Annex II – Core TSOs general measures and action plan to avoid future cross-zonal capacity reductions

Q2 2025

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# Introduction

This annex contains the required information for each Core TSO that has applied capacity reductions for its CNECs in more than 1% of ID CC MTUs of the analysed quarter as described per Article 18(12).

# CEPS

During the second quarter of 2025, the Czech transmission system operator (ČEPS) applied the Individual Validation Adjustment (IVA) procedure a total of 49 times.

These adjustments were exclusively related to the V443, V444, and V245 interconnection lines located in the CZ–PL–SK corner of the grid—an area consistently subject to high transit flow pressure.

A significant portion of the IVA applications stemmed from the fact that these lines were already heavily utilized in the day-ahead market, despite meeting the 70% cross-zonal capacity criterion. This pre-existing usage limited operational flexibility and, in several cases, triggered the need for IVA due to insufficient margin for secure operation.

Additionally, some instances of IVA were prompted by unresolved grid issues within the DACF (Day-Ahead Congestion Forecast) models used for running the IDCC(b). These deficiencies made the initial forecasts unsuitable for reliable capacity evaluation, necessitating validation adjustments to maintain system security.

The increased frequency of IVA in Q2 reflects the operational challenges in a highly utilized grid region, while also underscoring ČEPS's proactive approach in adapting to forecast limitations and preserving grid security under pressure.

# DAVinCy TSOs

## APG

## German TSOs

## TENNET TSO BV

# ELES

**General measures to avoid cross-zonal capacity reductions in the future, as per Article 18(11)(b) of ID CCM:**

* Improvement in congestion management – we will continue to improve the quality of our inputs for CORE ID CC in order to avoid unnecessary IVA application in case of errors in inputs files.

* Network development and optimisation.

**Detailed report and action plan describing how such deviations are expected to be alleviated and solved in the future as per Article 18(10)(h)(i) of ID CCM**  
   
 In Q2 of 2025, ELES applied reduction 3,53 % of MTU. 87% of these reductions were applied on CNECs on AT-SI and HU-SI borders (Kainachtall – Maribor 1&2, Maribor-Cirkovce 1&2 and Cirkovce-Heviz). The remaining 13% of applied reductions were applied on CNECs on the HR-SI border (Divaca-Pehlin and Krsko-Tumbri 1&2). The main reason for the above reductions at ELES lies in the fact, that we are in the cross-road of two CCR, which both aim to maximise capacities in order to fulfil 70% criteria in DA. Often, maximisation of the capacities in Italy North CCR have negative effect on the RAM of Slovenian elements in CORE CCR. This is mostly due to the fact, that we have a PST on the Slovenian – Italian border, that is used to maximise Italy North NTC values. Maximising capacities in DA often translates to low capacities available for Intraday.

Our plan to improve the situation consists of the following:

* Additional training of operators and improvement of the local validation tool in order to improve the process and improve stability and reliability of the tool
* Analysis will be performed on accuracy of validation tool (e.g. comparing the flows considered during the validation and realised flows). Based on the result of the analysis, the validation tool reliability margin will be adjusted in order to decrease the level of IVA application.
* Network development and optimisation - For AT-SI border, we are in the process to obtain and install a static serous synchronous compensator (SSSC) in Podlog substation (Q4 2027 or early 2028) in order to be able to redistribute and relieve the flows on the elements Kainachtal – Maribor and Obersielach- Podlog. For the Divaca – Pehlin line, we are still investigation different possibilities to increase capacities (SSSC or high temperature lines).
* In Q4 2025 ELES plans to implement DTR on all SI-HR tie-lines, that will presumably increase its Fmax in most of MTUs (expected positive impact on Divača-Pehlin tie-line)
* Improve the outage planning coordination.

# ELIA

# HOPS

General measures to avoid cross-zonal capacity reductions in the future, as per Articles 18(10)(h)(i) and 20(11)(b) of the ID CCM

General measures include, but are not limited to:

· Network development and optimization

The goal is to increase the transmission capacity and reduce grid congestion. The measures to achieve these goals include strengthening and optimizing the existing network and the development of new infrastructure.

· Improvements concerning congestion management

Core CCR coordinated improvements with coordinated actions to increase cross-zonal capacities (for example improvements of the outage planning coordination in order to increase flexibility of the grid). Introduction of additional effective remedial actions should help to relieve the congestion and therefore allows to reduce the number of IVA application. Also, inclusion of third countries could open further opportunities for HOPS (with planning process and implementation of remedial measures). Unscheduled allocated flows coming from commercial exchanges outside the Core CCR (Fuaf) has a strong impact on HOPS grid.

