila 400kV	12036	69,92%	84%	16%
10T-ES-PT-00013Z	Tavira – Puebla de Guzmán 400 kV	11	0,06%	100%	0%
10T-ES-PT-10004U	Alto Lindoso - Cartelle 1 380 kV	3281	19,06%	91%	9%
16TLALPDV------F	Alto Lindoso - Pedralva 400 kV	94	0,55%	100%	0%
16TLALRA2------W	Alto Lindoso - Riba d'Ave 400 kV	239	1,39%	100%	0%
16TLAMMLGC-----S	Armamar - Lagoaça 400 kV	75	0,44%	88%	12%
16TLPNAMM1-----E	Pocinho - Armamar 220 kV	51	0,30%	86%	14%

Finally, the following figure compares the hours during which congestion occurred (a non-zero price difference between Portugal and Spain) with the MACZT values calculated for those MTUs (in both directions where possible).

An analysis of the available data shows that, in 46% of the MTUs where congestion occurred and monitoring was possible, the MACZT values were higher than the defined minimum levels. This implies that, in situations of congestion, the number of MTUs in which the minimum MACZT levels were met was practically equal to the number of MTUs in which this did not occur; consequently, no significant correlation was found between the occurrence of interconnection congestion and non-compliance with the minimum MACZT levels.

Figure 3-5 – Comparison between MACZT/Fmax values and interconnection congestion situations in 2025



3.3 ASSESSMENT OF COMPLIANCE WITH THE DEROGATION FOR 2025

As set out in section 3.1.2, ERSE approved REN's request for a derogation regarding compliance with the minimum MACZT levels for the year 2025. In this request for a derogation, REN undertook a series of commitments.

An analysis of compliance with the commitments set out in the approved exemption application concluded that REN, together with Coreso and the other SWE TSOs, achieved the following results:

1. Completed the final adjustments to the new IT tool for calculating capacity in the CCR using different technology;
2. Completed the implementation of the second Intraday Capacity Calculation;
3. Continued the implementation of the Long-Term Capacity Calculation;
4. Continued the development of the Coordinated Security Analysis and Capacity Calculation processes for the Balancing Period.

As set out in the approved derogation request, excluding cases where the minimum levels were not met due to reductions in interconnection capacity not introduced by REN – which led to a reduction in the number of MTUs taken into account to 15957 (instead of the expected 17520) – it was found that the

minimum MACZT levels were met in 89.5% of the MTUs, thereby fulfilling the established minimum target (87.5% of the MTUs).

4 ASSESSMENT OF COMPLIANCE WITH MINIMUM MACZT LEVELS FOR THE PURPOSES OF THE IMDT

The assessment of compliance with the minimum MACZT levels for the purposes of determining the value of the incentive for improving the technical performance of the RNT (IMDT), for the 2022–2025 regulatory period, follows specific criteria, taking into account the national context in which this incentive is applied, as previously defined in ERSE's Memorandum[25] on the definition of criteria for assessing compliance with minimum MACZT levels for the purposes of the IMDT:

a. Limiting element in the Spanish system

The minimum MACZT levels are deemed to have been met in cases where the identified limiting CNEC is not part of the Portuguese power system.

b. NTC proposed by Coreso reduced by the Spanish TSO

REN identifies the situations in which a reduction was made by the Spanish TSO, distinguishing between those in which the minimum MACZT levels would have been met had there been no reduction in the NTC and those in which, even with the capacity calculated prior to the reduction, the minimum levels would not have been met. The minimum MACZT levels are considered to have been met only in the case of the former.

c. Additional NTC value limited by the Spanish counter-trading (CT) technical limit

In situations where it is found that the minimum MACZT levels have not been met due to the Spanish technical CT limit, the MACZT ≥ 70% criteria are deemed to have been met.

However, where non-compliance arises due to limitations imposed by both the Portuguese and Spanish TSOs, the non-compliance is attributable to the Portuguese TSO as well; consequently, it will continue

[25] ERSE memorandum issued in December 2023, concerning the definition of criteria for assessing compliance with minimum MACZT levels for the purposes of the incentive to improve the technical performance of the RNT (IMDT). This memorandum was drawn up following comments from REN regarding the assessment of its compliance with the minimum level of available capacity for cross-zonal trade (MACZT).

to be attributed to both systems, and the minimum MACZT levels will not be deemed to have been met in such situations.

d. Recognition of *fallback* procedures

On 1 February 2022, following an agreement between all the national regulatory authorities of the South-West Europe (SWE) Region, ERSE approved the amendment to the capacity calculation methodology for the day-ahead and intraday market timeframe[26], as proposed by the TSOs of the SWE Region.

