Best practices in electricity TSO monitoring based on EU Regulations and other national legislation

Croatian Energy Regulatory Agency

Joint Meeting of the NG & EMER Committees
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Hosted by: MEKH

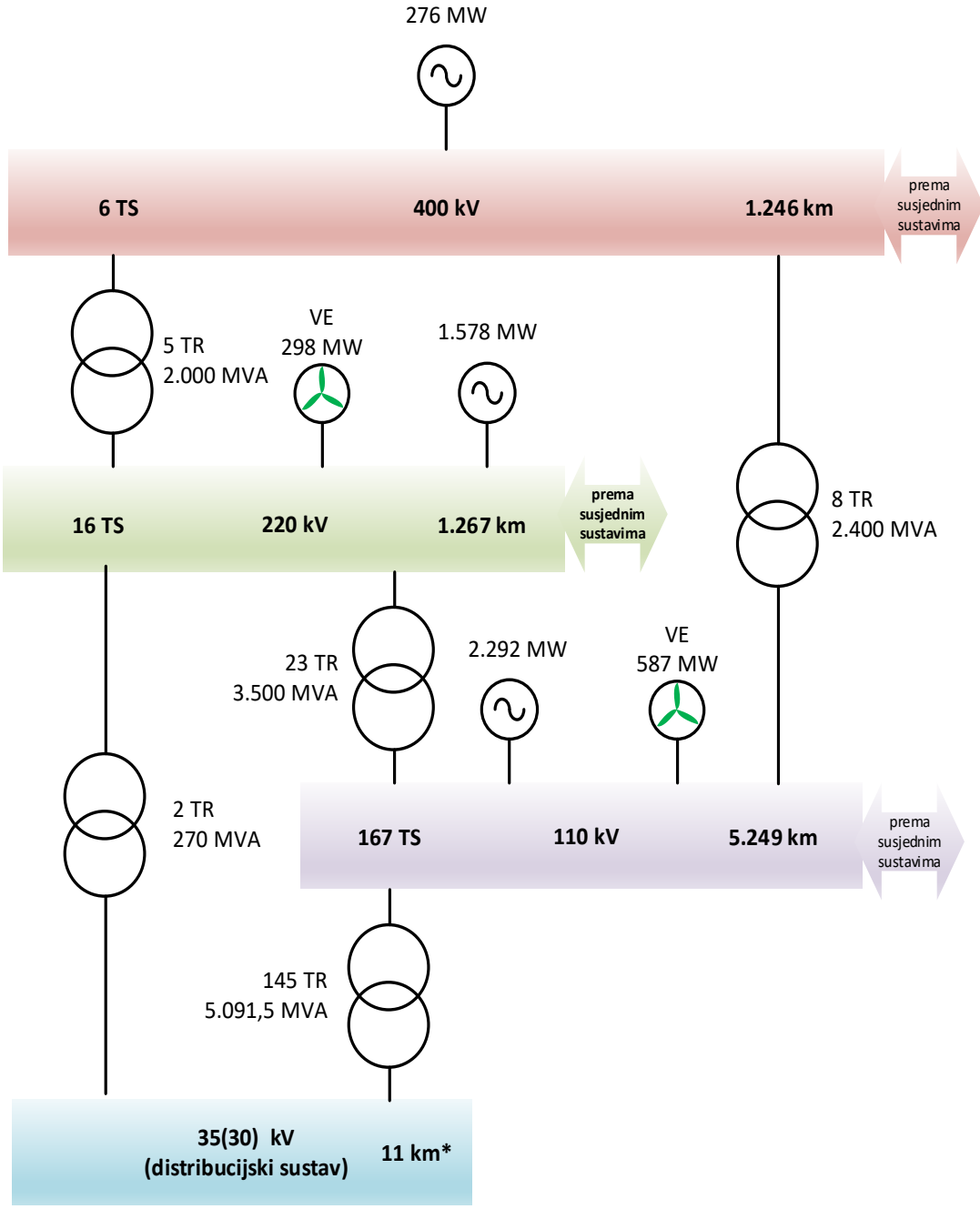
Basic information about the transmission system

- In Croatia, transmission system operator HOPS d.d. provides the public service of electricity transmission and is responsible for the operation, management, maintenance, development, and construction of the transmission network and cross-zonal transmission lines, as well as for ensuring the long-term capability of the network to satisfy reasonable requirements for the electricity transmission.
- Indicators for the transmission in the Republic of Croatia in 2022
  - Maximum daily electricity consumption – 62,9 GWh/day
  - Number of transmission systems operators – 1 (HOPS d.o.o. independent Transmission System Operator)
  - Length of transmission network – 7.774 km

Basic information about the transmission system as of 31 December 2021

- Figure shows basic information on the number of transformer substations (TS) and transformer ratings (TR), length of lines, and the power of connected power plants in the transmission system

*110kV medium-voltage transmission lines



Quality of electricity supply

- The quality of electricity supply is defined and monitored in terms of continuity of supply, voltage quality, and service quality
- In 2022 HERA (Croatian Energy Regulatory Agency) issued the new Conditions for the quality of electricity supply

Quality of electricity supply

- The Conditions for the quality of electricity supply specify
  - The guaranteed quality standards for network connection services
  - Supply quality indicators
  - Method of measuring, collecting and publishing supply quality indicators
  - Method, dynamics and scope of reporting and delivering data to HERA -
  - General, minimum and guaranteed standards and financial compensation in case of failure to meet the guaranteed standards.
  - The time for resolving applications for grid connection approvals and
  - The time foreseen for the connection of a building to the network with a simple connection.

