Vlada Republike Hrvatske

Ministry of Economy and Sustainable Development

Action Plan

In line with Article 15
of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity

Zagreb, February 2022

Contents

1. Summary

The Article 2 of the Electricity Market Act (Official Gazette No. 111/2021) ensures the implementation of Regulation (EU) 2019/943 of the European Parliament and of the Council on the internal electricity market (hereinafter: Regulation). In accordance with Article 16, paragraph 8 of the Regulation, transmission system operators may not limit the amount of interconnection capacity, which should be made available to market participants as a means of resulting congestions within their own bidding zone or as a means of managing power flows, which are resulting from transactions within bidding zones. This paragraph is considered to be respected if certain minimum levels of available capacity for cross-zonal trade are reached.

The provision on minimum levels of available capacity entered into force on January 1, 2020. When compliance with this provision cannot be ensured, at the request of the transmission system operator, the relevant national regulatory authority may grant a derogation, or the Member State with identified structural congestion, in cooperation with its transmission system operators, takes a decision to establish an Action Plan or a decision to review and change the configuration of its bidding zones.

Accordingly, the Croatian Energy Regulatory Agency (hereinafter: HERA) approved to the Croatian Transmission System Operator d.o.o. (hereinafter: HOPS) deviations from the requirement to ensure a minimum amount of 70% of the transmission capacity for the borders between Croatia and Slovenia and Croatia and Hungary, in other words on all elements of the transmission network important for cross-border trading, firstly for 2020 and then for 2021. HOPS used the mentioned period to study in detail the causes of non-satisfaction with the provisions of the Regulation, and HOPS pointed out in the Structural Congestions Report (hereinafter: the Report) that there are structural congestions in the Croatian transmission system. After HERA approved the Report in November 2021, HOPS informed the relevant Ministry of Economy and Sustainable Development (hereinafter: MINGOR) about this, with the proposal that the problem of structural congestion to be solved by establishing an Action Plan, i.e. by implementing the measures that will be stipulated in the Action Plan, and not by making a decision to review and change the configuration of its bidding zone.

Pursuant to the Decision on the establishment of a working group for the preparation of proposals for an Action Plan for the adoption of measures to reduce structural congestion in the transmission network of the Ministry of Economy and Sustainable Development from January 4, 2022 (class 310-02/22-01/05, Registration number 517-07- 2-1-22-1, hereinafter: Decision) begun the drafting of the proposal for an Action Plan for the adoption of measures to reduce congestion in the transmission network. The Decision also determines that the members of the working group consist of representatives of the ministry responsible for energy (MINGOR), the transmission system operator (HOPS) and the regulatory agency (HERA) in accordance with Article 15 of the Regulation, and if needed it will be expanded.

In consultation with HERA and HOPS, MINGOR accepted the proposal, and prepared an Action Plan for eliminating the congestion identified in the Report by December 31, 2025, at the latest. The Action Plan consists of several measures that will make available to market

participants the available capacities for cross-zonal trade, least in the quantities provided for within the Regulation.

The coordinated calculation of the capacity for the day-ahead market in the Core CCR to be implemented from April 2022 should provide much higher levels of capacity for cross-zonal trading compared to the current capacity calculation based on a non-coordinated approach based on network transmission capacity.

The coordination of remedial measures, which include redispatching and countertrading, and ensuring sufficient reserves in the network as a tool for implementing these measures, enables the elimination of recognized congestion, which is a way to offer the market more cross-zonal capacity. For this purpose, the Rules on congestion management within the Croatian electricity system will be applied, agreements on bilateral redispatching will be concluded with other transmission system operators, and at the level of the Core region, the Methodology for coordinated redispatching and countertrading and the Methodology for redispatching and countertrading cost sharing will be applied.

The optimization of network management is a measure by which the operational capabilities of each individual network element are used optimally, taking into account operational and meteorological constraints in real time. Investing into plants for reactive power compensation, devices for dynamically determining the limits of transmission lines, and more efficient capacity allocation algorithms will increase the utilization of available transmission capacities.

Network development is a measure that enables the increase of available capacity for cross-zonal trade increasing the transmission capacity of existing lines by replacing conductors or building new parts of the transmission network. This Action Plan envisages network development activities that, together with other measures, will enable reaching the minimum levels of available capacity for cross-zonal trade.

The provisions of the Action Plan envisage the supervision of the implementation of the measures of the Action Plan and reaching of the linear trajectory, which means that every year HOPS is obliged to submit a report on the assessment of the achieved minimum capacities to HERA for approval, which is after its approval also submitted to ACER.

2. Introduction

The electricity system is changing and being upgraded so as to ensure high quality and reliable supply of electricity to all consumers. By transitioning to sustainable development using renewable energy sources, stimulating energy generation at the site of consumption, and introducing measures for the more efficient use of energy, energy systems are being transformed and are becoming more vulnerable. In order to maintain the system reliability at high level, planning and supervision measures are introduced, transparency and the availability of information are raised to a higher level, and system operators and network users are being stimulated to engage in more competitive and sustainable production, and rational and efficient consumption, i.e. optimising system operation.

The aim of the Republic of Croatia is to transition fully to the use of energy from renewable energy sources by 2050, and to become a carbon neutral country. Numerous steps have already been taken to increase the share of renewable energy, and in the forthcoming period, full transition is expected within the framework of the European Green Deal. In 2019, the European Union (hereinafter: EU) adopted the energy policy entitled “Clean Energy for all Europeans” (hereinafter: CEP) to stimulate and accelerate the shift from fossil fuels and to transition to clean energy, as well as to fulfil the obligations under the Paris Agreement for reducing greenhouse gas emissions.

