

CROATIAN ENERGY  
REGULATORY AGENCY



ANNUAL REPORT **2022**







**Republic of Croatia**  
**Croatian Energy Regulatory Agency**

# **ANNUAL REPORT**

## **FOR 2022**

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# INTRODUCTION







# 1. INTRODUCTION

In accordance with the provisions of the Act on the Regulation of Energy Activities, the Croatian Energy Regulatory Agency (*Hrvatska energetska regulatorna agencija*, hereinafter: HERA) is obliged to submit a report on its work to the Croatian Parliament once a year. The 2022 Report on the Execution of the Budget of the Croatian Energy Regulatory Agency is also submitted with the Annual Report.

The Annual Report, among other things, provides an overview of the most important observations, evaluations and analyses of the energy sector, a presentation of the regulatory activities and work of the national energy regulator over the past year, as well as a list of by-laws, decisions, rules, opinions, resolutions and other acts adopted by HERA in 2022 in the fields of electricity, gas, thermal energy, biofuels, oil and petroleum products markets, which are important for the development and functioning of the market, as well as public services in the energy sector of the Republic of Croatia.

Since the whole of 2022 was marked, first of all, by the war in Ukraine, developments on the international geopolitical plane changed the usual flows of energy sources, which further increased the disruptions in relations on the energy markets that were gradually emerging in the previous years.

In a very short time, due to the disruptions in the energy supply flows throughout the world, there was a shortage of energy in certain markets and a drastic increase in energy prices, and consequently, increased activity in finding possible and acceptable solutions to the energy crisis. The disruption in supply flows hit the European Union member states the most, and thanks to the specific position of our country, domestic energy sources and timely measures to mitigate the rise in energy prices, the Republic of Croatia did not feel a stronger impact of the crisis.

Throughout 2022, the HERA worked rapidly on corrections to the regulatory framework and finding additional mechanisms for adapting to the new market circumstances that brought about an unprecedented increase in the prices of all energy sources.

In this regard, the HERA has made changes to several methodologies and other by-laws in order to ensure the continuity of supply to final energy customers whose suppliers have already encountered or could encounter difficulties in the further supply of gas and electricity. An equally important aspect when adjusting the regulatory framework was ensuring the acceptability of energy prices to final customers, especially citizens, through monitoring the daily fluctuations in the international energy markets and implementing appropriate formulas for calculating prices for end-customers.

It is important to point out that, in the entire transition process and despite all the difficulties in implementing the change of suppliers, not a single consumer was deprived of the supply of electricity, gas or thermal energy, while the level of quality and security of energy supply to the final customers was maintained.



During 2022, the HERA supervised the work of several energy entities and adopted a number of measures and instructions to improve their operations.

In the existing domestic and international regulatory framework, the HERA will continue to perform its tasks with the aim of achieving an optimal balance between the interests of the final energy customers, energy entities and other participants in the energy market.

#### Board of Commissioners of the Croatian Energy Regulatory Agency

Željko Vrban - Deputy President of the Board of Commissioners

Alenka Kinderman Lončarević - Member of the Board of Commissioners

Nikola Vištica - Member of the Board of Commissioners

# 2

## BRIEF OVERVIEW OF THE HERA'S WORK





## 2. BRIEF OVERVIEW OF THE HERA'S WORK

In its Annual Report, the Croatian Energy Regulatory Agency (HERA) provides a detailed overview of the performance of its legally prescribed obligations, results and statistical indicators of individual sectors, the operations of regulated entities in the Croatian energy sector, as well as regulatory assessments and observations related to the development of the energy markets in the Republic of Croatia.

Considering the fact that the year 2022 was one of the more challenging years in the energy sector, in this Report, the HERA tried to provide an overview of all the important events in the energy sector that took place in 2022 and their consequences on the energy sector, and consequently on the overall economy of the Republic of Croatia. As the Croatian energy sector is an integral part of the energy sector of the European Union, the Report also contains a brief overview of the most important documents that have been adopted in the European Union, which concern energy in general, that is, the energy crisis and its resolution – both short-term measures and long-term solutions of energy and climate challenges.

In these new circumstances, the HERA carried out a series of activities and established certain mechanisms in order to ensure the optimal functioning of the energy markets/sectors in the Republic of Croatia, and to ensure the safe delivery of energy products to all final energy customers in the Republic of Croatia, even in the changed circumstances.

The structure of the Annual Report is in line with the recommendations of the Council of European Energy Regulators (CEER), while in terms of content, an effort was made to follow the regulatory reporting practice of the Agency for the Cooperation of Energy Regulators (ACER).

This chapter provides a summary of all the activities in the electricity, natural gas and thermal energy sectors, which are the focus of the regulators' work, while a statistical overview of key events is presented for the sectors of oil and petroleum products and biofuels. After the description of the organisational structure, authority and activities of the HERA, the Report includes chapters in which all the sectors are described in detail. At the end of the Report, there is a chapter containing a list of all the tables and figures included in the Report, followed by a list of abbreviations and a glossary. As an appendix to the Report, a list of licences for the performance of energy activities is provided.

### 2.1. Electricity

#### Security of supply

The HERA has been systematically monitoring the balance of the power system of the Republic of Croatia since 2016, based on hourly data on delivered electricity provided by system operators. Also, the HERA gives an opinion on the annual reports on the security of supply in the transmission/distribution system for the previous calendar year with a projection for the current



calendar year, based on which the Ministry prepares its own annual report on the state of the security of the electricity supply for the previous calendar year and the expected electricity needs in the Republic of Croatia for the future ten-year period.

The balance of the electric power system in 2022 shows that the total electricity consumption in the Republic of Croatia was 18,530 GWh. The majority of the electricity consumption was covered by power plants located in Croatia (13,257 GWh, 71.5%), while the remainder was covered by physical net imports of electricity (5,273 GWh, 28.5%). If the production of the Krško Nuclear Power Plant in the Republic of Slovenia is added to the production of power plants in the Republic of Croatia, the total production amounts to 15,945 GWh and covers 86% of the total electricity consumption in the Republic of Croatia. The production of electricity in power plants that use renewable energy sources amounted to 8,612 GWh, which covers 46% of the total electricity consumption in the Republic of Croatia in 2022.

In 2022, the growth of electricity production from distributed energy sources<sup>1</sup> continued. The total production of electricity from distributed energy sources amounted to 1,816 GWh, which covered 9.8% of the electricity needs, and almost all the production was achieved using renewable energy sources.

The Republic of Croatia is moving closer to the indicative national target of 63.8% renewable energy sources in the gross direct electricity consumption by 2030, as stated in the 2019 *Integrated National Energy and Climate Plan for the Republic of Croatia from 2021 to 2030 (the NECP)*<sup>2</sup>.

The total connection capacity of all the power plants in Croatia amounted to 5,629 MW at the end of 2022, with the following shares of individual types of power plants: 2,203 MW hydroelectric power plants, 2,055 MW fossil-fired plants, 981 MW wind power plants, 224 MW solar power plants, 99 MW biomass power plants, 58 MW biogas power plants and 10 MW geothermal energy plants. The total connection capacity of all the power plants that use renewable energy sources is 3,575 MW, which makes up 65% of the total installed plant capacity.

At the end of 2022, 7,060 billing metering points were connected to the distribution network, where the connection capacity when injecting into the grid was 599 MW and where 1.8 TWh of electricity was delivered to the distribution network. From the end of 2022 to the beginning of May 2023, the number of solar power plants connected to the distribution network increased from 6,880 to 9,170. At the end of 2022, 3,806 final customers had the status of self-supply plants in the distribution network (compared to 1,570 in 2021), all with solar power plants within their installations, with a total connection capacity of roughly 23 MW when injecting into the grid (2.6 MW more than in 2021). In 2022, users of self-supply plants injected over 10 GWh of electricity into the grid or approximately twice as much as in 2021. During 2022, 210 customers with self-supply lost this status because they injected more electricity into the grid than they took from the grid on an annual basis.

The maximum load of the Croatian transmission system amounted to 3,125 MW; it took place on 4 July 2022. The minimum load was 1,212 MW and took place on 1 November 2022.

The security of supply reports of the Croatian transmission system operator Hrvatski operator prijenosnog sustava (hereinafter: HOPS) and the Croatian distribution system operator HEP-Operator distribucijskog sustava d.o.o. (hereinafter: HEP-ODS), as well as currently available data delivered to

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<sup>1</sup> *Distributed sources and/or distributed generation is a term indicating sources/production facilities of electricity or some other useful form of energy that are connected to the distribution network; they are most often located close to the energy users and places of consumption i.e., they are decentralised compared to "large" energy grids and the "large" sources attached to them.*

<sup>2</sup> *During the preparation of the Annual Report, a revision of the NECP was carried out with the aim of increasing the national targets for RES shares*



the HERA by HOPS and HEP-ODS, lead to the conclusion that the security of the electricity supply in the Croatian electricity system was at a satisfactory level in 2022.

Finally, it is important to point out that, based on the systematic monitoring of the hourly balance of the electricity system of the Republic of Croatia, the HERA observed that in the first three months of 2023, there was an increase in the production of electricity in hydroelectric power plants, which, in addition to production from other renewable energy sources, led to the fact that physical net imports amounted to only 4% of the total consumption of the electricity system of the Republic of Croatia. Moreover, due to the large production of hydroelectric power plants, other RES and distributed production in March 2023, the Republic of Croatia was a net exporter of electricity.

## Retail market

The retail electricity market in Croatia is completely open and almost without regulated prices. An exception is the guaranteed supply service, which is activated in situations when a customer from the business category is left without a supply contract with a market supplier of electricity with the aim of ensuring an uninterrupted supply of electricity. Guaranteed supply is performed by HEP ELEKTRA d.o.o. according to the tariff items issued by the HERA on a quarterly basis in accordance with the *Methodology for Setting Tariffs for Guaranteed Electricity Supply (Official Gazette no. 20/22)*.

Final customers in the household category who have not chosen a supplier on the electricity market are supplied by HEP ELEKTRA d.o.o. within the scope of the universal service, at a price that it freely determines.

Since 2014, the HERA has been continuously monitoring shares on the retail electricity market based on data on supplier activities (number of customers and delivered electricity) provided by system operators.

The total electricity sales to final customers in 2022 amounted to 16,812 GWh.

On the retail electricity market in the Republic of Croatia, the share of suppliers that are subsidiaries of HEP d.d. (HEP-Opkrba d.o.o. and HEP ELEKTRA d.o.o.) in the supply of electricity to all customers in 2022 amounted to 95%, which is an increase of 5% compared to 2021.

The three largest suppliers in the supply of household final customers had a 99.4% market share in the electricity sold. In the supply of final customers from the business category, the three largest suppliers had 94.5% of the market share in the electricity sold. Of the total electricity sold to households in 2022, 89% refers to supply within the universal service. The share of business customers within the framework of the guaranteed supply service was 11%.

In July 2022, the HERA adopted the *Rules on Switching Suppliers and Aggregators (Official Gazette no. 84/22)* on the basis of which system operators adjusted their IT processes, thus enabling the rapid confirmation of the compliance of contracts on supply and aggregation (within one day), which is one of the prerequisites for an efficient retail electricity market.

One of the prerequisites for accelerating the energy transition is the introduction of advanced measurement. In 2022, the HERA launched a study to help in the decision-making on the economic assessment of all the long-term costs and benefits of advanced measuring devices and systems for their networking. The distribution system operator prepared the bases for the economic assessment, including the proposal of the form of the advanced metering system and the time frame for its introduction. The study was completed in early 2023.



The prices of electricity for final customers changed during 2022. As of 1 April 2022, there has been a limited increase in the price of electricity for final customers in the household category who are using the universal supply. On an annual level, this is an increase in the final selling price for approximately 90% of all customers in the household category, in the following amounts: 8.1% for the Blue tariff model, 10.8% for the White tariff model, 7.7% for the Red tariff model and 7.9% for the Black tariff model. Although there was an increase in retail prices, the final customers in the household category felt the increase in wholesale prices to a lesser extent. Also, individual market suppliers have the same prices as the household category.

However, the situation with customers in the business category was more complex, as the vast majority of them were fully exposed to the increase in prices on the wholesale markets. After the expiration of the existing contracts in 2022, the electricity price offers in the new contracts were several times higher than before.

Also, from 1 April 2022, based on the decision of the HERA, there were changes in the tariff items for electricity transmission and tariff items for electricity distribution.

In order to prevent a further rise in electricity prices, in September 2022, the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22, 106/22, 121/22 and 156/22)*, which was in force from October 2022 to March 2023. The prices were limited for a period of six months to the price level of universal supply and with the limits of half-year consumption (2,500 kWh household, 250,000 kWh business and 2,500,000 kWh industry). In April 2023, the aforementioned measures were extended by the new *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 31/23)* for the next six-month period. The Regulation also prescribes the HERA's obligation to monitor its application and to monitor the application of the prices determined by the provisions of the Regulation. In this regard, electricity suppliers have the obligation to submit electricity supply contracts (except for universal supply and guaranteed electricity supply) and data on electricity sales to the HERA.

In August 2022, the HERA adopted the *Regulation on the General Terms of Network Usage and Electricity Supply (Official Gazette no. 100/22)*, which replaced the *General Terms and Conditions of Network Usage and Electricity Supply (Official Gazette, no. 85/15, 49/20)*. The aforementioned *Regulation* is of fundamental importance for regulating the retail electricity market and one of its main goals is to strengthen the position of the active final customer. In this sense, this Regulation regulates the framework for sharing electricity in the energy community of citizens and the community of renewable energy in which a renewable energy source is used for activities related to electricity and the sharing of electricity by a collective active customer. This *Regulation* also introduced the guaranteed purchase of electricity by a guaranteed supplier without a special request from a grid user who was left without the contracted purchase of electricity with an electricity purchaser on the retail market. The *Regulation* also prescribes the minimum requirements for issuing invoices and billing information, as well as the possibility of collective supplier switching through a supply negotiator in order to be able to negotiate the most favourable prices and terms of electricity supply. In particular, it should be noted that the Regulation stipulates that energy entities must provide the above services to their customers electronically, as well as the use of electronic signatures.

## Consumer protection and subsidies of the Government of the Republic of Croatia

At the beginning of 2022, the Government of the Republic of Croatia adopted a package of measures to mitigate the rise in energy prices worth HRK 4.8 billion, which began to be implemented from 1 April 2022.



With the price intervention of the HEP Group's suppliers, in the same period, the Government of the Republic of Croatia enacted changes in the system of benefits for the socially disadvantaged and one-off allowances for pensioners were paid. The allowance for vulnerable consumers of energy products was increased from HRK 200 to HRK 400 for a period of one year, while the scope of the beneficiaries was extended to include the beneficiaries of the national allowance for the elderly. The measures included a one-off allowance (energy allowance) for over 721,000 pensioners with a monthly pension of up to HRK 4,000 in the amount of HRK 400 to 1,200, depending on the amount of their pension.

Among the Government's measures from September 2022, which aim to mitigate the consequences of price increases for final electricity customers, it is important to highlight the new increase in the allowance for vulnerable consumers of energy products (the previously increased monthly allowance from HRK 200 to HRK 400 was raised to HRK 500) and that the users of the guaranteed minimum allowance were provided with the cost of housing, communal fees, heating and water services, as well as an energy supplement for 690,000 pensioners with a pension of up to HRK 4,360 (in amounts from HRK 400 to HRK 1,200, depending on the amount of their pension).

Furthermore, in September 2022, the Government of the Republic of Croatia adopted an even larger package of measures worth HRK 21 billion. The comprehensive package provided various subsidies with the aim of mitigating the consequences of the rise in energy prices. *The Regulation on Eliminating Disturbances on the Domestic Energy Market* introduced restrictions on the prices of electricity, thermal energy and gas. In particular, price restrictions were introduced for electricity in such a way that the prices for households and businesses are determined depending on the six-month consumption, for the period from 1 October 2022 to 31 March 2023. At the same time, more favourable prices were set for certain final customers in the business category, namely public institutions, etc. for which the price would be higher. The aforementioned *Regulation* essentially determines the prices that suppliers are obliged to apply if they have entered into a supply contract with the end-customer according to which the price would be higher.

## Quality of electricity supply

Since 2017, the HERA has been systematically monitoring the indicators of the quality of the electricity supply based on the *Requirements for the Quality of the Electricity Supply (Official Gazette no. 37/17, 47/17, 31/18, 16/20)* and the *Regulation on the Requirements for the Quality of the Electricity Supply (Official Gazette no. 84/22)*, which it adopted in accordance with its powers and obligations. Among other things, the aforementioned regulations prescribe the indicators and standards of the quality of the electricity supply and the method of measuring, collecting and publishing indicators of the quality of the electricity supply. In addition, the Regulation also determines the monetary compensation that energy entities are obliged to pay to grid users if the given individual quality indicators are exceeded (e.g. in case of exceeding the time required to resolve the request for the issuance of a grid connection approval).

Based on monitoring of the indicators, the HERA found that the quality indicators of the HEP-ODS connection service are significantly below the prescribed general service quality standard, and the HERA will insist on the mandatory improvement of the indicators in the HEP-ODS in the coming period. The proportion of simple connections carried out in a timely manner for buildings (most often residential buildings with a gross surface area of up to 400 m<sup>2</sup>, i.e. family houses) is especially unsatisfactory. In view of the above, in 2022, in accordance with Article 123 **of the Electricity Market Act**, the HERA initiated the supervision of the distribution system operator related to the quality of the electricity supply in the part that refers to the connection of buildings, and new indicators were introduced in the area of the connection of production facilities to existing customer's installations. Other service quality indicators of HEP-ODS improved compared to the previous year. Pursuant to the *Regulation on the Requirements for the Quality of the Electricity Supply*, HEP-ODS and HOPS have significantly improved their systems for monitoring power interruptions. However, in order to significantly improve





the SAIDI and SAIFI indicators in the HEP-ODS grid, an additional set of measures to improve the continuity of supply needs to be implemented in certain distribution areas. Compared to 2021, the number and duration of power interruptions in the transmission network declined significantly in 2022, as did the estimated energy not supplied.

## Connection to the grid

The **Electricity Market Act** replaced the detailed approach to calculating new grid user connection charges and increasing the connection capacity of the existing grid users with a hybrid approach. The system operator is obligated to create technical requirements in the network, in accordance with the ten-year plans for the development of the transmission or distribution network, which must be in line with Croatia's current spatial development strategy and spatial plans. In accordance with the aforementioned provisions of the Electricity Market Act, in July 2022, the HERA adopted the *Methodology for Determining the Grid Connection Fee*.

The new **Electricity Market Act** changes the connection procedure and the issuance of energy approvals for the construction of production facilities and the storage of electricity, with the aim of the achievable, sustainable addition of renewable energy sources into Croatia's power system. The energy approval becomes the first crucial step in the development of production facility designs.

The issuance of energy approvals should, in terms of time and power (MW), be aligned with the goals stated in the NECP and with the available network capacities, in order to prevent circumstances in which the connected production facilities or energy storage facilities would have to limit the delivery of electricity into the grid due to grid congestion.

In order to facilitate the process of assessing the possibility of connection, the HERA asked the system operators to publish information on the possibility of connecting electricity production facilities in accordance with the **Electricity Market Act**. The transmission system operator and the distribution system operator have published information on the possibilities of connecting to the transmission network<sup>3</sup> and distribution network<sup>4</sup>, respectively.

## Status of eligible electricity producer

The HERA issues decisions on the acquisition of the status of an eligible electricity producer for an individual plant for a period of 25 years, which is one of the prerequisites for exercising the right to an incentive price for the delivered electricity. State incentives are obtained based on a contract concluded with Hrvatski operator tržišta d.o.o. (hereinafter: HROTE). HROTE collects funds for the payment of incentives from three main sources: fees for promoting electricity production from renewable sources and cogeneration that are paid by final customers, regulated sale of a portion of electricity to suppliers and the commercial sale of a portion of the electricity on the market.

## Incentives for the production of electricity from renewable energy sources

In the incentive system, 2.7 TWh of electricity was produced from renewable energy sources, for which HRK 2,817 million was paid. Considering the significant increase in energy prices at the end of 2021 and during 2022, the average weighted price of electricity paid to the eligible producers in the incentive

<sup>3</sup> <https://www.hops.hr/pravila-za-prikljucenja/informacija-o-moqucnosti-prikljucenja-na-prijenosnu-mrezu-za-2023-godinu>

<sup>4</sup> [https://www.hep.hr/ods/UserDocs/Images/dokumenti/Pristup\\_mrezi/Informacije\\_o\\_moqucnostima\\_prikljucenja\\_na\\_distribuciju\\_mrezu\\_svibanj%202023.pdf](https://www.hep.hr/ods/UserDocs/Images/dokumenti/Pristup_mrezi/Informacije_o_moqucnostima_prikljucenja_na_distribuciju_mrezu_svibanj%202023.pdf)



system in 2022 was as much as 50% lower than the annual average price of electricity on the day-ahead market of Hrvatska burza električne energije d.o.o. (Croatian Electricity Exchange Ltd., hereinafter: CROPEX) in contrast to previous years when the average weighted incentive price was always higher. As a result, 67 eligible producers with a total installed capacity of over 376 MW left the incentive system, and the trend of increasing electricity production from plants that use renewable energy sources and high-efficiency cogeneration that were in the incentive system turned around and a sharp decline was recorded.

Therefore, the proposal for a new regulation on encouraging the production of electricity from renewable energy sources and high-efficiency cogeneration, which was consulted with the interested public from 25 May to 8 June 2023, includes provisions according to which contracts concluded with investors must contain provisions on conditions for the early termination of the contract.

The annual balance of the incentive system at the end of 2022 was HRK 23.63 million, which is more than eight times less than at the end of 2021, when the annual balance was HRK 193.93 million. HROTE conducted a tender in 2022 to encourage electricity production from renewable energy sources exclusively through the market premium system, on the basis of which 14 contracts were signed with project holders with a total power of 104.45 MW.

## Investments in the network

The **Electricity Market Act** prescribes that HOPS submits a proposal for the *Ten-Year Plan for the Development of the Transmission Network in 2023-2032, with a detailed elaboration for the initial three-year and one-year periods* to the HERA for approval until the end of September of the current year (2022). HOPS submitted the proposal to the HERA on 30 January 2023, after which the HERA held a public discussion during February 2023. In its plan, HOPS lists the challenges in adopting a ten-year plan. The biggest challenge is how to secure credit, given the current high level of indebtedness. The plan also emphasises that the *Regulation on Eliminating Disturbances on the Domestic Energy Market* made it impossible to submit a request for an increase in tariff items for the transmission of electricity. In addition to the above, the plan emphasises that, to insure against losses in the transmission network, the price of electricity has increased several times compared to previous years, which affected the costs of the system operator. A special challenge is how to estimate the connection capacity of new grid users, as well as their locations and connection costs, which significantly affects the development of the transmission network as a whole.

In 2022, the realised amount of investments in the transmission network amounted to HRK 572 million, taking into account all sources of financing for these investments. Roughly HRK 175 million has already been used during 2022 based on the National Recovery and Resilience Plan (NRRP), which is aligned with national strategic development documents, as well as with European priorities focused on the digital and green transition, which are founded on the modernisation of the economy and society through increased investment in innovation and new technologies. These priorities are embedded in the binding framework of the Recovery and Resilience Facility, which stipulates that at least 20% of the NRRP funds should be directed towards the digital transformation through investments and reforms, while at least 37% should be directed towards the green transition and the fight against climate change.

The **Electricity Market Act** prescribes that HEP-ODS must submit a proposal for the *Ten-Year Plan for the Development of the Distribution Network in 2023-2032, with a detailed elaboration for the initial three-year and one-year periods* to the HERA for approval until the end of September of the current year (2022). HEP-ODS submitted the first version of the plan in October 2022. However, HEP-ODS submitted a new version of the plan in February 2023. In the proposal for the ten-year plan submitted in February 2023, for which HERA held a public discussion in March 2023, total investments in the development of the distribution network in the ten-year period were planned in the amount of HRK



15.49 billion. Investments conditional upon the connection of new users to the grid and increasing the connection capacity of existing users amount to roughly HRK 5.9 billion.

Some of the measures that can delay investments in network reinforcements and that can facilitate the acceptance of renewable energy sources into the system are the use of flexibility services and the management of congestion in the network. **The Electricity Market Act** stipulates that in ten-year development plans, system operators present in an understandable and simple manner the needs for the use of flexibility, consumption management, energy storage and energy efficiency measures, and in what way and to what extent the use of flexibility, consumption management, energy storage and energy efficiency measures reduces or postpones the need to upgrade or replace power capacity in the network. According to **the Electricity Market Act**, in order to complete the legislative framework regarding non-frequency auxiliary services and congestion management, it is necessary to adopt the Rules on Non-frequency Ancillary Services for the Transmission System (HOPS), the Rules on Non-frequency Ancillary Services for the Distribution System (HEP-ODS), the Rules on Congestion Management in the Transmission System (HOPS) and the Rules on Congestion Management in the Distribution System (HEP-ODS).

## Transmission and distribution tariffs

On the basis of a request from HOPS to change tariffs for electricity transmission and a request from HEP-ODS to change electricity distribution tariffs, on 30 September 2021, the HERA carried out an analysis and adopted tariffs to be implemented as of 1 April 2022.

In 2022, compared to 2021, the aforementioned changes in tariff items resulted in an average of 6% higher charges for using the grid for the household category, 1.1% for the category non-household – MV and 1.5% for the category non-household – LV.

In July 2022, the HERA adopted the new *Methodology for Setting Tariffs for Electricity Transmission* and *Methodology for Setting Tariffs for Electricity Distribution*. The new methodologies, among other things, introduce a model for calculating the planned costs of losses for the following year, incentive regulation for the price of losses, incentive regulation for the amount of losses on the distribution network, a tariff element for connection capacity for customers, compensation for the use of the network for producers, as well as a regulatory sandbox.

The *2022 Regulation on Eliminating Disturbances on the Domestic Energy Market* stipulated that HOPS and HEP-ODS shall not submit a request to the HERA to change the amount of tariff items before 31 March 2023. In the *2023 Regulation on Eliminating Disturbances on the Domestic Energy Market*, the ban on submitting requests to the HERA to change the amount of tariff items was extended until 31 March 2024. Accordingly, the operators of the HERA system have not submitted requests for the determination of tariff items for 2023.

## Losses in the network

The HERA gives consent to the system operators to estimate the quantity and total cost of electricity procurement to cover the losses of electricity in the transmission/distribution network for the following year. HOPS planned power losses in the transmission network in the amount of 448 GWh for 2022, and the realised losses amounted to 463 GWh or 1.96% of the total transmitted electricity (23,608 GWh). Long-term procurement covered 47.4% of the realised losses, while short-term procurement covered the remaining 52.6%. Given that HOPS had procured more than half of the realised losses on a short-term basis, it was exposed to high prices on the short-term market, which resulted in the share of short-term procurement in the total cost of the procurement of electricity to cover losses being 77.8%. Within the framework of short-term procurement, HOPS also procured a significant portion of electricity



through the imbalance settlement (13.2%). The share of the purchased electricity in the total cost of the procurement of electricity to cover losses was 18.5%.

Power losses in the distribution network in 2022 amounted to 1,199 GWh, or 7.1% of the total net electricity taken up, which amounted to 16,943 GWh. In order to procure energy to cover losses in the distribution network for 2021, 2022 and 2023, HEP-ODS conducted three public tenders in 2020, after which two agreements were concluded. One of these agreements defined the baseload product (base energy) at a fixed price, while the other defined the purchase of a variable quantity of electricity at a price 25% of which depends on the price on the short-term markets, which moderated the effect of the short-term electricity market price increases on the realised cost of purchasing energy to cover losses in 2022.

The provision of *the General Terms and Conditions of Network Usage and Electricity Supply (Official Gazette, no. 104/20)* was changed, so that for a final customer with a half-year billing period, the amount of the expected monthly consumption is the same for each month within the billing period, and introduced the possibility of unequal monthly consumption in accordance with the rules of the application of substitute load profiles. The same is also prescribed in the *Regulation on the General Terms of Network Usage and Electricity Supply*. Abandoning the obligation to equal the expected monthly consumption makes it easier to determine the loss coefficient in the application of substitute load profiles. In accordance with the above, in 2022, all households with a half-year billing period in the Republic of Croatia switched to unequal monthly consumption, taking into account the region to which the billing metering point belongs (Continental region, Dalmatia and Primorje region, Lika and Gorski Kotar region).

## Wholesale market

The HERA monitors the wholesale market on the basis of data on planned and realised market positions at the hourly level that the HROTE provides to it each month for the previous month, as well as on the basis of data on electricity production plants connected to the grid that are provided to it by system operators. HEP d.d. and its subsidiaries dominate in the installed capacity of power plants, produced electricity and electricity sold on the wholesale market. The total trading volume on the Croatian market in 2022 was 61.8 TWh; HEP d.d.'s share amounted to 40.1 TWh (market share of trading volume).

The HERA also monitors the prices of electricity on the day-ahead and intraday markets based on hourly data on realised prices and sold quantities that the CROPEX electricity exchange provides to it each month for the previous month. Based on the submitted data, it is evident that in the middle of 2022, the prices of wholesale products reached record values, and in the second half of 2022 and the first quarter of 2023, the prices of wholesale products decreased. The price of natural gas was the main factor determining the prices of wholesale products on the electricity market.

On 29 December 2022, the Government of the Republic of Croatia adopted the *Regulation on the Act on Emergency Intervention to Address High Electricity Prices (Official Gazette no. 156/22)*, which ensures the implementation of *Council Regulation (EU) 2022/1854 of 6 October 2022 on Emergency Intervention to Address High Energy Prices*, in the part that refers to measures for the application of the caps on market revenues and the distribution of surplus congestion income revenues to final electricity customers. This regulation limits the market revenues generated by the production of electricity from certain sources<sup>5</sup> by prescribing a price cap of 180 euros per MWh of electricity produced

<sup>5</sup> From wind energy, solar energy (solar thermal and solar photovoltaic energy), geothermal energy, hydropower without reservoir, biomass fuel (solid or gaseous biomass fuel) except for biomethane, waste, nuclear energy, lignite, petroleum products and peat.



to the producers and intermediaries who participate in wholesale electricity markets on behalf of producers, except for energy entities connected to HEP and producers in the incentive system with a valid purchase agreement with HROTE. This intervention seeks to redistribute the additional profits of producers and resellers of electricity generated by the increase in the prices of wholesale products. Surplus market revenues are paid into the account of the Environmental Protection and Energy Efficiency Fund, with the exclusive purpose of installing photovoltaic power plants for households in single-family and multi-apartment buildings. This regulation stipulates that the HERA monitors the fulfilment of the realised surplus market revenues payment obligations. For this purpose, the HERA established a system for receiving and processing data from all those liable to pay surplus market revenues.

With the increasing integration of solar power plants, during certain sunny days, the market reacts with prices equal to zero or negative during sunny hours with low consumption. In order to mitigate the consequences of such circumstances on the system, network and prices of electricity, it is necessary to strengthen the flexibility of the electricity system through production flexibility, building energy storage facilities and using consumption response.

According to the **Electricity Market Act**, in order to complete the legislative framework governing wholesale electricity markets, it is still necessary to adopt the Rules for Organising Wholesale Electricity Markets (HROTE), the Rules on System Balancing (HOPS) and the Rules on the Application of Substitute Load Profiles (HEP-ODS).

## Cross-zonal trading

The HERA especially monitors the allocation of cross-zonal capacities<sup>6</sup> at the borders of the Republic of Croatia based on the data provided to it by HOPS. Based on the monitoring of the allocation of cross-zonal capacities, it can be concluded that cross-zonal capacities at the borders of the Republic of Croatia are allocated in a market-based manner in all time frames. The coordinated regional allocation of cross-zonal capacities in all the time frames on a market basis has been established at all borders except for intraday capacity allocations at the borders with Serbia and Bosnia and Herzegovina. The regional auction offices, JAO (Joint Allocation Office) for the borders with Slovenia, Hungary and Serbia, and SEE CAO (Coordinated Auction Office in Southeast Europe) for the border with Bosnia and Herzegovina conduct annual, monthly and daily auctions.

During 2022, a trend of long-term capacity reduction was observed on the Croatian borders with Slovenia and Hungary, which continued at the beginning of 2023. The main cause is the provision of more capacity that will be available for the day-ahead market, but also the increased costs of neighbouring transmission system operators who have the obligation to compensate market participants for unused physical transmission rights or all financial transmission rights based on the difference in the reference day-ahead prices on neighbouring exchanges.

From June 2022, a coordinated capacity calculation for the day-ahead market was established in the Core region<sup>7</sup> for the power capacity calculation to which the Croatian borders with Slovenia and Hungary also belong, using a power-flow-based approach. In addition to the calculation itself, a day-ahead market coupling was established from that moment on between Croatia and Hungary. With the establishment of a regional day-ahead capacity calculation, prices on the electricity exchanges of

<sup>6</sup> cross-zonal capacity – capacity between two trading zones that serves for electricity trading between neighbouring bidding zones or at the regional level for capacity calculation

<sup>7</sup> The region in the EU for the calculation of transmission capacities determined by borders and not by bidding zones, and that includes the following cross-zonal borders (borders marked with the ISO codes of states and countries): FR-BE, BE-NL, FR-DE/LU, NL-DE/LU, BE-DE/LU, DE/LU-PL, DE/LU-CZ, AT-CZ, AT-HU, AT-SI, CZ-SK, CZ-PL, HU-SK, PL-SK, HR-SI, HR-HU, RO-HU, HU-SI, DE/LU-AT



Croatia and Hungary became more consistent, while at the same time, there was a difference in the day-ahead market prices of Croatia and Slovenia.

From June 2022, a new way of determining the intraday cross-zonal capacities on the Croatian borders with Slovenia and Hungary was also established. Considering that in the transitional period, the intraday capacities were significantly lower than the usual values in the past years, transmission system operators used bilateral agreements in order to offer more capacity to the market in cases where system security would not be threatened. For the first time, it was recorded that in certain hours, there were no free cross-zonal capacities to be offered to the market in a particular direction at one of the two borders in question. A full transition to flow-based (FB) calculation and intraday capacity allocation is expected in the coming years, in accordance with the approved methodology for intraday capacity calculation in the Core region, which was developed on the basis of *Regulation 2015/1222<sup>8</sup> (CACM Regulation)*. The new method is expected to provide sufficient capacity and reduce the number of hours when capacity is not available to the market.

The existence of structural congestion in the transmission network as regards the minimum required 70% capacity for cross-zonal trading was affirmed in HOPS' Report on Structural Congestion, which the HERA approved in November 2021. The action plan being adopted by the competent Ministry in cooperation with the HERA, on the basis of HOPS' data, should represent a measure to solve the identified structural congestion by the end of 2025. Action plan has not been published yet.

## Electric power system balancing and imbalance settlement

The HERA monitors the imbalance settlement based on the data on realised market positions at the hourly level provided by HROTE on a monthly basis. In 2022, HROTE settled imbalances of the balancing groups in the amount of HRK 350 million. The highest average weighted monthly price for negative imbalances  $C_n$  was achieved in August (EUR 540/MWh), while the highest average weighted monthly price for positive imbalances  $C_p$  was achieved in the same month (EUR 374/MWh). Based on data monitoring, the HERA noticed that from 2021, there was an increasing trend of both positive and negative imbalances of the balancing groups. The amount of imbalances increased by 54% in 2022 compared to 2020. In 2022, the HERA analysed the reasons for this trend and asked for comments from system operators and entities that led to the observed trend of increasing imbalances.

The HERA also monitors the procurement of electricity for system balancing based on hourly data on activated balancing electricity and the associated costs. In 2022, HOPS's total costs for imbalance settlement from power reserves amounted to HRK 239.6 million. For other energies for balancing, the amounts are as follows: from the imbalance netting cooperation procedure, the cost is HRK 18.3 million, from the common settlement for unintended exchanges of energy, the cost is HRK 0.6 million, and the income from the energy from the frequency containment process is HRK 1.8 million. The total cost of all the balancing energy amounted to HRK 256.7 million. Due to the imbalances of the power system and the requirement to participate in frequency containment at the rated value, HOPS procures frequency ancillary services in the form of four types of power reserves: frequency containment reserve (FCR); frequency restoration reserve with automatic activation (aFRR) and frequency restoration reserve with manual activation (mFRR), which is divided into mFRR for balancing and mFRR for safety. The HERA approves the conclusion of a contract for the provision of ancillary services between HOPS and HEP-Proizvodnja d.o.o. Furthermore, the HERA gives consent to HOPS's reasoned request for the procurement of certain products and services in the part that cannot be procured on the market, together with an assessment of the possibility of providing a particular product and service on market principles. The total costs of providing ancillary services amounted to HRK 257 million, of which 82%

<sup>8</sup> Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management



was related to power reserves for system balancing. In the future, HOPS will be required to procure energy via the EU electricity balancing platforms based on *Regulation 2017/2195<sup>9</sup> (the EBGL Regulation)*, i.e. through the IN platform<sup>10</sup>.

## Energy efficiency

*Directive 2012/27/EU<sup>11</sup>*, or *Directive 2018/2002<sup>12</sup>*, and the **Energy Efficiency Act (Official Gazette no. 127/14, 116/18, 25/20, 41/21)** generally define the HERA's obligations regarding energy efficiency. The HERA primarily fulfils these obligations by adopting by-laws that direct HOPS, HEP-ODS and grid users to behave in accordance with energy-efficiency principles. When determining the costs in the process of adopting tariff items for electricity transmission and distribution, the quantity of energy losses in the grid is taken into account; when approving ten-year development plans, investments and measures to reduce technical losses in the transmission and distribution networks are taken into account. It must be noted that technical losses cannot be eliminated completely due to the limitations of the laws of physics; as losses become smaller, the investments required to further reduce them increase. The implementation of measures must also take into account plant safety, technical regulations and the development of the grid.

With the aim of contributing to the achievement of the national indicative energy efficiency targets, the **Energy Efficiency Act** sets mandatory cumulative energy-saving targets for energy end-use. Mandatory cumulative objectives are achieved through a combination of energy efficiency obligation systems established by the **Energy Efficiency Act** and alternative policy measures defined in the NECP. The energy efficiency obligation system requires electricity suppliers to save energy when supplying to consumers.

According to the **Energy Efficiency Act**, measures to improve the energy efficiency achieved in the transmission and distribution of electricity are considered alternative policy measures to achieve part of the mandatory cumulative energy savings goal. The measures specified in the ten-year plans of HOPS and HEP-ODS elaborate the measures tentatively specified in the *NECP* and the *National Energy Efficiency Action Plan for the period from 2022 to 2024*.

The Ministry takes an ex officio decision defining the energy savings requirement in kWh for a particular year, and obligated parties are required to deliver reports on the realised savings to the Ministry and enter data on implemented measures into the System for Monitoring and Verification of Energy Savings (hereinafter: SMIV). According to the statements received by the HERA from active electricity suppliers, nearly all active electricity suppliers who were obligated parties in 2022 fulfilled their requirements and reported them to the Ministry.

<sup>9</sup> Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing

<sup>10</sup> Imbalance Netting

<sup>11</sup> Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC or Directive 2012/27/EU on energy efficiency.

<sup>12</sup> Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency or Directive 2018/2002/EU amending Directive on energy efficiency.



## 2.2. Natural gas

### Characteristics of the gas sector in 2022

The natural gas market in 2022 in the European Union was marked by disruptions in gas supply and increased concerns about energy security due to Russia's aggression against Ukraine, which resulted in a strong and record-breaking increase in wholesale gas prices on the European markets, and therefore also on the Croatian gas market. Such circumstances significantly disrupted the previously established supply routes from Russia, and new sources of natural gas had to be found by the beginning of the 2022/2023 heating season. This resulted in the launch of a series of measures aimed at mitigating gas price increases, minimising the price impact on the economy and on households, protecting vulnerable customers and combating energy poverty.

The significant increases in prices on the European wholesale gas markets resulted in a high gas price spike in 2022 in Croatia compared to 2021. This was especially felt by the final customers in the business category, but also by the final customers in the household category who used the market gas supply service. For households that used the public gas supply service, the price of gas is regulated and the price increases in 2022 were significantly lower compared to customers using the market service, which led to the transfer of these customers to the public service at the beginning of the 2022/2023 heating season, and thus approximately 650,000 households were fully protected from the price spikes and multiple increases in gas prices suffered by the vast majority of households in the European Union.

The regulation of the end-price of gas for household customers who use the public gas supply service proved to be of significant importance for the entire market during the energy crisis, given that the final customers in the household category were protected from the fluctuations and uncertainty of the price movements in the most critical period of high prices on the gas market.

In addition to the implementation of this regulatory mechanism, the HERA participated in the implementation of the package of measures adopted by the Government of the Republic of Croatia in 2022, all with the aim of ensuring the optimal functioning of the gas market and the protection of customers and energy entities in the newly created circumstances. The measures adopted by the Government of the Republic of Croatia are briefly described below.

In March 2022, a package of measures was adopted to mitigate the rise in gas prices, which included the reduction of taxation on the price of natural gas by changing the VAT rate from 25% to 5%, and the adoption of a decision on subsidising gas prices for households and micro, small and medium-sized enterprises, as well as a one-off allowance for pensioners and socially disadvantaged persons. The amount of the subsidy for households was HRK 0.10 per kWh (0.0133 EUR/kWh), and for micro, small and medium-sized enterprises with an average annual consumption of up to 10 GWh, the amount of the subsidy was HRK 0.15 per kWh (0.0199 EUR/kWh). The measures entered into force on 1 April 2022, significantly mitigating the growth of retail gas prices in Croatia.

In view of the aforementioned disturbances on the gas market and the increased concern about the security of the gas supply, in April 2022, the Minister of the Economy and Sustainable Development, on the proposal of the Crisis Team responsible for the implementation of the Intervention Plan on Measures to Safeguard the Security of the Gas Supply of the Republic of Croatia, adopted the *Decision on the proclamation of an early warning regarding the level of the crisis state in the protection of the security of the gas supply of the Republic of Croatia (Official Gazette no. 49/22)* due to the existence of concrete, serious and reliable information of the possibility of an event that could result in a significant deterioration of the supply situation and that could trigger the activation of alert levels or emergency levels.





In September, October and December 2022, the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22, 106/22, 121/22 and 156/22)*, which, among other things, prescribed special measures for gas trade, the method and conditions for forming gas prices and ensuring conditions for the security of the gas supply, for the period from 1 October 2022 to 31 March 2024. The *Regulation* stipulates that, in order to ensure the supply and availability of natural gas in the Republic of Croatia during the term of the *Regulation*, the natural gas producer INA – Industrija nafte d.d. (hereinafter: INA d.d.) shall sell all the natural gas produced in the Republic of Croatia to the company Hrvatska elektroprivreda – dioničko društvo (hereinafter: HEP d.d.), as well as the price at which the produced gas shall be sold to HEP d.d. The gas produced from domestic production is intended for the needs of distributors in order to settle losses for gas distribution, for customers of thermal energy from an independent heating system, for the public gas supply service for the needs of customers in the household category and for certain gas customers from the business category.

With regard to the implementation of the *Regulation*, which prescribed various obligations to energy entities, on 30 September 2022, the Ministry of the Economy and Sustainable Development (hereinafter: the Ministry) in cooperation with the HERA issued the *Instruction on the treatment of energy entities related to the Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22 and 106/22) until the decisions from Article 5a (6) of the Regulation are adopted*. In the transitional period until the decision is adopted, it was necessary to define steps to ensure the continuity of natural gas supply through the automatic transition to a guaranteed supply for final customers in the business category whose gas supply contract has ended, which was also covered by the aforementioned *Instruction*.

Pursuant to the adopted *Regulation*, and based on data on customers, quantities and prices of gas for prescribed categories of final customers that the HERA collected, analysed and submitted to the Ministry, on 19 October 2022, the Government of the Republic of Croatia adopted the *Decision on the price and allocation of natural gas capacities taken over by Hrvatska elektroprivreda d.d. from natural gas producers (Official Gazette no. 122/2022)*. The *Decision* prescribes the price at which HEP d.d. shall sell gas to distribution system operators for the purposes of loss settlement, for the needs of customers of thermal energy from an independent thermal system, to suppliers with a public service obligation for the purposes of public service and to the company HEP - PLIN d.o.o. for the needs of supplying customers from a certain business category, as well as the estimated quantities of gas for the specified categories, during the term of the *Regulation*, namely, the period from 1 October 2022 to 31 March 2024.

On 31 October 2022, the Government of the Republic of Croatia published the *Intervention Plan on Measures to Safeguard the Security of the Gas Supply of the Republic of Croatia* in accordance with Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of the gas supply and repealing Regulation (EU) No 994/2010 supplemented by Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage and Council Regulation (EU) 2022/1369 of 5 August 2022 on coordinated demand-reduction measures for gas. The *Intervention Plan* defines the procedures, roles and responsibilities of the competent authorities and all involved participants in the gas market in the event of gas supply disruptions, measures to eliminate or mitigate the impact of gas supply disruptions, measures to ensure a reliable and efficient natural gas supply, criteria and method of determination of sufficient quantities of natural gas to ensure a reliable supply of natural gas to protected customers, and ordering the reduction or suspension of natural gas supply to certain categories of customers in the event of a crisis.

With regard to the expiration of the period for which special measures for gas trade were prescribed by the *Regulation*, the Government of the Republic of Croatia adopted a new *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 31/23)* on 16 March 2023, which extended the application of special and temporary measures for gas trade, for the period from



1 April 2023 to 31 March 2024. In accordance with the provisions of the *Regulation*, the company HEP d.d. shall sell the gas supplied by the company INA d.d. for the needs of distributors in order to settle losses for gas distribution, for customers of thermal energy from an independent heating system, for the public gas supply service for the needs of customers in the household category and for certain gas customers from the business category and for the purpose of settling gas losses in the transmission system and for the operational consumption of technological facilities of the transmission system. On 16 March 2023, the Government of the Republic of Croatia adopted a new *Decision on subsidising part of the end-price of the gas supply for households, and non-households with an annual gas consumption of up to 10 GWh (Official Gazette no. 31/23)*, for the period from 1 April 2023 to 31 June 2024.

The *Decision on subsidising* prescribes subsidising the end-price of gas supply for final customers in the household category, up to the amount of the gas price difference of 0.0277 EUR/kWh up to the amount determined by the *Methodology for setting tariffs for public service gas supply and guaranteed supply* applied for the period from 1 April 2023 to 31 March 2024, and the continuation of subsidising the final price of gas supply for customers belonging to the category of micro, small and medium businesses with an average annual consumption of up to 10 GWh in the amount of 0.0199 EUR/kWh.

## Overview of measures and activities in the gas sector within the competence of the HERA

During 2022, the HERA implemented measures and undertook activities with regard to making relevant decisions, instructions and providing information to participants in the gas market, while taking into account the adopted *Decision on the proclamation of an early warning regarding the level of the crisis state in the protection of the security of the gas supply of the Republic of Croatia* and the *Regulation on Eliminating Disturbances on the Domestic Energy Market*.

The measures and activities were aimed primarily at the protection of all final customers of gas, and especially protected customers who are entitled to be supplied with a certain amount of gas in case of crisis situations, and who belong to the category of households, small and medium-sized businesses and institutions connected to the distribution system, social services and centralised heating facilities to the extent that they deliver heat to final customers from these categories.

The measures and activities undertaken by the HERA with the aim of the security of the supply and the protection of final gas customers include the following groups of activities:

- ensuring the continuity of gas supply to final customers in the household category by making decisions that enable the automatic transition from market to public gas supply service,
- ensuring the continuity of gas supply by activating the guaranteed supply for final customers whose suppliers have run into difficulties due to the energy crisis,
- supervision of the implementation and execution of the activities prescribed by the *Regulation on Eliminating Disturbances on the Domestic Energy Market* and the related decisions of the Government of the Republic of Croatia and instructions of the Ministry,
- supervision of the implementation and adoption of decisions that ordered the actions of energy entities in cases of gas price increases for final customers in the business category that are not based on mutually accepted contractual provisions,
- informing gas market participants of their rights and obligations, in particular as regards the contracting of gas supply to final customers.



With the aim of ensuring the continuity of gas supply to final customers in the household category and enabling the transition from market to public gas supply service, and taking into account the numerous inquiries and complaints received from final customers in the household category regarding the actions of the energy entity GRADSKA PLINARA ZAGREB-OPSKRBA d.o.o. in connection with the procedure of changing the supplier, on 14 September 2022 the HERA issued the *Decision* ordering GRADSKA PLINARA ZAGREB-OPSKRBA d.o.o. to initiate supplier switching procedures for all billing metering points in the household category for which applications for switching the gas supplier had been received.

Following the announcements of the expiry or termination of gas supply contracts on 30 September 2022 by the market gas suppliers and the assessment that around 122,000 natural gas customers in the household category will request a return to the public gas supply service, as well as the observed problems when customers return to the public gas supply service, with the aim of protecting customers in the household category and ensuring the safety, regularity and quality of the gas supply, on 23 September 2022, the HERA adopted the *Decision on the start of providing public gas supply services to end-customers in the household category with a terminated gas supply contract*. The *Decision* prescribes the necessary steps and obligations of participants in the gas market so that household customers are not left without a gas supply from 1 October 2022, and so that they could start using the public gas supply service at a regulated price. It is prescribed that the change of supplier and the start of providing public gas supply services to end-customers in the household category with a terminated gas supply contract during the validity of the *Regulation* shall be carried out automatically.

## Adjustment of the legal framework to the changes in the gas market

Given the situation on the European wholesale gas market and the manifold price increases, which has resulted in an increase in the sale price of gas for non-household final customers beyond the guaranteed supply price range foreseen in the *Methodology for setting tariffs for gas supply as a public service and guaranteed supply (Official Gazette no. 108/20)* in 2022, in February of 2022, the HERA adopted the *Amendments to the Methodology for setting tariffs for gas supply as a public service and guaranteed supply (Official Gazette no. 20/22)*. The *Amendments to the Methodology* prescribe a new way of determining the final price of guaranteed supply for non-household final customers by reflecting market trends on a quarterly basis. As a result of the *Amendments to the Methodology*, which changed the conditions under which guaranteed supply is provided, a public tender to determine a new guaranteed supplier of gas was undertaken. On the basis of the public tender conducted in February 2022, in March 2022, the HERA adopted the *Decision to designate the guaranteed gas supplier*, which designated HEP-PLIN d.o.o. as the guaranteed gas supplier in Croatia for the period from 10 March 2022 to 30 September 2024.

## Guaranteed gas supply

Due to financial problems in the operations of gas suppliers, and with the aim of ensuring continuous gas supply to final customers, in March and April 2022, the HERA identified suppliers in difficulty and made a decision to begin providing a guaranteed gas supply to the final customers of two gas suppliers (IVAPLIN d.o.o. and BROD-PLIN d.o.o.). During the same period, the HERA carried out supervision over the performance of the energy activity of gas supply due to the non-fulfilment of the obligation to ensure sufficient quantities of gas for the final customers and the failure to fulfil the financial qualifications, and in early May 2022, the HERA decided to start providing a guaranteed gas supply to the final customers of another supplier of gas (ZELINSKE KOMUNALIJE d.o.o.). In June and October 2022, the HERA issued decisions on the permanent revocation of the licence for performing gas supply activities for the three of the energy entities mentioned.



## Consumer protection

In order to protect final customers, the HERA continuously reminded and asked all gas suppliers to ensure that their final customers are protected from unfair and misleading sales methods, that the provisions of gas supply contracts are fair to the final customers, and that they clearly, simply, and unambiguously describe the rights and obligations of both the supplier and the customer. The HERA's activities also included an analysis of offers, standardised contracts, and conditions offered by gas suppliers who supply household final customers. These activities resulted in gas suppliers harmonising standardised supply agreements and conditions, of which they were also required to inform their customers. The HERA continuously analyses offers, standardised contracts and contractual conditions of gas suppliers in the procedures for issuing and extending licences for performing gas supply activities.

Within the framework of the activities of monitoring the actions of gas suppliers and ensuring the rights and obligations of the final customers in accordance with the provisions of the *General Terms and Conditions of Gas Supply (Official Gazette no. 50/18, 88/19, 39/20, 100/21 and 103/22)*, at the end of 2021 the HERA started and at the beginning of 2022 completed the monitoring procedure over the energy entity GRADSKA PLINARA ZAGREB - OPSKRBA d.o.o., on the basis of which the energy entity was ordered to undertake actions in dealing with non-household final customers, namely, in cases of gas price increases that are not based on mutually accepted contractual provisions, final customers cannot be prevented from changing the gas supplier, and an order to suspend their gas supply cannot be issued. During 2022, the HERA initiated monitoring procedures over four other energy entities with the aim of determining potential non-compliance with the provisions that prescribe the amendment of the contractual conditions, changes of gas supplier and the fulfilment of obligations when giving offers, with the aim of protecting end-customers from unfair sales methods.

Upon receiving complaints and inquiries from final customers and other participants in the gas market, the HERA collects additional information and statements from stakeholders in specific cases, and informs the final customers of their rights, and if necessary, gives instructions and orders to energy entities with the aim of eliminating the identified deficiencies in procedures. Related to the above, the HERA also published information for final customers on its website about the method of contracting gas supply, the procedure for changing suppliers, and fulfilling the prescribed obligations of gas suppliers in the event of a change of supplier.

## Activities in the implementation of the Regulation on Eliminating Disturbances on the Domestic Energy Market

Based on the provisions of the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, the HERA was obliged, at the request of the Ministry, to submit the necessary data on customers, quantities and prices for distribution system operators for the purpose of settling losses for gas distribution, for customers of thermal energy from an independent thermal system, for public gas supply service for the needs of customers in the household category and for gas customers from the business category from Article 2 (3) of the *Regulation*, which include health institutions, preschools and schools, associations and cooperatives, municipalities, cities and counties, etc., and other necessary data, for the purpose of preparing the *Decision on the price and allocation of natural gas capacities taken over by Hrvatska elektroprivreda d.d. from natural gas producers*. Following the above, during September and October 2022, the HERA collected and analysed data from energy entities on the expressed interest in gas procurement, required gas quantities, billing metering points, as well as data on the planned production of natural gas in Croatia, and submitted them to the Ministry. Based on the data, the *Decision on the price and allocation of natural gas capacities taken over by Hrvatska elektroprivreda d.d. from natural gas producers (Official Gazette no. 122/22)* was adopted. In accordance with the provisions of the *Decision*, on 27 October 2022, the Ministry, in cooperation with



the HERA, issued the *Instruction on action for energy entities regarding the implementation of the Decision on the price and allocation of natural gas capacities taken over by Hrvatska elektroprivreda d.d. from natural gas producers (Official Gazette no. 122/22)* to prescribe in more detail the method of application and implementation of the provisions of the *Regulation* and *Decision*.

Taking into account the provisions of the *Regulation* according to which the HERA monitors its implementation and supervises the application of prices determined by the provisions of the *Regulation* and the *Decision*, the HERA continuously collected and analysed reports on gas volumes taken over from INA d.d. and delivered gas volumes from HEP d.d., as well as the applicable prices.

In order to remove obstacles to the development of the gas market, the HERA implemented various measures and activities, the most important of which were:

- creation of a specialised gas price comparison tool web application,
- adoption of rules for the functioning of the RBMP, a unique electronic database of all final customer billing metering points in Croatia, with the purpose of monitoring and improving business processes on the gas market, the better and faster implementation of the supplier switching procedure and the allocation of gas energy received at the distribution system entry point, and the continuous improvement of procedures and activities in providing information to gas market stakeholders through the RBMP, in cooperation with the gas market operator,
- the introduction of gross calorific value for the expression of the energy of gas and the capacity of gas systems, with the aim of harmonisation with gas systems in the neighbouring countries, by stating the gross calorific value instead of the net calorific value from 1 October 2022,
- making decisions on the amounts of tariff items, prices and fees in order to apply the gross calorific value of gas and introduce the euro currency,
- implementation of the certification procedure of gas storage system operators in order to assess the risks associated with the prescribed storage filling targets in the EU based on *Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage*.

## Gas price comparison web tool

In September 2022, the HERA initiated the creation of a specialised gas price comparison tool, which was finished in early 2023. The obligation to create a specialised web application is prescribed by the *General Terms and Conditions of Gas Supply*, all with the aim of making it easier for final customers to compare the available offers for gas supply, including gas prices and gas supply conditions. The application also makes it easier for final customers to make a decision on choosing a gas supplier and to access gas supplier contacts. The final customers for whom the gas price comparison tool is intended are household and non-household customers (businesses) with an annual gas consumption of up to 100,000 kWh. Also, for the purposes of the establishment and functioning of the gas price comparison tool, the HERA will enable gas suppliers to enter data on the final gas prices and gas supply conditions, as well as data on their changes, into the gas price comparison tool in a standardised format. With regard to the normalisation of prices on the gas market after the previously described disturbances, the HERA is evaluating the possibility of using the application, and the application will soon be available to users. In the coming period, the HERA plans to familiarise gas suppliers with the web application and inform them about the purpose and use of the application with the aim of filling the application with the available gas supply offers. Also, the HERA will make a public announcement for the final customers of gas about the possibility of comparing gas prices and gas supply conditions, as well as access to gas supplier contacts.



## Quality of supply

With the aim of harmonising with the practice in EU member states regarding the calculation of delivered gas energy, as of 1 October 2022, the conditions for calculating the delivered gas were changed. When calculating gas, instead of the previously used net calorific value of gas (NCV), from 1 October 2022, the gross calorific value of gas (GCV) will be applied. Calculation of gas using the gross calorific value (GCV) was introduced to simplify the process of gas trade and capacity leasing, to enable the simpler integration of the Croatian gas market into the regional gas market, as well as to reduce the possibility of errors in the calculation of gas energy.

With regard to the received inquiries from gas suppliers and distribution system operators related to the application of the provisions of the *General Terms and Conditions of Gas Supply* and the *Gas Distribution System Network Code*, asking for clarification on how to apply gas volume correction factors to correctly calculate the delivered gas energy at the gross calorific value and present the calculation on invoices for the delivered gas, in November 2022, the HERA also adopted the *Binding decision for energy entities for the application of the General Terms and Conditions of Gas Supply and the Gas Distribution System Network Code regarding the calculation of the delivered gas energy* with the aim of the unambiguous application of the calculation of delivered gas energy at the gross calorific value by all stakeholders in the gas market.

With regard to the aforementioned changes in the method of calculation, i.e. determining the energy of the delivered gas at the gross calorific value from 1 October 2022, in September 2022, the HERA adopted all the relevant decisions on the amounts of the tariff items, prices and fees, whereby the amounts were recalculated by applying a correction factor due to the higher level of energy of the delivered gas (11% more) expressed at the gross calorific value, which had no impact on the total cost of the delivered gas energy compared to the previous method of calculation when the net calorific value had been applied. Also, all the amounts in the decisions are expressed both in Croatian kunas and in euros with the application of a fixed conversion rate of 7.53450.

## Certification of gas storage system operators

In February 2023, the HERA established a draft decision on issuing a certificate to the gas storage system operator, the energy entity PODZEMNO SKLADIŠTE PLINA d.o.o., based on Article 14 (1) (1) of the **Act on the Regulation of Energy Activities (Official Gazette no. 120/12 and 68/18)** and Article 2 of *Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage*, which was submitted to the European Commission for its opinion. Namely, the HERA's obligation according to *Regulation (EU) 2022/1032* was to issue a draft decision on certification, and with regard to the criterion according to which certification is mandatory for gas storage systems with a capacity of over 3.5 TWh where the total storage facilities were filled on 31 March 2021 and on 31 March 2022 at a level that, on average, was less than 30% of their maximum capacity.

## Change in the method of determining the final price of gas for households

As previously pointed out, the HERA's duty is, among other things, to implement measures for the protection of final customers, which includes the supply of gas at reasonable prices. Bearing in mind the disturbances on the energy market and the significant increase in gas prices on the European gas markets during 2022, the HERA recognised the need for amendments to the *Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette no. 108/20 and 20/22)* In this regard, in April 2023, the HERA adopted the *Amendments to the Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette no. 38/23)*, which prescribe a new method of determining gas procurement costs for the regulatory year 2023/2024 and for the regulatory



year 2024 which reflects current gas prices on the market. For the regulatory year 2023/2024, this will mean the supply of gas to the final customers in the household category at reasonable prices, since gas prices on the European markets have had a downward trend since December 2022. Namely, if the amendments to the *Methodology* had not been adopted, there would have been a multiple increase in the final price of gas for households that use the public service, which would have disrupted market relations and called into question the possibility of supplying gas to final customers (households) from the suppliers with a public service obligation. From all of the above, it is clear that the *Amendments to the Methodology*, in addition to ensuring the protection of final customers, aim to create prerequisites for optimal functioning under the existing market circumstances.

## Overview of the gas sector

### *Wholesale market*

The average wholesale price of gas in Croatia (net of VAT) in 2022 amounted to HRK 0.7587/kWh, which was 199.4% higher than in 2021, when it amounted to HRK 0.2535/kWh (at gross calorific value). A strong increase in the price of gas on the wholesale market occurred in Q3 2022, with the price increasing by 82.3% compared to Q2 2022. At the same time, the wholesale price of gas in Q3 2022 (net of VAT) was HRK 1.1648/kWh, which is 331.6% higher compared to the same period of the previous year.

### *Retail market*

The average retail price of gas in Croatia (net of VAT) for non-household final customers<sup>13</sup> in 2022 was HRK 0.6468/kWh, which is an increase of 144.7% compared to 2021. At the same time, in Q3 2022, the average retail price for non-household final customers (net of VAT) was HRK 0.8058/kWh, which is 75.4% higher than the average price in Q2 2022, and 204.8% higher compared to the same quarter of 2021.

In 2022, the average gas sale price for household final customers<sup>14</sup> using the public gas supply service in Croatia was HRK 0.3227/kWh, which represents an increase of 36.6% compared to 2021. Taking into account the measures of the Government of the Republic of Croatia, namely tax relief and subsidising the price of gas for household final customers, the average increase in the final price of gas for households in 2022 compared to 2021 was about 21.5%.

The final price of gas for households (net of taxes) in Croatia in 2022 was still significantly lower than the EU average (51.9%), while the final price of gas for households including taxes in Croatia in 2022 was 56.8% lower than the EU average.

The final price of gas for non-household final consumers (net of taxes) in Croatia in 2022 was 0.6% higher than the EU average, while the final price of gas including taxes for non-household consumers in Croatia in 2022 was 10.3% lower than the EU average.

### *Natural gas production*

In order to ensure gas supplies and increase the availability of natural gas in the Republic of Croatia, in 2022, the obligation to increase the production of natural gas by 10% compared to the planned production of natural gas, depending on technical and technological possibilities, in the period from 1 October 2022 to 31 March 2024 was prescribed for the natural gas producer INA d.d. in accordance

<sup>13</sup> Non-household consumers are all final customers who are not household consumers. The Gas Market Act (Official Gazette no. 18/18 and 23/20) defines non-household final customers as consumers buying gas not intended for use in their own household.

<sup>14</sup> Including household final customers using the public supply service and household final customers using the market service.



with the *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22, 106/22, 121/22 and 156/22)*. Ensuring additional quantities of gas, in accordance with the aforementioned provisions of the *Regulation*, will have a positive impact on the security of the gas supply and on the overall economy.

### Gas import

Since the beginning of commercial operation, i.e. from 1 January 2021, more than 6.6 million m<sup>3</sup> of liquefied natural gas (LNG) has been gasified at the liquefied natural gas terminal, and more than 4 billion m<sup>3</sup> of natural gas has entered the transmission system of the Republic of Croatia from the LNG terminal. In 2022, more than 60% of all quantities of natural gas that entered the transmission system of the Republic of Croatia entered through the LNG terminal. A total of 32 LNG transport ships from 4 different countries arrived at the LNG terminal in 2022. During 2022, the gasification capacity of the LNG terminal was increased from 2.6 billion m<sup>3</sup> of natural gas to 2.9 billion m<sup>3</sup> of natural gas per year, and the capacities are fully leased until 2030. The shares of the total contracted capacity of the LNG terminal for the 2021-2040 period, by users of the LNG terminal, with the balance at the end of 2022, were: PPD d.o.o. 44.6%, MVM CEEnergy Croatia d.o.o. 18.7%, HEP d.d. 15.5%, MET Croatia Energy Trade d.o.o. 13.1%, INA d.d. 5.5% and Geoplin d.o.o. 2.6%.

### Gas transmission

The total quantity of natural gas measured at the entrance to the transmission system in 2022 was 41,040 GWh (domestic production 6,035 GWh, imports at interconnections 5,363 GWh, imports from the LNG terminal 26,476 GWh, and entrance from the storage facility 3,166 GWh), which was 16.6% less than in 2021. At the LNG terminal entrance to the Croatian transmission system, the transmitted quantity of gas amounted to 26,476 GWh, or 64.5% of the total transmitted quantity of gas, which is 51.9% more than in 2021. The total transported quantities of gas for exit groups from the Croatian transmission system in 2022 amounted to 41,041 GWh, which is 16.7% more compared to the total transported quantities recorded at the exit in 2021.

### Gas storage

In order to ensure a sufficient supply of gas in the territory of the Republic of Croatia in accordance with *Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage*, which, among other things, prescribes the targets for filling underground gas storage facilities for the year 2022, on 3 June 2022 the Government of the Republic of Croatia adopted the *Decision on securing gas supplies on the territory of the Republic of Croatia (Official Gazette no. 63/22)* by which the company HEP d.d. is tasked with providing 270.83 million m<sup>3</sup> of gas, and injecting this quantity into the gas storage system of the operator Podzemno skladište plina d.o.o. Namely, according to the aforementioned *Decision*, the users of the gas storage system were obliged to fill the gas storage in the amount of 63% of their total leased gas storage capacity until 1 August 2022, and 74% of their total leased storage capacity until 1 October 2022. Given that not all users of the gas storage system expressed interest in filling the leased storage capacity to the prescribed level, they left part of their capacity to HEP d.d., which had the obligation to use them and fill them up to the prescribed level in order to ensure sufficient gas supplies until 31 March 2023. In order to create conditions for the storage of surplus gas, the injection operation cycle of the storage was extended in the period from 1 November 2022 to 13 November 2022, and the operation cycle was changed from withdrawal to injection from 28 December 2022 to 8 January 2023, all in accordance with the technical and technological possibilities of the storage and in accordance with the provisions of the *Regulation on Eliminating Disturbances on the Domestic Energy Market*. On 12 January 2023, the storage was 92% full, which represents the highest level of filling in the last five years.





### *Market development indicators*

The total quantity of natural gas delivered to final customers in Croatia on the retail market in 2022 amounted to 24,237 GWh, which was 17.5% less than in 2021. Of this amount, a total of 6,452 GWh of gas was delivered to household final customers, which represents a decrease of 11.3% compared to 2021. A total of 5,329 GWh of gas was delivered to non-household final customers connected to the distribution system, which represents a decrease of 14.0% compared to 2021. A total of 12,456 GWh of gas was delivered to industrial final customers connected to the transmission system, which represents a decrease of 21.6% compared to 2021. At the same time, gas exports at the interconnections amounted to 11,489 GWh, which is a multiple increase compared to 2021, when gas exports amounted to 1,143 GWh.

Natural gas in Croatia was procured from multiple sources: from domestic production, from imports at interconnections with Slovenia and Hungary, and from the LNG terminal, which is an indicator of the diversity of supply routes and a factor in increasing the security of supply.

Transmission system users use all available capacity products to optimise their own costs. The more intensive use of short-term capacity products at the entrances to the transmission system is regular in the first half of the year, primarily at interconnections, in order to meet the needs for increased quantities of gas due to low temperatures. Due to the war events in Ukraine, gas flows have completely changed throughout Europe, including in Croatia, which has brought significant dynamics and frequent changes in the mode of operation of the transmission system. LNG terminals in EU countries have become the main supply routes, and filling gas storages, in order to enter the winter period with the largest gas supplies possible, has become a priority of all European Union members. In such conditions, the use of the capacity of the LNG terminal on the island of Krk and the physical use of gas output capacity to Hungary, and occasionally to Slovenia, also increased. The aforementioned conditions and events on the EU gas market and the Croatian gas market affected the reservations and utilisation of capacities, primarily at interconnections and at the entrance from the LNG terminal. In particular, the contracting and intensive use of short-term capacities at the exits of the interconnections from 1 April 2022, which were influenced by the temporary cessation of operations of Petrokemija d.d. and gas export to neighbouring countries, should be highlighted.

With the aim of increasing the security of the gas supply, on 18 August 2022, the Government of the Republic of Croatia adopted the *Decision on increasing the security of gas the supply by building the Zlobin - Bosiljevo gas pipeline and increasing the capacity of the LNG terminal to 6.1 billion cubic metres of gas per year (Official Gazette no. 96/22)*. The aforementioned Decision plans the construction of a gas pipeline with the aim of transporting additional quantities of gas from the LNG terminal through the interconnections with Slovenia and Hungary. At the same time, the gasification capacity of the LNG terminal will be further increased up to the planned 6.1 billion m<sup>3</sup> of natural gas per year, which will enable the doubling of the capacity of the terminal on the island of Krk.

In 2022, a total of 15 gas suppliers and traders organised as heads of balance groups sold gas on the wholesale market. A moderate level of competition was maintained on the wholesale gas market, dominated by several major suppliers. Namely, the market concentration index – the Herfindhal-Hirschmann Index (hereinafter: HHI) – on the Croatian wholesale gas market amounted to 2,005 in 2022, while it amounted to 2,160 in 2021, which is still an indicator of the moderate domination of a small number of suppliers on the wholesale gas market. The largest shares in the total natural gas quantities sold on the wholesale market belong to the balance groups PRVO PLINARSKO DRUŠTVO d.o.o., MVM CEEnergy Croatia d.o.o. and MET Croatia Energy Trade d.o.o.

The HHI score for the retail gas market of the Republic of Croatia in the non-household category in 2022 was 3,188, which represents a significant increase compared to 2021, when it was 2,056, and represents a departure from the target, recommended HHI level of 2,000. The change in the market



concentration is the result of a significant reduction in the supply of gas for the needs of Petrokemija d.d., but also the implementation of Government measures to eliminate disturbances on the domestic energy market, one of which included the sale of all natural gas produced in the Republic of Croatia to HEP d.d. with the aim of ensuring and increasing the availability of natural gas in the Republic of Croatia. At the same time that the sales volume of one of the largest participants in the retail market increased by 25% compared to the previous year, its dominance in the retail market also increased and its market share exceeded 50%, which additionally influenced the increase of HHI compared to the year 2021.

The majority of households in Croatia purchase gas under regulated conditions (99% of the total number of household final customers on 31 December 2022 were final customers who use the public gas supply service), considering the regulation model of the final price of gas, which protects household final customers on the gas supply public service from fluctuations on the gas market, ensuring a predictable, guaranteed final price of gas throughout the regulatory year, as well as considering the other regulated conditions of gas supply. Compared to 2021, in 2022 a significant decrease in the number of gas supplier switches was recorded, i.e. in 2022, a total of 14,203 requests for switching the supplier were processed. Of the total number of initiated procedures for switching suppliers, 9,814 were household final customers and the remaining 4,389 were non-household final customers. The decrease in the number of gas supplier switches is the result of the previously mentioned disturbances on the gas market.

With regard to the high market prices of gas and the measures of the Government of the Republic of Croatia that were adopted to protect the final customers of gas (non-household and household) from the high prices of energy products, as well as the HERA's decision on the automatic transition of household final customers from the market service to the public gas supply service, and all in order to ensure the continuity of the gas supply, an additional update of the status of household final customers and non-household final customers in the RBMP was performed by HROTE. Also, with regard to the activation of the guaranteed gas supply by the guaranteed supplier HEP-PLIN d.o.o. in three distribution areas, non-household and household customers who had been supplied by suppliers in difficulty started using the guaranteed gas supply. Pursuant to the above, in addition to the standardised recorded switching of supplier, 129,465 billing metering points of household final customers, and 19,059 billing metering points of non-household final customers were transferred by the end of 2022.

In March 2022, the HERA adopted the *Decision on tariffs for gas storage (Official Gazette no. 36/22)*, which defined the amounts of tariff items for gas storage for the third regulatory period from 1 April 2022 to 31 December 2026. The tariff for a contracted standard bundled unit (hereinafter: SBU) at the annual level for the year 2022 was 3.9% lower than in 2021. The established tariffs for gas storage in the third regulatory period are based on the calculation of the anticipated allowed revenues of the gas storage system operator, which include the difference identified after the regular revision of revenues for 2016 and the years of the second regulatory period in 2017, 2018, 2019 and 2020, which is also founded on planned investment projects for the third regulatory period. The most important investment project the gas storage system operator is planning for the period from 2022-2026 is the first phase of construction of the new Grubišno Polje peak storage facility, which the HERA has accepted as part of the approval of the investment plan for the third regulatory period.

Distribution system operators, in accordance with the *Gas Distribution System Network Code (Official Gazette no. 50/18, 88/19, 36/20 and 100/21)*, are obliged to ensure gas quantities sufficient to cover gas losses in the distribution system, whereby, from 1 July 2022, they are obliged to buy gas to cover losses based on market principles through a public tender for gas procurement. Until 30 June 2022, distributors procured gas for covering losses under regulated conditions and at the price of gas for the public gas supply service. Considering the high market prices of gas in 2022, and especially in the period from 1 July 2022, the procurement of gas to cover losses has become a major financial problem for distribution system operators, but also a problem due to the lack of interest of gas suppliers in



offering gas for these purposes. The aforementioned problems were also recognised by the competent authorities, and in accordance with the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, the gas produced by INA d.d. was provided for the needs of distribution system operators for the purpose of settling gas distribution losses at a regulated price.

During 2022, and especially with the entry into force of the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, in cooperation with the HERA and in accordance with the provisions of the *Regulation*, HROTE d.o.o. has improved and refined the functionality of the IT system for managing the RBMP in order to identify final customers who exercise the right to gas at the regulated price defined in the *Regulation*. The functional upgrading of the system enabled the correct identification of the final customers to whom the *Regulation* applies.



## 2.3. Oil, petroleum products and biofuels

In 2022, the oil, petroleum products and biofuel sector in Croatia was marked by a decrease in the production of petroleum products, an increase in petroleum product imports, and an increase in quantities of crude oil transported via the oil pipeline system. During 2022, the Rijeka Oil Refinery refined 248,000 tonnes of crude oil, 32,000 tonnes of domestically produced condensates, 593,000 tonnes of other raw materials (domestic and imported), and 1.47 million tonnes of imported crude oil from Azerbaijan and Kazakhstan. The total demand for raw materials for the production of petroleum products amounted to 2.31 million tonnes.

The production of petroleum products in 2022 amounted to 2.1 million tonnes, which represents a decrease of 9% compared to the quantities produced in 2021. A total of 2.3 million tonnes of petroleum products were imported, which is an increase in imports of 0.71 million tonnes, or 44.3% compared to the quantities imported in 2021. This increase in imports is primarily attributable to the increase in economic activities after the cessation of restrictions due to the Covid-19 pandemic.

The total production of liquefied petroleum gas in 2022 amounted to 159,000 tonnes, which is a decrease of 41,000 tonnes (+34.7%) compared to 2021.

The production of biofuel in 2022 amounted to 372 tonnes, which represents a decrease of 4.6% compared to 2021, when 390 tonnes of biofuels were produced.

Among the more significant events in 2022 that marked the petroleum product market are the takeover of CRODUX DERIVATA DVA d.o.o. by PETROL d.o.o., through which the market share of PETROL d.o.o. in Croatia increased to more than 25%, and the continuous increase in the prices of petroleum products. Furthermore, during 2022, driven by the recovery of the world economy from the Covid-19 pandemic, as well as other significant announcements, changes and events tied to energy in Europe and worldwide, the prices of all energy products began to rise significantly, including petroleum products. As a response to and mitigation measure for the situation for consumers of petroleum products, in 2022 the Government of the Republic of Croatia adopted a series of *Decisions on determining the maximum retail price of petroleum products (Official Gazette no. 17/22, 28/22, 35/22, 64/22, 70/22, 83/22, 86/22, 89/22, 91/22, 94/22, 97/22, 102/22, 105/22, 108/22, 111/22, 114/22, 120/22, 124/22, 130/22, 135/22, 141/22 and 149/22)*, which limit the growth of retail prices of petroleum products on the domestic market, and the period for determining the highest retail prices of petroleum products is set to 14 days. Furthermore, the Government of the Republic of Croatia also adopted a number of *Decisions amending the Decision on the amount of excise duty on energy products and electricity (Official Gazette no. 28/22, 64/22, 76/2022, 83/22, 89/22, 100 /22, 113/22, 126/22, 138/22 and 156/22)*, which prevented the impact of the increase in excise duties on the overall increase in the prices of petroleum products on the domestic market.



## 2.4. Thermal energy

### Characteristics of the thermal energy sector in 2022

During 2022, the thermal energy sector was affected by a sudden increase in the purchase prices of natural gas on the European markets, which required the initiation of measures aimed at mitigating the price impact on households and the economy, as well as customer protection and the fight against energy poverty. The Government adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22, 106/22, 121/22, 156/22)* by which it “froze” the prices of thermal energy for final customers, and based on a special Decision, the Government determined that the difference between the market and the “frozen” unit prices for central and closed heating systems will be subsidised, while for independent heating systems, gas quantities will be provided at the price of the public service.

In accordance with the Regulation, the HERA collected data from all the energy entities under the jurisdiction of DHS and CHS: data on the produced and delivered thermal energy in the 2021/2022 and 2022/2023 heating seasons, production plants, heating systems, final customers, the structure of end prices by tariff models, income and expenses during the 2021/2022 heating season and the estimate for the 2022/2023 heating season; the price of input energy and the price of emission units of greenhouse gases, copies of invoices and contracts for the purchase of energy from which the purchase prices for the 2021/2022 heating season can be seen, contracts for the purchase of energy for the 2022/2023 heating season that show the prices, cost structure, and copies of invoices showing the valid prices applicable to households, industry and business consumers.

The relevant data on the basis of which the unit price for the production of thermal energy for DHS and CHS was calculated includes:

- the quantity of delivered thermal energy according to the TM1, TM2 and TM3 tariff models
- the price of energy products (fuel) for the 2021/2022 heating season determined on the basis of submitted copies of invoices and energy purchase contracts, which show the purchase prices for the 2021/2022 heating season
- the price of energy products (fuel) for the 2022/2023 heating season determined on the basis of submitted energy purchase contracts, which show the purchase prices for the 2022/2023 heating season
- amounts of VAT: 13% on the date of adoption of the Regulation (valid for the 2021/2022 season and 5% for the 2022/2023 season)

The calculations adopted by the HERA Decisions or Government Decisions (Official Gazette no. 28/23 and 43/23) are fully in accordance with the Regulation and the data submitted by the energy entities.

On the basis of the aforementioned decisions, the energy entities issued invoices for thermal energy to the final customers. The amount of the subsidy for the delivered thermal energy was stated on the invoices, and the price remained unchanged compared to the period before the entry into force of the Regulation, thus protecting the final customers from the increase in the prices of energy products.

In order to protect consumers who receive thermal energy from independent heating systems, the HERA collected data from thermal energy consumers on the required gas quantities and the billing metering points, based on which the necessary gas quantities for the 2022/2023 heating season were obtained.

In order to protect customers, according to the Regulation, the price of thermal energy remains unchanged in the period from 1 September 2022 to 31 March 2024. The HERA calculated the unit prices for thermal energy produced in DHS and CHS, and the Government subsidised the difference related to the increase in the cost of thermal energy production.



In accordance with the regulations, the HERA supervises the implementation of the Regulation, as well as the application of prices determined by the provisions of the Regulation.

## Overview of key activities in 2022

In 2022, the HERA issued eight licences for thermal energy production and eight licences for thermal energy supply. Similar to the previous year, the new licences issued in 2022 are primarily a result of the construction of cogeneration facilities participating in the incentives system for electricity production from renewable energy sources and high-efficiency cogeneration.

In 2022, the HERA issued two decisions granting eligible electricity producer status to new biogas (1 decision) and biomass (1 decision) cogeneration plants. The majority of the cogeneration facilities participating in the incentives system for electricity production from renewable energy sources and cogeneration use the thermal energy produced for their own needs, or supply it to a single energy entity (wood processing company or farm). A significant portion of the thermal energy used for own needs pertains to the preparation of the primary energy source (wood chip drying or production of biogas).

Although the plants in the incentives system for electricity production from renewable energy sources and cogeneration are subject to energy efficiency conditions, the plants are mostly built to produce electricity in locations where there is no significant demand for thermal energy. However, based on the systematic monitoring of thermal energy consumption, the HERA finds that there is a trend towards the improved use of thermal energy in cogeneration plants with eligible electricity producer status, mainly through the construction of wood-drying kilns next to cogeneration plants.

With the exception of the construction of cogeneration facilities participating in the incentives system for electricity production from renewable energy sources and high-efficiency cogeneration, there were no significant changes in the development of heating systems in 2022. The total number of final customers of thermal energy, network length, and the installed plant capacity of existing energy entities essentially did not change compared to the previous year.

Energy entities engaged in thermal energy production and thermal energy distribution in district heating systems requested a change in tariffs for thermal energy production in 2022 in accordance with the *Methodology for setting tariffs for thermal energy production (Official Gazette no. 56/14)* and the *Methodology for setting tariffs for thermal energy distribution (Official Gazette no. 56/14)*. An application to change the amount of tariff items for the production of thermal energy and an application to change the amount of tariff items for the distribution of thermal energy primarily due to the increase in the price of natural gas and the cost of purchasing CO<sub>2</sub> emission units was submitted by the energy entity Gradska toplana d.o.o. for the Karlovac central heating system.

*The Methodology for setting tariffs for thermal energy production* provides a simplified procedure for changing tariffs in case of changes in the price of fuel used for thermal energy production of more than ±5% compared to the price of the fuel for which the energy tariffs have been approved. In 2022, the HERA received four applications to change the amount of tariff items for energy, two applications for the Olajnica and Borovo Naselje central heating systems from the energy entity Tehnostan d.o.o., one application for the Slavonija central heating system from the energy entity Brod-plin d.o.o. and one application for the Karlovac central heating system from the energy entity Gradska toplana d.o.o. As a result of all the received applications, there was no increase in the amounts of tariff items in 2022 as these procedures were suspended, because in the meantime, the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22, 106/22, 121/2 and 156/22)*, which stipulates in Article 4 (1) that the final price of delivered thermal energy, which includes fees and value-added tax, for final customers of thermal energy in thermal systems, except for thermal energy used for technological purposes (hot water, warm water or steam), will remain unchanged in the 2022/2023 heating season in relation to the final prices



valid on the date of adoption of this **Regulation**, namely in the period from 1 October 2022 to 31 March 2023.

Likewise, related to the renewable energy electricity production incentives system, the *Regulation on Promoting Electricity Production from Renewable Energy Sources and High-Efficiency Cogeneration (Official Gazette no. 116/18)* and the *Regulation on Amendments to the Regulation on Promoting Electricity Production from Renewable Energy Sources and High-Efficiency Cogeneration (Official Gazette no. 60/20)* provide a detailed elaboration of the manner and conditions under which new models of incentives for energy production from renewable energy sources and high-efficiency cogeneration are to be implemented. Directly related to this, the *Regulation on Quotas for Promoting Electricity Production from Renewable Energy Sources and High-Efficiency Cogeneration (Official Gazette no. 57/20)* defines quotas for biomass and biogas cogeneration facilities, though quotas for cogeneration facilities using natural gas are lacking, as are quotas for liquid biofuel power plants (which are in essence cogeneration plants), cogeneration plants using waste and other renewable fuels, and cogeneration plants using industrial waste heat.

After HROTE's first public tender for market premiums and guaranteed purchase prices to incentivise the production of electricity from renewable energy sources, in late 2020, the systematic distribution of state aid for the production of electricity from renewable energy sources and cogeneration continued after the expiry of the *Tariff System for the Production of Electricity from Renewable Energy Sources and Cogeneration (Official Gazette no. 133/13, 151/13, 20/14, 107/14, and 100/15)* in late 2015. With regard to the thermal energy sector, one contract for the purchase of electricity produced from renewable energy sources and cogeneration was activated in 2022 for a biogas power plant.

In early 2022, on the basis of the Support Program approved by the European Commission, HROTE announced a public call for tenders to incentivise the production of electricity from renewable energy sources (RES) through a market premium system with a defined total quota for new projects of 630 MW, in which biomass power plants, biogas and geothermal power plants with a capacity of over 500 kW are included.

As concerns eligible producers of electricity, the **Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette no. 138/21)** entered into force in late 2021. Article 41 of the **Act** foresees the adoption of a regulation that delineates the manner and conditions for gaining and revoking eligible electricity producer status, as well as the technical and plant conditions for power plants and/or production units that have attained eligible electricity producer status. At the beginning of March 2023, the *Regulation on the Use of Renewable Energy Sources and High-Efficiency Cogeneration (Official Gazette no. 28/23)* came into force. The adoption of this regulation is of exceptional significance to the HERA due to the need to improve procedures for the issuance of decisions on eligible producer status, to clarify the technical requirements of plant use, to significantly elaborate upon the issue of affirming the efficiency of cogeneration, and to regulate other implementation issues related to the eligible electricity producer status.

For the operation of energy entities in the thermal energy sector, the changes in obligations for the system of energy savings prescribed in the **Act on Amendments to the Energy Efficiency Act (Official Gazette no. 41/21)** are important, and are regulated in detail by the *Ordinance on the System for Monitoring, Measuring, and Verifying Energy Savings (Official Gazette no. 98/21)*. Provisions were adopted for a new cumulation period (the period in which the implementation of measures is monitored) from 1 January 2021 to 31 December 2030. At the same time, on the date of entry into force of that **Act**, the *Ordinance on the Energy Efficiency Obligation System (Official Gazette no. 41/19)* whose provisions were included in the **Energy Efficiency Act**, which was adopted in September 2021, ceased to be valid.

# 3

## ORGANISATIONAL STRUCTURE, AUTHORITY AND ACTIVITIES OF THE HERA







# 3. ORGANISATIONAL STRUCTURE, AUTHORITY AND ACTIVITIES OF THE HERA

The HERA is an independent, autonomous and non-profit legal person with public authority over the regulation of energy activities that was established in 2004 pursuant to the **Act on the Regulation of Energy Activities (Official Gazette no. 177/04)**. The HERA's activities are carried out in the interest of the Republic of Croatia and in accordance with its official authority.

The HERA's work is public, and all of its activities are conducted according to the principles of transparency, objectivity and impartiality.

## 3.1. Organisation

The structure of the HERA is defined by the **Act on the Regulation of Energy Activities (Official Gazette no. 120/12 and 68/18)** and the *Statute of the HERA* dated 16 October 2013. The structure of the HERA was modified by the Amendments to the Statute of the HERA dated 29 April 2019.

The HERA consists of a Board of Commissioners, the Office of the President of the Board of Commissioners, the Independent Internal Audit Department, core operations divisions, administrative and support services. The HERA is governed by its Board of Commissioners, which is responsible for its professional work. The President of the Board of Commissioners manages the board's work and represents the HERA, including in all proceedings before courts, administrative and other state authorities, and before legal entities vested with official authority. The President of the Board of Commissioners also takes all legal actions on behalf of and for the account of the HERA, organises and manages the HERA's operations, and is accountable for the legal compliance of the HERA's operations. The President of the Board of Commissioners has a deputy.

The divisions and services are in charge of the HERA's core operations and provision of administrative and support services. The divisions and services are managed by directors who are appointed by the President of the Board of Commissioners in accordance with public calls for applications. The directors are appointed for a term of four years with the possibility of re-appointment. The directors of divisions and services manage the professional operations of the divisions and are accountable to the President of the Board of Commissioners.

The HERA's organisational chart is shown in Figure 3.1.1.

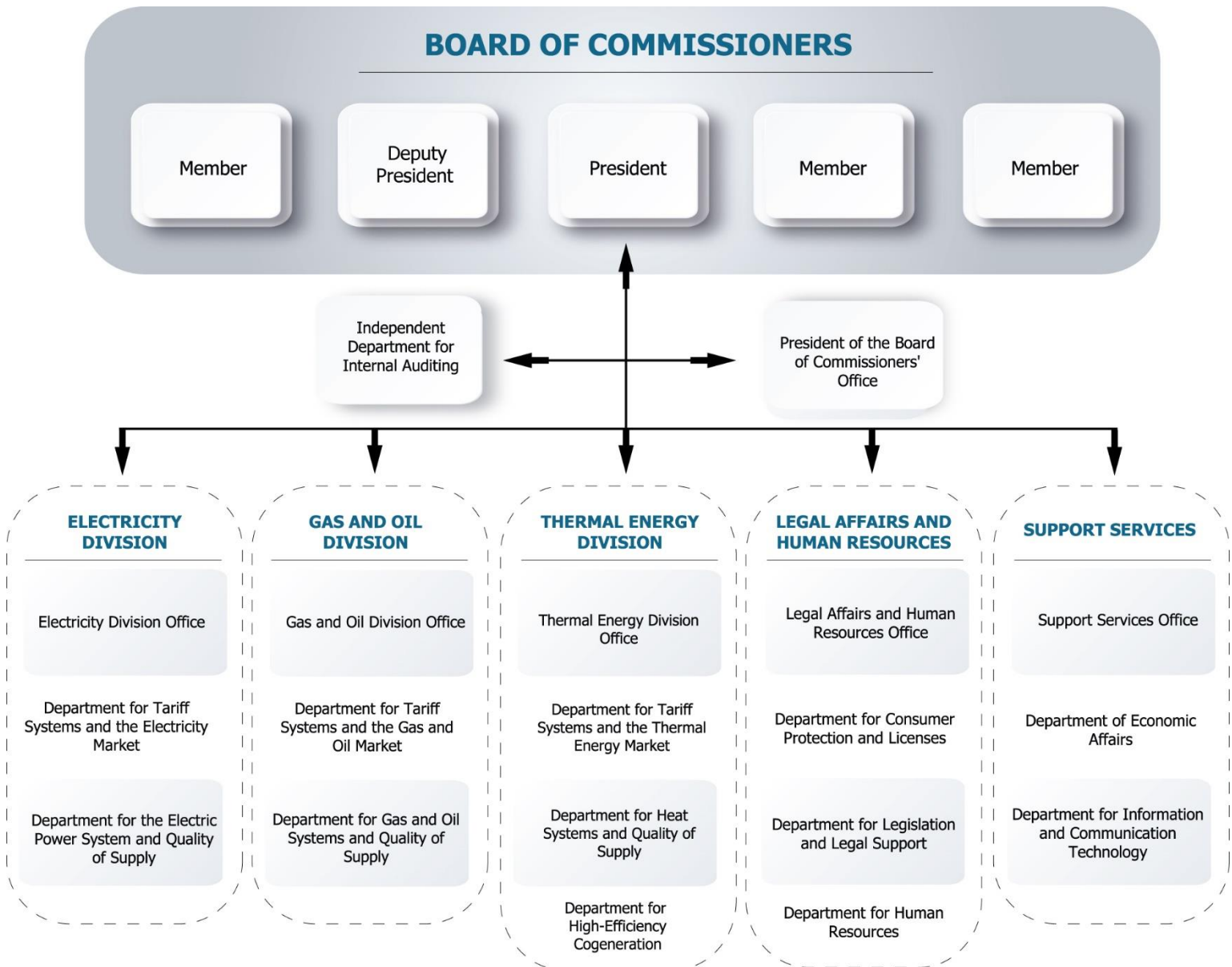
Pursuant to the *Decision of the Government of the Republic of Croatia on the amount of charges for the regulation of energy activities* (Official Gazette no. 155/08, 50/09, 103/09, and 21/12), the HERA's operations are funded from the following sources:



- a charge amounting to 0.05% of the total annual revenue from the sale of goods and/or services generated in the previous year by energy entities involved in energy activities conducted based on licences for performing such energy activities, and
- charges for issuing licences for performing energy activities, charges for acquiring eligible producer status, and charges for the settlement of claims, complaints and requests.