Quality of electricity supply

- New indicators, guaranteed standards and fees related to the production plants connection to the existing customer's installations were introduced
  - The time of issuing a preliminary opinion on the possibility of connection in the observed year,
  - The time of resolving the request for checking the possibility of connecting the production module to the existing plant of the end customer
  - The delivery time of the confirmation start of the network use, i.e. the change of status
  - The amount of fees were increased and the amount of some monetary fees is proportional to the requested connected power

Continuity of supply

- In accordance with the Conditions for the quality of electricity supply, the transmission system operator is required to submit a quality of supply report to HERA once a year.
- General power supply reliability standards for the transmission network are prescribed
  - unsupplied electricity (ENS) in the amount of 700 MWh
  - the average duration of long-term power interruptions (AIT) in the amount of 17 minutes

Continuity of supply

- Continuity of supply is measured by the number and duration of supply interruptions. The quality of continuity is inversely proportional to the number of supply interruptions and the duration of such interruptions. A supply interruption is considered planned if it is announced in the manner and within the time frame defined in the General terms and conditions for network usage and electricity supply
- HOPS monitors the number and duration of power outages in the transmission network and estimates the undelivered electricity due to power outages
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Continuity of supply

- Supply interruptions in the HOPS network from 2013 to 2022

Year	Number of supply interruptions	Duration of supply interruptions [min.]	Estimated volume of electricity not supplied [MWh]
2013.	51	2.908	329
2014.	40	2.410	485
2015.	54	3.522	470
2016.	80	4.651	366
2017.	147	10.448	949
2018.	111	6.124	572
2019.	74	5.932	326
2020.	85	5.787	874
2021.	81	3.098	333
2022.	65	2.785	260

Voltage quality

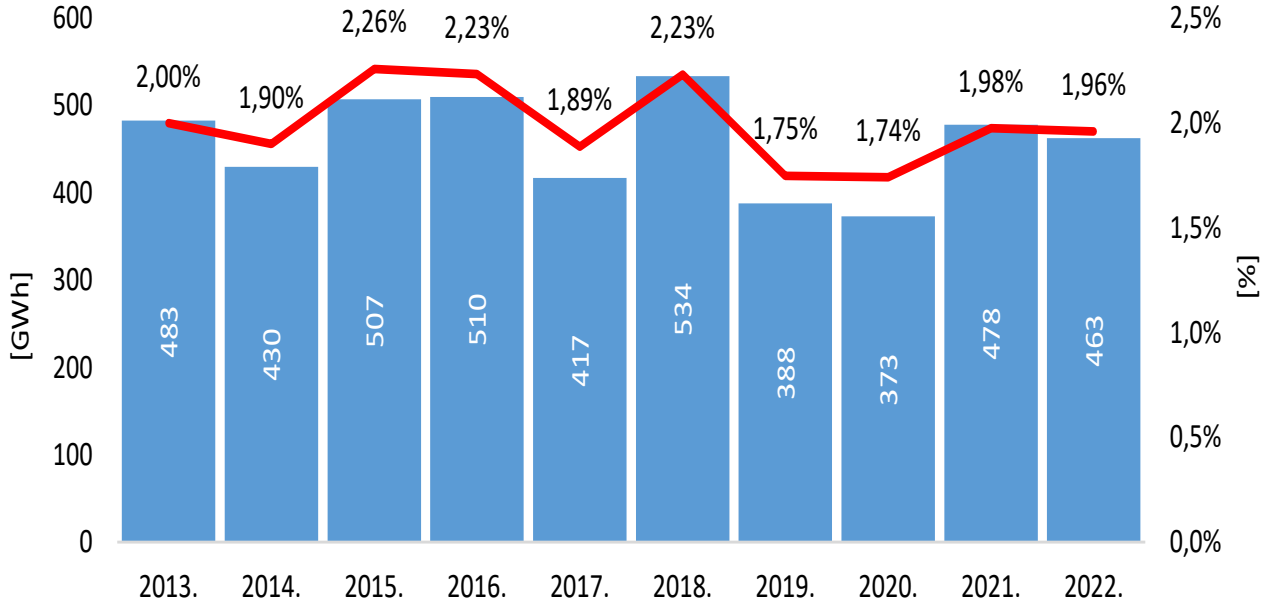
- According to the General terms and conditions for network usage and electricity supply, voltage quality is described as the variation of measured voltage characteristics at a supply terminal from the values listed in the Croatian standard HRN EN 50160.
- A network user may submit a written request once a year to HOPS, depending on the used network, for a report on voltage quality at the given supply terminal. HOPS must perform measurements, prepare and deliver a report on voltage quality at the supply terminal to the network user within 30 days.
- During 2022, four requests for voltage quality measuring was requested by a transmission network users; the measurement affirmed that all parameters in accordance with the HR EN 50160 standard had been met.