One of the shortcomings of generating electricity from renewable sources is its intermittent nature. Therefore, it is necessary to ensure sufficient quantities of electricity in all parts of the country or broader area by using reserves, or through the transmission of electricity from areas with increased generation to areas with decreased generation at all times. For this purpose, it is imperative to ensure sufficient transmission capacities.

Within the framework of the CEP, Regulation (EU) 2019/943 on the internal market for electricity of 5 June 2019 (hereinafter: Regulation) was adopted, and it governs the issues of curtailment of transmission capacities and determines minimum capacity that a transmission system operator must make available to market participants. The provisions of the Regulation present a challenge for the Republic of Croatia, as a country with a comparatively small electricity system, which is strongly connected with EU Member States (Slovenia and Hungary) on the one hand, and with non-EU countries (Bosnia and Herzegovina and Serbia) on the other.

Article 2 of the Electricity Market Act (Official Gazette No. 111/2021) ensures the implementation of the Regulation (EU) 2019/943 of the European Parliament and the Council on the internal market for electricity.

2.1 Legislative framework

Pursuant to Article 16(8) of the Regulation, 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.

It is deemed that this paragraph of the Regulation is complied with where the following minimum levels of available capacity for cross-zonal trading 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) for borders using a flow-based approach, the minimum capacity shall be a margin set in the capacity calculation process as available for flows induced by cross-zonal exchange. The margin shall be 70% of the capacity respecting operational security limits of internal and cross-zonal critical network elements, taking into account 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.

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

Instant fullfilment of Article 16(8) of the Regulation (hereinafter: 70% target) would place the transmission system operators in an unfavourable position in which they would not be able to assess the security risks for electricity system operation. Pursuant to Article 16(9) of the Regulation, at the request of the transmission system operators, the relevant regulatory authorities may grant a derogation from Article 16(8) on foreseeable grounds, where necessary for maintaining operational security. Such derogations shall be granted for no more than one-year at a time, or, provided that the extent of the derogation decrease significantly, after the first year, up to a maximum of two years.

For the period from 1 January 2020 to 31 December 2020, and from 1 January to 31 December 2021, HERA granted HOPS (17 December 2019 and 24 November 2020) the request for derogation from the requirements to ensure the minimum value of 70% transmission capacity is reached, in accordance with Article 16(8) of the Regulation, for the borders between Croatia and Slovenia, and between Croatian and Hungary, to all critical transmission network elements important for cross-border trading, in accordance with Article 16(9) of the Regulation. The authorisation was granted following the prescribed procedure in which, prior to granting authorisation for the derogation, HERA consulted with the regulatory authorities of other Member States. If the regulatory authorities were not to agree with the proposed derogation, the Agency for the Cooperation of Energy Regulators (ACER) then would decide on its authorisation pursuant to Article 6(10)(a) of Regulation (EU) 2019/942. The explanation and reasons for the derogation must be made public.

When it became evident that Croatia would take the direction towards adopting an Action Plan, in November 2021, HOPS submitted to HERA a request to grant the derogation from implementation of Article 16(8) of the Regulation until the adoption of the Action Plan. In line with this procedure, HERA granted the derogation for HOPS on 29 December 2021 from the implementation of Article 16(8) of the Regulation from the start of 2022 until the adoption of the Action Plan, respectively until the end of 2022 if the Action Plan is not adopted until the end of 2022.

If the transmission system operator can prove the existence of structural congestion in the transmission network, in line with Article 15 of the Regulation, then the Member State may draft an Action Plan in cooperation with its regulatory authority. That Action Plan contains a specific plan for the adoption of measures to reduce structural congestion by the beginning of 2026, from the date of adoption of that decision pursuant to Article 14(7) of the Regulation.

3. Decision on adoption of the Action Plan

Taking into account the definition of structural congestion, and the implementation of the congestion frequency threshold of 5% of the observed period,[1] the Structural Congestion Report that HOPS submitted to HERA in September 2021, which was approved by HERA on 12 November 2021, listed that structural congestion appear in the following critical network elements:

1. 400 kV Melina – Divača,
2. 400 kV Melina – Velebit,
3. 400 kV Konjsko – Mostar,
4. 220 kV Pehlin – Divača,
5. 220 kV Melina – Pehlin,
6. 220 kV Melina – Senj,
7. 220 kV Brinje – Pađene,
8. 220 kV Pađene – Konjsko,
9. 220 kV Zakučac – Konjsko,
10. 220 kV Zakučac – Mostar,
11. 220 kV Žerjavinec – Cirkovce.

In accordance with Article 14(7) of the Regulation, Member State with confirmed structural congestion, in cooperation with their transmission system operator, is required within six months of the receipt of the report to issue a decision on establishment of the national or multinational Action Plans, in line with Article 15 of the Regulation or the decision to review and amend its bidding zone configurations. The Commission and ACER must be promptly notified of such decisions.

Review and amendment of bidding zone configurations requires a number of intervention measures in the wholesale electricity market, and in its current activities, ENTSO-E (European Network of Transmission System Operators) in line with Article 14 of the Regulation did not considered the division of smaller systems such as Croatia into multiple bidding zones. At this moment, it is not clear what effects an amendment of the bidding zone comprising the Republic of Croatia could have, and which benefits or disadvantages this would bring. Further, the reconfiguration of the bidding zone cannot be considered and performed independently, but in coordination with other regulatory authorities and transmission system operators. The review process is complex, and the amendment of the configuration is a long and costly process, as it includes the establishment of a framework for the allocation of capacities between zones, the establishment of a wholesale market, review of incentive policies for electricity generation, and other.