In March 2022, the Government of the Republic of Croatia adopted a new *Decision on the amount of charges for the regulation of energy activities (Official Gazette no. 38/22)*, which reduced certain charges for submitting requests to the HERA and abolished charges for submitting appeals.

Figure 3.1.1 the HERA's organisational chart



Pursuant to the provisions of Article 8 of the **Act on the Regulation of Energy Activities (Official Gazette no. 120/12 and 68/18)**, the HERA is accountable to the Croatian Parliament for its work.





## 3.2. Legal framework

The legal framework regulating activities within the HERA's area of competence includes the following regulations:

- **Act on the Regulation of Energy Activities (Official Gazette no. 120/12 and 68/18),**
- **Energy Act (Official Gazette no. 120/12, 14/14, 102/15, and 68/18),**
- **Electricity Market Act (Official Gazette no. 111/21),**
- **Gas Market Act (Official Gazette no. 18/18 and 23/20),**
- **Thermal Energy Market Act (Official Gazette no. 80/13 and 14/14),**
- **Oil and Petroleum Products Market Act (Official Gazette no. 19/14, 73/17, and 96/19),**
- **Act on Biofuels for Transport (Official Gazette no. 65/09, 145/10, 26/11, 144/12, 14/14, 94/18, and 52/21),**
- **Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette no. 138/21),**
- **Energy Efficiency Act (Official Gazette no. 127/14, 116/18, 25/20, and 41/21),**
- **Deployment of Alternative Fuels Infrastructure Act (Official Gazette no. 120/16),**
- **Liquefied Natural Gas Terminal Act (Official Gazette no. 57/18),**
- **Act on the Ratification of the Energy Community Treaty (Official Gazette – International Agreements no. 6/06 and 9/06),**
- **General Administrative Procedure Act (Official Gazette no. 47/09 and 110/21),**
- *Ordinance on licences for performing energy activities and maintaining registers of granted and revoked licences for the performance of energy activities (Official Gazette no. 88/15, 114/15, and 66/18),*
- *Ordinance on licences for performing energy activities and maintaining registers of granted and revoked licences for the performance of energy activities (Official Gazette no. 44/22),*
- *Decision on the amounts of charges for the regulation of energy activities (Official Gazette no. 155/08, 50/09, 103/09, and 21/12)*
- *Decision on the amounts of charges for the regulation of energy activities (Official Gazette no. 38/22), and*
- other by-laws adopted pursuant to the **Energy Act** and other legislation regulating particular energy markets.



### 3.3. Activities

the HERA's activities are defined in the **Act on the Regulation of Energy Activities**, and include the following tasks:

- granting, renewing and transferring licences for the performance of energy activities, and revoking and suspending licences,
- supervision of energy entities in their performance of energy activities,
- supervision of the implementation of provisions on unbundling pursuant to the law governing the energy sector and the laws governing the performance of particular energy activities,
- supervision of the keeping of separate accounts, as provided by the law governing the energy sector and other laws governing specific energy markets,
- supervision of compliance with the provisions ensuring that there are no cross-subsidies between energy activities pursuant to the laws governing specific energy markets,
- supervision of compliance with the principles of transparency, objectivity and impartiality in the work of energy market operators,
- approval of general acts that organise the electricity market and general acts that organise the natural gas market,
- adoption of decisions on eligible producer status and the suspension and revocation of eligible producer status,
- issuing methodologies and tariff systems in accordance with the **Act on the Regulation of Energy Activities**, the law governing the energy sector and other laws governing particular energy markets,
- setting or approving prices, amounts of tariff items and charges in accordance with the methodologies and tariff systems under Article 9 (1) (11) of the **Act on the Regulation of Energy Activities**,
- approval of investment, development and construction plans for energy systems pursuant to the laws governing specific energy markets,
- supervision of the compliance of investment, development and construction plans of the transport system and transmission system operators with ENTSO-E and ENTSO-G development plans,
- supervising the transport, transmission and distribution system operators, i.e. the system owners, and other energy entities or system users, with respect to their compliance with the obligations defined in the **Act on the Regulation of Energy Activities**, the law governing the energy sector, and other laws governing particular energy markets, as well as *Regulation (EC) No. 2019/943 and Regulation (EC) 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005* (hereinafter: *Regulation (EC) No. 715/2009*),
- cooperation with the regulatory authorities of EU member states and the neighbouring countries, as well as with the *Agency for the Cooperation of Energy Regulators* (hereinafter: ACER),
- cooperation with the regulatory authorities and other authorities in the Energy Community pursuant to the **Act on the Ratification of the Energy Community Treaty**,
- implementation of the legally binding decisions of the ACER and the European Commission,
- submitting annual reports to Croatian Parliament, comprising information on activities taken and results achieved in relation to the scope of activities under Article 11 (1) (1) through (8) of the **Act on the Regulation of Energy Activities**,
- reporting to other competent national authorities, the ACER, the European Commission, and other European Union bodies, i.e. submitting annual reports to the ACER and the European Commission, comprising information on activities undertaken and results achieved in relation to the scope of activities under Article 11 (1) (1) through (8) of the **Act on the Regulation of Energy Activities**,



- laying down the requirements for the quality of the energy supply in accordance with applicable regulations governing specific energy activities,
- laying down general requirements for energy supply,
- specifying and supervising the methodology for determining the grid/system connection fee for new consumers and for increasing the connection power/capacity for energy entities and final customers,
- conducting cost-benefit analyses and obtaining opinions from representatives of consumer protection bodies with respect to the introduction of advanced metering devices for final customers,
- supervision of the quality of the energy supply pursuant to the applicable regulations governing specific energy markets,
- supervision of the transparency of the energy market,
- supervision of the level of openness, competition and misuse on the energy market and in consumer supply,
- supervision of restrictive contracts, especially those restricting the number of suppliers, and informing the national competition regulator when required,
- supervision of free contracting in terms of supply contracts with the possibility of termination and long-term contracts, provided that they comply with EU legislation and policies,
- supervision of the time needed by transport, transmission and distribution system operators for connection and repair works,
- providing assistance, together with other relevant authorities, to ensure the implementation of efficient and prescribed consumer protection measures,
- adopting recommendations related to the pricing of the energy supply performed as a public service, at least once per year,
- providing consumers with the right to access information on their energy consumption, i.e. designing a format for presenting consumers with consumption data that is easy to understand and standardised at the national level, and establishing procedures by which consumers and suppliers may exercise their right to access consumption data so that consumers can enable the registered suppliers to obtain access to data on their consumption, whereas the parties responsible for managing their own consumption data shall provide such data to the suppliers; all these services shall be free of charge for consumers,
- supervision of the confidentiality of consumer energy consumption data,
- monitoring investments in electricity generation facilities with regard to supply security,
- issuing certificates to transport and transmission system operators in accordance with the provisions of the law governing the electricity market and the law governing the natural gas market,
- supervision of the application of the requirements for access to the gas storage system,
- monitoring the implementation of measures stipulated by the Croatian government for emergency situations pursuant to the provisions of the law governing the energy sector,
- encouraging the harmonisation of data exchange in the most important market processes at the regional level, and
- other activities.

All statements and decisions of the Board of Commissioners are published regularly on the HERA's website. In 2022, the Board of Commissioners held 38 meetings, at which a total of 439 agenda items were discussed.



## 3.4. General overview of the HERA's activities and operations in 2022

### 3.4.1. Consumer protection

Within the area of its competence, the HERA actively participates in consumer protection in a number of ways:

- by supervising the energy entities, the quality of their services and by collecting and processing data related to the energy entities' activities in the field of consumer protection, pursuant to the provisions of the **Energy Act** and the laws governing the performance of particular energy activities, and by co-operating with ministries and competent inspectorates, pursuant to the provisions of relevant laws, and
- by resolving individual consumer complaints and objections, by virtue of public authority pursuant to the **Act on the Regulation of Energy Activities** and other laws and regulations governing individual energy markets.

Procedures related to the protection of their rights are initiated by energy consumers before the HERA by submitting appeals or complaints related to documents issued by energy entities and related to the operations of energy entities in the fields of electricity, thermal energy, natural gas and oil.

During 2022, the HERA received a total of 1841 submissions from energy consumers, which included 657 inquiries and 280 other submissions, as well as 904 appeals and complaints.

The most common reasons why final customers contacted the HERA are:

- in the electricity sector: records on network users - electricity customers; loss of customer status - right to use network; quality of the electricity supply, billing, the unauthorised consumption of electricity, the temporary disconnection of electricity supply, and connection to the grid and connection conditions (a detailed statistical overview is given in chapter "4.4.4. Protection of network users and other subjects" of this Report),
- in the gas sector: calculation - billing and gas price increase, suspension of gas delivery and continuation of gas delivery, unauthorised gas consumption, switching the gas supplier and change of consumption category/tariff model (a detailed statistical presentation is given in chapter "5.3.6 Consumer protection" of this Report),
- in the thermal energy sector: calculation - billing, disconnection from a central heating system or disconnection of an entire building from a central heating system, quality of the thermal energy supply (a detailed statistical overview is given in chapter "8.2.4. Consumer protection" of this Report).

Acting on appeals, the HERA made decisions by which it approved, rejected or dismissed them, in accordance with the provisions of the General Administrative Procedure Act. Regarding complaints, the HERA gave instructions to the energy entities to harmonise their actions with the relevant legal framework, responded to the parties in cases when the allegations from the complaint were assessed as ill-founded, and instructed them on how to enforce the further protection of their rights, and informed them when the energy entities accepted the complaints.

When making decisions on customer submissions, the HERA especially took into account the importance of the continuous supply of electricity or energy products, as well as the quality of supply of energy products, which the Consumer Protection Act has recognised as an exceptionally important element in protecting the rights of consumers. The HERA considers it important to reduce the number



of energy supply suspensions used by suppliers as a method of the enforced collection of overdue receivables; HERA believes that the primary tool used to this end should be the other prescribed measures (e.g. enforcement proceedings). In support of this, at the recommendation of the Ombudsman, the HERA added provisions to the general terms and conditions of electricity supply requiring suppliers to directly contact household final customers upon the first signs of difficulties in settling bills, to allow for individualised advice and assistance in settling bills and to attain an optimal level and schedule of energy consumption.

A total of 23 court proceedings were initiated against the HERA in 2022 by submitting a lawsuit to the competent administrative court; some proceedings are also still underway from the earlier period. As of 31 December 2022, there were 36 court proceedings initiated against the HERA's decisions and 2 (two) enforcement proceedings initiated by the HERA against an energy entity due to the non-payment of fees for the performance of energy activities.

Of the 36 court proceedings that were pending on 31 December 2022, 33 proceedings were conducted before the competent administrative court, 2 (two) proceedings were initiated before the High Administrative Court of the Republic of Croatia, while one court proceeding refers to a civil proceeding that was conducted before the Commercial Court in Zagreb for compensation for damages due to the actions of the HERA, and it ended with the final judgement of the High Commercial Court, which rejected the plaintiff's claim, so the plaintiff submitted a review to the Supreme Court of the Republic of Croatia, and finally, on 22 November 2022, the Supreme Court of the Republic of Croatia dismissed the review as ill-founded, and upheld the decisions of the High Commercial Court and the Commercial Court in Zagreb, which had dismissed the plaintiff's claim.

The court proceedings initiated in 2022 (23 of them) are namely:

- 18 administrative disputes initiated before the Administrative Court in Zagreb,
- 2 (two) administrative disputes initiated before the Administrative Court in Split,
- 1 (one) administrative dispute initiated before the Administrative Court in Osijek, and
- 2 (two) proceedings initiated before the High Administrative Court of the Republic of Croatia for assessing the legality of the general act adopted by the HERA (Methodology for determining the grid connection fee for new customers and for increasing the connection power of existing grid users).

Furthermore, the HERA was also actively involved in the work of the National Consumer Protection Council, with the aim of familiarising consumers in the energy sector with their rights and obligations, as well as introducing the HERA as an authority that can be contacted in case of a violation of any right guaranteed by regulations governing the energy sector.

The HERA also closely cooperated with other public and legal entities in 2022, as well as with various consumer protection associations. The HERA will continue this cooperation in the future, and maintain its contact with consumers by replying directly to inquiries, resolving matters related to consumer rights and protection, etc.

### 3.4.2. Statistical data on the time period in which the HERA processed requests

In addition to the **Act on the Regulation of Energy Activities** and sectoral laws and by-laws, the HERA applies the provisions of the **General Administrative Procedure Act** in its actions in administrative matters related to permits for the performance of energy activities and eligible producer status. Article 101 (1) and (2) of the **General Administrative Procedure Act** stipulate that, in cases of direct settlement at the request of a party, an official person is obligated to issue a decision and submit





it to the party without delay, no later than 30 days from the date of submission of a regular request; in the case of an investigation, the official person is obligated to issue a decision at the request of the party and submit it to the party no later than 60 days from the date of submission of a regular request.

The HERA issued an average of 1.4 decisions per request for licences for the performance of energy activities, through which it sought the elimination of problems in the requests or the delivery of evidence without which the request could not be processed. Procedures initiated under such requests lasted an average of 19.21 days.

The HERA issued an average of 0.79 decisions per request for the eligible producer status, through which it sought the elimination of problems in the requests or the delivery of evidence without which the request could not be processed. Procedures initiated under such requests lasted an average of 35.45 days.

A detailed elaboration of the administrative procedures in which the HERA issued decisions in 2022 is presented later in the text of this Report, in the chapters related to electricity, natural gas, and thermal energy, as well as in the chapter “11 APPENDIX – LICENCES FOR THE PERFORMANCE OF ENERGY ACTIVITIES”.

### 3.4.3. Electricity

In 2022, the HERA's activities in the electricity sector mainly involved the following:

- drafting and adopting by-laws governing the electricity market,
- implementing EU regulations,
- issuing decisions on tariffs based on the methodology applicable to energy entities performing electricity-related activities as a public service,
- approving and monitoring the implementation of ten-year development plans for transmission and distribution networks,
- monitoring power losses in the transmission and distribution network and participation in the preparation of Council of European Energy Regulators (CEER) reports on power losses,
- regular monitoring of the implementation of rules on managing and allocating interconnection capacities, as well as compliance with the capacity allocation regime,
- regular monitoring of balancing energy settlements and imbalance settlements in order to improve the regulations concerning balancing energy settlements and imbalance settlements, including the implementation of standard load profiles,
- collecting and processing data on the quality of the electricity supply and participating in the drafting of the CEER's reports on the quality of the electricity supply,
- implementing *Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency (REMIT Regulation)* in order to prevent insider trading and market manipulation in cooperation with ACER,
- monitoring the separation of energy-related operations and the unbundling of accounts for entities performing electricity-related activities as a public service (HEP-ODS),
- issuing 32 licences for the performance of energy activities (21 for electricity production, 1 for electricity supply, 6 for electricity trade, 1 for a closed distribution system, and 3 for aggregation), and one procedure of dismissing a request,
- extending 15 licences for the performance of energy activities (10 for electricity production, 1 for electricity supply, 3 for the electricity trade and 1 for organising the electricity market),
- issuing eight decisions granting eligible electricity producer status, two decisions amending decisions granting eligible electricity producer status, and two decisions issuing preliminary approval for planned changes to the conditions of plant use,



- initiating a supervision procedure over two energy entities,
- resolving 1057 appeals, complaints, inquiries and other submissions related to electricity.

After consultation with the interested public, the HERA adopted the following by-laws within the deadlines prescribed by the **Electricity Market Act** in 2022:

- *Regulation on the General Terms of Network Usage and Electricity Supply (Official Gazette no. 100/22)*
- *Methodology for Determining the Grid Connection Fee (Official Gazette no. 84/22)*
- *Methodology for Setting Tariffs for Electricity Transmission (Official Gazette no. 84/2022)*
- *Methodology for Setting Tariffs for Electricity Distribution (Official Gazette no. 84/2022)*
- *Regulation on the Requirements for the Quality of the Electricity Supply (Official Gazette no. 84/2022)*
- *Rules on Switching Suppliers and Aggregators (Official Gazette no. 84/22)*
- *Criteria for issuing consent for the construction and operation of direct lines (Official Gazette no. 85/2022)*
- *Methodology for Setting Tariffs for Guaranteed Electricity Supply (Official Gazette no. 20/22)*

the HERA issued the following decisions on tariffs:

- *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 27/22) (for the period from 1 April to 30 June 2022),*
- *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 61/22) (for the period from 1 July to 30 September 2022),*
- *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 100/22) (for the period from 1 October to 31 December 2022),*
- *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 146/22) (for the period from 1 January to 31 March 2023),*

The HERA has given preliminary approvals or approvals for the following by-laws:

- preliminary approval of the *Draft Rules for the daily explicit allocation of cross-zonal capacity on the border between the trading zones of Croatia and Hungary* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- approval of the *Draft Rules for data exchange between transmission system operators, distribution system operators, and production modules connected to the distribution system* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- approval of the *Draft Rules for the nomination of physical transmission rights for the borders between the trading zones of Austria, Croatia, the Czech Republic, Germany, Hungary, Poland, Slovakia and Slovenia in accordance with Article 36 of Commission Regulation (EU) 2016/1719* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- approval of the *Draft Rules for the nomination of physical transmission rights for the borders between the trading zones of Croatia and Slovenia in accordance with Article 36 of Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocations* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- preliminary approval of the *Draft Rules for non-standard services of the distribution system operator* of the energy entity HEP-Operator distribucijskog sustava d.o.o., Ulica grada Vukovara 37, Zagreb

The HERA gave preliminary approvals or approvals for the following draft agreements:



- preliminary approval of the *Draft Annex no.: O-21-2515/2 to the Contract on the supply of the final customer no.: O-21-2515* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- preliminary approval of the *Draft Addendum 3 to the Business premises lease agreement* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- preliminary approval of the *Draft Agreement on the connection of the Serj hydroelectric power plant to the transmission network no. 134/22* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- approval of the conclusion of the *Short-term revolving loan agreement number 3/2022* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- preliminary approval of the *Draft Agreement on the provision of balancing services – mFRR* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- preliminary approval of the conclusion the *Long-term loan agreement number 5/2022* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- preliminary approval of the *Draft Agreement on the establishment of the right of easement* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- preliminary approval of the *Draft Agreement on the connection of the Sklope hydroelectric power plant to the transmission network no. 135/22* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- preliminary approval of the *Draft Agreement on the provision of ancillary services in 2023* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb

The HERA issued the decision to adopt reports or decisions approving the following documents:

- Decision on the reference price of electricity for low-voltage final customers and the reference price of electricity for medium- and high-voltage final customers in accordance with Article 62 (2) and (3) of the *Requirements for the Quality of the Electricity Supply* (Official Gazette no. 37/17, 47/17, 31/18 and 16/20),
- Decision on the approval of the *Proposal of all Continental European transmission system operators to supplement the Decision on LFC blocks in the Continental Europe synchronous area with regard to LFC Denmark West* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- Decision on adopting the *Report on the use of revenues of Hrvatski operator prijenosnog sustava d.o.o. from the allocation of cross-border transmission capacities in 2021*,
- Decision on the request for the approval of the *Draft Rules for data exchange between transmission system operators, distribution system operators, and production modules connected to the distribution system* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- Decision on the request for the approval of *Draft 2 of the Amendments to the alternative procedures of the Core region for the capacity calculation prepared in accordance with Article 44 of Commission Regulation (EU) 2015/1222 establishing a guideline on capacity allocation and congestion management* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- Decision on the request for the approval of the *Act on the establishment of regional coordination centres in the Central Europe system operation region in accordance with Article 35 of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- Decision on the request for approval to deviate from the obligations prescribed by Article 53 of *Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,



- Decision on the request for the approval of the *Draft Special addendum to the harmonised allocation rules for the borders for which the allocation service is provided by SEE CAO* and the *Draft Rules for the explicit daily allocation of capacity for the borders for which the allocation service is provided by SEE CAO* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- Decision on the request for the approval of the *procurement of production and services that cannot be procured on the market* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb,
- Decision on giving an opinion on the *Annual report on the security of supply in the distribution system for 2021* of the energy entity HEP-Operator distribucijskog sustava d.o.o., Ulica grada Vukovara 37, Zagreb,
- Decision on giving an opinion on the *Annual report on the security of supply in the transmission system for 2021* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb
- Decision on the request for the approval of the *Proposal for a supplement to the contributions to the costs of the establishment, changes and operation of unified day-ahead and intraday coupling for 2022* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Kupska 4, Zagreb.

### 3.4.4. Natural gas

The HERA's activities in the gas sector in 2022 were aimed at fulfilling its obligations under the provisions of the **Gas Market Act**. After public consultations in 2022 and in early 2023, the HERA adopted the following:

- *Amendments to the General Terms and Conditions of Gas Supply (Official Gazette no. 103/22),*
- *Amendments to the Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the unloading and sending out of liquefied natural gas, and public service gas supply (Official Gazette no. 9/22),*
- *Amendments to the Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette no. 20/22) and*
- *Amendments to the Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette no. 38/23)*

The HERA approved the following by-laws:

- *Amendments to the Rules on Gas Storage System Use (Official Gazette no. 111/22),*
- *Rules on Amendments to the Rules for LNG Terminal Use (Official Gazette no. 72/22),*
- *Amendments to the Rules on the Organisation of the Gas Market (Official Gazette no. 154/22) and*
- *Amendments to the Gas Transmission System Network Code (Official Gazette no. 58/22).*

The HERA adopted the following decisions:

- *Decision on public service gas supply tariff amounts for the period from 1 April to 31 December 2022 and for the period from 1 January to 31 March 2023 (Official Gazette no. 32/22),*
- *Decision on the tariffs for gas distribution (Official Gazette no. 32/22),*
- *Decision on the tariffs for gas distribution (Official Gazette no. 108/22),*
- *Decision on the tariffs for Gas transmission (Official Gazette no. 108/22),*



- *Decision on the tariffs for gas storage (Official Gazette no. 36/22),*
- *Decision on the tariffs for gas storage (Official Gazette no. 108/22),*
- *Decision on the tariffs for receiving and sending out liquefied natural gas (Official Gazette no. 108/22),*
- *Decision on charges for connection to the gas distribution or transmission system and for the connection capacity increase (Official Gazette no. 108/22),*
- *Decision on the cost of non-standard services of the liquefied natural gas terminal operator (Official Gazette no. 108/22),*
- *Decision on the cost of non-standard services of the transmission system operator (Official Gazette no. 108/22),*
- *Decision on the cost of non-standard services of gas storage system operators (Official Gazette no. 108/22)*
- *Decision on the cost of non-standard services of distribution system operators (Official Gazette no. 108/22),*
- *Decision on the cost of non-standard services of gas suppliers with a public service obligation (Official Gazette no. 108/22),*
- *Decision on the gas market organisation fee (Official Gazette no. 108/22),*
- *Decision on public service gas supply tariff amounts for the period from 1 October to 31 December 2022 and for the period from 1 January to 31 March 2023 (Official Gazette no. 108/22),*
- *Decision on tariffs for guaranteed gas supply for non-household final customers for the period from 1 April 2022 to 30 June 2022 (Official Gazette no. 32/22),*
- *Decision on tariffs for guaranteed gas supply for non-household final customers for the period from 1 July 2022 to 30 September 2022 (Official Gazette no. 65/22),*
- *Decision on tariffs for guaranteed gas supply for non-household final customers for the period from 1 October 2022 to 31 December 2022 (Official Gazette no. 108/22),*
- *Decision on tariffs for guaranteed gas supply for non-household final customers for the period from 1 January 2023 to 31 March 2023 (Official Gazette no. 146/22),*
- *Decision on tariffs for guaranteed gas supply for non-household final customers for the period from 1 April 2023 to 30 June 2023 (Official Gazette no. 32/23),*
- *Decision appointing the guaranteed gas supplier (HERA 3/22),*
- *Decision affirming the conduct of GRADSKA PLINARA ZAGREB-OPSKRBA d.o.o., Zagreb, regarding the changed conditions for gas supply agreements with non-household final customers (HERA 3/22),*
- *Decision by which, on the basis of the facts determined by the Decision on implemented supervision of 16 March 2022, CLASS: 040-10/21-01/6, REG.NO.: 371-06-22-10, misdemeanour proceedings were initiated against the energy entity GRADSKA PLINARA ZAGREB - OPSKRBA, Zagreb (HERA 3/22),*
- *The decision on the provision of a guaranteed gas supply to final customers connected to the distribution system of the gas supplier IVAPLIN d.o.o., Ivanić-Grad (HERA 3/22),*
- *The decision on the provision of a guaranteed gas supply to final customers connected to the distribution system of the gas supplier Brod-plin d.o.o., Slavonski Brod (HERA 4/22),*
- *The decision on the provision of a guaranteed gas supply to final customers connected to the distribution system of the gas supplier ZELINSKE KOMUNALIJE d.o.o., Sveti Ivan Zelina (HERA 4/22),*



- *Decision on the adoption of the Decision on the harmonisation of procedures related to switching the gas supplier with the Gas Market Act and the General Terms and Conditions of Gas Supply, of the energy entity Gradska plinara Zagreb - Opskrba d.o.o., Zagreb (HERA 9/22),*
- *Decision on the start of providing public gas supply services to final customers in the household category with a terminated gas supply contract (HERA 9/22),*
- *Binding decision for energy entities for the application of the General Terms and Conditions of Gas Supply and the Gas Distribution System Network Code regarding the calculation of the delivered gas energy (HERA 11/22),*
- *Decision on the determination of the Draft decision on issuing a certificate to the gas storage system operator, the company PODZEMNO SKLADIŠTE PLINA d.o.o., Zagreb (HERA 2/23) and*
- *Decision on the introduction of the mechanism referred to in Article 14 (7) of Council Regulation (EU) 2022/2576 of 19 December 2022 enhancing solidarity through the better coordination of gas purchases, reliable price benchmarks and exchanges of gas across borders (HERA 3/23).*

The HERA issued the following decision:

- *Decision on the suspension of the supervision of the energy entity PLINARA ISTOČNE SLAVONIJE d.o.o., Vinkovci in the performance of the energy activity of gas supply (HERA 2/23),*
- *Decision on the suspension of the supervision of the energy entity PNA-INDUSTRIJA NAFTE, d.d., Zagreb in the performance of the energy activity of gas trade (HERA 2/23),*
- *Decision on the suspension of the supervision of the energy entity Brod-plin d.o.o., Slavonski Brod in the performance of the energy activity of gas supply (HERA 11/22),*
- *Decision on the suspension of the supervision of the energy entity IVAPLIN d.o.o., Ivanić-Grad in the performance of the energy activity of gas distribution (HERA 7/22),*
- *Decision on the suspension of the supervision of the energy entity Brod-plin d.o.o., Slavonski Brod in the performance of the energy activity of gas distribution (HERA 7/22), and*
- *Decision on the suspension of the supervision of the energy entity Brod-plin d.o.o., Slavonski Brod in the performance of the energy activity of the management of liquefied natural gas and/or compressed natural gas supply points (HERA 7/22).*

In 2022, the HERA:

- issued 7 licences for gas trading activities,
- issued 3 licences for gas supply activities,
- issued 1 licence for the management of liquefied natural gas and/or compressed natural gas supply points,
- extended 6 licences for gas trading activities,
- extended 8 licences for gas supply activities,
- cancelled 4 licences for performing energy activities after the expiry of the last day of the term of their validity (1 licence for performing gas trade activities and 3 licences for performing gas supply activities),
- cancelled 5 licences for performing energy activities upon the termination of the energy entity on the day of the finality of the decision on deletion from the Court register (2 licences for performing gas supply activities and 3 licences for performing gas distribution activities),
- issued the decision on the termination of validity of 1 licence for performing gas trade activities at the request of the energy entity,
- issued the decision on the termination of validity of 3 licences for performing gas supply activities at the request of the energy entity,



- issued the decision on the permanent revocation of 1 licence for the performance of gas trade activities,
- issued the decision on the permanent revocation of 4 licences for the performance of gas supply activities, and
- resolved 255 complaints, processed 280 inquiries, and 138 other submissions from final customers.

### 3.4.5. Oil and petroleum products

In 2022, the HERA carried out the following activities in the oil and petroleum products sector:

- issued 9 licences for the performance of energy activities (6 licences for wholesale trade in petroleum products and 3 licences for wholesale trade in liquefied petroleum gas),
- extended 12 licences for the performance of energy activities (11 licences for wholesale trade in petroleum products and 1 licence for wholesale trade in liquefied petroleum gas),
- cancelled 3 licences for the performance of energy activities after the expiry of the last day of the term of their validity (2 licences for wholesale trade in petroleum products and 1 licence for the storage of oil and petroleum products), and
- issued the decision on the rejection of the application for the extension of 1 licence for the energy activity of storage of oil and petroleum products.

### 3.4.6. Biofuels

In 2022, the HERA carried out the following activities in the biofuel sector:

- issued 3 licences for the performance of energy activities (2 licences for wholesale trade in biofuels and 1 licence for the storage of biofuels),
- extended 2 licences for the performance of the energy activity of wholesale trade in biofuels and
- cancelled 1 licence for the performance of the energy activity of wholesale trade in biofuels after the expiry of the last day of the term of its validity.

### 3.4.7. Thermal energy

In 2022, the HERA carried out the following activities in the thermal energy sector:

- with the aim of protecting customers, calculated the amount of unit prices for thermal energy produced in DHS and CHS, based on the *Regulation* prescribing that the price of thermal energy shall remain unchanged in the period from 1 September 2022 to 31 March 2024,
- issued 16 licences for the performance of energy activities (8 licences for thermal energy production and 8 licences for thermal energy supply),
- extended 11 licences for the performance of energy activities (4 licences for thermal energy production and 7 licences for thermal energy supply),
- deleted four thermal energy customers, did not register a single new entity in the Register of Thermal Energy Customers, and updated the records of thermal energy customers,
- issued decisions awarding the status of eligible electricity producer for cogeneration plants, and issued two decisions awarding the status of eligible electricity producer (one for biomass cogeneration and one for biogas cogeneration); issued one decision declining to issue a decision on awarding the status of eligible electricity producer, four decisions transferring the



rights and obligations from a decision awarding the status of eligible electricity producer, and the eligible electricity producer status ceased to be valid for one plant,

- processed requests related to previous decisions awarding the eligible electricity producer status for cogeneration facilities, and issued one decision declining the extension of the eligible electricity producer status,
- issued five preliminary approvals for planned changes to conditions for the use of power plants submitted by eligible electricity producers for biogas and biomass cogeneration facilities, as well as two decisions rejecting a request for the preliminary approval of planned amendments to conditions for the use of a power plant, and one request was withdrawn,
- supervised eligible electricity producers in implementing the prescribed energy efficiency conditions, issued five decisions defining the primary energy savings for high-efficiency cogeneration using natural gas, and sixty-five decisions defining the total annual energy efficiency of biomass and biogas plants,
- regarding the elimination of irregularities, 3 decisions were issued on the elimination of irregularities,
- processed, or resolved 112 submissions, of which 1 appeal, 1 supervision, 38 complaints, 55 inquiries and 17 other submissions from final thermal energy customers, authorised representatives of co-owners, energy entities, institutions and other parties.

### 3.4.8. REMIT

Development of the wholesale electricity market and natural gas market is governed by the *REMIT Regulation*. The basic task of every active market participant in the wholesale markets is to register in the Centralised European Register of Energy Market Participants (CEREMP). At the beginning of 2023, more than 120 participants in the electricity and/or natural gas market were registered. The data required for registration is determined by the ACER's decision 01/2012. Market participants established in Croatia and those with business establishments outside of the European Union that are active on the wholesale market within Croatia must register with the HERA. In order to make registration easier, the HERA has created user manuals for registering market participants in the CEREMP in Croatian and English. During 2022 and 2023, an increase in the number of market participants established outside the Republic of Croatia was observed, since their registration in the CEREMP is required for participating in auctions for cross-zonal capacities organised by the JAO and SEE CAO auction offices.

The REMIT Regulation stipulates that the ACER supervises trading activities in wholesale energy products in order to identify and prevent trading based on insider information and market manipulation. For this purpose, it collects data for the assessment and supervision of wholesale energy markets. On the other hand, national regulatory authorities can also monitor wholesale energy trading activities at the national level.

The HERA is currently unable to continuously receive data from the ACER as the acceptance of such sensitive data is subject to strict information security requirements. During 2023, the HERA plans to enable the use of the ACER's Case Management Tool (CMT) to manage cases of violation of the *REMIT Regulation*, enabling it to securely share a limited set of data with the ACER and other national regulatory agencies. Currently, the HERA has no open cases of violations of the *REMIT Regulation*.

At the beginning of 2023, a total of 20 national regulatory agencies had access to the CMT, while 12 regulatory agencies had the possibility of accepting all the data for their wholesale markets (*data sharing*).

Market participants are obliged to promptly report all suspicious transactions on the wholesale electricity and natural gas markets to the ACER and national regulatory agencies, which can simply be





done through ACER's notification platform accessible on the ACER and HERA websites. In addition, market participants must timely disclose inside information that represents information of a precise nature that has not been disclosed and that relates, directly or indirectly, to one or more wholesale energy products and that, if disclosed, would likely significantly affect the prices of those wholesale energy products. It is recommended that such information be published on specific platforms for the publication of such information<sup>15</sup>.

In order to adequately monitor the complex wholesale electricity and natural gas markets, which can be physical or financial in nature and cover both long-term and short-term periods, the ACER has established a system for collecting data on the activities of market participants in all the wholesale markets, as well as the necessary data on the physical condition of the electric power and gas transmission network.

*Commission Implementing Regulation (EU) No 1348/2014 on data reporting implementing Article 8 (2) and (6) of Regulation (EU) No 1227/2011 of the European Parliament and of the Council on wholesale energy market integrity and transparency* establishes rules for submitting data to the ACER, details on wholesale energy products and basic data on the capacity and use of facilities for the production, storage, consumption or transmission of electricity and the transmission of natural gas or on the capacity and use of liquefied natural gas facilities, including the planned or unplanned unavailability of these facilities. It also establishes the relevant channels for data reporting and determines the time and frequency of data reporting.

In order to harmonise and systematise the correct delivery of data, the ACER has created a series of documents<sup>16</sup> describing the electronic delivery of data to the ACER's system, among which the following are highlighted:

- Transaction Reporting User Manual (TRUM);
- Manual of Procedures (MoP) on Data Reporting;
- ARIS Data Validation Rules;
- Mapping between REMIT Implementing Regulation Tables and electronic schemas.

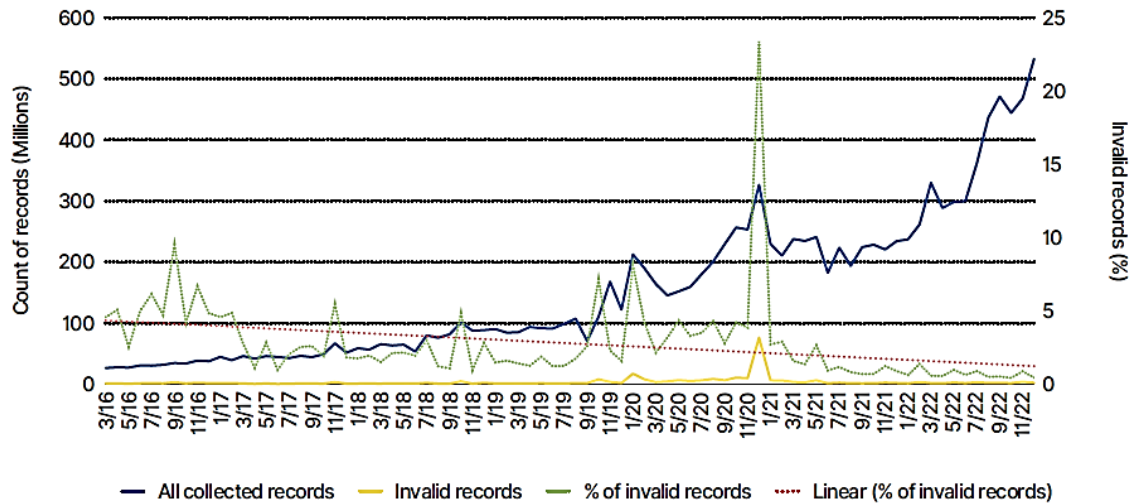
It is not permitted for every market participant to directly submit data to the ACER, only entities that have passed the ACER's strict qualification processes can send data, which is the so-called registered reporting mechanism. Currently, 130 such entities are registered<sup>17</sup> with the ACER so that they can adequately send data.

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<sup>15</sup> <https://www.acer-remit.eu/portal/list-inside-platforms>

<sup>16</sup> <https://www.acer.europa.eu/remit-documents>

<sup>17</sup> <https://www.acer-remit.eu/portal/list-of-rrm>



Source: ACER REMIT Quarterly Q4 2022 report

Figure 3.4.1 Number of received transaction records in relation to invalid records on a monthly basis

The Commission Decision (EU) 2020/2152 on fees due to the ACER for collecting, handling, processing and analysing information reported under Regulation (EU) No 1227/2011 of the European Parliament and of the Council was adopted in order to provide additional sources of income for the ACER for the collection and analysis of a large set of data. Registered reporting entities are required to pay an annual fee to the ACER calculated on the basis of the *Decision*. Each market participant must contract the service of the delivery of relevant data to the ACER with one of the registered data delivery entities.

Each national regulatory agency should be trained to conduct investigations in an appropriate manner and to sanction violations of the provisions of the REMIT Regulation themselves or in cooperation with other competent authorities. Most of the HERA's roles in this field of work are prescribed by the **Act on the Regulation of Energy Activities**, the **Electricity Market Act** and the **Gas Market Act**.

A list of all the fines in case of a violation of the provisions of the REMIT Regulation can be found on the ACER website<sup>18</sup>. The current sum of fines for all cases that have been completed or are pending amounts to more than 100 million euros.

As part of the comprehensive review of the electricity market design hereinafter: EMD), revisions to the REMIT Regulation are currently being prepared, which aim to expand and tighten the provisions for preventing market manipulation. The ACER should be given even stronger powers to supervise and conduct investigations in individual cases. Efforts are also being made to harmonise procedures with the supervision of financial markets as much as possible, as it is to be expected that the volume of financial contracts on wholesale markets will increase in the coming period.

In 2023, the HERA established the Independent REMIT Department, which operates within the Office of the President of the Board of Commissioners.

<sup>18</sup> <https://acer.europa.eu/remit/coordination-on-cases/enforcement-decisions>



### 3.4.9. Reform of electricity market model – proposal of the European Commission of 14 March 2023

A common electricity market has been present in the EU for more than twenty years, which provided economic advantages, security of supply and encouragement of decarbonisation for market participants and final electricity customers.

The energy crisis intensified by the invasion of Ukraine showed the importance of and need to accelerate the energy transition, which will benefit the final electricity customers.

Accelerating the integration of RES should increase the EU's energy security and reduce the need to import fossil fuels (especially gas), which will make electricity bills less dependent on the unstable fossil fuel prices. Due to the above, and in order for the electricity market design in the EU to be suitable for the future, the European Commission, after a public debate and a meeting with the stakeholders, published on 13 March 2023 a proposal to reform the electricity market model through a proposal for a regulation that will supplement *Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity* (hereinafter: *Regulation 943*), *Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 concerning common rules for the internal market in electricity and amending Directive 2012/27/EU* (hereinafter: *Directive 944*) and the *REMIT Regulation*.

The aforementioned proposal should increase investments in RES, provide better protection to final customers and strengthen their position on the electricity market, and improve the competitiveness of EU industry. In order to provide better protection to final customers from high and unstable electricity prices, especially in the event of a crisis, this proposal will give them new rights and wider contracting possibilities.

Thus, electricity suppliers, on the one hand, will have to offer contracts with a fixed price to final customers, and on the other hand, they will have the obligation of protection against price fluctuations on the wholesale market (hedging), for example by entering into long-term contracts with producers (*Power Purchase Agreement, PPA*) or forward contracts on the long-term market (*Forward Market*).

Final customers will be able to simultaneously conclude several supply contracts (with a fixed price for basic consumption and with a dynamic price for consumers such as electric vehicles) using, in addition to the main meter at the network interface, additional sub-meters within the installations, as well as be able to share their surplus electricity produced from their own power plant with their neighbours, gradually expanding the geographical scope of sharing within the trading zone (e.g. Croatia).

Member states have the obligation to declare a supplier of last resort, which, in the event of a crisis, will ensure the supply of electricity at regulated prices to customers from the household and small business category. Vulnerable customers will be protected from temporary grid disconnection due to difficulties in paying bills.

The proposal strengthens the power market monitoring capabilities of the ACER and the national regulatory agencies. It will be easier for final customers to participate in consumption responsiveness programmes and offering flexibility services.

To increase the competitiveness of EU industry, the reformed electricity market design facilitates the availability of more stable long-term contracts through:

- new measures to promote the conclusion of long-term contracts between energy producers and final customers, with the aim of protecting final customers from price volatility and encouraging investment in renewable energy sources,



- public support for new investments in renewable energy sources through two-way contracts for differences in price, where member states guarantee a stable price to producers, and direct surplus income to the ones in need.

The proposal should help with the implementation of the REPowerEU plan and the achievement of the climate goals, i.e. a total of 592 GW of solar power and 510 GW of wind power plant capacity at the EU level by 2030, which would achieve a share of 70% of renewable energy at the EU level. This requires an average annual increase in installed production capacities at the EU level of 48 GW of solar power plants and 36 GW of wind power plants.

### 3.4.10. Regulatory Affairs and the Consumer Protection Council

Pursuant to the Statute of the HERA and the *Rules of operation of the Regulatory Affairs and Consumer Protection Council of the HERA*, the Regulatory Affairs and Consumer Protection Council (hereinafter: Council) undertakes the following activities:

- providing opinions on the regulations and methodologies adopted by the HERA,
- participates in providing opinions to the HERA on proposals for legislation and other public policies relevant to the energy sector, upon the request of the President of the Board of Commissioners,
- monitoring the implementation of regulations and methodologies adopted by the HERA and proposing changes to the Board of Commissioners, and
- providing opinions to the Board of Commissioners on matters of significance to the energy sector in accordance with the HERA's powers and responsibilities.

In 2022, three sessions of the Council were held, where the following was discussed:

- proposal of public service gas supply and guaranteed gas supply tariff amounts for the period from 1 April 2022,
- Draft proposal of the regulation on the general terms of network usage and electricity supply,
- Proposal for a decision on the amount of the unit grid connection fee,
- information on gas price recalculation based on calorific value,
- protection of consumers through procedures for the supervision of energy entities and
- energy crisis and price movements, as well as the measures of the Government of the Republic of Croatia and the regulatory measures of the HERA in the electricity, gas and thermal energy sectors.

### 3.4.11. Cybersecurity

In 2015, the Croatian Government adopted the National Cybersecurity Strategy and Action Plan for the Implementation of the Strategy (Official Gazette No. 108/15), aimed at achieving a balanced and coordinated response to security threats in contemporary cyberspace. The term “cyberspace” means “a virtual space within which communication between network and information systems takes place, and which encompasses all network and information systems, regardless of whether they are connected to the Internet”.

Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union (hereinafter: NIS Directive) and the Act on the Cybersecurity of Operators of Essential Services and Digital Service Providers (Official Gazette no. 64/18) (hereinafter: Cybersecurity Act) are of special



importance to the energy sector, as is the corresponding Regulation on the Cybersecurity of Operators of Essential Services and Digital Service Providers (Official Gazette no. 68/18) (hereinafter: Cybersecurity Regulation), which transposed the NIS Directive into Croatian legislation.

The NIS Directive affirms the obligation of member states to introduce measures ensuring a high level of cybersecurity in key service sectors, which includes the energy sector (electricity, oil, and gas). The aforementioned Cybersecurity Regulation defines criteria that measure the effect of incidents on the continuity of provision of key services. The criteria are as follows:

- the number of users affected by the interruption of key services,
- the length of the incident,
- the geographical extent of the incident, or
- other sector criteria, such as economic effects and the dependence of other regions or businesses on the service.

An operator of essential services, as defined by the Cybersecurity Act, is “any public or private entity that provides any of the key services from the List in Annex I of the Cybersecurity Act, in which the key services offered by the said entity depend on network and information systems, and an incident would have a significant negative impact on the provision of key services”.

The Cybersecurity Act regulates the procedures and measures for achieving a high common level of cybersecurity for operators of essential services and digital service providers, outlines the jurisdiction and authorities of competent sector bodies, defines a single national contact point, defines the bodies responsible for incident prevention and protection (hereinafter: competent CSIRT) and the technical body for conformity assessment, regulates the supervision of key service operators and digital service providers in the implementation of the Act, and prescribes misdemeanour provisions. The goal of the Act is to ensure the implementation of measures for achieving a high common level of cybersecurity in the provision of services that are of particular importance to key social and economic activities, including the functioning of the digital market.

Annex I of the Cybersecurity Regulation sets out criteria and thresholds for assessing the importance of the negative impact of an incident by sector (eight sectors) and key service sub-sector. Table 3.4.1. lists the criteria and thresholds for assessing the negative impact of an incident on a key service – energy sector.



*Table 3.4.1 Criteria and thresholds for assessing the negative impact of an incident on a key service – ENERGY*

<b>Sector ENERGY</b>			
<b>Sub-sector</b>	<b>Key service</b>	<b>Criteria</b>	<b>Thresholds</b>
Electricity	Electricity production	Reduced production	60 MW
	Electricity transmission	Transmission interruption	Without exception
	Electricity distribution	Power interruption	More than 20,000 billing metering points
Oil	Transmission of oil through pipelines	Transmission interruption	Without exception
	Oil production	Reduced oil field production	10,000 t/yr
	Production of petroleum products	Reduced production of petroleum products	Petrol: 40,000 t/yr
			Diesel fuel: 40,000 t/yr
			Fuel oils: 20,000 t/yr
Storage of oil and petroleum products	Reduced oil storage capacity at the terminal	200,000 m <sup>3</sup>	
		Reduced petroleum product storage capacity at a particular storage facility	12,000 m <sup>3</sup>
Gas	Gas distribution	Interruption of distribution to final customers	More than 20,000 billing metering points
	Gas transmission	Transmission interruption	Without exception
	Gas storage	Reduction in storage capacity	5% of gas consumption in Croatia in the previous year
	Unloading and sending out LNG	Reduced LNG regasification capacity in m <sup>3</sup> /h	More than 100,000 m <sup>3</sup> /h
	Natural gas production	Reduced gas production delivered to the transmission system at each entry point	20%

In accordance with the aforementioned definition, the Cybersecurity Act distinguishes between a few competent authorities for operators of essential services, as defined in Annex III of the Cybersecurity Act (Table 3.4.2). These are, in order:

- competent sector bodies (the state body with jurisdiction over the energy sector is the Ministry of Environmental Protection and Energy),
- single national contact point (Office of the National Security Council - UVNS),
- competent Computer Security Incident Response Teams (CSIRT): IT System Security Department (hereinafter: ZSIS) and the National Computer Emergency Response Team (CERT), and
- technical conformity assessment bodies (ZSIS and the National CERT).



Table 3.4.2 List of competent authorities

Sector of key services	Competent sector body	CSIRT	Technical conformity assessment body
Energy	State administration body responsible for energy - Ministry of the Economy and Sustainable Development	IT System Security Department	IT System Security Department

One of the obligations of operators of essential services arising from the Cybersecurity Act and the Cybersecurity Regulation is reporting to the competent CSIRT (ZSIS for the energy sector) on incidents that have a significant impact on the continuity of the services they offer. In accordance with the prescribed criteria for identifying incidents that have a significant impact on the provision of an essential service, two Croatian CSIRTs (the ZSIS and the National CERT) have developed Guidelines for the submission of reports on incidents with a significant impact for key service operators and digital service providers, which contain a protocol for reporting to the competent CSIRT, the criteria for defining a significant impact, incident reporting forms, and other key information for successful communication between key service operators and the competent CSIRTs.

In December 2022, three new legislative acts related to cybersecurity were published in the Official Journal of the European Union, which entered into force in January 2023. The first is Regulation (EU) 2022/2554 of the European Parliament and of the Council of 14 December 2022 on digital operational resilience for the financial sector and amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014, (EU) No 909/2014 and (EU) 2016/1011 (hereinafter: DORA). While the DORA is aimed exclusively at the financial sector and aims to strengthen information and cybersecurity in the financial sector in order to maintain operational resilience due to serious work disruptions, the following are of particular importance for the energy sector: Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (hereinafter: NIS 2 Directive) and Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC (hereinafter: CER Directive).

The NIS2 Directive, similarly to the NIS Directive, establishes the obligation of member states to introduce measures for a high level of cybersecurity protection in key sectors. In addition to expanding the scope of entities to which the NIS2 Directive applies, the NIS2 Directive introduces “essential and important entities” instead of the previous “operators of essential services”, where the energy sector, as in the previous NIS Directive, occupies an important place. The energy sector, once again listed as the first in the list of highly critical sectors, was expanded from the previous three sub-sectors (electricity, oil and gas) to include the two additional sub-sectors district heating and cooling and hydrogen in the NIS2 Directive.

The deadline for the transposition of the NIS2 Directive into national law is 21 months, i.e. member states must adopt and publish measures for harmonisation with the NIS2 Directive by 17 October 2024. Pursuant the above, the adoption of a new national cybersecurity strategy that would contain certain elements required by the NIS2 Directive is envisaged, as well as a new law that would adopt the NIS2 Directive into Croatian legislation and repeal the existing Cybersecurity Act.

The CER Directive provides a legal framework for the digital and physical resilience of critical entities in the internal market by establishing harmonised minimum rules. As in the NIS2 Directive, the energy sector with its five sub-sectors (electricity, district heating and cooling, oil, gas, hydrogen) is recognised as one of the sectors of critical entities, and precisely critical entities should be able to strengthen their ability to prevent significant incidents that affect the provision of essential services as well as protection against them.



In addition to these three acts, in 2022 the national Act on the Implementation of Regulation (EU) 2019/881 of the European Parliament and the Council of 17 April 2019 (Official Gazette no. 63/22) was adopted (hereinafter: Act on the Implementation of Cybersecurity Certification). The Act on the Implementation of Cybersecurity Certification incorporates the provisions of Regulation 2019/881 on the framework for on information and communications technology cybersecurity certification of ICT products, ICT services and ICT processes, and regulates the system of competent authorities at the national level. Cybersecurity certification has become important due to the increasing use of technologies that require a high degree of both reliability and security, and the increasing dependence on ICT products, ICT services and ICT processes, such as industrial automation control systems (IACS systems).

An important aspect of the cybersecurity of the energy sector is the network code on cybersecurity, the aim of which is to further contribute to maintaining the security and resilience of the electric power system throughout Europe.

The process of developing a network code on cybersecurity is defined in Chapter VII of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity; the objective of the Regulation is to establish a network code on cybersecurity covering aspects such as automation and data flow related to cross-border electricity flows, common minimum cybersecurity requirements applicable to all electricity market stakeholders, planning for future developments, monitoring the implementation of all measures, reporting obligations (if necessary and justified), and crisis management if cyber risks materialise.

At the invitation of the European Commission, as part of the further implementation of the European Union Cybersecurity Strategy, the ACER published its non-binding Framework Guideline on sector-specific rules for the cybersecurity aspects of cross-border electricity flows in July 2021; it provides general principles and the basis for the development of a binding network code on cybersecurity that will contribute to maintaining the security of the electric power system across Europe. The topics covered by this Framework Guideline are: cybersecurity management in the field of electricity; the assessment and management of cross-border risks; a common framework for cybersecurity in the field of electricity; information sharing and essential information flows; incident management and crisis management (including data collection); a framework for cybersecurity exercises in the field of electricity; protection of information exchange in data processing; and monitoring, evaluation and reporting. The end of the document states that the network rules for cybersecurity, which will be created on the basis of the Framework Guideline, must be designed so that they are neither an obstacle to electricity market entrants, nor to the subsequent use of innovative solutions to contribute to the efficiency of the electricity system, all while promoting the safe digitisation of the electricity sector and discouraging and penalising any action that fails to duly consider security aspects, including cybersecurity.

In January 2022, based on the ACER's Framework Guideline on sector-specific rules for the cybersecurity aspects of cross-border electricity flows, the ENTSO-E and EU DSO submitted their draft network code on cybersecurity to the ACER. With the support of the expert group and extensive consultations with the relevant stakeholders, and taking into consideration the views of all the parties involved during the drafting of the proposed network code, the ACER revised the received draft network code and sent the revised draft network code to the European Commission in July 2022.

The main changes introduced by the ACER's revised draft include determining the elements and principles to be included in the terms, conditions and methodologies; elaboration of issues related to management; introducing a legal basis for creating guidelines for the exchange of information; and introducing the possibility for member states to be exempted from the provisions due to national security. Additionally, the ACER conducted a thorough review of the provisions of the proposed network code to ensure its compatibility with the NIS2 Directive, which had not yet been adopted at the time





the network code was revised. The next step in the development of the network code on cybersecurity includes the review of the submitted revised version of the network code by the European Commission and the initiation of the procedure for the adoption of delegated acts. After adoption by the member states, the network code will become legally binding throughout the European Union.

4

# ELECTRICITY





## 4. ELECTRICITY

### 4.1. Regulation of the legal framework for the electricity market

#### Legal framework for the electricity market in the Republic of Croatia

The basic framework is set by the **Electricity Market Act**, adopted at the end of 2021, which required the HERA and operators to adopt certain by-laws. Considering that the year 2022 was very challenging and demanding due to all the events and features in the electricity markets throughout Europe, as well as due to the numerous interventions of the EU member states in the determination of electricity prices and related to the realisation of surplus market revenues on the wholesale energy markets, most of the time, the HERA was focused on resolving the emerging situations. Regardless, the HERA has timely adopted the by-laws prescribed by this **Act**.

In April 2022, the Ministry of the Economy and Sustainable Development adopted *the Ordinance on licences for performing energy activities and maintaining registers of granted and revoked licences for the performance of energy activities (Official Gazette no. 44/22)*. This Ordinance covers new energy activities prescribed by the **Electricity Market Act** that are performed as market activities: aggregation, energy storage, organising citizen energy communities, and closed distribution system operators.

In accordance with the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, electricity suppliers are required to take a share, expressed as a percentage, in the net supplied electricity of eligible electricity producers at the regulated purchase price of HRK 0.42/kWh. Pursuant to the *Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obligated to take up from the electricity market operator (Official Gazette no. 147/21)*, adopted by the Government of the Republic of Croatia in December 2021, electricity suppliers were obliged to take over 60% of the net delivered electricity of eligible electricity producers from the electricity market operator at the regulated purchase price during 2022. Considering the amount of the regulated purchase price of HRK 0.42/kWh (HRK 420/MWh or EUR 55.74/MWh with the application of the conversion rate EUR 1 = HRK 7.5345), which is significantly lower compared to the electricity prices on the wholesale markets in 2022, this represented a kind of help to electricity suppliers.

At the end of December 2022, the Government of the Republic of Croatia adopted the *Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obligated to take up from the electricity market operator for the year 2023 (Official Gazette no. 156/22)*. According to this *Regulation*, starting from 1 January 2023, electricity suppliers are required to take up 60% of the net delivered electricity produced by eligible producers from the electricity market operator at the regulated purchase price. Compared to 2022, the share expressed as a percentage remained unchanged (60%).

At the beginning of September 2022, the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, which, due to disturbances on the domestic energy market, introduced special measures for electricity trade, the method and conditions of setting prices for certain categories of electricity and thermal energy customers, supervision over the implementation of prices determined by this *Regulation*, and special conditions for performing energy activities. The special measures prescribed in this *Regulation* are temporary and



are applicable in the period from 1 October 2022 to 31 March 2023. This *Regulation* stipulates that the HERA shall monitor its implementation and supervise the implementation of prices in accordance with certain provisions of the Regulation.

At the end of December 2022, the Government of the Republic of Croatia adopted the *Regulation on Amendments to the Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 156/22)*, which, due to the transition to EUR starting on 1 January 2023, determines the prices of working energy expressed in euros per kWh with a higher number of decimal places than in the *Regulation on Eliminating Disturbances on the Domestic Energy Market*.

At the end of December 2022, the Government of the Republic of Croatia adopted the *Regulation on the Act on Emergency Intervention to Address High Electricity Prices (Official Gazette no. 156/22)* (hereinafter: Regulation on Surplus Market Revenues), which ensures the implementation of *Council Regulation (EU) 2022/1854 of 6 October 2022 on Emergency Intervention to Address High Energy Prices* (hereinafter: Regulation 1854), in the part that refers to measures for the application of the caps on market revenues and the distribution of surplus congestion income revenues to final electricity customers. The Regulation on Surplus Market Revenues establishes the cap on market revenues realised on the wholesale electricity markets in the amount of 180 euros per MWh of electricity produced, regulates to whom the cap applies, on what basis the surplus market revenues are determined, to whom the excess market income is paid and who manages it, and for what purpose the paid surplus market revenues are used. Also, the Regulation on Surplus Market Revenues regulates the obligations and deadlines for the delivery of data and information necessary for its application, the obligation to monitor and supervise its implementation, and the HERA's obligation to prepare and publish additional instructions on its implementation on the HERA website.

After consultation with the interested public, the HERA adopted the following by-laws based on the Electricity Market Act:

- Regulation on the General Terms and Conditions of Network Usage and Electricity Supply,
- Methodology for Determining the Grid Connection Fee,
- Methodology for Setting Tariffs for Electricity Transmission,
- Methodology for Setting Tariffs for Electricity Distribution,
- Regulation on the Requirements for the Quality of the Electricity Supply,
- Rules on Switching Suppliers and Aggregators,
- Criteria for issuing consent for the construction and operation of direct lines, and
- Methodology for Setting Tariffs for Guaranteed Electricity Supply.

The *Regulation on the General Terms and Conditions of Network Usage and Electricity Supply* replaced the previous *General Terms and Conditions of Network Usage and Electricity Supply*, and the name change of this regulation was introduced by the **Electricity Market Act**. This *Regulation* regulates the general terms and conditions of using the network, which means that it primarily applies to users of the network, and in accordance with the **Electricity Market Act**, network users are natural or legal persons who have entered into an agreement with the system operator on the use of the network for the purpose of delivering electricity into the transmission network or distribution network, or for the purpose of receiving electricity from the transmission network or distribution network. The procedures that precede the use of the network are prescribed in other relevant regulations. In accordance with the coverage of the electricity market prescribed in the Electricity Market Act, this Regulation regulates the general terms and conditions for retail electricity markets, which include electricity supply and aggregation. The provisions of this Regulation regarding citizens' energy communities also apply to renewable energy communities in which renewable energy sources are used for activities related to electricity (this Regulation introduced the shorter common name energy community).



The most significant changes in this Regulation are related to:

- contractual relations,
- requirements for concluding a contract (for the purpose of harmonising with the Rules on Switching Suppliers and Aggregators),
- active customers,
- sharing the electricity of a group of final customers who jointly act as an active customer (hereinafter: collective active customer),
- energy community and the obligation to regulate relations through a contract on participation in an energy community and the terms and conditions of participation in an energy community,
- sharing electricity in an energy community,
- the obligation to regulate the mutual relations of the system operator with an aggregator, an energy community, with a representative of a collective active customer and with a closed distribution system operator through special agreements on mutual relations,
- terms and conditions of electricity delivery for network users,
- introducing the guaranteed purchase of electricity when a grid user is left without the contracted purchase of electricity from an electricity purchaser on the retail market (a supplier or aggregator),
- compensation for damage during the trial operation of facilities and installations of network users,
- payment of fees for using the network for a producer and for an energy storage operator,
- application of the tariff element of the calculated peak workforce for the direction of electricity delivery to the grid,
- temporary grid disconnection for an active customer and for an energy storage operator,
- termination of the electricity supply contract at the request of the network user with a simultaneous request for a temporary grid disconnection or for the purpose of acting independently on the electricity market, in which case the automatic transition to public service electricity supply is not applied (universal supply or guaranteed supply),
- minimum requirements for issuing invoices and billing information,
- collective supplier switching through a supply negotiator in order to be able to negotiate the most favourable prices and terms of the electricity supply,
- exceptions related to the network usage fee when the network user provides ancillary services at the request of the system operator,
- access to network user data when an advanced meter is installed,
- access to data in case of an energy community, aggregator, collective active customer and the collective switching of supplier, and
- electronic operations, where energy entities are obliged to enable the provision of services to their customers electronically, as well as the use of electronic signatures.

This *Regulation* stipulates that the contract on the use of the network may also contain provisions on the operational limitation of the use of connected power, which are contracted for a certain period of time with a clearly defined duration and the mutual rights and obligations of the system operator and the user of the network, and that the contract on electricity supply may contain provisions on the dynamic determination of the price of electricity taken from the network and/or delivered to the network in the freely negotiable part. Furthermore, the *Regulation* contains provisions on the aggregation contract and the conclusion of such contracts, provisions on the contract on participation in an energy community and the conclusion of such contracts, as well as provisions on the conditions of participation in an energy community and provisions on special agreements on mutual relations.

Also, this *Regulation* sets out the framework for sharing electricity in an energy community and sharing the electricity of a collective active customer, while prescribing the obligations of the participants in that process, the immutability of the sharing scheme during an ongoing billing period, and the method of



determining the delivered electricity at the billing metering point included in the electricity sharing scheme for the purposes of the electricity billing carried out by the electricity supplier and the calculation of the fee for using the network. In connection with the calculation of electricity at the billing metering points included in the sharing scheme, it is recognised that, both in the case of a collective active customer and in the case of an energy community, part of the electricity is delivered by the supplier while part of the electricity is delivered through the sharing scheme. Given that, in the case of a collective active customer, the installations of the collective active customer are used for sharing electricity, and not the distribution network, for the purposes of the calculation of electricity carried out by the supplier and the calculation of the fee for using the network, the distribution system operator determines the amount of electricity delivered by the supplier (and taken over using the distribution network) to the billing metering point included in the sharing scheme, and the price of electricity contracted with the supplier and the fee for using the network is paid for that amount. The remaining part of the electricity that originates from the electricity sharing process at that billing metering point is handled in accordance with the sharing scheme and the agreement on participation in a collective active customer. There is no charge for the use of the network for this remaining part of the electricity. In the case of electricity sharing in an energy community, the distribution network is used for the delivery of electricity originating from the sharing process. Therefore, at the billing metering point included in the sharing scheme in the energy community, the fee for using the network is calculated and charged for the total electricity taken at that billing metering point. For the purposes of the calculation of electricity carried out by the supplier, in this case too, the distribution system operator determines the amount of electricity delivered by the supplier to the billing metering point included in the sharing scheme, and the price of electricity contracted with the supplier is paid for that amount. The remaining part of the electricity that originates from the electricity sharing process at that billing metering point is handled in accordance with the sharing scheme and the agreement on participation in the energy community.

Given that the method of calculating electricity, as well as the fee for using the network and the fee for renewable energy sources and high-efficiency cogeneration, for users of self-supply facilities is essentially different from the method of calculation for other final customers, this *Regulation* stipulates that a final customer, or an owner of a share or a member of an energy community at a billing metering point included in a collective active customer, or an energy community, cannot be a user of the self-supply facility at the same time.

In addition, this *Regulation* stipulates that a network user can only deliver electricity to the network if they are a participant in the electricity market or if they have an agreement for the purchase of electricity with an electricity purchaser on the retail market (a supplier or aggregator). When a network user does not have an agreement for the purchase of electricity with an electricity purchaser on the retail market, a guaranteed purchase of electricity is introduced, carried out by a guaranteed supplier without a special request from the network user. In this way, situations are avoided on the retail market where a network user, without financial compensation, delivers electricity to the network that no one takes over, or where the system operator is forced to temporarily disconnect the billing metering point of that network user from the grid. The price of electricity in the guaranteed purchase, which the guaranteed supplier pays to the network user for the electricity delivered to the network, is set at a small enough amount to motivate the network user to look for a buyer and better conditions for the purchase of electricity.

As for the payment of the fee for using the network, this *Regulation* regulates the payment of the fee for the direction of take-over of electricity from the network and for the direction of delivering electricity to the network. For the direction of taking over electricity from the grid, for a medium-voltage or low-voltage billing metering point, the network user pays a fee for using the transmission network and a fee for using the distribution network, and for a very high-voltage and high-voltage billing metering point, the network user pays a fee for using the transmission network. For the direction of delivering electricity to the grid, for a medium-voltage or low-voltage billing metering point, the producer licensed



to perform energy activities pays a fee for using the distribution network, and for a very high-voltage and high-voltage billing metering point, the producer licensed to perform energy activities pays a fee for using the transmission network.

The *Methodology for Determining the Grid Connection Fee* changed the model for determining the fee for connecting new network users to the electric power network and for increasing the connection capacity of existing network users from the previous deep approach to a hybrid approach. This is a major change and an important step forward because now, instead of a deep approach according to which the network user bears all the costs of creating technical conditions in the network, the fee for connecting to the network, i.e. the fee for increasing the connection capacity of the existing connection, is determined using the connection capacity and the unit fee for connection to the network, i.e. unit connection prices. In this way, the calculation of the connection fee is simplified, which makes the process easier for the transmission system operator and the distribution system operator, and investors have clear information on the costs of connecting to the network. A different distribution of financing, i.e. connection costs, is achieved with the hybrid approach compared to the previous deep approach, because determining the amount of the unit fee for connection regulates which part of the costs of the creation of the technical conditions in the network will be financed from the connection fee, and which part will be financed from the revenues from the network usage fee. In addition, in the proposals for unit connection prices, the distribution system operator and the transmission system operator take into account that investments in the network in the part financed from the awarded grants, such as from European Union funds, are not financed from the connection fee or the connection capacity increase fee. Also, in the proposal for unit connection prices, the transmission system operator takes into account that investments in very high-voltage lines are considered to be investments of systemic importance and cannot be fully financed from the connection fee or the connection capacity increase fee.

The most significant changes in the *Methodology for Setting Tariffs for Electricity Transmission* and *Methodology for Setting Tariffs for Electricity Distribution* compared to the previous *Methodologies* are:

- application of the method of recognised costs with incentives as a method of regulation (unlike the previous method of recognised costs),
- introduction of an electricity price incentive model to cover losses of electricity in the transmission or distribution network for the purpose of improving the planning and implementation of electricity procurement to cover losses by transmission system operators and distribution system operators, with a transitional period until full implementation,
- introduction of the possibility of regulatory sandboxes as concrete frameworks that, by providing a structured context for experimentation, enable the testing of innovative technologies, products, services or approaches in a real environment for a limited period of time and in a limited part under regulatory supervision, as necessary, for the sake of the greater transparency of the initiation of pilot projects and the covering of their costs,
- new tariff element of settled connection active power, and
- introduction of a tariff model for the category of electricity production.

The *Regulation on the Requirements for the Quality of the Electricity Supply* replaced the previous regulation *Requirements for the Quality of the Electricity Supply*. This *Regulation* applies to all network users, regardless of whether they are a production plant, an energy storage plant or an active customer's plant. The most significant changes in this regulation are the introduction of some new indicators and guaranteed/default service quality standards, the introduction of progressive monetary compensation, depending on the requested connection capacity, which the system operator is obliged to pay to the investor, building owner or network user for exceeding the guaranteed/default service quality standard in terms of the time necessary for the connection of a building to the electric power network with a simple connection, and prescribing the right to monetary compensation for the investor,



or the owner of the building, separately from the right to monetary compensation for the user of the network.

The *Rules on Switching Suppliers and Aggregators* set out:

- the procedure for switching the electricity supplier,
- the procedure for switching the aggregator,
- the procedure for switching the electricity supplier or aggregator in case of entering into a contract regulating the purchase of electricity,
- the procedure for changing the participation in a citizen energy community,
- the procedure for automatic transition to the public electricity supply service (universal supply for network users from the household category, or guaranteed supply for network users from the non-household category), and
- the obligations of individual participants in the aforementioned procedures.

These Rules accept the new types of market participants introduced by the **Electricity Market Act** and regulate the procedures important for the functioning of the electricity market, which are based on the principle of the freedom of choice of electricity suppliers, aggregators or voluntary participation in a citizen energy community, and on the principle of the protection of final customers, which is activated when their electricity supplier ceases its operations so such final customers have an uninterrupted supply of electricity. In addition, for the functioning of the electricity market, the procedures regulated by these *Rules* are also important in the context of liability for deviations caused by market participants in the electric power system.

The *Criteria for issuing consent for the construction and operation of direct lines* are applied in the procedure for issuing consent for the construction and operation of direct lines carried out by the HERA at the request of an electricity producer established in the territory of the Republic of Croatia, if the electricity producer was previously denied access to the network in accordance with the **Electricity Market Act** or if a procedure has been initiated before the HERA to resolve a dispute on the denial or restriction of access to the network. These *Criteria* regulate the criteria for issuing consent for the construction and operation of direct lines in the territory of the Republic of Croatia, i.e. determine the requirements for applicants requesting consent for the construction and operation of a direct line, the conditions for the possibility of power supply via a direct line, the conditions for the construction and operation of a direct line, and relevant evidence that will prove the fulfilment of the conditions for the construction of a direct line. The most significant changes in these *Criteria* in relation to the previous ones are:

- removal of the requirement that the electricity producer who submits the application must have a licence to carry out the activity of electricity supply,
- the increase of the voltage level limit for direct lines so that these lines can now also be medium-voltage lines and, accordingly, the adjustment of the restriction that direct lines cannot be an integral part of the distribution network, and
- change in the conditions for the possibility of power supply through the direct lines of final customers, whereby now isolated final customers can be supplied with electricity in this way.

The most significant change in the *Methodology for Setting Tariffs for Guaranteed Electricity Supply* compared to the previous one is in the way of determining the reference price of electricity, which is now determined by taking the average monthly price of basic electricity and the average monthly price of peak electricity in the Hungarian Derivative Energy Exchange HUDEX realised in the first month of the current quarter for the future (next) quarter, instead of the highest average price of basic electricity and the highest average price of peak electricity for the future quarter and the three subsequent quarters, which were realised on the Hungarian Derivative Energy Exchange HUDEX in the first month of the current quarter. In addition, this *Methodology* also introduced the supply fee, given that it is a





common element in the price lists of electricity suppliers on the electricity market in the Republic of Croatia. The new method of determining the reference price of electricity results in amounts of the reference price or tariff items for guaranteed electricity supply that are lower than the amounts that would have been determined according to the previous Methodology. The change was introduced in order to partially mitigate the price impact caused by the highly dynamic and large price increases on the wholesale electricity markets on non-household final customers who use guaranteed electricity supply.

In January 2023, the HERA adopted the *Instructions for the implementation of the Regulation on the Act on Emergency Intervention to Address High Electricity Prices*, and published the instructions on its website<sup>19</sup>. These instructions clarify the method and scope of the delivery of data necessary for its implementation to those liable to pay surplus market revenues and to all entities obliged to submit data and the information necessary for the implementation of the Regulation on surplus market revenues.

In accordance with Article 24 of the **Electricity Market Act**, the HROTE created a tool for comparing the offers of suppliers for household customers and for non-household customers with an expected annual consumption of less than 100,000 kWh and published it on its website<sup>20</sup> in September 2022. With this tool, the HROTE provided free access to at least one information tool for comparing the supply model offers and electricity prices of electricity suppliers for the specified categories of final customers. Also, on 3 October 2022, the HROTE issued a reliability label to the company Uprise d.o.o. for the comparison tool available at <https://ustedi.hr/>. A list of all comparison tools that have a reliability label and information on their availability is also published on the HROTE website.

## Implementation of network codes and guidelines

The network codes and guidelines related to the electricity sector are:

- *Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CACM Regulation),*
- *Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for the grid connection of generators (RFG Regulation),*
- *Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocations (FCA Regulation),*
- *Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a network code on demand connection (DCC Regulation),*
- *Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for the grid connection of high-voltage direct current systems and direct current-connected power park modules (HVDC Regulation),*
- *Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (SOGL Regulation),*
- *Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (EBGL Regulation), and*
- *Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration (ERNC Regulation).*

The HERA continuously works to adopt and improve refined or new acts and cooperates with other energy regulatory authorities of EU member states through the ACER to create a fully interconnected European electricity market.

<sup>19</sup> [https://www.hera.hr/hr/docs/2023/Upute\\_2023-01-26.pdf](https://www.hera.hr/hr/docs/2023/Upute_2023-01-26.pdf)

<sup>20</sup> <https://www.hrote.hr/alat-za-usporedbu>



The most significant activities in accordance with the *CACM Regulation* are:

- In December 2021, the HERA approved a contribution to HOPS to cover the costs of establishing, changing and operating a unified day-ahead and intraday coupling for CROPEX in 2022. This decision was amended in December 2022 by adding categories of costs that the HERA considers justified for settlement without changing the total amount of the contribution,
- In April 2022, the HERA approved the Amendments to the alternative procedures of the Core region for the capacity calculation prepared in accordance with Article 44 of the *CACM Regulation*, aiming to increase the robustness of the EUPHEMIA algorithm to optimise the business processes in order to ensure an additional 20 minutes for the algorithm, which could help to avoid the declaration of full market unbundling,
- In April 2022, the ACER approved the amendments to the methodology for calculating intraday capacities in the Core region, in order to more appropriately take into account the allocated long-term capacities in the process of calculating intraday capacities

The most significant activities in accordance with the *FCA Regulation* are:

- In April 2022, the HERA approved the amendments to the rules on the nomination of physical transmission rights for the borders between the trading zones of Austria, Croatia, the Czech Republic, Germany, Hungary, Poland, Slovakia and Slovenia in accordance with Article 36 of the *FCA Regulation*, which takes into account the fact that from June 2022, with the beginning of the regional day-ahead capacity calculation in the Core region, physical transmission rights will be abandoned at the remaining borders, except for the border between Croatia and Slovenia,
- In December 2022, the HERA approved the Rules on the nomination of physical transmission rights for the border between the trading zones of Croatia and Slovenia in accordance with Article 36 of the *FCA Regulation*, since from the beginning of 2023 the nomination of long-term capacities can only be made at that border,
- In July 2022, the ACER approved the amendments to the set of requirements for the establishment of a single capacity allocation platform and the methodology for the distribution of the costs of the establishment, development and operation of the single capacity allocation platform in order to include the Finnish transmission system operator in the distribution of the relevant costs

The most significant activities in accordance with the *EBGL Regulation* were:

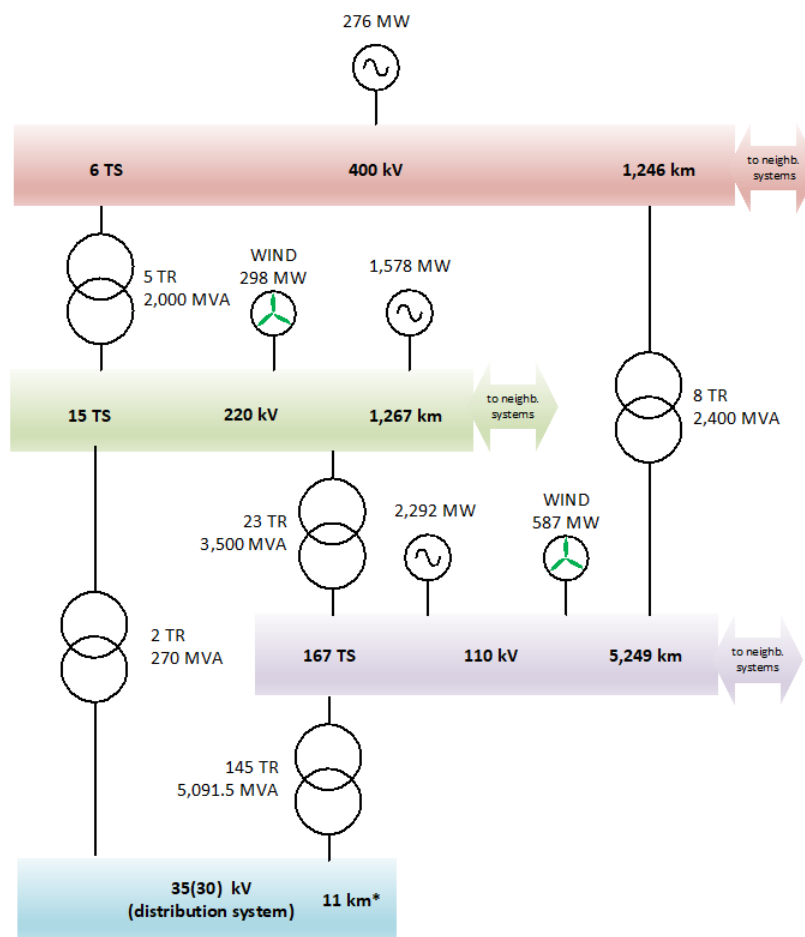
- HOPS submitted a new request to the HERA with the necessary documentation for deviating from the obligations stipulated in Article 53 (1) and Article 53 (2) *EBGL Regulation* (mandatory 15-minute imbalance settlement period in all scheduling areas while ensuring that all boundaries of the market time unit shall coincide with boundaries of the imbalance settlement period),
- in July 2022, the HERA made a decision to grant approval to HOPS for deviating from the obligations stipulated in Article 53 of the *EBGL Regulation* in the period from 1 January 2023 to 31 December 2024, with the obligation to apply the 15-minute imbalance settlement from 1 January 2025.



## 4.2. Regulated network activities and the technical functioning of the electric power system

### 4.2.1. Transmission and distribution systems

Electricity transmission and distribution are regulated energy activities performed as public services. In Croatia, HOPS 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 transmission of electricity. Figure 4.2.1. 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.



\*110 kV medium-voltage transmission lines

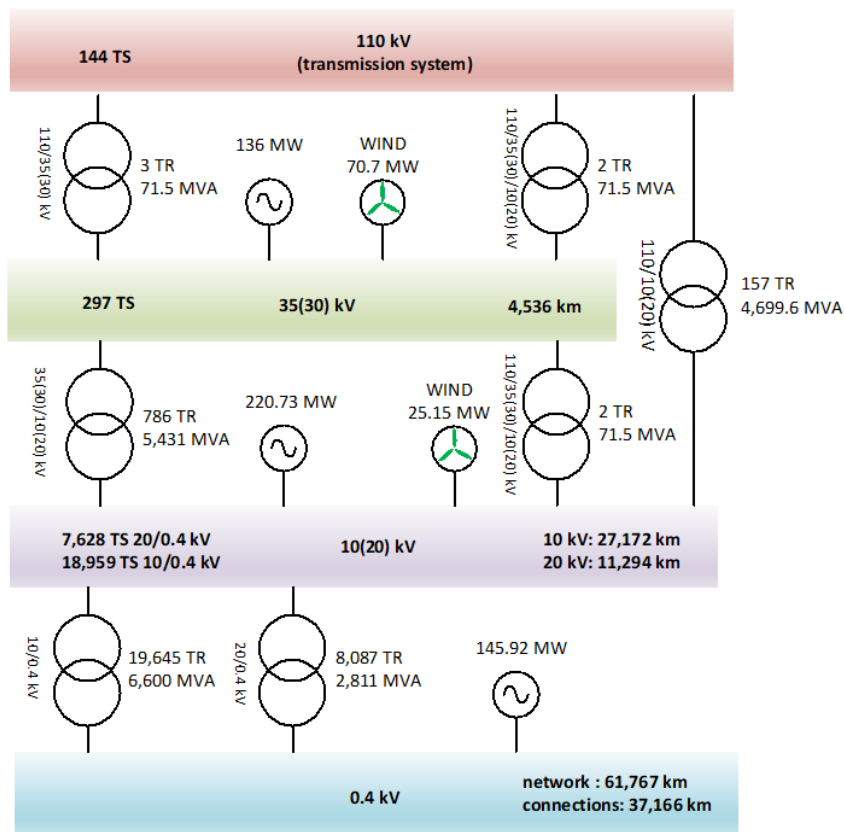
Source: HOPS

Figure 4.2.1 Basic information about the transmission system on 31 December 2022

In Croatia, HEP-ODS renders the public service of distribution of electricity and is responsible for the operation, management, maintenance, development and construction of the distribution network and for ensuring the long-term ability of the network to satisfy reasonable requirements for the distribution of electricity. Figure 4.2.2. 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 distribution system. Table 4.2.1. shows indicators for the transmission and distribution system in the Republic of Croatia from 2018 to 2022.



Source: HEP-ODS

Figure 4.2.2 Basic information about the distribution system on 31 December 2022

Table 4.2.1 Indicators for the transmission and distribution system in the Republic of Croatia from 2018 to 2022

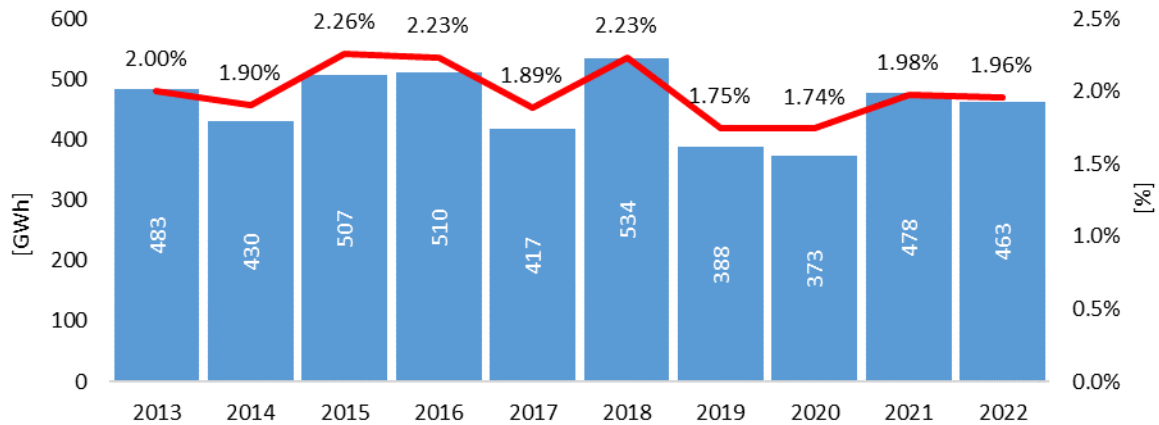
Indicator	2018	2019	2020	2021	2022
Maximum daily electricity consumption (GWh/day)	64.6	61.4	57.3	61.0	62.9
Number of transmission systems operators	1	1	1	1	1
Length of the transmission network [km]	7,791	7,758	7,785	7,779	7,774
Number of distribution systems operators	1	1	1	1	1
Length of the distribution network [km]	138,789	140,067	140,969	142,363	141,937



## 4.2.2. Procurement of electricity to cover losses in the transmission and distribution networks

### Losses in transmission

Power losses in the transmission network in 2022 amounted to 463 GWh, or 1.96% of total transmitted electricity (23,608 GWh), Figure 4.2.3.



Source: HOPS

Figure 4.2.3 Power losses in the transmission network from 2013 to 2022

HOPS provided the electricity to cover losses in the transmission network for the year 2022 through long-term contracts concluded on the basis of public bidding, short-term trading<sup>21</sup> on CROPEX, the “Root to market”<sup>22</sup> contract and through the imbalance settlement of EES. Table 4.2.2

<sup>21</sup> The short-term markets are the day-ahead market – DA and the intraday market – ID

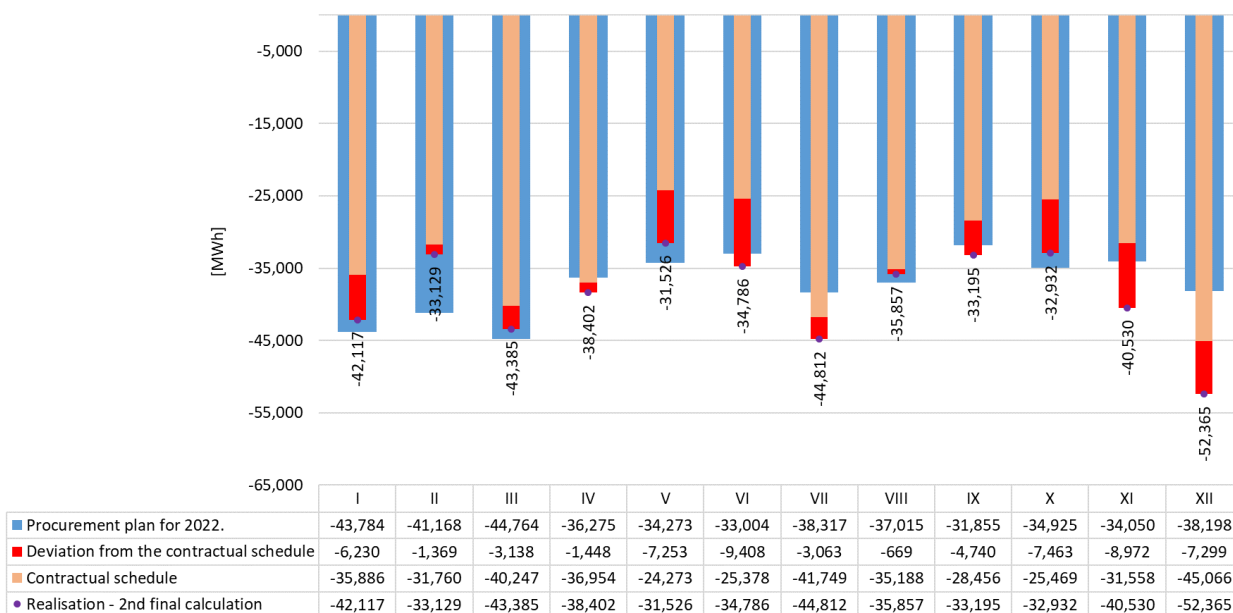
<sup>22</sup> The trader procured electricity for HOPS on the DA market with a commission



Table 4.2.2 Costs of the purchase of electricity to cover losses in the transmission network in 2022

Item	Quantity [GWh]	Cost/Income [€]	Unit cost [HRK/MWh]	Unit cost [€/MWh]	Share of amount*	Share of cost*	Share of amount**	Share of cost**
<b>Long-term procurement</b>	<b>219.000</b>	<b>19,750,093</b>	<b>679.48</b>	<b>90.18</b>	<b>54.5%</b>	<b>27.2%</b>	<b>47.3%</b>	<b>22.2%</b>
CROPEX DA	79.257	18,306,978	-	-	-	-	-	-
CROPEX ID	26.376	6,782,818	-	-	-	-	-	-
ROOT TO MARKET DA	48.480	11,421,869	-	-	-	-	-	-
ROOT TO MARKET ID	53.777	23,008,795	-	-	-	-	-	-
Sales on DA and ID	-24.907	-6,790,770	-	-	-	-	-	-
CROPEX fees	-	12,494	-	-	-	-	-	-
<b>Total short-term procurement (net)</b>	<b>182.983</b>	<b>52,742,184</b>	<b>2,171.71</b>	<b>288.24</b>	<b>45.5%</b>	<b>72.8%</b>	<b>39.5%</b>	<b>59.3%</b>
<b>Imbalance settlement</b>	<b>61.053</b>	<b>16,468,137</b>	<b>2,032.32</b>	<b>269.74</b>	-	-	<b>13.2%</b>	<b>18.5%</b>
<b>Total without imbalance*</b>	<b>401.983</b>	<b>72,492,277</b>	<b>1,358.75</b>	<b>180.34</b>	-	-	-	-
<b>Total with imbalance**</b>	<b>463.036</b>	<b>88,960,415</b>	<b>1,447.56</b>	<b>192.12</b>	-	-	-	-

Figure 4.2.4. shows the electricity procurement plan to cover losses in the transmission network, the contractual schedule, the imbalance from the contractual schedule in the first imbalance settlement and the realisation in the second final settlement for 2022 by month.





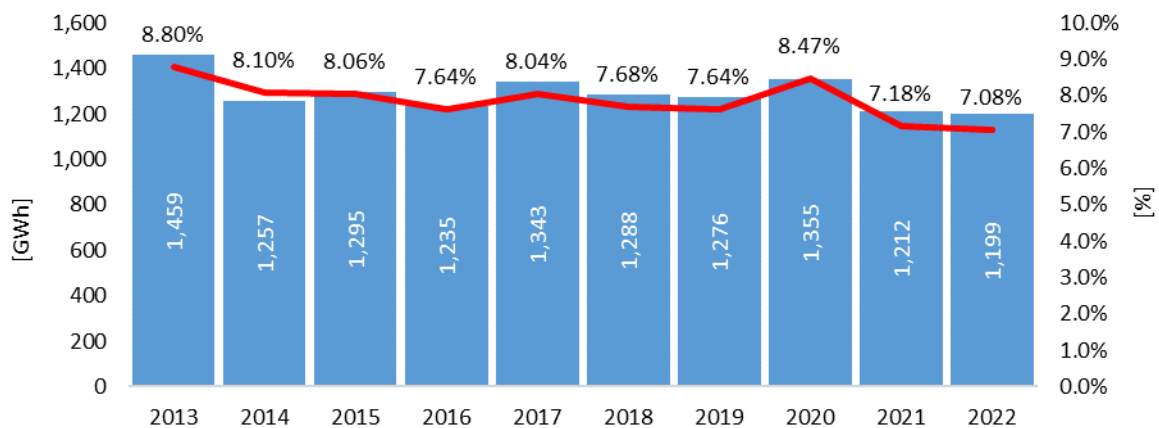
Source: HOPS, HROTE

Figure 4.2.4 Procurement plan, contractual schedule, and realisation of power losses in the transmission network for 2022

## Losses in distribution

Realised power losses in the distribution network in 2022 amounted to 1,199 GWh, or 7.08% of net electricity taken up, which amounted to 16,943 GWh (net electricity taken up from the transmission network and from electricity producers in the distribution network, minus the net electricity injected into the distribution networks of neighbouring countries).