In this context, the methodology now includes mechanisms and procedures designed to reduce or eliminate situations where GLSK is constrained; and, with regard to other situations where it is not possible to identify the constraining CNEC, the methodology also includes fallback procedures that enable the monitoring of compliance with the minimum MACZT levels. These procedures involve two key points:

i) taking into account the NTC value calculated in a coordinated manner for the long term (duly validated by the TSO) when the calculation process on a daily basis has not been successful; and

ii) taking into account, for monitoring purposes, the most representative CNEC from the previous quarter and average PTDFs [27] for the same period in cases where it is not possible to identify the limiting CNEC.

Article 15(2) of the methodology for calculating interconnection capacity provides for a trial period for the use of these procedures, on the assumption that their use would only be acceptable for a very small percentage of MTUs; it is therefore essential that there should be, from the outset, a fairly significant reduction in such situations.

Comparing the results for 2024 with those for 2025, it can be concluded that there has been a positive trend in this regard, with the number of MTUs for which it was not possible to identify the limiting

[26] https://www.erse.pt/media/a02fe4kw/swe-ccm-amendment_january2022_clean.pdf.

[27] PTDF – *Power Transfer Distribution Factor*. PTDFs are linear sensitivity factors that quantify how a commercial transaction or power injection between two regions affects the physical flow on any transmission line within an interconnected network.

CNEC falling from 5% in 2024 to 1.1% in 2025 (noting that between 2023 and 2024, there had already been a significant decrease from 8.3% to 5%).

Given the trend observed in the number of situations where it is not possible to identify the limiting CNEC, it is considered that the conditions are met for the results of the use of the fallback mechanism to be taken into account for the purposes of the IMDT. Consequently, MTUs for which compliance with the minimum MACZT levels has been verified following the use of the *fallback* procedures are considered valid.

Furthermore, in view of the limitations imposed on interconnection capacity by REN following the Iberian blackout of 28 April 2025, for reasons of operational security of the National Electricity System (SEN), and recognising that these occurred in an exceptional situation with a significant impact on system management, ERSE considered that, for the purposes of the IMDT, when assessing compliance with the minimum MACZT levels, the most reasonable approach would be to exclude the MTUs in which these limitations occurred. Consequently, for the purposes of the IMDT, the analysis covered 16877 MTUs, rather than the expected 17520.

For this sample, the analysis yielded the following results:

- Compliance with the minimum MACZT levels (base case[28]) – 84.6% of MTUs;
- Limiting element in the Spanish system (criterion a) – 3.88% of MTUs;
- NTC proposed by Coreso reduced by the Spanish TSO (criterion b) – 9.26% of MTUs;
- Additional NTC value limited by the Spanish CT technical limit (criterion c) – 0.5% of MTUs;
- Recognition of fallback procedures (criterion d) – 0.52% of MTUs.

In accordance with the above, by applying the aforementioned criteria, for the purposes of the IMDT, it is considered that the minimum MACZT levels were met in 98.77% of the MTUs (84.6% + 3.88% + 9.26% + 0.5% + 0.52%).

[28] Using the assessment methodology referred to in the previous sections of the report.

5 CONCLUSIONS

Under European regulations, the assessment of compliance with the minimum MACZT levels is the responsibility of the regulatory authority in each Member State.

Following the first five monitoring exercises (2020 to 2024), and taking into account the commitments made by REN in its request for a derogation for the year 2025, which was approved by ERSE, this report assesses the current level of compliance with those commitments.

As set out throughout the report, ERSE has reached the following main conclusions:

- In accordance with the general criteria, the minimum MACZT levels at the Portugal–Spain border were met in 81.5% of the MTUs (75% in the export direction, PT→ES, and 88% in the import direction, ES→PT);
- Adopting the criteria defined at national level for the purposes of the IMDT, the minimum MACZT levels at the Portugal–Spain border are met in 98.77% of MTUs, of which 3.88% correspond to situations where the limiting CNEC was located in Spain;
- The objectives of the derogation relating to the development of tools and methodologies for calculating and monitoring available capacity for cross-zonal trade were met;
- The degree of compliance with the minimum MACZT levels exceeded the commitment made by REN in its request for a derogation for 2025 (compliance with the minimum MACZT levels in 87.5% of MTUs, disregarding cases where the minimum levels are not achieved due to capacity reductions not introduced by REN);
- There is no significant correlation between the values of capacity made available for commercial purposes and interconnection congestion.



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