Taking into account the complexity of amending the bidding zones with the unknown ultimate benefits, HOPS proposed to the Ministry of Economy and Sustainable Development (hereinafter: MINGOR) that resolving structural congestion is addressed in the form of an Action Plan, as stipulated in Article 14(7) of the Regulation, with the aim of achieving final compliance with Article 16(8) of the Regulation by the beginning of 2026.

On 24 November 2021, MINGOR as the relevant authority in the Republic of Croatia received the HOPS proposal for the adoption of an Action Plan, with the decision of HERA authorising the Structural Congestion Report enclosed. MINGOR has accepted the HOPS's proposal

[1] Pursuant to the Structural Congestion Report already approved by other European regulatory authorities

pursuant to Article 14(7) of the Regulation which prescribes that the Member State with confirmed structural congestion drafts an Action Plan in cooperation with its regulatory authority, and on 4 January 2022 (class 310-02/22-01/05, ID no. 517-07-2-1-22-1) reached the Decision on establishing a working group for the Action Plan for the adoption of measures to reduce structural congestions in the transmission network (hereinafter: Decision). The Decision at the same time determines that the members of the group are the representatives of the competent ministry for energy (MINGOR), transmission system operator (HOPS) and regulatory agency (HERA) in accordance with the Article 15 of the Regulation, with the possibility of enlargement of the representatives of the group if needed.

The Action Plan contains a specific timeline for the adoption of measures to reduce structural congestion identified within four years of the adoption of the Decision.

The Action Plan consists of the following elements:

- Determination of the starting point and linear trajectory of the increase of the minimum cross-border capacity available for cross-zonal trading until 31 December 2025,
- Measures that would allow the reduction of the structural congestion identified in the Structural Congestion Report, and
- Provisions for monitoring implementation of this Action Plan.

4. Starting point and linear trajectory

In line with Article 15(2) of the Regulation, EU Member States shall ensure that the cross-zonal trade capacity is increased on an annual basis until the minimum capacity provided for in Article 16(8) of the Regulation is reached, by 31 December 2025.

Those annual increases shall be achieved by means of a linear trajectory. The starting point of that trajectory shall be either the capacity allocated at the border or on a critical network element in the year before the adoption of the Action Plan or the average during the three years before adoption of the Action Plan, whichever is higher. Member States shall ensure that, during the implementation of their action Plans the capacity made available for cross-zonal trade to be compliant with Article 16(8) is at least equal to the values of the linear trajectory, including by use of remedial actions in the capacity calculation region.

This chapter outlines how the starting point is determined, on all critical network elements relevant for cross-zonal trading, and the accompanying linear trajectory is determined.

4.1 Methodology to determine the starting point

The starting point of the linear trajectory depends on the capacity allocated to the critical network elements for cross-zonal trading in the previous period. At the borders with Slovenia and Hungary, the capacity calculation has been based for a number of years on the uncoordinated net transmission capacity (NTC) approach. However, the manner of calculation

of cross-zonal capacities will change with the implementation of the regional day-ahead capacity calculation in Core capacity calculation region (hereinafter: Core CCR), which is expected in late April 2022. The capacity calculation in Core CCR will be based on the methodology of capacity calculation using a flow-based (FB) approach (hereinafter: Core day-ahead methodology).

The Core day-ahead methodology was adopted under the ACER Decision No. 02/2019 of 21 February 2019.[2] In mid-2021, the regulatory agencies from the Core CCR revised and approved amendments to the Core day-ahead methodology. HERA adopted the mentioned Decision on 26 May 2021.[3]

The cross-zonal borders within the European Union are joined into regions for capacity calculations. The Republic of Croatia consists of a single bidding zone, and its borders with Slovenia and Hungary are contained within the Core CCR. The geographical limits of the region are presented in Figure 1.

Figure 1 shows the position of the Republic of Croatia (HR) in relation to its neighbouring countries. At the borders with Slovenia (HR-SI) and Hungary (HR-HU) the criteria from the Regulation must be met, while at the borders with Bosnia and Herzegovina (HR-BA) and Serbia (HR-RS) no requirements are prescribed by the Regulation concerning the minimum capacity amounts.