Figure 4.2.5. shows the amounts of losses in the distribution network in the past ten years.



Source: HEP-ODS

Figure 4.2.5 Power losses in the distribution network from 2013 to 2022

In order to procure energy to cover losses in the distribution network for 2022, a public tender was issued in the form of two long-term products – basic and variable. The basic product had a prearranged quantity and price, while HEP-ODS had the unlimited right to deviate from the framework plan for the variable product. The price of the variable product is calculated as 75% of the winning price in the public tender and 25% of the unit monthly price in the second informative imbalance settlement<sup>23</sup>, Table 4.2.3

Table 4.2.3 Costs of the purchase of electricity to cover losses in the distribution network in 2022

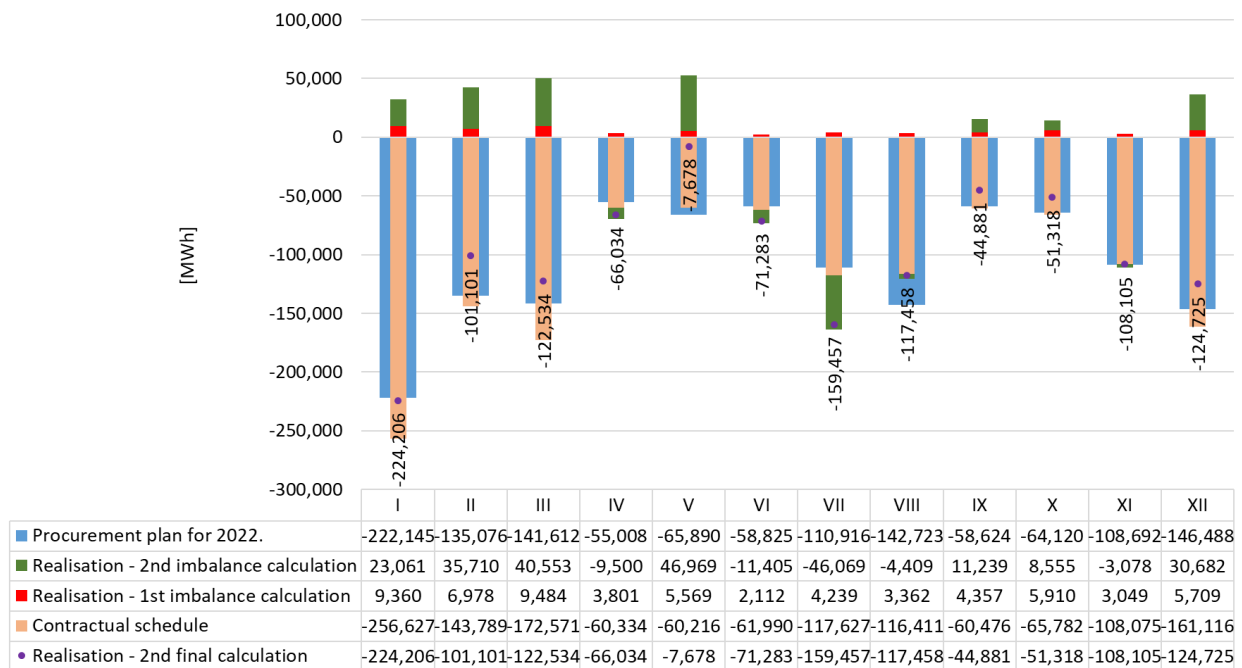
Item	Quantity [GWh]	Cost/Income [€]	Unit cost [HRK/MWh]	Unit cost [€/MWh]	Share in realisation	Share of total cost
Agreement – basic product	716	38,315,922	403.00	53.49	59.8%	51.7%

<sup>23</sup> The hourly price on the CROPEX DA market weighted by the load curve of the distribution system (the sum of the product of the hourly load value of the distribution system and the hourly price on CROPEX divided by the sum of the hourly load values of the distribution system).



Agreement – variable product	669	74,423,628	838.66	111.31	55.8%	100.5%
<b>Energy procured on the market</b>	<b>1,385</b>	<b>112,739,550</b>	613.32	81.40	115.5%	152.3%
1st settlement	- 64	-15,604,286	1,839.14	244.10	-5.3%	-21.1%
2nd settlement	- 122	- 23,091,751	1,422.53	188.80	-10.2%	-31.2%
<b>Energija - Imbalance settlements</b>	<b>-186</b>	<b>- 38,696,037</b>	<b>1,565.53</b>	<b>207.78</b>	<b>-15.5%</b>	<b>-52.3%</b>
<b>Realised losses</b>	<b>1,199</b>	<b>74,043,513</b>	<b>465.39</b>	<b>61.77</b>	<b>100.0%</b>	<b>100.0%</b>

Figure 4.2.6. shows the electricity procurement plan to cover losses in the distribution network, the contractual schedule, the imbalance in the first and second imbalance settlements and the realisation in the second final imbalance settlement for 2022 by month.

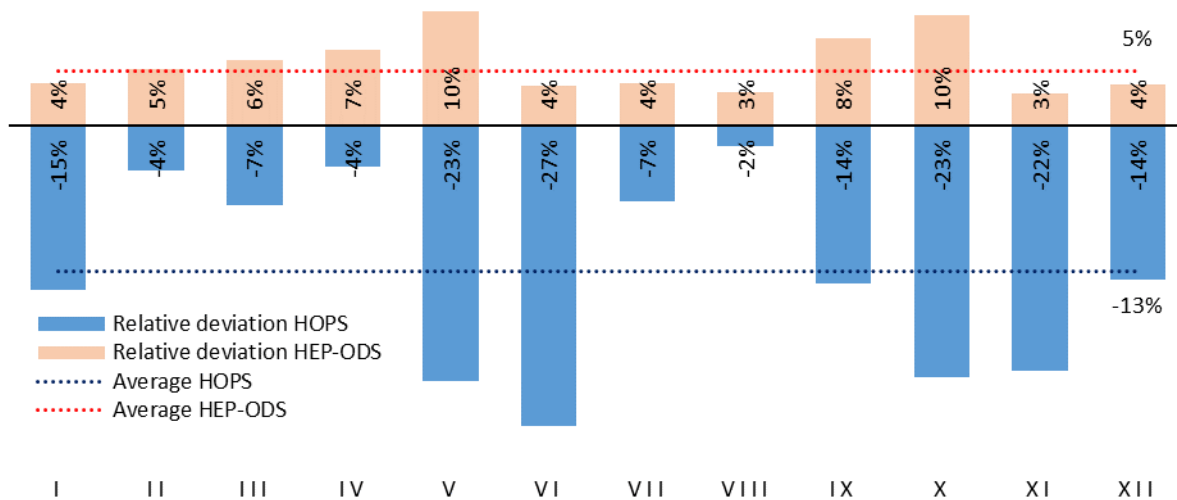


Source: HEP-ODS, HROTE

Figure 4.2.6 Procurement plan, contractual schedule, and realisation of power losses in the distribution network for 2022

In the first loss imbalance settlement, HOPS systematically deviated in a negative direction (deficit compared to the planned market position), while HEP-ODS systematically deviated in a positive direction (surplus compared to the planned market position), Figure 4.2.7.





Source: HOPS, HEP-ODS, HROTE

Figure 4.2.7 Relative deviation from the market position (contractual schedule) in relation to the realisation in the first (monthly) imbalance settlement of HOPS and HEP-ODS in 2022

## Monitoring the procurement of electricity to cover losses in the transmission and distribution networks

In December 2021, the HERA approved HOPS' annual plan of electricity procurement to cover losses for 2022, in which HOPS planned quantities of energy procurement to cover losses in the amount of 447.63 GWh at a planned price of HRK 531.70/MWh, which amounted to the total planned cost of HRK 238.2 million. In December 2021, the HERA approved HEP-ODS' annual plan for energy procurement to cover losses for 2022 in the amount of 1,310 GWh at a planned price of HRK 495.98/MWh, which amounted to the total planned cost of HRK 649.7 million.

An additional requirement is the delivery of a report on the realisation of the annual energy procurement plan to cover losses in the distribution and transmission network for the previous year up to 31 March of the current year. HOPS and HEP-ODS delivered the reports. The HERA has systematically monitored the quantity, price and purchase cost of electricity to cover losses in the distribution network on the basis of data delivered monthly by HOPS and HEP-ODS.

## Observations on the procurement of electricity to cover losses in the transmission and distribution networks

HOPS planned power losses in the transmission network in the amount of 448 GWh for 2022, and the realised losses amounted to 463 GWh. Long-term procurement covered 47.4% of energy for covering losses, while short-term procurement covered the remaining 52.6%. Long-term procurement refers to contracts with a supply period from 1 January 2022 to 31 December 2022, which were concluded from September 2019 until November 2021. Given that HOPS had procured more than half of the realised losses on a short-term basis, it was exposed to high prices on the short-term market, which resulted in the share of short-term procurement in the total cost of procurement of electricity to cover losses being 77.8%. Since HOPS did not have the necessary liquidity for daily trading on the electricity exchange, a public tender was carried out for the conclusion of the so-called "root to market" framework contract



according to which the trader procured electricity for HOPS with a commission on the short-term market. In this way, HOPS ensured payment for energy once a month, instead of daily payment on the electricity exchange. Within the framework of short-term procurement, HOPS also procured a significant portion of electricity through the imbalance settlement (13.2%). The share of the purchased electricity in the total cost of the procurement of electricity to cover losses was 18.5%. From the imbalance settlement, it is clear that during 2022, HOPS systematically deviated in a negative direction, on average 13% of realised losses in the first imbalance settlement.

For 2022, HEP-ODS planned power losses in the distribution network in the amount of 1,310 GWh (7.8% of the total supplied electricity), and the realised losses amounted to 1,199 GWh (7.08%). Planned costs for the procurement of electricity to cover losses amounted to HRK 649.8 million, and the realised costs were HRK 557.9 million (EUR 74 million). The planned unit cost of electricity procurement to cover losses was HRK 495.98/MWh (EUR 65.83/MWh), and the realised cost was HRK 464.39/MWh (EUR 61.77/MWh).

In 2020, HEP-ODS conducted a public tender for 2021, 2022 and 2023, which resulted in the conclusion of two agreements. One of these agreements defined the base product (base energy) at a fixed price, while the other defined the purchase of a variable quantity of electricity at a price (25%) of which depends on the price on the short-term markets, which moderated the effect of the short-term electricity market price increases on the realised cost of purchasing energy to cover losses in 2022. From the imbalance settlement, it is clear that during 2022, HEP-ODS systematically deviated in a positive direction, on average 5% of the realised losses in the first imbalance settlement. The total cost according to the concluded long-term contracts amounts to HRK 849.4 million (EUR 112.7 million). In the first imbalance settlement, HEP-ODS earned HRK 117.6 million (EUR 15.6 million). In the second imbalance settlement, HEP-ODS earned HRK 174 million (EUR 23.1 million).

The provision of the General Terms and Conditions of Network Usage and Electricity Supply (Official Gazette no. 104/20) was changed, so that for a final customer with a half-year billing period, the amount of the expected monthly consumption is the same for each month within the billing period, and introduced the possibility of unequal monthly consumption in accordance with the rules of the application of substitute load profiles. The same is also stipulated in the Regulation on the General Terms of Network Usage and Electricity Supply. Abandoning the obligation to equal the expected monthly consumption makes it easier to determine the loss coefficient in the application of substitute load profiles. In accordance with the above, in 2022, all households with a half-year billing period in the Republic of Croatia switched to unequal monthly consumption, taking into account the region to which the billing metering point belongs (Continental region, Dalmatia and Primorje region, Lika and Gorski Kotar region).

### 4.2.3. Development and optimisation of the transmission and distribution network

#### Ten-year development plan for the transmission network (2023-2032)

The **Electricity Market Act** prescribes that HOPS submits a proposal for the *Ten-Year Plan for the Development of the Transmission Network in 2023-2032, with a detailed elaboration for the initial three-year and one-year periods* to the HERA for approval until the end of September of the current year (2022). HOPS submitted the proposal to the HERA on 30 January 2023, after which the HERA held a public discussion during February 2023.

The adoption of the ten-year plan in question is challenging for several reasons:

- HOPS states that it is unable to provide credit funds due to its current high indebtedness,



- the *Regulations on Eliminating Disturbances on the Domestic Energy Market* prevent it from submitting a request for an increase in tariff items for the transmission of electricity,
- to insure against losses in the transmission network, the price of electricity has increased several times compared to previous years,
- a precise estimate of the connection power of new grid users is not possible, as well as estimating their locations and connection costs, which significantly affects the development of the transmission network as a whole.

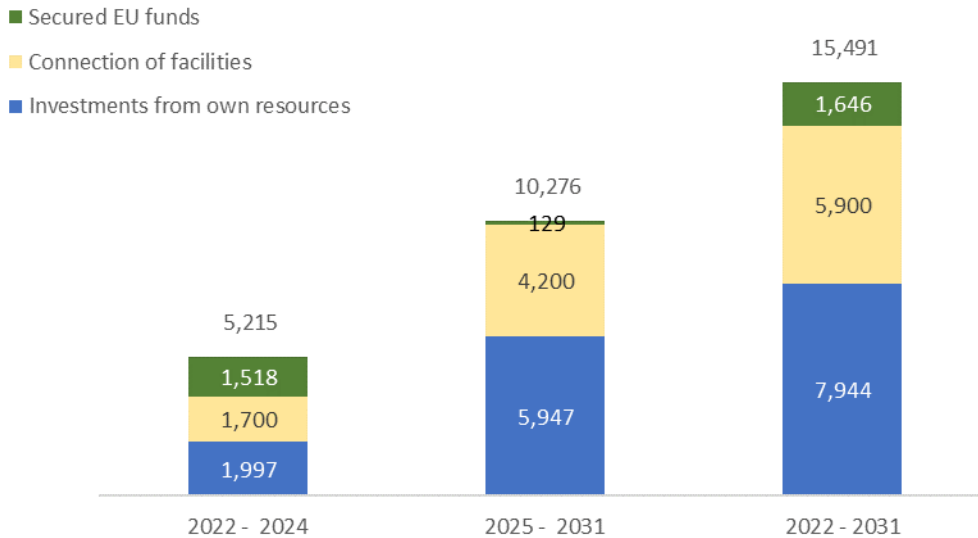
In 2022, the realised amount of investments in the transmission network amounted to HRK 572 million, taking into account all sources of financing for these investments.

Roughly HRK 175 million has already been used during 2022 based on the NRRP, which is aligned with national strategic development documents, as well as with European priorities focused on the digital and green transition, which are founded on the modernisation of the economy and society through increased investment in innovation and new technologies. These priorities are embedded in the binding framework of the Recovery and Resilience Facility, which stipulates that at least 20% of the NRRP funds should be directed towards the digital transformation through investments and reforms, while at least 37% should be directed towards the green transition and the fight against climate change. During 2022, submarine cables were laid in the sections Crikvenica - Krk and Dugi Rat - Brač, which represent the first phase of the planned submarine cable laying project, which should be completed in 2024.

### Ten-year development plan for the distribution network (2023-2032)

**The Electricity Market Act** prescribes that HEP-ODS must submit a proposal for the *Ten-Year Plan for the Development of the Transmission Network in 2023 - 2032, with a detailed elaboration for the initial three-year and one-year periods* to the HERA for approval until the end of September of the current year (2022).

HEP-ODS submitted the first version of the plan in October 2022. However, HEP-ODS submitted a new version of the plan in February 2022. Based on the plan, the HERA held a public discussion in March 2023 and total investments in the development of the distribution network in the ten-year period were planned in the amount of HRK 15.49 billion. Investments conditional upon the connection of new users to the network and increasing the connection capacity of existing users amount to roughly HRK 5.9 billion (Figure 4.2.8).



Source: HEP-ODS

Figure 4.2.8 Investment plan for the distribution network over a ten-year period [million HRK]

## Observations on the development plans for transmission and distribution networks

The approval of ten-year development plans is a precondition for the efficient preparation of construction, timely planning and ensuring financing, as well as the harmonisation of timelines and competences in the construction of joint facilities of the transmission and distribution system operators.

In accordance with the aforementioned, investments in the ten-year transmission network development plan are divided into a few basic categories: investments needed for the reliable function of the transmission system from own funds; investments for which funds have already been ensured from EU funds, primarily from the NRRP; investments for which financing will be sought from EU funds, and; investments into network reinforcements needed to connect new network users, mostly production units, which should be financed using EU funds on the basis of connection charges.

Investments financed using the NRRP should be completed by the end of 2026. The most important of these are:

- the installation of three 400/220 kV transformers of 400 MVA at TS Konjsko,
- the installation of one 400/110 kV transformer of 400 MVA at TS Velebit,
- an increase in the transmission power of the 220 kV Konjsko-Krš Pađene-Brinje transmission line,
- an increase in the transmission power of the 220 kV Senj-Melina transmission line,
- the installation of two 220/110 kV transformers of 150 MVA at TS Konjsko,
- reconstruction of the 220 kV HE Dubrovnik switchyard,
- construction of the new 2x110 kV Bilice-Trogir transmission line,



- increase in the transmission power of a series of 110 kV transmission lines along the Adriatic coast, and
- the replacement of 110 kV submarine cables with an increase in transmission power in the segments Crikvenica-Krk-Lošinj and Dugi Rat-Brač-Hvar-Korčula.

In 2022, the SINCRO.GRID project<sup>24</sup> was completed, which consists of compensation devices with a total power of 550 Mvar at TS Konjsko (250 Mvar SVC device), TS Melina (200 Mvar VSR device) and TS Mraclin (100 Mvar VSR device), and a dynamic line rating system. The SINCRO.GRID project was on the list of EU projects of common interest (PCI project<sup>25</sup>) and has been awarded a 51% grant through the CEF<sup>26</sup>.

In 2021, the GreenSwitch project received PCI project status in the category of smart grid projects and aims to optimally manage the transmission and distribution network while enabling the connection of as many RES as possible in the networks of Croatia, Slovenia and Austria. The promoters of this project from Croatia are HOPS, HEP-ODS and HEP d.d. At the end of 2022, the project received partial financing from the CEF. HOPS and HEP-ODS were granted co-financing of 50% of justified costs.

HOPS and HEP-ODS continued the good practice of harmonising their plans in terms of the construction dynamics and financing of joint facilities (TS 110/x kV). Investments into large 110/x kV facilities jointly owned by HOPS and HEP-ODS are conditioned by different multi-year load increase trends; the most common locations envisioned for new shared facilities are those with strong tourism development. In 2021, the large facilities TS 110/10(20) kV Zamet and TS 110/10(20) kV Zadar – east were completed and commissioned, which are of importance to the energy supply of Rijeka and Zadar, respectively.

In the ten-year plan for the transmission network, all projects specified in TYNDP 2020<sup>27</sup> were considered on an equal basis as other HOPS investments.

The earthquakes that occurred in 2020 caused damage to a large number of distribution facilities in DA Elektra Sisak, DA Elektra Zagreb, and DA Elektra Karlovac; of the larger installations, the 110/20 kV Petrinja transformer station suffered significant damage. For 2022, financial resources were earmarked to repair damage caused in earthquake-stricken areas of Sisak-Moslavina County and the distribution area of Elektra Zagreb in the amount of HRK 71 million. Investments in 2023 depend on the success of the planned investments in 2022.

The ten-year distribution network development plan also takes into account the strategic commitment of Croatia as concerns the reception of renewable energy sources. The development of the distribution network is being planned to fulfil the criteria of safety of supply, allowed voltage deviations and continuity of supply. The ten-year SAIFI, SAIDI, and CAIDI reliability indicators are trending downward, which indicates an improvement in the quality of the electricity supply.

As part of the measures for increasing energy efficiency, HEP-ODS also emphasised measures for reducing losses in the distribution electricity grid.

<sup>24</sup> Project co-financed by the CEF. The goal of the project is to improve the voltage quality in the electric power system and use the dynamic transmission capacity of the existing transmission lines by using advanced technical systems and algorithms.

<sup>25</sup> PCI - Projects of Common Interest (hrv. Projekti od zajedničkog interesa EU-a).

<sup>26</sup> CEF - Connecting Europe Facility - an EU funding instrument for infrastructure investment in the areas of transport, energy and digital services.

<sup>27</sup> Ten-Year Network Development Plan - ten-year plan for the development of the EU transmission network from 2020.



An increasing share of HEP-ODS' investments are co-financed investments, i.e. investments with external sources of financing from EU funds, the NRRP, Solidarity Fund, etc. The contract for the first such co-financed project, "Smart grid", was concluded in July 2018 with the European Cohesion Fund in the amount of HRK 150 million. The implementation of the project began in 2018 with a planned completion in 2023. The introduction of new technologies through pilot projects covered several types of new technological solutions. Investments in advanced networks refer to investment in distribution network management systems and automation (management by network depth), measuring instruments and infrastructure, as well as new technologies and development.

The National Recovery and Resilience Plan recognised three areas of HEP-ODS' investments, namely in the modernisation and development of the advanced network (including smart meters and the development of the advanced network), modernisation of the network in Natura 2000 areas and investments in submarine cables at the distribution level.



#### 4.2.4. Tariffs for using the transmission and distribution network and connection charges

##### Average network charges

Table 4.2.4. shows the average transmission network charges based on the realised consumption of final customers, while Table 4.2.5. shows the average distribution network charges.

Table 4.2.4 Average transmission network charges for the period from 2018 to 2022

Final customer category	2018 [lp/kWh]	2019 [lp/kWh]	2020 [lp/kWh]	2021 [lp/kWh]	2022 [lp/kWh]
Non-household – HV customers	8.0	7.0	6.6	7.0	7.2
Non-household – MV customers	7.6	7.0	6.9	6.8	6.9
Non-household – LV customers	9.0	9.1	9.1	9.2	9.4
Households	8.9	8.9	9.0	9.0	9.7
<b>Average for all categories</b>	<b>8.5</b>	<b>8.3</b>	<b>8.3</b>	<b>8.3</b>	<b>8.7</b>

Table 4.2.5 Average distribution network charges for the period from 2018 to 2022

Final customer category	2018 [lp/kWh]	2019 [lp/kWh]	2020 [lp/kWh]	2021 [lp/kWh]	2022 [lp/kWh]
Non-household – high-voltage	-	-	-	-	-
Non-household – medium-voltage	14.0	11.7	11.6	11.5	11.6
Non-household – low-voltage	28.1	24.7	25.0	24.9	25.2
Households	24.6	24.6	24.8	24.6	25.9
<b>Average for all categories</b>	<b>22.7</b>	<b>21.0</b>	<b>21.2</b>	<b>21.0</b>	<b>21.6</b>

Depending on the consumption category and tariff model, final customers in the Republic of Croatia are charged tariff items for the use of the transmission and distribution network for the following tariff elements: active power at the high/low/uniform daily tariff [HRK/kWh], settled peak active power [HRK/kWh], excess reactive power [HRK/kvarh], and billing metering point charge [HRK/month].



Figure 4.2.9. shows the share of the tariff items in the total network usage charge (transmission and distribution), while Figure 4.2.10. shows average prices per tariff element by consumer category and tariff model.

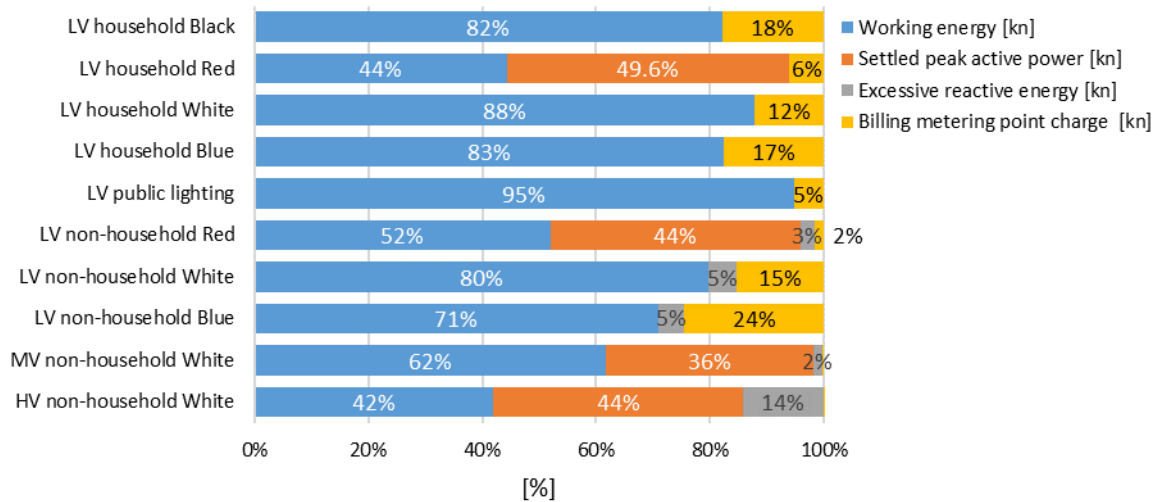


Figure 4.2.9 Share of the tariff items in the total network usage charge (transmission and distribution) in 2022

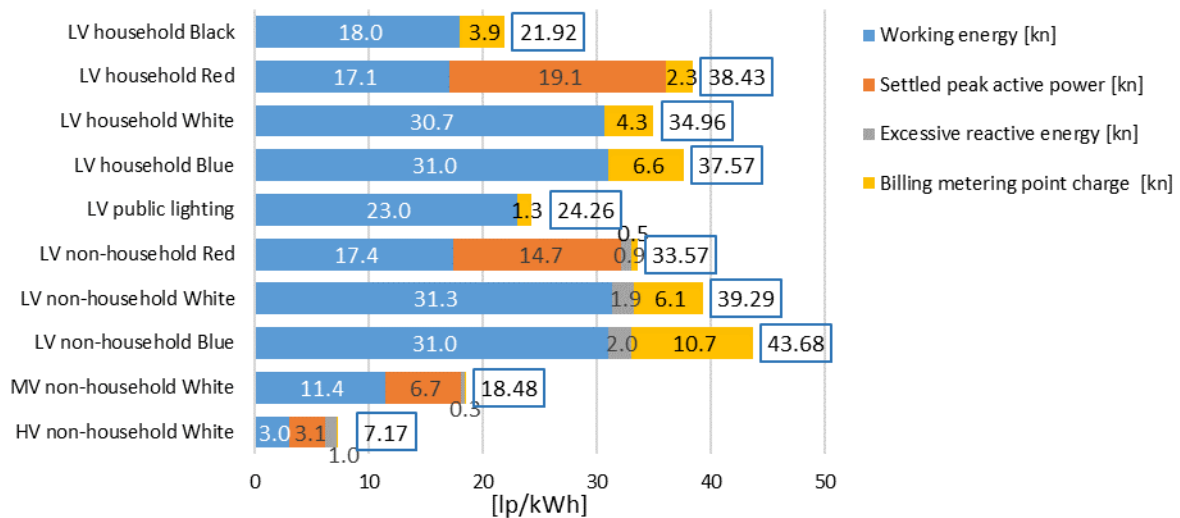
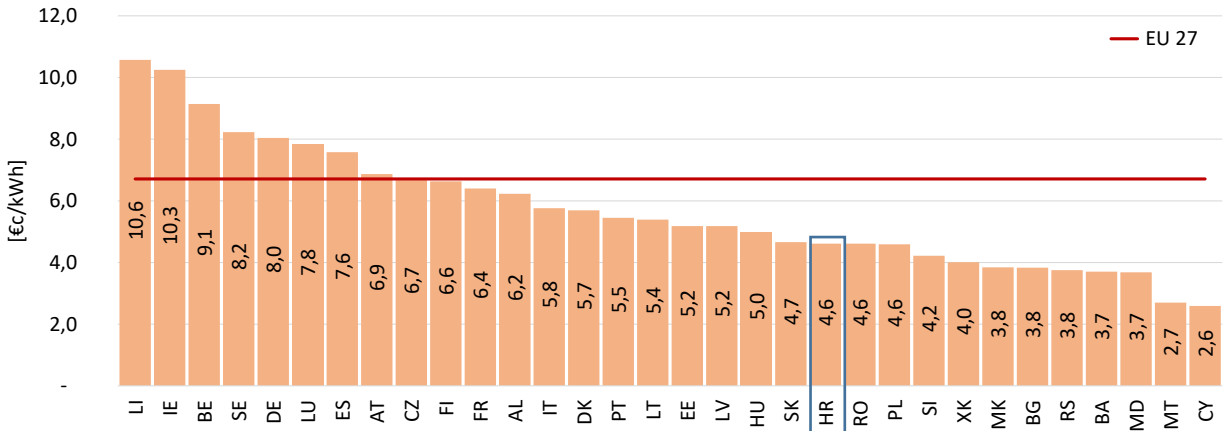


Figure 4.2.10 Average prices by tariff element for consumption categories and tariff models in 2022



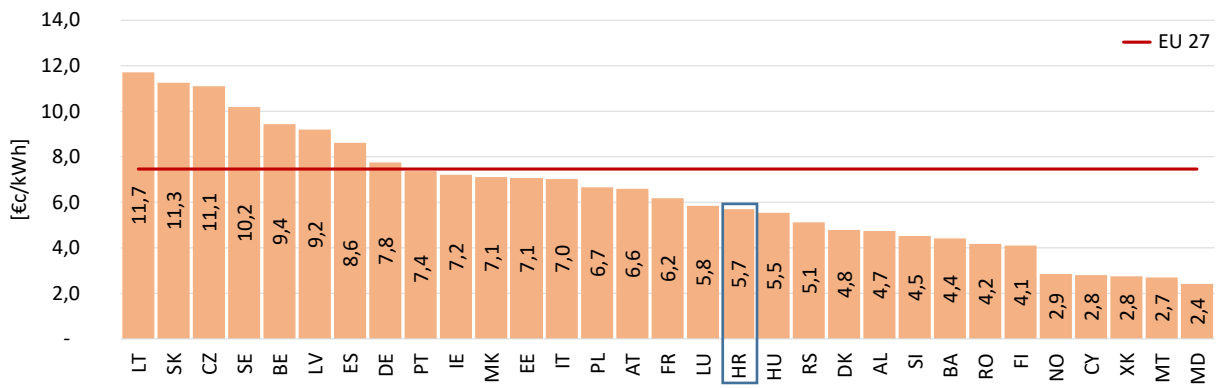


Figures 4.2.11. to 4.2.17. show the average network charges in European countries for final customers in EUROSTAT's consumption categories *DC*, *IA*, *IB*, *IC*, *ID*, *IE* and *IF*<sup>28</sup> in 2022.



Source: EUROSTAT; data processing: HERA

Figure 4.2.11 Average network charges in European countries for household final customers in the DC consumption category in 2022<sup>29</sup>

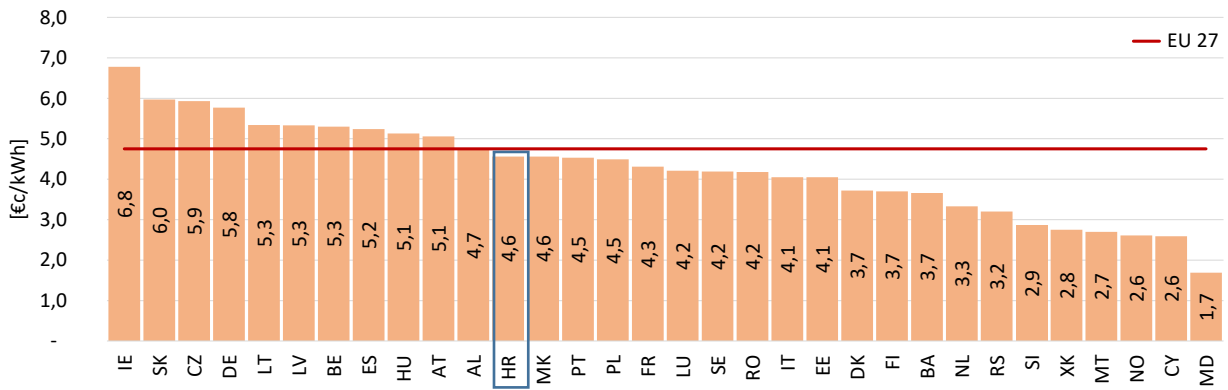


Source: EUROSTAT; data processing: HERA

Figure 4.2.12 Average network charges in European countries for non-household final customers in the IA consumption category in 2022

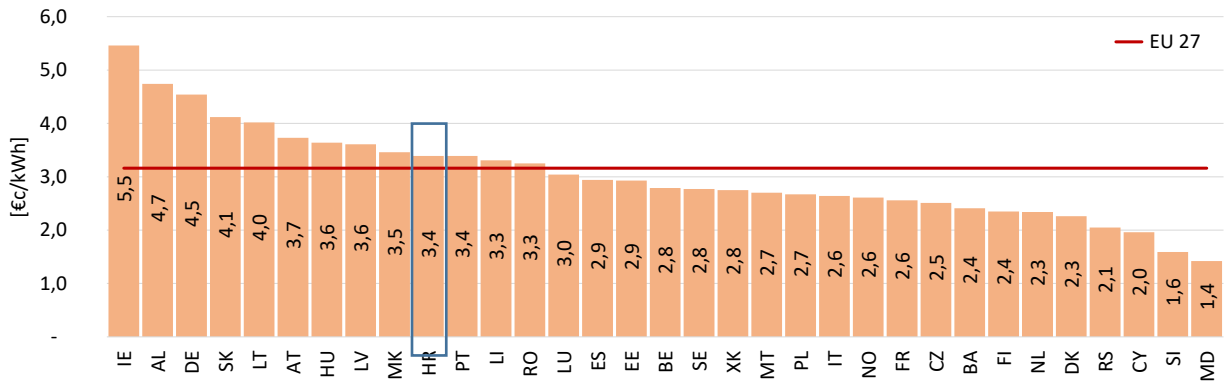
<sup>28</sup> The specified consumption categories in accordance with the distribution of consumption categories and the distribution of billing metering points of household and non-household final customers with the corresponding characteristics as listed in Table 4.4.3. and Table 4.4.4. of this Report.

<sup>29</sup> ISO country codes: AL - Albania, AT - Austria, BA - Bosnia and Herzegovina, BE - Belgium, BG - Bulgaria, CY - Cyprus, CZ - Czech Republic, DK - Denmark, DE - Germany, EE - Estonia, EL - Greece, ES - Spain, FI - Finland, FR - France, GE - Georgia, HR - Croatia, HU - Hungary, IE - Ireland, IS - Iceland, IT - Italy, LI - Lichtenstein, LT - Lithuania, LU - Luxembourg, LV - Latvia, MD - Moldova, ME - Montenegro, MK - North Macedonia, MT - Malta, NL - Netherlands, NO - Norway, PL - Poland, PT - Portugal, RO - Romania, RS - Serbia, SE - Sweden, SI - Slovenia, SK - Slovakia, TR - Turkey, UA - Ukraine, UK - United Kingdom, XK - Kosovo.



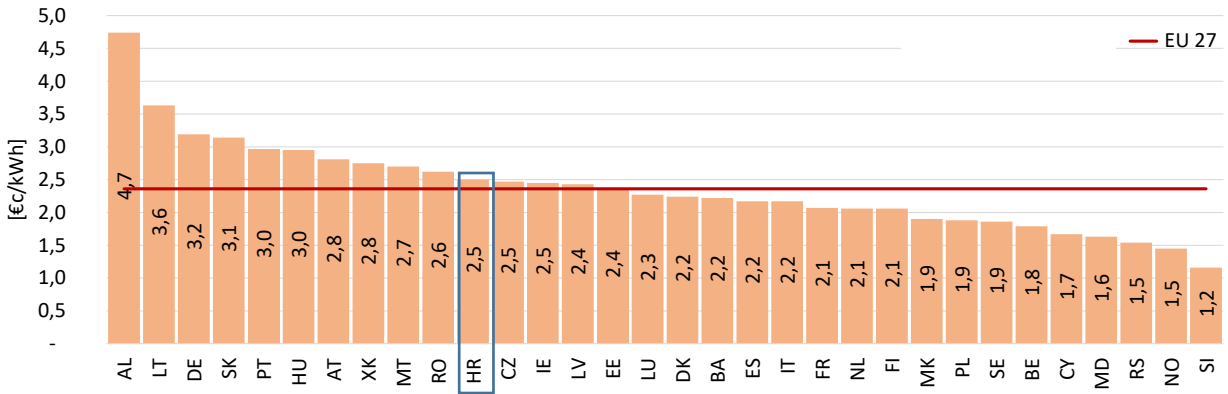
Source: EUROSTAT; data processing: HERA

Figure 4.2.13 Average network charges in European countries for non-household final customers in the IB consumption category in 2022



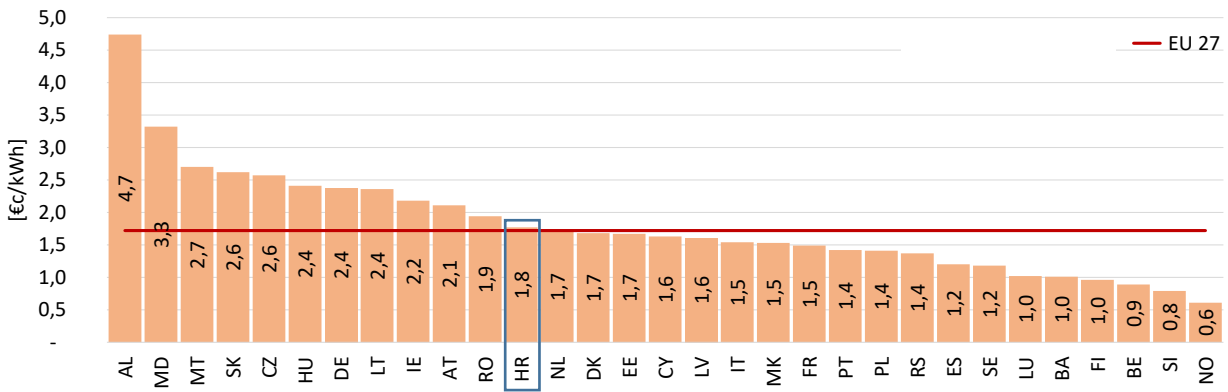
Source: EUROSTAT; data processing: HERA

Figure 4.2.14 Average network charges in European countries for non-household final customers in the IC consumption category in 2022



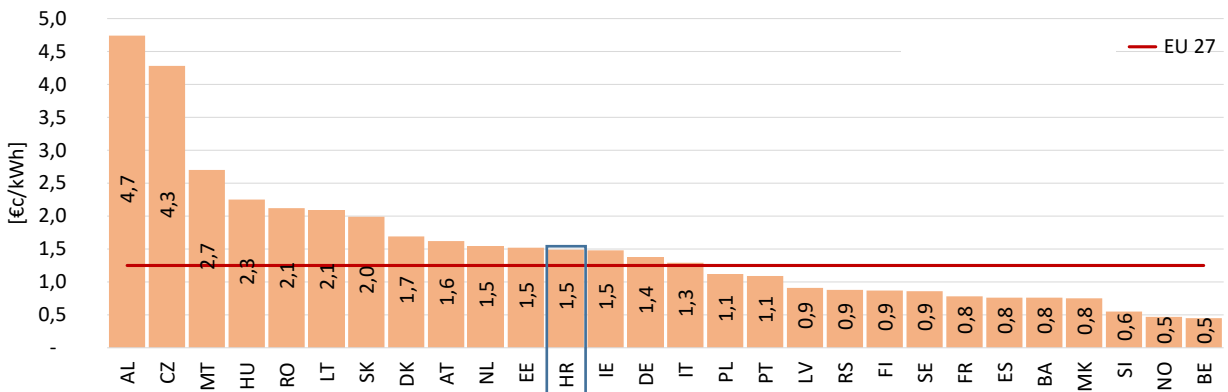
Source: EUROSTAT; data processing: HERA

Figure 4.2.15 Average network charges in European countries for non-household final customers in the ID consumption category in 2022



Source: EUROSTAT; data processing: HERA

Figure 4.2.16 Average network charges in European countries for non-household final customers in the IE consumption category in 2022



Source: EUROSTAT; data processing: HERA

Figure 4.2.17 Average network charges in European countries for non-household final customers in the IF consumption category in 2022



The share of individual consumption categories in system operator revenues from transmission network charges and distribution network charges in 2022 are shown in Figure 4.2.18. Figure 4.2.19 shows the proportions of individual tariff elements in the revenues from transmission network charges and distribution network charges in 2022.

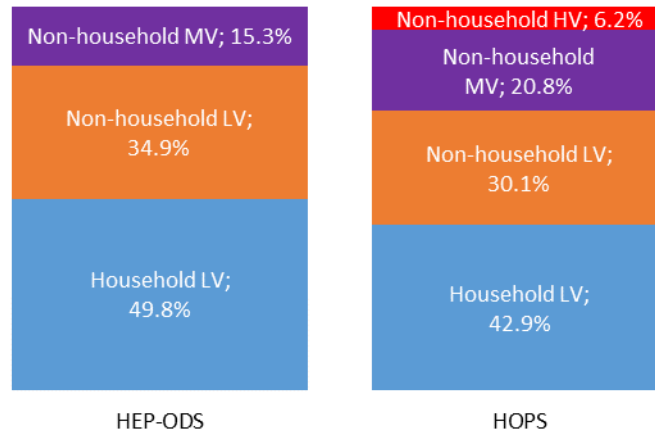


Figure 4.2.18 Share of individual consumption categories in system operator revenues from transmission network charges and distribution network charges in 2022

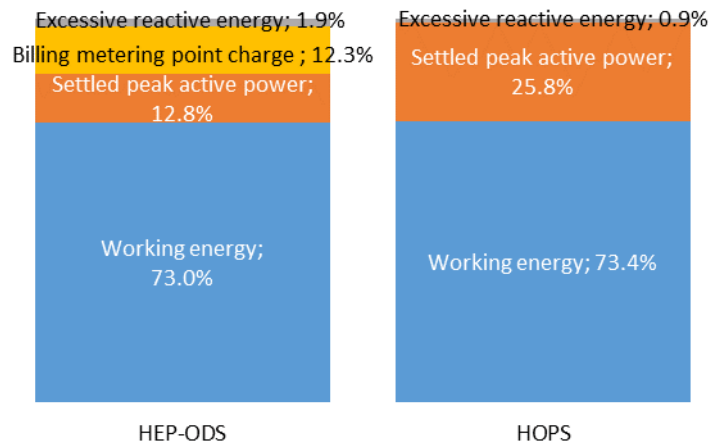


Figure 4.2.19 Proportions of individual tariff elements in revenues from transmission network charges and distribution network charges in 2022



## Write-off of receivables for final customers in earthquake-affected areas

On 18 January 2021, the Government of the Republic of Croatia adopted the Decision of the Government of the Republic of Croatia regarding the write-off of claims and compensation for claims for energy delivered to final customers in earthquake-affected areas (hereinafter: Government Decision) for the period from January to March 2021. On 25 March 2021, the Government Decision for April 2021 was adopted. On the basis of the Government Decision, all households in earthquake-stricken municipalities and cities, regardless of the degree of damage they suffered, were freed from paying the cost of electricity<sup>30</sup>. In accordance with the Government Decision, the Shareholders Assembly of Hrvatska elektroprivreda d.d. adopted the Decision on the write-off of receivables for energy delivered to household final customers in earthquake-stricken areas (hereinafter: Decision on the write-off of receivables) on 18 January 2021. Table 4.2.6. shows the amount of transmission and distribution network charges written off in 2022 based on the Decision on the write-off of receivables.

Table 4.2.6 Transmission and distribution network charges written off in 2022 based on the Decision on the write-off of receivables

Consumption category	Tariff model	Tariff element	Revenue HEP-ODS [HRK]	Revenue HOPS [HRK]	
Households	Blue	Energy - single tariff	4,516,985	1,847,857	
		billing metering point charge	1,071,013	-	
	White	energy - higher tariff	5,844,930	2,842,903	
		energy - lower tariff	1,485,200	618,833	
		billing metering point charge	1,344,539	-	
	Red	energy - higher tariff	202,803	63,376	
		energy - lower tariff	59,947	14,987	
		settled peak active power	140,568	84,927	
		billing metering point charge	-	-	
	Black	Energy - single tariff	5,032	-	
		billing metering point charge	-	-	
	<b>Total:</b>				<b>5,472,883</b>

<sup>30</sup> These municipalities and cities are: the cities Petrinja, Glina, Sisak and Hrvatska Kostajnica, and the municipalities of Lekenik, Sunja, Donji Kukuruzari, Majur, Dvor, Topusko, Gvozd, Jasenovac, Hrvatska Dubica, Martinska Ves, Pokupsko, and Kravarsko.



## Decision on electricity transmission tariffs and Decision on electricity distribution tariffs

On 30 September 2021, HOPS and HEP-ODS submitted to the HERA a request to change the tariff items for electricity transmission and distribution. On the basis of the submitted requests and a subsequent analysis, the HERA adopted tariff items that were implemented as of 1 April 2022, as shown in Table 4.2.7.

Table 4.2.7 Electricity transmission tariff items and electricity distribution tariff items

Category/tariff model	Tariff element <sup>31</sup>	Unit of measure	"Old" tariff items		"New" tariff items	
			Distribution	Transmission	Distribution	Transmission
<b>HV Non-household – White</b>	$EN_{VT}$	HRK/kWh	-	0.04	-	0.04
	$EN_{NT}$	HRK/kWh	-	0.02	-	0.02
	$P_V$	HRK/kW	-	14.00	-	14.00
	$E_J$	HRK/kvarh	-	0.16	-	0.16
	$NK$	HRK/month	-	68.00	-	68.00
<b>MV Non-household - White</b>	$EN_{VT}$	HRK/kWh	0.10	0.04	0.10	0.04
	$EN_{NT}$	HRK/kWh	0.05	0.02	0.05	0.02
	$P_V$	HRK/kW	12.00	14.00	12.00	14.00
	$E_J$	HRK/kvarh	0.15	-	<b>0.16</b>	-
	$NK$	HRK/month	66.00	-	66.00	-
<b>LV non-household - Blue</b>	$EN_{JT}$	HRK/kWh	0.22	0.09	0.22	0.09
	$E_J$	HRK/kvarh	0.15	-	<b>0.16</b>	-
	$NK$	HRK/month	41.30	-	41.30	-
<b>LV Non-household - White</b>	$EN_{VT}$	HRK/kWh	0.24	0.11	<b>0.26</b>	<b>0.13</b>
	$EN_{NT}$	HRK/kWh	0.12	0.05	0.12	0.05
	$E_J$	HRK/kvarh	0.15	-	<b>0.16</b>	-
	$NK$	HRK/month	41.30	-	41.30	-
<b>LV non-household - Red</b>	$EN_{VT}$	HRK/kWh	0.16	0.05	<b>0.17</b>	0.05
	$EN_{NT}$	HRK/kWh	0.08	0.02	0.08	0.02

<sup>13</sup>  $EN_{JT}$ : active power – uniform tariff,  $EN_{VT}$ : active power – higher tariff,  $EN_{NT}$ : active power – lower tariff,  $P_V$ : settled peak active power,  $E_J$ : excess reactive power,  $NK$ : BMP charge.



Category/tariff model	Tariff element <sup>31</sup>	Unit of measure	"Old" tariff items		"New" tariff items	
			Distribution	Transmission	Distribution	Transmission
	$P_V$	HRK/kW	24.00	14.50	<b>24.50</b>	14.50
	$E_J$	HRK/kvarh	0.15	-	<b>0.16</b>	-
	$NK$	HRK/month	41.30	-	41.30	-
LV non-household - Yellow	$EN_{JT}$	HRK/kWh	0.17	0.06	<b>0.18</b>	0.06
	$NK$	HRK/month	14.70	-	<b>15.45</b>	-
LV Household - Blue	$EN_{JT}$	HRK/kWh	0.22	0.09	0.22	0.09
	$NK$	HRK/month	10.00	-	<b>11.60</b>	-
LV Household - White	$EN_{VT}$	HRK/kWh	0.24	0.11	<b>0.26</b>	<b>0.13</b>
	$EN_{NT}$	HRK/kWh	0.12	0.05	0.12	0.05
	$NK$	HRK/month	10.00	-	<b>11.60</b>	-
LV Household - Red	$EN_{VT}$	HRK/kWh	0.16	0.05	<b>0.17</b>	0.05
	$EN_{NT}$	HRK/kWh	0.08	0.02	0.08	0.02
	$P_V$	HRK/kW	24.00	14.50	<b>24.50</b>	14.50
	$E_J$	HRK/kvarh	-	-	-	-
	$NK$	HRK/month	41.30	-	41.30	-
LV Household - Black	$EN_{JT}$	HRK/kWh	0.13	0.05	<b>0.14</b>	0.05
	$NK$	HRK/month	5.80	-	<b>6.10</b>	-



## New tariff methodologies

In July 2022, the HERA adopted the new Methodology for Setting Tariffs for Electricity Transmission and the Methodology for Setting Tariffs for Electricity Distribution in accordance with the **Electricity Market Act**.

The new methodologies introduce:

- the model for calculating the planned costs of losses for the next year,
- incentive regulation for the price of losses,
- incentive regulation for the amount of losses in the distribution network,
- the procedure for changing the amounts of tariff items in the current regulatory year for its remaining part,
- tariff element of customer connection capacity,
- network charge for producers,
- the time frame for reporting has been extended for another two years after the future regulatory year.

The methodology introduces an incentive regulation for the price and amount of losses in such a way that the accepted realised costs of energy procurement to cover losses in the previous regulatory year correspond to the product of the accepted realised amount of losses and the realised cost of purchasing losses. The realised unit price in electricity purchase is accepted for the operators to cover the losses. However, in order to reduce the total cost of purchasing losses, the methodologies also apply incentives. For both operators, incentives are applied to the price of losses, and for distribution system operators, an incentive to reduce the amount of losses is also applied. In this way, the distribution system operator is motivated to realise the smallest amount of losses without reducing the tariff items for using the distribution network. By using incentives on loss prices, operators are encouraged to use their procurement procedures to achieve prices that are as close as possible to market prices or lower than them. Without incentives, operators have no interest in realising such prices, as the latter could result in a reduction of tariff items for using the network.

The *Regulation on Eliminating Disturbances on the Domestic Energy Market* from September 2022 stipulated that HOPS and HEP-ODS shall not submit a request to the HERA to change the amount of tariff items before 31 March 2023. Consequently, the mentioned operators did not submit requests to change the amount of tariff items.

In the *Regulation on Eliminating Disturbances on the Domestic Energy Market* from March 2023, the ban on submitting requests to the HERA to change the amount of tariff items was extended until 31 March 2024.

## Transmission and distribution network connection charges

In July 2022, the HERA adopted the *Methodology for Determining the Grid Connection Fee*. This *Methodology* introduced changes in relation to the previous approach to determining the connection fee. Namely, instead of the detailed approach, when the network user bore all the costs of creating technical requirements in the network (hereinafter: STUM), a hybrid approach was introduced using a unit connection fee. In this way, investors have clear information on the costs of connecting to the network. In doing so, the calculation of the connection fee is simplified, which makes the process easier for system operators and reduces the number of complaints on determining the connection fee. By setting the amount of the unit price for the connection, it is regulated how much of the STUM is financed from the connection fee, and how much from the tariff revenues. In the proposals for the unit prices, the distribution system operator and transmission system operator take into account that investments





in the network in the part financed from the awarded grants, such as from European Union funds, are not financed from the connection fee or the connection capacity increase fee. In the proposal for the unit prices, the transmission system operator takes into account that investments in very high voltage lines are considered to be investments of systemic importance and cannot be fully financed from the connection fee or the connection capacity increase fee. The connection capacity in both directions (takeover and delivery) is considered equally, and connection capacity in the opposite direction to the existing connection capacity is not charged up to the amount of the existing connection capacity. The connection fee for the low-voltage network and the medium-voltage network is determined exclusively by the product of the unit price and the connection capacity for the calculation of the network connection fee. When connecting to the medium-voltage network, part of the fee is paid to the distribution system operator, and part to the transmission system operator. When connecting to the high-voltage network, the connection fee is determined from the sum of the actual cost of building the connection and the product of the unit price and the connection capacity for the calculation of the network connection fee. The connection fee for connecting an energy storage facility to the network via a special billing metering point is equal to the actual cost of building the connection of the energy storage facility via a special billing metering point. In the event of a simultaneous request for a connection capacity increase and a change in the connection, a larger amount is paid. The amount is obtained by comparing the actual costs of the change in the connection and the unit price multiplied by the connection capacity for calculating the connection capacity increase fee, according to the same principle as for the initial connection. In the case of a connection request for a location that is outside the construction area according to the spatial plan of the city or municipality whose construction is in accordance with special regulations (remote connections, legalised buildings in bays, water pumps, etc.), a special method of calculating the fee is applied, which takes into account the actual costs of the STUM and the actual costs of building the connection, as well as the connection capacity of the potential network users at the location in question. In accordance with this Methodology, the HERA makes a decision on the amount of the unit network connection fee based on reasoned proposals of the system operator or independently at its own discretion.

## Observations on transmission and distribution charges and connection charges

Based on the request from HOPS to change the amount of tariff items for electricity transmission and the request from HEP-ODS to change the amount of tariff items for electricity distribution, submitted on 30 September 2021 in accordance with the *Methodology for Setting Tariffs for Electricity Transmission* (Official Gazette no. 104/15, 84/16) and the *Methodology for Setting Tariffs for Electricity Distribution* (Official Gazette no. 104/15), the HERA carried out an analysis and adopted tariffs to be implemented as of 1 April 2022. The aforementioned changes resulted in an average of 6% higher charges for using the grid for the household category, 1.1% for the non-household category - MV and 1.5% for the non-household category - LV.

The September 2022 *Regulation on Eliminating Disturbances on the Domestic Energy Market* stipulated that HOPS and HEP-ODS shall not submit a request to the HERA to change the amount of tariff items before 31 March 2023.

In the 2023 *Regulation on Eliminating Disturbances on the Domestic Energy Market*, the ban on submitting requests to the HERA to change the amount of tariff items was extended until 31 March 2024.

Accordingly, the system operators have not submitted requests for the determination of tariff items for 2023 to the HERA.



## 4.2.5. Unbundling of activities

### Transmission system operator

Electricity transmission is performed as a public service, which must be available at all times to all final customers and energy entities at a regulated price and according to the regulated conditions of access and use of service, with a view to safety, regularity, service quality, environmental protection, energy efficiency and climate protection; this service is to be performed according to the principles of transparency and impartiality, and under the supervision of bodies determined by regulations. The transmission system operator shall act in a transparent, objective, and impartial manner towards all electricity market participants and network users.

The transmission system operator must carry out the transmission of electricity under the conditions determined by the licence to perform the business activity and according to the principles of objectivity, transparency and impartiality throughout the territory of the Republic of Croatia in accordance with the **Electricity Market Act**.

On 22 February 2016, after obtaining the opinion of the EC, the HERA adopted and published on its website its *Decision on the issuance of a certificate* to HOPS according to the model of an independent transmission operator (ITO).

In accordance with Article 100 of the **Electricity Market Act**, all commercial and financial relations between the vertically integrated entity and HOPS must be in accordance with the market conditions; HOPS is obligated to submit all commercial and financial contracts to the HERA for approval prior to their conclusion with the vertically integrated entity. The HERA verifies whether the contracts are market-oriented under impartial conditions.

In accordance with the rules on HOPS' functional independence as an independent transmission operator as defined by the **Electricity Market Act**, according to the information available to the HERA, neither HEP d.d. (the owner of HOPS) nor other related companies within the vertically integrated entity exerted any undue influence on the business decisions taken by HOPS' management structure during 2022. Also, during 2022, HOPS' Management Board made business decisions and represented the company towards all third parties, including companies and other organisations from Croatia and abroad, in accordance with the aforementioned rules of functional independence.

In accordance with Article 86 (12) of the **Electricity Market Act**, the decision adopted by HOPS' Assembly on 6 April 2022 and the decision of the Commercial Court in Zagreb of 11 April 2022 transformed HOPS d.o.o. into the joint stock company Hrvatski operator prijenosnog sustava d.d. (short name: HOPS d.d.), or in English – Croatian Transmission System Operator Plc. This change was registered in the Court Register of the Croatian Ministry of Justice and Public Administration.

### Unbundling of business premises

During 2022, HOPS was the owner of all the business premises it used, and to a lesser extent it used premises rented from third parties. All the business premises used by HOPS on any basis were physically separated from the business premises of the vertically integrated entity.



## Independence of the IT system

Throughout 2022, HOPS was fully independent in performing activities related to IT system maintenance and upgrading.

Considering its position as the operator of critical infrastructure in Croatia and considering the handling of the confidential commercially sensitive data of all network users, HOPS must pay special attention to the information security of its business and process IT system.

In 2022, HOPS completed the implementation of the project co-financed with EU funds under the CEF Telecom call – Cybersecurity under the name “System for the Prevention and Analysis of HOPS’s Communication and Network Security Incidents” (E-PASIS) with a duration of 27 months (from September 2020 to November 2022). The aim of the project was to strengthen HOPS’ cybersecurity capabilities. As part of the project, new program support (new software) was implemented to detect, prevent and analyse security threats in the HOPS communication network in real-time, and a device for detecting and preventing APT (Advanced Persistent Threat) attacks at the network level and a system for centralised management.

As a follow-up to the E-PASIS project, HOPS is implementing a new project co-financed by EU funds called “Advanced platform for the business content and file sharing analysis in the HOPS Security and Operations Centre” (e-CYBIS). As part of the e-CYBIS project, HOPS will define a framework for the effective operational management of the Security Operations Centre (SOC), improve security incident management processes, increase and standardise penetration testing in order to prevent cyber threats through continuous monitoring, and acquire an additional security tool for business content and file sharing analysis. HOPS will also provide training for its employees to increase their abilities and to achieve cybersecurity.

## Telecommunications sector unbundling

In 2022, the unbundling of the telecommunications system continued as in 2021, in accordance with the agreements between HOPS and HEP-Telekomunikacije d.o.o. defining rights and obligations related to the lease of telecommunications capacities, telecommunications systems maintenance and the lease of premises for the storage of telecommunications equipment and fibre-optic telecommunications infrastructure.

## Procurement of ancillary services and balancing energy

HOPS procures balancing services in a transparent and non-discriminatory manner by carrying out the public procurement procedure through periodical public tenders, in which the tendering rules are published on HOPS’s website.

If only one (dominant) balancing service provider responds for a particular balancing service or other ancillary services, HOPS conducts procurement by directly contracting the balancing service or ancillary service with the dominant provider. For the purposes of providing ancillary services in 2022, given the absence of other prequalified ancillary service providers, in December 2021, HOPS concluded six contracts on the provision of ancillary services with the company HEP-Proizvodnja d.o.o. as the dominant provider. For these contracts, HOPS obtained the consent of the HERA before concluding them, given that these are contracts between HOPS and a company that is part of a vertically integrated entity.

In the Croatian electric power system, the service of providing a manual frequency restoration reserve (mFRR power reserve) and/or balancing energy during 2022 was mostly procured by the company



HEP-Proizvodnja d.o.o. as the balancing service provider. In 2022, this service was procured to a lesser extent from balancing service providers who participated in the process of procuring the mFRR power reserve and/or the balancing energy for system security through public tenders.

All individual (transmission and/or distribution) network users and aggregators who have successfully completed the pre-qualification procedure and, as balancing service providers with HOPS, have a valid contract on the provision of balancing services (mFRR) have the right to participate in the tender.

In January 2022, the first balancing service provider participating in the market as an independent aggregator was prequalified.

## Electric power system balancing

In accordance with the *EBGL Regulation*, HOPS is required to publish balancing reports at least once every two years for the previous two calendar years. The report for 2020-2021 was published on HOPS' website<sup>32</sup> in October 2022, and contains data on the requirements and provisions for balancing in the Croatian electric power system for the reporting period. HOPS regularly publishes monthly system balancing reports on its website<sup>33</sup>.

HOPS publishes data on electric power system balancing for the Croatian regulatory area on the Central Information Platform for the transparent publication of basic energy and market data, which serves as a source of information for market participants.

## Relations with transmission network users and the connection of new users

As concerns HOPS activities relating to network users (parts of the vertically integrated entity and third parties outside the vertically integrated entity), HOPS undertook no discriminatory behaviour that might have given the vertically integrated entity a privileged position over any other network user. Also, HOPS did not discriminate against third parties as users of the transmission network.

## Electricity supply to HOPS' business premises

As a customer of electricity for final consumption in its business premises, HOPS purchased electricity in 2022 in accordance with the Agreement on final customer supply for a one-year period, concluded with the company HEP-Opkrba d.o.o. for the period from 1 December 2021 to 30 November 2022. At the end of August 2022, HOPS launched the procurement of electricity and published a call for tenders for the supply of electricity for the one-year period from 1 December 2022. Only one tender was received with an amount significantly higher than the estimated procurement amount. Since the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market* between the initiation of the procurement submission of the tender in question, based on the analysis of electricity prices, HOPS issued the *Decision on cancelling the procurement procedure*.

Upon the expiry of the contract concluded with the company HEP-Opkrba d.o.o., from 1 December 2022, HOPS automatically switched to the guaranteed electricity supply provided by the company HEP Elektra d.o.o. as the guaranteed supplier in accordance with the *Rules on Switching Suppliers and Aggregators*.

<sup>32</sup> <https://www.hops.hr/izvjesce-o-uravnotezenju-ees-a>

<sup>33</sup> <https://www.hops.hr/izvjestaji-uravnotezenje>



## Cooperation between HOPS and other institutions in Croatia and abroad; participation in the co-founding of business entities

According to the information available to the HERA, during 2022, neither HEP d.d., as the controlling company, nor other parts of the vertically integrated entity influenced the cooperation, decision-making or ownership rights of HOPS in companies and organisations of which it is the co-founder or co-owner, or in whose work it participated.

HOPS is the co-founder of the company HEP-Telekomunikacije d.o.o., in which it has a 13.73% share of ownership. This company provides telecommunications services to HOPS and other companies within the vertically integrated entity, under conditions defined by its founding act, agreements with the companies in the vertically integrated entity and with HOPS, and conditions from HOPS' certificate according to the model of an independent transmission operator.

## Distribution system operator

Electricity distribution is performed as a public service, which must be available at all times to all final customers and energy entities at a regulated price and according to the regulated conditions access and use of service, with a view to the safety, regularity, and service quality, environmental protection, energy efficiency and climate protection; this service is to be performed according to the principles of transparency and impartiality, and under the supervision of bodies determined by the regulations. The distribution system operator must act in a transparent, objective, and impartial manner towards all network users and electricity market participants.

The distribution system operator must carry out the distribution of electricity under the conditions determined by the licence to perform the business activity and according to the principles of objectivity, transparency and impartiality throughout the territory of the Republic of Croatia in accordance with the **Electricity Market Act**.

HEP-ODS is part of a vertically integrated entity and, in organisational terms, is a dependent company in relation to HEP d.d. as the controlling company. In terms of its legal form, organisation and decision-making, HEP-ODS is independent of other activities of HEP d.d. and its subsidiaries that do not relate to the distribution of electricity, and HOPS.

Pursuant to the **Electricity Market Act**, HEP-ODS is responsible for monitoring the implementation of all its activities, responsibilities and duties, especially with regard to ensuring the principles of transparency, objectivity and impartiality, with the obligation to submit an annual report to the HERA on the implementation of its activities in accordance with the principles of transparency, objectivity and impartiality in the previous calendar year.

On 6 April 2023, the HERA received the *Report on the implementation of activities in accordance with the principles of transparency, objectivity and impartiality for 2022* from HEP-ODS.

During 2022, HEP-ODS performed the activity of electricity distribution, within the framework of the prescribed duties and obligations, and in accordance with the principles of transparency, objectivity and impartiality. The Management Board of HEP-ODS and all employees with special authority took decisions and undertook business tasks independently of the applicants who had submitted them.

In accordance with the **Electricity Market Act** and the *Regulation on the Requirements for the Quality of the Electricity Supply*, HEP-ODS published the following documents on its website (<https://www.hep.hr/ods>):



- *Compliance programme of the company HEP-Operator distribucijskog sustava d.o.o.*
- *Report on monitoring the compliance programme of the company HEP-Operator distribucijskog sustava d.o.o. for 2022*
- *Report on the performance of activities of the company HEP-Operator distribucijskog sustava d.o.o. for 2022*
- *Report on the Quality of the Electricity Supply in 2022*

## Financial and other commercial relationships between HOPS and other companies from the vertically integrated entity

As the controlling company, HEP d.d. performs work for HEP-ODS as the controlled company and part of a vertically integrated entity based on the concluded *Agreement on Mutual Relations* and the associated *Methodology for Pricing Services/Jobs*, which is used for calculating the costs of providing services to HEP-ODS. The services performed by HEP d.d. for HEP-ODS on the basis of the agreement on mutual relations are:

- establishing general principles and instructions for creating business plans,
- determining the financial policy and organising the centralised treasury,
- determining the general risk management policy,
- internal auditing,
- determining the accounting policy and performing part of the accounting work,
- determining the human resource management strategy and performing part of these tasks,
- performing a part of legal affairs,
- corporate communication jobs,
- support in monitoring and participating in the process of drafting and adopting regulations,
- support in monitoring and participating in EU projects,
- determining the corporate security strategy and performing part of these tasks,
- performing part of the work related to information and communication technologies (ICT), and
- determining the procurement strategy and performing part of these tasks.

HEP-ODS prepares distribution network development plans with prior approval from its parent company HEP d.d. as regards the financial framework and established debt projections. The parent company HEP d.d. approves the financial framework and structure of financing for one-year business and investment plans in accordance with the **Electricity Market Act**. Consequently, HEP-ODS has real decision-making rights independent of its parent company HEP d.d., given the fixed assets required for the operation, maintenance and development of the network within the approved financial framework.

During 2022, financial resources for operations, maintenance, development and construction in the distribution network were available in accordance with the business plans and decisions of the controlling company HEP d.d.

## HEP-ODS compliance programme

In accordance with the provisions of the **Electricity Market Act**, in early 2022, HEP-ODS adopted the new *Compliance programme of the company HEP-Operator distribucijskog sustava d.o.o.* (hereinafter: *the Compliance Programme*), which is publicly available on the HEP-ODS website (<https://www.hep.hr/ods>).



The *Compliance Programme* establishes measures to ensure non-discriminatory behaviour that excludes the possibility of bias in HEP-ODS' operations, as well as the appropriate monitoring of the implementation of the *Compliance Programme*, and special obligations of HEP-ODS employees and the HEP-ODS *Compliance Programme* Monitoring Committee.

On 6 April 2023, the HERA received the *Report on monitoring the compliance programme of the company HEP-Operator distribucijskog sustava d.o.o. for 2022* from HEP-ODS.

The Director of HEP-ODS and employees with special authority do not participate in the management structures of the vertically integrated entity, which are directly or indirectly responsible for the everyday work in performing the activities of electricity production, electricity transmission and electricity supply.

During 2022, the *Compliance Programme* Monitoring Committee received no written complaints regarding non-compliance with the *Compliance Programme*.

## Development of the IT system with users

The activities related to the implementation of the new central IT system, which began in the middle of 2021, continued in 2022.

The implementation of the electronic mail module centralisation project is underway, with the aim of standardising the procedure and ensuring the application of the standardised procedure for responding to users. In 2022, communication by electronic mail was taken over centrally and permanently for the distribution areas of Elektrojug Dubrovnik and Elektra Sisak and for two central email addresses. In 2023, the takeover of communication with users via electronic mail for other distribution areas will continue.

In accordance with the **Electricity Market Act**, in the second half of 2022, regulations were adopted on the basis of which HEP-ODS audited and adjusted the information provided to network users through communication channels, forms, requests and other accompanying documents that should be updated and harmonised with the valid legislative framework of business operations. This had an impact on the prolongation of the completion of the project *Digitisation of requests on the website Moja mreža*<sup>34</sup>.

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<sup>34</sup> *Moja mreža* is a web application of HEP-ODS intended for network users (<https://mojamreza.hep.hr/>)



## 4.2.6. Quality of the electricity supply

The quality of the electricity supply is defined and monitored in terms of continuity of supply, voltage quality and service quality.

In 2022, the HERA adopted the new *Regulation on the Requirements for the Quality of the Electricity Supply*<sup>35</sup>. In this *Regulation*, the HERA determined electricity supply quality indicators, the method of measuring, collecting and publishing electricity supply quality indicators, the method, frequency and scope of reporting and submitting information about the quality of the electricity supply to the HERA. It prescribes the general, minimum and guaranteed standards, as well as financial compensation in the event of a failure to meet the guaranteed standards.

New indicators, guaranteed standards and fees related to the connection of production facilities to the installations of an existing customer 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 a production module to an existing facility of a final customer and the time of delivery of the certificate on the start of using the network, or a change of status. The amounts of the fees have been increased, and the amount of some monetary fees is proportional to the requested connection capacity. In addition, operators and suppliers are prescribed a standardised form of data delivery.

HOPS, HEP-ODS and the suppliers are obligated to submit an annual report on the quality of the electricity supply and quality of services to the HERA, and to publish the report on their websites.

### Continuity of supply in 2022

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 *Regulation on the General Terms of Network Usage and Electricity Supply*; otherwise, it is considered an unplanned supply interruption.

The *Regulation on the Requirements for the Quality of the Electricity Supply* stipulates general standards of continuity of supply for the transmission network: energy not supplied (ENS) in the amount of 700 MWh and an average long-term interruption time (AIT) of 17 minutes. The transmission system operator monitors the number and duration of supply interruptions in the transmission network and estimates the volume of electricity not supplied during the interruption (Table 4.2.8.) In 2022, the ENS amounted to 260 MWh, while the AIT amounted to 5.8 minutes, which means the general standards of continuity of supply were not breached (ENS 700 MWh, AIT 17 minutes).

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<sup>35</sup> *Regulation on the Requirements for the Quality of the Electricity Supply (Official Gazette no. 84/22)*





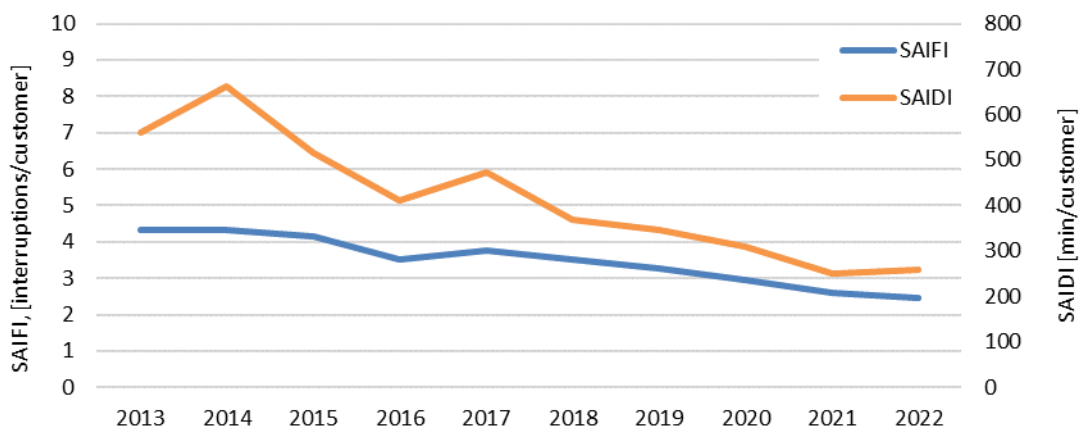
Table 4.2.8 Power interruptions in the HOPS network from 2013 to 2022

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

Source: HOPS

Supply continuity indicators, which are systematically monitored in the distribution network, show the annual system average interruption frequency index (SAIFI), and the annual system average interruption duration index (SAIDI).

In 2022, the SAIFI amounted to 2.46 power interruptions per customer in the HEP-ODS network, of which 36% were planned interruptions. The SAIDI amounted to 258.3 minutes per customer, of which 52.6% related to planned interruptions. The SAIFI and SAIDI indicators show a continuing improving trend in the continuity of supply in the HEP-ODS network (Figure 4.2.20).

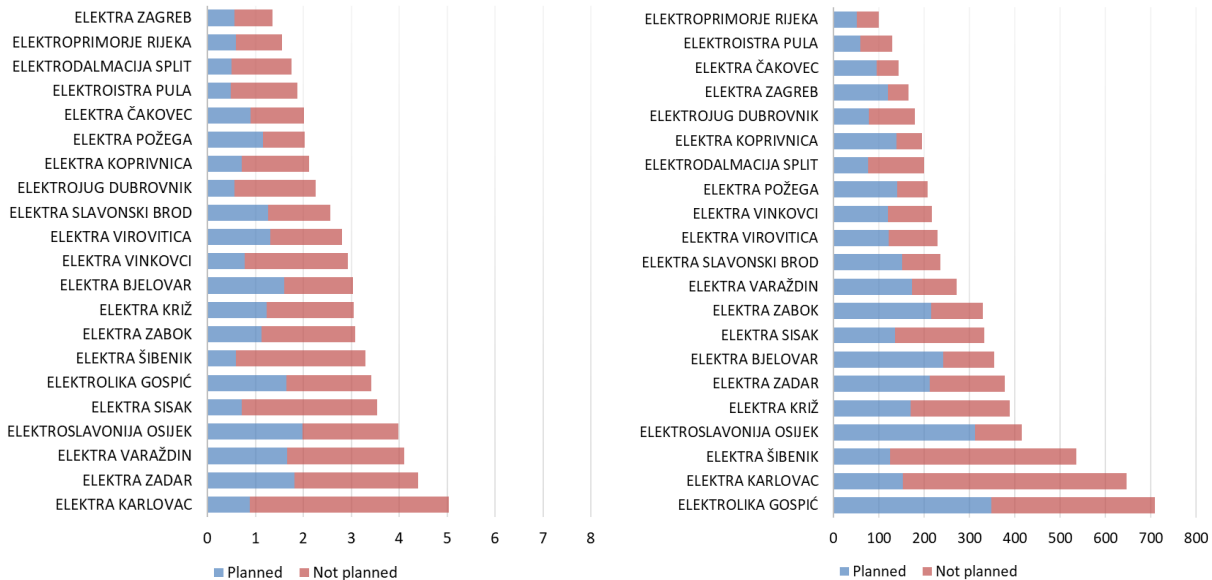


Source: HEP-ODS

Figure 4.2.20 Indicators of continuity of supply in the HEP-ODS network from 2013 to 2022



Viewed by distribution area, in 2022, Elektra Zagreb and Elektroprimorje Rijeka had the best SAIFI indicator, and DA Elektroprimorje Rijeka had the best SAIDI indicator. DA Elektra Karlovac had the worst SAIFI indicator due to the consequences of earthquakes and poor weather (Figure 4.2.21). DA Elektrolika Gospić has a lower SAIDI indicator because of the especially harsh weather conditions in the area, as well as its specific network characteristics (long overhead lines). DA Elektra Karlovac and DA Elektrolika Gospić are distribution areas with poor SAIDI and SAIFI indicators. HEP-ODS received a total of 14 written complaints concerning continuity of supply.



Annual system average interruption frequency index – SAIFI

Annual system average interruption duration index – SAIDI

Source: HEP-ODS

Figure 4.2.21 Indicators of continuity of supply in the HEP-ODS network per distribution area in 2022

## Voltage quality in 2022

According to the *Regulation on the General Terms of 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.

Once a year a network user may submit a written request for a report on voltage quality at the given supply terminal to HOPS or HEP-ODS. HOPS or HEP-ODS must perform measurements and prepare and deliver a report on voltage quality at the supply terminal to the network user within 30 days. In 2022, HEP-ODS received a total of 56 written complaints concerning voltage quality in the distribution network. Also, a total of 87 requests to measure voltage quality were submitted to HEP-ODS, of which 9 were founded and resolved in favour of the applicant. In 2022, four requests to measure voltage quality were submitted by transmission network users; the measurement affirmed that all the parameters in accordance with the HR EN 50160 standard had been met. In one case, there was a sudden increase of 110 kV voltage within the permitted limits due to the automatic shutdown of the SVC device in TS Konjsko. Voltage quality measurement devices have been installed in nearly all billing metering points in accordance with the HR EN 50160 standard.



## Service quality in 2022

The *Regulation on the Requirements for the Quality of the Electricity Supply* prescribes 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, the time for resolving applications for grid connection approvals, and time foreseen for the connection of a building to the network with a simple connection.

The reports on service quality in 2022 submitted to the HERA by HOPS and HEP-ODS show that the operators' general service quality indicators related to network connection for HEP-ODS are below the general service quality standard (Table 4.2.9). HOPS received two complete applications for EOTRP<sup>36</sup>, and 25 applications for a grid connection approval.

*Table 4.2.9 General indicators of the service quality of HOPS and HEP-ODS regarding network connections in 2022*

General indicator of service quality	HOPS	HEP-ODS	General standard of service quality
Percentage of applications for EOTRP resolved in a timely manner in the observed year <sup>37</sup>	0% <sup>38</sup>	30%	95%
Share of applications for a grid connection approval resolved in a timely manner in the observed year	100%	38%	95%
Proportion of timely connections in the case of the simple connection of buildings in the observed year	n/a	26%	95%

*Source: HOPS and HEP-ODS*

Table 4.2.10 shows the statistics of resolving applications for EOTRP and grid connection approval (hereinafter: EES).

<sup>36</sup> Report on the optimal technical solution for connecting to the network

<sup>37</sup> The data is in accordance with the previous Requirements for the Quality of the Electricity Supply because, given that no new Connection Rules have been adopted, HOPS and HEP-ODS have not started to approve the EOTRP in accordance with the Regulation on the Requirements for the Quality of the Electricity Supply

<sup>38</sup> One EOTRP was not sent in time because the final customer informed HOPS during the EOTRP preparation period about a change in the heating technology of the melting furnace, for which the customer will subsequently provide the data necessary to complete the EOTRP. The second EOTRP was not sent in time because the final customer did not accept the proposed variants of connecting the plant to the transmission network from the working version of the EOTRP, and it was necessary to find another technical solution for connecting the plant. Therefore, it is not a case of untimely sending due to the fault of HOPS.

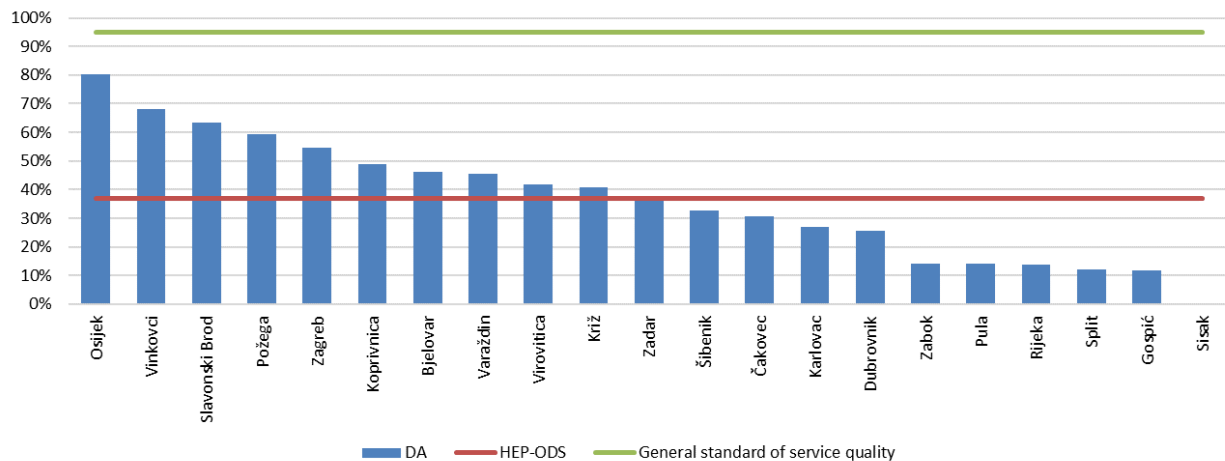


Table 4.2.10 Resolved applications for EOTRP and EES in the HEP-ODS network in 2022

Type of request	No. of decisions issued	No. of decisions issued in a timely manner	Number of decisions with indeterminate status
EOTRP	2,703	808	601
EES	39,785	15,141	-

Source: HEP-ODS

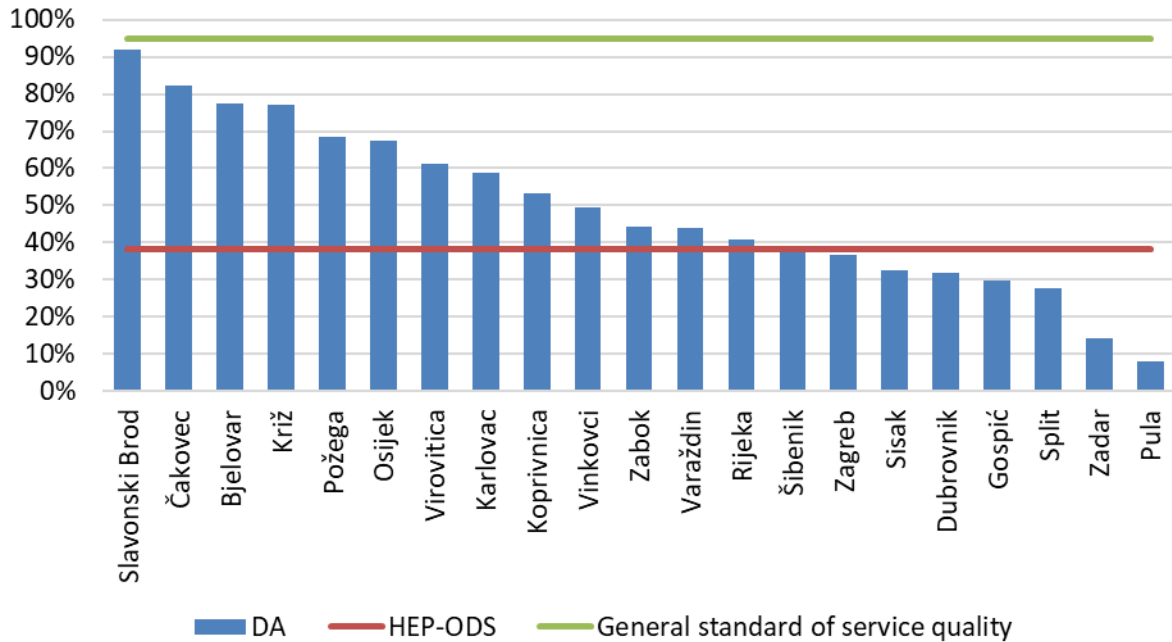
Viewed by distribution area, the share of applications for EOTRP resolved in a timely manner is the lowest in DA Sisak and the highest in DA Osijek; however, none of the distribution areas achieved the required general standard of service quality for resolving applications for EOTRP (Figure 4.2.22). Consequently, the indicator for the entire HEP-ODS is 30%, which is below the general quality standard of 95%.



Source: HEP-ODS

Figure 4.2.22 Applications for EOTRP resolved in a timely manner in the HEP-ODS network in 2022 by distribution area

Looking at the proportion of applications for EES resolved in a timely manner by distribution area, it is evident that there has been a deterioration, both at the level of individual distribution areas and overall, as the indicator for the entire HEP-ODS dropped from almost 60% to below 40%. Once again, DA Pula had the poorest score. Not a single DA achieved the required general standard of service quality for issuing EES (Figure 4.2.23).



Source: HEP-ODS

Figure 4.2.23 Applications for grid connection approvals resolved in a timely manner in the HEP-ODS network in 2022 by distribution area

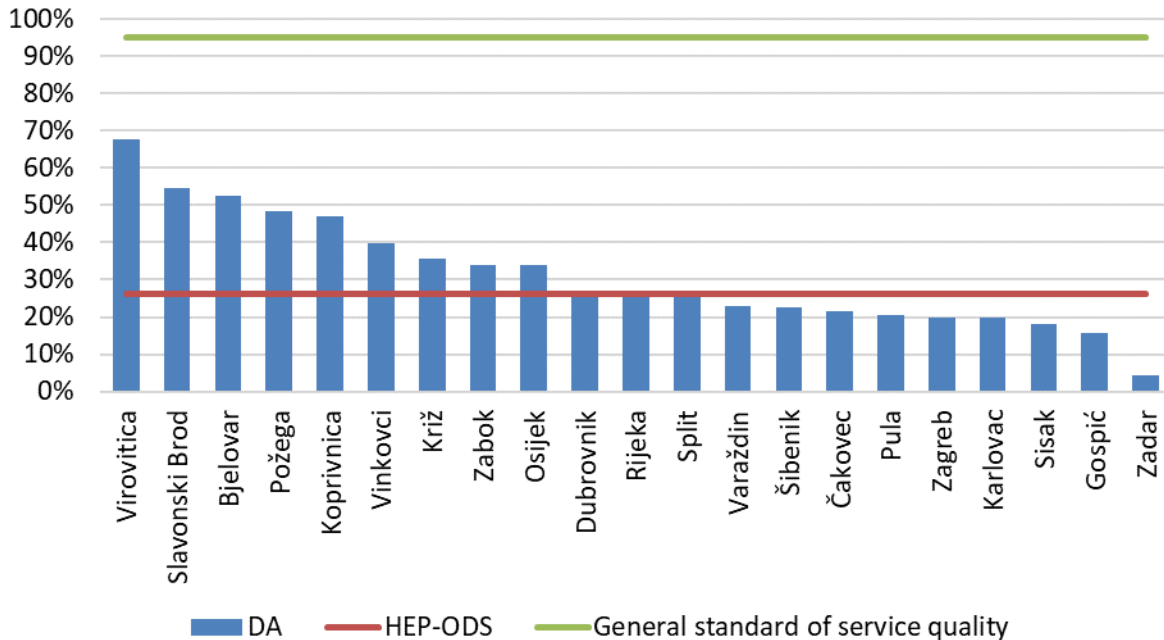
Table 4.2.11 shows the simple connection of buildings to the network for the HEP-ODS network in 2022 with the total number of new connections and the number of connections realised within the period prescribed in the Regulation on the Requirements for the Quality of the Electricity Supply.

Table 4.2.11 Simple connections of buildings in the HEP-ODS network in 2022

Number of connected consumers	Number of timely connections
21,903	5,703

Source: HEP-ODS

The percentage of timely simple connections of buildings to the network is the highest in DA Virovitica, and by far the lowest in DA Zadar, where only 4% of buildings were connected within the prescribed period during 2022. Not a single DA achieved the required general standard of service quality, and there was also a further decline in the number of timely connections at the level of HEP-ODS (Figure 4.2.24).



Source: HEP-ODS

Figure 4.2.24 Proportion of timely connections in the case of the simple connection of buildings by HEP-ODS per distribution area in 2022

## Observations on the quality of the electricity supply in 2022

Compared to 2021, the number and duration of power interruptions in the transmission network declined significantly in 2022, as did the estimated energy not supplied. The AIT and ENS scores were within the stipulated general standard in 2022.

In the distribution network, the SAIFI indicator is better compared to previous years, while the SAIDI indicator is somewhat worse than last year.

The connection service quality indicators of HEP-ODS are significantly below the required general standard of service quality. The proportion of simple connections carried out in a timely manner for buildings (most often residential buildings with a gross surface area of up to 400 m<sup>2</sup>, i.e. family houses) is especially unsatisfactory. In the past few years, this indicator had been slightly over one-third of the prescribed general quality standard, but it dropped to only 28% in 2022. In view of the above, in accordance with Article 123 of the **Electricity Market Act**, the HERA initiated the supervision of the distribution system operator related to the quality of the electricity supply in the part that refers to the connection of buildings in 2022. The supervision was not completed as of the date of preparation of this Report.

There is a trend towards an increase in the number of distributed sources, which was not accompanied by an adequate quality of services. The HERA requested and analysed data on the procedures for connecting production facilities to the existing customer's installations, and in order to speed up the procedure, new indicators, guaranteed standards and fees related to such connections were introduced by the *Regulation on the Requirements for the Quality of the Electricity Supply*.



The poorest SAIFI and SAIDI indicators for HEP-ODS were recorded at DA Elektra Karlovac and DA Elektrolika Gospić due to the technical features of the network (long overhead lines) and harsh climate in the area.

A small number of written complaints about the continuity of supply (14) were received, roughly the same number as in the previous year (11). The number of written complaints about voltage quality (56) was also roughly the same as in the previous year (58). The highest number of written complaints regarding voltage quality (15 of 87 received complaints) was in DA Vinkovci, and all were resolved in a timely manner. Other service quality indicators of HEP-ODS are roughly at the level of the previous year.

However, in order to significantly improve the SAIDI and SAIFI indicators, and in light of the above, an additional set of measures to improve the reliability of supply must be implemented in certain distribution areas.

#### 4.2.7. Monitoring the balance of the production and consumption of electricity

##### Electric power system balance

Table 4.2.12 shows the electricity balance in Croatia in 2021 and 2022. The largest part of the total consumption of electricity in the Republic of Croatia in 2022 (18,531 GWh) was covered by the production of electricity from power plants on the territory of the Republic of Croatia (13,257 GWh, 71.5%), and the rest was covered by physical net imports (5,273 GWh, 28.5%). An increase in production in the distribution network (1,816 GWh) is also noticeable, which is 155 GWh more than in 2021 and which covered 10% of the total consumption of electricity in the Republic of Croatia in 2022.