Detailed report and action plan describing how such deviations are expected to be alleviated and solved in the future

In the analysed quarter (Q2 2025), HOPS applied reduction to around 12,59% MTUs. For most MTUs, the reductions are applied to:

· TL 220kV Pehlin - Divaca (11,99% MTUs, or around 95,27% of times of all HOPS applied reductions)

· TL 400 kV Ernestinovo – Pecs 1 (0,64% MTUs, or around 5,09% of times of all HOPS applied reductions)

· TL 220kV Brinje - VE Padene (0,27% MTUs, or around 2,18% of times of all HOPS applied reductions)

· TL 400kV Melina- Divaca (0,18% MTUs, or around 1,45% of times of all HOPS applied reductions)

· TL 400kV Tumbri - Krsko 2 (0,14% MTUs, or around 1,09% of times of all HOPS applied reductions)

· TL 400 kV Ernestinovo – Pecs 2 (0,09% MTUs, or around 0,73% of times of all HOPS applied reductions)

· TL 400 kV Ernestinovo - Mitrovica (0,09% MTUs, or around 0,73% of times of all HOPS applied reductions)

· TL 400kV Tumbri - Krsko 1 (0,09% MTUs, or around 0,73% of times of all HOPS applied reductions)

· TL 220kV Zakucac - Mostar (0,05 % MTUs, or around 0,36% of times of all HOPS applied reductions)

Applied reductions on network element are mostly low (less than 2,62% of Fmax), while for a few MTUs during April (BD20250428) higher values are applied on TL 400 kV Ernestinovo - Pecs 1 and during May (BD20250510) on TL 220 kV Pehlin – Divaca due to unsolvable overloads in the relevant grid area caused by unavailability of grid elements in the surrounding area, additionally under the influence of high exchanges between Core and non-Core countries (impact of uncoordinated flows coming from third countries, mainly from the direction of RS and BA). It is important to emphasize that energy needs increased during Q2 2025 in SEE with significant flows in the network towards SEE, which is why some reductions were applied during Q2 2025 to maintain a secured network. Such reductions are planned to be solved by developing and optimising the transmission network.

In Q2 of 2025, HOPS installed HTLS conductors on TL 220 kV Brinje – VE Padene that increases its maximum admissible power flow and improves available capacities.

Further on, there is ongoing investigation of various possibilities to increase capacities for the TL 220 kV Pehlin – Divača.

Improvements are also expected with upcoming important processes such as coordinated validation capacities and Regional Operational Security Coordination.

# MAVIR

1. **Explanation for the reductions applied by MAVIR in Q2, 2025**

MAVIR performs the individual validation with the basic principle of determining CBCOs that can be potentially overloaded by a realistic market outcome. In case a CBCO which cannot be solved by available remedial actions from contingency analysis but selected to be potentially overloaded is identified, IVA with the objective of minimizing the loss of the flow-based domain volume is optimized and calculated in order to relieve the potential overload. In Q2, there were 7 business days with IVA applied to CBCOs by MAVIR due to two different factors. One is the pattern of significant power flows from import direction over the northern HU borders due to strong import energy need in combination with planned special grid outage situation most of the time for which there is no other solution but IVA application and the other one is the application of IVA fallback due technical failure. There were 28 distinct hours (or 1,28% of the 2184 MTUs) with IVA application. There were no operational fallback IVA application which contributed to the amount of IVA in Q2. In total, 28 distinct hours, the CBCOs with IVAs were a domain limiting constraint.

MAVIR aims to apply the following measures in order to minimize the application of IVAs and, as required by article Article 18 (11)(b) and 18 (12) ID CCM, avoid cross-zonal capacity reductions in the future:

* Consideration of effective topological remedial actions

Based on growing operational experience, methodological improvement in the IVA calculation by excluding areas of the domain in which the concerned overloaded element to the amount of IVA is less sensitive. Note that the operational experience also shows better judgement of IVA applications as to the trade-off between operational security and offered capacities.