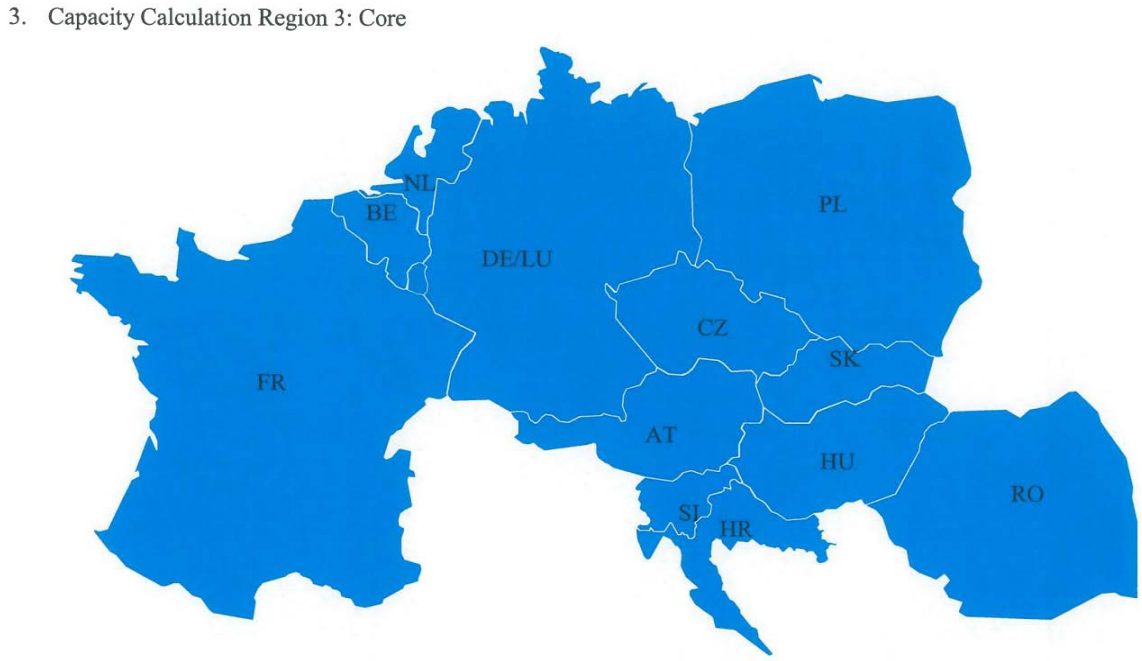

Figure 1. Geographic scope of Core CCR

[2] Decision No 02/2019 of the Agency for the Cooperation of Energy Regulators of 21 February 2019 on the Core CCR TSOs' proposals for the regional design of the day-ahead and intraday common capacity calculation methodologies

[3] The decision to revise and grant approval to the Joint proposal of all transmission system operations in the Core region on capacity calculation. The first amendments of the methodology of the coordinated capacity calculation for the day-ahead market for capacity calculation are in line with Article 20 and further of Regulation Commission (EU) 2015/1222 of 24 July 2015 on the establishment of guidelines for capacity allocations and congestion management

In accordance with the Core day-ahead methodology, HOPS has to determine the network elements that are important for cross-zonal trading. This list consists of the critical network elements important for cross-zonal trade and contingency (CNEC). Since the implementation of flow-based capacity calculations will be used in the coming years to define the trajectory, in accordance with the Core day-ahead methodology, HOPS considers that the starting point of the linear trajectory should be determined for all CNECs which will be used during the day-ahead capacity calculation in the Core CCR.

4.2 Defining of the linear trajectories

The HOPS list of CNECs includes approximately 110 network elements including corresponding outage due to the good interconnectivity with neighbouring countries and the widespread internal network.

In order to avoid the complex and confusing implementation of multiple linear trajectories, a common starting point was selected as the average result for all CNECs to be used in the day-ahead capacity calculations in the Core CCR. This approach simplifies monitoring the capacities offered for cross-zonal trading.

The cross-zonal trading capacities were determined for each CNEC, for each time unit (hour) in the observed period, if data were available.

Appendix 2 of the Core day-ahead methodology defines the manner of calculation of the starting point of the linear trajectory, which Article 17(7) also prescribes that the minimum capacity available for trading at each CNEC in the Core CCR should not be less than 20% of the maximum load of that network element.

The calculation of averages and determination of the linear trajectory is based on the NTC approach that was used for 2019, 2020 and 2021, and the FB approach used for 2021 that was used to test the Core day-ahead methodology. The results of the calculations and linear trajectory are shown in Tables 1–4. The capacity values obtained using the FB approach are significantly higher than those obtained using the NTC approach, indicating that introducing the FB approach is a significant measure towards meeting the “70% target”, as explained in Chapter 4.2.1 of this Action Plan .

ACER developed its Recommendation[4] for the determination of the minimum margin available for cross-zonal trade (MACZT), which is used as the basis for calculating the available capacities at cross-zonal borders.

[4] Recommendation No 1/2019 of the European Union Agency for the Cooperation of Energy Regulators of 08 August 2019 on the implementation of the minimum margin available for cross-zonal trade pursuant to Article 16(8) of Regulation (EU) 2019/943

Table 1. Starting point for network elements important for cross-zonal trading using the NTC approach

	Minimum margin available for cross-zonal trading (minMACZT) in %				
Year	2019	2020	2021	Mean value (2019–2021)	Starting point
HR – SI	9.5	9.8	9.7	9.7	7.6
HR – HU	5.6	5.6	5.6	5.6	(recommended min: 20.0)

Table 2. Linear trajectory for network elements important for cross-zonal trading based on the NTC approach

	Minimum margin available for cross-zonal trading (minMACZT) in %					
Year	Starting point	2022	2023	2024	2025	2026
HR – SI	20.0	20.0	32.5	45.0	57.5	70.0
HR – HU	20.0	20.0	32.5	45.0	57.5	70.0

Table 3. Starting point for network elements important for cross-zonal trading using the FB approach

	Minimum margin available for cross-zonal trading (minMACZT) in %		
Year	2021	Mean value (2021)	Starting point
HR – Core	20.4	20.4	20.4

Table 4. Linear trajectory for network elements important for cross-zonal trading based on the FB approach

	Minimum margin available for cross-zonal trading (minMACZT) in %					
Year	Starting point	2022	2023	2024	2025	2026
HR – Core	20.4	20.4	32.8	45.2	57.6	70.0

Applying strictly the Core day-ahead methodology, the starting point should be determined using the NTC approach, since the FB approach was not applied in the relevant three-year or one-year period. However, since the expected start of implementation of the FB approach for capacity calculation in Core CCR was envisaged to almost at the same time as the adoption of this Action Plan, and that the Action Plan will be implemented for the period of use of FB approach, then the starting point and accompanying linear trajectories are determined in line with Tables 3 and 4.

The selected starting point of the linear trajectory represents the mean value of all minimum annual values of the MACZT for each CNEC which will be used in the regional flow-based day-ahead capacity calculations in the Core CCR.