Table 4.2.12 Electricity balance in Croatia in 2021 and 2022 in GWh

No.	Electricity balance	2021	2022
1	Total production	14,153	13,257
2	Imports into Croatia on the transmission network	11,504	11,919
3	Imports into Croatia on the distribution network	0.6	0.6
<b>4</b>	<b>Total procurement (1+2+3)</b>	<b>25,658</b>	<b>25,177</b>
5	Exports from Croatia to the transmission network	7,159	6,642
6	Exports from Croatia to the distribution network	4.1	4.2
<b>7</b>	<b>Physical net imports (2+3-5-6)</b>	<b>4,342</b>	<b>5,273</b>
<b>8</b>	<b>Total electricity consumption (4-5-6)</b>	<b>18,495</b>	<b>18,530</b>
9	Production in the distribution network	1,661	1,816
10	Losses in the transmission network	478	463
<b>11</b>	<b>Transmission consumption (1-9+2-5-10)</b>	<b>16,359</b>	<b>16,255</b>
12	Delivery to final customers in the transmission network and power plant consumption	971	962
13	Pumping mode	169	163

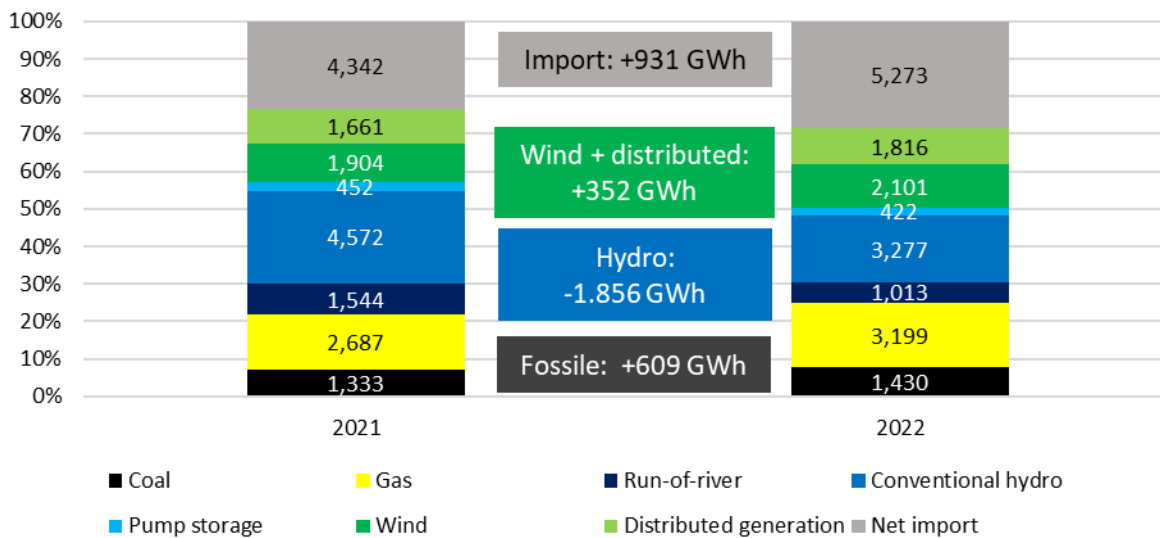


<b>14</b>	<b>Net delivery to the distribution network from the transmission network (11-12-13)</b>	<b>15,219</b>	<b>15,131</b>
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*Source: HOPS, HEP-ODS*

In 2022, the production of electricity from wind farms in the transmission network and distributed sources (power plants in the distribution network) was 352 GWh higher than in 2021, Figure 4.2.25. The production of electricity from thermal power plants (coal and gas) also increased by 609 GWh. However, due to extremely bad hydrology during 2022, the production from hydroelectric power plants was 1,856 GWh lower in 2022 than in 2021, which is why the net import was 931 GWh higher.

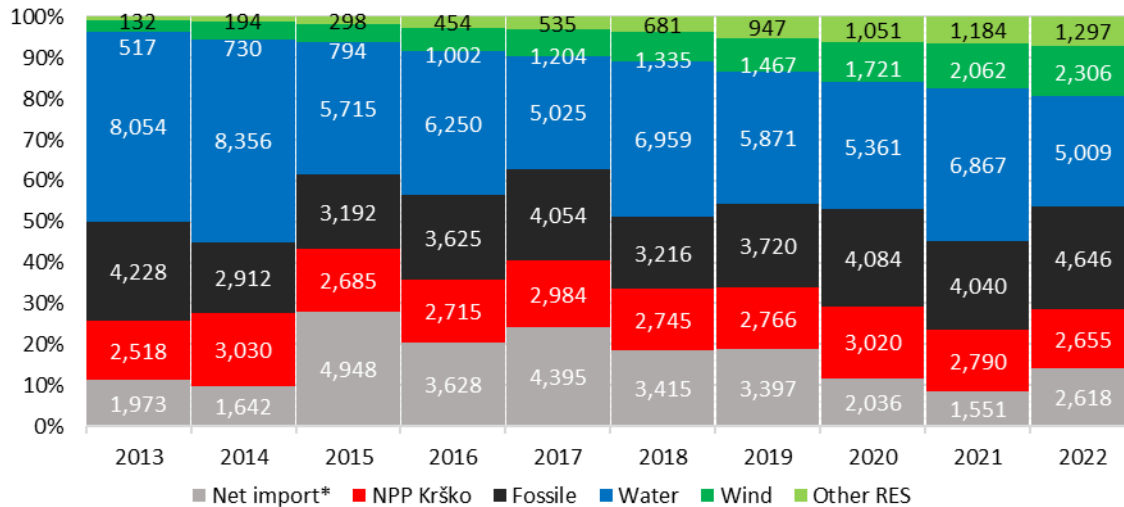
Figure 4.2.26 shows the share of electricity sources in electricity procured for the requirements of the Croatian electricity system on an annual basis across the past 10 years. The amount produced by the Krško Nuclear Power Plant for HEP d.d. is presented separately from the net imports. There is a visible increase in the share of production from wind and other RES in covering the total consumption of the Croatian electric power system.



*Source: HOPS, HEP-ODS*

*Figure 4.2.25 Covering the total consumption of the Croatian electric power system – comparison of 2021 and 2022*

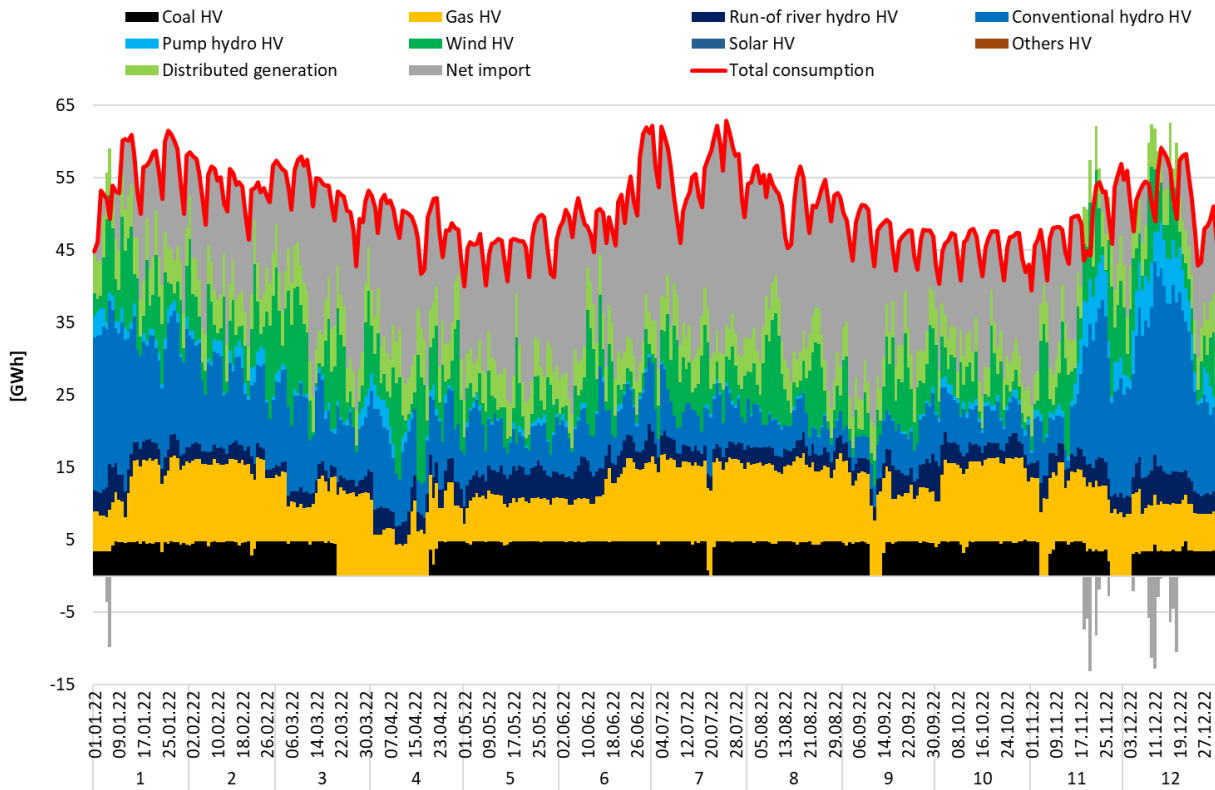




Source: HOPS, HEP-ODS

Figure 4.2.26 Share of electricity sources in electricity procured and produced [GWh] for the requirements of the Croatian electricity system from 2013 to 2022 (\*Net import does not include NPP Krško)

The daily values of the production and consumption of electricity in the Croatian electric power system in 2022 in Figure 4.2.27 show a reduced production from hydroelectric power plants during the spring and summer months and consequently higher imports and production from gas thermal power plants. In November and December, in the net balance during certain days, the Croatian electric power system physically exported electricity due to the increased production of electricity from hydroelectric power plants and renewable sources of electricity.



Source: HOPS and HEP-ODS

Figure 4.2.27 Daily values of production and consumption of electricity in the Croatian electric power system in 2022

In the first three months of 2023, there was a significant improvement in hydrology, which, in addition to production from renewable energy sources, led to the fact that the physical net import amounted to only 4% of the total consumption of the electric power system of the Republic of Croatia. In March, the Republic of Croatia was a net exporter of electricity, Figure 4.2.28.

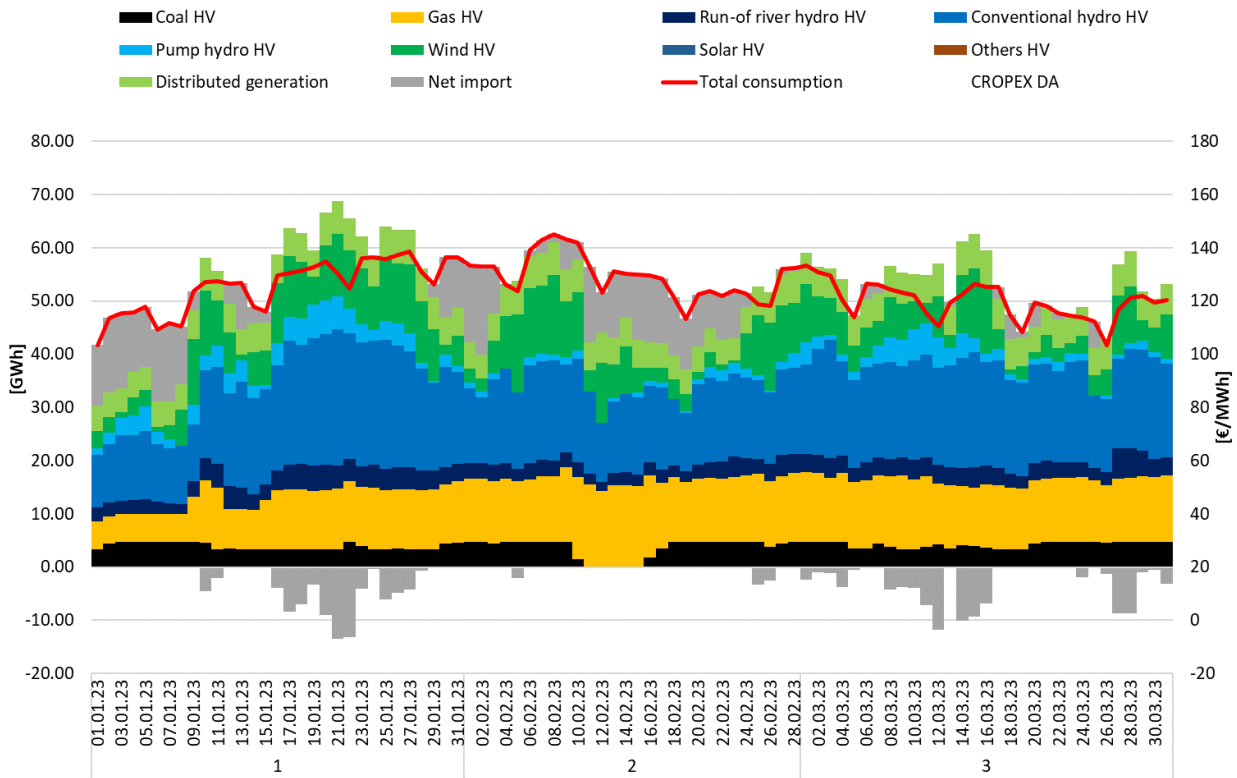


Figure 4.2.28 Daily values of production and consumption of electricity in the Croatian electric power system in Q1 2023

Table 4.2.13 shows the maximum and minimum loads ( $P_{max}$  and  $P_{min}$ ), the times when they occur, and the corresponding electricity imports and exports in the last five years. In the last few years (with the exception of 2018), the maximum load has occurred in the summer months due to the relatively mild winters and increased consumption in the summer (air conditioning). This is also apparent in the time of the highest load (14:00).

Table 4.2.13 Maximum and minimum loads of the Croatian transmission system

Year	Maximum load			Minimum load		
	$P_{max}$ [MW]	Date, time	Net exchange [MW] (Imports [MW]; Exports [MW]) with $P_{max}$	$P_{min}$ [MW]	Date, time	Net exchange [MW] (Imports [MW]; Exports [MW]) with $P_{min}$
2018	3,168	26.02., 20:00	784 (2,147; 1,363)	1,249	20.05., 6:00	402 (1,008; 606)
2019	3,038	25.07., 14:00	1,545 (1,973; 428)	1,226	22.04., 4:00	545 (1,663; 1,118)
2020	2,872	31.07., 14:00	1,259 (2,007; 748)	1,067	13.04., 5:00	808 (1,167; 359)
2021	3,072	16.08., 14:00	1,462 (1,672; 210)	1,237	02.05., 5:00	197 (897; 700)

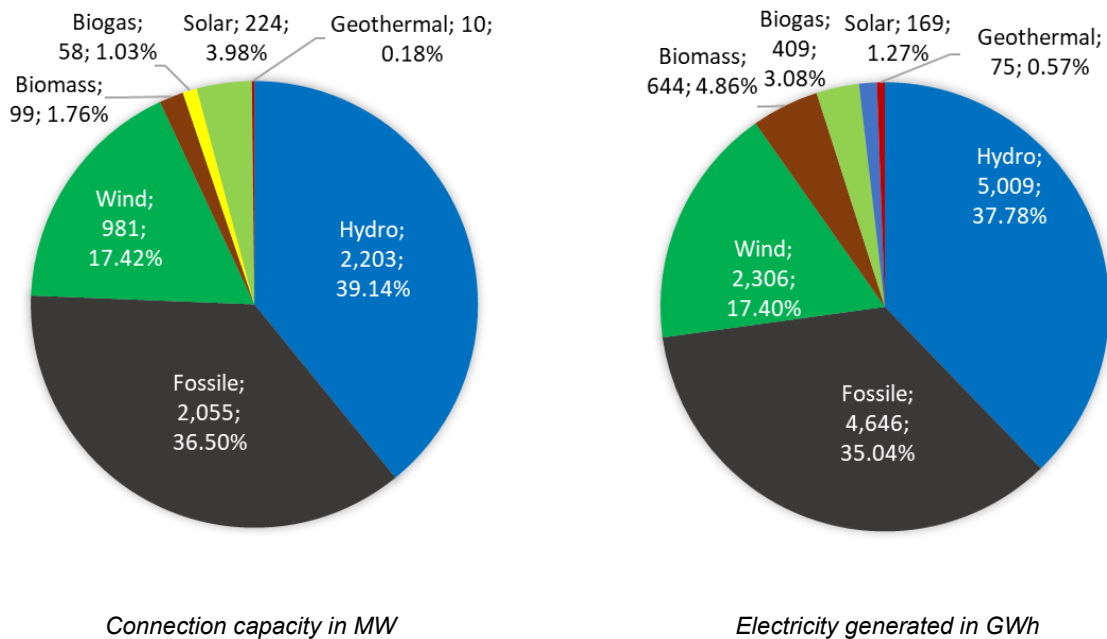


2022	3,126	04.07., 14:00	1,337 (1,900; 563)	1,212	02.11., 3:00	656 (1,273; 617)
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### Production capacities in Croatia

The connection capacity of all the power plants in Croatia amounted to 5,629 MW at the end of 2022. In addition, HEP d.d. is a co-owner of the Krško Nuclear Power Plant located in Slovenia, and has at its disposal 50% of its capacity, i.e. 348 MW.

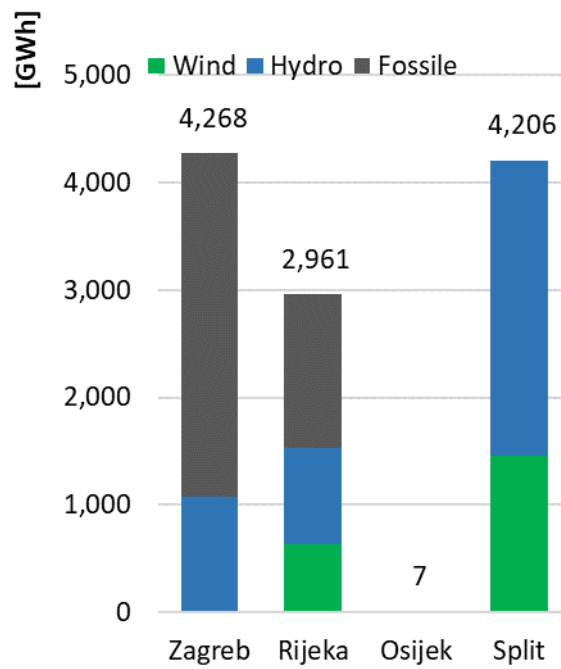
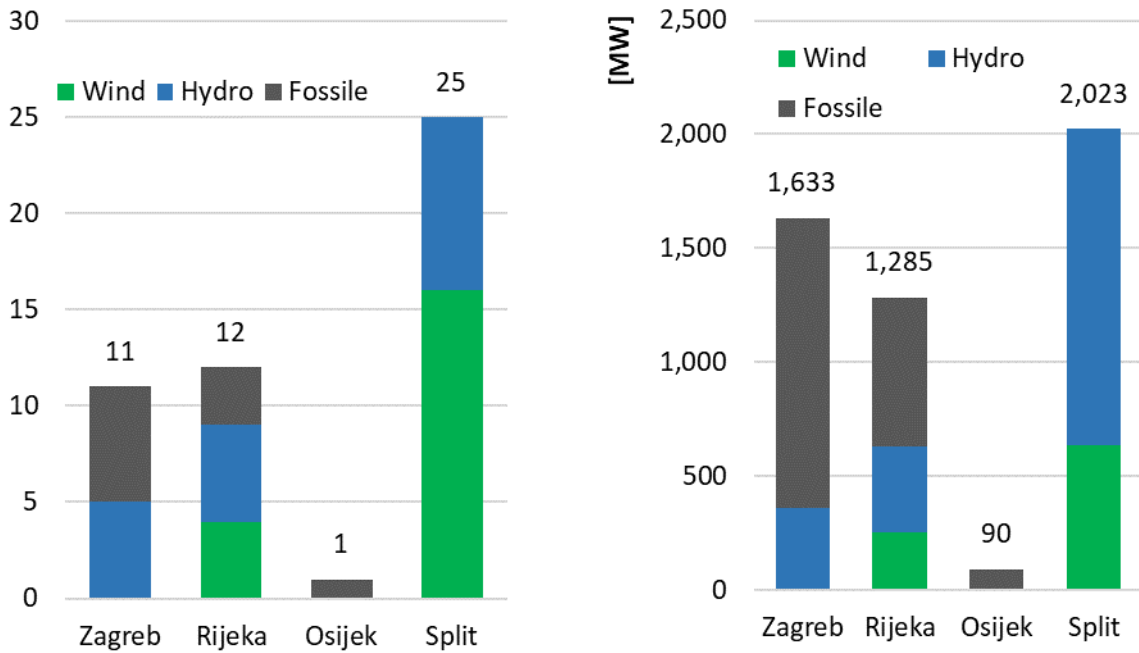
Figure 4.2.29 shows the shares of all the primary power sources in the total connected capacity and generated electricity of power plants in the Republic of Croatia in 2022 (including power plants in test operation mode). The share of renewable energy sources in the total production is around 65%.



Source: HOPS and HEP-ODS

Figure 4.2.29 Share of individual energy sources in the capacity and generated electricity of power plants in the Republic of Croatia at the end of 2022

At the end of 2022, 10 thermal power plants with a total connection capacity of 2,019 MW, 19 hydroelectric power plants with a connection capacity of 2,127 MW, and 20 wind power plants with a connection capacity of 885 MW were connected to the transmission network in the Republic of Croatia. This amounts to a total of 5,031 MW or 91% of the total connection capacity of connected power plants in the Republic of Croatia. Figure 4.2.30 shows the layout of power plants by transmission area.

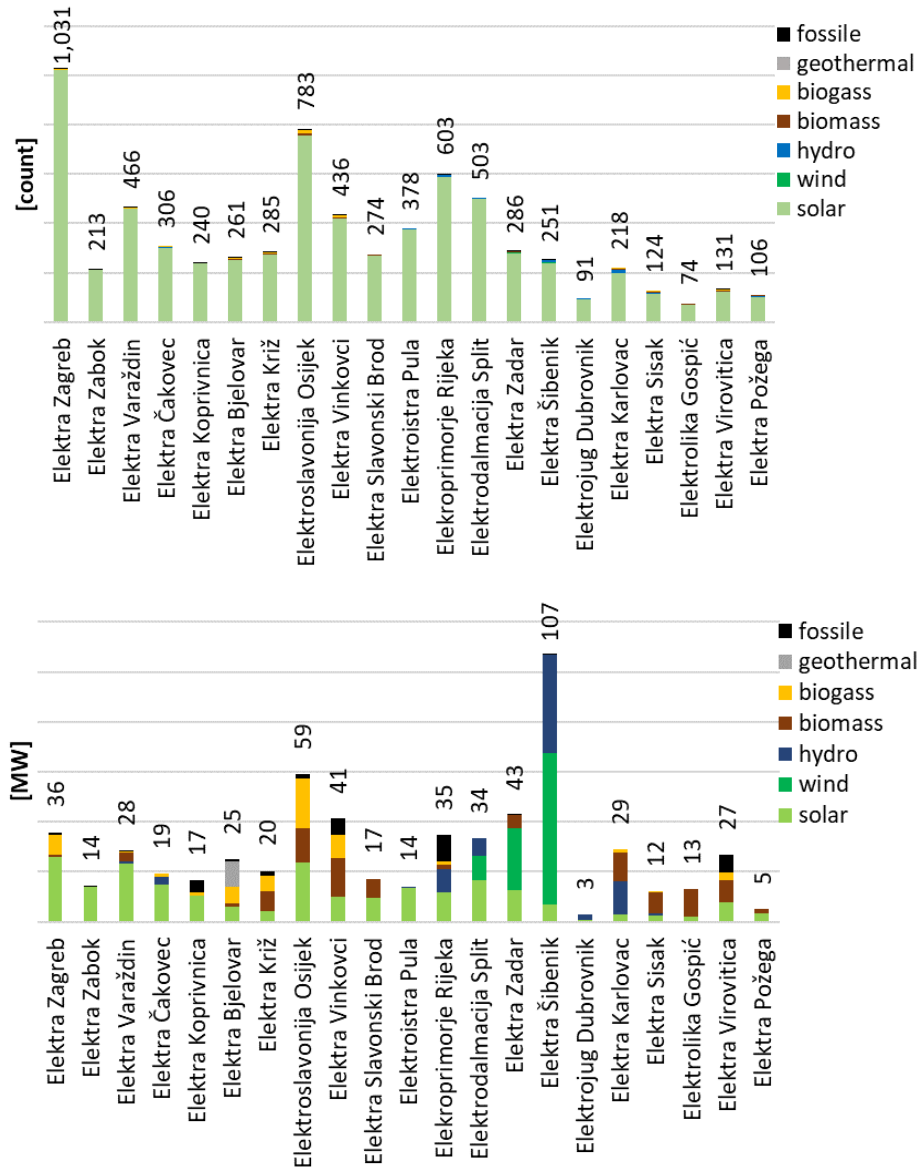


Source: HOPS

Figure 4.2.30 Number, connection capacity, and production of power plants by HOPS transmission areas in 2022



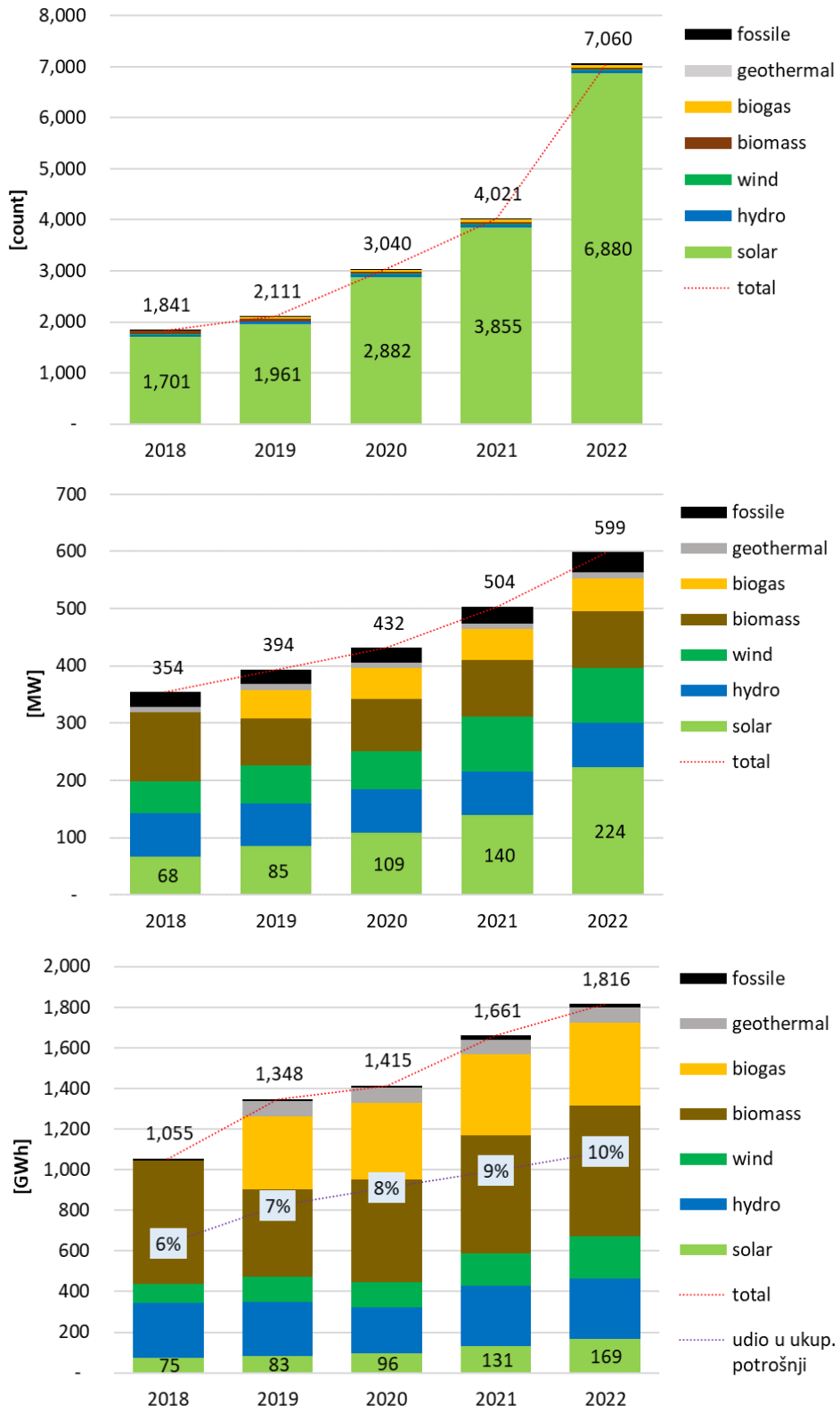
Growth in electricity production from distributed energy sources continued in 2022 with 1,816 GWh of electricity produced, 9% more than in 2021. Roughly 99% of electricity from distributed energy sources was produced using renewable energy sources. The share of delivered electricity from distributed energy sources in the total consumption of the electricity system (18,531 GWh) in 2022 amounted to 9.8%. Figure 4.2.31 shows the distribution of production plants by distribution area.



Source: HEP-ODS

Figure 4.2.31 Number and connection capacity of production plants by HEP-ODS distribution areas at the end of 2022

At the end of 2022, 7,060 billing metering points were connected to the distribution network, where the connection capacity when injecting into the grid was 599 MW and where 1.8 TWh of electricity was delivered to the distribution network, Figure 4.2.32. By the beginning of May 2023, the number of solar power plants connected to the distribution network had increased from 6,880 to 9,170.



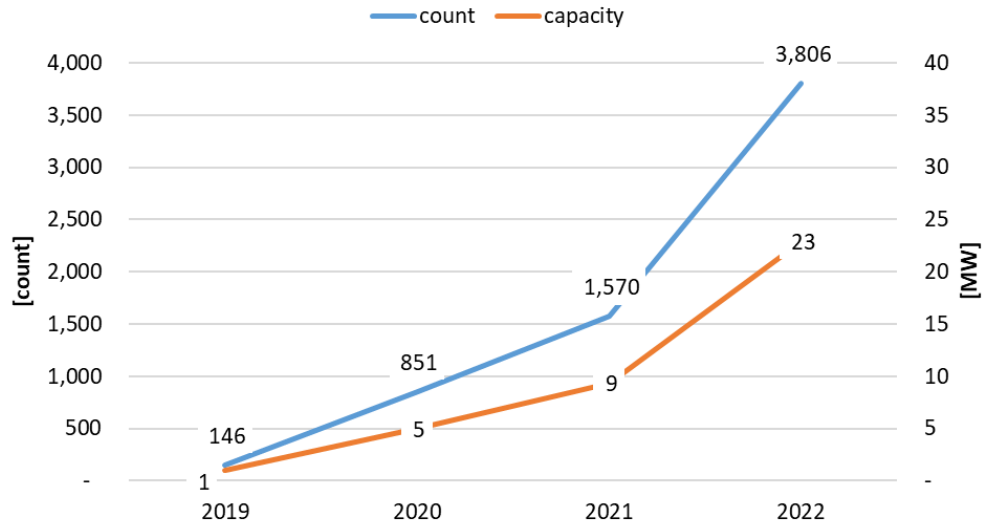
Source: HEP-ODS

Figure 4.2.32 Number, connection capacity and production of electricity of production plants in the distribution network



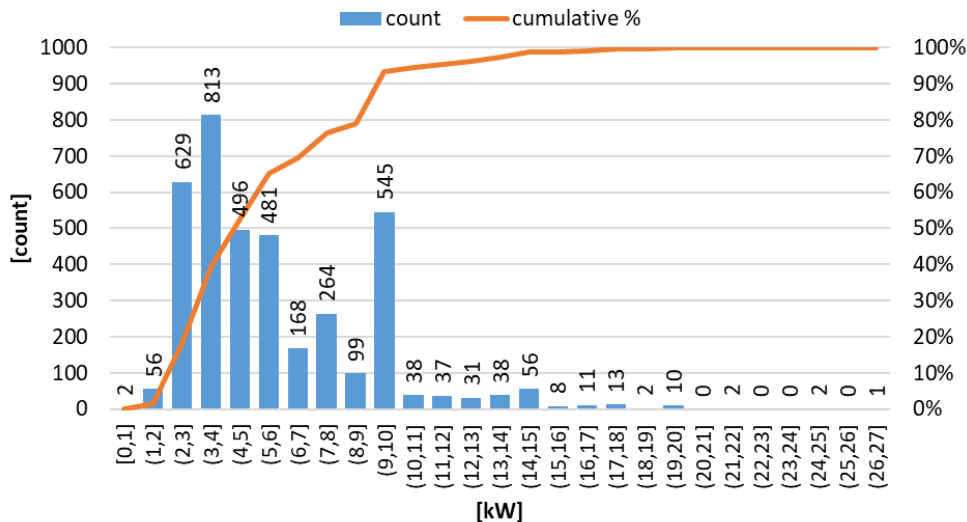
In 2022, compared to 2021, the number of BMPs that are users of self-supply plants increased by 2,236, or 2.4 times (from 1,570 to 3,806), and the total power increased by 14 MW, or 2.6 times (from 9 at 23 MW), Figure 4.2.33.

The connection capacity of BMPs that are users of self-supply plants in the direction of injecting into the grid is mostly in the interval (3, 4] kW, 813 BMPs, the interval (2, 3] kW, 629 BMPs and the interval (9, 10] kW, 545 BMPs, Figure 4.2.34. The average connection capacity of BMPs that are users of self-supply plants in the direction of injecting into the grid is 6 kW, the median is 5 kW, i.e. 50% of the BMPs have a connection capacity in the direction of injection into the network of up to 5 kW.



Source: HEP-ODS

Figure 4.2.33 Number and connection capacity of users of self-supply plants



Source: HEP-ODS

Figure 4.2.34 Statistical distribution of connection capacity in the direction of injecting into the grid of users of self-supply plants





## Observations on monitoring the balance of production and consumption of electricity

In 2022, 72% of the total electricity consumption in Croatia was covered by power plants located in Croatia. If the production of the Krško Nuclear Power Plant, which belongs to HEP d.d., is added to that production, 86% of the total electricity consumption is covered by production on the territory of the Republic of Croatia and production from production facilities owned by HEP d.d. in other states.

Due to the extremely bad hydrology during 2022, the production from hydroelectric power plants was 1,856 GWh lower in 2022 than in 2021. The net import was 931 GWh higher.

Electricity production from renewable energy sources in 2022 amounted to 8,612 GWh, 46% of the total production of electricity.

Distributed production continues to grow and covered 9.8% of the total electricity consumption in the Republic of Croatia in 2022.

In Q1 2023, HOPS and HEP-ODS submitted reports to the HERA on monitoring the security of supply in the transmission and distribution system for 2022. These reports and the currently available data supplied to the HERA by HOPS and HEP-ODS show that systems operators are cooperating to maintain sufficient levels of security of electricity supply in the Croatian electricity system.



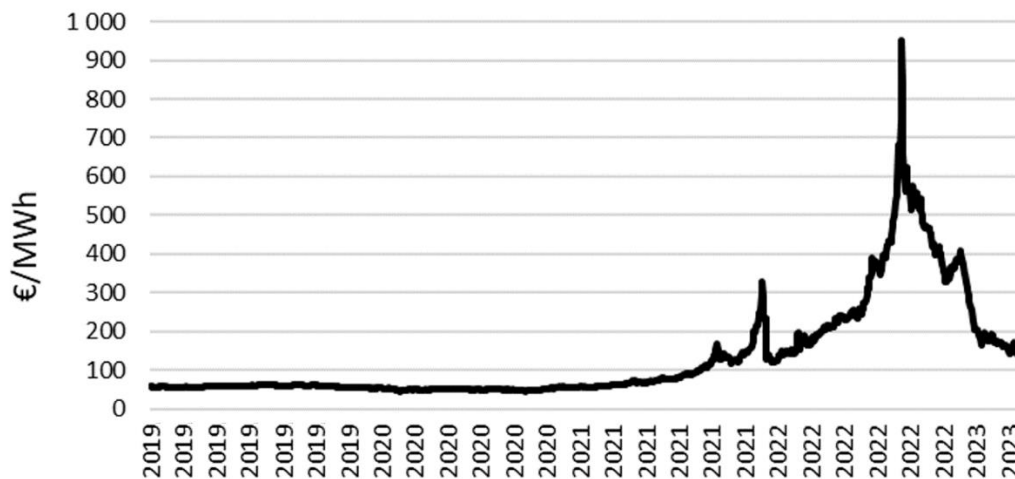
## 4.3. Wholesale electricity market

### 4.3.1. Development of the wholesale electricity market

#### Wholesale electricity market prices

In the European Union, wholesale electricity prices are freely negotiated. Prices on the bilateral electricity market are not publicly available. The prices of some products can be seen on the electricity exchanges.

Figure 4.3.1. shows the daily prices of the annual baseload product for the next year on the Hungarian energy exchange HUDEX. In at least four EU countries (Czech Republic, Bulgaria, Belgium and Hungary) in the period from 2016 to 2020, the quantity of electricity sold through long-term products was less than 25% of the consumption.

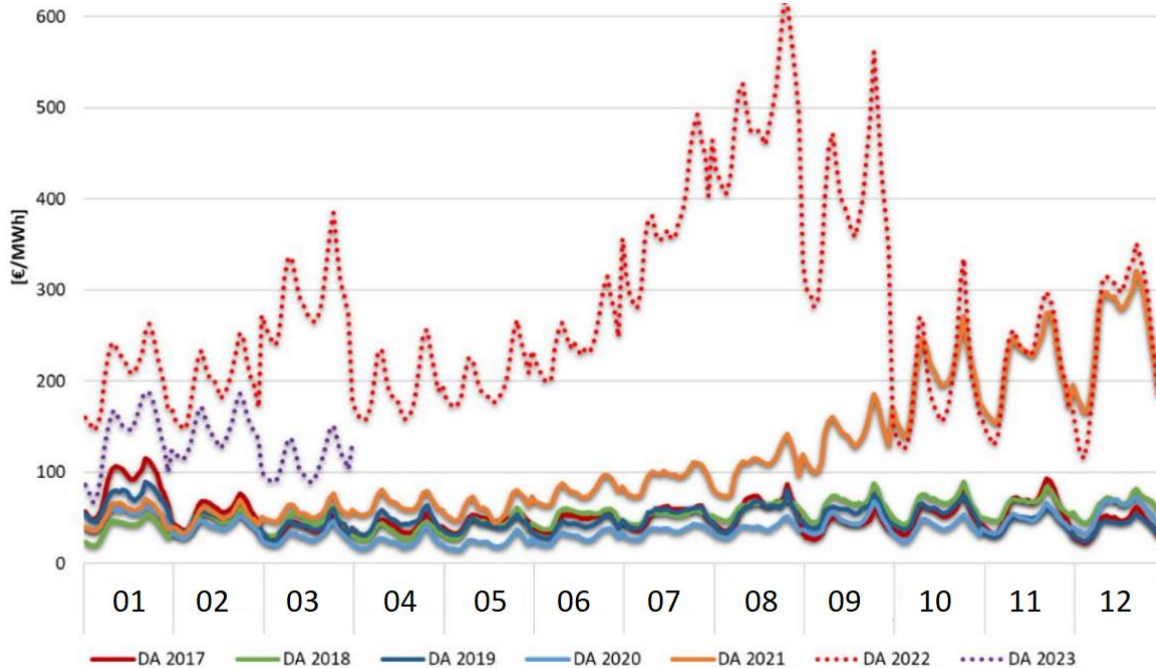


Source: HUDEX

Figure 4.3.1 Daily prices of the annual baseload product for the next year on the Hungarian energy exchange HUDEX for the first subsequent year (Y+1) from 2019 to 2023

Since there was no energy exchange for long-term products for the territory of the Republic of Croatia, the reference price was formed based on the prices of long-term products on the Hungarian energy exchange HUDEX with a price correction for cross-zonal (cross-border) capacities. The price of the cross-zonal capacity reflects the price difference between neighbouring countries. On 10 March 2023, the CROPEX informed the HERA that it plans to establish a forward market (financial derivatives) in June 2023, where prices from the CROPEX would be used.

The price of the annual baseload product on a certain day represents the best estimate of the average price on the day-ahead market. The quantity of electricity sold on the organised day-ahead market (energy exchange) was less than 50% of the total electricity consumption from 2016 to 2020 in a large number of countries (Austria, Germany, Luxembourg, Bulgaria, Belgium, France, Netherlands, Czech Republic and Switzerland), and the Republic of Croatia was also in that category. The average hourly prices on the CROPEX by month are shown in Figure 4.3.2. for the period from 2017 to March 2023.



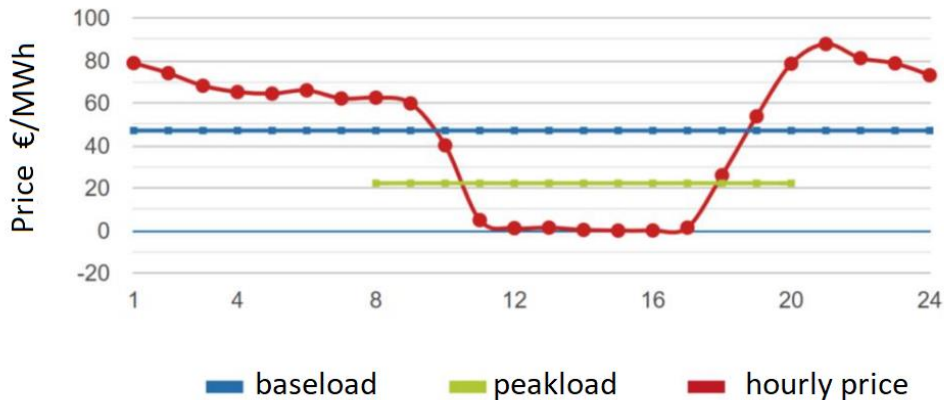
Source: CROPEX

Figure 4.3.2 Average prices on the CROPEX day-ahead electricity exchange from 2017 to March 2023

The unexpected increase in natural gas prices after May 2021 is the main factor that determined the prices of wholesale products on the electricity market.

With the increasing integration of solar power plants, during certain sunny days, the day-ahead market reacts with the price curve taking the form of the so-called *duck curve*<sup>39</sup> and in more extreme cases the so-called canyon curve. Figure 4.3.3. shows the hourly prices on the CROPEX day-ahead electricity exchange on 20 May 2023, which illustrate such a case. In order to mitigate the consequences of such circumstances on the system, network and prices of electricity, it is necessary to strengthen the flexibility of the electricity system through production flexibility, building energy storage facilities and using consumption response.

<sup>39</sup> The name originates from the California Independent System Operator (CAISO)

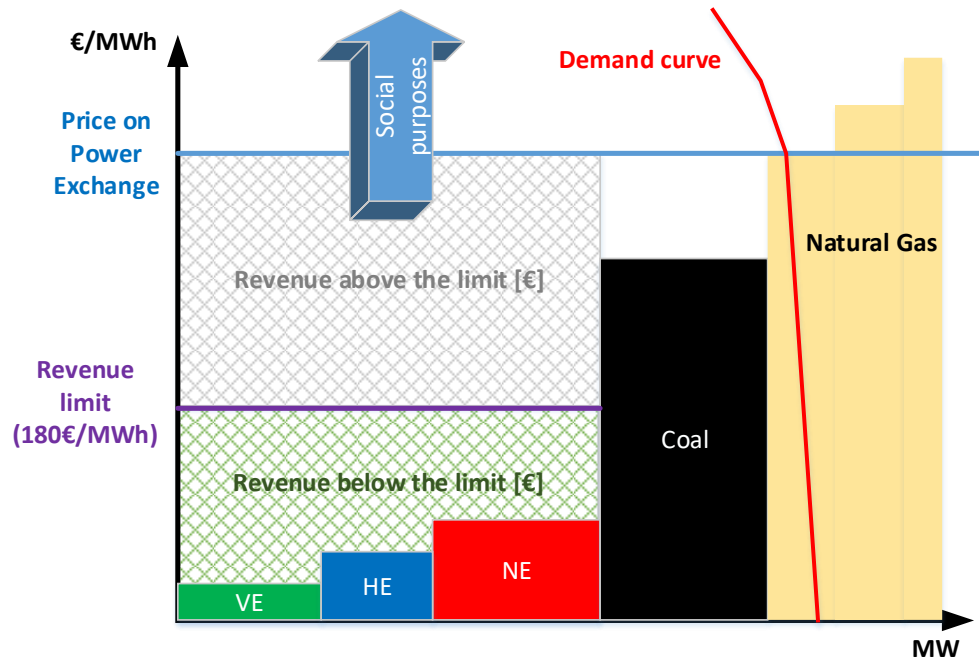


Source: CROPEX (<https://www.cropep.hr/hr/trgovanja/dan-unaprijed-trziste/rezultati-dan-unaprijed-trzista.html>)

Figure 4.3.3 Hourly prices on the CROPEX day-ahead electricity exchange on 20 May 2023

Depending on the distribution of risk between the producer and the market participant, different models of purchasing electricity can be chosen. A market participant can offer the producer a fixed price in all hours of the contract period, in which case the purchaser assumes a greater risk, because they need to protect themselves from price uncertainty with long-term products instead of their cost to the producer being determined by the price at which they sell the producer's energy (*Route-to-market*). Alternatively, they can offer a price based on the day-ahead market (*Route-to-market*; e.g. 5% lower than the price on the CROPEX in a particular hour), in which case the purchaser assumes a lesser risk. Purchasers who contracted the prices according to the *route-to-market* model do not realise an increase in profit that would be defined by the product of the absolute increase in the day-ahead market price and the electricity sold ( $\Delta C \cdot E$ ), since the day-ahead market price uniquely determines their costs in relation to the producers (e.g. selling price  $0.95 \cdot C_{\text{CROPEX,DA},i}$  in hour  $i$ ) and their additional costs, e.g. for wind power plants, increase proportionally with the increase in the market price, as previously shown according to the data of the EKO Balance Group. Purchasers who purchase electricity according to the *fixed price* model can have large profits if they take a risk by contracting a low fixed purchase price without protecting themselves from the price risk with long-term products, expecting lower market prices, and at the same time, the price at which they sell electricity on the market is significantly higher than the fixed purchase price. However, the latter case is unlikely. Purchasers who have protected themselves from the price risk with long-term products (e.g. contracts for difference) are more indifferent to the market price on the day-ahead market, and producers who sell regardless of the market price on the day-ahead market when they have a long-term contracted fixed price for electricity supplied to the network.

As a result of the significant increase in electricity prices, certain producers had revenues several times higher than their capital costs (CAPEX) and production costs (OPEX). On the day-ahead exchange, manufacturers offer products at prices equal to their production costs (OPEX). In addition, some producers have increased production costs (e.g. increase in CO<sub>2</sub> emission prices, increase in silage prices for biogas and biomass plants, increase in natural gas prices). Figure 4.3.4 shows the principle of economic priority according to *Regulation 1854*. If the model from *Regulation 1854* is properly implemented, the wholesale price of electricity is not affected.



Source: HERA

Figure 4.3.4 List of economic priority by type of electricity production (WPP - wind power plant, HE - hydroelectric power plant, NPP - nuclear power plant) with the demand curve according to Regulation 1854

Namely, Regulation 1854 stipulates that electricity producers using certain electricity production technologies<sup>40</sup> should return the surplus market revenues exceeding EUR 180/MWh in order to finance support measures for final electricity customers that mitigate the effect of high electricity prices. The market revenue cap of EUR 180/MWh should be higher, including a reasonable profit, than the levelised cost of electricity production (LCOE) for the relevant technologies, thus allowing the producers to which the cap applies to cover their capital expenses and operating expenses. In accordance with Regulation 1854, a higher market revenue cap can be set, provided that capital expenses (CAPEX) and operating expenses (OPEX) exceed EUR 180/MWh.

Ideally, the electricity producer sells electricity at a price of electricity that is, for example, higher than the monthly LCOE. In Figure 4.3.5, the green line shows the LCOE, thus ensuring the profitability of electricity production. If a market participant who buys electricity from a producer wants to make a profit, that electricity should be sold in the long-term at a price (red line) that is higher than the price paid to the producer (height of blue) increased by the additional costs he has (e.g. costs of imbalance settlement; the additional costs are the difference between the brown and blue column).

<sup>40</sup> wind energy; solar energy (solar thermal and solar photovoltaic energy); geothermal energy; hydropower without reservoir; biomass fuel (solid or gaseous biomass fuel) except for biomethane; waste; nuclear energy; lignite; petroleum products; peat.

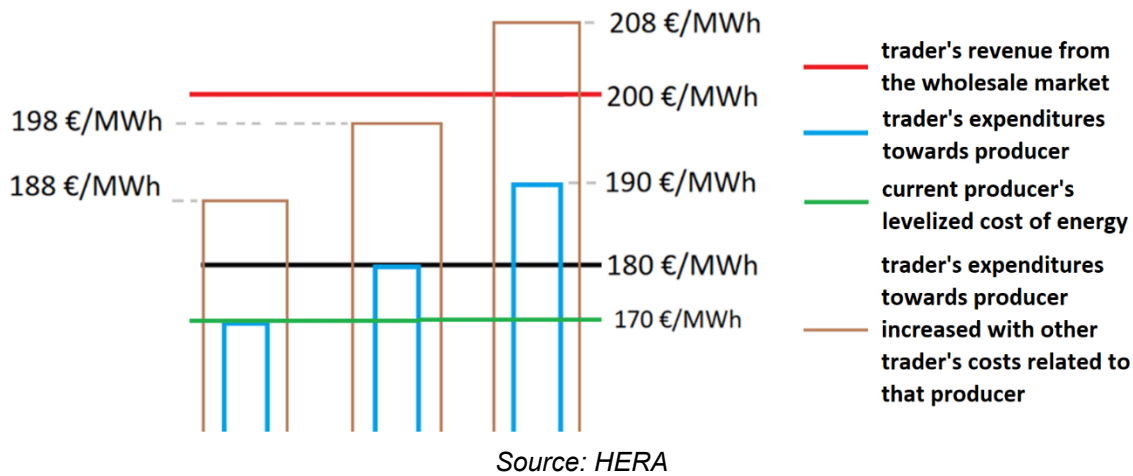


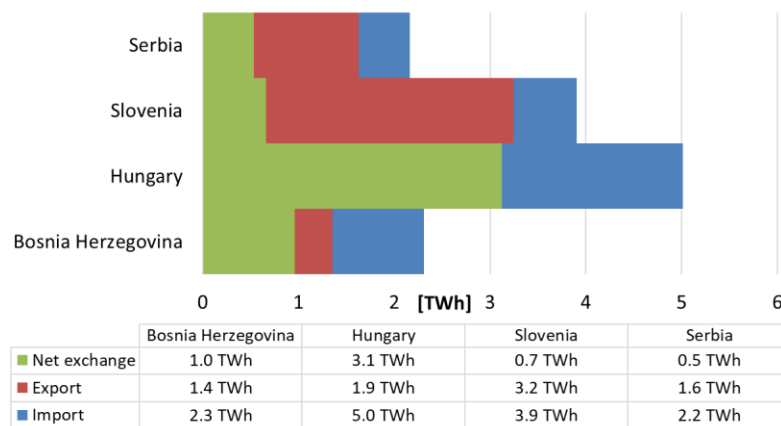
Figure 4.3.5 Current producer's levelized cost of energy, trader's expenditures towards producer, trader's expenditures towards producer increased with other trader's costs related to that producer, trader's revenue from the wholesale market

With the *Regulation on surplus market revenues*, the Government of the Republic of Croatia ensured the implementation of *Regulation 1854* in the part that refers to measures for the application of the caps on market revenues and the distribution of surplus congestion income revenues to final electricity customers.

### Trade at the Croatian borders

Figure 4.3.6 shows the volumes of cross-zonal (cross-border) trading with neighbouring trading zones (countries) in 2022 (imports, exports and net exchange) at the Croatian borders according to the volumes from contractual schedules. Net imports exist at all borders.

Imports from Slovenia include electricity from NPP Krško (2.7 TWh) for HEP d.d. The total net (trade) exchange for Croatia, together with electricity from NPP Krško, amounted to 5.3 TWh.



Source: HOPS

Figure 4.3.6 Cross-zonal trade on the borders between Croatia and neighbouring trading zones in 2022 by volumes from the contractual schedules of energy entities



## Hrvatska burza električne energije d.o.o. (the Croatian electricity exchange)

In 2022, CROPEX's day-ahead market (CROPEX DA) had 30 registered members. The trading volume on the day-ahead market in 2022 amounted to 5,789 GWh. Since 2018, the CROPEX and the Slovenian power exchange BSP have connected day-ahead markets (*market coupling*). Until June 2022, cross-zonal transmission capacity was calculated based on the NTC approach, and the calculation based on power flows has been used since then.

The Croatian intraday market (CROPEX ID) is connected to the Hungarian and Slovenian markets through the CROPEX via the SIDC project (*Single Intraday Coupling Project*), previously known as XBID (*Cross-Border Intraday*). Connecting intraday markets allows trade orders received on one market to compete with trade orders on other markets within the SIDC project. Market participants can continuously issue trade orders throughout the day (*continuous intraday trading*).

In 2022, the CROPEX's intraday market had 25 registered members, who bought 399.1 GWh and sold 440.5 GWh from the CROPEX. Additionally, the Slovenian exchange bought 678.9 GWh from the CROPEX on an intraday basis in the same year, while the Hungarian exchange bought 749.0 GWh.

Three auctions were held on the CROPEX's platform in 2022 for HOPS for the purpose of purchasing electricity to cover losses in the transmission network for 2023, 2024 and 2025.

In December 2022, the Slovenian (ELES) and the Serbian transmission system operator (EMS), together with the EPEX SPOT power exchange, established an electricity exchange for Central and Southeastern Europe with its headquarters in Ljubljana. The new legal entity *Alpine-Adriatic-Danube Power Exchange* (hereinafter: ADEX) will offer harmonised and unique services for short-term electricity trading in Slovenia and Serbia, and will aim to expand its services to other countries in Central and Southeastern Europe. ADEX envisages a business merger of the Slovenian (BSP) and Serbian power exchanges (SEEPEX). The arrival of the ADEX power exchange in the Republic of Croatia as the second NEMO exchange is expected.

## Electricity market concentration indicators

HEP d.d. and its subsidiaries dominate in the installed capacity of power plants, produced electricity and electricity sold on the wholesale market. The total trading volume on the Croatian market in 2022 was 61.8 TWh (including the quantities of the CROPEX, HROTE, HOPS, and HEP-ODS); the companies of HEP d.d. participated with 40.1 TWh (without HEP-ODS and HOPS).

Energy entities who wish to participate in the electricity market in the Republic of Croatia must obtain the appropriate licence from the HERA. As of 31 December 2022, there were 90 valid licences for electricity production, 11 licences for electricity supply, 37 licences for electricity trade, one licence for electricity transmission, one licence for electricity distribution, one licence for electricity market organisation, three licences for aggregation and one for the closed distribution system operator. In the electricity sector, during 2022, the HERA issued 32 licences for the performance of energy activities (21 for electricity production, 1 for electricity supply, 6 for electricity trade, 1 for a closed distribution system, and 3 for aggregation), and dismissed one application. The HERA extended 15 licences for the performance of energy activities (10 for electricity production, 1 for electricity supply, 3 for the electricity trade and 1 for organising the electricity market). The HERA established that there are entities connected to the distribution network and delivering electricity to it that have not obtained a licence for the production of electricity, although they are required to obtain such a licence, and steps are being taken to regulate or sanction them.

A prerequisite for participation in the wholesale electricity market is the EIC code. The issuance of EIC codes is carried out by ENTSO-E's Central Issuing Office (CIO) and local issuing offices in individual



European countries (CLIO). The Croatian EIC code issuing office is established within HOPS, and it carries out all activities related to issuing and updating unique energy codes. Croatian energy entities need EIC codes to exercise the right to participate in the local and common electricity and gas markets. During 2022, 250 EIC codes were issued, which is 180 more than the previous year. The number of registrations of producers and facilities that use renewable energy sources in the distribution network has increased. By belonging to different balance groups as new participants, due to the high price on the electricity market, they are included in the market mechanisms, in contrast to the earlier practice when they mainly participated in the EKO Balance Group.

The number of participants who fulfilled the requirements for entering the electricity market on 31 December 2022 was 74 (34 production, 9 test operation, 8 suppliers and 23 traders, excluding HOPS, HEP-ODS, CROPEX and HROTE) which is an increase of 27 compared to 2021. From 2009 to 2021, the number of entities that would fulfil the requirements for entering the electricity market in a given year ranged from 19 to 36.

### Observations on the development of the wholesale market

In mid-2022, prices of wholesale products reached record values, and in the second half of 2022 and the first quarter of 2023, prices of wholesale products decreased.

The measures of the Government of the Republic of Croatia in the first half of 2022 mitigated the impact of the increase in the prices of wholesale products on some consumers, while in the second half of 2022, the Government of the Republic of Croatia adopted measures in which, through regulated prices, the impact of the increase in wholesale prices of electricity on all consumers was reduced.

The increase in prices on the wholesale market led to a change in the financial liquidity of suppliers, transmission and distribution system operators for electricity losses, and other market participants whose electricity procurement costs are linked to market electricity prices.

*The Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obligated to take up from the electricity market operator (Official Gazette no. 147/21) reduced the share of the EKO Balance Group's electricity sold by HROTE at a market price from 60% in 2021 to 40% in 2022. In 2021, HROTE sold 1.1 TWh at EUR 92/MWh for 2022. And while HROTE sold 1.1 TWh on the CROPEX day-ahead market in 2021, HROTE bought 289 GWh and sold 253 GWh in 2022. The suppliers took over 1.7 TWh while the EKO Balance Group producers produced 2.7 TWh. The decrease in the amount of electricity available for sale on the CROPEX day-ahead market was influenced by the increase in the share of regulated purchases for suppliers to 60%, the premature exit of members of the EKO Balance Group, and weaker wind conditions in 2022.*

With day-ahead market coupling at the border with Hungary, in June 2022, the allocation of physical cross-zonal (cross-border) rights was switched to the allocation of financial rights for annual and monthly products, and explicit daily auctions for the allocation of cross-zonal capacity were also discontinued.

Abolishing the mandatory share of net delivered electricity produced by eligible producers that electricity suppliers are obligated to take up from electricity market operators would contribute to the development of the wholesale market. In this case, electricity market operators on the market would offer the full amount of net electricity supplied by eligible producers.

As transparent disclosure is important in promoting competition, HOPS is required to publish data according to *Commission Regulation (EU) No 543/2013 of 14 June 2013 on the submission and publication of data on electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council*. Publishing all the prescribed data on the central platform for





information transparency (<https://transparency.entsoe.eu/>) would enable greater transparency in the wholesale electricity market, and thus improve the operation of the market. During 2022, HOPS delivered all configured data in hourly and quarter-hourly resolution almost 100% of the time (*Completeness*), which placed HOPS among the first dozen deliverers of this data. As for the timely delivery of data, it amounted to about 50% (*On Time*).

Information on the availability of production units in the electricity system is required by stakeholders when they estimate future prices of electricity. The website <http://remit.hep.hr/> publishes data on the availability of production units in the Republic of Croatia owned by HEP d.d., which increases transparency.

The market in the Republic of Croatia currently operates on an hourly basis. This means that electricity is purchased and sold for each individual hour, according to which the obligations of the market stakeholders are also defined. The deadline for the Croatian electricity market to transition from 60 minutes to 15 minutes was extended to 1 January 2025 in 2022. Market participants would find it easier to work on a 15-minute basis if they could pair 15-minute products across borders, or at least on the intraday CROPEX market.

Table 4.3.1 shows the wholesale electricity market indicators from 2018 to 2022.



Table 4.3.1 Wholesale electricity market indicators from 2018 to 2022

Indicator	2018	2019	2020	2021	2022
Electricity production [GWh]	12,192	12,006	12,216	14,153	13,257
Number of active participants in the wholesale market	41	35	37	47	74
Total electricity consumption [GWh]	18,352	18,169	17,272	18,495	18,530
Imports [GWh]	12,692	11,400	10,490	11,504	11,919
Exports [GWh]	6,532	5,237	5,434	7,159	6,642
Share of HEP-Proizvodnja d.o.o. in the total electricity production [%]	83%	80%	77%	75%	72%
Number of active traders on the wholesale market	24	21	22	23	23
Energy marketed on the power exchange [GWh]	2,460	5,429	7,051	7,391	6,937
Total marketed electricity [TWh]	67	58	64	65	62
Average price of electricity on the power exchange [€/MWh]	52	49	38	115	272
Structure of production capacities by source in Croatia (GW):					
Coal	0.34	0.34	0.34	0.34	0.34
Natural gas/Fuel oil	1.85	1.70	1.70	1.71	1.72
Nuclear	0.00	0.00	0.00	0.00	0.00
Hydro	2.20	2.20	2.20	2.20	2.20
Wind	0.58	0.74	0.79	0.98	0.98
Solar	0.07	0.08	0.11	0.14	0.22
Other	0.13	0.14	0.16	0.16	0.17
Share of electricity production on the market (%)	79%	73%	89%	90%	79%
Total installed plant capacity [GW]	5.17	5.21	5.31	5.53	5.63

Source: HOPS, HEP-ODS, CROPEX, ENTSO-E



### 4.3.2. Allocation of cross-zonal capacities and congestion management

#### Cross-zonal capacity allocation regimes in 2022

The calculation and allocation of cross-zonal transmission capacities are the most efficient congestion management measures. Other measures include limiting the use of already allocated cross-zonal capacities and the use of corrective measures such as topological measures or redispatching.

HOPS performs the uncoordinated capacity calculation at all borders for annual and monthly cross-zonal capacities using the NTC approach (*Net Transfer Capacity*). The day-ahead market capacity began to be calculated in a coordinated manner from June 2022 on the borders with Slovenia and Hungary, when a regional day-ahead capacity budget was established within the Core region for capacity budgeting using the flow-based (*Flow-based* – FB). The intraday capacities are not yet calculated, but the remaining capacities that have not been used from the previous capacity allocation levels are used.

The coordinated regional allocation of cross-zonal capacities in all time frames on a market basis has been established at all borders except for intraday capacity allocations at the borders with Serbia and Bosnia and Herzegovina (Table 4.3.2).

In accordance with the **Act on the Regulation of Energy Activities**, the HERA consults and closely cooperates with other national regulatory agencies and ACER in cross-border matters. The HERA is also 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 the supervision of cross-border trading, congestion management and capacity allocation on cross-border transmission lines. At the level of the European Union, the supervision of congestion management is prescribed by *Regulation 943*, as well as the *CACM Regulation*, which refers to short-term markets, and the *FCA Regulation*, which regulates the allocation of long-term cross-zonal capacities.

Table 4.3.2 Cross-zonal capacity allocation regimes and offices on the borders between Croatia and neighbouring bidding zones in 2022

Border	Yearly auction	Monthly auctions	Daily auctions	Intraday allocations
Slovenia	JAO	JAO	CROPEX <sup>41</sup> (SDAC)	CROPEX (XBID) <sup>42</sup>
Hungary	JAO	JAO	JAO/CROPEX (SDAC) <sup>43</sup>	CROPEX (XBID)
Serbia	JAO	JAO	JAO	EMS
Bosnia and Herzegovina	SEE CAO	SEE CAO	SEE CAO	NOSBiH

Legend:

 Coordinated

 Bilateral

<sup>41</sup> Implicit capacity allocation for the day-ahead market.

<sup>42</sup> Implicit capacity allocation for the intraday market.

<sup>43</sup> The implicit capacity allocation for the day-ahead market began on 8 June 2022.



### *Analysis: HERA*

Regional auction offices (JAO for the borders with Slovenia, Hungary and Serbia, and SEE CAO for the border with Bosnia and Herzegovina) carry out annual, monthly and daily auctions.

As of November 2019, Croatia's borders with Slovenia and Hungary have been included in the coupling of the intraday markets of EU member states through the XBID project. Compared to previous years, the intraday allocation of cross-border transmission capacities has been carried out by NOSBiH instead of HOPS from 2022.

## Long-term cross-zonal capacities

Neighbouring transmission system operators calculate cross-zonal capacities considering the future state of their transmission network only and taking into account the N-1 safety criterion. This method of calculation is called non-coordinated, or unilateral calculation. If system operators calculate different capacity values, market participants are offered the lower value. Long-term cross-zonal capacities through explicit allocations at all borders are allocated to market participants through annual and monthly products that have the same amount of capacity in all hours of the relevant product's duration.

Generally, during explicit capacity allocation, auction offices organise auctions in which market participants explicitly compete for (only) the offered capacity. If market participants bid for more capacity than is offered in a particular auction, congestion occurs; neighbouring transmission system operators then share revenues equal to the reference price for unit capacity multiplied by the total allocated capacity.

Cross-zonal long-term capacities can take one of the following two forms: physical transmission rights or financial transmission rights. Physical transmission rights were the dominant form of cross-zonal capacities on all the Croatian borders until June 2022, when the allocation of financial transmission rights began on the border with Hungary, which coincided with the introduction of the regional Core budget for day-ahead capacities. In the entire Core region, which includes 19 borders between the countries of Central Europe, only on the Croatian border with Slovenia is it possible to grant physical transmission rights, while financial transmission rights have been established on all other borders.

The advantage of physical transmission rights is the possibility of the physical use of cross-zonal capacities for the import or export of energy across the border. This is extremely important in the case of Croatia due to the continuous import of electricity from NPP Krško.

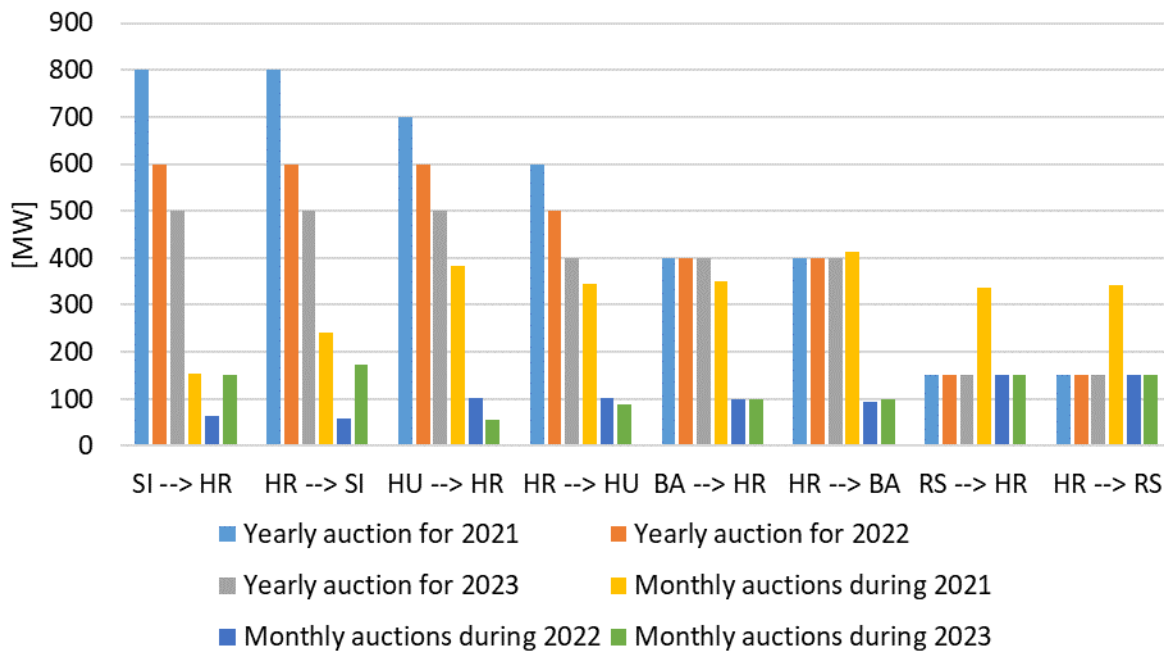
During 2022, a trend of long-term capacity reduction was observed on the Croatian borders with Slovenia and Hungary, which continued at the beginning of 2023. The main cause is the provision of more capacity that will be available for the day-ahead market, but also the increased costs of neighbouring transmission system operators who have the obligation to compensate market participants for unused physical transmission rights or all financial transmission rights based on the difference in the reference day-ahead prices on neighbouring exchanges.

Figure 4.3.7. shows the average annual and monthly cross-zonal capacities offered at auctions organised by auction offices. Based on the data, a trend of decreasing long-term capacities can be observed on Croatia's borders with Slovenia and Hungary. In addition, at the beginning of 2023, on the border with Slovenia, there was a decrease in the capacity offered at the annual auction, while at the same time, the capacity offered at the monthly auctions for the first three months of 2023 increased.



During 2021 and in the first part of 2022, the decrease was caused by the decision of the neighbouring transmission system operators to leave a significant part of the capacity to the exchanges for implicit allocation through day-ahead market coupling.

In the second part of 2022, after the day-ahead regional allocation of capacities in the Core region had been established, neighbouring transmission system operators were motivated to reduce long-term capacities in order to reduce the compensation based on difference in the reference prices of two neighbouring exchanges to the market participants (*market spread*). Until a coordinated calculation and allocation of cross-zonal long-term capacities in the Core region is established in accordance with the *FCA Regulation*, HOPS may incur significant financial costs due to the compensation of market participants who have been allocated a long-term capacity, which is not nominated for use.



Source: HOPS, analysis: HERA

Figure 4.3.7 Average annual and monthly cross-zonal capacities 2021-2023



## Cross-zonal capacities for the day-ahead market

Capacity unallocated at monthly auction, which is intended for daily auctions, as well as capacity not reported for use, is offered at daily auctions; this capacity is then increased by the long-term capacity that has already been nominated in the opposite direction.

At the border with Slovenia, where the day-ahead market coupling was established in 2018, the Croatian and Slovenian electricity exchanges implicitly allocate available cross-zonal capacity for the day-ahead market, which is calculated using the non-coordinated method based on the NTC approach by neighbouring transmission system operators (cross-zonal transmission capacity and energy are allocated simultaneously) given to them by the transmission system operator. In this case, neighbouring transmission system operators share revenues equal to the difference in hourly prices on the neighbouring day-ahead markets multiplied by the exchange of electricity between neighbouring markets calculated using the EUPHEMIA algorithm<sup>44</sup>.

From June 2022, a coordinated capacity calculation for the day-ahead market was established in the Core region for the power capacity calculation to which the Croatian borders with Slovenia and Hungary also belong, using a flow-based approach. In addition to the calculation itself, a day-ahead market coupling was established from that moment on between Croatia and Hungary.

Unlike the NTC approach, which only determines the available capacity for cross-zonal trading on a single critical network element, taking into account the outage of another network element, in the FB approach, the available capacities are calculated on all network elements that are significantly affected by cross-border trading, taking into account the N-1 security criterion. In the Core region, there are several tens of thousands of such cases.

The FB calculation for each combination of CNEC<sup>45</sup> defines the following parameters used by EUPHEMIA<sup>46</sup>:

- the remaining available margin (RAM), which is determined for each CNE from the maximum allowed power flow, reference power flow, reliability limits and based on the experience of the transmission system operator, and
- the power transfer distribution factors (PTDF), each of which represents the impact of a change in power plant production and the net position of the observed trading zone on the power flow through the CNE.

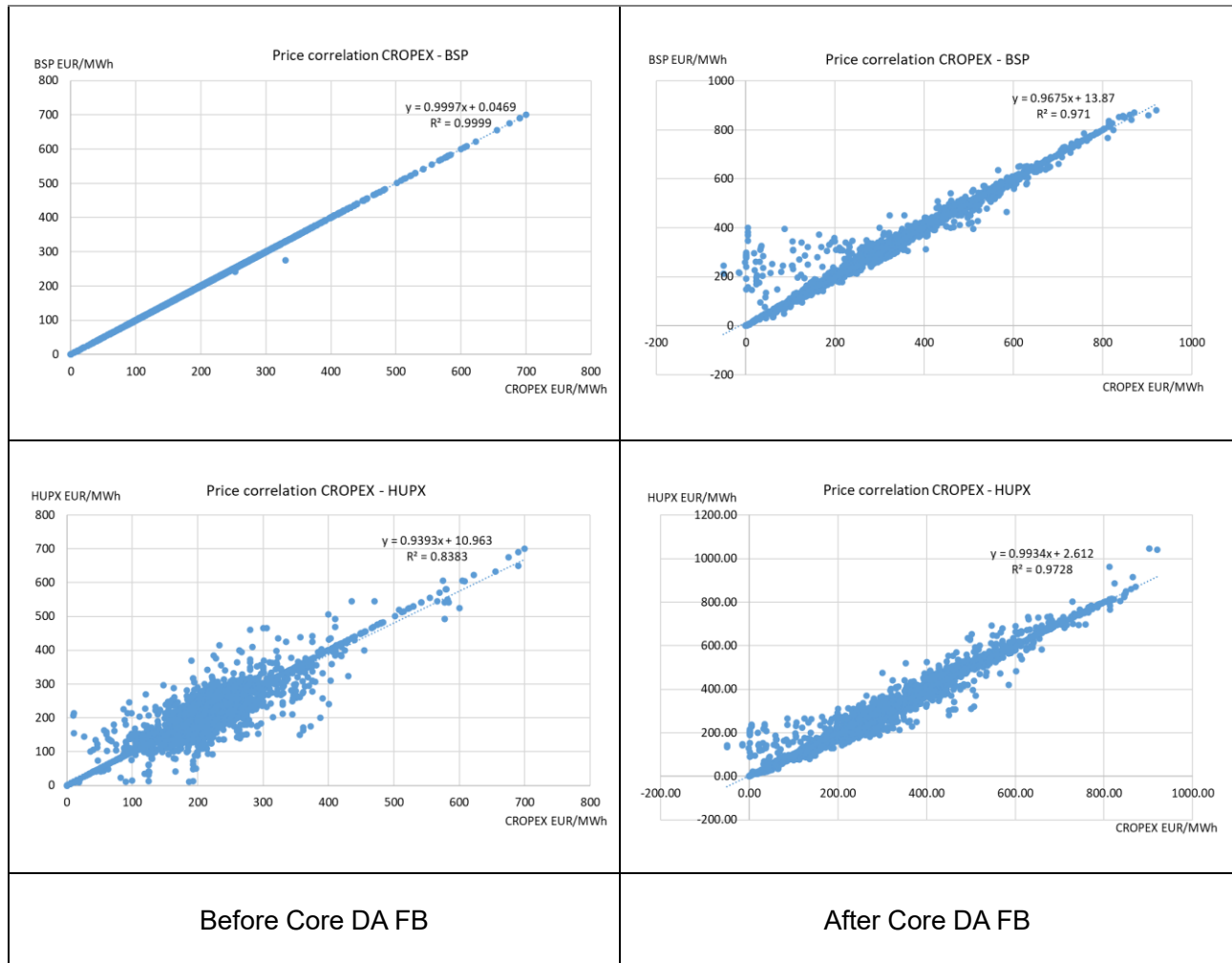
Figure 4.3.8 shows the convergence of reference hourly prices on the day-ahead CROPEX market with neighbouring power exchanges in Slovenia and Hungary. It can be noted that, with the establishment of a regional day-ahead capacity calculation, the prices on the electricity exchanges of Croatia and Hungary became more consistent, while at the same time, there was a difference in the day-ahead market prices of Croatia and Slovenia.

This is a direct consequence of the regional coordinated calculation and allocation of cross-zonal capacities on all 19 borders of the Core region, whereby EUPHEMIA aims to enable a maximum social well-being at the level of the entire Core region, and not only at an individual border.

<sup>44</sup> Algorithm for calculating prices on the day-ahead electricity market.

<sup>45</sup> Critical Network Element with Contingency

<sup>46</sup> <https://publicationtool.jao.eu/core/>



Source: CROPEX, analysis: HERA

Figure 4.3.8 Comparison of the day-ahead prices on the CROPEX with BSP and HUPX in 2022 before and after Core DA FB MC

Cross-zonal capacities for the day-ahead market at the borders with Serbia and Bosnia and Herzegovina are not calculated – the capacity that was not previously allocated to market participants at the annual and monthly auctions is allocated. At both borders, ATC values (*available transfer capacity*) are assigned, which represent the unused part of the NTC calculated for each direction for monthly capacity auctions. In doing so, the nomination of long-term capacities in the opposite direction is respected in order to offer the market more capacity in the observed direction.

Given that an electricity exchange has been established in Serbia and that Serbia, together with the other countries of the Energy Community, is in the process of adopting the *CACM Regulation* into its legislation, it is expected that the Croatian and Serbian day-ahead markets will be connected in the coming years. On the other hand, an electricity exchange has not yet been established in Bosnia and Herzegovina.



## Cross-zonal capacities for the intraday market

The cross-zonal capacity in the form of ATC values remaining from the daily auctions, taking into account transactions in the opposite direction, is allocated on all borders free of charge, in the order in which requests were received for intraday capacity allocations. In general, in the past years, there were sufficient intraday cross-zonal capacities on all borders.

Currently, transmission system operators do not earn revenues from the allocation of intraday cross-zonal capacity.

*Table 4.3.3 Intraday cross-zonal capacities in all directions and borders, including bilateral agreements on the borders with Slovenia and Hungary*

Direction	Average value of offered capacity [MW]	Minimum value of offered capacity [MW]	Maximum value of offered capacity [MW]
SI → HR	1075	0	4,066
HR → SI	939	0	3,000
HU → HR	430	0	3,443
HR → HU	874	0	3,203
BA → HR	578	0	1,262
HR → BA	734	51	1,524
RS → HR	517	0	1,100
HR → RS	619	0	1,200

*Source: HOPS; edited by HERA*

At the border with Slovenia, in addition to the usual implicit allocation of intraday capacities established by the XBID project, the parallel function of explicit intraday allocation has also been enabled since 2019 in accordance with the *CACM Regulation*. This allows traders to take advantage of the benefits of both implicit and explicit intraday capacity allocation regimes.

From June 2022, when the coordinated calculation of day-ahead capacity at all the borders of the Core region began, a new way of determining the intraday cross-zonal capacities on the Croatian borders with Slovenia and Hungary was also established. The value of the intraday cross-zonal capacity is determined based on the unused capacities after the calculation results for the day-ahead market are known. This is a transitional solution where ATC values are still offered on XBID.

Considering that in the transitional period, the intraday capacities were significantly lower than the usual values of the past years, transmission system operators used bilateral agreements in order to





offer more capacity to the market in cases where system security would not be threatened. The final values of intraday capacities are regularly published on the ENTSO-e Transparency Platform<sup>47</sup>.

For the first time, it was recorded that in certain hours, there were no free cross-zonal capacities to be offered to the market in a particular direction at the borders with Slovenia and Hungary.

A full transition to the FB calculation and intraday capacity allocation is expected in the coming years, in accordance with the approved methodology for intraday capacity calculation in the Core region, which was developed on the basis of the *CACM Regulation*.

## Observations on the allocation of cross-zonal capacities and congestion management

The amounts of cross-zonal capacities offered at the Hungarian border in both directions are relatively small in light of the total thermal transmission capacity of the cross-zonal transmission lines; in 2022, these capacities reduced even further compared to the previous year.

The revenues of the transmission system operators from the allocation of cross-zonal capacities should be earmarked to increase or guarantee cross-zonal capacity. In April 2022, the HERA published a *Report on the use of HOPS revenues from the allocation of cross-border transmission capacities in 2021* and confirmed that HOPS had used the funds in question in accordance with *Regulation 943*.

*Table 4.3.4 Revenues and expenses from congestion management during 2022*

Item	[HRK]
Yearly auction	52,045,661.69
Monthly auctions	51,501,456.44
Daily auctions	259,918,998.70
Capacity resale	211,319,642.90
JAO and SEE CAO expenses	3,825,945.30
<b>Total</b>	<b>148,320,528.63</b>

Source: HOPS

In general, during 2022, there was a significant increase in HOPS' congestion management revenue, but on the other hand, capacity resale costs also increased. It is not possible to fully explain whether

<sup>47</sup> <https://transparency.entsoe.eu/dashboard/show>



this is caused by the establishment of the Core Capacity Calculation Region (*Core CCR*) or if this is a general consequence of the increase in wholesale electricity prices throughout Europe.

During 2022, HOPS mostly used the funds collected from congestion management, which were received from the allocation of cross-zonal capacities, to cover the costs of capacity resale. The second largest item is HOPS' investment in energy procurement to cover losses in the transmission network, which also represents a new category of investment compared to previous years. The next item is the settlement of costs for the operation of the regional coordination centre (RCC), i.e. the costs of TSCNCET, and the smallest in terms of value were the investments in the development of the transmission network. The HERA believes that, in the future, HOPS must allocate a greater share of the funds collected from congestion management to direct investments in the network in order to increase the cross-zonal capacities at all borders.

At the time of writing this Report, the HERA has not yet published a report confirming that HOPS has invested the funds collected from congestion management during 2022 in priority objectives in accordance with *Regulation 943*.

In November 2022, the HERA approved the revision of the rules for the allocation of long-term capacities for borders for which the allocation service is provided by SEE CAO and new rules for the explicit daily allocation of capacities for borders for which the allocation service is provided by SEE CAO. The most important change is that market participants on the border between Croatia and Bosnia and Herzegovina will have to obtain an ACER code from the Central European Register of Energy Market Participants (CEREMP) in order to participate in cross-zonal capacity auctions.

No limitations of previously allocated cross-zonal capacity were recorded for market participants in 2022.

Due to limitations in the transmission network, during 2022, HOPS redispatched a total of 5.5 GWh of electricity in both directions, either to reduce or to increase production from production units. Currently, redispatching is not charged to network users who need to change the operating point of their production unit.

HOPS is currently participating in the non-compulsory multilateral cross-zonal redispatching activity of TSCNET<sup>48</sup>, which can address congestion in the transmission network.

According to *Regulation 943*, transmission system operators are not allowed to limit the interconnection capacity they make available to market participants as a means to resolve congestion within their own bidding zones, or as a means to manage flows that are the result of transactions within bidding zones. A minimum of 70% of the capacity must be ensured for cross-zonal trading. The remaining 30% of the capacity can be used for confidence limits, circular flows and internal flows at every critical network element.

In the previous period, the HERA approved HOPS' derogations from the minimum 70% of the capacity ensured for 2020 and 2021. In December 2021, the HERA granted HOPS' request for a derogation from the minimum 70% capacity for cross-zonal trading from the beginning of 2022 to the adoption of an action plan. These derogations were approved due to the time necessary to design the tools needed to appropriately take energy flows into account within and without the Core Region for capacity calculation, the limited ability to activate redispatching, planned long-term network element downtime, and the time needed to design the action plan.

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<sup>48</sup> *Regional Security Coordinator (RSC) Service for the TSOs in Central and Southeastern Europe – one of the regional security coordinators for the synchronous area of continental Europe.*



The existence of structural congestion in the transmission network as regards the minimum required 70% capacity for cross-zonal trading was affirmed in HOPS' Report on Structural Congestion, which the HERA approved in November 2021. The action plan being adopted by the competent Ministry in cooperation with the HERA, on the basis of HOPS' data, should represent a measure by which to solve the identified structural congestion by the end of 2025.

During 2020, the CROPEX initiated negotiations regarding the launch of the power futures market with the company EEX – European Energy Exchange, as an additional type of trading for members. Electricity derivatives for the Croatian market will be introduced on EEX by setting up basic long-term financial derivatives (weekly, monthly, quarterly and annual financial derivatives) with a base and peak profile. The introduction of electricity derivatives for the Croatian market was planned for 2022. According to the latest information received from EEX, the introduction of the financial derivatives is expected in mid-2023.

In accordance with the *FCA Regulation*, based on the adopted methodology for the coordinated calculation of long-term capacities in Core CCR, the FB approach for the calculation will start to be used at the end of 2024 for the capacity in 2025, which will be explicitly allocated at the annual and monthly auctions organised by the JAO auction office. This method of calculating and allocating long-term capacities has not yet been applied in Europe. Since cross-zonal long-term capacities will be allocated at all Core CCR borders in a single auction, it will be necessary to increase the financial guarantees for participation in the auctions, which may have a negative impact on the total volume of trading.



### 4.3.3. Electric power system balancing and ancillary services

#### Imbalance settlement for balance-responsible parties

The balance groups are balance-responsible parties. Imbalances are calculated hourly as the difference between the real volume and the market position<sup>49</sup> of the balance group. Hourly volume is the difference between the energy injected and taken up by the balance group, while the hourly market position is calculated as the difference between the contracted purchase of energy and contracted energy sold. If the imbalance is negative (the balance group procured too little energy), the balance group manager pays the system operator; if the balance is positive (the balance group procured too much energy), the system operator pays the balance group manager.

The price of imbalances per hour is equal for all the balance groups; it is determined in accordance with the *Rules on System Balancing* adopted by HOPS.

In 2022, HROTE settled imbalances of the balancing groups in the amount of HRK 350 million. During 2022, two complaints were submitted to HROTE, for February (HROTE and HOPS) and September (HEP d.d.). The complaints concerned incorrect realisations of HEP-ODS. HROTE accepted the complaints, new versions of the realisations were prepared, and HROTE made a new imbalance settlement for all balance groups in both cases.

By the decision of the HERA of 20 July 2022, HOPS was granted a derogation from the obligations prescribed in Article 53 of the *EBGL Regulation* until 31 December 2024. This obligation relates to the required transition to the 15-minute calculation interval. Currently, imbalances are calculated on an hourly basis as stated above.

Figure 4.3.9 shows the average monthly prices of positive and negative imbalances in 2022. The highest average weighted monthly price for negative imbalances  $C_n$  was achieved in August (EUR 540/MWh), while the highest average weighted monthly price for positive imbalances  $C_p$  was achieved in the same month (EUR 374/MWh).

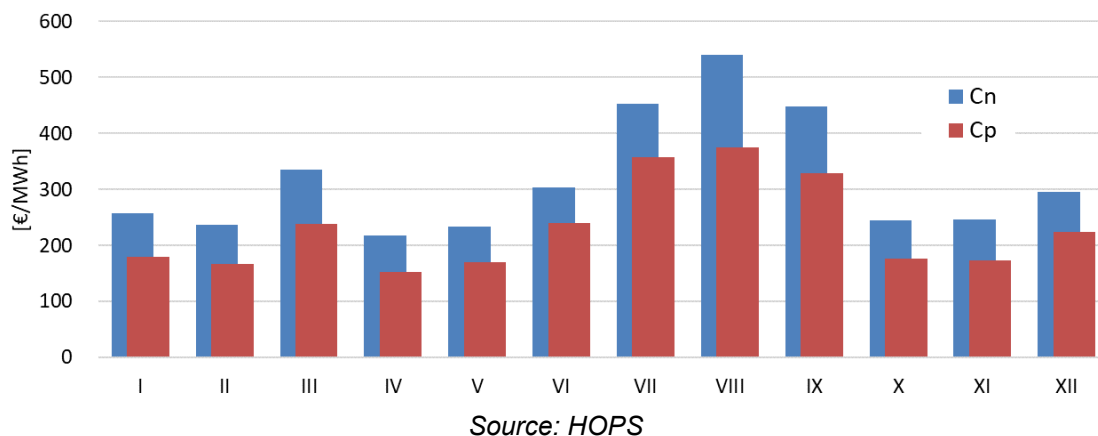


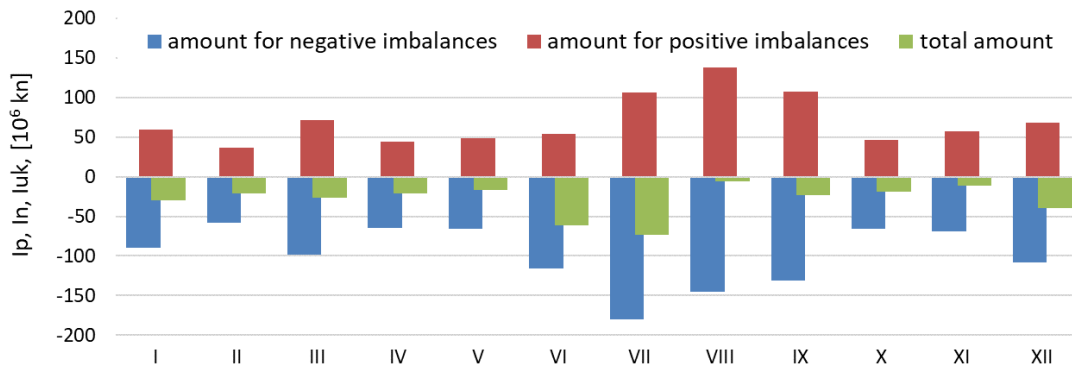
Figure 4.3.9 Average weighted monthly prices of positive and negative imbalances in 2022

<sup>49</sup> The market position is the difference between sales (including exports) and purchases (including imports) of the balance group's electricity in a single accounting interval, including market position adjustment.



Figure 4.3.10 shows a monthly breakdown of imbalance amounts calculated by HOPS in 2022 ( $I_{uk}$  – total amount,  $I_n$  – amount of negative imbalances,  $I_p$  – amount of positive imbalances). In 2022, the total calculated amount of imbalance settlement was HRK 349.8 million (without VAT), of which HRK 185.5 million pertained to imbalances of the EKO Balance Group, while HRK 124.1 million pertained to imbalances in energy procurement to cover losses in the transmission network, and the remaining amount to imbalances of other balance groups.

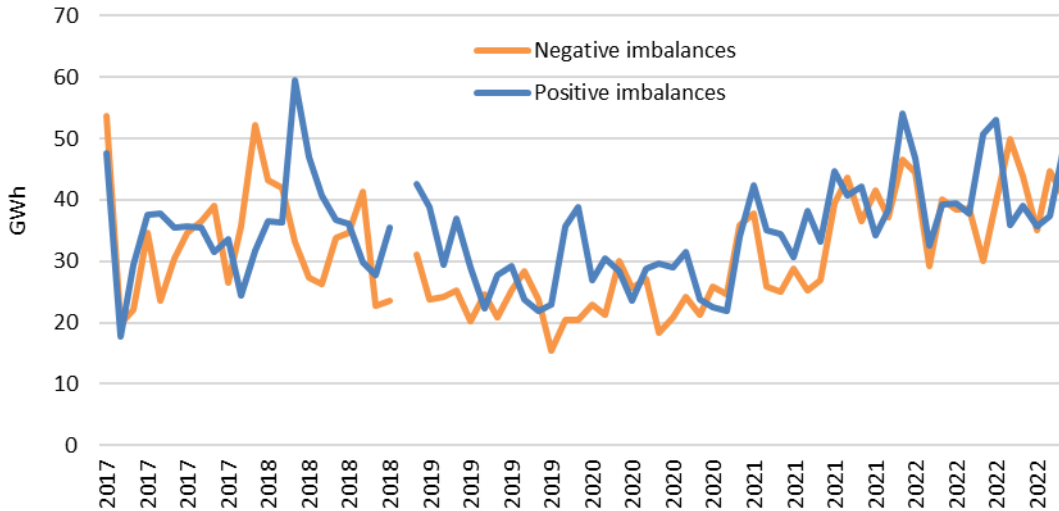
A change in the behaviour of certain market participants has been observed. As the reporting of unbalanced contractual schedules is not allowed under the *Electricity Market Organisation Rules* (Official Gazette no. 107/19 and 36/20), market participants would balance the contractual schedules by reporting an unbalanced trade with CROPEX, after which it would be dropped to 0 MWh and the contractual schedules would ultimately remain unbalanced.