MAVIR aims to apply the following measures in order to minimize the application of IVAs and, as required by Article 18 (11)(b) and 18 (12) ID CCM, avoid cross-zonal capacity reductions in the future:

* Consideration of effective topological remedial actions even for those hours in which the NRAO did not select them due to loopflow constraint violation, but the selection of RA would have mitigated the application of IVA amount.

Based on growing operational experience, methodological improvement in the IVA calculation by excluding areas of the domain in which the concerned overloaded element to the amount of IVA is less sensitive. Note that the operational experience also shows better judgement of IVA applications as to the trade-off between operational security and offered capacities.

There are several internal projects and cross-border projects planned with Slovakia, Romania and Serbia to further increase capacities available for the commercial cross-border trades in the day-head and intraday market timeframes. The planned cross-border investments by 2030 are the following, all included in TYNDP 2024:

1. Second circuit of the 400 kV OHL Sajoivanka (HU) – Rimavská Sobota (SK) – (2028)
   1. This grid investment should help to reduce the congestion for [SK-HU] Levice – God [DIR] [HU] and [SK-HU] R. Sobota – Sajoivanka [DIR] [HU] cross-border CNEC
2. New 400 kV OHL Debrecen Del (HU) - Oradea Sud (RO) – (2030)
   1. This grid investment should help to reduce the congestion for the [RO-HU] Arad – Sandorfalva [OPP] [HU] cross-border CNEC
3. Second circuit of the 400 kV OHL Nadab (RO) - Bekescsaba (HU) – (2028)
   1. This grid investment should help to reduce the congestion for the [RO-HU] Arad – Sandorfalva [OPP] [HU] cross-border CNEC
4. New 400 kV OHL SS Subotica 3 (RS) – SS Sandorfalva (HU) – (2028)
   1. This grid investment should help to reduce the congestion for the [RO-HU] Arad – Sandorfalva [OPP] [HU] cross-border CNEC

In addition to the cross-border investments, the following internal investments are expected to have a significant effect on cross-zonal trade:

1. New 400 kV OHL between Sandorfalva and Szolnok, replacing the existing 220 kV line (2028)
   1. This gird investment should help to reduce the congestion for [HU-HU] Paks – Sandorfalva [DIR]. The [HU-HU] Szolnok – Szeged network element will be decommissioned.
2. Second 400 kV OHL between Felsozsolca and Sajoivanka (2026)
   1. This gird investment should help to reduce the congestion for [SK-HU] Levice – God [DIR] [HU] cross-border network element and [HU-HU] Felsozsolca – Sajoivanka [OPP] [HU] network element.

It is important to note that there are also internal and cross-border grid development projects in Slovakia which are foreseen to considerably mitigate grid constraints over the SK – HU.

1. Planned development in the Velky Dur – Levice region (2029)
   1. This grid investment should help to largely reduce the most frequently limiting constraints [SK-SK] V. Dur – Levice 1 [DIR] and [SK-SK] V. Dur – Levice 2 [DIR] from the Top 20 ATC limiting element list. It is also foreseen to help to mitigate the grid constraints over the SK – HU border

Although MAVIR provides already today a high level of RAM on most of its CNECs in the day-ahead and intraday timeframe on several network elements, the RAM may be limited to maintain operational security. For an increase of the RAM the key is the improvement of security coordination in the Core CCR with the implementation of coordinated validation and ROSC.