5. Measures to reduce structural congestion

Pursuant to Article 15(1) of the Regulation, the Action Plan contains a concrete timetable for adopting measures to reduce identified structural congestion by the start of 2026 from the date of adoption of the decision. Pursuant to Article 14(7) of the Regulation, these measures include, but are not limited to:

a) Network development and optimisation,
b) Network expansion,
c) Coordinated capacity calculations,
d) Network reserves for redispatching purposes,
e) Coordination of remedial measures.

Below are the measures arranged in groups into two main categories: network development and optimisation, which includes measures (a) and (b), and improvements concerning congestion management, which includes points (c) through (e). The predictable schedule of measures and network interventions is provided in the Appendix to this Action Plan.

5.1 Network development and optimisation

The green energy transition implies both the efficient use of energy and its production from sources that are neutral in regard to greenhouse gas emissions. The conditions for the construction and installation of such production capacities are not equal in all areas, and it is necessary to ensure sufficient transmission capacity for the complete amount of energy produced from renewable resources. In the Republic of Croatia, the majority of renewable sources are being built in the southern part of the country along the Adriatic coast, due to the favourable wind and solar conditions. HOPS recognised the need to upgrade and strengthen the grid to ensure a successful transition to renewable energy sources, while ensuring full implementation of Article 16(8) of the Regulation at the same time.

The electricity transmission grid is constantly being developed, and a key document for network development is the Ten-Year Transmission Network Development Plan (hereinafter: Ten-Year Development Plan). The Ten-Year Development Plan includes all forecast changes in the grid configuration, recognises the need to connect new users and resolve identified congestions. The public was included in the adoption process of the Ten-Year Development Plan, and HOPS is required to make Ten-Year Development Plan and to obtain HERA's approval which follow the public consultation for concerned public to make the process of adopting the Ten-Year Development Plan completely transparent.

The Ten-Year Development Plan is updated annually, and is intended to increase the transmission capacity, reduce grid congestions and facilitate the achieving of the set goals. The measures to achieve these goals include the strengthening and optimising of the existing network and the development of the new infrastructure. A strong and reliable network is a key for achieving the 70% target from the Regulation.

5.1.1 Increasing availability, strengthening and optimising the network

In the forthcoming period, a numerous interventions are planned in the transmission network, which will ensure the preconditions for more efficient system operation of the Croatian transmission system. This includes the installation of devices that will enable the increase of the transmission capacity of existing transmission lines, and replacing existing network elements with new elements having increased transmission capacity.

In cooperation with the Slovenian Transmission System Operator ELES, HOPS is in the advanced phase of realization of the project SINCRO.GRID where devices for compensation of reactive power have been installed in the transmission system to increase the quality of grid management (voltage regulation and reactive power flows) and to increase transmission capacities.

Moreover, HOPS is also participating in the project FARCROSS (FAcilitating Regional CROSS-border Electricity Transmission through Innovation), which aims to research the potential to increase the amounts and improve the use of transmission capacities, with the aim of improving intraday and day-ahead markets. The research is focused on the installation of dynamic line rating (DLR) devices, as well as increasing transmission capacities of the existing transmission lines, while also analysing the results of monitoring atmospheric conditions, with the purpose of increasing and verifying the calculated amounts of cross-border capacities. The market direction of the research is aimed at increasing the utilisation of available transmission capacities using an algorithm that includes joint optimisation of capacity allocation for amounts of energy and reserve capacity. In addition to the FARCROSS project, additional dynamic line rating devices have also been installed as part of the SINCRO.GRID project.

Figure 2 shows locations where power optimisation devices in the transmission grid were installed as part of the projects SINCRO.GRID and FARCROSS.

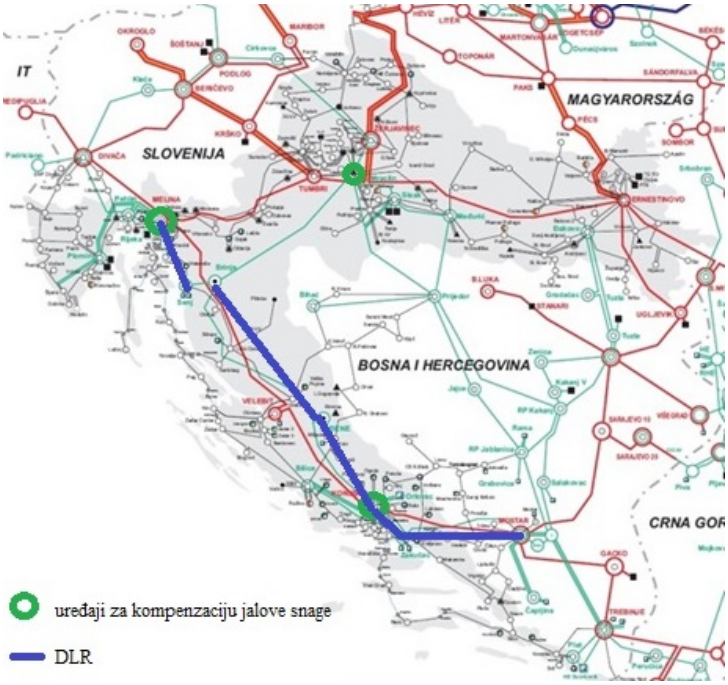

Figure 2. Planned measures to optimise the transmission network

A part of the replacement and strengthening of the transmission network was planned earlier for increasing network availability and due to existing congestions, but also due to forecasted congestions expected due to production in newly connected renewable energy sources. These replacements and reinforcements have already been included in the Ten-Year Development Plan for 2022–2031, and their financing has already been secured through the National Recovery and Resilience Plan.

These replacements and reinforcements have been marked on the scheme of Croatia's electricity system as shown in Figure 3.