Source: HOPS

Figure 4.3.10 Imbalance amounts in 2022

Since 2021, there has been a trend of increasing positive and negative imbalances of the balance groups. The amount of imbalances increased by 54% in 2022 compared to 2020. In the letter of 15 November 2022, HOPS informed the HERA that it is raising payment insurance instruments in the contract for liability for imbalances, recalling the cases of the energy entities Partner Elektrik d.o.o. and Enerģia Gas and Power d.o.o., i.e. entities responsible for imbalances that had left the market. For example, HOPS increased the minimum amount of the payment insurance instrument from HRK 0.35 million to HRK 3.50 million. There is no prohibition of intentional imbalances within the legal framework.



Source: HOPS

Figure 4.3.11 Amounts of monthly negative and positive imbalances from 2017 to 2022 (data for November 2018 not included)

As not all billing metering points measure electricity consumption on an hourly basis, the *Rules on the Application of Substitute Load Profiles* are used to determine supplier imbalances in the first (monthly) imbalance settlement. This results in a difference between the net electricity procured by the supplier on the wholesale market (contractual schedules and imbalance settlement) and the electricity the supplier invoices to the final customers. This difference is considered in the second (annual) imbalance settlement in accordance with the *Rules on System Balancing*, which defines prices as the weighted price on the CROPEX day-ahead market. The load curve of the distribution system is used to calculate the weighted price.



## Provision of balancing services

HOPS is obligated to procure balancing energy and exchange imbalances with other regulatory areas (*imbalance netting cooperation*) to always keep imbalances in the electricity system as close to zero as possible. Balancing energy prices for HEP-Proizvodnja d.o.o. are determined in accordance with the *Rules on System Balancing*. The balancing energy market in the Republic of Croatia has not yet been deregulated, as there are no other bidders for aFRR and mFRR balancing reserves besides HEP-Proizvodnja d.o.o.

In its decision of 5 September 2022, the HERA gave the preliminary approval for the contract between HOPS and HEP-Proizvodnja d.o.o., the subject of which is the market procurement of the mFRR security power reserve and the market procurement of balancing energy from mFRR for the period until 31 December 2022. This has completely opened up the market for the procurement of the mFRR security power reserves, both in terms of balancing energy and balancing capacity. The price of balancing energy that HEP-Proizvodnja d.o.o. can offer according to that contract is limited by the price of balancing energy from the *Rules on System Balancing* (HOPS, 11/2019), and the price of balancing capacity (power reserve) is limited by the *Methodology for establishing prices for the provision of ancillary services* (HOPS, 9/2020).

The *Rules on System Balancing* contain provisions defining the market procurement of balancing energy, which includes an independent aggregator. Network users are required to inform suppliers and/or purchasers and the competent system operator before approaching an independent aggregator.

On 9 December 2022, the HERA received the Draft Methodology for the calculation of cross-zonal capacity within the balancing time frame for the exchange of balancing energy or the implementation of the deviation exchange process, in accordance with Article 37 of the *EBGL Regulation* from HOPS.

In 2022, HEP-Proizvodnja d.o.o. provided 72% of the total share in the required mFRR security power reserve, and its share amounted to 74% in 2021. In 2022, nine balancing service providers were present, and the required extent of mFRR security reserve was provided for 96.52% of the hours in 2022. The cost of purchasing the mFRR security reserve was HRK 2.2 million lower due to the market procurement of the power reserve and HRK 1.9 million lower due to the uninsured power reserve.

In January 2022, KOER d.o.o. was technically qualified in the Republic of Croatia, which is the first balancing service provider for the mFRR power reserve with the role of independent aggregator. In April 2022, the *Ordinance on licences for performing energy activities and maintaining registers of granted and revoked licences for the performance of energy activities (Official Gazette no. 44/22)* was adopted, which regulates the issue of issuing permits to aggregators. In 2022, the HERA issued three licences for energy aggregation to the following entities: Nano Energies Hrvatska d.o.o. (on 30 August 2022), IE-ENERGY d.o.o. (on 7 September 2022) and KOER d.o.o. (on 22 December 2022). Of the aforementioned entities, only KOER d.o.o., as an independent aggregator, provided the mFRR security power reserve to HOPS during 2022.

A total of 133 GWh of balancing energy was activated to increase electricity production, while 109 GWh was activated to reduce production. Additionally, within the framework of imbalance netting (IGCC<sup>50</sup> process), as well as in FSKAR<sup>51</sup> process, with other regulatory areas, 178 GWh was exchanged for increases and 101 GWh for reductions.

<sup>50</sup> *International Grid Control Cooperation*

<sup>51</sup> *common settlement rules applicable to all intended and unintended exchanges of energy*



In 2022, HOPS's total costs for imbalance settlement from power reserves amounted to HRK 239.6 million. For other balancing energies, the amounts were as follows: for the imbalance netting cooperation, the expenditure was HRK 18.3 million, for the common settlement for unintended exchanges of energy, HRK 0.6 million, and the income from energy from the frequency containment process was HRK 1.8 million. The total cost of all the balancing energy amounted to HRK 256.7 million.

On 23 July 2021, the HERA granted a derogation to HOPS until 24 July 2024 in terms of connection to the European mFRR platform (to activate balancing energy from reserves to manually restore frequency) and the European aFRR platform (for activating balancing energy from reserves to automatically re-establish frequency).

When there is a need for it in the plant, HOPS limits the production of electricity. The limit of electricity production from wind power plants in 2022 was 0.6 GWh, 4.8 GWh from other renewable energy sources and 0.1 GWh from other sources of electricity. The total activated electricity for the purposes of congestion management in the direction of increasing production and/or reducing consumption amounted to 2.4 GWh, and the total activated electricity for the purposes of congestion management in the direction of reducing production and/or increasing consumption amounted to 3.1 GWh in 2022.

## Ancillary services

HOPS is obligated to maintain the state of the power system so that all network users can exchange electricity flows with the network within the framework of connection capacity. In order to ensure the operational safety of the electricity system, the transmission system operator procures non-frequency auxiliary services: the availability of plants capable of a black start, islanding capability and island operation, and compensation for voltage regulation and reactive power control.

Due to the imbalances of the power system and the requirement to participate in frequency containment at the rated value, HOPS procures frequency auxiliary services in the form of power reserves: frequency containment reserve (FCR); frequency restoration reserve with automatic activation (aFRR); frequency restoration reserve with manual activation (mFRR), which is divided into mFRR for balancing and mFRR for security.

On 27 December 2022, the HERA approved an ancillary services agreement between HOPS and HEP-Proizvodnja d.o.o. for the period from 1 January 2023 and 31 March 2023. The total planned costs for 2023 amount to EUR 52.39 million (HRK 394 million), while in the HOPS operational plan for 2023, the amount of planned costs is EUR 48.38 million (HRK 364 million), in which the suspension of the application of the *Methodology for establishing prices for the provision of ancillary services* was taken into account. HOPS stated that, taking into account the existing amounts of tariff items, there are not enough funds to fulfil the obligations that would arise from the conclusion of the mentioned contracts, therefore HOPS set the term of the contract to a period of three months (January, February and March).

Through public tenders, 28% of the required mFRR power reserves for system security were obtained. On the other hand, the prices in the ancillary services agreements between HEP-Proizvodnja d.o.o. and HOPS were calculated based on the *Methodology for establishing prices for the provision of ancillary services*. The price of mFRR power reserves for system security calculated in this way also limited the price in public tenders for mFRR power reserves.

Four balancing service providers had control units connected to the distribution network.

The *Rules on System Balancing* contain provisions regulating the market procurement of power reserves.





The aFRR power reserve needs for the year 2022 ranged from 35 to 75 MW in the direction for increasing production per hour, and from -75 to -35 MW for reducing production, or an average of 59 MW in each direction per hour. The needed power reserves for mFRR for system balancing amounted to +120 MW and -100 MW per hour, while the reserves for mFRR for system security amounted to +130 MW per hour. HOPS procured some of the mFRR for system security from entities outside of HEP d.d., as was previously noted. HOPS also used FCR<sup>52</sup> amounting to  $\pm 15$  MW per hour, which it obtained from HEP-Proizvodnja d.o.o at no charge.

On 9 December 2022, ENTSO-E launched a consultation for the adoption of the Proposal for the RCC Task "Regional Sizing of Reserve Capacity"<sup>53</sup>.

Ancillary services and balancing energy were paid for based on unit prices and realised quantities. The total costs of providing ancillary services amounted to HRK 257 million, of which 82% was related to power reserves for system balancing. Revenues from contractual penalties for power reserves amounted to HRK 0.7 million.

In a letter of 25 July 2022, the Hungarian regulator MEKH expressed its readiness to open the market for balancing capacities between Hungary and the Republic of Croatia. On 18 November 2022, the HERA and MEKH sent an application to HOPS and the Hungarian transmission system operator MAVIR regarding the aforementioned initiative.

During 2022, HOPS worked on the amendment of the *Agreement on the Provision of Mutual Emergency Energy Delivery for Securing the System's Services between the Power Systems of Croatia and Hungary in cooperation with MAVIR*. During 2022, HOPS worked on the amendment of the *Agreement on mutual emergency assistance service* in cooperation with ELES, and in early 2023, the Agreement on mutual emergency assistance service was signed by both parties. Also, during 2022, HOPS and EMS worked on the amendment of certain annexes to the Agreement on Network and System Operation Management between Hrvatski operator prijenosnog sustava d.o.o. Zagreb and the Joint Stock Company „Elektromreža Srbije“ Beograd.

Article 52 (35) of the **Electricity Market Act** stipulates that HOPS shall submit a reasoned request for the procurement of certain products and services in the part that cannot be procured on the market, together with an assessment of the possibility of providing a particular product and service on market principles to the HERA for approval by 30 September each year. In its decision of 3 November 2022, the HERA approved HOPS's request for approval of 30 September 2022. In its request for approval, HOPS submitted information on the current situation, i.e. an assessment of procurement possibilities on the market and an activity plan for the following services: balancing capacity concerning FCR, balancing capacity concerning aFRR, balancing capacity concerning mFRR, compensatory operation for voltage and reactive power regulation, the availability of production unit start-up without external power supply (black start), production unit start-up without external power supply, production unit availability for island operation, delivered electricity in island operation, voltage and reactive power regulation through production or consumption of reactive power and for congestion management.

HOPS has the possibility of procuring congestion management services in a market-based manner as part of cross-border redispatching via the TSCNET (Transmission System Operator Security Cooperations – Regional Security Coordinator Service for the TSOs in Central and Southeastern Europe). Namely, the prices for providing congestion management services through cross-border redispatching within TSCNET are not regulated, since providers from the territory of the Republic of

<sup>52</sup> Frequency Containment Reserves

<sup>53</sup> [https://consultations.entsoe.eu/entso-e-general/entso-e-proposal-for-the-rcc-task-regional-sizing/consult\\_view/](https://consultations.entsoe.eu/entso-e-general/entso-e-proposal-for-the-rcc-task-regional-sizing/consult_view/), accessed on 5 April 2023.



Croatia are free to offer the price. Participation in TSCNET is an optional activity of providing multilateral procedures to eliminate congestion in the transmission network in which fourteen transmission system operators from eleven European countries participate<sup>54</sup>. It plans to procure internal congestion management services in a non-market way in accordance with the *Rules on congestion management within the Croatian electric power system, including connecting lines (HOPS, 4/2021)* (hereinafter: *Rules on Congestion*), where it is currently free, and the regulated price could be determined by the *Rules on Congestion*. Redispatching contract forms for internal congestion based on the *Rules on Congestion*, as well as new rules on managing congestion in the transmission system, including transmission lines, were being prepared.

Regarding the aFRR balancing capacity, as well as for the negative direction for mFRR, during 2022, HOPS will explore procurement opportunities on the market and is currently procuring them in a regulated manner. The contracts concluded by HOPS with HEP-Proizvodnja d.o.o. offer the possibility of reducing the contracted quantity if HOPS procures part of this service on the market. This type of provision in previous contracts were exercised when the market was opened for the positive direction of the mFRR power reserve, and enabled the opening of the market. HOPS concluded contracts with such provisions for 2023 as well. In the *Methodology for Setting Tariffs for Electricity Transmission*, the HERA introduced regulatory sandboxes.

In 2022, HOPS did not procure the service of regulation voltage and reactive power through the production or consumption of reactive energy, and planned to announce a public call for interested providers that would provide the service in 2023. With the aim of determining the market potential, HOPS also planned a call for potential aFRR service providers during 2022, as well as for the negative direction of the mFRR capacity for balancing.

In a completely market way, HOPS plans to acquire mFRR for security in the positive direction, despite the fact that it concluded a contract with HEP-Proizvodnja d.o.o. with the prices from the *Methodology for establishing prices for the provision of ancillary services*.

According to the new draft of the *Rules on System Balancing*, HOPS plans to procure FCR balancing capacity ("primary reserve") on the market through inclusion in the EU FCR project. For 2023, HOPS planned to procure FCR free of charge from HEP-Proizvodnja d.o.o.

## Observations on electricity system balancing

In the future, HOPS will be required to procure energy via the EU electricity system balancing platforms (IN platform<sup>55</sup>, aFRR platform and mFRR platform) in accordance with the *EBGL Regulation*. The HERA approved a delay in HOPS' accession to the aFRR and mFRR platforms until 24 July 2024. In addition, in June 2022, HOPS was an observer in the APLACA initiative (*Allocation of Cross-zonal Capacity and Procurement of aFRR Cooperation Agreement*). The aim of the APLACA initiative is to exchange capacities for balancing aFRR. This project has three members: Austria, the Czech Republic and Germany, and the observers are: Hungary, Croatia, the Netherlands and Slovenia<sup>56</sup>. In general, participation in European projects for the market exchange of products contributes to social well-being, since providers of these products in the Republic of Croatia are enabled to offer their products on a wider market, as well as to cover costs through the market price, as opposed to the administrative pricing of products that cannot otherwise be procured on the market.

<sup>54</sup> 50Hertz (Germany), Amprion (Germany), APG (Austria), ČEPS (Czech Republic), ELES (Slovenia), HOPS (Republic of Croatia), MAVIR (Hungary), PSE (Poland), SEPS (Slovakia), Swissgrid (Switzerland), TenneT (Germany), TenneT (Netherlands), Transelectrica (Romania) and TransnetBW (Germany).

<sup>55</sup> *Imbalance Netting*

<sup>56</sup> [https://www.entsoe.eu/network\\_codes/eb/alpaca/](https://www.entsoe.eu/network_codes/eb/alpaca/), accessed on 5 April 2023



On 25 February 2022, the ACER issued a decision on the proposed amendments to the PPIF<sup>57</sup>. The price range remains between EUR -99,999/MWh and EUR 99,999/MWh, instead of EUR -15,000/MWh and EUR 15,000/MWh as proposed to the ACER by the transmission system operators.

On 2 June 2022, the ACER initiated a public consultation regarding the proposal for a framework that would regulate the issue of consumption management (*New framework guidelines on demand response*)<sup>58</sup>, and submitted the proposal to the European Commission on 20 December 2022<sup>59</sup>.

On 31 March 2022, transmission system operators submitted three proposals for amendments (for mFRRIF<sup>60</sup>, aFRRIF<sup>61</sup> and INIF<sup>62</sup>) regarding the appointment of entities that will perform the CMF (*capacity management function*), as well as the proposal to amend the mFRRIF in the part concerning technical amendments where certain technical aspects are further clarified. The ACER announced that it approved the operators' proposals<sup>63</sup> on 3 October 2022.

The final customer who, independently or through an independent aggregator, participates in consumption management, in accordance with Article 28 (6) of the **Electricity Market Act**, should pay compensation to the supplier who is directly affected by the activation of consumption management. Imposing an obligation on the final customer to compensate the supplier because of participating in flexibility programmes will not increase the confidence of smaller final customers in accessing the portfolio of an independent aggregator. It is necessary to consider a solution in which the independent aggregator would compensate the supplier indirectly through the transmission system operator (direction of consumption reduction and/or production increase) and in which the supplier would compensate the independent aggregator indirectly through the transmission system operator (direction of consumption increase and/or production reduction) (*central settlement model*).

A complete lifting of the obligation for suppliers to purchase electricity from HROTE from the incentive system at a regulated price would have a beneficial effect on the balancing system, and the work of the EKO Balance Group

HEP-ODS should improve the publication of data for the needs of balance group planning in order to ensure that their imbalances are as close to zero as possible, which would reduce the need for power reserves and increase the ability to use renewable energy sources.

HEP-ODS needs to implement the optimal model for the calculation of realisation in the rules of application of substitute load profiles, as well as the optimal IT solution, in order to minimise errors in the calculation of realisation for the imbalance settlement. In 2022, ENTSO-E, eBIX (European forum for energy Business Information eXchange) and EFET (European Federation of Energy Traders) published a new version of the harmonised electricity market role model, which strives to achieve the

<sup>57</sup> *methodology for determining prices for the balancing energy that results from the activation of balancing energy bids for the frequency restoration process and for the pricing of cross-zonal capacity used for the exchange of balancing energy or for operating the imbalance netting process*

<sup>58</sup> [https://extranet.acer.europa.eu/Official\\_documents/Public\\_consultations/Pages/PC\\_2022\\_E\\_05.aspx](https://extranet.acer.europa.eu/Official_documents/Public_consultations/Pages/PC_2022_E_05.aspx), accessed on 5 April 2023.

<sup>59</sup> <https://www.acer.europa.eu/news-and-events/news/acer-submitted-framework-guideline-demand-response-european-commission-first-step-towards-binding-eu-rules>, accessed on 13 April 2023.

<sup>60</sup> *implementation framework for a European platform for the exchange of balancing energy from frequency restoration reserves with manual activation*

<sup>61</sup> *implementation framework for a European platform for the exchange of balancing energy from frequency restoration reserves with automatic activation*

<sup>62</sup> *implementation framework for a European platform for the imbalance netting process*

<sup>63</sup> <https://acer.europa.eu/news-and-events/news/acer-has-decided-amendments-implementation-frameworks-european-balancing-platforms>, accessed on 5 April 2023.



optimal IT arrangement of the market model for business processes<sup>64</sup>. In addition, in 2022, ebIX issued new recommendations for the IT establishment of an optimal model for balancing service providers<sup>65</sup>.

The law stipulates that the regulated calculation of balancing energy prices and frequency ancillary services should be prescribed by the rules on balancing the electric power system.

HOPS' planned revised costs of ancillary services for the year 2023 are EUR 52.39 million, and previously EUR 48.38 million was planned for 2023. The realised costs in 2021 were EUR 39.1 million, and EUR 34.2 million in 2022. The increase in the planned costs of ancillary services by EUR 18.2 million euros compared to 2022 is a consequence of the increase in prices on the CROPEX electricity exchange in 2021, which increases the opportunity cost due to night work (the methodologically determined costs in 2021 are compensated through the price in 2023). Namely, in order to provide a power reserve for reducing the production, HEP-Proizvodnja d.o.o. consumes hydropower during periods when the price of electricity is lower, instead of supplying electricity from flexible hydropower plants during periods when the price of electricity is higher. It would be worth considering a solution according to which the price would be calculated on a monthly basis so that the costs from the previous month are covered by the price for that same month.

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<sup>64</sup> THE HARMONISED ELECTRICITY MARKET ROLE MODEL, VERSION: 2022-01, [https://eepublicdownloads.entsoe.eu/clean-documents/EDI/Library/HRM/Harmonised\\_Role\\_Model\\_2022-01.pdf](https://eepublicdownloads.entsoe.eu/clean-documents/EDI/Library/HRM/Harmonised_Role_Model_2022-01.pdf), accessed on 5 April 2023.

<sup>65</sup> Business Requirements for Flexibility register administration and Business Requirements for Prepare and aggregate Resources for flexibility services, <https://www.ebix.org/news/detail/6437>, accessed on 5 April 2023.



## 4.4. Retail electricity market

### 4.4.1. Basic features of electricity consumption

#### Sale of electricity in 2022

Table 4.4.1 shows data on the average number of billing metering points<sup>66</sup> (BMP), sales, average electricity sales by billing metering point, and the share of individual consumption categories in total electricity sales.

*Table 4.4.1 Average number of billing metering points and the sales, average sales, and share in the sales of electricity to final customers by consumption category in Croatia in 2022*

Consumption category	Average number of BMPs	Sales [MWh]	Sales per BMP [kWh]	Share in total sales [%]	Change in sales 2022/2021 [%]
High voltage-110 kV <sup>67</sup>	154	1,258,298	8,192,932	7.48	-3.1
Medium voltage	2,501	4,428,278	1,770,939	26.34	1.7
Total high and medium voltage:	2,654	5,686,576	2,142,556	33.82	0.6
Low voltage – non-household users (blue)	39,362	182,373	4,633	1.08	-1.1
Low voltage – non-household users (white)	126,121	1,031,206	8,176	6.13	0.6
Low voltage – non-household users (red)	32,282	3,121,228	96,687	18.57	3.1
Low voltage – public lighting (yellow)	22,207	323,340	14,560	1.92	-5
Total low voltage – non-household:	219,973	4,658,146	21,176	27.71	1.8
Low voltage – household (blue)	695,951	1,421,368	2,042	8.45	-3.2
Low voltage – household (white)	1,580,232	4,991,934	3,159	29.69	-1.7
Low voltage – household (red)	2,294	48,925	21,324	0.29	7.6
Low voltage – household (black)	2,856	5,272	1,846	0.03	-14.9
Total low voltage – household:	2,281,333	6,467,499	2,835	38.47	-2
Total low voltage:	2,501,305	11,125,645	4,448	66.18	-0.4

<sup>66</sup> The average monthly number of accrued charges for a billing metering point.

<sup>67</sup> 154 BMPs of final customers from the industry and transport sector (HŽ electric locomotives) and power plants, which are final customers in this case (own consumption), are connected to high voltage. PSH Velebit is also included in the high voltage sales.



<b>Total:</b>	<b>2,503,960</b>	<b>16,812,222</b>	<b>6,714</b>	<b>100.00</b>	<b>-0.1</b>
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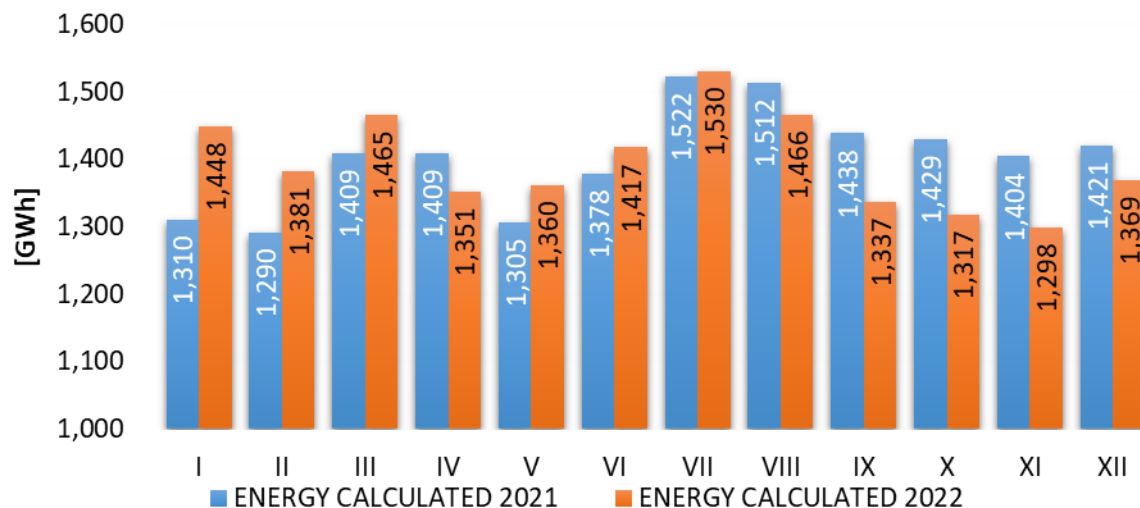
Table 4.4.2 shows electricity sales to final customers in the period from 2013 to 2022. The table specially indicates electricity procured on the wholesale market for the needs of pumping and compensation mode of the pumped storage hydroelectric power plant (PSH).

Table 4.4.2 Electricity sales to final customers from 2013 to 2022

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Final customers, GWh</b>	15,187	14,932	15,485	15,570	16,158	16,407	16,320	15,312	16,679	16,649
<b>Change, %</b>	-1.1%	-1.7%	3.7%	0.5%	3.8%	1.5%	-0.5%	-6.2%	8.9%	-0.2%
<b>PSH, GWh</b>	152	171	236	290	284	129	176	231	148	163
<b>Total, GWh</b>	<b>15,339</b>	<b>15,103</b>	<b>15,721</b>	<b>15,860</b>	<b>16,442</b>	<b>16,536</b>	<b>16,496</b>	<b>15,543</b>	<b>16,827</b>	<b>16,812</b>

Source: HEP-ODS and HOPS; data processing: HERA

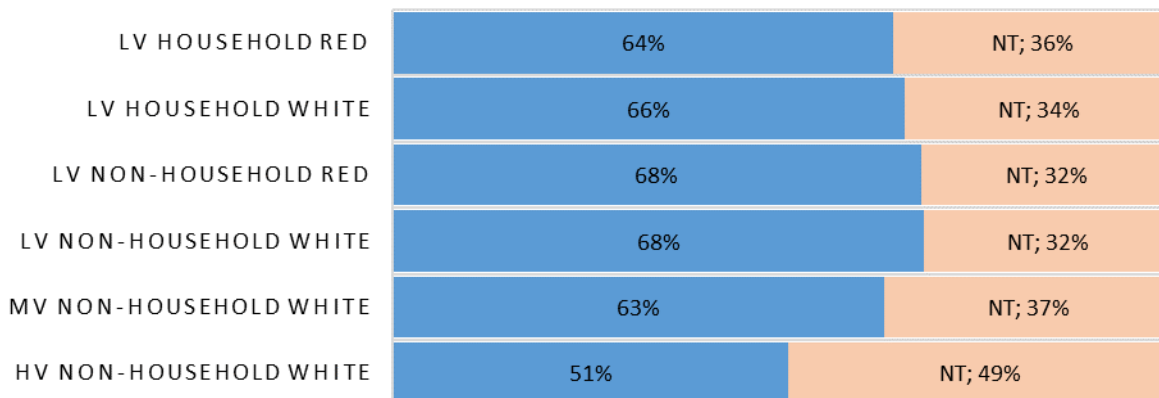
A comparison of the amount of energy calculated for the network usage fee by month in 2022 compared to 2021 is shown in Figure 4.4.1.



Source: HEP-ODS and HOPS; data processing: HERA

Figure 4.4.1 A comparison of the amount of energy calculated for network usage fee by month in 2022 compared to 2021

The consumption ratio in the higher and lower tariffs by category and tariff model in 2022 is shown in Figure 4.4.2.



Source: HEP-ODS and HOPS; data processing: HERA

Figure 4.4.2 Consumption ratio in the higher (HT) and lower tariff (LT) by category and tariff model in 2022

### Distribution by EUROSTAT consumption category

The following table shows that the majority of electricity sold falls into consumption categories *DD* (large households) and *DC* (medium households), while the majority of billing metering points fall into categories *DA* (very small households), *DB* (small households), and *DC* (medium households).

Table 4.4.3 Breakdown of consumption and billing metering points for household final customers in Croatia by EUROSTAT consumption category

Consumption category	Lowest consumption [kWh/year]	Highest consumption [kWh/year]	Consumption [%]	Number of BMPs [%]
<i>DA</i> – very small households	1	< 1,000	3.3	31.7
<i>DB</i> – small households	1,000	< 2,500	16.0	26.2
<i>DC</i> – medium households	2,500	< 5,000	32.6	25.7
<i>DD</i> – large households	5,000	< 15,000	40.8	15.5
<i>DE</i> – very large households	≥ 15,000		7.4	0.9

Source: EUROSTAT and HEP-ODS; data processing: HERA



Table 4.4.4. shows electricity consumption categories and indicative peak loads for non-household end-consumers according to EUROSTAT, while Table 4.4.5. shows a breakdown of consumption and billing metering points for low, medium and high voltage non-household end-consumers by EUROSTAT consumption category.

*Table 4.4.4 Electricity consumption categories and indicative peak loads for non-household final customers according to EUROSTAT*

Consumption category	Lowest consumption [kWh/year]	Highest consumption [kWh/year]	Minimum [kW]	Maximum [kW]
IA		< 20	5	20
IB	20	< 500	10	350
IC	500	< 2,000	200	1,500
ID	2,000	< 20,000	800	10,000
IE	20,000	< 70,000	5,000	25,000
IF	70,000	≤ 150,000	15,000	50,000

Source: EUROSTAT

*Table 4.4.5 Breakdown of consumption and billing metering points for low, medium and high voltage non-household final customers in Croatia by EUROSTAT consumption category*

Consumption category	Non-household – LV		Non-household – MV		Non-household – HV		Total	
	Consumption [%]	BMP [%]	Consumption [%]	BMP [%]	Consumption [%]	BMP [%]	Consumption [%]	BMP [%]
IA	7.73	79.5041	0.01	0.0542	0.00	0.0067	7.74	79.5649
IB	27.15	19.3298	0.93	0.2131	0.03	0.0053	28.11	19.5482
IC	9.24	0.4932	4.19	0.1744	0.07	0.0044	13.49	0.6720
ID	1.20	0.0204	22.13	0.1665	0.52	0.0031	23.85	0.1900
IE	0.00	0.0000	12.10	0.0164	3.63	0.0044	15.74	0.0209
IF	0.00	0.0000	3.74	0.0018	3.87	0.0013	7.61	0.0031
> 150,000 MWh	0.00	0.0000	0.00	0.0000	3.46	0.0009	3.46	0.0009
<b>All categories</b>	<b>45.3</b>	<b>99.3475</b>	<b>43.1</b>	<b>0.6263</b>	<b>11.6</b>	<b>0.0262</b>	<b>100.0</b>	<b>100.0</b>

Source: HEP-ODS and HOPS; data processing: HERA





In the low voltage category of non-household final customers, the largest share of electricity sold was in the *IB* consumption category, whereas the share of final customers in the exceptionally small industry category (*IA*) is by far the highest.

In the medium voltage category of non-household final customers, the most electricity was sold in the *ID* consumption category, which also includes the largest number of final customers (in terms of metering points). In the category of high voltage final customers, the most electricity was sold in the *IF* category.

Table 4.4.6. shows a breakdown of consumption for low, medium, and high voltage non-household final customers in the Republic of Croatia by tariff model and EUROSTAT consumption category. The following is apparent from the table (colour added for emphasis):

- the *IA* consumption category mainly involves the White low-voltage tariff model
- the *IB* and *IC* consumption categories mainly involve the Red low-voltage tariff model,
- the *ID* consumption category mainly involves the White medium-voltage tariff model,
- the *IE* consumption category mainly involves the White medium-voltage tariff model,
- the *IF* consumption category mainly involves the White high-voltage tariff model,
- the consumption category >150,000 MWh exclusively involves the White high-voltage tariff model.

*Table 4.4.6 Breakdown of consumption for low, medium and high voltage non-household final customers in the Republic of Croatia by tariff model and EUROSTAT consumption category*

Consumption category	HV	MV	LV	LV	LV	LV	Total
	White	White	Blue	White	Red	Yellow	
<i>IA</i>	0.00008%	0.00814%	1.14441%	4.68496%	0.79062%	1.11324%	7.74144%
<i>IB</i>	0.02726%	0.93183%	0.62894%	5.34194%	19.14413%	2.03361%	28.10771%
<i>IC</i>	0.06617%	4.18635%	0.00000%	0.00000%	9.24144%	0.00000%	13.49396%
<i>ID</i>	0.51554%	22.13283%	0.00000%	0.00000%	1.19817%	0.00000%	23.84653%
<i>IE</i>	3.63422%	12.10206%	0.00000%	0.00000%	0.00000%	0.00000%	15.73628%
<i>IF</i>	3.86945%	3.74029%	0.00000%	0.00000%	0.00000%	0.00000%	7.60974%
> 150,000 MWh	3.46433%	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%	3.46433%
<b>Total:</b>	11.57706%	43.10149%	1.77335%	10.02689%	30.37436%	0.00000%	100.00000%

Source: HEP-ODS and HOPS; data processing: HERA



## Observations on the main characteristics of electricity sales in 2022

The quantity of electricity calculated for the network usage fee was 0.2% smaller in 2022 than in 2021.

The quantity of electricity billed to the non-household HV and MV categories was 0.6% larger, and the non-household LV category 1.8% larger than in 2021.

The quantity of electricity billed to the household category was 2.0% smaller than in 2021.

The share of total electricity sold to household final customers was 38.47%, and the share sold to non-household final customers was 61.53%.

The ratio of consumption in the high tariff versus the lower tariff in the household category (White model) in 2022 was 63% versus 37%.

### 4.4.2. Development of the retail electricity market

#### Public electricity supply service

Electricity supply as a public service is electricity supply to final customers who have a right to this manner of supply and choose it either freely or use it automatically. Household final customers who are left without a supplier for any reason will automatically be switched to supply as part of the universal service. If they wish, household final customers supplied by a market supplier can switch to the universal service.

Electricity supply in the public service treats household and non-household final customers differently. Electricity supply is called the *universal service* for household final customers and *guaranteed service* for non-household final customers. In 2022, public supply within the universal service and guaranteed supply were both provided by HEP Elektra d.o.o.

The price of electricity in the public service is not regulated and is freely determined by HEP ELEKTRA d.o.o., which is in accordance with the recommendations of the European Commission and the practice in the majority of EU member states. Prices for household final customers using the universal supply has not changed over the past few years until 2022.

Guaranteed supply is a service ensuring the right to an electricity supply for non-household final customers who have no market supplier under the same conditions throughout Croatia. Guaranteed supply is activated when a non-household final customer is left with no supply agreement with a market supplier of electricity, to ensure that customers have a continuous supply of electricity. The **Electricity Market Act** prescribes that tariffs in guaranteed supply must be higher than the average amount of tariffs for the supply of final consumers in the same category supplied by the market suppliers on the electricity market.

From the second half of 2021 until mid-2022, electricity prices increased several times over on the electricity exchanges. The increase in wholesale prices on the HUDEX influenced the calculation of the price of guaranteed supply. The price of guaranteed supply was calculated during 2021 according to the *Methodology for Setting Tariffs for Guaranteed Electricity Supply (Official Gazette no. 20/19)*, taking the prices on the HUDEX into account.

In February 2022, the HERA adopted the *Methodology for Setting Tariffs for Guaranteed Electricity Supply (Official Gazette no. 20/22)*, and in March 2022, it adopted new tariff items for guaranteed electricity supply.



In addition to this, the HERA introduced a supply charge with a fixed monthly amount for non-household final customers on the guaranteed supply, as the same principle is applied by market suppliers.

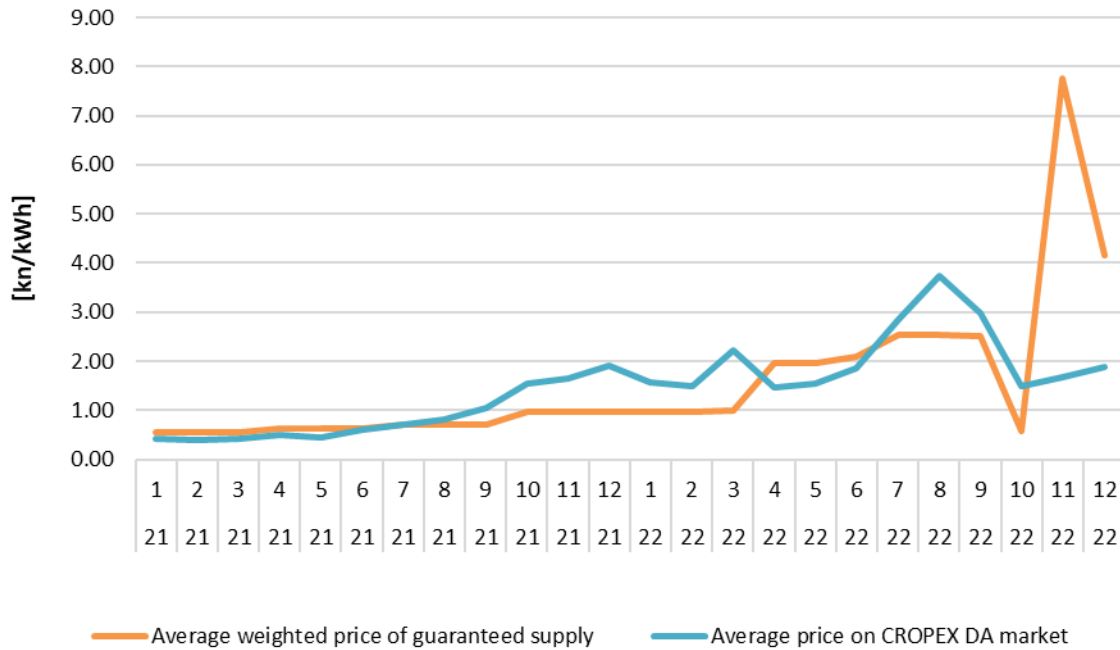


Figure 4.4.3 The average weighted price of guaranteed supply and prices on the CROPEX day-ahead market in 2021 and 2022

Figure 4.4.4 shows the change in the share of guaranteed electricity supply compared to consumption from the non-household consumption category, as well as the change in the number of billing metering points on the guaranteed supply.

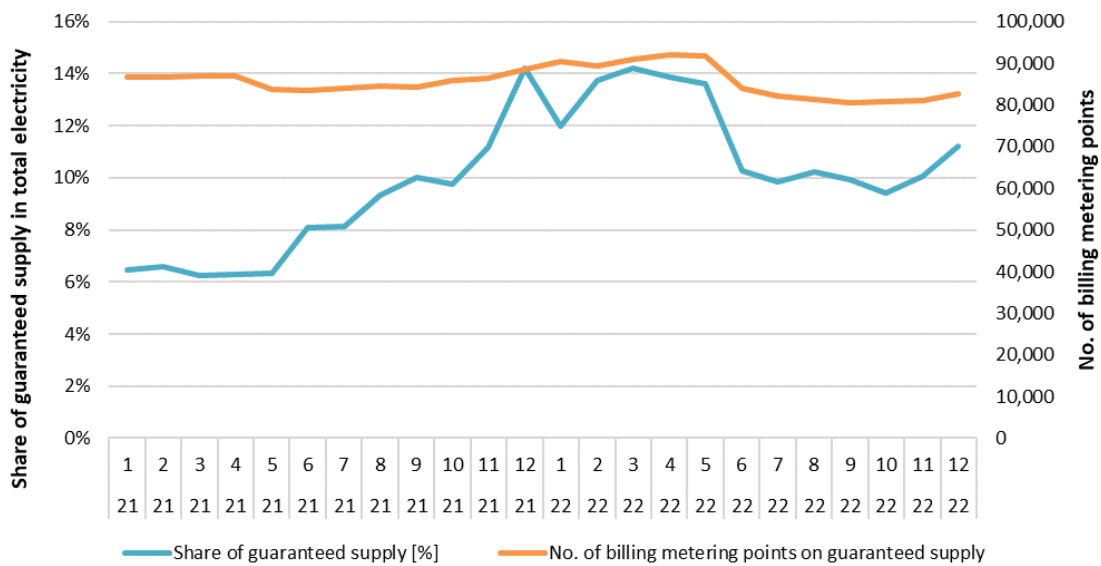


Figure 4.4.4 Share of the guaranteed supply in the total electricity in the non-household consumption category; number of billing metering points on the guaranteed supply in 2021 and 2022



## Retail market in 2022

There were no regulated prices on the retail electricity market until 1 October 2022, with the exception of guaranteed supply, which was explained above.

Of the total electricity sold to households in 2022, 89% was within the universal service, while the share of guaranteed supply in the non-household category amounted to 11% (Figure 4.4.5). The share of HEP d.d.'s suppliers (HEP-Opkrba d.o.o. and HEP ELEKTRA d.o.o.) in the supply to all customers in 2022 amounted to 95%, which is a 5% jump compared to 2021.

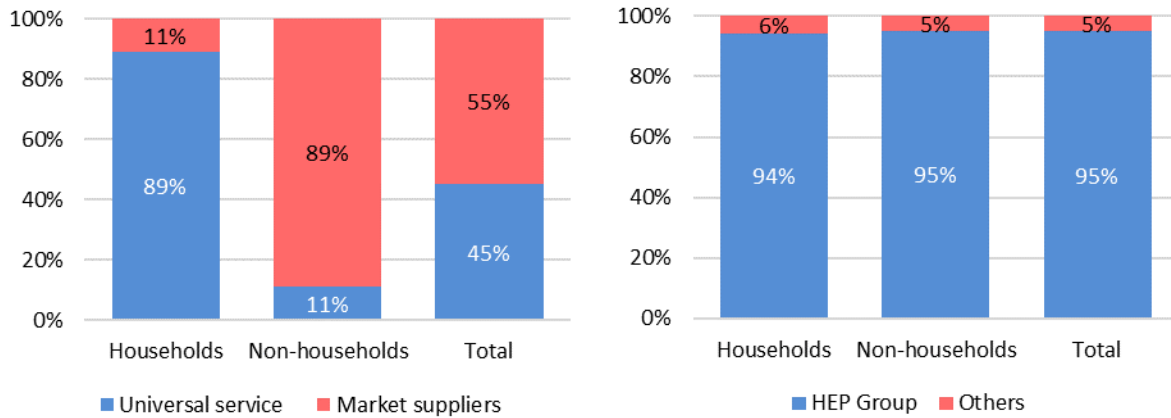


Figure 4.4.5 Proportions of energy sold to household and non-household final customer categories in 2022

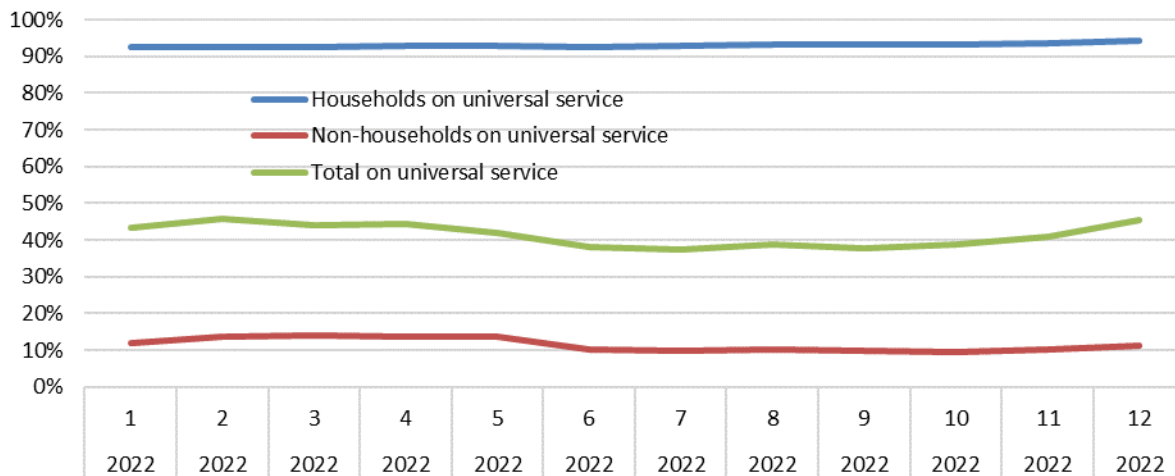


Figure 4.4.6 Shares of electricity in the public service during 2022

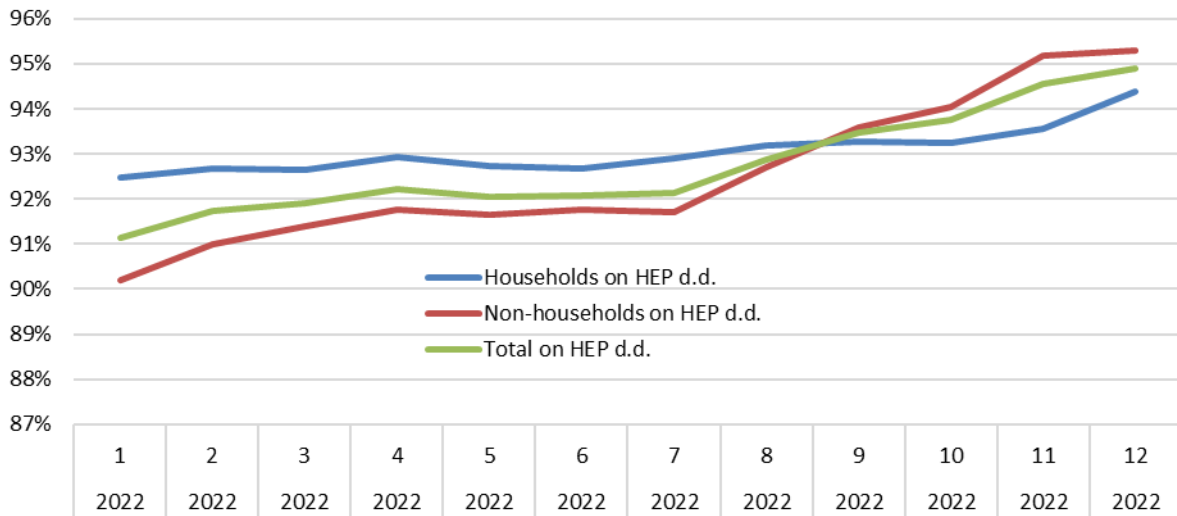


Figure 4.4.7 Shares of electricity of HEP d.d. during 2022



## Introduction of advanced electricity meters

According to the **Energy Act**, HEP-ODS sets out the technical requirements and determines the costs of introducing advanced meters and the mass roll-out of advanced metering systems and communicates these requirements to the HERA. The HERA then performs a cost-benefit analysis and obtains the opinion of the representatives of consumer protection bodies. The minister responsible for energy in turn sets out a programme of measures for introducing smart meters for final customers. The **Electricity Market Act**, which entered into force in late 2021, similarly defines the framework for the introduction of advanced meters. According to this framework, the minister responsible for the energy sector decides to introduce the advanced metering system in the Republic of Croatia on the basis of the HERA's economic assessment of all the long-term costs and benefits of such a system, wherein the basis for this economic assessment (including the proposed form of the advanced metering system and the time-frame for its introduction) are ensured by the distribution system operator.

At the beginning of 2022, the HERA launched a study that is the basis for an economic assessment of all the long-term costs and benefits of advanced meters and systems for their networking, and based on the results of that study, it will perform the said economic assessment in 2023. Regardless of the so-called "mass roll-out of advanced meters", which would follow the decision or plan for the introduction of advanced meters, HEP-ODS already plans to install a significant number of advanced meters that would replace the existing conventional meters.

Also, HEP-ODS installs advanced meters at the request of final electricity customers and when connecting network users with production plants and energy storages, i.e. in the case when the network user requests the possibility of supplying electricity to the network. In these cases, the meter installation cost is borne by the network user. Advanced meters are installed during certain meter replacements due to certification, malfunctions and other reasons and within pilot projects of advanced networks, whereby the cost is borne by HEP-ODS. The status of the installed types of meters at the end of 2022 is shown in Table 4.4.7.

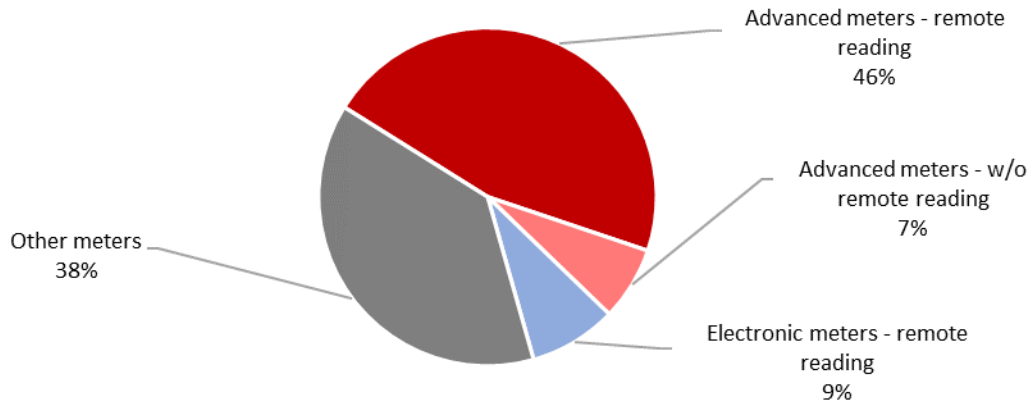
Table 4.4.7 Status of the total number of installed advanced meters at the end of 2022

Final customer category	Advanced meters in the remote reading system	Advanced meters not in the remote reading system	Electronic meters that are not advanced, but are in the remote reading system	Other electricity meters	Total electricity meters
Medium voltage (MV)	2,506	8	7	1	2,522
Low voltage (LV) – Total	402,090	178,058	64,886	1,866,488	2,511,522
Non-household LV - Blue	14,634	2,951	1,450	20,195	39,230
Non-household LV - White	47,696	11,730	11,642	54,456	125,524
Non-household LV - Red	28,288	167	4,174	46	32,675
Public lighting LV	9,682	801	1,400	10,372	22,255
Households LV	301,790	162,409	46,220	1,781,419	2,291,838

Source: HEP-ODS



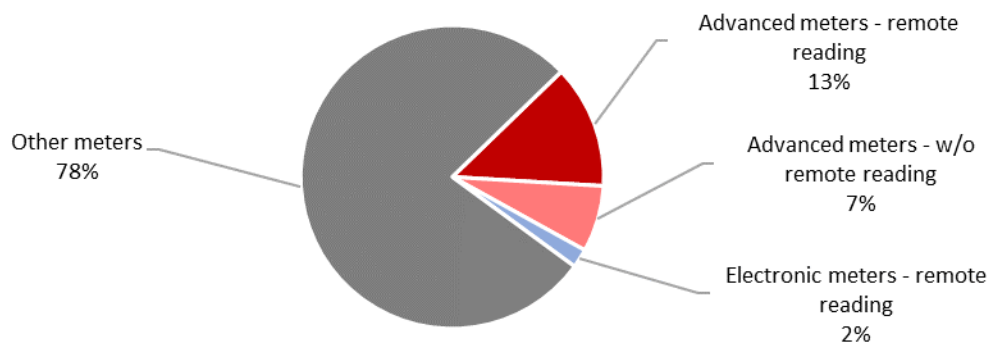
The share of installed advanced meters in the total number of installed meters at billing metering points (BMP) in the non-household category is 53% (Figure 4.4.8). This is a slight increase compared to the end of 2021, when this share was 50%. In the category “Non-household – Red”, which has the highest average consumption per billing metering point and is predominantly comprised of industry and other entrepreneurs with higher consumption, the percentage of BMPs equipped with advanced meters is 87%, while almost all the meters (99%) of this category are in the remote reading system.



Source: HEP-ODS

Figure 4.4.8 Share of the types of meters at the BMPs of non-household low-voltage final customers as of the end of 2022 (all non-household categories)

While the share of advanced meters at household BMPs was 13% at the end of 2021, at the end of 2022 it was 20%, of which 65% are in the remote reading system (Figure 4.4.9), which is a result of a strong increase in the number of advanced meters installed in households during 2022.



Source: HEP-ODS

Figure 4.4.9 Share of particular types of meters at the BMPs of household final customers at the end of 2022



The number and structure of meters installed in 2022 is given in table 4.4.8, which shows that in 2022 a total of 178,524 electricity meters were installed, of which 62% were advanced meters. In 2021, a total of 15,149 meters were installed for the non-household category, of which 71% were advanced meters; for the household category, a total of 163,375 meters were installed, of which 61% were advanced meters.

However, it must be noted that 49% of the newly installed advanced meters for the non-household category are not in the remote reading system. This percentage is even higher for the household category, namely 52%.

Table 4.4.8 Number of meters installed in the distribution system in 2022

Final customer category	Advanced meters in the remote reading system	Advanced meters not in the remote reading system	Electronic meters in the remote reading system	Other meters	Total meters
Medium voltage	164	0	0	0	164
Low voltage	55,295	55,681	1,971	65,413	178,360
Non-household LV - Blue	886	730	79	623	2,318
Non-household LV - White	3,458	2,682	444	2,264	8,848
Non-household LV - Red	2,104	58	106	10	2,278
Public lighting LV	500	172	57	812	1,541
Households LV	48,347	52,039	1,285	61,704	163,375
Total	55,459	55,681	1,971	65,413	178,524

Source: HEP-ODS

As in previous years, data on meter installation and the number of advanced meters installed shows that efforts must be undertaken to introduce the advanced meters into the remote reading system. One part of the difficulties in introducing meters into the remote reading system are technical problems with individual meters that are already outdated and malfunction or break down frequently. The second part of the difficulties is related to the systematic equipping of certain parts of the distribution network with advanced meters in order to make the installation of concentrators for reading the meters in the network more rational.

The final electricity customers and the distribution system operator would benefit from the so-called mass roll-out of advanced meters, i.e. the systematic installation of advanced meters for all final electricity customers. This installation of advanced meters (meters with a range of functionalities and remote reading), together with the accompanying systems for networking and managing the network of advanced meters (the so-called "introduction of advanced metering infrastructure"), brings multiple





benefits to the distribution system operator. More comprehensive monitoring of the distribution system (multiple billing measurement points) enables the more realistic measurement or determination of losses in the distribution network, the easier and faster location of fault points in the distribution network, as well as locating areas with increased losses. By analysing the data recorded by advanced meters, significant savings in non-technical losses (unauthorised consumption) are possible, and the costs associated with meter reading are also reduced.

The advanced meters also bring numerous advantages to the final electricity customers, including paying for the actual electricity consumed based on the monthly calculation instead of advance payments, and the possibility of contracting supply with dynamic pricing. In addition, final customers with insight into their consumption (in short intervals of 15 minutes) can make significant progress in optimising their electricity consumption, with all the effects that follow, such as reducing electricity costs, reducing the negative impact on the environment, etc. Also, advanced meters are a prerequisite for the active participation of final customers in the electricity market through consumption management (through suppliers or aggregators), the use of production facilities and energy storage and other mechanisms (electricity sharing, energy communities, collective active customer, etc.). It is precisely in terms of this active participation that the systematic installation of advanced meters would reduce or eliminate the need for final customers, who wish to be active customers, to specifically request the installation of an advanced meter and bear the costs associated with such a request.

The framework for the introduction of advanced metering infrastructure is determined by European legislation, as a result of which the provisions on the introduction of advanced metering infrastructure were transposed into the national legislation. In accordance with the **Energy Act** and the previous **Electricity Market Act** (Official Gazette no. 22/13 and 102/15), a cost-benefit analysis of the introduction of advanced meters and systems for their networking was prepared in 2017. Although the economic and financial cost-benefit analysis carried out at the time gave a positive result in terms of the cost-benefit ratio, the plan and programme of measures for the introduction of advanced meters for final customers was not adopted.

The provisions of *Directive (EU) 2019/944*, which concern the introduction of advanced metering infrastructure, were transposed into the national legislation in the **Electricity Market Act**, which was adopted at the end of 2021. Thus, Article 31 of the **Electricity Market Act** stipulates that the Minister responsible for energy will decide on the introduction of an advanced metering system in the Republic of Croatia based on an economic assessment of all the long-term costs and benefits of such a system for the market and individual final customers, which is prepared by the HERA based on data provided by the system operator.

The “Study of the basis for the economic assessment of all the long-term costs and benefits of the advanced metering system for the market and individual final customers in the Republic of Croatia” (hereinafter: the Study) was prepared on the basis of data provided by HEP-ODS, and it should be noted that it was prepared under conditions of great uncertainty, especially in relation to future trends in electricity prices (which is important for determining the future costs of HEP-ODS for the procurement of electricity to cover losses) and CO<sub>2</sub> prices, as well as the increasing inflation.

Three scenarios were analysed in the Study. The basic scenario that represents normal operation and two scenarios with the installation of advanced devices that aim to equip 100% of the final customers in the household and non-household categories with advanced meters. Both project scenarios aim to equip the entire non-household category with advanced meters in 2023 and 2024, while they differ in the rate of equipping the household category. In the first scenario, household meters are installed from 2023 to 2029, and in the second one from 2023 to 2026. In the Study, the economic and financial indicators of the cost-benefit analysis showed that the introduction of the advanced metering system in the Republic of Croatia is profitable. As in any cost-benefit analysis, a sensitivity analysis of individual parameters and a risk analysis were carried out, whereby the major risks of the introduction of



advanced meters were identified in the implementation time and in the assessment of the investment and operating costs. Regarding costs, it is necessary to point out that determining the parameters for the cost-benefit analysis was demanding in 2022 due to the uncertainties created by the energy crisis (which makes it demanding and thankless to predict electricity price movements in the long-term) and the uncertainties related to the prices of goods and services, which are not only exacerbated by the energy crisis since the consequences of the disruptions in the global value chains due to the COVID-19 virus pandemic are still present.

It should be noted that the scenario that envisages equipping all final customers, both the non-household and household categories, by 2026 is based on the possibility of using funds from the NRRP. Specifically, within the subcomponent “C1.2. Energy transition for a sustainable economy” of the “Economy” component of the NRRP, investment C1.2. R1-I1 “Revitalization, construction and digitisation of the energy system and supporting infrastructure for the decarbonisation of the energy sector” is relevant, within which part of the funds is earmarked for the financing of the advanced metering infrastructure. In accordance with the NRRP, it is planned to invest almost HRK 1.3 billion in the modernisation of the distribution system, of which over HRK 600 million of grants are planned to be invested in the modernisation and development of the advanced network (including advanced meters and the development of a smart network). Preparations for the use of these grants are currently underway. As financial resources will be allocated through the NRRP until the end of June 2026, the time period for the implementation of the second scenario until June 2026 has been determined accordingly. The rate of installation of advanced meters and the impact of related capital and operating costs and installation on tariff items for electricity distribution will depend on the introduction of advanced metering infrastructure and the share of grants from the NRRP, among other factors.

Regarding the short deadlines for the use of the NRRP funds and the fact that the installation time plan represents a big risk according to the Study, it is necessary to highlight the observations related to the current state of installing meters. Namely, regardless of the installation that would follow the economic assessment and the Minister's decision on the introduction of advanced metering infrastructure, HEP-ODS is already planning to equip a significant number of final customers with advanced meters, namely approximately 90% of final customers in the household category by 2032 and 100% of final customers in the non-household category until 2024. This approach, which was positively evaluated in the Study, is a consequence of the increasing number of meters that are outdated and business decisions in the direction of improving the service quality.

Traditionally, the high quantity of the metering data allows good insight into the state of the electricity distribution network, as well as managing the distribution network on levels not previously possible. At the same time, in the context of the development of the electricity market and new energy activities, additional functions are enabled for final customers and aggregators through the measurements and functionalities provided by advanced meters. However, based on the same data, it is possible to offer services related to their electricity consumption to the final customers, including active participation in the electricity market, and energy or other types of services. In this regard, additional equipment for smart homes and alternative solutions for electricity measurement and consumption management, primarily based on the IoT (Internet of Things), are increasingly being used, whereby such solutions or devices are aimed at measurements as close as possible to real-time. For this reason, it is in the interest of electronic communications operators, as well as other businesses, to impose themselves (take over the metering service) or intervene (with additional devices) in the collection and processing of metering and other data related to the use of electricity by final electricity customers. The establishment of parallel data collection using devices that connect to local computer networks (e.g. home Wi-Fi) is especially pronounced. Therefore, it is necessary to continuously monitor the method of the collection, processing and storage of measurement data, as well as the competence over meters and measurement data.



## Overview of the movement of retail and wholesale electricity prices in Croatia

The base wholesale price on CROPEX in 2022 grew 2.4 times compared to 2021 (Table 4.4.9).

Table 4.4.9 Average annual price on CROPEX from 2018 to 2022

	2018	2019	2020	2021	2022
CROPEX base wholesale price [HRK/kWh]	0.39	0.37	0.29	0.86	2.05

Source: market suppliers

On the other hand, in the period from 2018 to 2022, as can be seen in the next chapter, the price of electricity in the universal service remained unchanged, and the average annual price for the non-household final customer grew by about 10% for high and medium voltage, and by about 2% for low voltage.

The sharp rise in wholesale electricity prices on the electricity exchanges does not immediately affect all the final customers on the retail market. This is why suppliers procure electricity in the long-term, thus protecting the procurement side from price risk, while simultaneously concluding long-term agreements with final customers, for whom prices do not change during the term of the agreement. For example, on the HUDEX, it is possible to protect oneself from price risk for the upcoming period of several years by purchasing the offered quarterly and annual financial derivatives (<https://hudex.hu/en/market-data/power/daily-data#year>). After the expiry of such agreements, final customers either end up in the public service or conclude agreements on the basis of new offers received from market suppliers.

From 1 October 2022, the retail prices of electricity paid by end-customers have become regulated (except in the calculation of VAT) by the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, and the prices that final customers have agreed on with their suppliers do not apply unless the agreed prices are lower than prescribed. Suppliers outside HEP d.d. have the right to compensation for the difference between the price agreed with the customers and the price prescribed by the *Regulation*.

During 2022, three suppliers offered contracts with dynamic electricity pricing, and 60 GWh was billed for 1,054 billing metering points based on such contracts. For such contracts, the wholesale hourly price from the day-ahead electricity exchange is directly reflected each month in the retail price of electricity.



## Observations on the development of the retail market in 2022

In 2022, a total of seven suppliers were active on the retail market.

Non-household final customers whose long-term price-fixed supply contracts expired while wholesale prices were high were exposed to market offers for electricity at significantly higher prices. More of the large non-household final customers ended up on guaranteed supply than in the previous years. This indicates that some non-household final customers opted for electricity prices in the guaranteed supply rather than choosing the prices market suppliers were able to offer.

With the corresponding change in the amount of the tariff items, which is related to the change in the prices of wholesale products, it is expected that non-household final consumers will leave the guaranteed supply and switch to market suppliers. Legally limiting the retail prices of market suppliers, without taking into account wholesale prices, could lead to suppliers exiting the market and their final customers switching to guaranteed and universal supply, and the cost of purchasing electricity for these final customers would shift to the guaranteed and universal supplier.

The sudden increase in electricity prices during 2021 did not impact all household and non-household final customers equally. The average household final customer in 2021 was not affected at all by the increase in wholesale prices. On the other hand, the sudden increase in wholesale prices of electricity did not affect all non-household final customers equally. Non-household final customers who had a valid long-term fixed-price electricity agreement during 2021 did not feel the impact of the increase in wholesale electricity prices in their bills. During 2022, some of these final customers were hit with the high prices of electricity offered to them after their supply agreements expired.

In March 2022, the Government of the Republic of Croatia adopted a package of social measures<sup>68</sup> to protect and help vulnerable household final customers in terms of the availability of electricity and paying for the expenses of electricity. This package consists of:

- *Regulation amending the Regulation on criteria for attaining the status of a vulnerable energy consumer in networked systems (Official Gazette no. 31/22),*
- *Regulation on the monthly amount of charges for vulnerable energy consumers, the manner of participating in settling the costs of energy for beneficiaries of compensation and the actions of the Croatian Institute for Social Work (Official Gazette no. 31/22),*
- *Decision on the implementation of measures to reduce the impact of the increase in energy prices on social service providers in the Republic of Croatia (Official Gazette no. 31/22),*
- *Decision on the payment of a one-off cash benefit to pension beneficiaries in order to mitigate the consequences of the increase in energy prices (Official Gazette no. 31/22), and*
- *Decision to adopt Amendments to the Plan for the use of financial assets obtained from the sale of emission units by auction in the Republic of Croatia from 2021 to 2025 (Official Gazette no. 84/19).*

At its 6 May 2022 session, the Government of the Republic of Croatia adopted the *Decision amending the Decision on the payment of a one-off cash benefit to pension beneficiaries in order to mitigate the consequences of the increase in energy prices* (Official Gazette no. 53/22), which expanded the one-off cash benefit to pensioners with somewhat larger pensions (to HRK 4,100 inclusive from HRK 4,000 inclusive).

<sup>68</sup> <https://vlada.gov.hr/sjednice/107-sjednica-vlade-republike-hrvatske-35029/35029>, accessed on 15 April 2022



The Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, which, due to the disturbances on the domestic energy market, introduced special measures for electricity trade, the method and conditions of setting prices for certain categories of electricity customers, supervision over the implementation of prices determined by this *Regulation*, and special conditions for performing energy activities. The special measures are temporary, and are applicable in the period from 1 October 2022 to 31 March 2023. These measures set prices for certain categories of electricity customers depending on consumption for the period from 1 October 2022 to 31 March 2023.

In 2022, the number of temporary disconnections due to the non-payment of electricity charges for household customers was 20,481, and for non-household customers 5,060.

Market suppliers reacted in different ways. Some deliberately terminated all contracts with household customers and smaller non-household customers. Some of the suppliers applied the strategy of not offering new contracts to certain categories of customers after the expiration of the existing contracts. Some of the suppliers sent letters about price increases, thus securing either the market price or contract terminations. A consequence was the switching of a large number of final customers to suppliers from the HEP Group (HEP Elektra d.o.o. and HEP-Opkrba d.o.o.), which led to the situation that at the end of 2022, approximately 95% of final customers used the services of these suppliers.

The Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, which entered into force on 1 April 2023, which redefined the special measures for electricity trade, the method and conditions of setting prices for certain categories of electricity customers, supervision over the implementation of prices, and special conditions for performing energy activities for the next 6 months.



Table 4.4.10 shows the wholesale market development indicators in the Republic of Croatia from 2018 to 2022 for the household consumption category, and Table 4.4.11 for the non-household consumption category.

*Table 4.4.10 Retail market development indicators in the Republic of Croatia from 2018 to 2022 for the household consumption category*

Indicator	2018	2019	2020	2021	2022
Total electricity consumption [TWh]	6.09	6.2	6.1	6.5	6.5
Average number of billing metering points	2,215,296	2,209,224	2,227,106	2,287,501	2,291,807
Number of registered electricity suppliers	16	13	12	11	11
Number of active electricity suppliers	12	9	6	7	6
Share of the three largest suppliers by BMP [%]	99%	99%	99%	99%	100%
Number of suppliers with a market share >5%	2	2	2	3	2
Number of suppliers with a share of consumers >5%	2	2	2	2	1
Number of completed supplier switches	54,348	19,783	14,716	9,439	3207
Legal time limit necessary for supplier switch [days]	21	21	21	21	21
Average time necessary for supplier switch [days]	46	42	2.44	1.80	0.51
Number of electricity consumers supplied at a regulated price	0	0	0	0	0
HHI for sales	7,774	7,792	7,749	7,825	7,852
HHI for the number of BMPs	8,238	8,221	8,222	8,208	8,375
Number of temporary disconnections due to non-payment	12,896	33,765	22,217	22,365	20,481
Average price of electricity (universal supply) [HRK/kWh]	0.45	0.45	0.45	0.45	0.50
Share of the three largest suppliers by energy [%]	99.07	99.21	99.20	99.23	99.37



*Table 4.4.11 Retail market development indicators in the Republic of Croatia from 2018 to 2022 for the non-household consumption category*

Indicator	2018	2019	2020	2021	2022
Total electricity consumption [TWh]	10.02	10.29	9.47	9.71	10.3
Number of final customers	218,313	219,792	219,785	217,451	226,402
Number of registered electricity suppliers	16	13	12	11	11
Number of active electricity suppliers	12	9	7	8	7
Share of the three largest suppliers by energy [%]	94.72	97.23	93.60	92.6	94.5
Number of suppliers with a market share >5%	2	2	2	2	2
Number of suppliers with a share of consumers >5%	3	3	3	3	2
Number of completed supplier switches	31,384	20,857	18,760	13,936	46,658
Legal time limit necessary for supplier switch [days]	21	21	21	21	21
Average time necessary for supplier switch [days]	6	4	0.57	0.16	0.00
Number of electricity consumers supplied at a regulated price <sup>69</sup>	87,797	88,494	86,295	88,549	82,730
HHI for sales	6,627	7,172	6,282	6,432	6,709
HHI for the number of BMPs	3,915	4,097	3,994	4,020	4,659
Number of temporary disconnections due to non-payment	4,364	8,313	5,457	4,396	5,060

<sup>69</sup> This is guaranteed electricity supply.



### 4.4.3. Electricity prices for final customers

#### Electricity prices in the Republic of Croatia in 2022

As of 1 April 2022, there was an increase in the price of electricity, as well as changes in the tariff items for electricity transmission and electricity distribution. At the annual level, this is an increase in the final selling price of electricity for the household category on universal supply<sup>70</sup> (approximately 90% of all customers from the household category) of 8.1% for the tariff model Blue, 10.8% for White, 7.7 % for Red and 7.9% for Black.

In September 2022, the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, which applied to the period from the beginning of October 2022 to the end of March 2023. Figure 4.4.10 shows the restriction of prices for the household and non-household categories depending on the semi-annual consumption based on *the Regulation*, which was valid in the fourth quarter of 2022 and the first quarter of 2023.

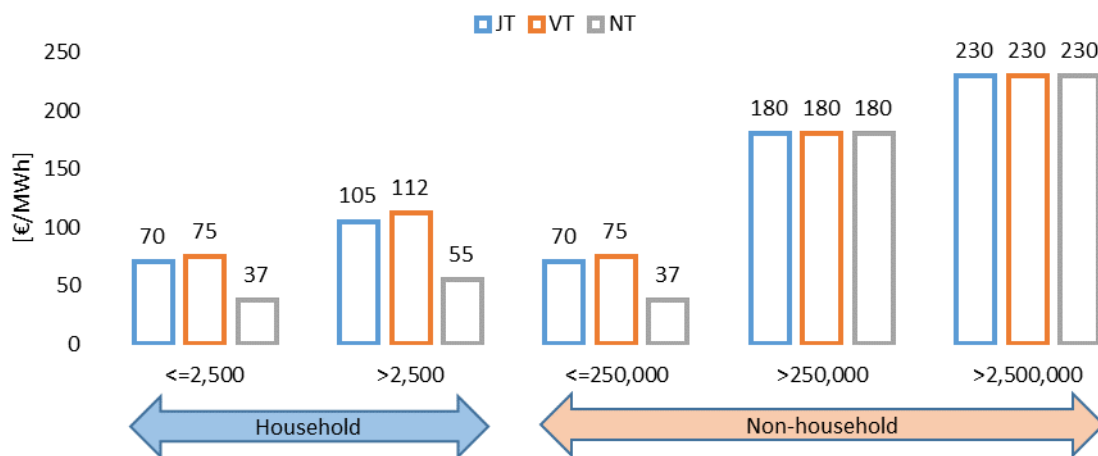


Figure 4.4.10 Restriction of electricity prices for household and non-household final customers depending on semi-annual consumption based on the Regulation on Eliminating Disturbances on the Domestic Energy Market

Table 4.4.12 shows the average electricity prices (excluding the network usage charge, other charges, and taxes) for final customers on the electricity market (non-household customers) and for final customers within the universal supply (households) from 2018 to 2021.

<sup>70</sup> The final selling price of electricity includes transmission and distribution network charges and the price of energy for the final customers, as well as other taxes and charges



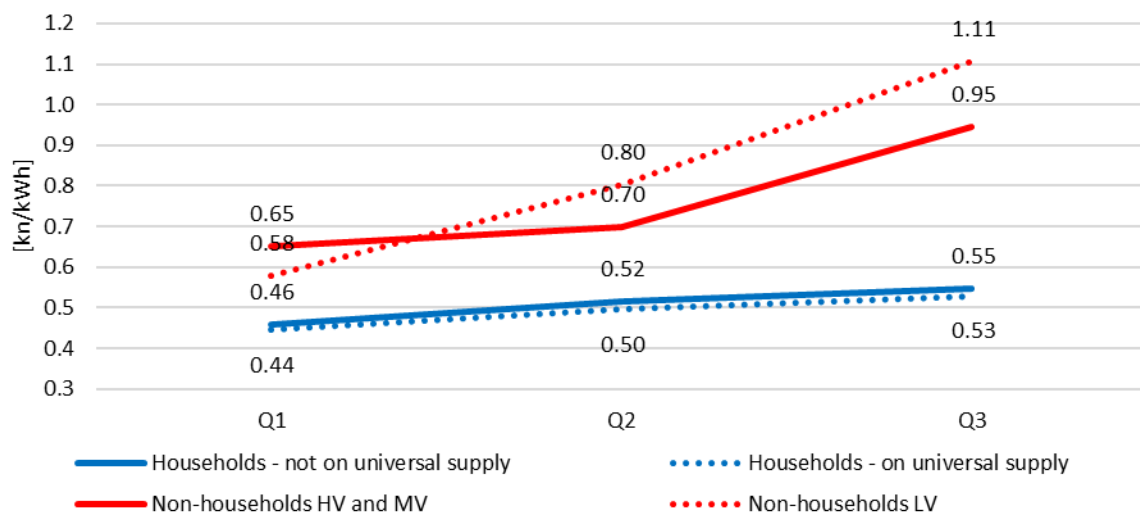


Table 4.4.12 Average electricity prices for final customers on the market (outside the public service) and within the universal service (households) in the period from 2018 to 2022 [HRK/kWh]

Type of supply	2018	2019	2020	2021	2022 <sup>71</sup>
Market (high and medium voltage)	0.32	0.39	0.41	0.45	0.77
Market (low voltage, non-household)	0.35	0.42	0.43	0.44	0.85
Universal supply (households)	0.45	0.45	0.45	0.45	0.49

Source: market suppliers

Figure 4.4.11 shows the average electricity prices during the first three quarters of 2022 for the household category and the non-household category.



Source: Suppliers

Figure 4.4.11 Average electricity prices during the first three quarters of 2022 for the household category and the non-household category

The average total selling prices for final customers<sup>72</sup> by consumption category and voltage from 2018 to 2022 are shown in Table 4.4.13. Prices are calculated on the basis of average prices determined by applying tariff items for electricity transmission and tariff items for electricity distribution, as well as according to the supplier data.

<sup>71</sup> Average price in the first three quarters before the price restrictions pursuant to the Regulation on Eliminating Disturbances on the Domestic Energy Market

<sup>72</sup> The total selling price includes transmission and distribution network charges and the price of energy.



Tablica 4.4.13 Average total selling prices of electricity for final customers from 2018 to 2022 [HRK/kWh]

Final customer category	2018	2019	2020	2021	2022 <sup>73</sup>
Medium-voltage customers	0.54	0.58	0.60	0.63	0.97
Low-voltage customers – non-household	0.70	0.75	0.77	0.79	1.19
Low-voltage customers – households	0.78	0.78	0.79	0.79	0.84

Source: HEP-ODS, suppliers on the market

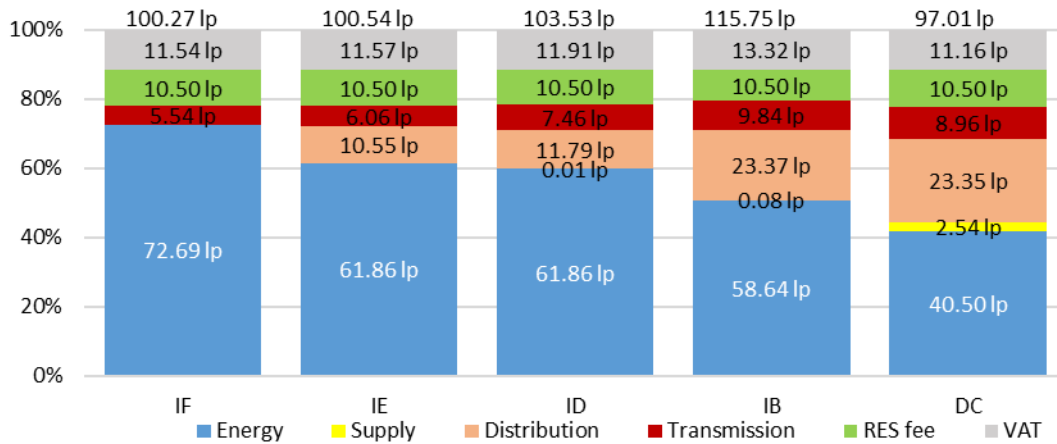
Table 4.4.14 shows the characteristics of typical final electricity customers in the Republic of Croatia by EUROSTAT consumption category, while Figures 4.4.12 to 4.4.15 show the structure of the final electricity selling price for typical final customers, including all charges and taxes, by EUROSTAT consumption category and quarters in 2022.

Table 4.4.14 Characteristics of typical electricity final customers in the Republic of Croatia in 2022

Type of final customer	Consumption category designation	Consumption [MWh/year]	Settled peak active power [MW]	Consumption ratio HT/LT <sup>74</sup> [%]	Category by tariff system
Very large industry	<i>IF</i>	100,000	15.00	51/49	HV Non-household - White
Large industry	<i>IE</i>	24,000	4.00	63/37	MV (35 kV) Non-household - White
Medium industry	<i>ID</i>	2,000	0.50	63/37	MV (10 kV) Non-household - White
Medium business	<i>IB</i>	150	0.05	68/32	LV Non-household - Red
Medium households	<i>DC</i>	3.5		66/34	LV Household - White

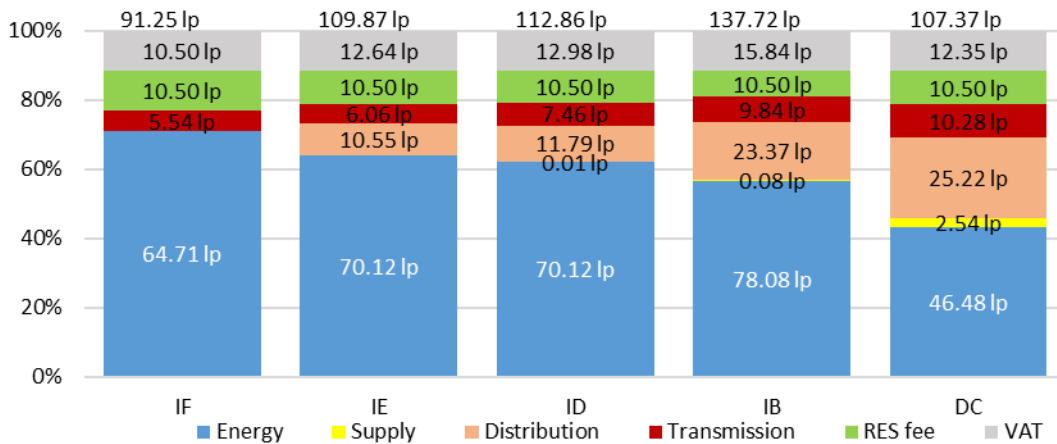
<sup>73</sup> Average total selling price in the first three quarters before the price restrictions pursuant to the Regulation on Eliminating Disturbances on the Domestic Energy Market

<sup>74</sup> The ratios are taken from the chapter "4.4.1 Basic features of electricity consumption".



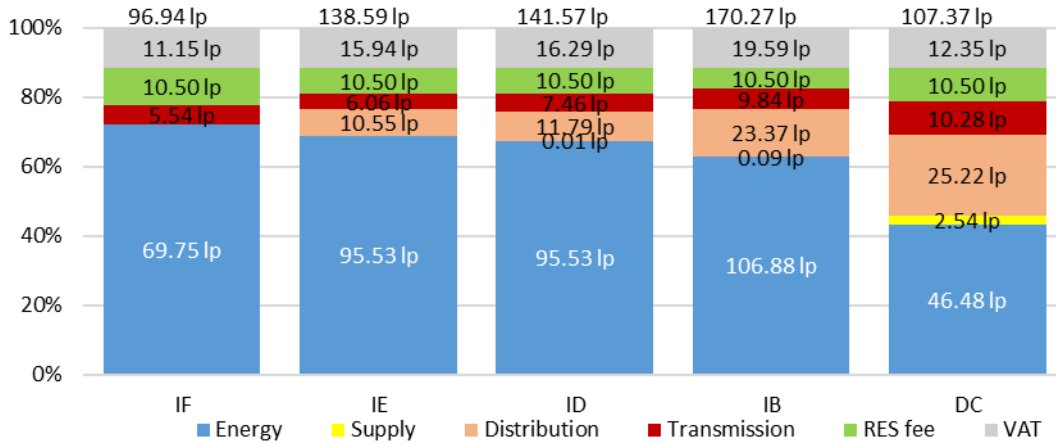
Source: HOPS, HEP-ODS, HEP ELEKTRA, suppliers on the market; Processed by: HERA

Figure 4.4.12 Structure of the final selling price of one kWh of electricity for typical final customers in the Republic of Croatia according to EUROSTAT consumption categories in Q1 2022



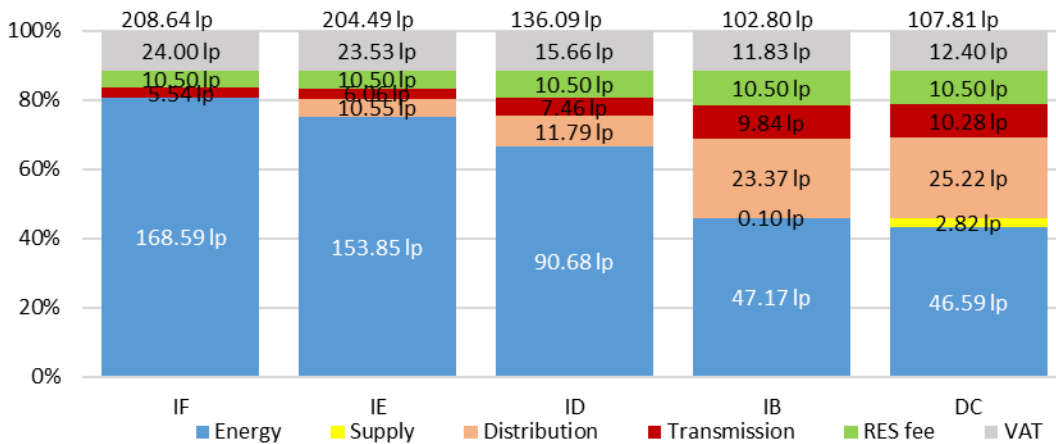
Source: HOPS, HEP-ODS, HEP ELEKTRA, suppliers on the market; Processed by: HERA

Figure 4.4.13 Structure of the final selling price of one kWh of electricity for typical final customers in the Republic of Croatia according to EUROSTAT consumption categories in Q2 2022



Source: HOPS, HEP-ODS, HEP ELEKTRA, suppliers on the market; Processed by: HERA

Figure 4.4.14 Structure of the final selling price of one kWh of electricity for typical final customers in the Republic of Croatia according to EUROSTAT consumption categories in Q3 2022

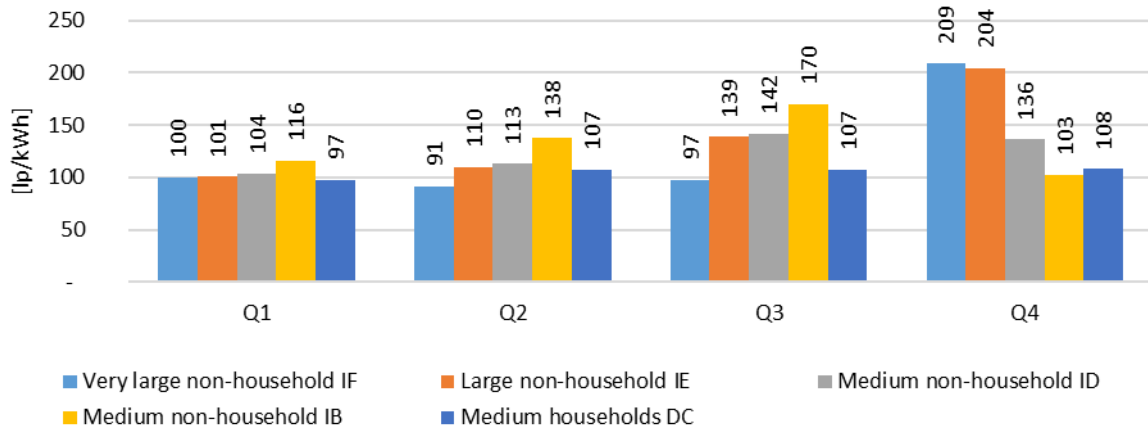


Source: HOPS, HEP-ODS, HEP ELEKTRA, suppliers on the market; Processed by: HERA

Figure 4.4.15 Structure of the final selling price of one kWh of electricity for typical final customers in the Republic of Croatia according to EUROSTAT consumption categories in Q4 2022

It should be noted that for the fourth quarter (Figure 4.4.15), it was assumed that the typical final customer concluded a contract valid from 1 October 2022, and the prices were determined in accordance with the customer’s quarterly consumption (a quarter of the annual consumption) and the price and consumption restrictions in accordance with the *Regulation on Eliminating Disturbances on the Domestic Energy Market* (see Figure 4.4.10).

Figure 4.1.16 shows the changes in the final selling price of one kWh of electricity for typical final customers in the Republic of Croatia by quarters in 2022 according to EUROSTAT consumption categories. For the fourth quarter, the previously mentioned note on figure 4.4.15 applies.

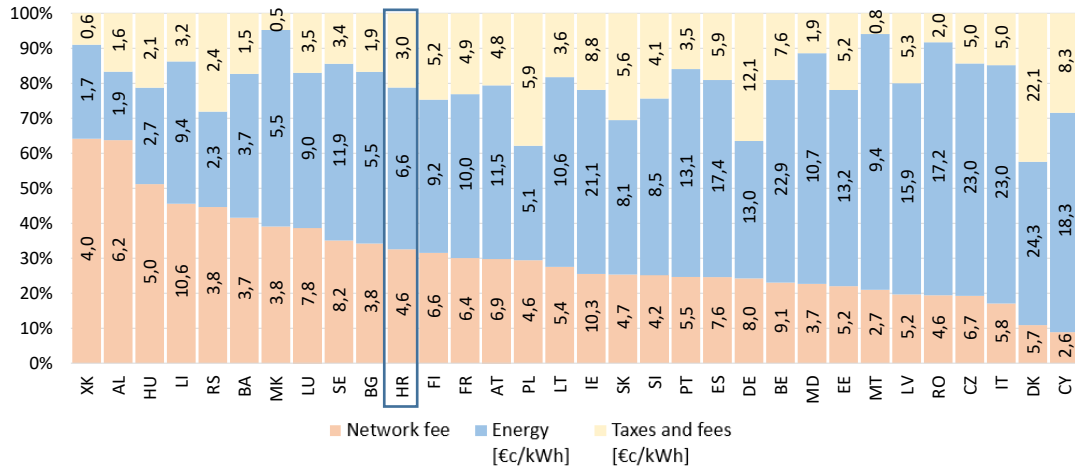


Source: HOPS, HEP-ODS, HEP ELEKTRA, suppliers on the market; Processed by: HERA

Figure 4.4.16 Changes in the final selling price of one kWh of electricity for typical final customers in the Republic of Croatia by quarters in 2022 according to EUROSTAT consumption categories

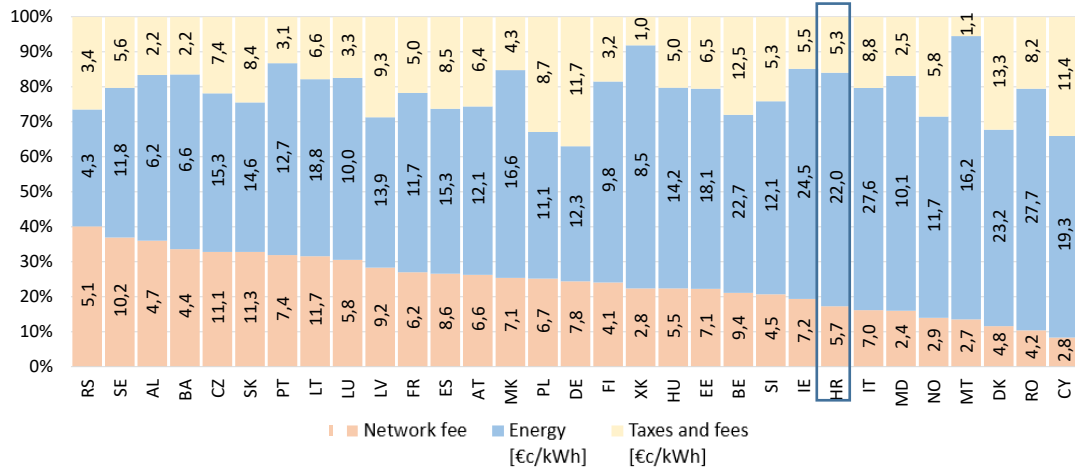
### Electricity prices in European countries in 2022

Figures 4.4.17 to 4.4.23 show the structure of the total price of electricity in European countries for final customers in EUROSTAT's consumption categories DC, IA, IB, IC, ID, IE, and IF.