# PSE

# RTE

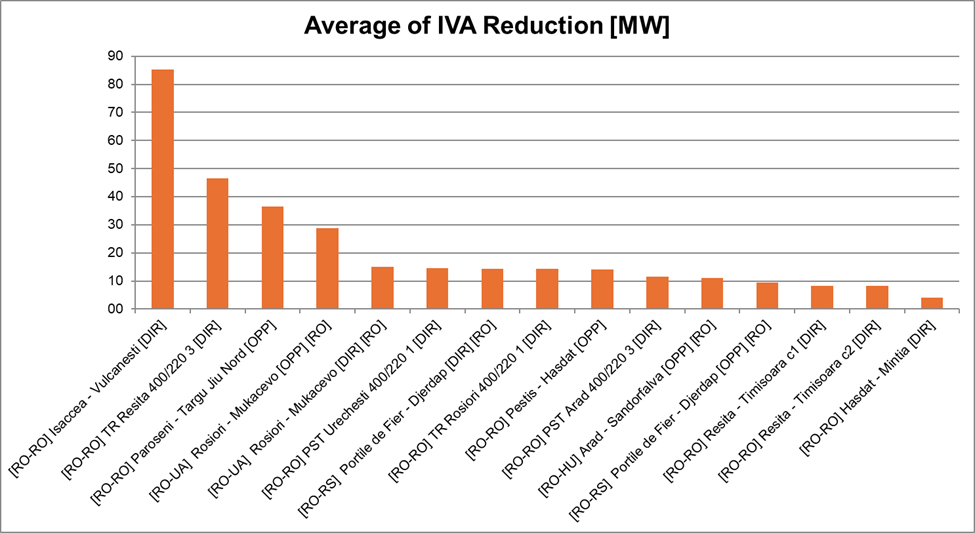
# SEPS

# Transelectrica

In addition to being part of the Core CCR, Transelectrica is also part of SEE CCR with RO – BG border having operational processes for the First Intraday capacity calculation since October 2021 and Second Intraday capacity calculation since October 2022. Moreover, there are three non-EU borders for which there is no coordinated capacity calculation.

Regarding the capacity calculation process, the Core ID CCM allows TSOs to correct cross-zonal capacity for reasons of operational security during the validation process individually and in a coordinated way according to Article 18 (2): “Each Core TSO shall validate and have the right to decrease the RAM for reasons of operational security during individual validation. [...] IVA may reduce the RAM only to the minimum degree that is needed to ensure operational security, and only after all the expected available costly and non-costly remedial actions pursuant to Article 22 of the SO Regulation are considered”.

For the period 20250401 – 20250630, Transelectrica applied an Individual Validation Adjustment (IVA) on the following CNEs, for a total of 4.44% of MTUs. In the graph below the average IVA per CNE is represented for the timestamps where reductions were applied.



OHL 400 kV Portile de Fier – Djerdap is a tieline between Romania and Serbia, both countries having tielines with Bulgaria and Hungary. Because of this, the power flows on OHL 400 kV Portile de Fier – Djerdap are highly impacted by the cross-border exchanges between RO-BG, RO-RS, RO-HU.

General measures to avoid cross-zonal capacity reductions in the future, as per Articles 18(10)(h)(i) and 20(11)(b) of the ID CCM.

* **Development of the transmission grid**

The main measure to reduce overloads in the capacity calculation process is to finalize investment projects with cross-border impact:

* New OHL 400 kV Portile de Fier – Resita and TIE 400 kV Resita – Pancevo circ. 2 have been commissioned in mid November 2024. TIE 400 kV Resita – Pancevo circ. 1 was commissioned in February 2025.
* New Autotransformer 400/220 kV in Rosiori substation to be commissioned in 2027;
* 400 kV OHL Resita – Timisoara – Sacalaz to be commissioned in 2026;
* 400 kV d.c. OHL Timisoara – Arad to be commissioned in 2027;
* Increasing the transmission capacity on the OHLs 220 kV Urechesti – Targu Jiu Nord – Paroseni – Baru Mare – Hasdat to be commissioned in 2028;
* Increasing the transmission capacity on the OHL 220 kV d.c. Portile de Fier – Resita to be commissioned in 2028;
* 400 kV TIE Nadab – Graniceri circ. 2 to be commissioned in 2027;
* 400 kV TIE Portile de Fier – Djerdap circ.2 to be commissioned in 2029;
* 400 kV TIE Oradea Sud – Josza to be commissioned in 2030.

* **Outage planning coordination**

Relevant assets are coordinated in the Outage coordination regions. This coordination has the scope of avoiding simultaneous disconnection of multiple elements with cross-border impact, taking into consideration the system security as a first step. Lately it has been observed that the finalization of the Yearly Maintenance Plan is highly impacted by the level of cross-border capacities provided to the market. Thus, it became a necessity to coordinate the outage of relevant assets also from the perspective of the capacity calculation processes.

* ***Implementation of regional coordinated processes for security analysis and redispatching and countertrading processes***

Results of the intraday capacity calculation process come with a lot of uncertainties, mainly due to the input data, volumes of capacity allocated and available redispatching. Measures to decrease the need of application of IVA include the consideration of internal redispatching. Due to the proximity to real-time, multiple power plants cannot be considered. Also, depending on the location of the congested elements, there may be none, one or multiple generators that can help decreasing the overload, but not necessarily avoiding them altogether.

It is thus mandatory to have security analysis implemented at regional level before real-time with coordinated means of reducing the observed overloads.

At Core CCR level these processes are still under implementation.