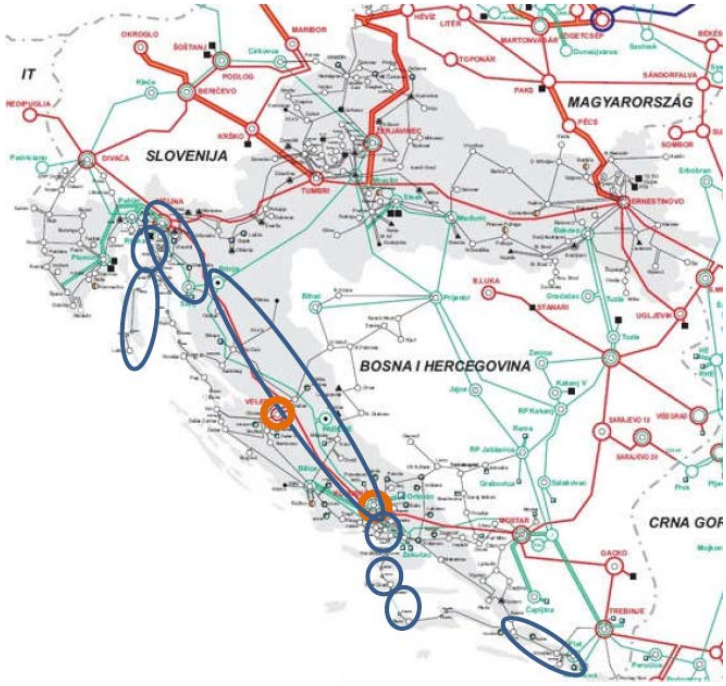

Figure 3. Planned network reinforcements through the National Recovery and Resilience Plan

5.1.2 Network expansions

In the short-term period, once circuit of the double circuit OHL 400 kV Žerjavinec – Heviz will be rerouted to the new transmission line 400 kV Žerjavinec – Cirkovce, while the OHL 220 kV Žerjavinec – Cirkovce has already been reconnected so as to create the new OHL 220 kV Žerjavinec – Podlog (activity no. 5 from Table 5). Based on calculations, with realisation of the planned network expansion, significant changes to power flows are expected, which will resolve the identified congestions in this area of central Croatia, particularly the identified congestion on the OHL 220 kV Žerjavinec – Cirkovce.

The structural congestion has been identified in the network elements of OHL 220 kV Melina – Pehlin, which is not recognised as a CNEC in line with the Core day-ahead methodology, and additional analysis have confirmed that this is only important as an occasional internal congestions. Therefore, the linear trajectory determined in this Action Plan will not be applied to this network element.

For the purpose of elimination of the remaining congestions, as defined in the Structural Congestion Report and as listed in Chapter 2 of this Action Plan, the valid Ten-Year Development Plan for the period 2022–2031 lists activities 1–4 from Table 5, since they belong within the analysed initial three-year and one-year periods for which the precise time frame of implementation is defined, and for which financing has been ensured.

Table 5. Activities from the Ten-Year Development Plan and transmission lines requiring strengthening activities or network upgrades

No.	Transmission line important for cross-border trading	Activity until 31 December 2025
1.	OHL 220 kV Melina - Senj	Increase transmission capacity
2.	OHL 220 kV Brinje – WPP Pađene	Increase transmission capacity
3.	OHL 220 kV Konjsko – WPP Pađene	Increase transmission capacity
4.	OHL 220 kV Konjsko - Zakučac	Increase transmission capacity
5.	OHL 220 kV Žerjavinec - Cirkovce	Network reconfiguration

However, it is already now evident that to respect the 70% target without significant use of remedial measures it will be necessary to also carry out additional activities to increase availability, and to strengthen and optimise the transmission network. This is due to the exceptionally high interdependence of the necessary network expansion in order to meet the 70% target and the necessary network expansion in order to connect a large number of new renewable energy sources. What is generally known is that it will be necessary to strengthen the existing network and expand the network by building a larger number of transmission lines to move the energy produced from renewable energy sources in the southern part of the country towards the consumption areas in the north. Given the high diversity of possible solutions, this Action Plan will not provide a specific list, though it can certainly be expected that a part of the reinforcement would be carried out during the implementation period of this Action Plan (until 31 December 2025). For those projects that involve expansion of the network, and which require a longer implementation time, preparatory activities for the realization of those projects will begin as soon as the justification is determined. This will provide for a long-term cost-effective commitment to meeting the 70% target, even though only implementing additional activities with long period of realization (10 years and more) during the period of implementation of this Action Plan will not have an effect on meeting the “70% target”.

In general, HOPS will invest in network development and in securing other system services to ensure that structural congestions are removed from all 11 network elements identified in the Structural Congestion Report.

All network investments listed in Table 5 and Table 6.1 of the Appendix are listed in the Ten-Year Development Plan for the period 2022 – 2031, and will be financed from the funds secured in the National Recovery and Resilience Plan. Consequently, this will have no effect

on increasing capital expenditures of HOPS when determining the amounts of tariff items for the transmission of electricity once those investments are constructed.

5.2 Measures to improve congestion management

With the adoption of the energy policy framework entitled “Clean Energy for all Europeans”, the congestion management measures should be coordinated at the level for capacity calculation region. As shown in Figure 1, Croatia is part of the Core CCR with 12 other EU Member States. The specificity of Croatia is its long border and excellent connections with neighbouring countries that are not EU member states, which significantly restricts the area for coordinating congestion management measures.

5.2.1 Coordinated capacity calculation

Currently, at certain borders in the Core CCR, including Croatia’s borders with Slovenia and Hungary, the NTC approach is used for capacity calculations while the FB approach is in the trial run phase, with the public disclosure of the results of that testing. It is expected that by the end of April 2022, a regional coordinated FB approach should be in effect. Knowledge to date suggests that the FB approach would largely increase the capacities that HOPS makes available to market participants.