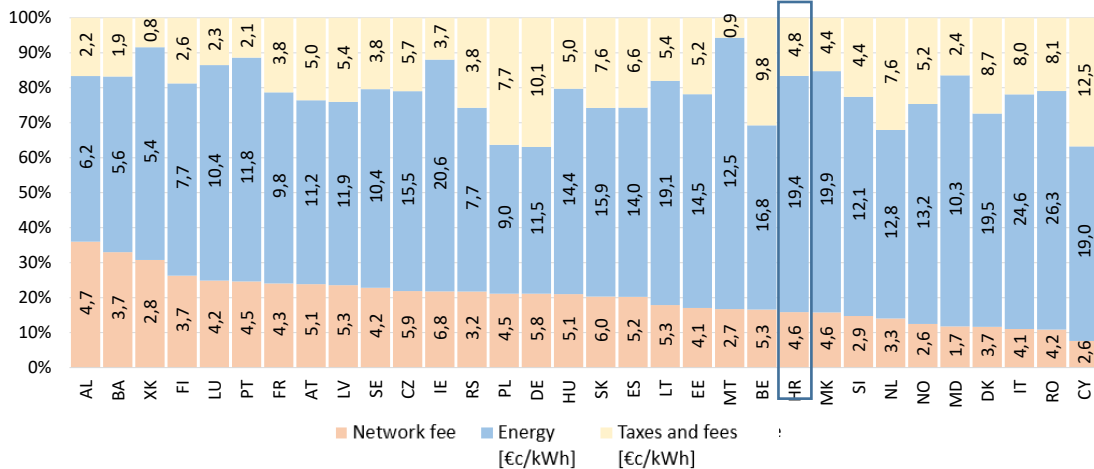
Source: EUROSTAT; data processing: HERA

Figure 4.4.17 Structure of the total electricity price in European countries for household final customers in the DC consumption category in 2022



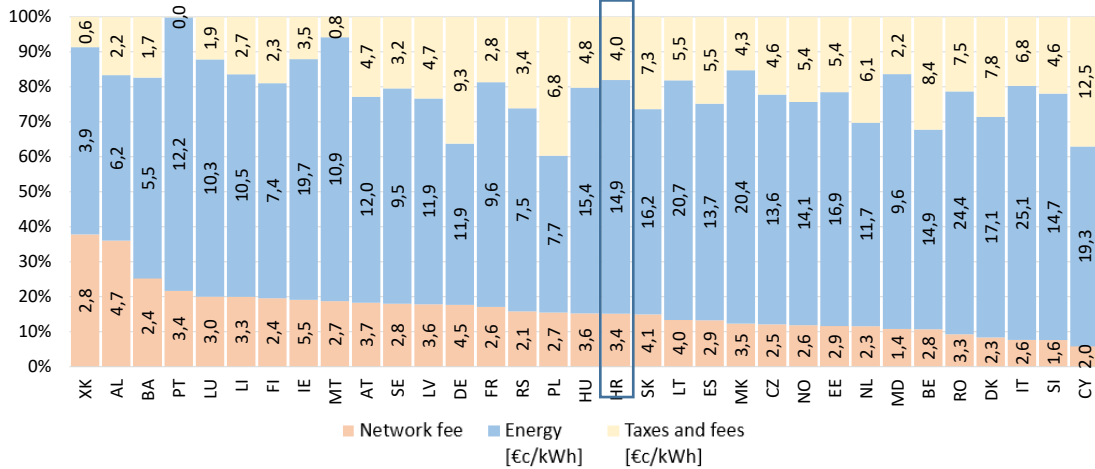
Source: EUROSTAT; data processing: HERA

Figure 4.4.18 Structure of the total electricity price in European countries for non-household final customers in the IA consumption category in 2022



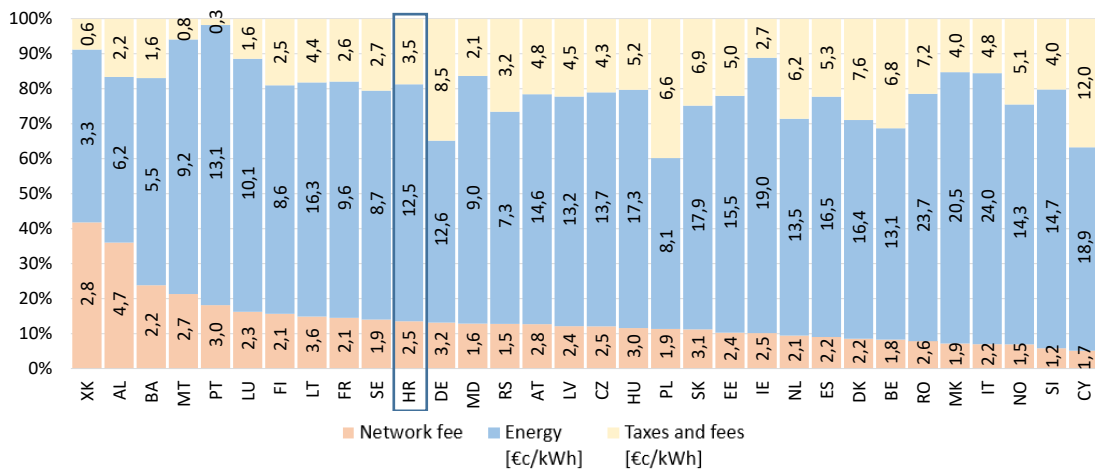
Source: EUROSTAT; data processing: HERA

Figure 4.4.19 Structure of the total electricity price in European countries for non-household final customers in the IB consumption category in 2022



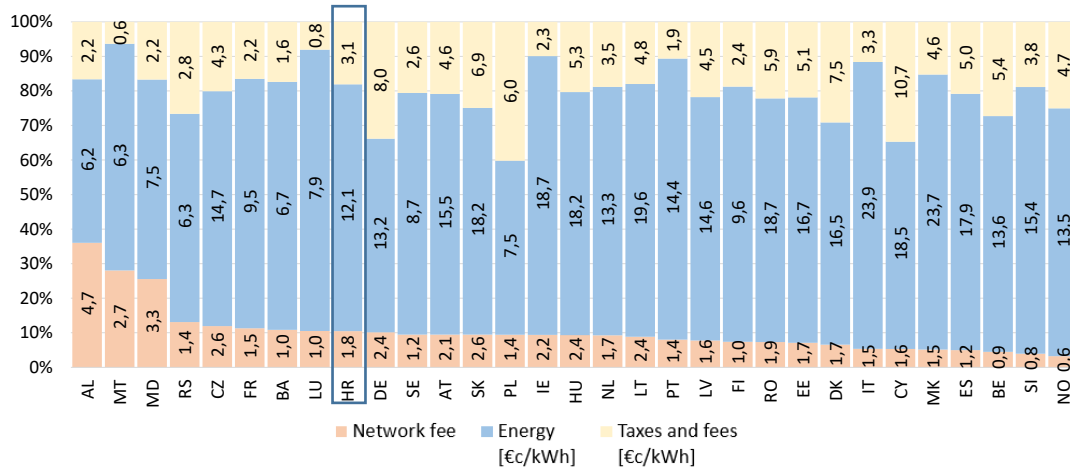
Source: EUROSTAT; data processing: HERA

Figure 4.4.20 Structure of the total electricity price in European countries for non-household final customers in the IC consumption category in 2022



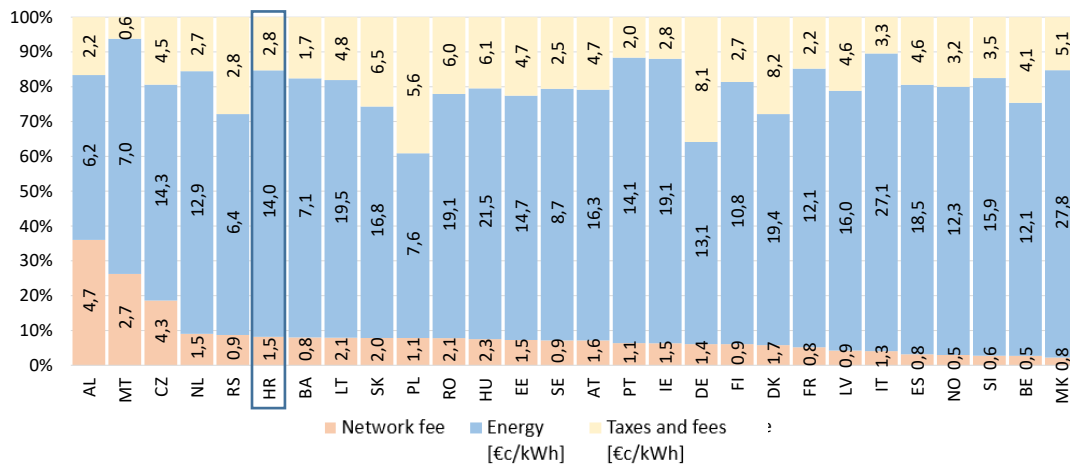
Source: EUROSTAT; data processing: HERA

Figure 4.4.21 Structure of the total electricity price in European countries for non-household final customers in the ID consumption category in 2022



Source: EUROSTAT; data processing: HERA

Figure 4.4.22 Structure of the total electricity price in European countries for non-household final customers in the IE consumption category (tariff model White MV) in 2022

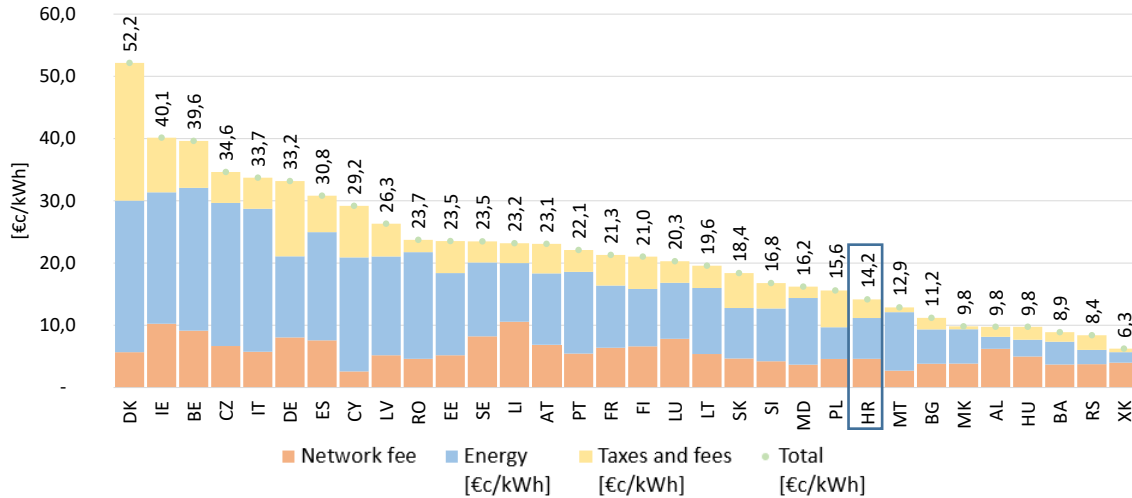


Source: EUROSTAT; data processing: HERA

Figure 4.4.23 Structure of the total electricity price in European countries for non-household final customers in the IF consumption category in 2022

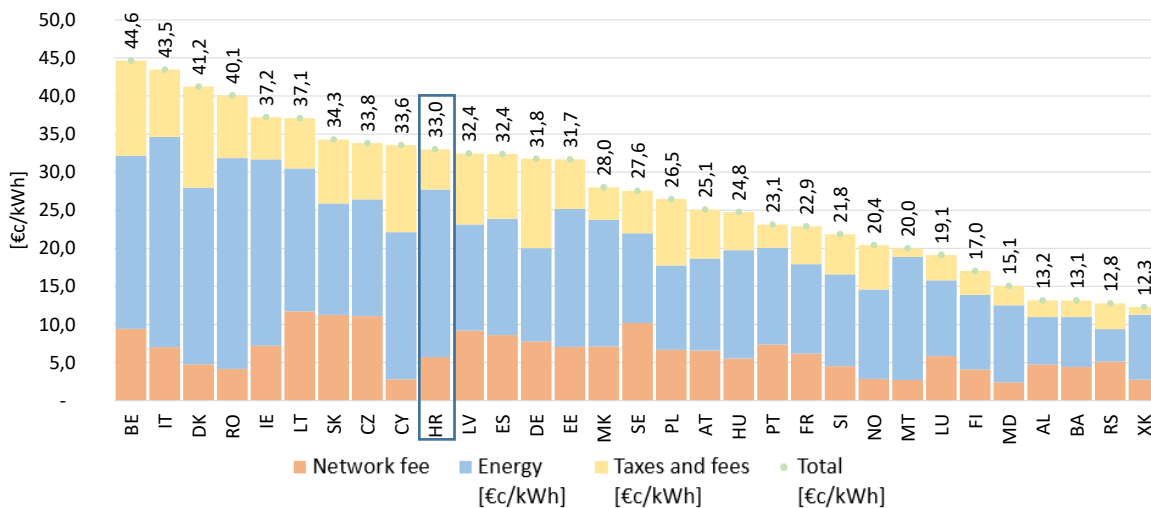
Figures 4.4.24 to 4.4.30 show the structure of the total price of electricity in European countries for final customers in EUROSTAT's consumption categories DC, IA, IB, IC, ID, IE and IF.





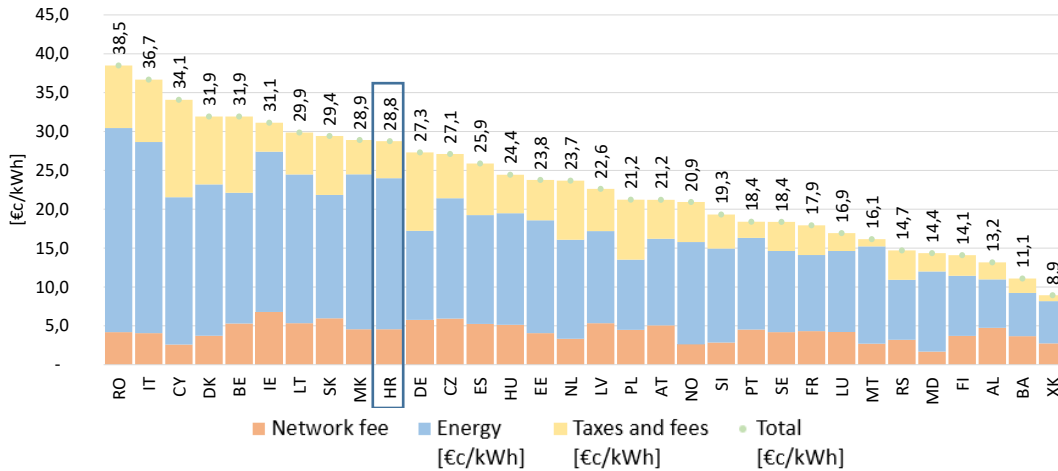
Source: EUROSTAT; data processing: HERA

Figure 4.4.24 Total electricity price in European countries for household final customers in the DC consumption category in 2022



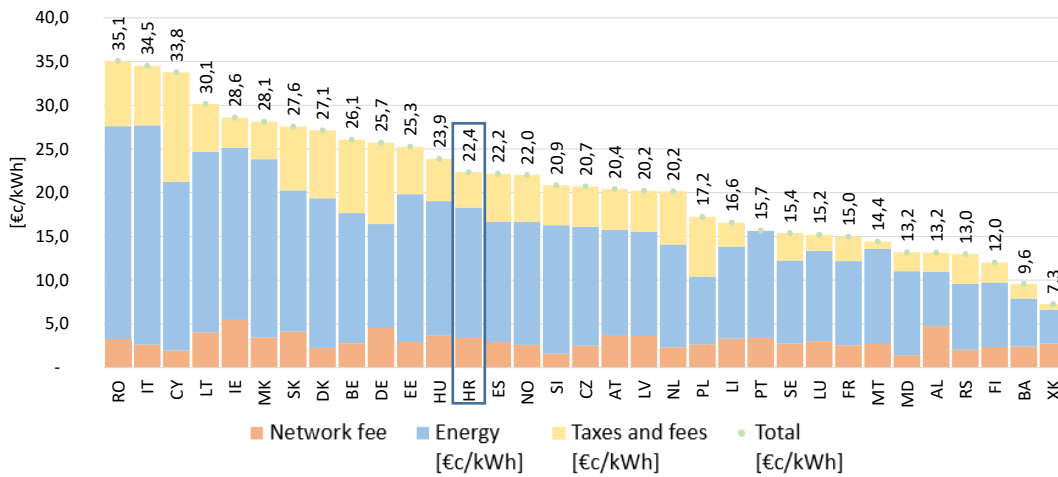
Source: EUROSTAT; data processing: HERA

Figure 4.4.25 Total electricity price in European countries for non-household final customers in the IA consumption category in 2022



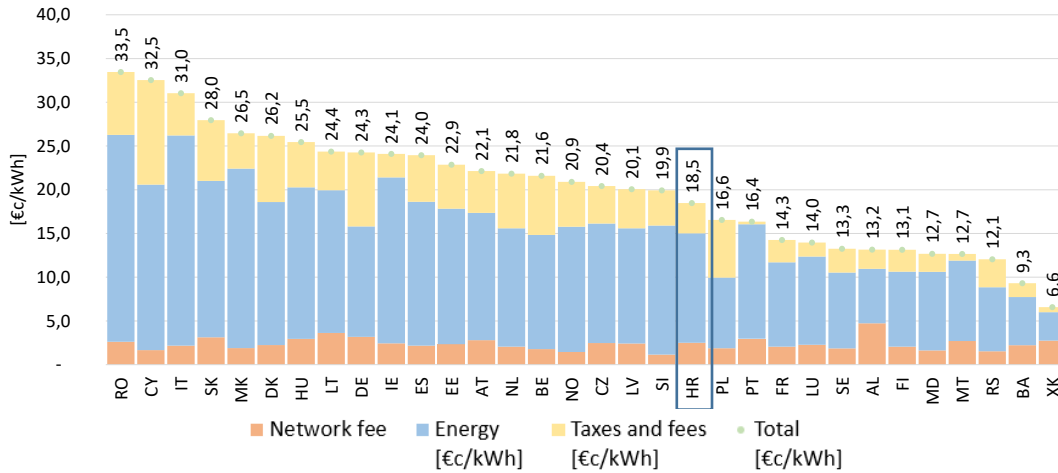
Source: EUROSTAT; data processing: HERA

Figure 4.4.26 Total electricity price in European countries for non-household final customers in the IB consumption category in 2022



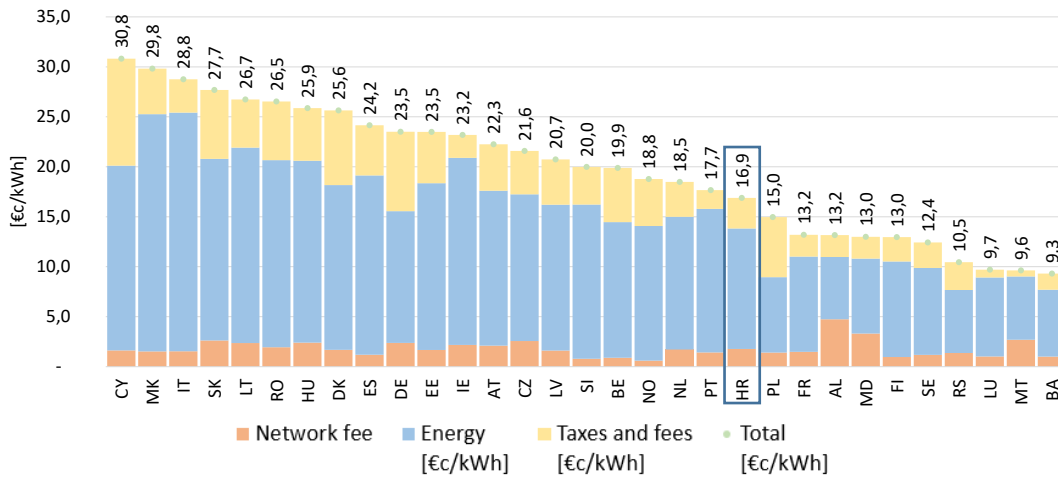
Source: EUROSTAT; data processing: HERA

Figure 4.4.27 Total electricity price in European countries for non-household final customers in the IC consumption category in 2022



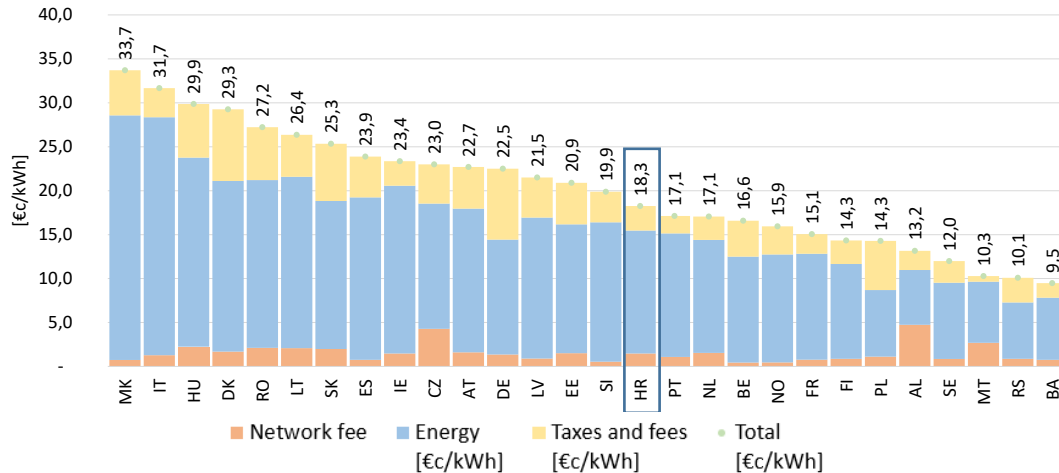
Source: EUROSTAT; data processing: HERA

Figure 4.4.28 Total electricity price in European countries for non-household final customers in the ID consumption category in 2022



Source: EUROSTAT; data processing: HERA

Figure 4.4.29 Total electricity price in European countries for non-household final customers in the IE consumption category in 2021



Source: EUROSTAT; data processing: HERA

Figure 4.4.30 Total electricity price in European countries for non-household final customers in the IF consumption category in 2022

## Observations on electricity prices for final customers in 2022

From 1 April 2022, there was a very limited increase in electricity prices within the framework of universal supply and grid tariffs (the total invoice for the average household increased by 10.8%). As their existing contracts stipulated, non-household customers remained fully exposed to price increases. Offers for new contracts were several times higher than previous ones. At the end of the year, some suppliers started to change their price lists for households as well. In September 2022, the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, which applies to the period from October 2022 to March 2023 inclusive. The prices were limited to a period of six months to the price level of electricity in universal supply and with the condition of a maximum semi-annual consumption (2,500 kWh household, 250,000 kWh business and 2,500,000 kWh industry). In April 2023, the aforementioned measures were extended with the new *Regulation* for the next six-month period. The consequences of the measures are, on the one hand, the protection of final customers from the impact of a large increase in wholesale prices, but on the other hand, HEP d.d. bears the brunt of the burden due to the largest market share. Suppliers also reacted in different ways. Some terminated contracts with customers from the household category and with smaller customers from the non-household category, others had a strategy of not offering contract extensions and thus gradually getting rid of final customers, and some started offering only contracts with dynamic prices.

### 4.4.4. Protection of network users and other subjects



## Submissions processed in the electricity sector in 2022

Table 4.4.15 shows the classification of submissions submitted by all subjects<sup>75</sup> and resolved by the HERA in the electricity sector in 2022, and Table 4.4.16 shows statistics on appeals and complaints submitted by network users<sup>76</sup> and resolved in the electricity sector.

*Table 4.4.15 Classification of submissions of all subjects resolved in the electricity sector in 2022*

Description	Number	Share
Appeal	17	2%
Complaint	593	56%
Inquiry	322	30%
Other submissions	125	12%
<b>Total:</b>	<b>1057</b>	

Source: HERA

*Table 4.4.16 Statistics on the appeals and complaints of network users resolved in the electricity sector in 2022*

Description	Number	Share
Records of grid users / electricity customers	94	13%
Loss of customer status / network usage rights	19	3%
Quality of electricity supply	30	4%
Unauthorised consumption	4	1%
Right to use property not owned by energy entities	16	2%
Supplier switching	6	1%
Connection	204	28%
Temporary grid disconnection	42	6%
Change in the contract/unit price of electricity	19	3%
Billing	241	33%

<sup>75</sup> Including network users, energy entities, legal representatives, media, foreign companies, administrative entities and others

<sup>76</sup> Network users are final customers from the household and non-household categories and producers



Termination of supply contracts and the conduct of sales representatives	7	1%
Other	40	6%
<b>Total:</b>	<b>722</b>	<b>100%</b>

Source: HERA

Most of the submissions resolved by the HERA in 2022 related to the amount of the invoice, which is probably related to the situation on the energy market, connection, mostly to the time of connection, and much less to the issuance of EES and EOTRP, and to recording network users or electricity customers, mostly relating to the change of ownership. Regarding the situation with energy prices on the European market, by the end of 2022, 19 complaints and appeals were resolved regarding the change of contractual provisions and unit prices of electricity.

## Operator and supplier reports in accordance with the Requirements for the Quality of the Electricity Supply

The transmission and distribution system operator, as well as electricity suppliers, are required to submit a quality of service report to the HERA for 2022 in accordance with the *Regulation on the Requirements for the Quality of the Electricity Supply*; they are also required to publish quality of service indicators for final customers for the previous year on their website once a year, thus enabling the systematic and transparent monitoring of the work of operators and suppliers in this important segment.

Based on the quality of service reports submitted by suppliers to the HERA in 2022 by 15 April 2022<sup>77</sup>, statistics were prepared for complaints received regarding the work of suppliers (Table 4.4.17).

Table 4.4.17 Statistics of complaints regarding the work of electricity suppliers in 2021 and 2022

Subject of complaint	Number of complaints	
	2021	2022
Unfair commercial practice	6	12
Contracts and sales	2,332	11,410
Initial connection	1	463
Disconnection due to late payment or non-payment (suspension of electricity supply)	907	1,525
Calculation, collection and debt claim proceedings	7,928	5,993
Tariff items	7	144

<sup>77</sup> Reports were submitted in a timely manner by E.ON Energija d.o.o., ENNA Opskrba d.o.o., GEN-i Hrvatska d.o.o., HEP Elektra d.o.o., HEP-Opkrba d.o.o. and MET Croatia Energy; Trade d.o.o. failed to submit a report by the prescribed date.



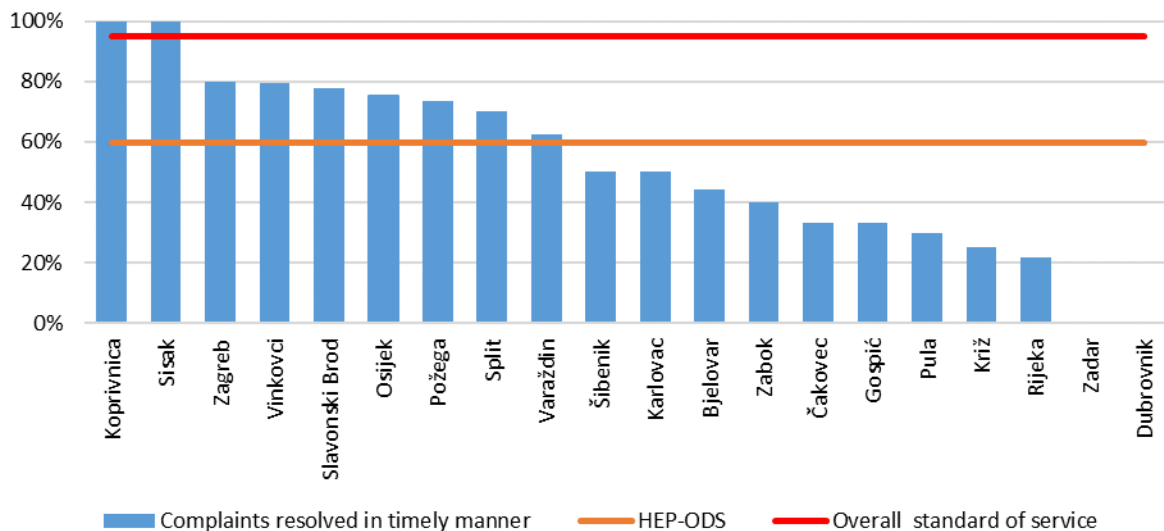
Compensation for damages	1	18
Supplier switching	0	5
Customer support	1	533
Other	437	1,099
<b>Total:</b>	<b>11,620</b>	<b>21,202</b>

Source: Electricity suppliers

In general, the largest number of complaints were related to contracts and sales, including contract terminations and the regulation of customer status, advance payments and payments in instalments, and the contract term, followed by billing, the collection and settlement of debt, which includes issues relating to invoices for non-standard services, administrative costs of contract termination, invoices for the shared consumption of electricity, refunds of overpaid invoices and fees for metering services, and disconnections due to late payment or non-payment.

The largest number of complaints was again received regarding E.ON Energija. The largest number of complaints regarding that supplier was about the termination of the supply contract, followed by payments (advance payments and payments in instalments) and disconnection due to non-payment or late payment.

In 2022, HEP-ODS received 247 written complaints. A total of 215 complaints were resolved, 128 of which were resolved in a timely manner. Figure 4.4.31 shows the share of complaints resolved in a timely manner in the total share of resolved complaints by distribution area in 2022, not including network access complaints. Only distribution areas where complaints have been resolved are shown.



Source: HEP-ODS

Figure 4.4.31 Proportion of complaints resolved in a timely manner compared to the overall standard of service by HEP-ODS distribution area and in the HEP-ODS system as a whole in 2022, not including network access complaints



It can be seen that there is a difference in the fulfilment of the prescribed general standard of the timely resolution of complaints by distribution areas, which results in the non-fulfilment of the prescribed general standard by HEP-ODS, and the proportion of timely resolved complaints for HEP-ODS as a whole in 2022 was 60%, significantly below the prescribed standard of 95%.





## The work of the HEP-ODS Consumer Complaints Committee in 2022

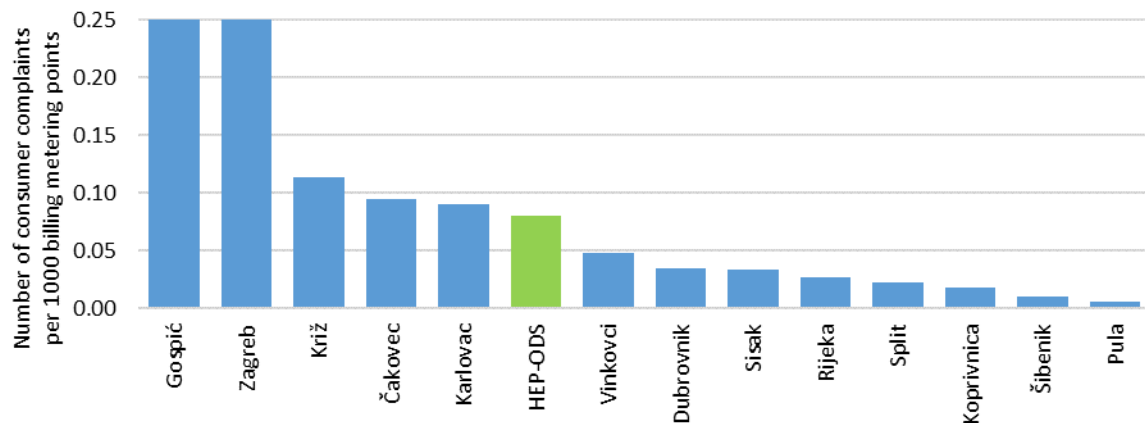
The HEP-ODS Consumer Complaints Committees in HEP-ODS' distribution areas were founded in accordance with the **Consumer Protection Act (Official Gazette no. 19/22)**. Members of the committee are representatives of distribution areas and consumer associations.

The Consumer Complaints Committee resolves complaints related to electricity billing, meter malfunction, connection/disconnection, voltage conditions, etc. HEP-ODS has ensured that inquiries, complaints and appeals can be received and processed via email.

Comparing the work of the committees in 2022 with 2021, a significant increase in the total number of complaints was observed, but the percentage of accepted complaints was significantly reduced. The number of complaints about billing decreased, as did the percentage of accepted applications. The number of complaints regarding faulty meters also decreased significantly. Complaints related to connections/disconnections decreased compared to the previous year, and there were no complaints regarding voltage. The number of complaints classified in the "other" category has not changed significantly, but the ratio of accepted and dismissed complaints has completely changed.

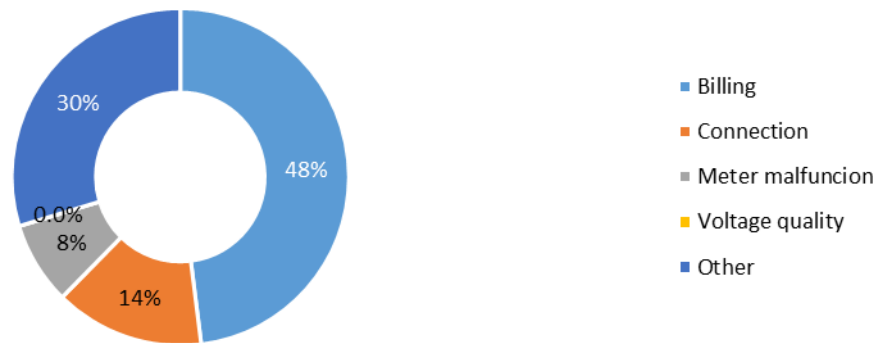
The ratio of founded and ill-founded applications as a whole changed compared to 2021, and the number of founded applications in 2022 was approximately 29% of the total number of applications, in contrast to 2021, when it was approximately 42%.

Figure 4.4.32 shows the number of complaints per 1,000 billing metering points by distribution area, while Figure 4.4.33 shows the structure of complaints resolved by HEP-ODS's distribution area consumer complaints committees in 2022. Only distribution areas where complaints were received are shown.



Source: HEP-ODS

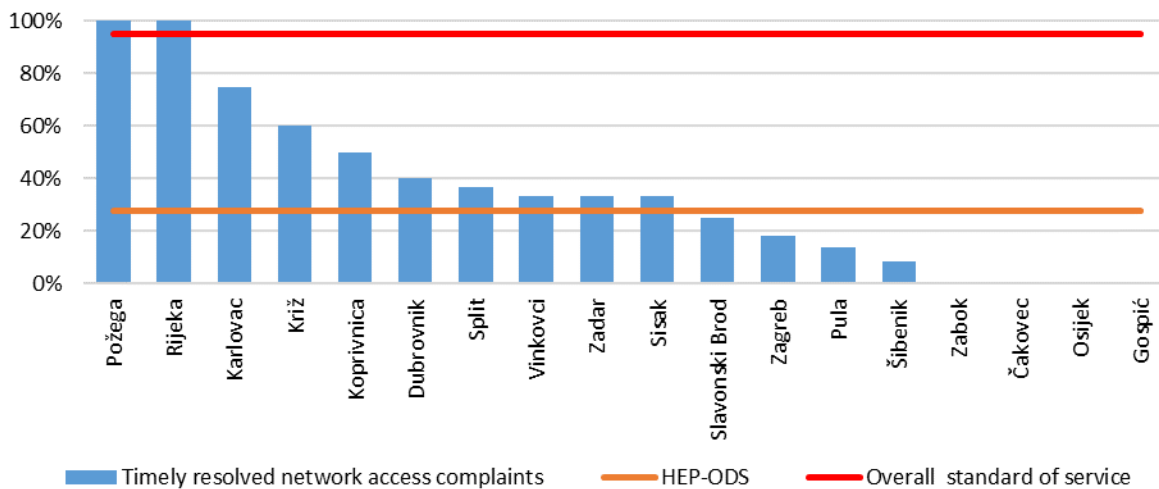
Figure 4.4.32 Number of consumer complaints per 1,000 billing metering points by HEP-ODS distribution area in 2022



Source: HEP-ODS

Figure 4.4.33 Structure of complaints processed by HEP-ODS distribution area consumer complaints committees in 2022

Complaints from network users regarding network access are resolved by the centralised Appeals Processing Committee of HEP-ODS. This greatly standardises access to appeal resolution and the application of by-laws and regulations in all HEP-ODS distribution areas. Regarding network access, 141 appeals were resolved, 39 of which HEP-ODS resolved in a timely manner. The largest number of appeals (37) is from DA “Elektroistra” Pula. Figure 4.4.34 shows the share of network access complaints resolved in a timely manner in the total share of resolved complaints by HEP-ODS distribution area. Only distribution areas where complaints were resolved are shown.



Source: HEP-ODS

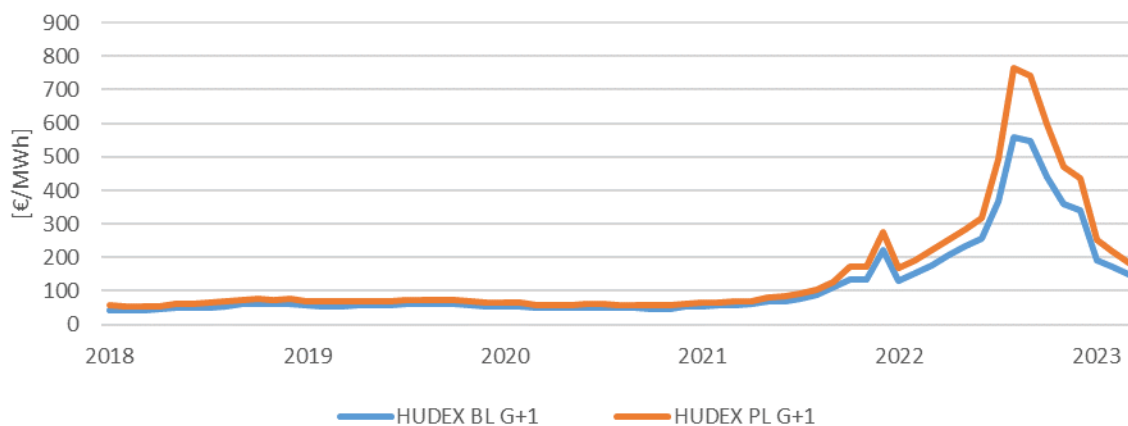
Figure 4.4.34 Share of network access complaints resolved in a timely manner in the total share of resolved complaints by HEP-ODS distribution area in 2022



The figures above show that the general indicator of the timely resolution of network access complaints is below the prescribed general standard of service, both for HEP-ODS as a whole and for all distribution areas except DA Požega and DA “Elektroprimorje” Rijeka.

## Measures to mitigate the energy price increases in the European Union and in the Republic of Croatia in 2022 and 2023

During 2022, there was an unprecedented increase in energy prices on the European market and manifold increases in prices on electricity exchanges and wholesale markets. Figure 4.4.35 shows trends in wholesale electricity prices on the Hungarian HUDEX exchange by month for year Y+1. The maximum on the HUDEX was recorded in August 2022, when a monthly level of EUR 560/MWh for base energy for a year ahead and EUR 765/MWh for peak energy for a year ahead were recorded.



Source: HUDEX

Figure 4.4.35 Trends in prices on the Hungarian HUDEX exchange by month for year Y+1 (from 2018 to March 2023 inclusive)

High gas and electricity prices affected most EU member states, albeit to varying degrees and at different times. The relationship between wholesale and retail prices differs among the EU member states, depending on regulation and the structure of the final retail prices. The wholesale element (price of energy) usually comprises only 1/3 of the final price; other costs include transmission and distribution costs, taxes and other duties.

EU member states' measures against the growth in energy prices and to mitigate the negative impact of the high growth in energy prices in 2021 and 2022 were primarily directed at the retail markets. Twenty member states implemented or plan to implement measures, often focused on mitigating impact on the most vulnerable groups, small businesses and energy-intensive industries. This includes price caps and temporary tax breaks for vulnerable energy consumers or vouchers and subsidies for consumers and businesses. The majority of the measures are aimed at protecting vulnerable consumers either directly or indirectly, and can be divided into:

1. support measures for vulnerable households through vouchers or other forms of direct support, and limiting disconnections,



2. protective measures such as reductions in tax, duties, and other levies related to energy bills, and
3. other measures.

The EC also issued the “*Guidance on the Application of Article 5 of the Electricity Directive*”<sup>78</sup> during the *current situation*”<sup>79</sup>, which reminds EU member states of the possibility of deviating from market pricing principles. *Directive (EU) 944* contains provisions under which member states may provide for public interventions into electricity supply prices to be carried out by national legislation, namely:

- Article 5.3., which allows member states to regulate retail energy supply prices to poor or vulnerable household customers, subject to special conditions in Article 5.4., in order to ensure that they can afford to satisfy their basic energy needs, and
- Article 5.6., which allows intervention in determining retail prices for households and micro-enterprises during a given period in order to ease the transition to real market competition between suppliers. This derogation is subject to more specific conditions in Article 5.7., which differ from those applicable to regulated retail prices for energy for poor or vulnerable customers. Recital 23 of the *Directive*, which states the objective of Article 5, shows that it can be used to mitigate the consequences of especially high prices.

Thus, the EC supported (under certain conditions) measures including temporary interventions into retail prices in order to protect vulnerable customers and household customers during periods with exceptionally high prices, ensuring the continuation of a transition to a fully deregulated market and preventing serious disruption to the level of market competition attained so far for the aforementioned reasons. Which measures are most appropriate depends on the specific situation in each member state and the specific challenges they face.

In February 2022, the Government of the Republic of Croatia adopted a package of measures to mitigate the rise in energy prices worth HRK 4.8 billion. These measures included changes in the compensation system for socially disadvantaged customers and one-off benefits for pensioners. The scope of electricity and gas voucher users was significantly expanded, and the monthly voucher amount was increased from HRK 200 to HRK 400 for a period of one year. A special one-off allowance (energy allowance) was provided for over 721,000 pensioners with a monthly pension of up to HRK 4,000 in the amount of HRK 400 to 1,200, depending on the amount of their pension.

Additionally, the Government of the Republic of Croatia adopted the *Decision amending the Decision on the payment of a one-off cash benefit to pension beneficiaries in order to mitigate the consequences of the increase in energy prices (Official Gazette no. 53/22)*, which expanded the one-off cash benefit to pensioners with somewhat larger pensions (to HRK 4,100 inclusive from HRK 4,000 inclusive).

The *Regulation on Eliminating Disturbances on the Domestic Energy Market* regulates special measures for electricity trade, the method and conditions of setting prices for certain categories of electricity customers, supervision over the implementation of prices, and special conditions for performing energy activities. The *Regulation* ensured that the prices for household customers and for certain non-household customers are fixed, regardless of the supplier. For household customers, prices are prescribed based on a six-month consumption of up to 2,500 kWh and for consumption over that amount, and for non-household customers, prices for consumption up to 250,000 kWh, from

<sup>78</sup> *Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 concerning common rules for the internal market in electricity and amending Directive 2012/27/EU.*

<sup>79</sup> *COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS REPowerEU: Joint European Action for more affordable, secure and sustainable energy, COM(2022) 108 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A108%3AFIN> and annexes.*



250,000 kWh to 2,500,000 kWh and over that amount. This *Regulation* was initially adopted for the period from 1 October 2022 to 31 March 2023, and on 16 March 2023, the Government of the Republic of Croatia adopted a new *Regulation* with measures valid until 30 September 2023. In this way, the Government of the Republic of Croatia protected the final customers and some businesses from high electricity prices, taking care to discourage irrational consumption.

## Observations on consumer protection in 2022

Most customer appeals and complaints resolved by the HERA pertained to billing for electricity and grid connections.

The majority of complaints resolved by the HEP-ODS Complaints Committee regarded billing, connection/disconnection and faulty meters. Indicators of the time needed to resolve complaints and appeals are unsatisfactory; HEP-ODS must invest additional efforts in this area.

The largest number of complaints received by the suppliers were regarding contracts and sales, billing, collection and debt claim proceedings. The total number of complaints almost doubled, and the number of complaints regarding contract terminations increased in particular, which can be linked to the situation in which some market suppliers found themselves.

Timeliness and quality in terms of data delivery and publication on the website in accordance with the *Regulation on the Requirements for the Quality of the Electricity Supply in 2023* regarding achievements in 2022 were relatively satisfactory.

In addition to the package of energy laws and by-laws, household final customers are also protected by the **Consumer Protection Act**.

Table 4.4.18 shows indicators of the position of household final customers in the Republic of Croatia from 2017 to 2022.

*Table 4.4.18 Indicators of the position of household final customers in the Republic of Croatia from 2018 to 2022*

Indicator	2018	2019	2020	2021	2022
Number of household final customers (BMPs)	2,220,180	2,240,916	2,263,628	2,266,847	2,291,838
Number of final customers (BMPs) supplied under the universal service	2,008,848	2,026,349	2,047,012	2,046,906	2,090,823
Number of working days in practice between debt notifications and temporary disconnection due to non-payment [days]	14.06	11.72	9.90	14.22	20.28
Number of temporary disconnections for household consumers due to non-payment	12,896	33,765	22,217	22,365	20,481
Number of BMPs with advanced meters	66,612	149,436	270,818	299,195	464,199
Number of households (BMPs) with photovoltaic systems installed for self-supply	-	146	855	1,580	3,806



Source: HEP-ODS

## 4.5. Electricity production from renewable energy sources and high-efficiency cogeneration

### 4.5.1. Eligible electricity producers and the incentive system

#### Eligible electricity producers

Eligible producer status enables producers of electricity with plants using renewable energy sources and high-efficiency cogeneration (hereinafter: RES&HEC) to have priority<sup>80</sup> in injecting electricity into the grid and participation in the guarantees of origin system; this status is a requirement for participation in the incentive system for the production of RES&HEC energy as defined by the **Renewable Energy Sources and High-Efficiency Cogeneration Act**. The status is acquired by the decision of the HERA; for plants built as simple structures, this status is automatically acquired by exercising the right to permanent connection to the grid<sup>81</sup>.

In 2022, for wind power plants, hydroelectric power plants and solar power plants, the HERA issued: eight decisions granting eligible electricity producer status, two decisions amending decisions granting eligible electricity producer status, and two decisions issuing preliminary approval for planned changes to conditions of plant use.

For thermal power plants, it also issued two decisions awarding eligible producer status (one for biomass power plants and one for biogas power plants); one decision denying the issuance of eligible producer status, four decisions transferring rights and obligations from a decision on eligible producer status, one decision rejecting the extension of a prior decision, five preliminary approvals for planned changes, two decisions rejecting the request for preliminary approval for planned changes to the conditions of use of a power plant, and one application was withdrawn.

Table 4.5.1 shows the number of decisions granting eligible electricity producer status issued by the HERA in 2022, and Table 4.5.2 shows the decisions granting eligible electricity producer status issued by the HERA from 2007 to 2022<sup>82</sup>.

<sup>80</sup> Determined in Article 34 (2) of the **Renewable Energy Sources and High-Efficiency Cogeneration Act**.

<sup>81</sup> Exceptionally, a legal or natural person that produces electricity from renewable energy sources and high-efficiency cogeneration in simple buildings determined by the regulation determining simple and other buildings and works, who wants to participate in the system of guaranteeing the origin of electricity, must obtain a decision on the acquisition of eligible producer status (Article 42 of the **Renewable Energy Sources and High-Efficiency Cogeneration Act**).

<sup>82</sup> The data refers to decisions issued by the HERA, and therefore the number and total capacity of plants do not necessarily match the number of facilities in the incentive system (e.g. eligible producers who are not in the incentive system, integrated solar power plants that are not required to apply for a decision by the HERA, etc.).



Table 4.5.1 Decisions granting eligible electricity producer status issued by the HERA in 2022

Technology	No. of decisions issued	Plant capacity [MW]
Solar power plants	3	1.498
Hydroelectric power plants	3	7.466
Wind power plants	2	29.97
Biomass power plants	1	2
Geothermal power plants		
Biogas power plants	1	0.99
Cogeneration		
Other plants using renewable sources (landfill gas, gas from wastewater treatment plants, etc.)		
<b>Total</b>	<b>10</b>	<b>41.924</b>

Source: HERA

Table 4.5.2 Decisions granting eligible electricity producer status issued by the HERA from 2007 to 2022

Technology	Number of plants	Total capacity [MW]
Solar power plants	235	26.83
Hydroelectric power plants	44	2,152.78
Wind power plants	35	847.37
Biomass power plants	42	98.07
Geothermal power plants	1	10.00
Biogas power plants	45	51.64
Cogeneration	6	112.94
Other plants using renewable sources (landfill gas, gas from wastewater treatment plants, etc.)	2	3.70
<b>Total</b>	<b>410</b>	<b>3,303.32</b>

Source: HERA



## Incentives for the production of electricity from renewable energy sources and cogeneration

The system of electricity production from RES&HEC described in this chapter refers to a system of state incentives defined by the **Renewable Energy Sources and High-Efficiency Cogeneration Act** and previous tariff systems for the production of energy from RES&HEC. Although it may appear that electricity production is incentivised because incentives are paid on the basis of the electricity supplied (operational aid), it is essentially a system that encourages the construction of new RES&HEC power plants.

From 2007 to 2015, investors were able to obtain incentives on the basis of tariff systems for RES&HEC energy production via a feed-in system, in which HROTE paid eligible producers for electricity delivered at an incentivised price.

The entry into force of the previous **Renewable Energy Sources and High-Efficiency Cogeneration Act** on 1 January 2016 introduced a new form of incentive based on public tenders. This framework was elaborated in greater detail in the *Regulation on promoting electricity production from renewable energy sources and high-efficiency cogeneration (Official Gazette no. 116/18 and 60/20)*. Under this framework, which was improved in the **Renewable Energy Sources and High-Efficiency Cogeneration Act** adopted in late 2021, investors apply to HROTE's public tenders with projects listing the reference value of electricity—the purchase price necessary for return on investment.

HROTE's public tender defines quotas (the total capacity of plants for which a corresponding agreement can be signed) by individual group of plants (groups of plants differ by type of renewable energy source and capacity); for each group, the maximum reference price that can be offered is defined. **The Renewable Energy Sources and High-Efficiency Cogeneration Act** foresees incentives via long-term market premium agreements and fixed-price electricity purchase agreements. Market premium agreements allow producers to receive a premium in addition to revenues from the sale of electricity and the sale of related guarantees of origin of electricity on the market. The premiums HROTE pays out should make up the difference between the revenue needed for return on investment and expected revenues from the sale of electricity on the market (which is assumed to be lower). Incentivising through guaranteed purchase prices is similar to the previous feed-in system of incentives, as HROTE buys the delivered electricity at an incentivised price. However, as opposed to the earlier system in which purchase prices were defined in advance in tariff systems for electricity production from RES&HEC, individual incentive agreements with a guaranteed price list the purchase price the investor stated in the public tender (their reference price at the public tender).

The *Regulation on quotas for promoting electricity production from renewable energy sources and high-efficiency cogeneration* of the Government of the Republic of Croatia stipulates the total connection capacity (total quota) of all groups of plants for which the electricity market operator can issue a tender for the allocation of market premiums/guaranteed purchase price (Table 4.5.3). The total quota for all such plants amounts to 2,265 MW.





*Table 4.5.3 Total quota by groups of plant type for the incentivised production of electricity from renewable energy sources and high-efficiency cogeneration*

Groups of plants	Classification of plants based on technology and installed capacity	Quota [MW]
a.2	Solar power plants with an installed capacity from 50 kW to 500 kW inclusive	210
a.3	Solar power plants with an installed capacity from 500 kW to 10 MW inclusive	240
a.4	Solar power plants with an installed capacity greater than 10 MW	625
b.1	Hydroelectric power plants with an installed capacity up to 50 kW inclusive	4
b.2	Hydroelectric power plants with an installed capacity from 50 kW to 500 kW inclusive	10
b.3	Hydroelectric power plants with an installed capacity from 500 kW to 10 MW inclusive	10
c.4	Wind power plants with an installed capacity greater than 3 MW	1,050
d.2	Biomass power plants with an installed capacity from 50 kW to 500 kW inclusive	6
d.3	Biomass power plants with an installed capacity from 500 kW to 2 MW inclusive	20
d.4	Biomass power plants with an installed capacity from 2 MW to 5 MW inclusive	15
e.2	Geothermal power plants with an installed capacity greater than 500 kW	20
f.2	Biogas power plants with an installed capacity from 50 kW to 500 kW inclusive	15
f.3	Biogas power plants with an installed capacity from 500 kW to 2 MW inclusive	30
	Innovative technologies in accordance with the classification of plants from energy approvals that have received development support from the European Union	10

*Source: Official Gazette*

On the basis of this *Regulation*, after the tender in November 2020, HROTE concluded the first contracts with a guaranteed purchase price and the first contracts with a market premium, for a total connection capacity of 30.27 MW. In 2021, there were no tenders for the allocation of quotas.

On 17 June 2022, HROTE announced a public call for bids for incentivised electricity production from renewable energy sources through the market premium system. The total quota for new projects in this call amounted to 648 MW. The call was open for solar power plants with a capacity of more than 500 kW, hydroelectric power plants with a capacity of more than 500 kW to 10 MW inclusive, wind power plants with a capacity of more than 3 MW, biomass power plants with a capacity of more than 500 kW to 5 MW inclusive, biogas power plants with a capacity of more than 500 kW to 2MW inclusive, geothermal power plants with a capacity of more than 500 kW, and power plants using innovative technology. 19 bids were received, and 16 bids were successful. The market premium contract was concluded with 14 project holders for 104.45 MW. Table 4.5.4 provides an overview of all the concluded contracts for winning projects in both tenders, as well as an overview of contracts terminated in the meantime.



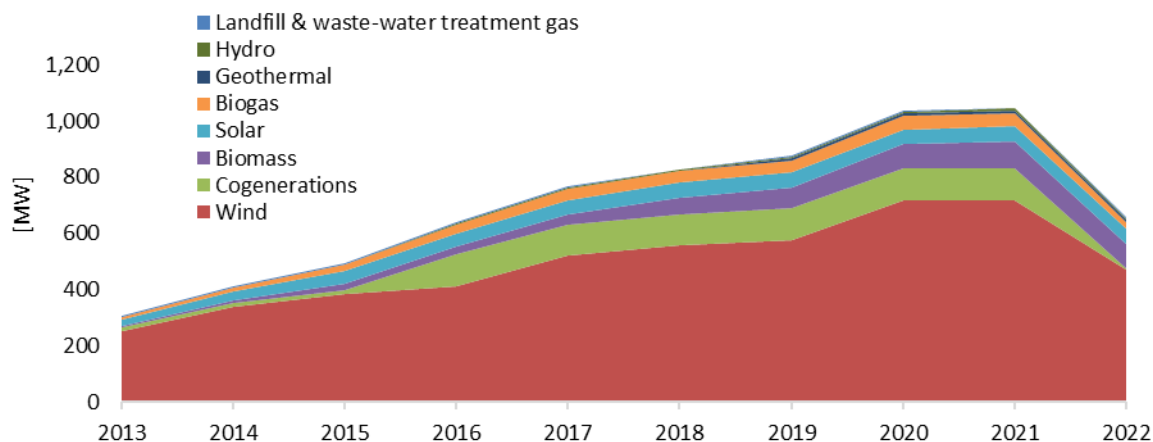
Table 4.5.4 Contracts concluded until 31 December 2022 by tender, technology and connection capacity (terminated contracts include contracts with eligible producers and project holders)

Technology		Tender winners with a signed contract		Terminated contracts, status on 31/12/2022	
		Number of projects	Connection capacity (kW)	Number of projects	Connection capacity (kW)
<b>Tender 1/2020</b>	Solar power plants	60	14,196	11	3,821
	Hydroelectric power plants	5	1,264		
	Biomass power plants	7	7,349	3	3,740
	Biogas power plants	5	7,740		
	<b>Total</b>	<b>77</b>	<b>30,549</b>	<b>14</b>	<b>7,561</b>
<b>Tender 1/2022</b>	Wind power plants	2	78,000		
	Solar power plants	4	8,000		
	Hydroelectric power plants	2	2,750		
	Biomass power plants	-	-		
	Biogas power plants	5	5,700		
	Geothermal power plants	1	10,000		
	<b>Total</b>	<b>14</b>	<b>104,450</b>	<b>-</b>	<b>-</b>
<b>Total</b>		<b>91</b>	<b>134,999</b>	<b>14</b>	<b>7,561</b>

Source: HROTE



Figure 4.5.1 shows the gradual entry of plants into the incentive system since 2013, and Table 4.5.5 shows the basic indicators related to the incentive system.



Source: HROTE

Figure 4.5.1 Installed capacity of plants in the incentive system from 2013 to 2022 by type of plant

Table 4.5.5 Production and incentives paid to eligible producers in 2022 by type of plant

Technology	Number of plants	Installed capacity [MW]	Share of installed capacity	Electricity production [MWh]	Share of production	Incentives paid (without VAT) [mil. HRK]	Share of disbursements
Solar power plants	1216	51.3	7.8%	74,028	2.7%	143.77	5.1%
Hydroelectric power plants	14	5.3	0.8%	25,393	0.9%	26.60	0.9%
Wind power plants	14	473.2	72.1%	1,410,880	51.9%	1,145.17	40.6%
Biomass power plants	38	90.3	13.8%	627,616	23.1%	919.54	32.6%
Geothermal power plants	1	10.0	1.5%	60,261	2.2%	97.75	3.5%
Biogas power plants	20	23.3	3.5%	253,497	9.3%	341.44	12.1%
Power plants fuelled by landfill gas and gas from wastewater treatment plants	1	2.5	0.4%	13	0.0%	0.01	0.0%
Cogeneration	1	0.5	0.1%	268,473	9.9%	142.86	5.1%
<b>Total</b>	<b>1305</b>	<b>656.3</b>		<b>2,720,160</b>		<b>2,817.14</b>	

Source: HROTE



In 2022, a total of 6 agreements on the purchase of electricity produced from renewable energy sources and cogeneration (incentive system) were activated for a total capacity of 3.8 MW (five solar power plants and one biogas power plant). The year was marked by numerous terminations of contracts between eligible producers and HROTE, and by the end of the year, 67 contracts had been terminated at the request of eligible producers, Table 4.5.6.

*Table 4.5.6 Number and total capacity of all terminated contracts with eligible producers (at their request) who stopped supplying energy within the incentive system during 2022, by technology*

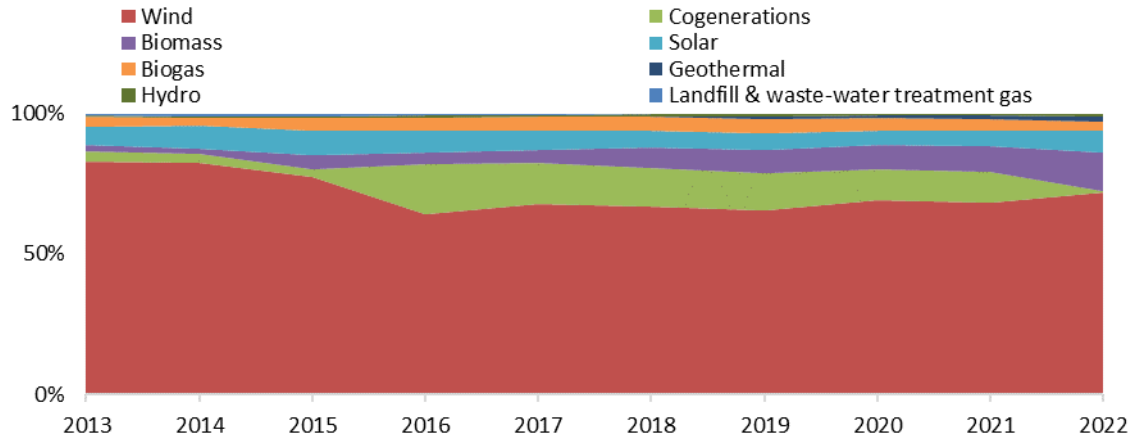
Technology	Eligible producers (number of plants)	Connection capacity [kW]
Cogeneration	3	102,800
Biomass power plants	4	6,730
Biogas power plants	22	24,649
Hydroelectric power plants	1	1,090
Wind power plants	11	234,000
Solar power plants	26	6,842
<b>Total</b>	<b>67</b>	<b>376,111</b>

*Source: HROTE*

In addition to the entry of new eligible producers and the termination of contracts, 2022 was also marked by the following:

- four contracts were concluded on the transfer of purchase contracts, based on which the project holders, or eligible producers for certain plants, were changed,
- 24 addendums to purchase contracts were concluded, which amended the provisions of the basic purchase contracts,
- four electricity purchase contracts expired, and
- 14 contracts on market premium were concluded.

Shares of installed capacity in the incentive system by plant type and by year are shown in Figure 4.5.2.



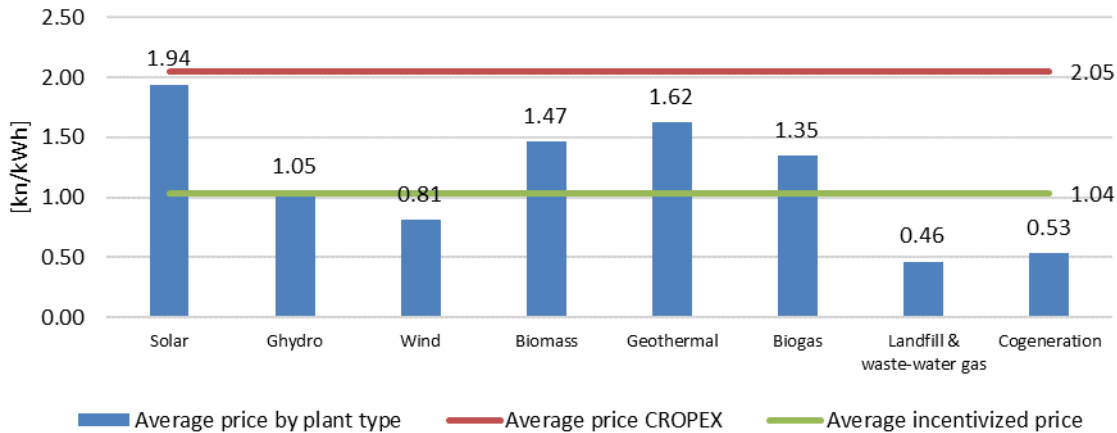
Source: HROTE

Figure 4.5.2 Installed capacity of plants in the incentive system from 2013 to 2022 by plant type

The total installed capacity of all eligible producers in the incentive system at the end of 2022 amounted to 656 MW, which is 63% compared to the installed capacity of all eligible producers in the incentive system in 2021. Although the total installed capacity of the eligible producers of the wind power plant type in the incentive system decreased by one-third, they retained the largest shareholder status and increased their share from 68.4% to 72%.

All installed production capacities for renewable energy sources and cogeneration in the incentive system in 2022 produced around 2.7 TWh (including test mode), which represents a decrease of 23% compared to the previous year. Wind power plants comprise the largest share of this production, with total production of around 1.4 TWh (52%), followed by biomass with around 0.6 TWh (23%), high-efficiency cogeneration with 0.27 TWh (9.9%) and biogas with 0.25 TWh (9.3%).

Figure 4.5.3. shows the average prices for delivered electricity by plant type in the incentive system and in total for all types compared to the annual average price of electricity on the day-ahead market on the CROPEX in 2022 (HRK 2.05/kWh). The average incentivised price amounted to HRK 1.04, while the highest incentivised price (HRK 1.94/kWh) was paid for electricity from solar power plants; the lowest incentivised price was for electricity from landfill gas power plants (HRK 0.46/kWh). The average incentivised price paid for electricity from wind power plants amounted to HRK 0.81/kWh.



Source: HROTE, HNB, CROPEX

Figure 4.5.3 Weighted average buy-off price of electricity in the incentive system by plant type in 2022.

In 2022, HROTE bought off electricity from eligible producers in the incentive system using funds collected on the following bases:

- in the Republic of Croatia, the fee for incentivising RES&HEC is HRK 0.105/kWh for all customers; for electricity buyers who must obtain a greenhouse gas emissions permit in accordance with the law governing air protection, the fee for incentivising RES&HEC is HRK 0.021/kWh. Certain energy-intensive categories of customers are entitled to a reduced fee for incentivising RES&HEC according to the electrical intensity classes,
- all suppliers must buy off 60% of electricity generated in the incentive system at the regulated price of HRK 0.42/kWh in an amount proportional to their share in total electricity delivered to consumers. Electricity generated in eligible producer plants is allocated to suppliers in two ways:
  - by allocating realised quantities of electricity from the previous period via buy-off schedules (with a time shift of three months) for all other suppliers, and (exceptionally) also
  - by allocating planned day-ahead values for HEP ELEKTRA d.o.o. and HEP-Opkrba d.o.o.
- revenues from the sale of 40% of electricity produced from renewable energy sources and cogeneration on the CROPEX by the EKO balance group,
- revenues from the sale of guarantees of origin of electricity produced by eligible producers in the incentive system sold on the CROPEX through the EKO balance group, and
- revenues from the membership of eligible producers with a capacity greater than 50 kW that are in the incentive system in the EKO balance group.

The new **Renewable Energy Sources and High-Efficiency Cogeneration Act** expands the collection of funds for incentives to:

- funds raised from CO<sub>2</sub> emissions trading,
- charges for imported electricity produced from fossil fuel power plants in third countries,
- charges for the issuance of energy approvals, and
- funds collected through statistical transfers between Croatia and EU member states.

Table 4.5.7. shows HROTE's revenues and expenditures related to the incentive system and the operation of the EKO balance group in 2022.



Table 4.5.7 Revenues and expenditures related to the incentive system [mil. HRK]

Income/expenses	2021	2022
<b>Incentive system income</b>	<b>3,591.42</b>	<b>3,684.90</b>
Income from final customers of electricity (from RES&HEC fee)	1,577.95	1,594.11
Income from the sale of electricity from the incentive system to suppliers	586.99	685.48
Income from the sale of electricity on the market	1,379.82	1,334.70
Income from the sale of guarantees of origin	14.07	29.61
Income from charges paid by members of the EKO balance group for balancing energy	32.50	25.41
Income from interest earned, collected guarantees and fees	0.09	15.60
<b>Incentive system expenses</b>	<b>3,397.49</b>	<b>3,661.27</b>
Cost of electricity bought from eligible producers	3,334.24	2,817.14
Costs of financing HROTE's activities in the RES&C incentive system and EKO balance group	9.69	
Expenditures for purchasing electricity on the market	-	658.98
Balancing energy costs	53.56	185.15
<b>Difference in income and expenditures on an annual basis</b>	<b>193.93</b>	<b>23.63</b>

Source: HROTE

In accordance with the *Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obligated to take up from the electricity market operator*, in 2021, electricity suppliers were obligated to take up from HROTE 40% of the net delivered electricity from eligible producers. In late 2021, the Croatian government adopted the new *Regulation* increasing this share to 60% as of 1 January 2022.

Due to the Covid-19 pandemic, in order to reduce the risk of businesses losing market competitiveness due to the expense of paying for RES&HEC charges, in 2020, the Croatian government adopted the *Regulation on criteria for paying a reduced charge for renewable energy sources and high-efficiency cogeneration (Official Gazette no. 57/20)* allowing the payment of a reduced charge for energy-intensive industry. The reduced charge is in accordance with electrical intensity categories<sup>83</sup>. A percentage in charge reduction is defined for each category. Of a total of 69 requests to reduce charges, 65 businesses received the right to a reduction, of whom 13 were in the 40% category, 28 were in the 60% category, and the remaining 24 were in the 80% category.

<sup>83</sup> Category R1: range of electrical intensity from 5% to 10% inclusive – right to a reduction in charges by 40% (HRK 0.063/kWh), Category R2: range of electrical intensity from 10% to 20% inclusive – right to a reduction in charges by 60% (HRK 0.042/kWh), Category R3: range of electrical intensity greater than 20% – right to a reduction in charges by 80% (HRK 0.021/kWh).



## Observations on eligible electricity producers and the incentive system

Considering the significant increase in energy prices in late 2021 and during 2022, the average weighted price of electricity in 2022 paid to eligible producers in the incentive system was 50% smaller than the yearly average price of electricity on the CROPEX day-ahead market. The annual average of electricity prices on the CROPEX increased by 2.4 times. As a result, 67 eligible producers with a total installed capacity of over 376 MW left the incentive system, including some plants owned by HEP d.d., and the upward trend of electricity production from plants that use renewable energy sources and high-efficiency cogeneration that were in the incentive system turned around and a sharp decline was recorded.

Part of the electricity produced in plants in the incentive system is sold on the CROPEX electricity exchange, and part of the produced electricity is bound by sales contracts. However, when the plants began to leave the incentive system, there were cases when HROTE had to fulfil long-term obligations by purchasing energy on the electricity exchange. In the draft of the new regulation on encouraging production from RES&C, it is proposed to introduce a penalty for the early termination of incentive contracts.

The annual balance of the incentive system at the end of 2022 was HRK 23,627,678.16. HROTE conducted a tender in 2022 to encourage electricity production from renewable energy sources exclusively through the market premium system, on the basis of which 14 contracts were signed with project holders with a total power of 104.45 MW.

### 4.5.2. Construction and usage of plants that use renewable energy sources and cogeneration

#### Register of renewable energy sources and cogeneration, and eligible producers

The Register of Renewable Energy Sources and Cogeneration, and Eligible Producers (hereinafter: RES&C Register) is a unified register of renewable energy and high-efficiency cogeneration projects, plants using renewable energy sources, high-efficiency cogeneration plants, and eligible producers operating in the Republic of Croatia. It is established and maintained by the Ministry in order to monitor and supervise the implementation of projects involving renewable energy sources and high-efficiency cogeneration and to provide administrative support to project operators, as well as public and legal entities.

The Register is published on the Ministry's website at <https://oie-aplikacije.mzoe.hr/Pregledi/> (Figure 4.5.4) along with an interactive map of Croatia containing the locations of all the plants entered in the Register, accessible at <https://oie-aplikacije.mzoe.hr/InteraktivnaKarta/> (Figure 4.5.5).





https://oie-aplikacije.mzoe.hr/pregledi/PopupIzvjestaj.aspx?ReportId=5b47346e-67aa-4df2-9603-fa83c47061e3

Vrsta postrojenja: NIJE EVIDENTIRANO; Sunčana elektr... Županija: NIJE EVIDENTIRANO; Bjelovarsko-bilj...

Nositelj projekta: NIJE EVIDENTIRANO; OTILIJA ALTUS; Naziv projekta: ...

Registarski broj: ... Vrsta dokumenta: Dodatak ugovoru o otkupu električne ...

OIB nositelja projekta: ... Integrirane sunčane elektrane: Svi

1 of 1 Find | Next

**MINISTARSTVO GOSPODARSTVA, RADA I PODUZETNIŠTVA**  
Ministry of Economy, Labour and Entrepreneurship

**JIZ-01 Pregled projekata upisanih u Registar OIEKPP**  
JIZ-01 Overview of projects entered in the RERCPPP Registry

Datum : 13.04.2023.	Vrsta postrojenja (Plant category)	Registarski broj (Registry number)	Naziv projekta (Project)
<b>Odabrani parametri:</b>	<input type="checkbox"/> Sunčana elektrana - Solar power plant (3850)		
<b>Vrste postrojenja:</b>	<input type="checkbox"/> Hidroelektrana - Hydro power plant (54)		
- NIJE EVIDENTIRANO	<input type="checkbox"/> Vjetroelektrana - Wind power plant (51)		
- Sunčana elektrana	<input type="checkbox"/> Elektrana na biomasu - Biomass power plant (120)		
- Hidroelektrana	<input type="checkbox"/> Geotermalna elektrana - Geothermal power plant (2)		
- Vjetroelektrana	<input type="checkbox"/> Elektrana na bioplin - Biogas powerplant (71)		
- Elektrana na biomasu	<input type="checkbox"/> Elektrana na deponijski plin i plin iz postrojenja za pročišćavanje otpadnih voda - Landfill gas power plant and gas from the plant wastewater treatment (5)		
- Geotermalna elektrana	<input type="checkbox"/> Kogeneracije - Cogenerations (12)		
- Elektrana na bioplin	<input type="checkbox"/> Ostale - Other (1)		
- Elektrana na tekuća biogoriva	<input type="checkbox"/> Baterijski spremnik energije - Battery energy storage (1)		
- Elektrana na deponijski plin i plin iz postrojenja za pročiš...			
- Kogeneracije			
- Ostale			
- Baterijski spremnik energije			
<b>Županija:</b>	Ukupno / Total: 4167		

Figure 4.5.4 Overview of data in the RES&C Register, <https://oie-aplikacije.mzoe.hr/Pregledi/>

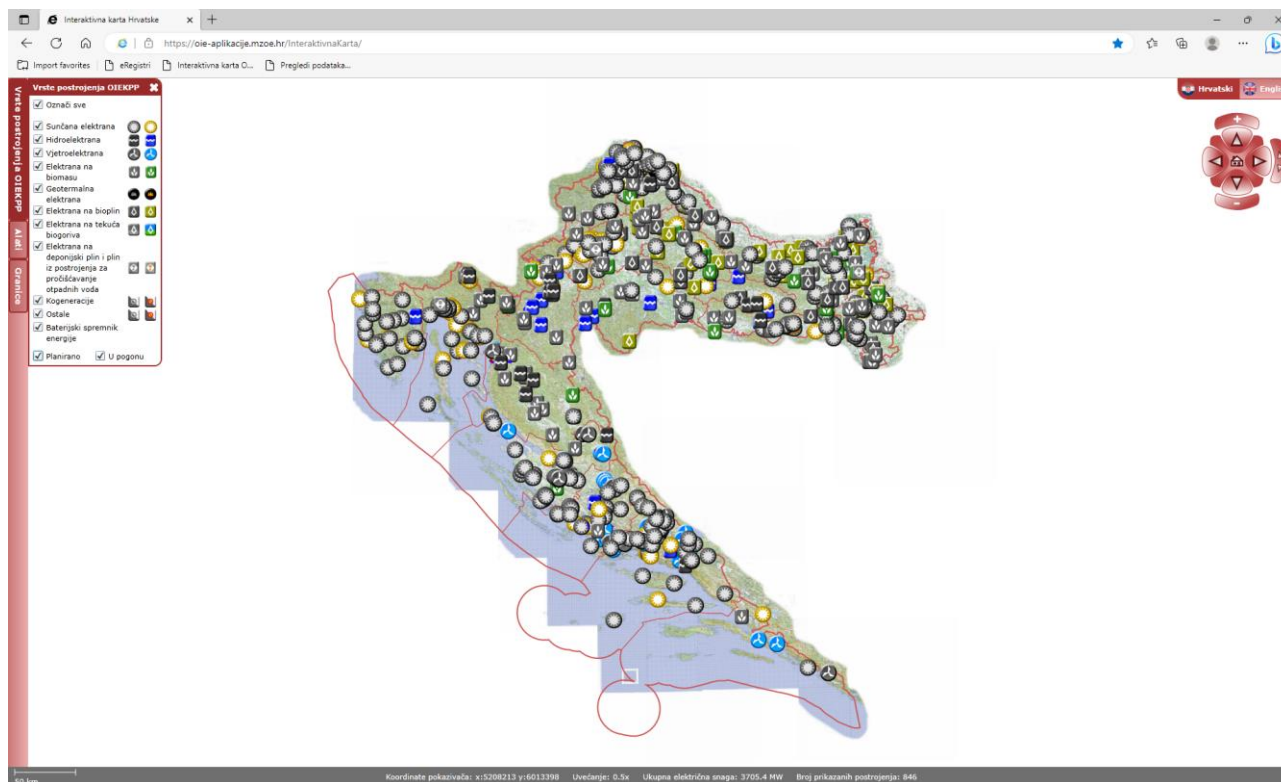


Figure 4.5.5 Interactive map of Croatia with marked locations of all the plants entered in the RES&C Register<sup>84</sup>

In accordance with the *Ordinance on the Register of renewable energy sources and cogeneration and on eligible producers*, information, data, certificates and documents regarding eligible producers are entered in the Register by the HERA.

An overview of projects from the publicly available sections of the Register of Renewable Energy Sources and Cogeneration and on Eligible Producers (Ministry data) and constructed plants from RES&HEC in the incentive systems (HROTE data) is shown in Table 4.5.8.

<sup>84</sup> <https://oie-aplikacije.mzoe.hr/InteraktivnaKarta/>, the page requires the use of Microsoft Silverlight



Table 4.5.8 Overview of projects entered in the RES&C Register and constructed RES&HEC plants

Technology	Total registered in the RES&C Register		Constructed and in the incentive system		Constructed and in the guaranteed purchase price system or premium system	
	Number of plants	Installed capacity [MW]	Number of plants	Installed capacity [MW]	Number of plants	Installed capacity [MW]
Solar power plants	3,850	1,133.9	1,216	51.3	5	1.8
Hydroelectric power plants	54	2,107.7	14	5.3		
Wind power plants	51	2,102.3	14	473.2		
Biomass power plants	120	218.8	38	90.3		
Geothermal power plants	2	20.0	1	10.0		
Biogas power plants	71	78.1	20	23.3	1	2.0
Power plants fuelled by landfill gas and gas from wastewater treatment plants	5	8.4	1	2.5		
Cogeneration	12	1,069.0	1	0.5		
Other	1	1.0				
Battery energy storage	1	66.0				
<b>Total</b>	<b>4,167</b>	<b>6,805.3</b>	<b>1,305</b>	<b>656.3</b>	<b>6</b>	<b>3.8</b>

Sources: Ministry, HROTE

## Activities of the EKO Balance Group

The establishment of the EKO Balance Group is regulated by the **Renewable Energy Sources and High-Efficiency Cogeneration Act** and the *Rules on electricity market organisation*; it consists of eligible producers of electricity and other entities performing electricity production activities who have the right to an incentive price in accordance with electricity buy-off agreements.

The EKO Balance Group started its work in early 2019. The *Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obligated to take up from the electricity market operator (Official Gazette no. 147/21)* prescribed that electricity suppliers were obligated to take up from HROTE 60% of net delivered electricity from eligible producers in the incentives system in 2022. The remaining electricity produced by the EKO balance group is sold by HROTE on the electricity market in accordance with the *Rules on the sale of electricity* (HROTE, 12/2018), which established the combined short-term and long-term sale of electrical energy through three possible models: sale at auction, sale on the electricity exchange, and sale through framework agreements. Energy was sold on the day-ahead market, on the intraday market and at auctions.



If the production of the EKO balance group deviates from the planned production, HROTE is obligated to reimburse HOPS for the balancing energy costs incurred by the EKO balance group from the funds collected within the incentives system for the production of electricity from renewable energy sources and cogeneration and from monthly charges paid by members of the EKO balance group.

## Implementation of *Regulation 1854* in the Republic of Croatia

To ensure the implementation of *Regulation 1854* in the part that refers to measures for the application of the caps on market revenues and the distribution of surplus revenues to final electricity customers, the Government of the Republic of Croatia adopted the *Regulation on Surplus Market Revenues*. This regulation limits the market revenues of producers generated by the production of electricity from certain sources<sup>85</sup> by prescribing a price cap of 180 euros per MWh of electricity produced, as well as the market revenues of intermediaries who participate in wholesale electricity markets on behalf of producers, except for energy entities connected to HEP and producers in the incentive system with a valid purchase agreement with HROTE. This intervention seeks to socially redistribute the additional profits of producers and resellers of electricity generated by the increase in the prices of wholesale products. Surplus market revenues are paid into the account of the Environmental Protection and Energy Efficiency Fund, with the exclusive purpose of installing photovoltaic power plants for households in single-family and multi-apartment buildings.

The *Regulation on Surplus Market Revenues* stipulates that the HERA monitors the fulfilment of the realised surplus market revenues payment obligations. For this purpose, the HERA established a system for receiving and processing data from all those subject to this regulation.

## Final customers with own production

A final customer with their own production is a final customer of electricity whose installation is connected to a production facility for the production of electricity from renewable energy sources or high-efficiency cogeneration that meets the needs of the final customer and with the possibility of delivering excess electricity to the transmission or distribution network.

Electricity suppliers have an obligation to take over excess electricity from final customers with their own electricity production that cumulatively meet the prescribed conditions<sup>86</sup>.

At the end of 2022, there were 1,618 plants with the status of final customer with own production with a total installed capacity of 160.45 MW. The vast majority of final customers with own production, 1,580 of them, use a solar power plant as the production facility, with a total installed capacity of 112.25 MW.

## Self-supply plant user

A self-supply plant user is a household final customer of electricity, including institutions, who has an electricity self-supply plant connected on their property that uses either renewable energy sources or high-efficiency cogeneration. Energy surpluses can be taken up by a supplier or market participant under a relevant contract, provided that the total volume of electricity injected into the network in a calendar year is less than or equal to the electricity taken up from the network.

Suppliers are obligated to conclude a supply contract with self-supply installation users at the users' request; this agreement must contain provisions on the buy-off of surplus electricity produced by the

<sup>85</sup> From wind energy, solar energy (solar thermal and solar photovoltaic energy), geothermal energy, hydropower without reservoir, biomass fuel (solid or gaseous biomass fuel) except for biomethane, waste, nuclear energy, lignite, petroleum products and peat.

<sup>86</sup> Article 51 of the *Renewable Energy Sources and High-Efficiency Cogeneration Act*.



production facility. The **Renewable Energy sources and High-Efficiency Cogeneration Act** stipulates that, when calculating electricity consumption, network charges and charges for renewable energy sources and the high-efficiency cogeneration of users of self-supply plants, the difference in the amount of electricity taken up and injected in the accounting period (one month) under a particular tariff is taken into account.

At the end of 2022, there were 3,806 users of self-supply plants with a total installed capacity of almost 23 MW. All final customers with self-supply use solar power plants for production. During 2022, 210 self-supply customers lost their status.

### Observations on the construction and use of plants using renewable energy sources and cogeneration

According to HOPS' data, the interest in connecting to the transmission network projects of production plants that use renewable energy sources and cogeneration, mainly plants that use solar and wind energy, is the highest in the national statistical region of Adriatic Croatia. In accordance with the **Electricity Market Act**, the issuance of an energy approval is the first step in the grid connection process, which is why it is expected that fewer projects will enter the phase of EOTRP development (those that are more ready for implementation).

Challenges and issues that project managers encounter while developing renewable energy and cogeneration power plant projects are not unique to Croatia; the majority of EU member states are also in an energy transition and are still developing or modifying the legislative and regulatory framework for this segment of energy production.

In 2022, there was a trend of decreasing electricity production from renewable energy sources in the incentive system, which is the result of exiting the incentive system of a large number of production plants during that year. Namely, apart from the plants for which the contracts have expired, a large number of contracts have been terminated at the request of the eligible producers.

### 4.5.3. Guarantee of electricity origin system

#### Development of the guarantee of origin system

The guarantee of origin system enables suppliers of electricity to offer final customers supply contracts or tariff models with a guaranteed share of one or more electricity sources used for electricity generation. In addition, final customers can rely on this system, as it ensures the supply of electricity of guaranteed origin.

The *Methodology for determining the origin of electricity (Official Gazette no. 133/14, 127/19)* requires electricity suppliers to submit a relevant annual report to final customers describing the origin of the electricity supplied during the previous year, between 1 and 31 July of the current year. Those suppliers who sent reports to their final customers provided only a minor portion of the required data (basic data and basic structure of electricity sold).

According to the *Methodology*, electricity suppliers base their reports to final customers on HROTE reports:

- annual report on the structure of the total remaining electricity for the previous year, and



- annual report on the generation of electricity under the incentives system for the previous year.

HROTE published these reports for 2022 on its website, together with the required *Annual report on the origin of electricity in the Republic of Croatia for 2022*, which provides an overview of the structure of the electricity produced and sold in the Republic of Croatia, information on suppliers' reports regarding the origin of electricity, the use of guarantees of the origin of electricity, and other related data.

A guarantee of origin, among other things, contains data on the quantity of electricity (the basic unit is 1 MWh), the date of the beginning and end of electricity generation for which the guarantee of origin is issued, the type of primary energy source, and data on the production plant, including the location of the plant and the identity of the authority that issued the guarantee of origin.

Electricity producers may sell guarantees of origin independently from the produced electricity, on a separate market of guarantees of origin, as these are only used to prove the structure of electricity.

The origin of electricity, i.e. the structure of electricity sold to the final customer, is proven according to the *Methodology* and through the use of guarantees of origin, and excludes the use of other certificates, certificates of the generation of electricity, or contracts tracing the origin of electricity.

## Register of Guarantees of Origin

HROTE issues guarantees of origin in accordance with the *Regulation on the establishment of a system of guarantees of origin of electricity* (Official Gazette no. 84/13, 20/14, 108/15, 55/19) and the *Rules for using the Register of Guarantees of Origin* (HROTE, 7/19).

As the authority competent for issuing guarantees of origin in Croatia, HROTE operates a Register of Guarantees of Origin (hereinafter: the Register) – a computer system that stores guarantees of origin used to issue, transfer and cancel guarantees of origin as electronic documents.

The register enables the transfer of guarantees of origin from one user account to another, which is the basis for trade in guarantees of origin. HROTE is a full member of the *Association of Issuing Bodies* (AIB), an international association of competent authorities for guarantees of origin, and the Croatian register is connected to other registers in EU Member States via AIB's hub.

During 2022, due to major changes in the European electricity market (the increase in energy prices and the consequent increase in electricity prices), many eligible producers decided to enter the electricity market independently and terminated their incentive contracts. During September 2022, HROTE initiated a campaign to clarify the functioning of the entire guarantee of origin system in the Republic of Croatia. In the campaign, producers received information about the possibilities for opening user accounts in the Register and registering production plants, as well as data on projections of potential additional income and benefits that they could achieve by entering and registering their production plants in the Register. This initiative led to increased interest from eligible producers in entering the Register, and by the end of 2022, the registration of production plants in the Register was requested for 14 plants with a newly created user account and 14 plants with a user account of another user of the register (Table 4.5.9).



Table 4.5.9 Registrations in the Register of Guarantees of Origin

Type of registration	Total registrations
User of the Register with a production plant	2
Supplier	5
Supplier / User of the Register with a production plant	1
Producer	11
Producer / User of the Register with a production plant	1
Trader	3
<b>Total</b>	<b>23</b>

Source: HROTE

In 2022, six registered suppliers traded in guarantees of origin, while guarantees of origin were issued for 46 production plants. An overview of activities in the Register of Guarantees of Origin is provided in Table 4.5.10.

Table 4.5.10 Activities in the Register of Guarantees of Origin in 2022

Activity	Quantity
Number of issued guarantees of origin for electricity generated in Croatia	5,023,361
Number of imported guarantees of origin	207,170
Number of exported guarantees of origin	3,460,639
Number of cancelled guarantees of origin	3,823,695
Number of expired guarantees of origin	0

Source: HROTE

In 2022, HROTE earned HRK 2,642,342.39 from fees for keeping the Register. The cost of operating the Register and other activities in the guarantee of origin system amounted to HRK 1,370,789.40. The balance of the Register amounts to HRK 1,271,552.99.

## Auctions of guarantees of origin of electricity

During 2022, HROTE issued guarantees of origin for electricity for a part of the electricity produced by eligible producers in the incentives system, which was sold on the electricity market through the EKO



balance group; these guarantees of origin were then sold on the market through guarantee of origin auctions on the CROPEX's IT auction trading platform. After the end of the auctions and the successful sale of guarantees of origin, the funds collected were transferred to HROTE for payment into the incentive system; on the other hand, the guarantees of origin sold at auction were transferred from HROTE's account in the Croatian Register of Guarantees of Origin to the user accounts of auction participants who had won the guarantees of origin at auction. Before holding each public auction, HROTE published the minimum price of the guarantees for individual groups of plants at the link <https://www.hrote.hr/drazbe-jamstva-podrijetla>.

In 2022, 1,494,833 guarantees of origin tied to 40% of electricity produced in the incentives system sold by HROTE on the market were sold at auction. The funds collected from the sale of guarantees of origin and paid to HROTE for transfer into the incentive system amounted to HRK 29,606,160.51.

### Observations on the guarantees of origin system

During 2022, 20 new plants were registered in the guarantee system: Bioplinско postrojenje Gudovac, Bioplinско postrojenje CRNAC 1, Vjetroelektrana P ZD6, Vjetroelektrana ST1-1, Vjetroelektrana ST1-2, Vjetroelektrana ZD2, Vjetroelektrana ZD3, Vjetroelektrana ZD4, Vjetroelektrana ZD6, Bioplin Kućanci, Kogeneracijsko postrojenje STRIZIVOJNA HRAST, LANDIA-GRADINA, Vjetroelektrana PONIKVE, BIOPLIN-MAKS, Bioplinara organica Kalnik 1, Bioplinска elektrana Orehovec, Bio postrojenje Viljevo, Bio postrojenje Donji Miholjac, Bioplinско postrojenje Slatina 1 MW and Bioplinско postrojenje OSILOVAC, with a total installed capacity of 2.47 GW.

In the future, it should also be possible for final customers to dispose of guarantees, in accordance with the policy of encouraging the conclusion of PPAs.





## 4.6. Energy efficiency in the electricity sector

### Energy efficiency in the transmission and distribution of electricity

*Directive 2012/27/EU*, *Directive 2018/2002/EU*, and the **Energy Efficiency Act** generally define the HERA's obligations regarding energy efficiency. These obligations primarily pertain to the consideration of energy efficiency in decision and tariff methodologies related to the transmission and distribution of electricity, as well as enabling and promoting demand response. As these are principled obligations, the HERA primarily fulfils these obligations by adopting by-laws that direct HOPS, HEP-ODS and network users to behave in accordance with the principles of energy efficiency.

When determining costs in the process of adopting tariff items for electricity transmission and distribution, the quantity of energy losses in the grid is taken into account; when approving ten-year plans, investments and measures to reduce technical losses in the transmission and distribution networks are taken into account. However, it must be noted that technical losses cannot be eliminated completely due to the limitations of the laws of physics, and the reduction of technical losses requires increased investments. The implementation of measures must also take into account plant safety, technical regulations and the development of the grid.

In 2022, the HERA adopted the *Methodology for Setting Tariffs for Electricity Distribution*, which for the first time directly includes energy efficiency in the process of determining tariff items by introducing incentives for reducing the amount of losses.

In accordance with the **Energy Efficiency Act**, in 2016, the HERA published the *Assessment of the Potential for Increasing the Energy Efficiency of the Electricity Infrastructure* on the basis of a previous study examining specific measures and investments in the ten-year development plans of the transmission and distribution system from 2016 to 2025 as concerns technical losses. When advanced load management technologies are implemented on a larger scale (e.g. mass roll-out of advanced meters), the HERA will revise the assessed potential for increasing the energy efficiency of the electricity infrastructure.