Quality of service

- The Conditions for the quality of electricity supply specify the guaranteed quality standards for network connection services:
  - time for resolving applications for a report on the optimal technical solution for connecting to the network depending on connection capacity
  - time for resolving applications for grid connection approvals
  - time foreseen for the connection of a building to the network with a simple connection

Losses in the transmission network

- Power losses in the transmission network in 2022 amounted to 463 GWh, or 1.96% of total transmitted electricity (23,608 GWh).



Monitoring of Losses in the transmission network

- According to Electricity Market Act HOPS should submit to HERA
  - ➢ for approval a quantity and total electricity cost procurement estimation for covering losses for the following year by 30 September
  - ➢ report on the procurement of electricity for covering losses for the previous calendar year
  - ➢ concluded agreements on the procurement of electricity to cover losses for the previous calendar year must be delivered
  - ➢ data and information about sales transactions concluded on the electricity exchange or forward market
- Since 2020, HERA has systematically monitored the quantity, price, and purchase cost of electricity for covering losses on the basis of data delivered monthly by HOPS

Losses in the transmission network

- For 2022, HOPS planned electricity losses in the transmission network in the amount of 448 GWh, and the realization of losses amounted to 463 GWh.
  - Long-term procurement covered 47.4% of energy – long-term contracts concluded on the basis of public bidding
  - short-term procurement covered the remaining 52.6% - short-term trading on CROPEX, the "Route to market" contract and through the calculation of power system deviations
- Given that HOPS procured more than half of the realized losses on a short-term basis, it was exposed to high prices on the short-term market, which resulted in the share of 77.8% of short-term procurement in the total cost of purchasing electricity

Ten-year development plan and tariffs

- According to *Electricity Market Act*, every year HOPS should submit to HERA for approval a Ten-year development plan for the transmission network, with a detailed elaboration of the initial three- and one-year periods (10Y plan) by 30 September. It must be in line with Croatia's current spatial development strategy and the spatial plans of counties, cities, and municipalities
- Furthermore, according to *Methodology for the determination of the tariffs for electricity transmission system,* HOPS should submit three-year business plan, documents and statements related to corporate financial reporting for previous year and fulfilled Annexes of the Methodology.

Allocation of cross-zonal capacities and congestion management

- Calculation and allocation of cross-zonal transmission capacities are the most effective measures for congestion management. Other measures include limitation of the already allocated cross-zonal capacities and the use of corrective measures such as topological measures or redispatching.
- HOPS carries out an uncoordinated capacity calculation at all borders, using the NTC (*net transfer capacity*) approach.
- In accordance with the Croatian Law on Regulation of Energy Activities, HERA consults and closely cooperates with other national regulatory agencies and ACER (*the European Union Agency for the Cooperation of Energy Regulators*) in cross-border matters.
- HERA is responsible for giving consent to general acts related to cross-border trading, congestion management and capacity allocation on cross-border transmission lines, as well as supervision of cross-border trading, congestion management and capacity allocation on cross-border transmission lines.

Allocation of cross-zonal capacities and congestion management

- The supervision of congestion management is prescribed by **Regulation (EU) 2019/943**, as well as by the Capacity Allocation and Congestion Management Regulation, which refers to short-term markets, and by the FCA *(Forward Capacity Allocation*) Regulation, which regulates the allocation of long-term cross-zonal capacities.
- Regulation (EU) 2019/943 regulates the allocation of long-term cross-zonal capacities
- It sets out that revenues resulting from the allocation of cross-zonal capacity shall be used in priority for guaranteeing the actual availability of the allocated capacity or maintaining or increasing cross-zonal capacities
- The Regulation prescribes that the TSO's revenues from the allocation of cross-zonal capacities should be used for the purpose of increasing or guaranteeing cross-zonal capacity.

Allocation of cross-zonal capacities and congestion management

- In accordance with Regulation HOPS is obliged to submit HERA proposal on the use of congestion income for the next calendar year and submit report on the actual use of CI during the previous calendar year
- Every year, HERA publishes a Report on the use of HOPS revenues from the allocation of cross-border transmission capacities in previous year and confirms that HOPS had used the funds in question in accordance with Regulation (EU) 2019/943.

THANK YOU FOR YOUR ATTENTION!

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