It is expected that the FB approach would bring a number of advantages over the current approach, including:

- Common forecasts and aligned assumptions in capacity calculations,
- Capacity calculation based on a joint network model,
- Coordinated actions to increase cross-zonal capacities, while ensuring network operation security.

The integration of the third countries into the coordinated capacity calculation is of key significance for the increasing of calculated capacities that HOPS makes available to market participants. It is expected that the EU and Energy Community will engage in activities to reach an agreement with third countries on implementation of the rules for the coordinated capacity calculation.

All these activities and advantages of the FB approach will reduce uncertainties and risks in system operation, and will more precisely determine capacities that can be placed on the market, taking into account that 30% of the capacities can be used for the reliability margin, loop flows and internal flows on each network element that is important for cross-border trading, pursuant to Article 16(8) of the Regulation.

HOPS will continue to actively participate in all activities at the regional and European level, and will contribute to accelerating the implementation process for the new calculation approach.

5.2.2 Use of remedial actions

In cases of short-term network congestions, HOPS may take remedial actions to change power flows so as to reduce or fully eliminate the congestion:

- Tap changes of power transformer,
- Changes of network topology,
- Redispatching.

All remedial actions aimed at reducing congestion must be carried out taking into account the security electricity system.

Some remedial actions have no financial effect and can be used without limit, while redispatching, as the most efficient measure, causes financial responsibility for possible losses caused by reduced production or energy consumption, and must therefore be carefully planned. However, more significant use of redispatching as an essential measure for achieving the 70% target can be expected in the period until all the necessary network expansions and reinforcements are executed.

5.2.3 Network reserves

The transmission system operator will take all necessary preliminary actions to ensure sufficient power reserves in the network, which can help with redispatching to remove or eliminate congestion. Taking into account system security and financial consequences, it is necessary to implement at the Core CCR level and apply the Methodology for Coordinated Redispatching and Countertrading (RDCT)[5] and the Methodology for cost sharing of redispatching and countertrading.[6] The rules of congestion management within the Croatian electricity system including interconnection lines, which HOPS adopted in April 2021, should be applied in all cases of congestion and reduced ability to achieve the 70% target from the Regulation.

Implementing the activities envisaged under the mentioned Methodologies and other projects, HOPS has concluded bilateral redispatching agreements with ELES and with the Austrian Transmission System Operator APG, and an agreement with the Hungarian Transmission System Operator MAVIR is currently in preparation. The purpose of these agreements is to ensure a tool to remove congestions in the transition period until the implementation of multilateral redispatching at the Core CCR level.

Redispatching shall be based on objective, transparent and non-discriminatory criteria, taking into account all market mechanisms and price signals.

[5] ACER, Decision No 35/2020 on the Methodology for Coordinated Redispatching and Countertrading for the Core Capacity Calculation Region, 4 December 2020
[6] ACER, Decision No 30/2020 on the Core CCR TSOs proposal for the methodology for cost sharing of redispatching and countertrading, 30 November 2020

5.2.4 Coordination of remedial measures

With the implementation of provisions of the RDCT Methodology and the Methodology for regional operational security coordination for the Core CCR,[7] in line with the provisions of Articles 75 and 76 of Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (SO GL), it is expected in the Core CCR that this will lead to an alignment of measures and more efficient operation of electricity transmission systems. Similar to the implementation of the coordinated capacity calculation, the basic advantages of a coordinated approach to the implementation of remedial measures include:

- Use of common data input from the coordinated capacity calculation,
- Identification of congestions in the common network model,
- Optimisation and coordination of remedial measures to mitigate congestions throughout the region.

Using the common framework for resolving congestion, it is expected that the remedial actions taken will have an optimal effect on the operation and security of the transmission system, with minimum financial costs. After the full implementation and start of implementation of coordinated remedial measures to resolve congestions in the Core CCR significant capabilities to increase capacities being available to market participants are expected.

Inclusion of third countries into the joint planning processes and implementation of remedial measures will open further opportunities to HOPS for congestion management in an effective and transparent way. Only full implementation of regional and inter-regional EU legislative acts can enable the optimal implementation of remedial measures.

6. Supervision

Pursuant to Article 15(4) of the Regulation, during the implementation of the Action Plan and within six months after its expiry, the transmission system operator assesses each year for the preceding 12 months whether the available cross-zonal capacity has reached the linear trajectory or whether, starting on 1 January 2026, the minimum capacities envisaged in Article 16(8) of the Regulation have been achieved. Accordingly, HOPS is required to submit a report on the assessment of the achieved minimum capacities firstly to HERA for approval, and then to ACER.

MINGOR, HERA and HOPS, as the transmission system operator in the Republic of Croatia, agree that the HOPS's Report on the assessment of minimum capacities will be submitted by 1 April each year for the preceding year except for 2022 when the Report on the assessment of minimum capacities would be delivered from the beginning of the validity of Action Plan till the end of 2022.

[7] ACER, Decision No 33/2020 on the Methodology for regional operational security coordination for the Core CCR, 4 December 2020

If the Report on the assessment of minimum capacities or ENTSO-E's Report on structural congestions, as in Article 14(2) of the regulation shows that the targets from the linear trajectory are not met, MINGOR will implement procedure from Article 15(5) of the regulation.

MINGOR will monitor implementation of Action Plan and if necessary in agreement with HERA and HOPS make amendments with the aim to ensure sufficient capacities for cross-zonal trade in accordance with linear trajectory.