The *Draft Ten-year development plan for the transmission network from 2023 to 2032, with a detailed elaboration of the initial three- and one-year periods* contains the usual measures for improving energy efficiency: replacing conductors (use of HTLS conductors, replacing submarine 110 kV cables with new, ecologically friendly cables with higher transmission capacity, replacing overhead lines with cable lines), replacing transformers (replacing old transformers with new ones with lower losses), reinforcement of the network (construction of new lines) and improvement of transmission network management (optimising power flows and optimising the operation of power transformers).

The *Draft Ten-year (2023-2032) development plan for the distribution network, with a detailed elaboration of the initial three- and one-year periods* foresees direct measures to replace parts of the network, measures to achieve the more efficient operation of the distribution network, and measures to ensure the more efficient planning and implementation of direct measures for increasing efficiency at the system level. Among the measures concerning the replacement of parts of the distribution network, it is necessary to highlight the transition of parts of the network from 10 kV to 20 kV (investments in the reconstruction of MV lines and MV/LV transformer stations) aimed at the transition of the MV network from 10 kV and 35 kV to 20 kV, together with the gradual introduction of direct 110/10(20) kV transformation and the abolition of 35/10(20) kV transformation. The percentage of MV transformer stations ready to switch to 20 kV at the end of 2021 was 61.7%. The percentage of 20 kV lines at the end of 2021 was 28.5%, which is relatively low, although this share is continuously increasing. Figure 4.6.1 shows the readiness of the distribution areas for switching the MV network to 20 kV.

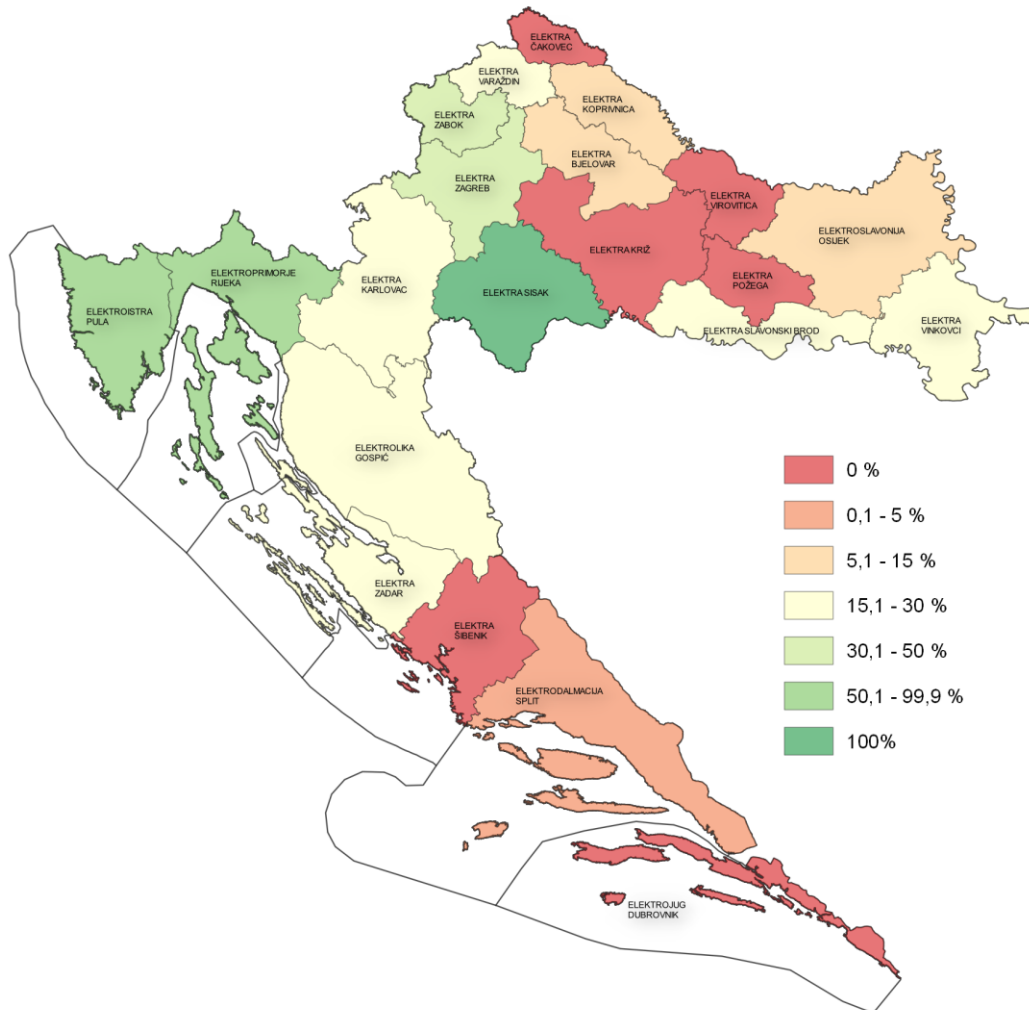


Figure 4.6.1 Readiness of distribution areas for switching the MV network to 20 kV (at the end of 2021)

In 2020, HOPS and HEP-ODS established an energy management system in accordance with the international standard ISO 50001:2018.

## Features of electricity calculation and measurement

For the purposes of the implementation of national and EU public policies related to energy efficiency, it is necessary to highlight the features of the calculation and measurement of electricity, so that there are no doubts when preparing reports regarding their implementation.

The *Regulation on the General Terms of Network Usage and Electricity Supply*, and the *Methodology for Setting Tariffs for Electricity Transmission* and the *Methodology for Setting Tariffs for Electricity Distribution* define tariff elements used to calculate transmission and distribution network charges. Specifically, tariff elements are active power (by uniform, higher and lower daily tariffs), settled peak active power, excess reactive energy, and billing metering point charge.

The aforementioned methodologies introduced the tariff element of connection capacity (settled connection active power) for the first time. It should be pointed out that the tariff elements are applied to the readings, or data on the energy (power) taken from the network (consumption, i.e. the so-called



“L” (Load) component). The aforementioned methodologies, in accordance with the **Electricity Market Act**, also introduced the use of the tariff element of connection capacity for producers, i.e. introduced the tariff element of connection capacity that is calculated for energy directed from the producer to the grid (so-called “G” (Generation) component).

The lower daily tariffs enable final customers to save money by using electricity during the lower tariff hours. As a result, the change in the time of use leads to savings, both in the transmission and distribution of electricity and in the production of electricity. Final customers on the low-voltage network with the dual-tariff model (“White” tariff model) can request to switch to the single-tariff model (“Blue” tariff model). The opposite change is also possible; however, if a single-tariff meter is installed at the billing metering point, a new meter must be installed.

Final customers with a connection capacity over 22 kW are charged for settled peak active power as a tariff element. Settled peak active power (the highest amount of active power during a billing period during the higher daily tariff period) as a tariff element directly encourages final customers to monitor and alter the time and ways in which they use their devices (especially those requiring more power), thus motivating final customers to adopt electricity usage habits that result in lower losses in the electricity system and also enables the better utilisation of the production plants.

Reactive power occurs during the use of alternating current; it is the consequence of the electromagnetic nature of the electricity system, devices and other components of the electricity system that work in the unified alternating current system. As it causes losses in the network, the *Regulation on the General Terms of Network Usage and Electricity Supply* prescribes that billing metering points that measure reactive energy are charged for excess reactive energy. This encourages final customers to take over as little reactive energy as possible from the grid by purchasing and using devices that use less reactive energy and, where technically feasible and justified in terms of cost, to produce the required amounts of reactive energy to power these devices on their own premises.

The “Black” tariff model is unique in terms of energy efficiency. This is a tariff model to manage electricity consumption via MTU signals, which is still in limited use in the Elektroistra Pula and Elektrojug Dubrovnik distribution areas. This model includes the delivery of electricity to household customers for whom HEP-ODS determines when electricity can be used by remote control (customers do not have access to electricity 24 hours a day).

The aforementioned tariff elements are used to determine network usage charges; they are also traditionally used to bill for electricity suppliers selling to final customers. Suppliers can offer their own supply models, which use different elements and billing methods. If a particular billing metering point is equipped with an advanced meter that measures the load profile (measurements for each 15-minute or hour interval), then dynamic contracts and innovative billing methods can be implemented. In other words, electricity suppliers can offer final customers with advanced meters supply models oriented towards specific groups of final customers and their consumption habits.

A contract with the dynamic pricing of electricity (dynamic contract) is an electricity supply contract between a supplier and a final customer that reflects price changes on spot markets, including the day-ahead and intraday markets, at intervals corresponding to at least the market settlement frequency (one hour or 15 minutes, according to the regulations governing the organisation of the electricity market and the calculation of balancing energy). The basic idea of electricity supply contracts with dynamic pricing is that final customers can accommodate their consumption to price signals on the short-term markets, whereby the prerequisite is that the final customer has an advanced meter installed. Although electricity supply contracts with dynamic pricing were possible before the adoption of the new **Electricity Market Act**, the **Act** prescribes that suppliers who supply more than 200,000 billing metering points of final customers are required to offer an electricity supply contract with dynamic



pricing for non-regulated elements upon customer request. During 2022, three suppliers offered contracts with dynamic electricity pricing.

However, disruptions in the energy markets from the end of 2021 onwards have increased the need for stable prices and the fear of exposure to extremely high prices in short-term markets among final customers. For this reason, but also because of the easier financing of the construction of plants that use renewable energy sources, various long-term forms of power purchase agreements (PPAs), which are the opposite of dynamic contracts, are increasingly being promoted. At the end of 2022 and the beginning of 2023, the first corporate PPAs began to be concluded. Bearing in mind that the **Electricity Market Act** introduced new electricity activities, but also put the customer first in the energy transition through the introduction of an active customer, the development of various forms of contracts is certainly to be expected.

Electricity billing in Croatia is based on real electricity consumption from metering data taken at the billing metering points of final customers of electricity (network users). If a billing metering point cannot be accessed or read, electricity consumption is estimated, and the estimated value on the bill is specially marked. In multi-apartment buildings, each independent unit has its own billing metering point, while shared consumption is metered at a separate billing metering point.

The billing period for which the energy consumption of a network user is determined can be monthly or semi-annual. The monthly billing period refers to the calendar month and is applied to household final customers with a connection capacity of up to and including 22 kW with remote reading, household final customers with a connection capacity of more than 22 kW, non-household final customers, active customers, energy storage operators, and producers. That is, the monthly billing period applies to network users with advanced meters or meters within the remote reading system. Household final customers who read their meter balances themselves and submit the readings to HEP-ODS on a monthly basis (so-called self-reading) also have a monthly billing period.

In connection with the calculation of electricity for final customers, it should be pointed out that the *Regulation on Eliminating Disturbances on the Domestic Energy Market* determines the electricity prices for certain categories of final customers depending on their six-month consumption. For the household category, this *Regulation* determined the basic electricity prices for a consumption of up to 2,500 kWh within a six-month period and a price increase of 50% for consumption beyond 2,500 kWh. For the non-household category, except for public institutions and other non-profit organisations (final customers from Article 2 (3) of the *Regulation*), prices are determined for consumption levels in a six-month period: up to 250,000 kWh, from 250,000 kWh to 2,500,000 kWh, and more than 2,500,000 kWh. Each of these levels of consumption has its own prices, with the price being higher in the higher levels. This approach directly motivates final customers to reduce electricity consumption.

Within the separate bill for network usage, the distribution system operator delivers information on the current network usage charges and real electricity consumption. As separate bills for network usage are issued for final customers on medium and high voltage (these customers are also charged for peak load and excess reactive power in addition to electricity consumption), data by which to compare current electricity consumption and consumption in the same period in the previous year (measured in 15-minute intervals in numerical and graphical form) is available via the internet portal of the distribution system operators ([mjerjenje.hep.hr](http://mjerjenje.hep.hr) or [mojamreza.hep.hr](http://mojamreza.hep.hr)). The [mjerjenje.hep.hr](http://mjerjenje.hep.hr) web portal allows access to the following metering data on the consumption and production of electricity: active energy curve, register readings, and calculated delivered electricity into the distribution network. These portals can be accessed by all final customers with household category billing metering points with a connection capacity above 20 kW withdrawing from the network, all non-household final customers with an interval meter, and all electricity producers on the distribution network.



All final customers, including household customers, can also access data on readings and electricity consumption in past periods via the distribution system operator's internet portal (the *mojamreza.hep.hr* app), which also allows them to deliver meter readings.

The system operator is obligated to install a smart meter at the request of final customers or at the request of the supplier with the consent of the final customer.

With the aim of contributing to the achievement of national indicative energy efficiency targets, the **Energy Efficiency Act** set mandatory cumulative energy-saving targets in energy end-use for the second energy savings cumulation period, which will last from 1 January 2021 to 31 December 2030. The obligatory cumulative targets are met through a combination of the energy efficiency obligation system prescribed by the **Act** and alternative policy measures defined in the NECP and the *National Energy Efficiency Action Plan for the period from 2022 to 2024*.

The energy efficiency obligation system, which was introduced in 2019, obligates energy suppliers to save in one of the following ways:

- investing in measures to improve energy efficiency in final consumption sectors through measures to improve energy efficiency defined in the *Ordinance on the System for Monitoring, Measuring and Verifying Energy Savings (Official Gazette no. 33/20, 98/21, 30/22)*, without excluding investments into equipment to produce electricity and for electricity self-supply, small and micro-cogeneration facilities, smart meters for final consumers, and all other investments into measures to improve energy efficiency through which obligated parties prove new energy savings, or
- investments into energy efficiency improvement measures in the energy conversion and distribution sectors, including district heating and cooling infrastructure, or
- the purchase or transfer of energy savings from third parties, or
- paying an amount into the Environmental Protection and Energy Efficiency Fund that corresponds to the unit charge for unrealised savings multiplied by the amount of energy savings to which the obligated party is obligated.

In fulfilling the energy savings obligation, obligated parties are encouraged to increase energy efficiency as a priority in households at risk of energy poverty in the following manner:

- calculated savings resulting from measures for improving energy efficiency implemented in households in areas with developmental issues in accordance with acts regulating regional development are increased by 10%,
- calculated savings resulting from measures to improve energy efficiency implemented in households that are beneficiaries of compensation as at-risk energy customers are increased by 20%,
- calculated savings resulting from measures to improve energy efficiency implemented in households that are beneficiaries of compensation as at-risk energy customers in areas with developmental issues are increased by 30%.

The system of energy efficiency obligations is regulated in detail by the **Energy Efficiency Act** and the *Ordinance on the System for Monitoring, Measuring and Verifying Energy Savings*. The amendments to the *Ordinance* in 2022 improved the methodology for evaluating energy savings in direct consumption by applying the bottom-up method, which calculates new energy savings for individual energy efficiency measures.

The Ministry in charge of energy makes an ex officio decision defining the energy savings requirement in kWh for a particular year, and obligated parties are required to deliver reports on realised savings to the Ministry and enter data on implemented measures into the System for the Monitoring, Measuring



and Verification of Energy Savings (SMIV). For the unfulfilled part of the obligation from the previous year, the Ministry will also determine the amount that the party is obligated to pay in a lump sum into the Environmental Protection and Energy Efficiency Fund. According to the statements received by the HERA from active electricity suppliers, all active electricity suppliers who were obligated parties in 2022 fulfilled their requirements and reported them to the Ministry.

In 2022, the obligated parties were energy suppliers who delivered more than 300 GWh of electricity in 2020 (the obligation in a given year is affirmed on the basis of delivered electricity in the year before last). However, it should be emphasised that the obligation applies to energy suppliers and subsidiaries who are energy suppliers according to the definition of the term in the **Energy Efficiency Act**. Subsidiaries are obligated parties if they fulfil the criteria for the energy savings obligation as a whole.

Table 4.6.1 shows the savings obligations prescribed for active electricity suppliers in 2022; it must be noted that the obligations are not directly proportional to the sale of electricity, as the obligation is determined on the basis of the sale of all forms of energy, and each supplier can achieve certain reductions in the obligation determined by the **Energy Efficiency Act** of up to 25% of its sales. Table 4.6.1 shows that 4 suppliers fulfilled or exceeded their annual obligation by implementing their own measures, while PETROL d.o.o. and GEN-I Hrvatska d.o.o. purchased savings on the market to fulfil their obligations.

*Table 4.6.1 Savings obligations prescribed for active electricity suppliers for 2022 and implemented own measures*

Active electricity suppliers	Obligation [kWh]	Savings by implementing own measures [kWh]
PETROL d.o.o.	53,036,660	36,000,529
HEP-Opkrba d.o.o.	52,440,874	2,324,529
HEP ELEKTRA d.o.o.	45,737,257	58,489,493
E.ON Energija d.o.o.	6,712,523	12,326,105
MET Croatia Energy Trade d.o.o.	3,691,260	3,975,000
GEN-I Hrvatska d.o.o.	2,879,824	0
ENNA Opkrba d.o.o.	Not obligated	

According to the statements received by the HERA from active electricity suppliers, all the active electricity suppliers who were obligated parties in 2022 fulfilled their requirements and reported them to the Ministry.

According to the data that the HERA received from active electricity suppliers, the use of the measure M18 "Informing customers about improving energy efficiency through leaflets" has visibly increased in order to fulfil obligations. Given that investments in equipment for the production of electricity and the self-supply of energy are also considered individual energy efficiency measures, an increase in the savings achieved by these measures is expected in the coming period, given that several electricity suppliers significantly intensified the advertising of offers for the construction of solar power plants in 2022.

HEP ELEKTRA d.o.o. and HEP-Opkrba d.o.o. realised significant savings on the basis of paying solidary charges in place of its customers and reduced income on the basis of write-offs in earthquake-affected areas in accordance with Article 19 of the *Ordinance on the System for Monitoring, Measuring,*



*and Verifying Energy Savings.* Based on that article, HEP Elektra d.o.o. achieved 16,470,221 kWh of savings, while HEP-Opkrba d.o.o. realised 2,324,529. kWh of savings. The 18,796,772 kWh of savings in 2022 due to the aforementioned measures are significantly less than in 2021, when the savings were 106,194,316 kWh.

HEP d.d. and its subsidiaries are related parties in terms of the energy efficiency obligation system, in which HEP d.d. was the holder of the unified report on realised savings. In 2022, the Ministry set savings obligations for HEP d.d.'s subsidiaries in the total amount of 119.2 GWh, of which 52.4 GWh for HEP-Opkrba d.o.o and 45.7 GWh for HEP ELEKTRA d.o.o.; the remainder related to two energy suppliers under HEP d.d. (HEP-Plin d.o.o. and HEP-Toplinarstvo d.o.o.). HEP d.d. and its subsidiaries exceeded their savings obligation by 2,057,016 kWh in 2022.

In connection with the offers of electricity suppliers for the construction or financing of the construction of solar power plants, i.e. energy efficiency measures that require significant investments, it is necessary to point out that the **Energy Efficiency Act** prescribes that obligated parties, when fulfilling their energy efficiency obligation, must not create barriers to their customers related to switching to other energy suppliers. The HERA has not yet received any complaints regarding this issue.

Table 4.6.2 shows data on energy savings and carbon dioxide (CO<sub>2</sub>) emissions savings realised by electricity suppliers by implementing their measures in 2022. The total savings of these entities were 113 GWh and 20,191 tonnes of CO<sub>2</sub> emissions. Furthermore, Table 4.6.3 and Table 4.6.4 show data on energy savings and carbon dioxide emissions savings that the energy entities from Table 4.6.2 realised by sector.

It is evident from the data that electricity suppliers predictably implement measures that are complementary to their activities (informing final customers about energy use and measures aimed at installing devices at the premises of final customers). The exception, which is not unexpected, is the electricity supplier PETROL d.o.o., which achieved savings through traffic-related activities.



Table 4.6.2 Data on the energy savings and carbon dioxide (CO<sub>2</sub>) emissions savings realised by electricity suppliers through their own measures in 2022, by type of energy savings measure

Suppliers through own measures	E.ON Energija d.o.o.	HEP ELEKTRA d.o.o.	HEP-Opkrba d.o.o.	MET Croatia Energy Trade d.o.o.	PETROL d.o.o.
Type of measure					
<b>Energy savings [kWh]</b>					
Adding additives to diesel fuel (HRN EN 590) (T9)	-	-	-	-	15,522,891
Adding additives to petrol (HRN EN 228) (T10)	-	-	-	-	20,477,638
Solar photovoltaic modules (M16)	7,146,789	-	-	-	-
Informing customers about improving energy efficiency through leaflets (M18)	3,165,031	42,019,272	-	3,975,000	-
Installation or replacement of lighting systems in service and industrial sector buildings (M10)	1,317,906	-	-	-	-
Measure undefined in the methodology (M99)	-	16,470,221	2,324,529	-	-
Introduction of advanced (smart) metering systems to monitor the consumption of electricity and thermal energy, gas-derived energy and water consumption (M24)	696,380	-	-	-	-
<b>Total</b>	<b>12,326,105</b>	<b>58,489,493</b>	<b>2,324,529</b>	<b>3,975,000</b>	<b>36,000,529</b>
<b>CO<sub>2</sub> savings [t]</b>					
<b>Total</b>	<b>2,120</b>	<b>6,882</b>	<b>0</b>	<b>1,093</b>	<b>10,096</b>





*Table 4.6.3 Data on the energy savings (kWh) realised by electricity suppliers through their own measures in 2022, by electricity consumption sector*

Suppliers through own measures	Sector				Total
	Industry	Households	Transport	Commercial service sector	
E.ON Energija d.o.o.	1,317,906	4,983,824		6,024,375	12,326,105
HEP ELEKTRA d.o.o.		58,489,493			58,489,493
HEP-Opkrba d.o.o.		2,324,529			2,324,529
MET Croatia Energy Trade d.o.o.		3,975,000			3,975,000
PETROL d.o.o.			36,000,529		36,000,529
<b>Total</b>	<b>1,317,906</b>	<b>69,772,846</b>	<b>36,000,529</b>	<b>6,024,375</b>	<b>113,115,656</b>

*Table 4.6.4 Data on the CO<sub>2</sub> emissions savings (t) realised by electricity suppliers through their own measures in 2022, by electricity consumption sector*

Suppliers through own measures	Sector				Total
	Industry	Households	Transport	Commercial service sector	
E.ON Energija d.o.o.	210	922	-	989	2,120
HEP ELEKTRA d.o.o.	-	6,882	-	-	6,882
HEP-Opkrba d.o.o.	-	0	-	-	0
MET Croatia Energy Trade d.o.o.	-	1,093	-	-	1,093
PETROL d.o.o.	-	-	10,096	-	10,096
<b>Total</b>	<b>210</b>	<b>8,897</b>	<b>10,096</b>	<b>989</b>	<b>20,191</b>

According to the **Energy Efficiency Act**, measures to improve the energy efficiency achieved in the transmission and distribution of electricity are considered alternative policy measures by which to achieve part of the mandatory cumulative energy savings goal. Also, HOPS and HEP-ODS are required to enter such energy efficiency improvement measures into the SMIV.

As stated at the beginning of this chapter, the *Draft Ten-year development plan for the transmission network 2023-2032, with a detailed elaboration of the initial three- and one-year periods* and the *Draft Ten-year (2023-2032) development plan for the distribution network, with a detailed elaboration of the initial three- and one-year periods* contain measures that HOPS and HEP-ODS will implement with the aim of improving energy efficiency. The measures stated in the ten-year development plans elaborate on the measures listed tentatively in the *Integrated National Energy and Climate Plan for the Republic of Croatia for 2021-2030* (hereinafter: the *NECP*) and the *National Energy Efficiency Action Plan for*



*the period from 2022 to 2024* (measures: “ENU-15: Energy Efficiency of the Electricity Transmission System” and “ENU-16: Reduction of losses in the electricity distribution network and introduction of advanced networks”). The verified measures of HOPS and HEP-ODS are included in the alternative measures.

The special feature of the implementation of alternative measures is the complex calculation of savings for each individual savings. In 2022, HOPS drafted the following documents for entering data into the SMIV:

- Report on energy savings realised by replacing transformers at TE Sisak,
- Report on energy savings realised by replacing transformers at TS 110/35 kV Daruvar, and
- Report on energy savings realised by replacing the 110 kV submarine cable Crikvenica - Krk.

In accordance with the reports, savings of 70,682 kWh were achieved in 2022, that is, 12,780,908 kWh in the 30-year lifetime of the measure.

In addition to alternative measures, HOPS and HEP-ODS also implemented individual measures. HOPS implemented one measure of installing a solar power plant for its business complex's own needs, and HEP-ODS reported 33 energy efficiency measures implemented on business buildings.

5

# NATURAL GAS





# 5. NATURAL GAS

## 5.1. Energy entities in the gas sector

The regulation of energy activities is established for the purpose of implementing a system of regulated activity of energy entities in the performance of energy activities, especially those energy activities that are performed as public services and in the public interest on the one hand, and for the purpose of establishing and regulating the energy market on the other hand, all in accordance with the provisions of the law regulating the energy sector and other laws regulating individual energy markets.

Gas market participants include gas producers, gas system operators (transport system, distribution system, gas storage system and LNG terminal), gas suppliers and traders, the gas market organiser and final customers. The aforementioned participants, with the exception of final customers, who are organised as legal or natural persons, can only perform energy activities on the basis of a licence to perform the corresponding activity, which is issued by the HERA.

Energy activities on the gas market are divided into regulated and market activities. Regulated energy activities are considered to be those that are performed as public services for which the terms and conditions, which may include the price/charge/tariff for the performance of the service and service quality, are determined by the HERA, while market energy activities are performed based on market principles, i.e. gas prices in market activities are freely contracted.

Performance of energy activities as a public service is regulated by the **Energy Act**. The public service is defined as a service available at all times to final customers and energy entities at a regulated price and/or under regulated conditions for access to and use of the energy service. Such a service must be available, sufficient and sustainable, taking into account the safety, regularity and quality of the service, environmental protection, the efficiency of energy utilisation, and climate protection, and it is performed according to the principles of transparency and impartiality and supervised by the competent authorities.

The **Gas Market Act** prescribes which energy activities in the field of gas are performed as market activities:

- natural gas production,
- management of the supply point for LNG and/or CNG,
- gas trade, and
- gas supply to final customers in the gas market,

which are regulated activities, i.e. as a public service:

- gas transmission,
- gas distribution,
- gas storage,
- management of the LNG terminal,
- gas market organisation,
- gas supply within the public service obligation and guaranteed gas supply.

The activities of transmission system operators, distribution system operators, gas storage system operator, and LNG system operator, including operators that are part of a vertically integrated energy entity, must be organised into legal entities independently of other activities in the gas sector pursuant to the provisions of the **Gas Market Act** on the unbundling of energy activities.



In 2022, the energy activity of gas transmission was performed by the energy entity PLINACRO d.o.o., the energy activity of gas storage was performed by the energy entity Podzemno skladište plina d.o.o., and the energy activity of LNG terminal management was performed by the energy entity LNG Hrvatska d.o.o.

In 2022, the energy activity of gas distribution was performed by 31<sup>87</sup> energy entities, and the activity of gas supply was performed by 42 out of 49 licensed energy entities. Of the 31 distribution system operators, 10 were organised as independent legal entities engaged for gas distribution alone, whereas 21 energy entities were organised as vertically integrated legal entities with fewer than 100,000 consumers and were active in both gas distribution and gas supply. The structure of the energy entities in the gas sector as of 30 April 2023 with respect to their energy activities and unbundling requirements pursuant to the **Gas Market Act** is shown in Figure 5.1.1.

In accordance with the **Gas Market Act**, the HERA conducted a public tender from October to December 2020 to select the gas suppliers with a public service obligation for household final customers for the period from 1 April 2021 to 30 September 2024 for all distribution areas in the Republic of Croatia. On the basis of the tender, in its decisions of 11 December 2020, the HERA selected suppliers with a public service obligation for 33 distribution areas in the Republic of Croatia for the period from 1 April 2021 to 30 September 2024. As a result of the tender, the public gas supply service in the Republic of Croatia in the period from 1 April 2021 was performed by 14 gas suppliers, while the public gas supply service in the Republic of Croatia at the time of writing the report is performed by 11 gas suppliers due to the permanent revocation of the licence for gas supply of three energy entities.

**The Gas Market Act** prescribes consumer protection measures for all final customers via the right to guaranteed supply. The role of a guaranteed supplier is to provide public gas supply services to final customers left without a supplier under specific conditions, over a limited period and under regulated circumstances. The regulated conditions of guaranteed gas supply, among other things, include the application of the final price of guaranteed supply, which is determined in accordance with the *Methodology for setting tariffs for public service gas supply and guaranteed supply*.

In March 2022, the HERA adopted the *Decision* designating HEP-PLIN d.o.o. the guaranteed supplier of gas in Croatia in the period from 10 March 2022 to 30 September 2024.

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<sup>87</sup> Based on the Merger Agreement concluded between HEP-PLIN d.o.o. and the company PAKRAC-PLIN d.o.o. of 2 November 2022. The Commercial Court in Osijek issued the Decision on the Merger of PAKRAC-PLIN d.o.o. and the company HEP-PLIN d.o.o. on 30 November 2022.





## 5.2. Regulation of the legal framework for the natural gas market

As the Croatian national independent regulatory body, the HERA regulates energy activities in the Republic of Croatia in accordance with the national legal framework and EU law. The HERA's obligations related to the gas market are stipulated in the following laws: **Act on the Regulation of Energy Activities, Energy Act, Gas Market Act, Act on the Liquefied Natural Gas Terminal**, and by-laws adopted pursuant to these laws.

Below is an overview of the by-laws and decisions adopted by the HERA during 2022 and at the beginning of 2023, as well as by-laws approved by the HERA, all with the aim of continuously improving the functioning of the gas market in the Republic of Croatia. Also, an overview of the measures and activities undertaken in the Republic of Croatia, as well as the EU, with the aim of eliminating the consequences of disturbances on the gas market, is included.

### Amendments to the General Terms and Conditions of Gas Supply (Official Gazette no. 103/22)

The HERA adopted the *Amendments to the General Terms and Conditions of Gas Supply* in September 2022. The HERA previously, from 27 July to 23 August 2022, held a public consultation in which a total of nine energy entities submitted comments and proposals for the revision of the Draft Amendments to the General Terms and Conditions.

The *Amendments to the General Terms and Conditions* mostly refer to the improvement of the provisions on gas quality standards, registers of billing metering points and the quality of gas supply.

The adopted *Amendments to the General Terms and Conditions* prescribe a minimum methane number of 70, which enables the acceptance of LNG from a larger number of countries, i.e. a greater diversification of supply routes, which certainly contributes to increasing the security of the gas supply.

With regard to the register of billing metering points, the Amendments additionally prescribe the right of access of the head of the balancing group to collective data on the intermediate members of the balancing group, i.e. data on the total number of billing metering points through which gas is supplied to the intermediate members of the balancing group organised and managed by the head of the balancing group. The right is detailed by system operator, hydraulic unit, transmission system user, gas supplier, tariff model of the billing metering point and the right to supply within the public service obligation and the status of using the public gas supply service of the final customer at the billing metering point.

With regard to gas supply, the *Amendments to the General Terms and Conditions* clarify and prescribe in more detail the gas suppliers' rights to compensation in case of a failure to meet the guaranteed standard.

### Amendments to the Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette no. 20/22)

The extremely unstable prices and manifold price increases on the European wholesale gas markets during 2021 and 2022 resulted in an increase in gas sales prices for non-household final customers beyond the limits of the guaranteed supply price range provided by the previously valid *Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette no. 108/20)*. For this reason, in February 2022, after a public consultation during which a total of four energy entities made comments and proposals for the revision of the Draft Amendments to the Methodology, the HERA adopted the *Amendments to the Methodology for setting tariffs for public*



*service gas supply and guaranteed supply (Official Gazette no. 20/22) (hereinafter: Amendments to the Methodology).*

*The Amendments to the Methodology* prescribe a new way of determining the final price of guaranteed supply for non-household final customers by reflecting current market trends on a three-month basis. As a result of the *Amendments to the Methodology*, which changed the conditions under which guaranteed supply was provided, a public tender to determine a new guaranteed supplier of gas was undertaken.

### Decision on the adoption of the Decision on the harmonisation of procedures related to switching the gas supplier with the Gas Market Act and the General Terms and Conditions of Gas Supply, of the energy entity Gradska plinara Zagreb-Opkrba d.o.o., Zagreb (the HERA 9/22)

In view of the numerous inquiries and complaints received from household final customers in relation to the actions of the energy entity GRADSKA PLINARA ZAGREB-OPSKRBA d.o.o. (hereinafter: GPZ-OPSKRBA) in connection with the process of switching the gas supplier, or returning from the market service to the public gas supply service, on 14 September 2022, the HERA issued the aforementioned *Decision* and ordered GPZ-OPSKRBA to do the following:

- to initiate the process of switching the gas supplier for all billing metering points of household final customers for which it received application forms for switching the gas supplier signed by the final customers as soon as possible, namely, for applications received by 14 September 2022 no later than 20 September 2022, and for applications received after 14 September 2022, no later than 5 days from the date of receiving the application,
- to enable the electronic submission of applications for switching the gas supplier and to provide simple and easy access to information on switching the gas supplier, to the e-mail address for submitting applications for switching the gas supplier and the link for downloading the application form for switching the gas supplier within three days from the date of receiving the said *Decision*,
- to submit to the HERA a list of household final customers who submitted applications for switching the gas supplier by the date of receiving the *Decision* within seven days from the date of receiving the said *Decision*.

### Decision on the start of providing public gas supply services to final customers of the household category with a terminated gas supply contract (the HERA 9/22)

As a result of numerous cases of the expiry or termination of gas supply contracts by gas suppliers on 30 September 2022, and problems observed during the return of customers to the public gas supply service, on 23 September 2023, the HERA adopted the aforementioned *Decision* with the aim of protecting household customers and ensuring the safety, regularity and quality of the gas supply in accordance with the *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22 and 106/22)*.

The *Decision* prescribes the necessary steps and obligations of the gas market participants so that customers from the household category could start using the public gas supply service at a regulated price from 1 October 2022. The change of supplier and the start of providing public gas supply services to household final customers with a gas supply contract terminated during the validity of the *Regulation* is carried out automatically in accordance with this *Decision*. The *Decision* stipulates that, for all customers whose contract ceased to be valid on 30 September 2022 due to the expiry or termination of the contract by the supplier, the supplier was obliged to inform the customers about the cessation or termination of the contract and the transition to the public gas supply service on its website and through public media by 27 September 2022, and to update the





data on the date of cessation of gas delivery in the register of metering points by the same date. If the customer's contract expired or was terminated after 30 September 2022 or was concluded for an indefinite period, the gas suppliers were obliged to inform these customers by 27 September 2022 on their websites and through public media in a clear and comprehensible manner of their right to terminate the contract and return to public service and invite customers to inform the supplier of their choice as soon as possible by telephone, in writing or by e-mail, whereby if the customer's choice was to return to public service, the existing gas supplier had to update the data on the date of cessation of gas delivery in the register of billing metering points without delay so that the supplier would be switched automatically.

### Binding decision for energy entities for the application of the General Terms and Conditions of Gas Supply and the Gas Distribution System Network Code regarding the calculation of the delivered gas energy (the HERA 11/22)

Following the process of harmonisation with the practice in EU member states in connection with the calculation of delivered gas energy, with the *Amendments to the General Terms and Conditions of Gas Supply (Official Gazette no. 100/21, 103/22)* and the *Amendments to the Gas Distribution System Network Code (Official gazette no. 100/21)* the terms of calculation, and thus the billing of supplied gas, were changed. When calculating the supplied gas, instead of the previously used net calorific value of gas Hd (NCV), from 1 October 2022, the gross calorific value of gas Hg (GCV) is applied.

With the aim of the unequivocal application of the calculation of the supplied gas energy by all gas market participants, and with regard to the method of applying the gas volume correction factor when calculating the supplied gas energy and showing the calculation on the invoice for the supplied gas, in November 2022, the HERA adopted the aforementioned binding Decision.

### Decision on the determination of the Draft Decision on issuing a certificate to the gas storage system operator, the company PODZEMNO SKLADIŠTE PLINA d.o.o., Zagreb (HERA 2/23)

In February 2023, the HERA established a draft decision on issuing a certificate to the gas storage system operator, the energy entity PODZEMNO SKLADIŠTE PLINA d.o.o., based on Article 14 (1) of the **Act on the Regulation of Energy Activities (Official Gazette no. 120/12 and 68/18)** and Article 2 of the *Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage*, which was submitted to the European Commission for its opinion. Namely, the HERA's obligation according to *Regulation (EU) 2022/1032* was to issue a draft decision on certification, and with regard to the criterion according to which certification is mandatory for gas storage systems with a capacity of over 3.5 TWh where total storage facilities were filled on 31 March 2021 and on 31 March 2022 at a level that, on average, was less than 30% of their maximum capacity.

### Decision on the introduction of the mechanism referred to in Article 14 (7) of Council Regulation (EU) 2022/2576 of 19 December 2022 enhancing solidarity through the better coordination of gas purchases, reliable price benchmarks and exchanges of gas across borders (HERA 3/23)

In March 2023, the HERA adopted the *Decision on the introduction of the "use it or lose it" mechanism for a continuous day-ahead capacity at all interconnection points of the gas transmission system of the Republic of Croatia* based on Article 14 of *Council Regulation (EU) 2022/2576 of 19 December 2022 enhancing solidarity through the better coordination of gas purchases, reliable price benchmarks and exchanges of gas across borders* (hereinafter: *Regulation (EU) 2022/2576*) and Article 14 (1) of the **Act on the Regulation of Energy Activities (Official Gazette no. 120/12 and 68/18)**.



In order to achieve a higher degree of use of the long-term contracted capacities of transmission systems on interconnections within the European Union, i.e. in order to enable the largest possible gas flows, *Council Regulation (EU) 2022/2576* provides new rules that enable operators of the transmission system to undertake the automated and accelerated marketing of unused long-term transmission capacities. This Regulation foresees the possibility of monitoring the capacity utilisation of the transmission system from previous months and offering unused capacity as free for re-contracting by other users at the next monthly auction. Alternatively, the possibility of applying one of the three mechanisms that can be used for contractual congestion is foreseen, in which case an analysis of the expected effects, a decision of the national regulator and consultation with the regulatory bodies of all the neighbouring member states is necessary for the mentioned possibility.

Following the above, based on the analysis of the proposal of the transmission system operator PLINACRO d.o.o. and after consultation with all the regulatory bodies and operators of related transmission systems, the HERA adopted the aforementioned *Decision*.

The decision stipulates that, starting from 31 March 2023, the contracted and unused day-ahead capacities at all interconnection points in both directions, whether congested or not, will be offered for use to the market participants. The mechanism covers all users of the transmission system who have a total reserved capacity of more than 10% of the total technical capacity in the past gas year at an individual interconnection point. This enables an optimal and uniform approach to a more effective utilisation of transmission capacities at interconnection points, which is also important in balancing the transmission system during conditions of changed gas flows and the need for a quick reaction to changes in gas flows.

### Amendments to the Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette no. 38/23)

The HERA adopted the *Amendments to the Methodology for setting tariffs for public service gas supply and guaranteed supply* in April 2023. A public consultation about the Draft Amendments to the Methodology was conducted from 8 March to 14 March 2023, and an additional public consultation from 17 March to 26 March 2023. During the public consultation, six energy entities submitted their remarks and proposals for the revision of the Draft Amendments to the Methodology.

In the *Amendments to the Methodology*, the 2023/2024 regulatory year, which was previously set to last from 1 April 2023 to 30 September 2024, is divided into two periods, whereby the 2023/2024 regulatory year begins on 1 April 2023 and ends on 31 March 2024, and the 2024 regulatory year lasts from 1 April 2024 to 30 September 2024. The final price of the gas supply according to the *Amendments to the Methodology* is determined for each of the 2023/2024 regulatory years separately, thus shortening the period for which a decision on the amount of tariff items for the public gas supply service is made, i.e. enabling the determination of the gas procurement cost as a component of the final gas price separately for each of the periods.

In accordance with the determination of the duration of the 2023/2024 regulatory year and with the period for which the final gas supply price is determined, in the *Amendments to the Methodology*, the HERA amended the provisions related to the formula for determining the gas procurement cost. The new formula determines the gas procurement cost reflecting the current prices of forward contracts on the reference TTF market for gas supply in the third quarter and in the winter season of the 2023/2024 regulatory year, as well as the prices of forward contracts that will be current immediately before the start of the 2024 regulatory year when the decision on the final price of gas supply for the 2024 regulatory year is made. The use of the modified cost of gas procurement when determining the final gas supply price will result in the final gas price for households for the 2023/2024 regulatory year, which will not be affected by the significant fluctuations in gas prices caused by disruptions on the European gas markets, which were particularly pronounced in the second half of 2022.



In 2022, the HERA approved the following by-laws:

### Amendments to the Network Code for the Gas Transmission System (Official Gazette no. 58/22)

In May 2022, the transmission system operator PLINACRO d.o.o. adopted the *Amendments to the Network Code for the Gas Transmission System* with the HERA's approval, which amended the code with the aim of introducing a new, improved capacity contracting model at the entrances and exits of the transmission system. The *Amendments to the Network Code* were adopted with the aim of significantly relieving the administrative burden of both the users and the operators of the transmission system.

In accordance with the provisions of the Gas Market Act, in the process of adopting the Draft Amendments to the Network Code for the Gas Transmission System, PLINACRO d.o.o. ensured the appropriate participation of all interested parties and conducted a public consultation in the period from 25 April to 10 May 2022, during which no objections or proposals were received to refine the Draft Amendments to the Network Code.

### Rules on Amendments to the Rules for LNG Terminal Use (Official Gazette no. 72/22)

The LNG terminal operator LNG Hrvatska d.o.o. adopted the *Rules on Amendments to the Rules for LNG Terminal Use* in June 2022 with the HERA's approval. The need to adapt and amend the current *Rules* arose as a result of significant changes in the energy market and, consequently, the determined possibility of increasing the capacity of the LNG terminal and providing the non-standard service of reloading LNG from a floating unit for receiving, storing and gasifying LNG into trucks for transporting LNG.

In accordance with the provisions of Article 93 (4) of the **Gas Market Act**, in the process of adopting the *Rules on Amendments to the Rules for LNG Terminal Use*, LNG Hrvatska d.o.o. ensured the appropriate participation of all interested parties and conducted a public consultation in the period from 1 June to 15 June 2022, during which two proposals to refine the Draft Amendments to the Rules were received.

### Amendments to the Rules on Gas Storage System Use (Official Gazette no. 111/22)

The gas storage system operator Podzemno skladište plina d.o.o., with the HERA's approval, adopted the *Amendments to the Rules on Gas Storage System Use* in September 2022. The *Amendments to the Rules on Gas Storage System Use* harmonise the previously valid *Rules* with the provisions of the *General Terms and Conditions of Gas Supply (Official Gazette no. 50/18, 88/19, 39/20, 100/21 and 103/22)*, the provisions of the *Transmission System Network Code (Official Gazette no. 50/18, 31/19, 89/19, 36/20, 106/21 and 58/22)*, and the provisions of the *Gas Distribution System Network Code (Official Gazette no. 50/18, 88/19, 36/20 and 100/21)* for the purpose of harmonisation with the European regulations and guidelines for the establishment of a single European gas quality standard and with *Commission Regulation (EU) 2015/703 of 30 April 2015 establishing a network code on interoperability and data exchange rules*, as well as with the practice in EU member states regarding the calculation of supplied gas energy expressed using the gross calorific value of gas (Hg), instead of the net calorific value of gas (Hd).

In accordance with the **Gas Market Act**, in the process of adopting the *Amendments to the Rules on Gas Storage System Use*, Podzemno skladište plina d.o.o. ensured the appropriate participation of all interested parties and conducted a public consultation in the period from 2 September to 16 September 2022, during which one proposal to refine the Draft Amendments to the Rules was received.



## Amendments to the Rules on the Organisation of the Gas Market (Official Gazette no. 154/22)

The Croatian energy market operator HROTE d.o.o. adopted the *Amendments to the Rules on the Organisation of the Gas Market* with the HERA's approval in December 2022. Based on the analysis of the situation on the gas market, which has become even more dynamic and exposed to potential disruptions with political restrictions on imports and the need to diversify supply routes, HROTE d.o.o. assessed that the current *Rules* need to be amended in a way that contributes to the stability and liquidity of the gas market organisation model, both in terms of operations within balance groups and between balance groups, and especially in business transactions with HROTE. The *Amendments to the Rules* regulate in more detail the obligations and responsibilities of balance group members if their balance group manager is deleted from the Register of Balance Group Managers. It is also stipulated that a billing metering point of a final customer can only belong to one balance group, unless a special regulation for a particular case prescribes otherwise.

Also, the *Amendments to the Rules* were adopted due to the need to prescribe additional assurance of the stability of the financial flow in the collection of fees for the daily imbalance of a market operator in relation to the balance group, as well as of a balance group in relation to the market operator. In this regard, the *Amendments to the Rules* introduce the General Terms and Conditions of the Mutual Relations Agreement with the Balance Group Manager as a separate appendix and regulate the mutual relations of all energy entities on the gas market in more detail. Furthermore, the *Amendments to the Rules* prescribe new obligations and rules for the delivery of bank guarantees and additional means of insurance for the financial exposure of individual balance group managers.

### 5.2.1. Gas market disturbances – measures and activities in the Republic of Croatia

In view of the significant increase in gas prices on the market and the resulting disturbances on the gas market, as well as the increased concern about the security of the gas supply, in April 2022, the Minister of Economy and Sustainable Development, at the proposal of the Crisis Team responsible for the implementation of the Intervention Plan on Measures to Safeguard the Security of the Gas Supply of the Republic of Croatia, adopted the *Decision on the proclamation of an early warning regarding the level of crisis state in the protection of the security of the gas supply of the Republic of Croatia (Official Gazette no. 49/22)*, which declared an early warning related to the levels of a crisis situation for the protection of the security of the gas supply of the Republic of Croatia, given the existence of concrete, serious and reliable information on the possibility of an event that could result in a significant deterioration of the supply situation and that could trigger the activation of alert levels or emergency levels.

Due to the disturbances in the domestic energy market and high gas prices on the European gas markets, on 16 February 2022, the Government of the Republic of Croatia adopted a package of measures to mitigate the rise in energy prices. A comprehensive package of measures in the amount of HRK 4.8 billion included assistance to households, entrepreneurs and farmers. The package of measures to mitigate the rise in gas prices included, among other things, assistance to households that use gas by subsidising part of the final gas price, and by reducing VAT on gas from 25% to 5% until 31 March 2023.

In accordance with the package of measures, at the session held on 9 March 2022, the Government of the Republic of Croatia adopted the *Decision on subsidising part of the end price of gas supply for households and non-households with an annual gas consumption of up to 10 GWh*. The decision determined the amount and procedure for subsidising part of the end price of gas supply for household final customers and micro, small and medium-sized businesses as non-household final customers. In the period from 1 April 2022 to 31 March 2023, the final price of gas



supply for household final customers was subsidised in the amount of HRK 0.10/kWh, and the final price of gas supply for non-household final customers was subsidised in the amount of HRK 0.15/kWh.

In order to ensure a sufficient supply of gas in the territory of the Republic of Croatia in accordance with *Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage*, which, among other things, prescribes the targets for filling underground gas storage facilities for the year 2022, on 3 June 2022, the Government of the Republic of Croatia adopted the *Decision on securing gas supplies on the territory of the Republic of Croatia (Official Gazette no. 63/22)* by which the company HEP d.d. is tasked with providing 270.83 million m<sup>3</sup> of gas, and to inject this quantity into the gas storage system of the operator Podzemno skladište plina d.o.o. Namely, according to the aforementioned *Decision*, the users of the gas storage system were obliged to fill the gas storage in the amount of 63% of their total leased gas storage capacity by 1 August 2022, and 74% of their total leased storage capacity by 1 October 2022.

Given that not all users of the gas storage system expressed interest in filling the leased storage capacity to the prescribed level, they left part of their capacity to HEP d.d., which had the obligation to use them and fill them up to the prescribed level in order to ensure sufficient gas supplies until 31 March 2023.

Furthermore, in September and October 2022, the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22, 106/22, 121/22 and 156/22)*, which, among other things, prescribed special measures for gas trade, the method and conditions for forming gas prices and ensuring conditions for the security of the gas supply, for the period from 1 October 2022 to 31 March 2024. The *Regulation* stipulates that, in order to ensure the supply and availability of natural gas in the Republic of Croatia during the term of the *Regulation*, INA d.d. shall sell all the natural gas produced in the Republic of Croatia to the company HEP d.d., as well as the price at which the produced gas shall be sold to HEP d.d.

The company HEP d.d. further disposes of the gas taken over for the needs of distribution system operators in order to settle losses for gas distribution, for customers of thermal energy from an independent heating system, for the public supply service for the needs of customers from the household category and for certain gas customers from the business category.

Pursuant to the adopted *Regulation*, on 19 October 2022, the Government of the Republic of Croatia adopted the *Decision on the price and allocation of natural gas capacities taken over by Hrvatska elektroprivreda d.d. from natural gas producers (Official Gazette no. 122/22)*. The *Decision* prescribes the price at which HEP d.d. shall sell gas to distribution system operators for the purposes of loss settlement, for the needs of customers of thermal energy from an independent thermal system, to suppliers with a public service obligation for the purposes of public service and to the company HEP-PLIN d.o.o. for the needs of supplying customers from a certain business category, as well as the estimated quantities of gas for the specified categories, during the term of the *Regulation*, namely, the period from 1 October 2022 to 31 March 2024.

Furthermore, the Government of the Republic of Croatia adopted the new *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 31/23)* on 16 March 2023, which extended the application of special and temporary measures for the period from 1 April 2023 to 31 March 2024. The *Regulation* adopted in March 2023 stipulates that INA d.d. shall sell all gas produced in the Republic of Croatia to HEP d.d., at a price in accordance with the *Methodology for setting tariffs for public service gas supply and guaranteed supply*, which applies from 1 April 2023 to 31 March 2024.

In accordance with the provisions of the *Regulation* from March 2023, the company HEP d.d. shall sell the gas supplied by the company INA d.d. for the needs of distribution system operators in order to settle losses for gas distribution, for customers of thermal energy from an independent heating system, for the public gas supply service for the needs of customers from the household category and for certain gas customers from the business category and for the purpose of settling



gas losses in the transmission system and for the operational consumption of technological facilities of the transmission system.

Also, on 16 March 2023, the Government of the Republic of Croatia adopted a new *Decision on subsidising part of the end price of gas supply for households and non-households with an annual gas consumption of up to 10 GWh (Official Gazette no. 31/23)*, for the period from 1 April 2023 to 31 June 2024.

The Decision on subsidising prescribes subsidising the end price of gas supply for final customers from the household category, up to the amount of the gas price difference of 0.0277 EUR/kWh up to the amount determined by the *Methodology for setting tariffs for public service gas supply and guaranteed supply* applied from 1 April 2023 to 31 March 2024, and subsidising the final price of gas supply for non-household customers in the amount of 0.0199 EUR/kWh.

At the session held on 30 March 2023, the Government of the Republic of Croatia adopted the new *Decision on securing gas supplies on the territory of the Republic of Croatia for the 2023/2024 heating season (Official Gazette no. 37/23)*, which stipulates that the gas stock procured in accordance with the *Decision on securing gas supplies on the territory of the Republic of Croatia (Official Gazette no. 63/22)* in the amount of 270.83 million m<sup>3</sup>, at the disposal of the company HEP d.d. for the needs of supplying household customers within the public service, for customers of thermal energy from an independent heating system and for other protected gas customers from the *Regulation on the criteria for acquiring the status of a protected consumer in gas supply crisis situations (Official Gazette no. 65/15)* for the 2023/2024 heating season in the period from 1 November 2023 to 31 March 2024.

## 5.2.2. Gas market disturbances – measures and activities in the EU

After Russia invaded Ukraine on 24 February 2022, the situation with energy prices in the EU worsened. For this reason, the Commission adopted a new communication on 8 March 2022 – the *REPowerEU: Joint European Action for more affordable, secure and sustainable energy COM/2022/108*. With this document, the Commission proposed a draft plan under which Europe would become independent of Russian fossil fuels well before 2030. In this plan, in addition to measures to restore gas supplies for the winter of 2022/2023, a number of measures are stated as a response to the ever-increasing energy prices in the EU. In addition to the package of measures that had been adopted in October 2021, which contained a series of measures that member states could take in order to mitigate the impact of high prices on vulnerable consumers, with this document, the Commission presented additional guidelines that gave member states the possibility to regulate prices in exceptional circumstances and determined the way in which revenues from high profits in the energy sector and revenues from emissions trading can be redistributed to consumers. This Communication established new measures for increasing green energy production, diversifying supply and reducing demand, with an emphasis on gas.

On 23 March 2022, the Commission presented the communication *Security of supply and affordable energy prices: Options for immediate measures and preparing for next winter COM/2022/138*. In this Communication, the Commission presented options for market interventions at the European and national level. The Commission announced the establishment of a Task Force on common gas purchases at the EU level. By pooling demand, the Task Force would facilitate and strengthen the EU's international outreach to suppliers, with a view to securing well-priced energy ahead of next winter.

On 18 May 2022, the Commission adopted two communications: the communication *REPowerEU Plan COM/2022/230* and the communication *EU 'Save Energy' COM/2022/240*. The communication "*REPowerEU Plan*" is a continuation of the document dated 8 March 2022 entitled "*REPowerEU: Joint European Action for more affordable, secure and sustainable energy*" in which the Commission called for an accelerated but gradual abolition of imports of Russian fossil fuels and accelerated implementation of the European Green Plan.



The REPowerEU plan is an upgrade of the “Fit for 55” package of proposals from 2021 and a supplement to the measures for the security of supply and storage from spring 2022. It does not change the main ambitions of that package (to achieve a reduction of net greenhouse gas emissions of at least 55% by 2030 compared to 1990, and complete climate neutrality by 2050). The main directions of action within the REPowerEU Plan are energy saving by promoting energy efficiency, diversification of energy supply and the rapid replacement of fossil fuels with energy from renewable sources, i.e. the accelerated transition of Europe to clean energy in households, industry and energy production.

Given that saving energy is the fastest and cheapest way to solve the current energy crisis and reduce bills, the Commission proposed the improvement of long-term energy efficiency measures, including increasing the binding energy efficiency target from 9% to 13%.

In line with the above, the Commission published a document entitled “Communication from the Commission *EU ‘Save Energy’*” which outlines short-term behavioural changes that could reduce the demand for gas and oil by 5% and encourages the EU member states to launch communication campaigns aimed at households and industry. It is also proposed that member states should apply fiscal measures to encourage energy saving, such as lowering the VAT rate on energy-efficient heating systems, the thermal insulation of buildings and energy-efficient devices and products. The Commission also established extraordinary measures in the event of a serious disruption in supply, and the plan also provides guidelines on criteria for determining priorities for consumers and for the preparation of a coordinated plan to reduce demand at the EU level.

On 29 June 2022, the European Parliament and the Council adopted *Regulation (EU) 2022/1032 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage*. This Regulation, which has been in force since 1 July 2022, introduced the obligation to fill European gas storage facilities before the winter of 2022. In particular, the 18 member states with underground gas storage facilities were required to fill 80% of their storage capacity by 1 November 2022. For 2023 and the following years, the target is 90% by 1 November. For 2023 and the following years, each EU member state with underground gas storage must submit a draft loading curve together with transitional targets for February, May, July and September to the Commission by September 15 of the previous year. Member states without storage infrastructure must conclude, in the spirit of solidarity, bilateral agreements for storing sufficient quantities of gas for their own needs in neighbouring countries. Gas storage facilities are starting to be considered critical infrastructure, and all gas storage system operators in the EU will have to undergo a certification process.

On 20 July 2022, the Commission issued the communication “*Save gas for a safe winter*” COM/2022/360. This Communication reviews the current situation and the steps that have already been taken, as well as outlining the tools that the EU has available to respond to the current energy situation. It also proposes additional measures, principles and criteria for a coordinated demand reduction and a ramping up of the EU’s joint efforts on securing the gas supply.

The Communication proposes a new European Gas Demand Reduction Plan, drawing on best practices from across the Union. The plan is primarily focused on replacing gas with other fuels and overall energy savings in all sectors. The plan provides guidelines that member states should take into account when planning spending cuts. The plan establishes principles and criteria for a coordinated reduction in demand, the aim of which is not only to protect the gas supply of households and basic users, such as hospitals, but also to provide basic products and services to the economy, i.e. to industries that are important for EU supply chains and competitiveness. In order to avoid gas shortages in the coming months, the total recommended reduction in gas demand from 1 August to 31 March 2023 is 15%.

This plan aims to reduce the risk and costs for Europe in the event of a complete cut-off of the gas supply from Russia. All consumers, public administrations, households, owners of public buildings, electricity suppliers and industry can and should take measures to save gas.



The Commission adopted the *Council Regulation (EU) 2022/1369 on coordinated demand-reduction measures for gas*, which entered into force on 9 August 2022. This Regulation aims to ensure gas supply in the EU by applying voluntary demand reduction and improving coordination, and by monitoring and reporting on national measures to reduce gas demand. It introduces the possibility of declaring a Union alert, which activates the obligation of mandatory demand reduction at the EU level. The Regulation is applied for a period of one year, and if the Commission assesses the need after conducting an analysis by 1 May 2023, it may propose an extension of the period of application of the Regulation.

The Regulation stipulates that member states must undertake their best efforts to reduce their gas consumption in the period from 1 August 2022 to 31 March 2023 by at least 15 % compared to their average gas consumption in that period during the five consecutive years preceding the date of entry into force of the Regulation (reference period).

On 6 October 2022, the *Council Regulation (EU) 2022/1854 on Emergency Intervention to Address High Energy Prices* was adopted. This Regulation aims to reduce electricity demand and redistribute the excess income and profits of the energy sector to households and businesses in order to mitigate the impact of rising energy prices. It also introduces a solidarity contribution in the crude petroleum, natural gas, coal and refinery sectors.

The Regulation introduces a voluntary monthly electricity consumption reduction target of 10% and a mandatory electricity consumption reduction target of 5% during peak hours.

A redistribution of surplus revenues and profits in the energy sector is being introduced, whereby the market revenues of inframarginal generators is limited to a maximum of EUR 180/MWh in order to temporarily limit the extraordinary market revenues of producers with lower marginal costs, given the extremely high price of gas, which increases the costs of gas-fired power plants. This level is designed to preserve the profitability of producers and avoid hindering investment in renewable energy sources.

Member States must ensure that any surplus revenues collected are used to alleviate high electricity prices.

The Regulation establishes a mandatory temporary solidarity contribution to the surplus profit of companies in the crude petroleum, natural gas, coal and refinery sectors, which is calculated on the basis of taxable profits in the fiscal year of 2022 and/or 2023, which is more than 20% higher than the average annual taxable profits in the period of four fiscal years, 2018-2021. Member states use the revenues thus collected to provide targeted financial support.

On 18 October 2022, the Commission issued the communication "*Energy Emergency - preparing, purchasing and protecting the EU together*" COM/2022/553. This Communication provides the context of the emergency measures introduced to guarantee the security of energy supply in the EU. The European Commission established a common approach to solving these challenges in July 2022, and the EU Council reached an agreement on intervention in the markets to address high energy prices in October 2022. This communication presents an improved framework for action to address these issues before the winter of 2022/2023 and to prepare for the next winter. Among other things, this includes using the united market to achieve joint purchasing and keeping the market prices under control, limiting excessive price spikes and making the best use of the existing infrastructure to ensure that gas flows where it is most needed. These measures may be considered exceptional and temporary, aimed at responding to the crisis and providing solutions for immediate crisis mitigation.

On 29 December 2022, two documents were adopted:

- *Council Regulation (EU) 2022/2576 of 19 December 2022 enhancing solidarity through the better coordination of gas purchases, reliable price benchmarks and exchanges of gas across borders and*





- *Council Regulation (EU) 2022/2578 of 22 December 2022 establishing a market correction mechanism to protect Union citizens and the economy against excessively high prices.*

The *Regulation on enhancing solidarity* introduces new measures to improve solidarity in the event of a state of emergency and gas shortage, measures to ensure the better coordination of joint gas purchases, and measures to limit volatility in gas and electricity prices. Member states and energy companies will be enabled to jointly purchase gas on global markets. Pooling demand at the EU level will ensure that EU countries have more leverage when it comes to purchasing gas on global markets. It also aims to avoid competition between member states, which inevitably increases the final price of gas.

Member states will require domestic companies to use a service provider to aggregate the demand for gas volumes corresponding to 15% of their gas storage filling obligations for 2023 (around 13.5 billion m<sup>3</sup> for the EU as a whole). Apart from the mandatory 15%, the aggregation for other amounts and participants will be voluntary but based on the same mechanism.

This *Regulation* also includes provisions on increasing the transparency of planned and concluded offers for the purchase of gas, with the obligation to notify the Commission and the member state in advance if it is planned to purchase more than 5 TWh of gas per year (slightly more than 500 mil. m<sup>3</sup> of gas).

The Regulation introduces additional solidarity measures in the event of gas supply shortages, supplementing the existing rules and expanding the measures that enable member states to request solidarity from other member states in cases where they cannot provide critical quantities of gas needed for their electric power system.

The *Regulation on establishing a market correction mechanism* seeks to protect households and energy entities on the gas market from excessively high gas prices in the EU. This *Regulation* establishes a temporary market correction mechanism (MCM) for natural gas transactions in the main markets for TTF derivatives and derivatives linked to other virtual trading points (VTPs), as an instrument against episodes of excessively high gas prices in the EU that do not reflect the prices on the global market. The MCM is temporary in nature and is only activated to limit episodes of exceptionally high gas prices that are not linked to prices on other gas exchanges.

The number of documents and the scope of topics covered during 2022 shows the extreme seriousness of the approach of the Commission, but also of other EU institutions, in solving one of the biggest energy crises since the Second World War. Although the listed documents are a good foundation for a secure energy future for the EU, the Commission continues to monitor the situation on the European energy market in order for the EU to prepare for the next winter of 2023/2024.

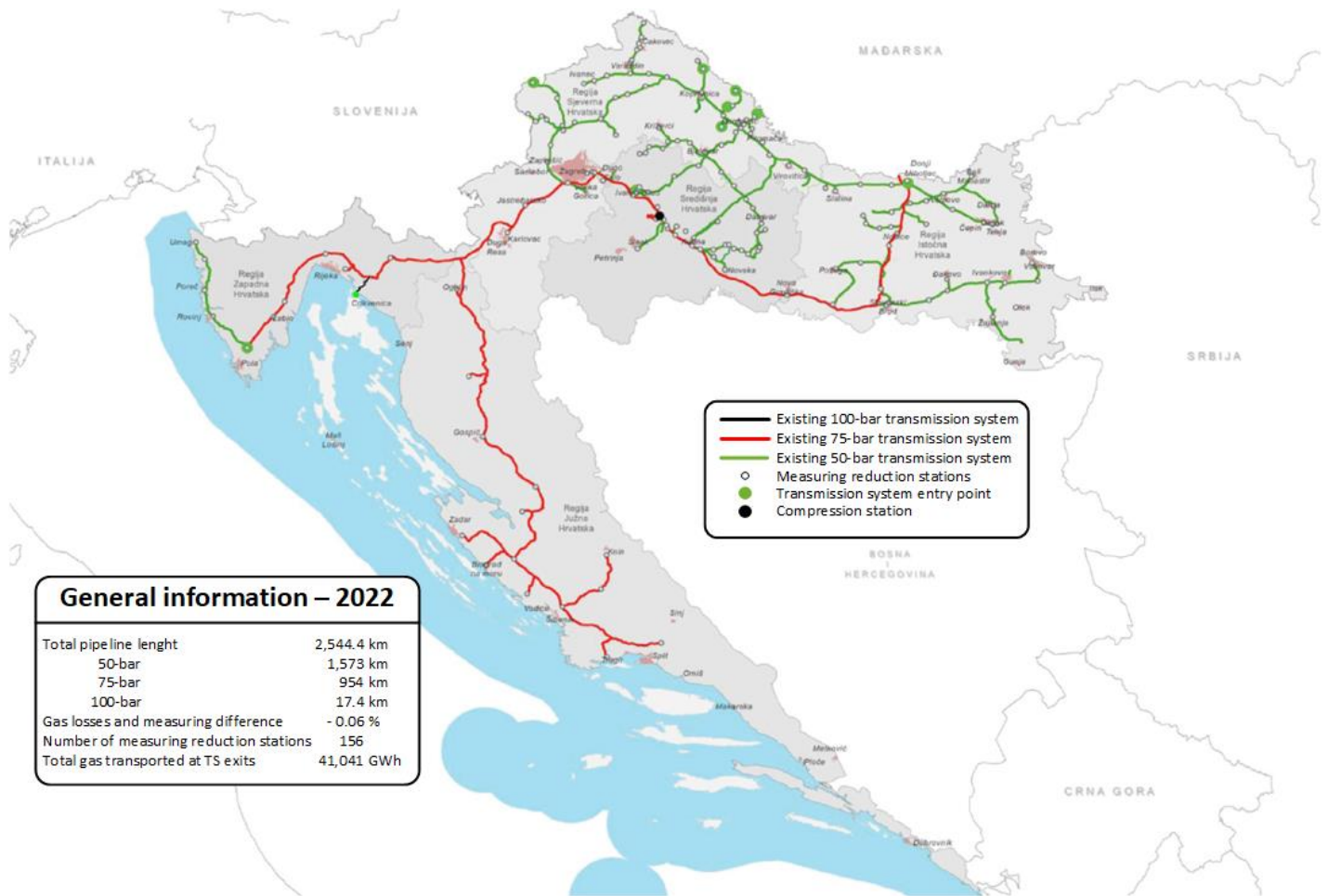


## 5.3. Regulated activities in the gas sector

### 5.3.1. Gas transmission

The gas transmission system of the Republic of Croatia is owned and managed by the transmission system operator of the energy entity PLINACRO d.o.o., founded by the Republic of Croatia. PLINACRO d.o.o. operates as a proprietary unbundled transmission system operator based on the HERA's Decision on issuing a certificate to the transmission system operator of 23 July 2021.

The gas transmission system stretches across all the counties of the Republic of Croatia and the City of Zagreb, except for Dubrovnik-Neretva County, and is shown in Figure 5.3.1.



Source: Plinacro d.o.o.

Figure 5.3.1 Gas transmission system in the Republic of Croatia

The total length of the gas transmission system at the end of 2022 was 2,544 km (1,573 km of gas pipelines with a working pressure of 50 bar, 954 km of gas pipelines with a working pressure of 75 bar, and 17 km of gas pipelines with a working pressure of 100 bar).



Gas is received into the transmission system from eight gas input metering stations (IMS), four of which are input metering stations at connections with natural gas production plants, two interconnection metering stations at connections with the transmission systems of Slovenia and Hungary, one input-output metering station at the connection with the underground gas storage facility, and one input metering station at the connection with the LNG terminal.

Gas is supplied from the transportation system to 21 final customers directly connected to the transmission system, to distribution systems managed by 31 distribution system operators, two output interconnections, and one gas output connection with the underground gas storage facility.

Regarding the realised investments in the construction and reconstruction of the gas transmission system for the year 2022, fulfilling its obligation from Article 27 of the **Gas Market Act**, PLINACRO d.o.o. reported to the HERA that during 2022, an investment of HRK 67.6 million was made in the fixed assets of PLINACRO d.o.o., of which HRK 21.7 million was allocated to investments in gas pipelines and HRK 17.5 million in gas nodes.

In August 2022, the Government of the Republic of Croatia adopted the *Decision on increasing the security of the gas supply by building the Zlobin-Bosiljevo gas pipeline and increasing the capacity of the LNG terminal to 6.1 billion cubic metres of gas per year (Official Gazette no. 96/22)* in which it is decided that the Republic of Croatia will participate in the financing of the construction of the Zlobin-Bosiljevo gas pipeline and the increase of the gasification capacity of the LNG terminal on the island of Krk to 6.1 billion m<sup>3</sup> of gas per year. Part of the funds necessary for the construction are foreseen in the budget of the Republic of Croatia for 2023, while in the projection of the budget for 2024, additional funds are foreseen for the implementation of this project within the Recovery and Resilience Mechanism. The project is launched with the aim of ensuring the energy independence of the Republic of Croatia, as well as ensuring the continuity and security of natural gas supply to households and businesses on the territory of the Republic of Croatia and other EU member states. Following the aforementioned decision, in 2022 PLINACRO d.o.o. began investing in the main Zlobin-Bosiljevo gas pipeline through the activities of project design, purchasing the necessary pipes and the related prerequisites for starting the construction phase.

Activities on the development of interconnections also continued in the form of investments in project documentation for the Lučko-Rakitje-Zabok-Rogatec gas pipeline. This is also the only project of PLINACRO d.o.o. included in the current PCI list (Project of Common Interest), which will potentially enable this investment to be financed from the CEF fund (Connect Europe Facility). The allocation of funds and the final investment decisions for the project are expected in 2023.

According to data submitted to the HERA by the energy entity PLINACRO d.o.o., the total quantity of gas transmitted in Croatia in 2022 amounted to 41,041 kWh, which represents a 16.7% increase compared to the total transmitted quantity in 2021.

This increase in transmitted gas volumes is the result of the high utilisation of the technical capacity of the gas input from the LNG terminal during the year, with a simultaneous significant increase in gas exports at the interconnections with Hungary and, to a lesser extent, Slovenia. The share of gas produced in Croatia in relation to the total recorded quantities of gas at the entry points of the transmission system was 14.7%, while the share of gas from the LNG terminal was 64.5%, and 13.1% from other imports, and 7.7% of the total quantity of transmitted gas was taken over from the Okoli underground gas storage facility.

Due to the drop in production, gas input from production fields decreased by 5.8%, while gas input from the LNG terminal increased by 51.9% compared to the previous year.

In 2022, 12,023 GWh was supplied from the transmission system to final customers on distribution systems, which is 12.4% less than the previous year, and 12,456 GWh was supplied to final customers connected to the transmission system, which is 21.6% less compared to the previous year.



At the same time, the supply of gas, i.e. exports at interconnections, increased significantly, namely, the supplied quantity was 11,489 GWh or 905% more than in 2021, while 5,072 GWh of gas was pumped into the UGSF Okoli, which is 15.4% more than in 2021.

30.3% of the total quantities of gas supplied from the transmission system was supplied at the transmission system outputs, 29.3% at the distribution system outputs, 28.0% at the interconnection outputs, and 12.4% at the UGSF Okoli output.

The quantities of transported gas by transmission system entry groups per month in 2022 are shown in Figure 5.3.2.

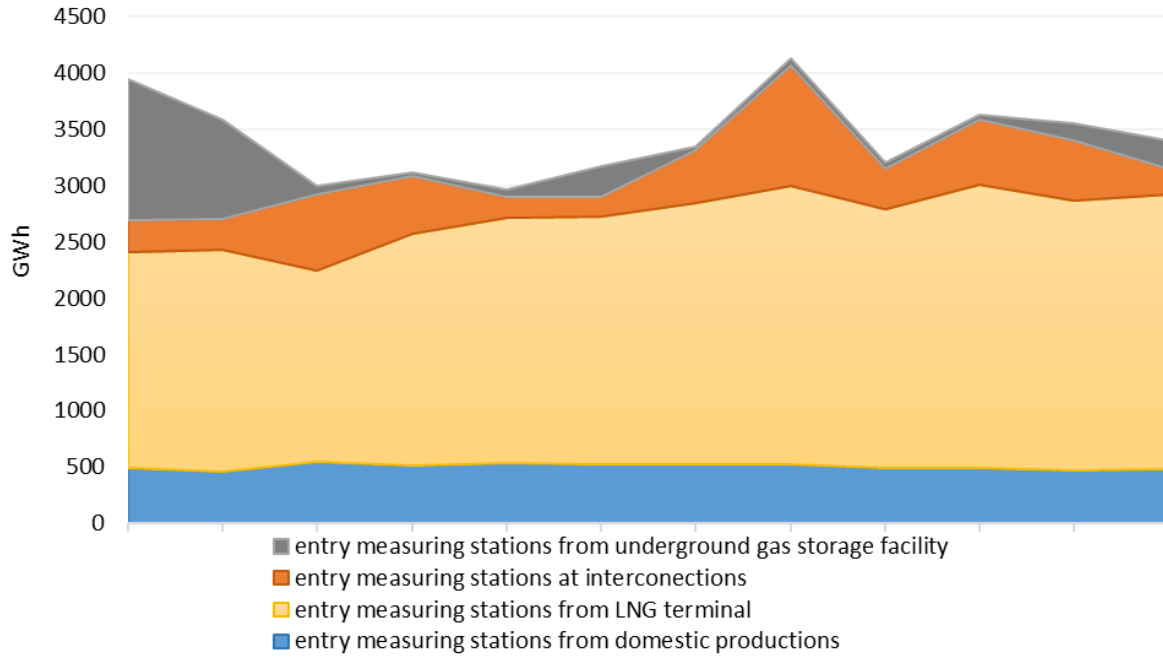


Figure 5.3.2 Quantities of transmitted gas by transmission system input groups by month in 2022

The maximum capacity utilisation at all transmission system outputs in 2022 amounted to 10.21 GWh/h, which represents an 18.0% increase compared to 2021; the highest maximum capacity utilisation was recorded at distribution systems outputs in the amount of 3.56 GWh/h, which represents a 9.7% increase compared to 2021.

As for capacity utilisation at the interconnections, the maximum capacity utilisation of the output in Rogatac towards Slovenia in 2022 was 0.30 GWh/h, while at the Donji Miholjac-Dravaszerdahely interconnection, the maximum capacity utilisation in 2022 was 2.13 GWh/h, which is also 100% of the technical capacity of that output, which is 280% more than the capacity used in 2021.

The quantities of transmitted gas by transmission system output groups by month in 2022 are shown in Figure 5.3.3.

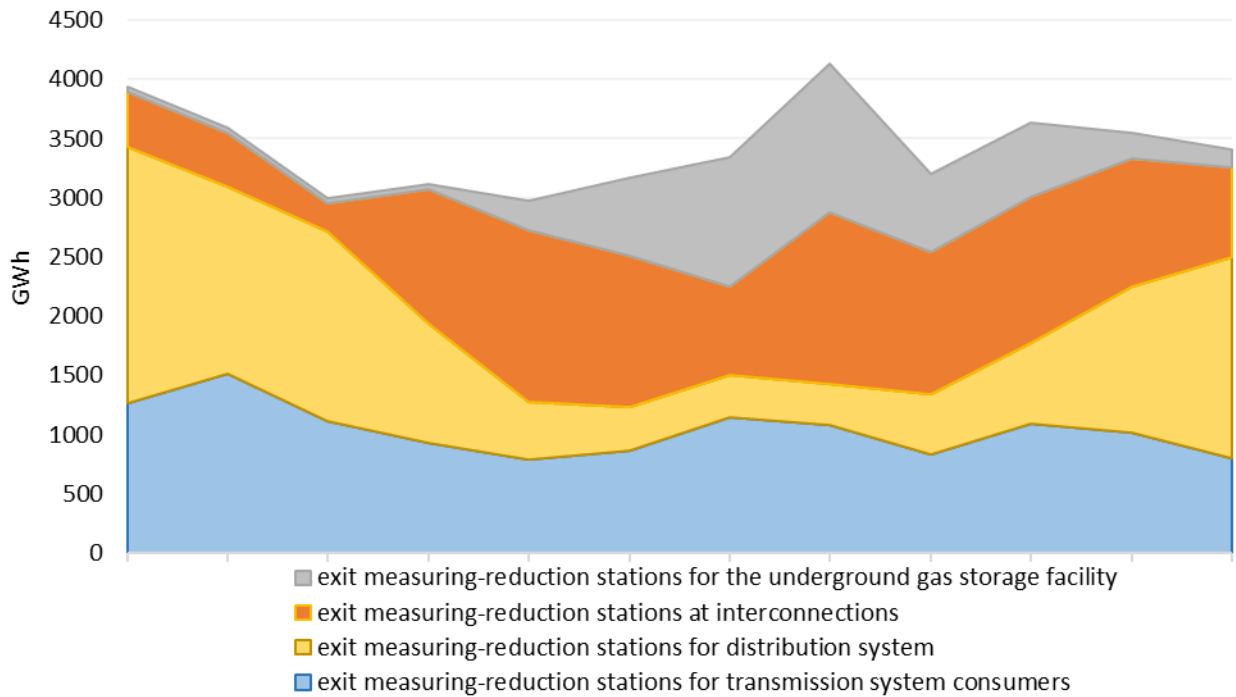


Figure 5.3.3 Quantities of transmitted gas by transmission system output groups by month in 2022

The total annual quantities of transmitted gas by final customer groups are shown in Figure 5.3.4.

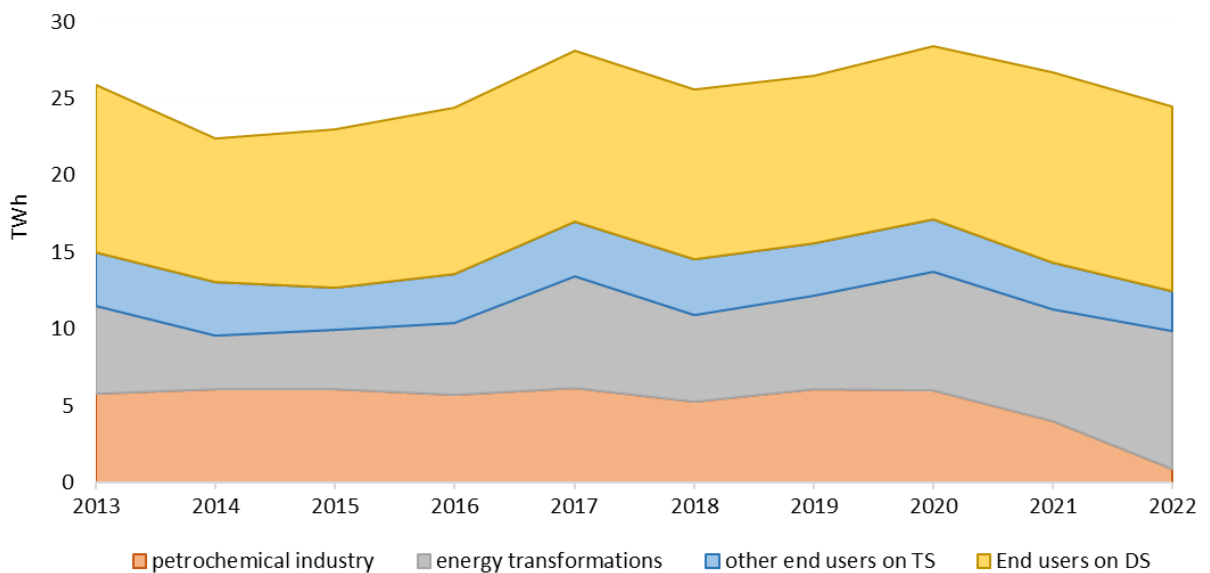


Figure 5.3.4 Total annual quantities of transmitted gas by final customer groups from 2013 to 2022

An overview of indicators for gas transmission by year from 2018 to 2022 is presented in Table 5.3.1.

Table 5.3.1 Overview of indicators for gas transmission by year from 2018 to 2022



Indicator	2018	2019	2020	2021	2022*
Number of transmission system operators	1	1	1	1	1
Total length of gas pipelines in the transmission system (km)	2,693	2,531	2,549	2,549	2,544
Maximum quantity of transmitted gas for end consumption (TWh/day)	0.157	0.133	0.137	0.129	0.141
Quantity of transmitted gas by transmission system input groups (TWh)	29.541	30.807	32.480	31.712	41.040
Quantities of transmitted gas by transmission system output groups (TWh)	29.541	30.809	32.481	31.674	41.041

\*Note: expressed as the gross calorific value

## Gas transmission regulation method

In addition to the **Gas Market Act** and other energy regulations, gas transmission is also regulated by the *Methodology for setting tariffs for gas transmission*, adopted by the HERA, and is based on the incentive regulation method, which defines the maximum allowed levels of transmission system operator revenues in an individual revenue period. The distribution of allowed revenues and the determination of tariff amounts is based on the entry-exit model, without considering the length of the transmission route, i.e., the distance between entry and exit points in the transmission system (postage stamp principle). According to the *Methodology*, allowed operating costs are determined by applying incentive mechanisms of efficiency coefficients and allocating actual savings, while allowed capital costs are determined based on the allowed depreciation of regulated assets and the allowed rate of return on regulated assets. The projection of the value of regulated assets for a regulatory period of five years is determined using the *ex-ante* approach of approving investment plans, as well as with the *ex-post* revision of realised investments. The *Methodology* also prescribes the ability to determine justified values of long-term material and non-material assets on the basis of economic efficiency analyses of operator assets, as well as expense and efficiency analyses of transmission system operators in Croatia and operators in the surrounding areas.

Upon the expiry of a regulatory period, allowed revenues are revised, including operating and capital costs, and the realised revenues are compared based on tariffs with the revised allowed revenues; possible imbalances are included in the calculation of allowed revenues for the following regulatory period.

A regulatory period for gas transmission is defined as a multi-annual, five-year period for which allowed revenues and tariffs are determined independently for each regulatory year. The third regulatory period is currently underway, which began on 1 January 2021 and will last until 31 December 2025, and for which tariffs are determined using the *Methodology* in accordance with *Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas*.

## Gas transmission price and connection fee

In accordance with the *Amendments to the Methodology for setting tariffs for gas transmission*, the HERA sets the amounts of the tariff items for gas transmission for each regulatory year, which are equal for all transmission system users.

In 2022, the second year of the third regulatory period for gas transmission, tariff items were defined in the *Decision on tariffs for gas transmission (Official Gazette no. 147/20)*, which the HERA



adopted in accordance with the *Methodology for setting tariffs for gas transmission (Official Gazette no. 79/20)* in December 2020. Due to changes in the method of calculation and the collection of supplied gas using the gross calorific value from 1 October 2022, the aforementioned *Decision* was amended by the *Decision on tariffs for gas transmission (Official Gazette no. 108/22)*. The total average price of gas transmission in 2022, influenced by the heavy usage of more expensive short-term capacity products, amounted to HRK 0.0185/kWh, which represents an increase of HRK 0.0011/kWh, or 6.5% compared to the realised average cost of HRK 0.0174/kWh in 2021.

Tariffs for transmission system use for the third regulatory period are based on a calculation of planned permitted operator revenue, which also contains the difference established during the regular revenue audit for the previous (second) 2017-2020 regulatory period, which is to a certain extent influenced by new gas transmission infrastructure that allows gas to be dispatched from the LNG terminal into the Croatian gas transmission system and onward towards the rest of the European Union.

On the basis of the established planned permitted revenue and with the implementation of the elements of the aforementioned *Methodology*, the amount of the tariffs for all transmission system entries are equal, except for the transmission system entries from the gas storage facility and the LNG terminal, which are discounted compared to other tariffs. The amounts of tariffs for transmission system exits (exits in Croatia and exits at interconnections) are also equal.

Figure 5.3.5. shows the tariff amounts for gas transmission for the third regulatory period (2021-2025), net of VAT

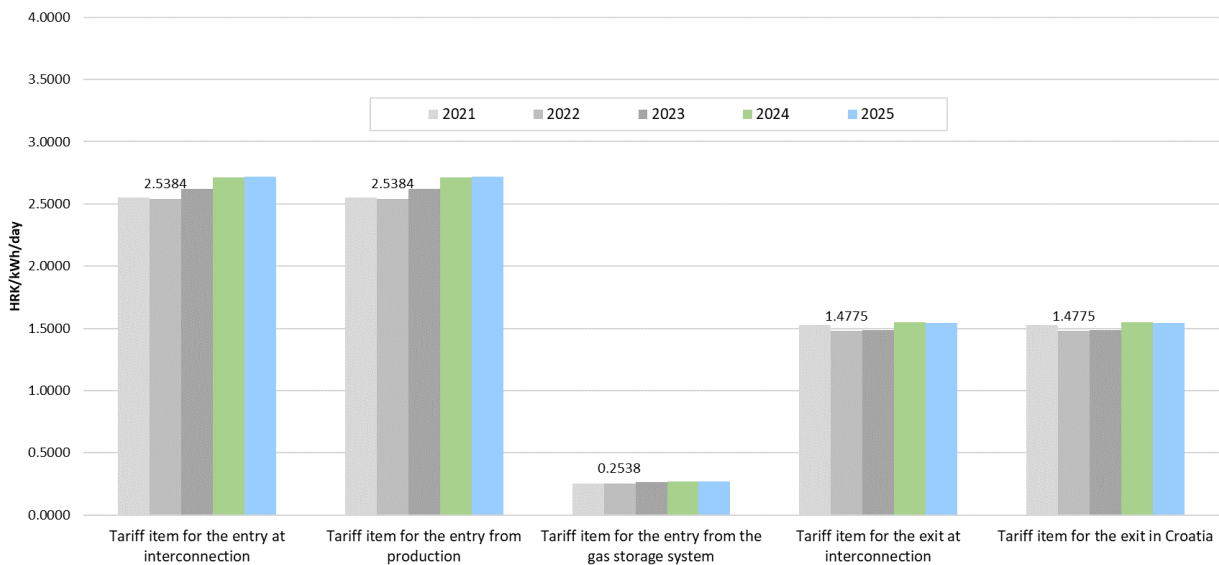


Figure 5.3.5 Tariff amounts for gas transmission for the first and second regulatory periods (2021-2025), net of VAT

In addition to gas transmission service, the transmission system operator also provides connection services to the transmission system or increases in connection capacity in accordance with the *Methodology for establishing charges for connection to the gas distribution or transmission network and for increasing connection capacity* adopted by the HERA. Among other things, this *Methodology* defines: categories of connections to the gas transmission system; categories of operations according to complexity; methods, elements, and criteria for calculating the charges for gas transmission system connection and increases in connection capacity; request procedure for determining or changing the amount of charges for connection, as well as the adoption, publishing and implementation of connection charges. *The Methodology* defines categories of connections and the corresponding coefficients, as well as the number of working hours required in a particular category of operations according to complexity for connecting particular categories of use to the transmission system.



Connection fees consist of the cost of the extraordinary creation of technical requirements in the transmission system and the cost of implementing connections to the transmission system. The cost of the extraordinary creation of technical requirements, which is equal to the cost of building new parts of the transmission system, consist of the cost of project documentation, enacting the permits required by valid legislation, resolving property ownership issues, purchasing the required materials and equipment, and implementing engineering, electrical, construction, geodetic, and other required works. The connection charge is charged directly to the investors at whose request the service is initiated, and the amount of the charge depends on the complexity of the task.

The connection fee is determined by the HERA for a regulatory period of five years; until 30 September 2022, it was calculated by the transmission system operator based on the HERA's *Decision on charges for connection to the gas distribution or transmission and for increasing connection capacity for the 2022-2026 regulatory period (Official Gazette no. 141/21)* of 20 December 2021, and from 1 October 2022 based on the *Decision on charges for connection to the gas distribution or transmission and for increasing connection capacity (Official Gazette no. 108/22)*, as a result of changes in the method of calculation and the collection of supplied gas using the gross calorific value.

On the basis of the *Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the unloading and send-out of liquefied natural gas, and public service gas supply*, in December 2021, the HERA adopted the *Decision on the cost of non-standard services of the transmission system operator (Official Gazette no. 141/21)* for the 2022-2025 period, which was amended for the purpose of dual price display by the *Decision on the cost of non-standard services of the transmission system operator (Official Gazette no. 108/22)* of 14 September 2022. With this Decision, the average hourly price of the transmission system operator for the third regulatory period, 1 October 2022 - 31 December 2025, is set at HRK 190.00/h (EUR 25.22/h), excluding VAT.

## Contracting and using capacity products

During 2022, transmission system capacity management was carried out by the allocation of capacities and the transfer of capacities on the secondary market, in the manner prescribed by the provisions of the Network Code for the Gas Transmission System. In 2022, applications from 18 balance groups for yearly, quarterly, monthly, daily, and intraday capacity reservations were received via the SUKAP system and via auctions on the PRISMA and RBP online platforms.

In order to optimise their costs, users of the transmission system used all available capacity products. More intensive use of short-term capacity products at the entrances to the transmission system, primarily at interconnections, was recorded in the first months of the year, as a result of the needs for additional quantities of gas due to low temperatures. LNG terminals have become the main supply routes in the EU, and filling gas storages, in order to enter the winter period with the most gas supplies possible, has become a priority of all European Union members. In such conditions, the use of the capacity of the LNG terminal on the island of Krk and the physical use of gas output capacity to Hungary and Slovenia also increased.

With the occurrence of the aforementioned events on the gas market, monthly and daily reservations were intensively used at interconnections (both directions) and at the entrance from the LNG terminal, while at the beginning of the 2022/2023 gas year (1 October 2022), the number of annual reservations increased significantly while maintaining the trend of using daily and intraday reservations.

In particular, the contracting and intensive use of short-term capacities at the outputs on the interconnections from 1 April 2022, which, in addition to the increase in capacity at the entrance from the LNG terminal, was also affected by the cessation of gas use in Petrokemija d.d. in the second half of 2022 and the export of gas to neighbouring countries.





The structure of contracting capacity products by groups of outputs from and inputs to the transmission system in 2022 is shown in Figures 5.3.6 and 5.3.7.