7. Appendix

7.1 List of planned projects to increase availability, develop, strengthen, and optimise the transmission grid

Table 6. Planned projects to increase availability, develop and strengthen, and optimise the transmission grid

Network element	Project title	Impact on network element	Finalization of the project
OHL 220kV Konjsko – Pađene	Increase of transmission capacity of OHL 220 kV Konjsko – Brinje	Increase of reliability and transmission capacity from 310 MVA to 570 MVA	2024
OHL 220kV Pađene – Brinje	Increase of transmission capacity of OHL 220 kV Konjsko – Brinje	Increase of reliability and transmission capacity from 310 MVA to 570 MVA	2024
OHL 220kV Senj – Melina	Increase of transmission capacity of OHL 220 kV Senj – Melina	Increase of reliability and transmission capacity from 310 MVA to 570 MVA	2024
SS Konjsko	SS Konjsko – replacement and upgrade of grid transformers 400/220 and 220/110 kV	Increase of reliability and rated transformer capacity from 400/220kV to 3 x 400 MVA	2024
SS Konjsko	SS Konjsko - replacement and upgrade of grid transformers 400/220 and 220/110 kV	Increase of reliability of transformation 220/110kV	2023
Switchyard of HPP Dubrovnik	Switchyard of HPP Dubrovnik	Increase of reliability	2024
OHL 2x110 kV Bilice – Trogir	Construction of OHL 2x110 kV Bilice - Trogir	Decrease of load on current area at 110kV Bilice – Trogir and construction of the new OHL 2x110 kV of transmission capacity 2x120 MVA	2024
OHL 110 kV Lovran - Plomin	Program of replacement and increase of transmission capacity 110 kV lines to connect RES (phase 1)	Increase of reliability and transmission capacity from 90 MVA to 160 MVA	2022
OHL 110 kV Matulji - Lovran	Program of replacement and increase of transmission capacity 110 kV lines to connect RES	Increase of reliability and transmission capacity from 90 MVA to 160 MVA	2022

	(phase 1)		
OHL 110 kV Benkovac - Zadar	Program of replacement and increase of transmission capacity 110 kV lines to connect RES (phase 1)	Increase of reliability and transmission capacity from 90 MVA to 160 MVA	2023
OHL 110 kV Matulji - Ilirska Bistrica	Program of replacement and increase of transmission capacity 110 kV lines to connect RES (phase 1)	Increase of reliability and transmission capacity from 90 MVA to 160 MVA	2025
OHL 110 kV Bruška - Obrovac	Program of replacement and increase of transmission capacity 110 kV lines to connect RES (phase 1)	Increase of reliability and transmission capacity from 90 MVA to 160 MVA	2025
OHL 110 kV Bilice - Benkovac	Program of replacement and increase of transmission capacity 110 kV lines to connect RES (phase 1)	Increase of reliability and transmission capacity from 90 MVA to 160 MVA	2025
OHL 110 kV Otočac - Senj	Program of replacement and increase of transmission capacity 110 kV lines to connect RES (phase 1)	Increase of reliability and transmission capacity from 90 MVA to 160 MVA	2025
OHL 110 kV Otočac - Lički Osik	Program of replacement and increase of transmission capacity 110 kV lines to connect RES (phase 1)	Increase of reliability and transmission capacity from 90 MVA to 160 MVA	2025
OHL KB 110 kV Crikvenica – Krk	Program of replacement of 110 kV submarine cables (phase 1)	Increase of reliability and transmission capacity from 70 MVA to 136 MVA	2022
OHL KB 110 kV Dugi Rat – Postira	Program of replacement of 110 kV submarine cables (phase 1)	Increase of reliability and transmission capacity from 90 MVA to 136 MVA	2022
OHL KB 110kV Hvar – Brač	Program of replacement of 110 kV submarine cables (phase 1)	Increase of reliability and transmission capacity from 70 MVA to 136 MVA	2024
OHL KB 110kV Hvar – Korčula	Program of replacement of 110 kV submarine cables (phase 1)	Increase of reliability and transmission capacity from 70 MVA to 136 MVA	2024
OHL KB 110kV Krk – Lošinj (section Krk-Cres)	Program of replacement of 110 kV submarine cables (phase 1)	Increase of reliability and transmission capacity from 70 MVA	2024.

		to 136 MVA	
OHL KB 110kV Krk – Lošinj (section Cres-Lošinj)	Program of replacement of 110 kV submarine cables (phase 1)	Increase of reliability and transmission capacity from 100 MVA to 136 MVA	2024
OHL 220kV Konjsko – Zakučac	Increase of transmission capacit OHL 220 kV Konjsko – Zakučac	Increase of reliability and transmission capacity from 310 MVA to 570 MVA	2022
OHL 400 kV Žerjavinec – Cirkovce	Network reconfiguration	Decrease of load on several network elements in north-west Croatia	2022
Several elements of the transmission network	Installation of devices for dynamic determination of OHL's capacity limits	Increase of transmission capacity	continuous

7.2 List of planned measures to improve congestion management

Table 7. List of planned measures to improve congestion management

Scope of implementation	Planned measure	Implementation deadline
Core CCR	Implementation of the Methodology of Coordinated Capacity Calculation for the Day-ahead Market	2022
Core CCR	Implementation of the Methodology of Coordinated Capacity Calculation for the Intraday Market	2023
Core CCR	Implementation of the Regulation Coordination of Operational Security, together with the Methodology of for Coordinated Redispatching and Countertrading, and Methodology of cost sharing of redispatching and countertrading	Phase 1: 2024 Phase 2: 2025
Croatia	Implementation of the Rules for congestion management within the Croatian electricity system, including interconnection lines	2022
Croatia, Hungary	Agreement on bilateral cross-border redispatching	2022