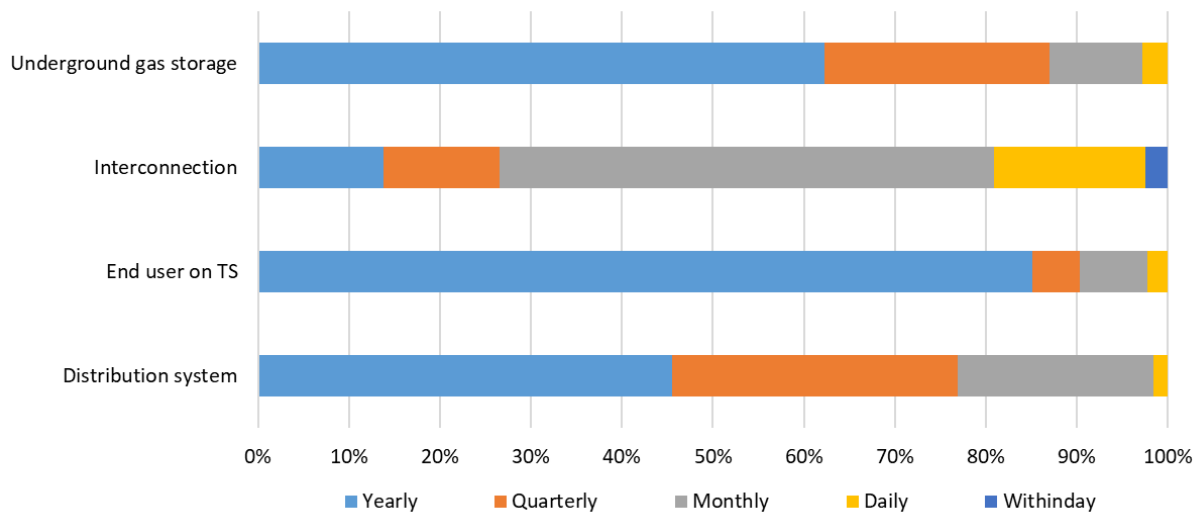


Figure 5.3.6 Structure of contracting capacity products by groups of outputs from the transmission system

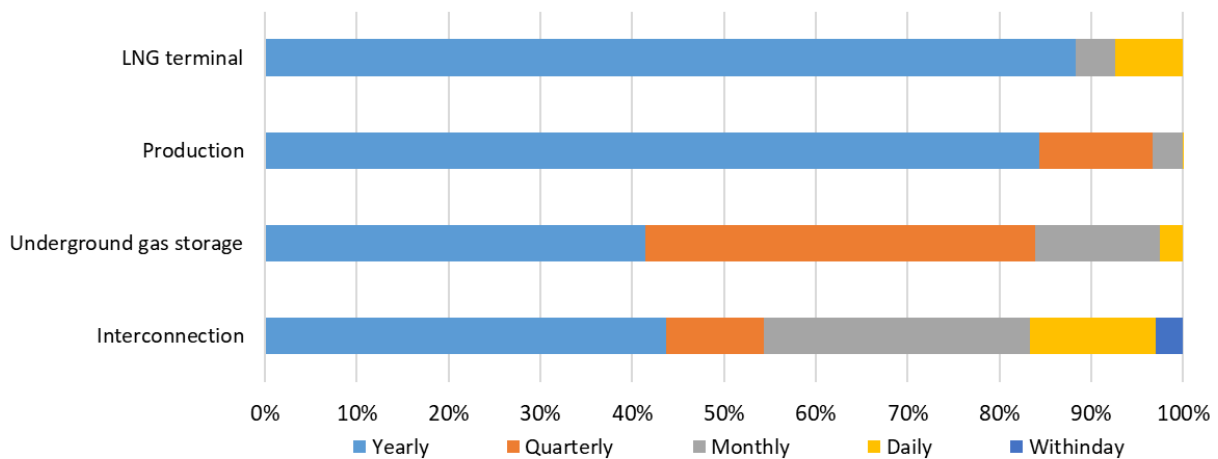


Figure 5.3.7 Structure of contracting capacity products by groups of inputs to the transmission system

According to the data provided by PLINACRO d.o.o. to the HERA, the contracted capacities were ultimately used in an average amount of 67% (62% at inputs and 72% at outputs), whereby the transmission system users efficiently contracted and utilised international transport and inputs from production and LNG terminals, and less efficiently the other transmission system inputs and outputs.

### 5.3.2. Management of the liquefied natural gas terminal

Management of the liquefied natural gas terminal is a regulated energy activity performed as a public service. The LNG terminal operator in Croatia is the energy entity LNG Hrvatska d.o.o.



The LNG terminal operator has concluded a lease agreement for LNG terminal capacities for the 2021-2040 regulatory period with six terminal users; the full capacity of the LNG terminal has been leased until 2030. The LNG terminal operator publishes and updates free long-term capacities for lease in the annual LNG unloading and send-out procedure on its website, as well as free short-term capacities that can be leased in the process of contracting short-term LNG regasification capacities, which are published after the annual procedure for contracting LNG unloading and send-out services, in accordance with the *Rules for LNG terminal use*. In 2022, the short-term lease of LNG regasification capacities was not contracted.

The terminal consists of a floating storage and regasification unit and an onshore terminal. The technical capacity of the LNG terminal on the island of Krk is 2.9 billion m<sup>3</sup> per year. In addition to the floating storage and regasification unit (FSRU), LNG carriers with a capacity of 3,500 m<sup>3</sup> to 265,000 m<sup>3</sup> can also dock at the terminal. The "LNG Croatia" FSRU ship consists of LNG storage containers and equipment for the loading, unloading and regasification of LNG. The "LNG Croatia" FSRU ship is equipped with four LNG storage tanks with a total storage capacity of 140,206 m<sup>3</sup>, three LNG regasification units with a maximum total regasification rate of 451,840 m<sup>3</sup>/h, and a power plant that produces electricity for the terminal's operations. The onshore part of the LNG terminal consists of the jetty head, breasting dolphins for FSRU berthing, mooring dolphins for FSRU and LNG carrier berthing, quick release hooks, an access bridge, high-pressure offloading arms with connecting pipeline, a pig launching station, firefighting system, terminal control building, and associated facilities. Figure 5.3.8 shows the "LNG Croatia" FSRU ship on the island of Krk.



Source: LNG Hrvatska d.o.o.

Figure 5.3.8 The "LNG Croatia" FSRU ship on the island of Krk



The LNG terminal began operations on 1 January 2021. Developments and improvements to the terminal from 2021 onwards included investments into the increased efficiency and reliability of technological processes, as well as the increased security of the terminal itself, including e.g. the construction of access paths and roads, the placement of a protective fence around the terminal, works on the coastline, anti-corrosion protection for pipe fittings and the dolphin catwalks, adjustments to the cathodic protection system, the implementation of methane number in TMS (*Terminal management system*) and IAS (*Integrated Automation System*) IT systems, which are controlled by the LNG terminal operator. In order to increase the safety and reliability of the terminal, the LNG terminal operator LNG Hrvatska d.o.o. had started the development of the project for monitoring the gas pipeline system of the terminal using an optical system already in 2021, which was completed in 2022 and the system was put into operation.

During 2021, the development of the project “service of reloading LNG from the FSRU ship into trucks for LNG transport” was launched, which enabled the provision of a new service of the LNG terminal operator and produced additional value for the entire business. The project was fully completed in 2022, when the new service was offered to the users of the terminal. The service was implemented in the TMS and IAS systems, thus increasing the accuracy and efficiency of the system itself.

The development and improvement of the terminal in 2022 were investments in increasing the reliability of technological processes, which included, for example, the installation of natural gas quality analysis equipment at the terminal. With the installation and commissioning, the gas quality monitoring system was expanded and redundancy in gas quality monitoring was ensured.

In 2022, a total of 32 ships from 4 exporting countries arrived at the LNG terminal, namely: the USA, Egypt, Qatar, and Spain, whose total purchased quantity of LNG was 27,224,153 MWh. The total quantity of natural gas sent out from the LNG terminal into the gas transmission system in 2022 amounted to 26,475,790 MWh, and the total amount of LNG stored at the terminal as of 31 December 2022 amounted to 846,865 MWh. Figure 5.3.9 shows the share of purchased quantities of LNG in 2021 and 2022 by LNG terminal user, and Figure 5.3.10 shows the total quantity of LNG by country of origin.

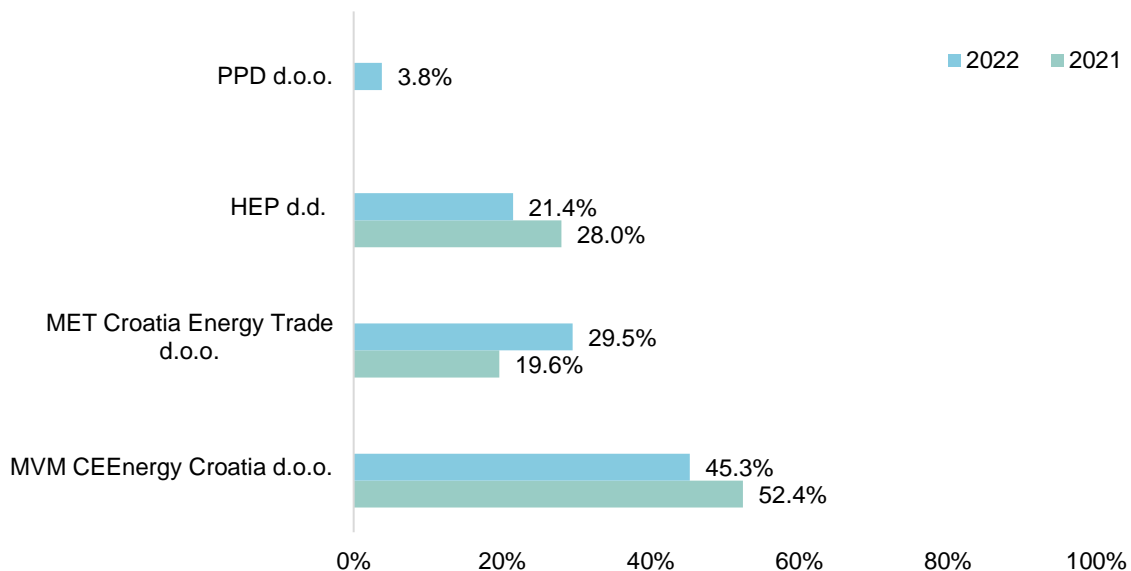


Figure 5.3.9 Share of purchased quantities of LNG in 2021 and 2022 by LNG terminal users

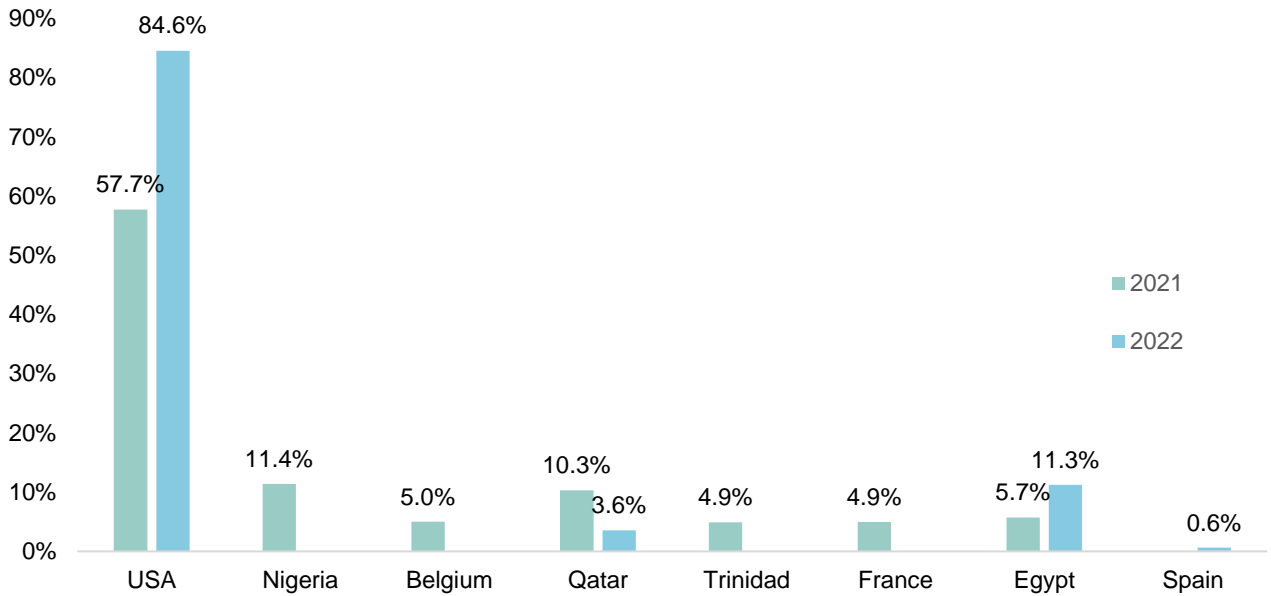


Figure 5.3.10 Purchased quantities of LNG in 2021 and 2022 by country of origin

The maximum utilised LNG receipt capacity on the FSRU ship in 2022 was 1,235,520 MWh/day, and the maximum used LNG regasification capacity at the terminal was 85,461 MWh/day.

Figure 5.3.11 shows the shares of total contracted LNG terminal capacities for 2021-2040 by LNG terminal user.

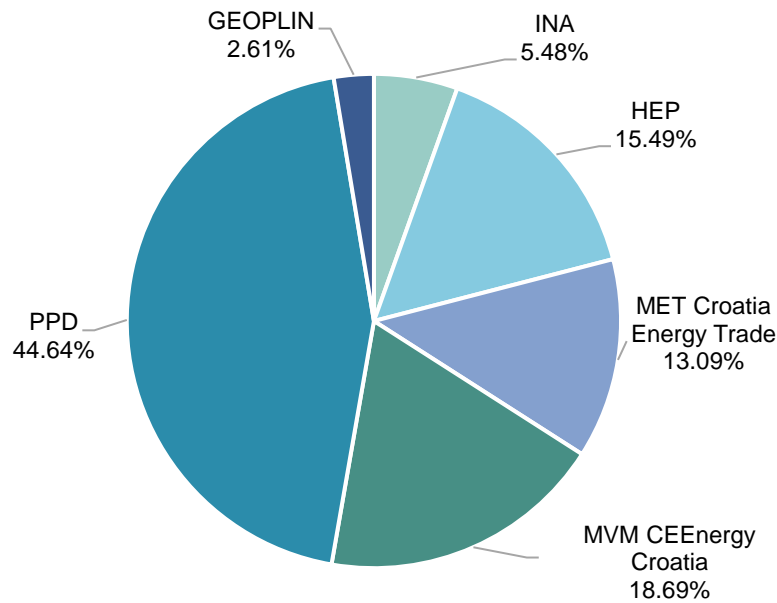


Figure 5.3.11 Distribution of shares of total contracted LNG terminal capacities for 2021-2040 by LNG terminal user

An overview of indicators for LNG terminal management for the period from 2020 to 2022 is shown in Table 5.3.2.



Table 5.3.2 Overview of indicators for LNG terminal management for the period from 2020 to 2022

Indicator	2018	2019	2020	2021	2022*
Total receipt of LNG per year (MWh)	-	-	127,260	16,264,872	27,224,153
Total sent out natural gas from the terminal into the transmission system (MWh)	-	-	74,188	15,703,324	26,475,790
Total natural gas reloaded from the terminal into LNG transport trucks (MWh)	-	-	-	-	32,673
Total LNG stored at the terminal on 31/12 (MWh)	-	-	17,331	389,413	846,865
LNG reception capacity on the FSRU ship (MWh/day)	-	-	48,000	1,156,424	1,267,200
Storage capacity (MWh/day)	-	-	840,000	844,466	925,360
LNG regasification capacity at the terminal (MWh/day)	-	-	10,800	107,056	118,819
Natural gas send-out capacity into the transmission system (MWh/day)	-	-	72,000	72,000	85,500

\*Note: expressed as the gross calorific value

## Method of regulating the management of the LNG terminal

In addition to the **Gas Market Act**, the **Liquefied Natural Gas Terminal Act**, and other energy regulations, the management of the LNG terminal is also regulated by the *Methodology for determining the amount of tariffs for the unloading and send-out of liquefied natural gas* adopted by the HERA which is based on the incentive regulation method, which defines the maximum allowed levels of LNG terminal operator revenues in an individual revenue period.

The *Methodology* also foresees the implementation of a regulatory account, which was established for LNG Hrvatska d.o.o. for the 2021-2040 period as a model of incentivised energy activity regulation when, due to significant planned investments in the development of the LNG terminal, a lengthy ROI period is foreseen for the operator, given that the amount of tariff items for the unloading and send-out of LNG without the implementation of a regulatory account may result in a non-competitive price that hinders the development of the project. The regulatory account is based on the incentive regulation method, i.e. on the maximum allowable price method, and is approved so that the operator generates cumulatively equal permitted revenues as it would without the implementation of a regulatory account, but at a different time dynamic.

The *Methodology* also includes the economic efficiency of existing operator assets, as well as foreseeing the possibility of determining the fair value of long-term material and non-material assets on the basis of an economic efficiency analysis of operator assets, as well as comparative expense and efficiency analyses of transmission system operators in Croatia and the surrounding region.

The regulatory period for which the regulatory account is established may not be shorter than two regulatory periods, i.e. shorter than 10 years. The operating conditions of the LNG terminal are



determined by the *Rules for LNG terminal use* prescribed by the LNG terminal operator with the HERA's approval.

### Price of the unloading and send-out of liquefied natural gas

In December 2020, based on the *Methodology for determining the amount of tariffs for the unloading and send-out of liquefied natural gas* (Official Gazette no. 48/18 and 79/20), the HERA adopted the *Decision on the amount of the tariffs for the unloading and send-out of liquefied natural gas* (Official Gazette no. 144/20) for the years of the first regulatory period (2021-2025) and the *Decision establishing a regulatory account for LNG terminal management for energy entity LNG Hrvatska d.o.o., Zagreb, for the 2021-2040 period* in order to define tariffs for LNG terminal operator LNG Hrvatska d.o.o. that are competitive compared to the service prices of other LNG terminal operators in Croatia's surrounding area, and that reduce significant variability in tariffs due to the influence of changes in capacity lease levels at the LNG terminal realised for a period of 20 years. As of 1 October 2022, due to changes in the method of calculation and the collection of supplied gas using the gross calorific value, the *Decision on tariffs for the receiving and send-out of liquefied natural gas* (Official Gazette no. 108/22) is in force.

On the basis of these decisions, the amounts of tariffs for the unloading and send-out of LNG were defined for the LNG terminal operator LNG Hrvatska d.o.o., which are equal for all the years of the first regulatory period and amount to EUR 1.05/MWh.

Also, on the basis of the *Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the unloading and send-out of liquefied natural gas, and public service gas supply*, in December 2021, the HERA adopted the *Decision on the cost of non-standard services of the liquefied natural gas terminal operator* (Official Gazette no. 141/21) for the period 2022-2025, which was amended for the purpose of dual price display by the *Decision on the cost of non-standard services of the liquefied natural gas terminal operator* (Official Gazette no. 108/22). With this *Decision*, the average hourly price of the LNG terminal operator for the first regulatory period, 1 October 2022 - 31 December 2025, is set at HRK 270.00/h (EUR 35.84/h), excluding VAT.

### 5.3.3. Gas storage

Gas storage is a regulated energy activity performed as a public service. The Croatian gas storage system operator is the energy entity Podzemno skladište plina d.o.o. (hereinafter: PSP d.o.o.), which uses the underground gas storage facility in the Okoli field for natural gas storage (hereinafter: UGSF Okoli).

UGSF Okoli consists of underground gas reservoirs (geological formations), operating and control wells, and the overground part of the plant. As a rule, natural gas is injected into the underground reservoir from 1 April to 31 September and withdrawn from 1 October to 31 March. The minimum hourly gas injection capacity is 300,000 kWh/h, and the minimum hourly gas withdrawal capacity is 200,000 kWh/h.

The technical capacity of the gas storage system<sup>88</sup> for the working volume in 2022 from 1 January 2022 to 31 March 2022 amounted to 5,216,426 MWh or 94 standard bundled units (SBU), and from 1 April 2022, it reduced to 4,772,475 MWh or 86 SBUs; the technical withdrawal capacity amounted to 2,149 MWh/h (51,576 MWh/day); the technical injection capacity amounted to 1,828 MWh/h (43,872 MWh/day).

As of 1 April 2022, the working volume of the gas storage was reduced to 4,772,475 MWh (438,000,000 m<sup>3</sup>), or 86 SBUs, in accordance with the *“Detailed report on the construction, shape, size and volume of geological structures suitable for natural gas storage – hydrocarbon exploitation*

<sup>88</sup> *Technical capacity is the total capacity of the gas storage system that the gas storage system operator can offer to system users, taking into account the integrity and technical capabilities of the gas storage system.*



field UGSF Okoli” (May 2021/January 2022) (hereinafter: Detailed Report) approved by the Ministry. The Detailed Report determined that the new available working volume of the storage is  $Q_{skl} = 438,000,000 \text{ m}^3$ , which corresponds to 86 SBUs. The Detailed Report was prepared based on the balancing of the injected and withdrawn quantities of gas during the entire working life of the storage facility, which resulted in harmonising the sales capacity with the realistic technical and technological capabilities of the underground gas storage facility.

In 2022, a total of 4,227,142 MWh of natural gas was injected into UGSF Okoli, and 2,311,250 MWh of natural gas was withdrawn. There were several operating cycles in UGSF Okoli in 2022: two periods of gas withdrawal, two stand-by periods, and two periods of gas injection. The first withdrawal cycle ended on 2 March 2022, and the natural gas injection cycle began on 7 March 2022, and lasted until 13 November 2022, after which the last withdrawal phase began, and lasted almost until the end of the year, namely, until 27 December 2022. The working volume of the storage facility at the end of 2022 was 4,359,466 MWh.

The stocks of natural gas during 2022, as well as the storage capacity level, are shown in Figure 5.3.12.

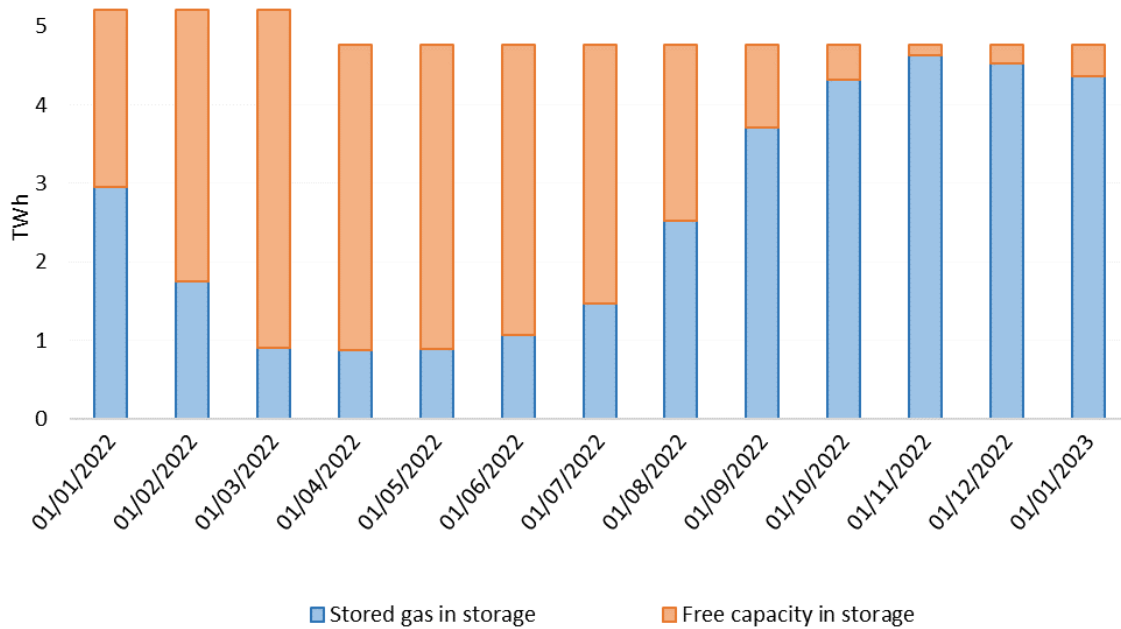


Figure 5.3.12 Stocks of natural gas in UGSF Okoli on certain days in 2022

The largest gas withdrawal capacity in 2022 was achieved in the first three months and amounted to 1,995 MWh/h, while the largest gas injection capacity was 1,826 MWh/h.

Natural gas stocks at UGSF Okoli (GWh) by day of the month in the 2018-2022 period are shown in Figure 5.3.13.

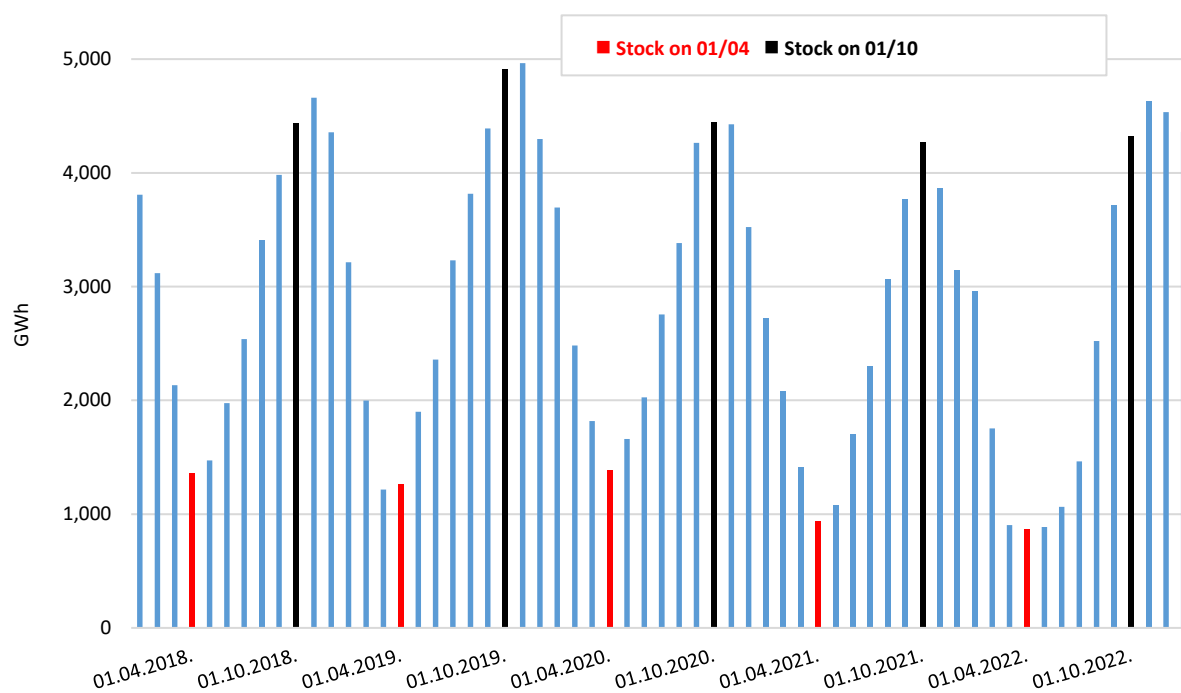


Figure 5.3.13 Natural gas stocks at UGSF Okoli by day of the month in the 2018-2022 period

An overview of indicators for gas storage by year from 2018 to 2022 is presented in Table 5.3.3.

Table 5.3.3 Overview of indicators for gas storage by year from 2018 to 2022

Indicator	2018	2019	2020	2021	2022*
Working volume capacity of the gas storage system (GWh)	5,050	5,050	4,700	4,700	4,772
Technical working volume capacity of the gas storage system (SBU)	101	101	94	94	86
Maximum used working volume capacity of the gas storage system (SBU)	95	100	90	85	84
Gas withdrawal capacity of the gas storage system (MWh/h)	2,274	2,274	2,116	2,116	2,149
Gas injection capacity of the gas storage system (MWh/h)	1,705	1,705	1,587	1,587	1,828

\*Note: expressed as the gross calorific value

During 2022, from the realised investments of PSP d.o.o., the continuation of activities on the project of the construction of a new underground gas storage at the location of the exploitation field "Grubišno Polje" stands out. The construction of oil and mining buildings and facilities of the new UGSF Grubišno Polje formally began on 21 February 2022. In accordance with the location permit, which foresees the phased construction of buildings and facilities, in 2022, activities took place on the first three phases of construction for which construction permits were issued.





The market role and significance of gas storage are directly related to other gas market components, particularly in the context of market liberalisation.

In this sense, the operations of the gas storage system operator were marked by several phases – up to 31 March 2014, when the storage system was used by only one user; from 1 April 2014 to 31 March 2017, when the storage system was used by a number of users for the first time (four gas suppliers and the transmission system operator); and from 1 April 2017 up to and throughout 2021, when the gas storage service was used by 10 users (9 gas suppliers and the transmission system operator).

It should be noted here that the gas storage system operator was obligated<sup>89</sup> to allocate, as a priority, a part of the gas storage system capacities, i.e. the standard storage capacity packages (SBUs), to the wholesale market supplier (WMS) from 1 April 2018 to 31 March 2020.

From 1 April 2020 to 31 March 2021, the gas storage system operator distributed the available number of SBUs to suppliers in the public service using a proportional principle based on historical data on delivered gas quantities in accordance with the **Gas Market Act**.

As of 1 April 2021, the gas storage system operator places the available number of SBUs and the period for which they are being offered on the market, without priority allocation for the public service.

In accordance with the *Amendments to the Rules on Gas Storage System Use*, in June 2021, the gas storage system operator PSP d.o.o. allocated 32 available SBUs, which were placed on the market for the contracting period from 1 April 2022 to 31 March 2027. SBUs were allocated through an auction, which was a new model of allocation enabling the more efficient allocation of SBUs in a transparent way. The available number of SBUs was allocated to 5 users who submitted requests for allocation on the basis of the highest auction premium offered. As of 1 April 2022, the capacity of the gas storage system operator contracted by users amounts to 86 SBUs.

In order to ensure a sufficient supply of gas in the territory of the Republic of Croatia in accordance with *Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage*, which, among other things, prescribes the targets for filling underground gas storage facilities for the year 2022, on 3 June 2022 the Government of the Republic of Croatia adopted the *Decision on securing gas supplies on the territory of the Republic of Croatia (Official Gazette no. 63/22)* (hereinafter: *Decision on securing gas supplies*).

In accordance with the *Decision on securing gas supplies*, the users of the gas storage system were obliged to fill the gas storage in the amount of 63% of their total leased gas storage capacity until 1 August 2022, i.e. 74% of their total leased storage capacity until 1 October 2022. Given that not all users of the gas storage system expressed interest in filling the leased storage capacity to the prescribed level, they left part of their capacity to HEP d.d., which had the obligation to use them and fill them up to the prescribed level in order to ensure sufficient gas supplies until 31 March 2023. In accordance with the above, from 3 June 2022, a new allocation of the available 86 SBUs of storage capacity was made.

The allocation of capacities (SBUs) in the gas storage system by user, showing the largest users of the gas storage system in the aforementioned periods, is shown in Figure 5.3.14.

<sup>89</sup> *Decision on determining priorities in implementing the procedure for gas storage system capacity allocation for suppliers participating in the wholesale gas market (Official Gazette no. 29/14), i.e. Article 31 2. of the Act on Amendments to the Gas Market Act (Official Gazette no. 16/17), and Article 114 of the Gas Market Act (Official Gazette no. 18/18).*





## Gas storage regulation method

Aside from the **Gas Market Act** and other energy-related legislation, gas storage is also regulated by the *Methodology for setting tariffs for gas storage (Official Gazette no. 48/18)* adopted by the HERA. This *Methodology* is based on incentive regulation, which involves determining the maximum allowed revenue for the gas storage system operator. According to the *Methodology*, the operator's allowed operating costs are determined by applying incentive mechanisms of efficiency coefficients and allocating actual savings. Allowed capital costs are determined based on the allowed depreciation of regulated assets and the allowed rate of return on regulated assets. The *Methodology* also foresees the implementation of a regulatory account as a separate model of incentivised energy activity regulation; its implementation enables an appropriate return on reasonable investments made by the operator, who plans significant investments into the development of the LNG terminal system under particular circumstances and across a long time period. The *Methodology* also includes the economic efficiency of existing operator assets, as well as foreseeing the possibility of determining the fair value of long-term material and non-material assets on the basis of an economic efficiency analysis of operator assets, as well as comparative expense and efficiency analyses of transmission system operators in Croatia and the surrounding region.

A regulatory period is defined as a multi-annual period of five years for which allowed revenues and tariff amounts are determined independently for each regulatory year. The operating conditions of the gas storage system are prescribed by the *Rules on Gas Storage System Use*, issued by the gas storage system operator PSP d.o.o., and approved by the HERA. For the purpose of harmonisation with the provisions of the **Gas Market Act**, the *Rules* were improved and supplemented in May 2021 in terms of prescribing the general rules for the allocation of SBUs and the rules for the allocation of SBUs in the auction process for the period after 1 April 2022. In September 2022, *Amendments to the Rules on Gas Storage System Use (Official Gazette no. 111/22)* were adopted, mostly due to the adjustment of the transition from the net calorific value of gas under standard conditions to the gross calorific value of gas under normal conditions, and due to the change in the size of the standard package of storage capacity from the previous 50,000,000 kWh to 55,493,895 kWh.

## Gas storage price

In March 2022, the HERA adopted the *Decision on tariffs for gas storage (Official Gazette no. 36/22)*, which defined the amounts of tariff items for gas storage for the third regulatory period from 1 April 2022 to 31 December 2026. Due to changes in the method of calculation and the collection of supplied gas using the gross calorific value from 1 October 2022, the aforementioned *Decision* was amended by the *Decision on tariffs for gas storage (Official Gazette no. 108/22)*. The annual tariff for a contracted SBU for 2022 was 3.9% lower than in 2021. The established tariffs for gas storage in the third regulatory period are based on the calculation of the anticipated allowed revenues of the gas storage system operator, which include the difference identified after the regular revision of revenues for 2016 and the years of the second regulatory period in 2017, 2018, 2019 and 2020, which is also founded on planned investment projects for the third regulatory period.

The largest investment project planned by PSP for the 2022-2026 period is the first phase of construction of the new Grubišno Polje peak storage facility, which involves research work and initial investments into purchasing and installing equipment for the project, which the HERA has accepted as part of the approval for the investment plan for the third regulatory period. By the decision of the Ministry and pursuant to the **Act on Strategic Investment Projects of the Republic of Croatia (Official Gazette no. 18/18 and 23/20)**, the project "*Construction of an underground gas storage facility at the Grubišno Polje hydrocarbon production field*" has also been included in the list of strategic projects as of 23 February 2018.

In addition to the standard bundled unit (SBU) as a permanent service and the individual permanent lease services and individual temporary lease services, PSP d.o.o. also offers non-standard



services. The non-standard services of the storage system operator are prescribed in the *Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the unloading and send-out of liquefied natural gas, and public service gas supply*.

On the basis of the *Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the unloading and send-out of liquefied natural gas, and public service gas supply*, in December 2021, the HERA adopted the *Decision on the cost of non-standard services of gas storage system operators (Official Gazette no. 141/21)* for the 2022-2026 period, which was amended for the purpose of dual price display by the *Decision on the cost of non-standard services of gas storage system operators (Official Gazette no. 108/22)*. With this *Decision*, the average hourly price of the gas storage system operator for the third regulatory period, 1 October 2022 - 31 December 2026, is set at HRK 190.00/h (EUR 25.22/h), excluding VAT.

### 5.3.4. Gas distribution

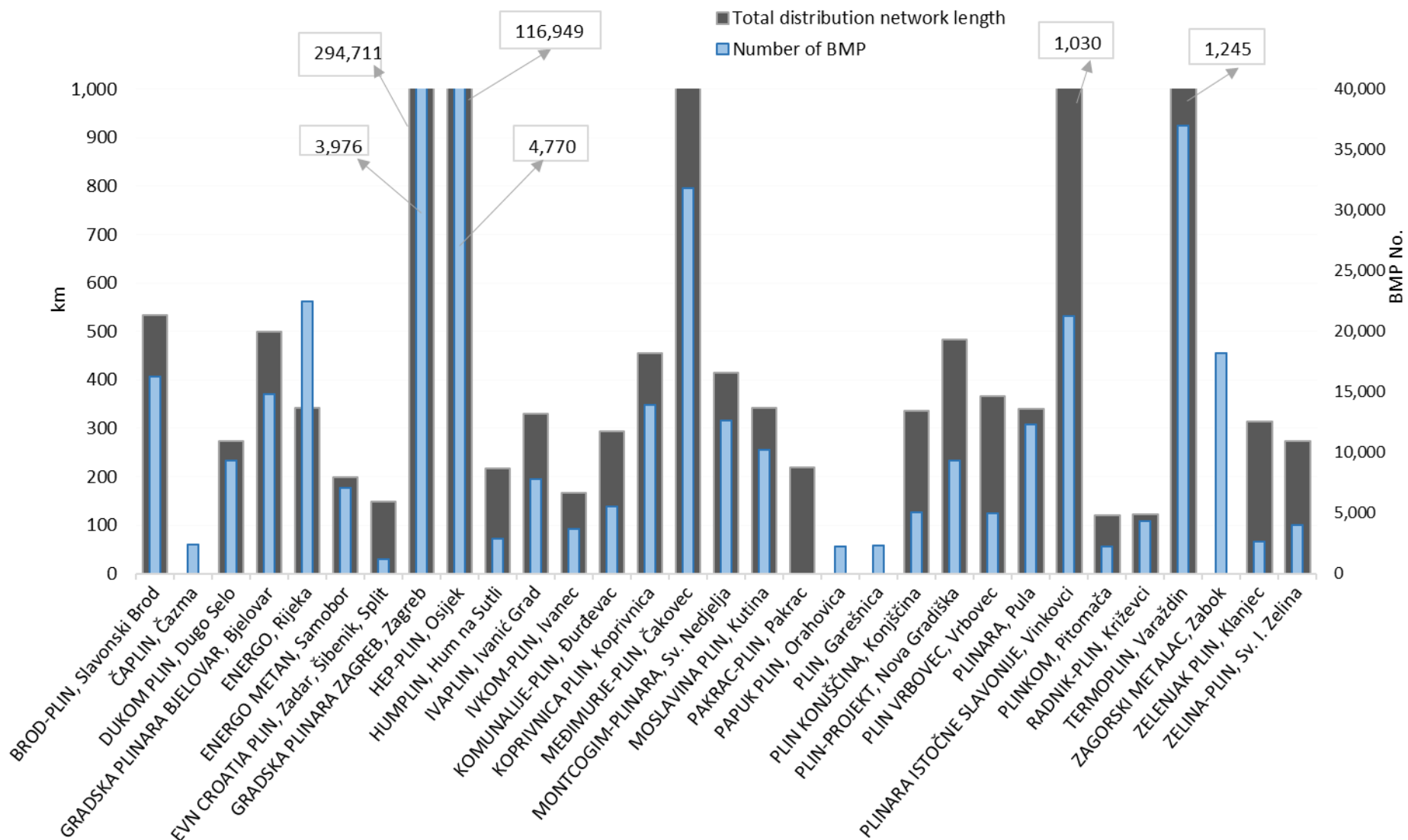
Gas distribution is a regulated energy activity performed as a public service. In 2022, gas distribution in Croatia was performed by 31 energy entities, i.e. distribution system operators. In early 2022, the energy entity HEP-PLIN d.o.o., Osijek, carried out the status merger of the energy entities DARKOM DISTRIBUCIJA PLINA d.o.o., Daruvar, and GRADSKA PLINARA KRAPINA d.o.o., Krapina. This resulted in a decrease in the number of distribution system operators from 33 in 2021 to 31 in 2022.

According to the data for 2022 collected by the HERA from 31 distribution system operators, the total quantity of gas distributed in 2022 amounted to 12,023 GWh, which was a 12.4% decrease in comparison to the total distributed quantity in 2021. Of the total quantity of distributed gas, the largest quantities were distributed to the TM2 (3,887 GWh), TM5 (1,238 GWh) and TM3 (1,194 GWh) tariff model users.

The total number of billing metering points of final customers connected to the distribution system was 699,786 in 2022, which was an increase of 0.8% compared to the total number of billing metering points in 2021. Of the total number of billing metering points in 2022, 693,466 were under TM1-TM4 tariff models (with an annual consumption up to 100,000 kWh), while 6,320 were under TM5-TM12 tariff models (with an annual consumption exceeding 100,000 kWh).

The total length of all gas distribution systems in 2022 was 20,144 km, which represents a 1.3% increase compared to the total length of all the gas distribution systems at the end of 2021. Of the total length of distribution systems at the end of 2022, low-pressure gas pipelines accounted for 15.8%, medium-pressure gas pipelines accounted for 77.7%, and high-pressure gas pipelines accounted for 6.5%.

A comparison of the length of the distribution systems, gas losses and the number of billing metering points by distribution system operator in the Republic of Croatia in 2022 is shown in Figure 5.3.15, and the geographical layout of the distribution system operators' distribution areas in 2022 is shown in Figure 5.3.16.



\*Note: the number of BMPs on 31 December 2022



*Figure 5.3.145 Comparison of the length of the distribution systems, gas losses and the number of billing metering points by distribution system operator in the Republic of Croatia in 2022*

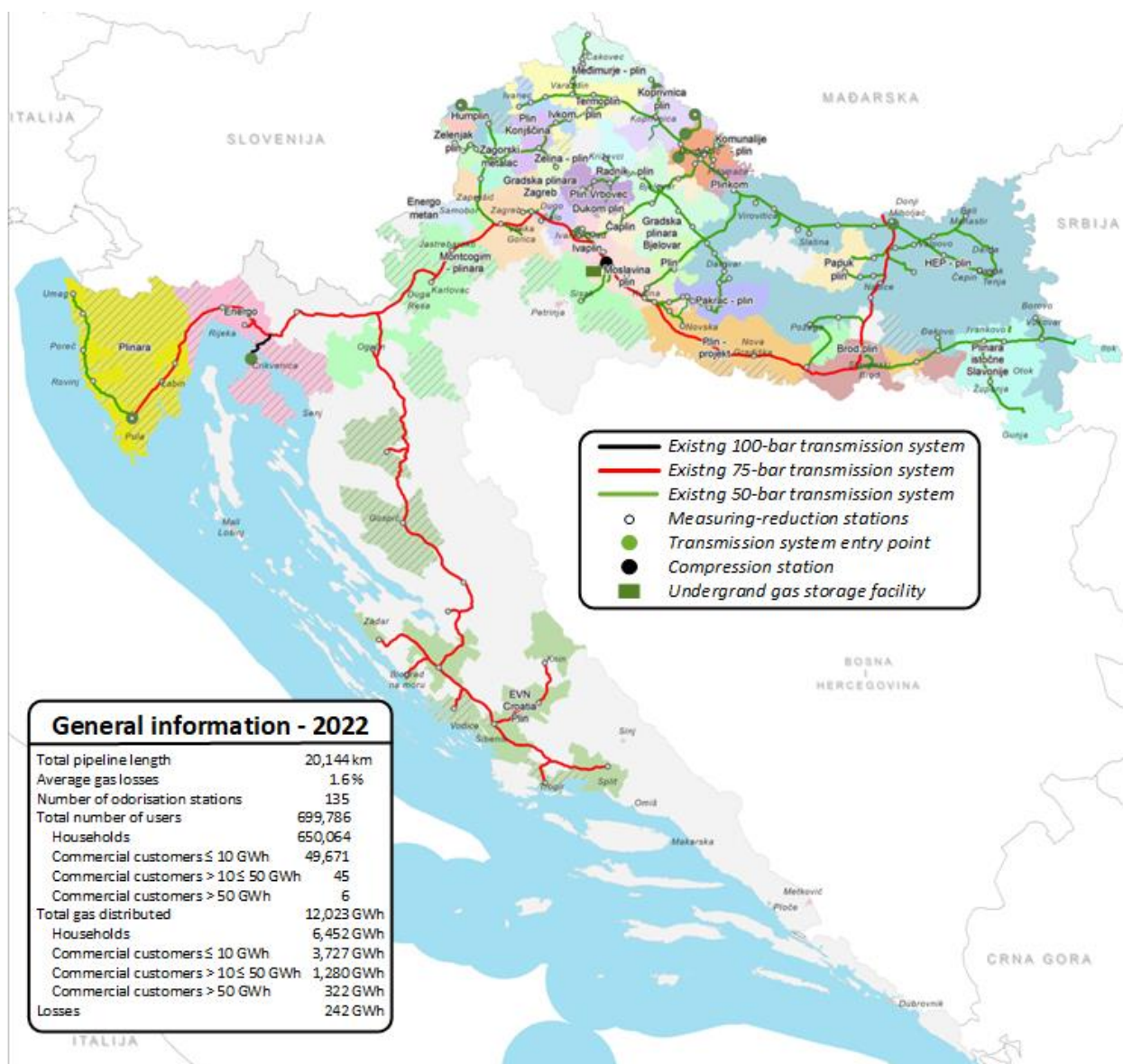


Figure 5.3.16 Geographical layout of the distribution system operators' distribution areas and basic information on gas distribution activities in the Republic of Croatia in 2022

An overview of the indicators for gas distribution by year from 2018 to 2022 is presented in Table 5.3.4.

Table 5.3.4 Overview of the indicators for gas distribution by year from 2018 to 2022

Indicator	2018	2019	2020	2021	2022*
Number of distribution system operators	35	35	33	33	31
Total length of distribution network (km)	19,448	19,673	19,787	19,891	20,144
Total distributed gas (GWh)	11,071	10,914	11,309	12,366	12,023

\*Note: expressed as the gross calorific value



## Gas distribution regulation method

Aside from the **Gas Market Act** and other energy-related legislation, gas energy distribution is also regulated by the *Methodology for setting tariffs for gas distribution* (Official Gazette no. 48/18). This *Methodology* is based on determining the maximum allowed revenue for the distribution system operator in a given regulatory period. Tariff items for gas distribution for all billing metering points on the same tariff model within a distribution system managed by a single operator are equal, regardless of the length of the distribution route (postage stamp principle). According to the *Methodology*, allowed operating costs are determined by applying incentive mechanisms of the efficiency coefficients and allocating actual savings, while allowed capital costs are determined based on the allowed depreciation of regulated assets and the allowed rate of return on regulated assets. The projection of the value of regulated assets for a regulatory period of five years is determined using the *ex-ante* approach of approving investment plans, as well as the *ex-post* revision of realised investments. The *Methodology* also prescribes the ability to determine the justified values of long-term material and non-material assets on the basis of economic efficiency analyses, as well as the implementation of comparative expense and efficiency analyses of the operations of distribution system operators in Croatia and the surrounding region. Upon the expiry of a regulatory period, allowed revenues are revised, including operating and capital expenditures, and the realised revenues are compared based on tariffs with the revised allowed revenues. Possible imbalances are included in the calculation of the allowed revenues for the following regulatory period. The *Methodology* also foresees the implementation of a regulatory account as a model of gas distribution regulation; its implementation enables operators planning significant investments into new distribution systems or the development of an existing system to be recompensated in later years of the regulatory account for lower revenues from initial years.

A regulatory period for gas transmission is defined as a multi-annual, five-year period for which allowed revenues and tariffs are determined independently for each regulatory year. The third regulatory period for gas distribution began on 1 January 2022 and will last until 31 December 2026.

The *Methodology* classifies billing metering points into 12 tariff models according to the annual gas consumption; the operator classifies them in accordance with the data on realised annual gas consumption at each billing metering point in the previous calendar year or, in the case of new billing metering points, according to estimated annual gas consumption based on the data on the connection capacity of each billing metering point. The gas distribution price consists of tariff item Ts1 for the distributed quantity of gas, which is established independently for each distribution system operator, and tariff item Ts2, representing a fixed monthly charge that is equal for all operators for a particular tariff model.

## Gas distribution price and connection fee

The price of gas distribution in 2022 was set by the *Decision on tariffs for gas distribution* (Official Gazette no. 141/21 and 32/22). Due to changes in the method of calculation and the collection of supplied gas using the gross calorific value and the dual price display (in HRK and EUR), from 1 October 2022, the aforementioned *Decision* was amended by the *Decision on tariffs for gas storage* (Official Gazette no. 108/22).

The total average weighted price of gas distribution in the period from 1 January to 31 December 2022 for the 31 distribution system operators in the Republic of Croatia was HRK 0.0467/kWh, which represents a decrease of 7.9% compared to the total average weighted price of gas distribution in 2021, which amounted to HRK 0.0508/kWh after confirmation of the realised distributed amounts of gas. The gas distribution tariff decreased in 23 distribution areas and increased in 8 distribution areas. Figure 5.3.17 shows the tariffs, net of VAT, for gas distribution for the years of the third regulatory period of 2022-2026 by distribution system operator in the Republic of Croatia.



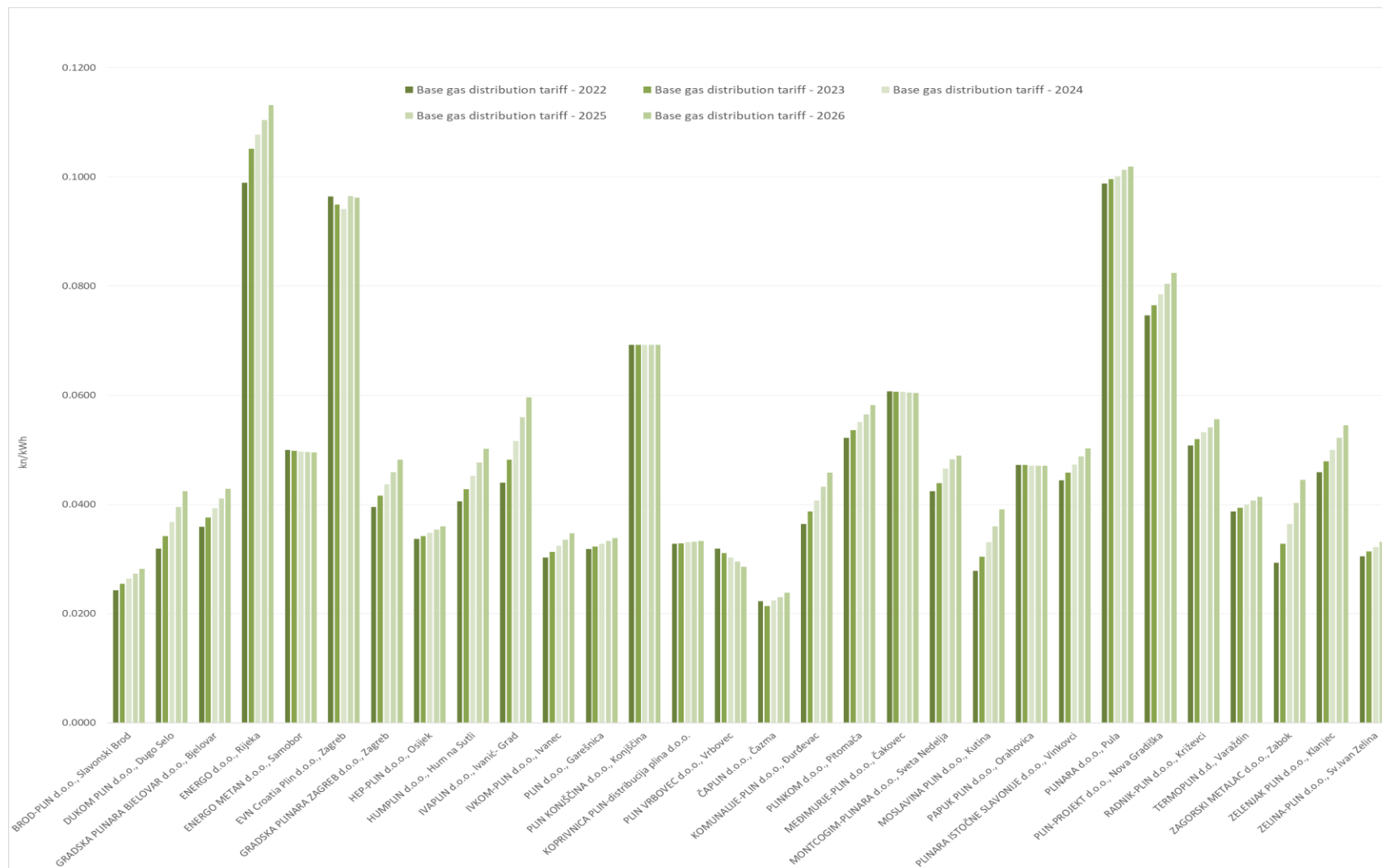


Figure 5.3.17 Tariffs, net of VAT, for gas distribution for the years of the third regulatory period of 2022-2026 by distribution system operator in the Republic of Croatia



The gas distribution system connection fee is based on the *Methodology for calculating the charge for connection to the gas distribution or transmission system and for the connection capacity increase* (Official Gazette no. 48/18). This *Methodology* defines: categories of connections to the gas transmission system; categories of operations according to complexity; methods, elements and criteria for calculating charges for gas transmission system connection and increases in connection capacity; the procedure for requests to determine or change the amount of charges for connection, as well as changes in the connection charges and charges for the adoption, publishing and implementation of connection fees. *The Methodology* defines categories of connections to the distribution system and the corresponding coefficients, as well as the number of working hours required in a particular category of operations according to complexity for connecting particular categories of use to the distribution system.

The connection fee consists of the cost of the extraordinary creation of technical requirements in the distribution system and the cost of implementing connections; it is charged directly to investors who have requested the service, and the amount of the charge depends on the complexity of the work involved. In December 2021, on the basis of the *Methodology for calculating the charge for connection to the gas distribution or transmission system and for connection capacity increase*, the HERA adopted the *Decision on charges for connection to the gas distribution or transmission system and for increasing connection capacity* (Official Gazette no. 141/21), which defined the charge for connection to the distribution system during the preparatory and final works for the years of the third regulatory period (2022-2026). Due to changes in the method of calculation and the collection of supplied gas using the gross calorific value and the dual price display (in HRK and EUR), from 1 October 2022, the aforementioned *Decision* was amended by the *Decision on charges for connection to the gas distribution or transmission system and for increasing connection capacity* (Official Gazette no. 108/22).

On the basis of the *Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the unloading and send-out of liquefied natural gas, and public service gas supply* (Official Gazette no. 48/18, 25/19, 134/21 and 9/22), in December 2021, the HERA adopted the *Decision on the cost of non-standard services of the distribution system operator* (Official Gazette no. 141/21) for the 2022-2026 period, which was amended for the purpose of dual price display by the *Decision on the cost of non-standard services of the distribution system operator* (Official Gazette no. 108/22). With this *Decision*, the average hourly price of the distribution system operator for the third regulatory period, 1 October 2022 - 31 December 2026, is set at HRK 110.00/h (EUR 14.60/h), excluding VAT.

### 5.3.5. Management of liquefied natural gas and/or compressed natural gas supply points

The energy activity of liquefied natural gas (hereinafter: LNG) and/or compressed natural gas (hereinafter: CNG) supply point management is regulated by:

- the **Gas Market Act** and
- the **Act on the Deployment of Alternative Fuels Infrastructure** (Official Gazette no. 120/16 and 63/22), and

and regulations subordinate to these acts.

Based on the **Act on the Deployment of Alternative Fuels Infrastructure**, which transposes the provisions of *Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the Deployment of Alternative Fuels Infrastructure* into Croatian legislation, the Ministry of Maritime Affairs, Transport and Infrastructure adopted the following by-laws in 2022:

- *Ordinance on the comparison of unit prices of alternative and conventional fuels* (Official Gazette no. 134/22) and



- *Ordinance on the register of identification codes and alternative fuels infrastructure (Official Gazette no. 134/22).*

In 2021, the HERA began collecting data on sold quantities of liquefied natural gas and compressed natural gas to final customers at the LNG and/or CNG supply points.

In 2022, the energy activity of LNG and/or CNG supply point management was undertaken by 5 energy entities, of which 4 sold CNG and 2 sold LNG. LNG and CNG are considered alternative fuels and, as such, represent a measure from the common alternative fuel infrastructure deployment framework, which intends to reduce oil dependence to the greatest degree possible and mitigate the negative impact of transport on the environment, as set forth in the **Act on the Deployment of Alternative Fuels Infrastructure (Official Gazette no. 120/16)**.

In 2022, the **Act on Amendments to the Act on the Deployment of Alternative Fuels Infrastructure (Official Gazette no. 63/22)** was adopted, which amends the existing legal framework for the development of infrastructure and the use of alternative fuels in transport, with the aim of achieving a sustainable market and transport system with minimal negative effects on the environment and society. These amendments additionally regulate the charging points for category L motor vehicles, the points for supplying electricity from land for vessels on inland waterways, and the points for supplying liquefied natural gas for water traffic. In the same way, the establishment of a register of filling stations for alternative fuels is prescribed and the obligation to present information for comparison between the corresponding unit prices of all types of fuel at places for supplying and filling alternative fuels is introduced. With these amendments, the provisions of the EU acquis that Croatia, as a member state, is obliged to apply in the area of alternative fuels are transposed into the national legislation.

The HERA participated in the public consultation procedures for the adoption of the **Act on Amendments to the Act on the Deployment of Alternative Fuels Infrastructure**, as well as in the procedures for the adoption of by-laws based of this Act, which were adopted by the Ministry of Maritime Affairs, Transport and Infrastructure.

CNG is an alternative to LNG in the transport of natural gas and the development of the retail market for natural gas; it is playing an increasingly important role in the supply of alternative transport fuel, the main difference being the aggregate state of the gas. CNG is a gas in its aggregate state, while LNG is a liquid when transported.

Natural gas is brought to the CNG supply point via the gas distribution system to which the supply point is connected, and is compressed at the CNG supply point, while LNG is first delivered by ship to the LNG terminal, from where it is delivered to the LNG supply point by LNG truck. CNG has long been used as an internal combustion fuel for transport and represents a more ecological alternative to liquid fossil fuels.

The establishment and opening of new LNG and CNG supply points contribute to the greater use of alternative fuels in heavy transit (trucks), public transit (buses), and personal vehicles, which has a positive economic impact (cheaper fuel); as an alternative fuel with low carbon content, it also has a significant positive impact on the environment unlike liquid petroleum-based fuels.

Final customers use CNG supply points for their personal vehicles, buses and trucks. The total sold quantity of CNG amounted to 1,205,769 kg, or 17,166 MWh, or 91.6% of the total sold amount of natural gas at LNG and/or CNG supply points.

The average purchase price of gas delivered at a CNG supply point ranged from HRK 0.32/kWh to HRK 0.91/kWh, while the average sale price of gas delivered at a CNG supply point ranged from HRK 0.46/kWh to HRK 1.02/kWh.

Final customers used the LNG supply points to supply trucks. The total sold quantity of LNG amounted to 110,871 kg, or 1,693 MWh, or 8.4% of the total sold quantity of natural gas at LNG



and/or CNG supply points. The average purchase price of LNG ranged from HRK 0.84/kWh to HRK 0.91/kWh, while the average sale price of gas delivered at an LNG supply point ranged from HRK 1.02/kWh to HRK 1.08/kWh.

In 2022, a new energy entity appeared that performs the energy activity of managing a liquefied natural gas and/or compressed natural gas supply point (ENERGY PRIME d.o.o.). In this regard, a significant increase in the share of LNG sales in the total share of sold quantities of gas for supplying trucks was also evident, which thus grew by 110,044 kg, i.e. by 99.3%, while the sale of CNG in relation to the volumes of CNG in 2021 dropped by 193,560 kg, i.e. by 13.8%, which may be a consequence of the inactive performance of energy activities by one energy entity (BROD-PLIN d.o.o.). Figure 5.3.18 shows the ratio of the sold quantities of LNG and CNG.

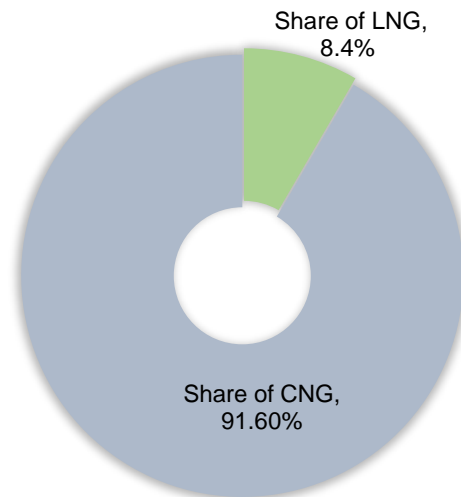


Figure 5.3.15 Ratio of sold quantities of LNG and CNG in 2022

### 5.3.6. Regulatory measures and observations

The regulation of energy activities is established for the purpose of implementing a system of the regulated activity of energy entities in the performance of energy activities, especially those energy activities that are performed as public services.

Network energy activities in the natural gas sector are performed as public services and include gas transmission, gas storage, LNG terminal management, gas distribution and LNG and/or CNG supply point management.

The measures and activities undertaken by the HERA in 2022 with the aim of regulating network activities through decision-making or the approval of the operators' by-laws include the following groups of activities:

- improvement of the legal framework that determines the standard gas quality, the register of billing metering points and the quality of the gas supply with the aim of diversifying the LNG supply routes, and thus increasing the quantity of transmitted gas and the security of gas supply by adopting *Amendments to the General Terms Conditions of Gas Supply* and approving the *Amendments to the Rules on Gas Storage System Use*,
- harmonisation in the statement and contracting of the capacity of the transmission system and the calculation of the supplied gas with gas systems in the region by using the gross calorific value of gas instead of the net calorific value of gas from 1 October 2022, as done in the EU, by adopting a binding decision for energy entities,



- making decisions on the amounts of tariff items for network activities, and the prices of non-standard services in order to apply the gross calorific value of gas and introduce the euro currency,
- approving the introduction of a new and improved capacity contracting model at the inputs and outputs of the transmission system, with the aim of significantly relieving the administrative burden of both the users and the operators of the transmission system, by approving the *Amendments to the Network Code for the Gas Transmission System*,
- initiation of the certification procedure for gas storage system operators in order to assess the risks associated with the prescribed storage filling targets in the EU based on *Regulation (EU) 2022/1032*,
- improving the rules for the use of liquefied natural gas terminals, which created the prerequisites for increasing the LNG terminal capacity by approving the *Amendments to the Rules for LNG Terminal Use*,
- supervision of energy entities in their performance of energy activities, and the implementation and execution of the activities prescribed in the *Regulation on Eliminating Disturbances on the Domestic Energy Market* and the related decisions of the Government of the Republic of Croatia and instructions of the Ministry,
- supervision of the transparency and functioning of the gas market.

Despite a year of crisis unlike any that has been recorded in recent history, the entire Croatian gas infrastructure enabled a sufficient and secure supply of gas to final customers, as a key element of public security, which is prescribed by the **Gas Market Act**.

With the construction and full use of the LNG terminal, a high level of security of the natural gas supply to the Republic of Croatia and neighbouring countries has been achieved, which is evident from the significant quantities of gas recorded at the transmission system outputs, especially at the interconnections.

The transmission system operator PLINACRO d.o.o. initiated the project for the construction of the new gas pipeline Zlobin - Bosiljevo in 2022, with the aim of ensuring the energy independence of the Republic of Croatia and the secure supply of natural gas to households and businesses in the territory of the Republic of Croatia, and in connection with the decision to increase the capacity of the LNG terminal on the island of Krk. These related projects were supported by the Government of the Republic of Croatia in the *Decision on increasing the security of the gas supply by building the Zlobin-Bosiljevo gas pipeline and increasing the capacity of the LNG terminal to 6.1 billion cubic metres of gas per year (Official Gazette no. 96/22)* in which it is decided that the Republic of Croatia will participate in the financing of the construction of the Zlobin-Bosiljevo gas pipeline and the increase of the gasification capacity of the LNG terminal on the island of Krk to 6.1 billion m<sup>3</sup> of gas per year through the Recovery and Resilience Mechanism.

This investment in the gas pipeline is not included in the approved amount of tariff items for gas transmission for the years of the third regulatory period of 2021-2025, therefore the HERA believes that the financing of such projects should be provided through an increase in the transmitted gas quantities and sources of financing that will not result in an increase in the final price of gas for users in the Republic of Croatia, given the current status of finalised construction of the gas transmission system in the Republic of Croatia.

All network operators made the maximum efforts in fulfilling their legal obligations in terms of ensuring the adequate operation of the key infrastructure that participates in the delivery of gas necessary for the life and work of citizens and economic entities in a reliable manner.

In this regard, the HERA positively evaluates all investments related to increasing the reliability of technological process management, which, for example, in the case of the LNG terminal, included the expansion of the gas quality monitoring system, considering the increase in the number of countries from which ships carrying LNG arrive, and additional investments in gas storage



capacities undertaken by the gas storage system operator through the project for the construction of the peak gas storage at Grubišno Polje.

With regard to gas distribution, as a network activity that distributes gas to final customers, the HERA sees a problem in carrying out the maintenance and reconstruction of existing gas pipelines, since the cost of purchasing gas for the network, i.e. for covering losses in the system, has become one of the biggest operational problems due to the significant increase in gas prices in 2022. From a regulatory point of view, when determining the amount of tariff items for gas distribution, only justified gas losses in an individual system of up to 3% are accepted.

In order to ease the burden of the high gas prices on network operators as well, the *Regulation on Eliminating Disturbances on the Domestic Energy Market* also ensured the quantities of gas to cover losses in the distribution system at a set, regulated price, which was determined by the *Decision on the price and allocation of natural gas capacities taken over by Hrvatska elektroprivreda d.d. from natural gas producers*.

Bearing in mind the two key goals that await us in the near future – decarbonisation through the energy transition and maintaining a secure supply of energy, the HERA will continue to participate in the further development of the network infrastructure to ensure the efficient and rational use of energy, with adequate protection of energy customers and energy entities, based on the postulates of the fundamental goals of regulation and by ensuring objectivity, transparency and impartiality in the performance of energy activities.



## 5.4. Wholesale natural gas market

### 5.4.1. Natural gas balance in the transmission system

In 2022, the total natural gas quantity that entered the transmission system amounted to 41,040 GWh, which was 16.6% more than in 2021. Of this quantity, 6,035 GWh of natural gas entered the transmission system from domestic production, which is 14.7% of the total quantity of gas that entered the transmission system, and which is 5.8% less than in 2021; 5,363 GWh of natural gas entered the transmission system from the entrances at the interconnections, i.e. 13.1% of the total transmitted quantity, which is 22.4% less than in 2021; and 3,166 GWh of natural gas entered the transmission system from UGSF Okoli, i.e. 7.7% of the total transmitted quantity, which is 28.8% less than in 2021. In 2022, the total quantity of natural gas sent out from the LNG terminal into the transmission system was 26,476 GWh, which was 64.5% of the total quantity of gas that entered the transmission system, i.e. 51.9% more than in 2021 (Figure 5.4.1).

The total gas quantity that exited the transmission system in 2022 amounted to 41,040 GWh, which is 16.7% more than in 2021. Of this quantity, 12,456 GWh of natural gas (30.3% of the total transmitted quantity) was delivered to final customers connected directly to the transmission system, which is 21.6% less than in 2021; 12,023 GWh of natural gas was delivered to customers on the distribution system, or 29.3% of the total transmitted quantity, which is 12.4% less than in 2021. The quantity of natural gas delivered at outputs at interconnections amounted to 11,489 GWh, or 28.0% of the total transmitted quantity; 5,072 GWh of natural gas were delivered from UGSF Okoli, or 12.4% of the total transmitted quantity, which is 15.4% more than in 2021.

According to the data obtained from gas suppliers, a total of 11,781 GWh of natural gas were delivered to final customers from the distribution systems in 2022, of which 6,452 GWh (54.8%) was delivered to households, and 5,329 GWh (45.2%) was delivered to non-household customers.

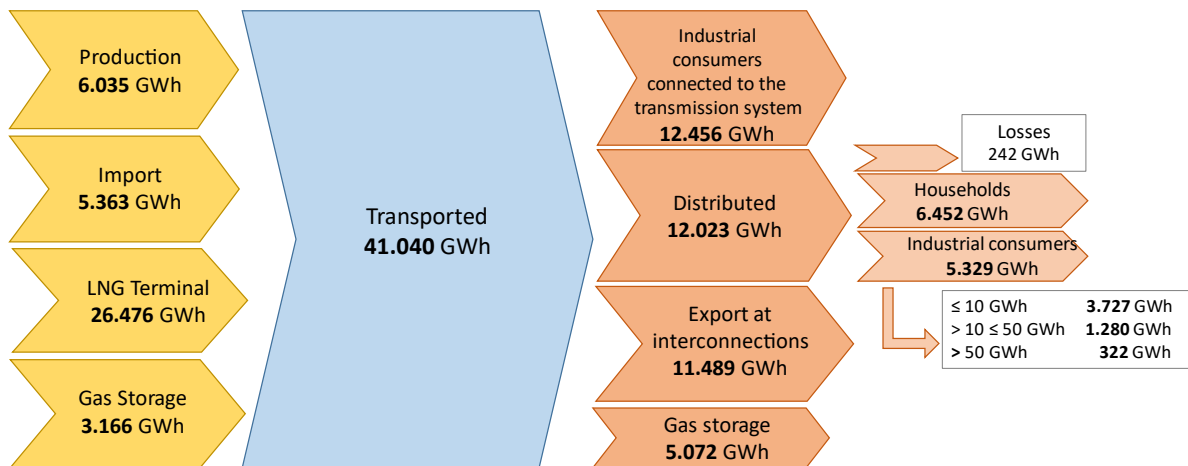


Figure 5.4.1 Natural gas balance in the transmission system in the Republic of Croatia in 2022



In 2022, requests for transmission system capacity booking were submitted by 39 active transmission system users, i.e. direct members of balance groups associated into 14 balance groups. The shares of individual balance groups in the total natural gas quantities allocated by the transmission system in 2022 are shown in Figure 5.4.2.

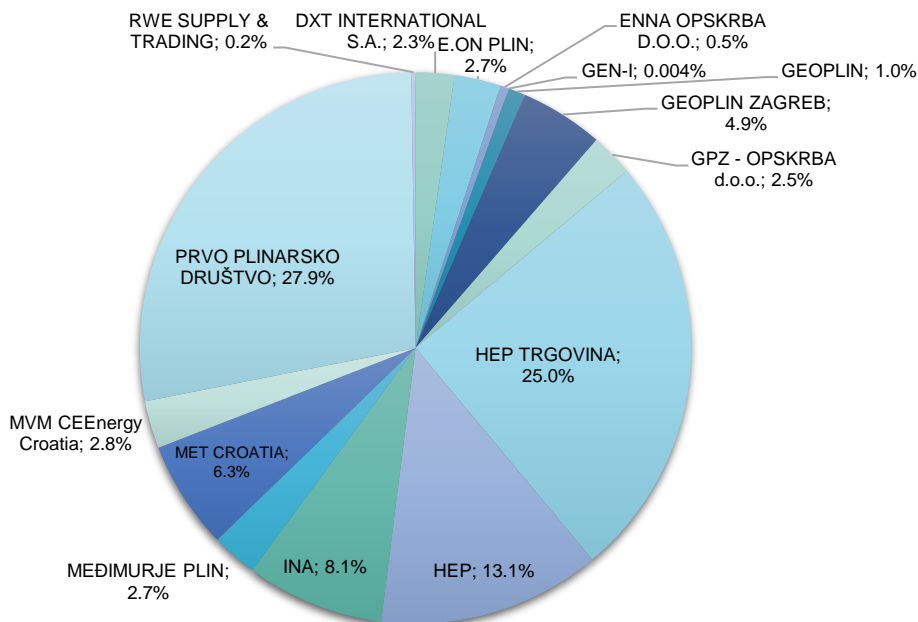


Figure 5.4.2 The share of balance groups in the total natural gas quantities allocated at exits from the transmission system in 2022

The gas crisis that a large part of Europe is facing due to the war in Ukraine is once again putting domestic gas production into focus. After a period of five years during which exploration of new fields was not possible in Croatia, new exploration concessions were tendered in 2016, which led to certain developments in ensuring domestic gas production. Although INA d.d. is no longer the only one on the domestic market for the exploration and production of oil and gas, it continues to be the biggest investor in production by investing in new concessions, exploration works and the development of the existing fields. INA d.d. also invests in extending the life of gas fields in the Adriatic, which have a significant share (30%) in the total domestic gas production.

In 2022, the Government of the Republic of Croatia passed the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, which prescribes an increase in gas production by 10% compared to the planned production of natural gas, in accordance with the technical and technological possibilities, with the aim of increasing production by creating new wells and potentially new platforms, as well as the introduction of already discovered and confirmed gas deposits into production. All these activities ensure the possibility of providing additional quantities of gas to the Croatian market, which will have a positive impact on supply security and the entire economy.





The trend in gas production in Croatia by year is shown in the following figure:

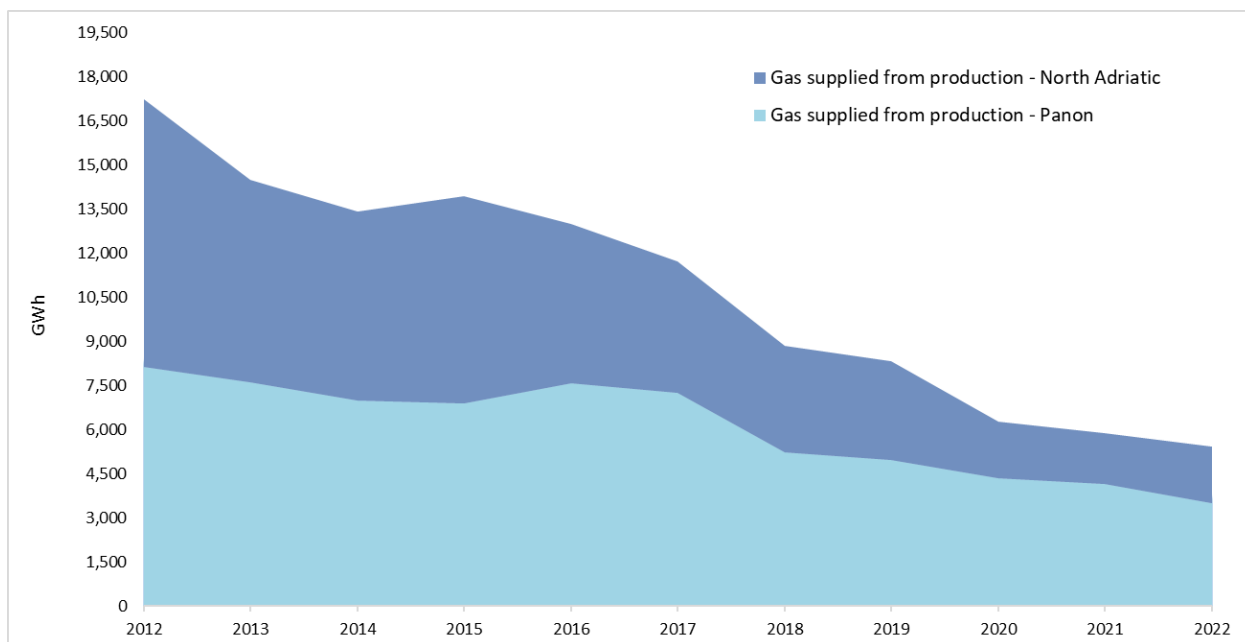


Figure 5.4.3 Total quantities of gas production in the 2012-2022 period

During 2022, INA d.d. produced a total of about 6 billion kWh of gas in the Croatian gas fields and delivered it to the transmission system, which meets only about 25% of the domestic gas needs, and accounts for 15.4% of the total transmitted gas quantities, while the remaining 84.6% of the transmitted gas quantities were imported via interconnections and from the LNG terminal on the island of Krk.

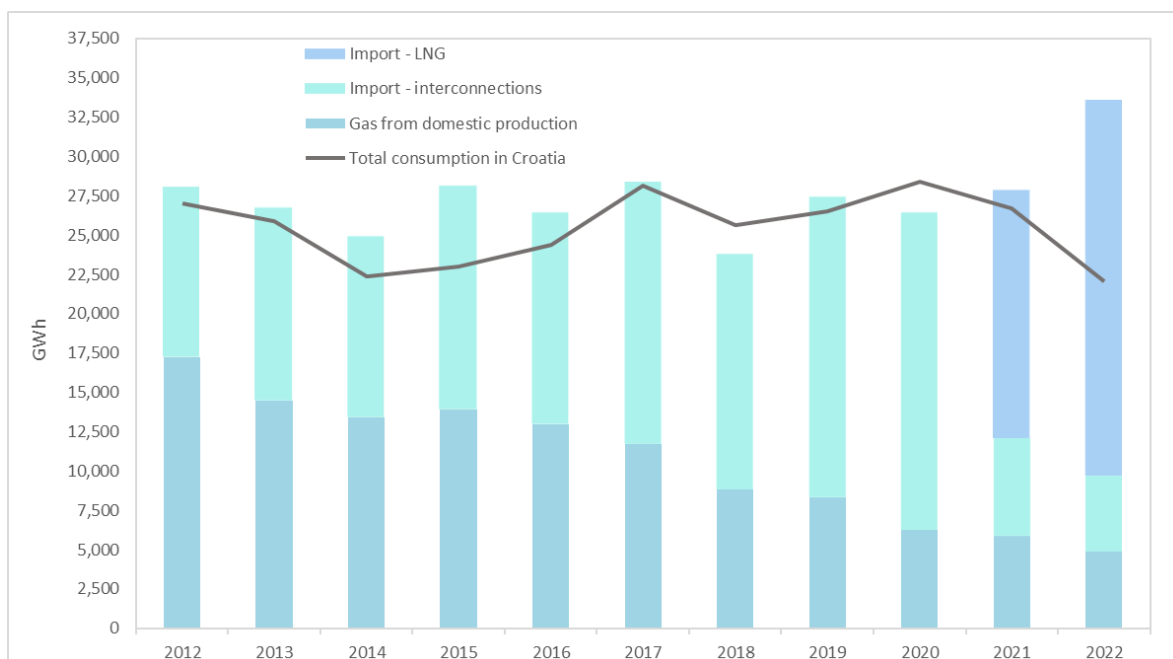


Figure 5.4.4 Gas quantities from domestic production delivered to the transmission system and imported gas quantities in the 2012-2022 period



### 5.4.2. Transmission system balancing

The wholesale gas market in Croatia is organised according to the balance group model, representing an interest group of participants in the gas market, organised on a commercial basis, primarily for the purpose of balancing and optimising balancing costs, for which the balance responsible party is responsible.

Transmission system balancing is carried out at the gas day level in order to ensure the secure operation of the transmission system. The management of transmission system balancing is prescribed by the *Rules on the Organisation of the Gas Market* adopted by HROTE d.o.o., the *Network Code for the Gas Transmission System* adopted by PLINACRO d.o.o. and approved by the HERA, and *Commission Regulation (EU) No 312/2014 of 26 March 2014 establishing a Network Code on Gas Balancing of Transmission Networks*.

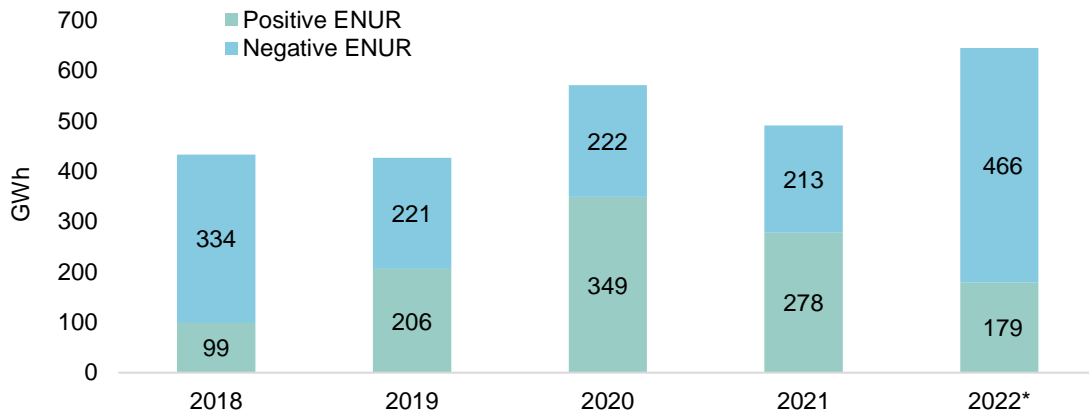
Each balance group manager is primarily responsible for balancing the balance group that the manager organizes and manages, that is, the balance group manager is responsible for balancing the daily quantities of gas delivered to and taken from the transmission system, so that the transport system operator undertakes as few balancing actions as possible.

Balancing performed by the transport system operator implies trading in products on the trading platform managed by HROTE d.o.o., in the amount of gas quantities that will reduce the estimated total imbalance. A product on the trading platform is the quantity of gas available for trading by the participants on the trading platform. Products can be offered and used within-day or day-ahead, and the transport system operator can both buy and sell gas in a single gas day for balancing purposes.

In addition to trading on the trading platform, the transmission system operator can balance the transmission system by activating the balancing energy for the balancing service, if the operator has concluded a contract with an energy entity that would act as a provider of this service. The balancing service was not available during 2022 because there were no interested tenderers. Also, there was no need to use the balancing service, as short-term products offered through the trading platform were sufficient.

The transport system operator PLINACRO d.o.o. balanced the transmission system in 2022 through 156 activations of short-term products on the trading platform in periods when the balance group managers failed to balance their portfolios. There were 52 interventions more than in the previous year.

A total of 179 million kWh of positive balancing energy and 466 million kWh of negative balancing energy were activated in 2022. Compared to the total amount of gas taken up into the transmission system, 1.14% of negative balancing energy and 0.44% of positive balancing energy was activated in 2022.

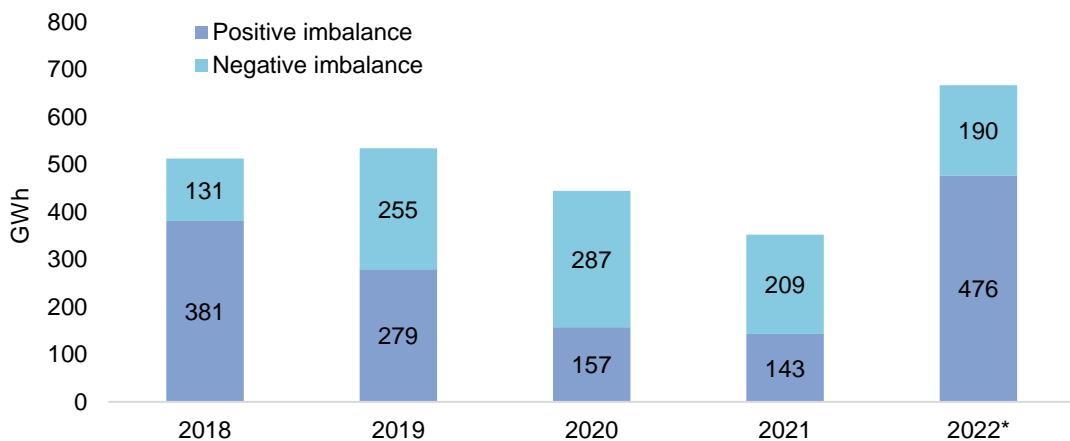


\* expressed as the gross calorific value

Source: HOPS; edited by the HERA

Figure 5.4.5 Overview of activated balancing energy (EnUr) in the 2018-2022 period

In terms of balancing by balance groups, in 2022, a large increase in the positive daily imbalance of the balance groups was recorded compared to previous years due to the remaining gas surpluses in the transmission system of the Republic of Croatia, which is shown in Figure 5.4.6.



\* expressed as the gross calorific value

Source: HOPS; edited by the HERA

Figure 5.4.6 Total imbalance of all balance groups in the 2018-2022 period

Due to the high positive imbalances, in 2022, the transmission system operator had to activate the largest quantity of negative balancing energy since 2018. On the other hand, balance groups that, due to the lack of available gas on the market, failed to secure sufficient quantities of gas to supply their final customers in time, mainly relied on surplus gas from the transmission system, gas storage or on the purchase of gas from the activation of negative balancing energy. As a result of the above, balance groups that did not secure gas for their portfolio of customers on time created negative imbalances that, together with the high prices, resulted in high financial obligations from monthly calculations. The high financial obligations of the balance groups also influenced the need to amend the provisions of the *Rules on the Organisation of the Gas Market*; therefore HROTE d.o.o. initiated the process of amending them in order to establish stronger financial protection mechanisms in the sustainability of the financial operations of gas market operators and other market participants. The



*Amendments to the Rules on the Organisation of the Gas Market* were adopted in 21 December 2022 and entered into force on 1 January 2023.

### Applicable price for daily imbalances

The applicable price is the price on the basis of which the compensation for the daily imbalance is calculated and is determined for each gas day as the marginal selling price and the marginal purchase price.

The marginal selling price is determined according to the lower price criterion between: the lowest unit price of the product used by the transport system operator as negative balancing energy for that gas day or the weighted average gas price for that gas day minus 10%.

The marginal purchase price is determined according to the higher price criterion between: the highest unit price of the product used by the transport system operator as positive balancing energy for that gas day or the weighted average gas price for that gas day plus 10%.

During 2022, a high growth of the applicable prices was recorded compared to previous years. This particularly applies to March 2022 with the start of the war in Ukraine and the rise in prices that began in June and culminated at the end of August, when the highest marginal purchase price of HRK 2,530.00/MWh and the highest marginal selling price of HRK 2,500.47/MWh were achieved.

The trends of the marginal purchase price and marginal selling price in 2022 are shown in Figure 5.4.7.

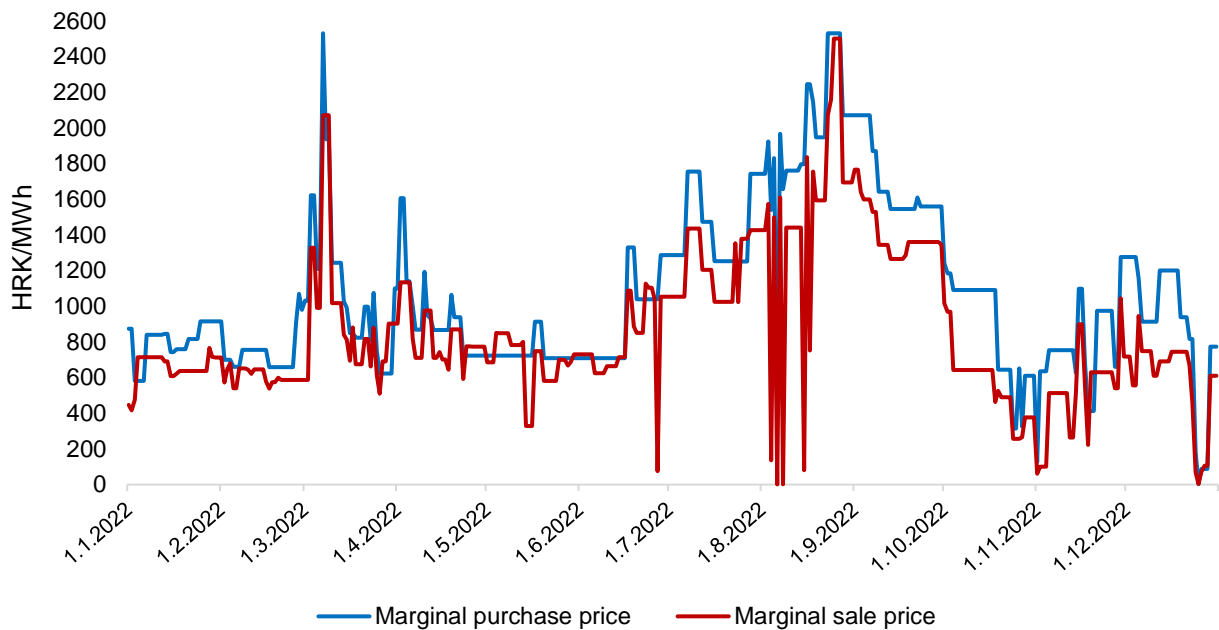


Figure 5.4.7 Trends of the applicable marginal prices in 2022

### 5.4.3. Wholesale market development indicators

Performance indicators of the wholesale market are reflected in the diversity of gas supply sources, the concentration of gas suppliers and the market's potential to meet its demand for gas without its largest supplier. Therefore, the Herfindahl-Hirschman Index (HHI), the number of gas supply sources, and the *Residual Supply Index* (RSI) are the most important indicators applicable to the



Croatian market. These three closely related and interdependent measures indicate whether there is healthy market competition.

HHI is the most commonly used indicator for determining the concentration of market power. A higher HHI indicates greater concentration and measures how much market share is held by a few of the largest traders. HHI ranges between 0 and 10,000; a high HHI closer to 10,000 indicates a monopoly, i.e. that one market participant has a predominant influence. A market with an HHI score below 2,000 is considered a competitive market in which none of the participants has a dominant influence.

According to the HERA's data for 2022, the HHI score for the Croatian wholesale gas market was 2,005, and in 2021 it was 2,160, which indicates the continuation of the multi-year trend of competition development and the reduction of concentration on the wholesale market. The HHI trend for the Croatian wholesale gas market in the period from 2011 to 2022 is shown in Figure 5.4.8.

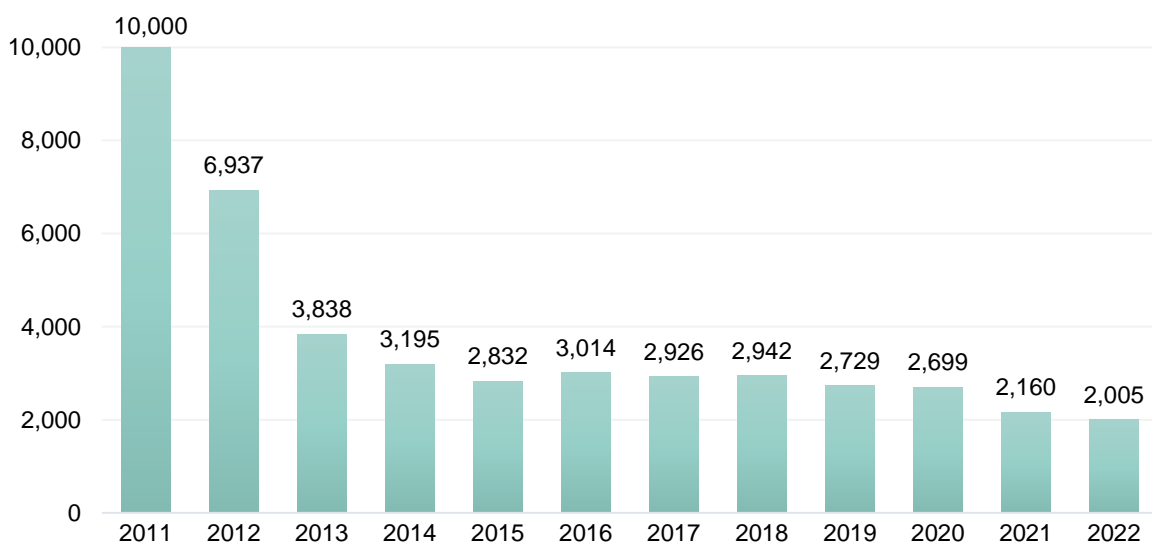


Figure 5.4.8 HHI trend for the Croatian wholesale gas market from 2011-2022

The number or diversity of gas supply sources is another wholesale market development indicator. According to data collected by the HERA for 2022, gas in Croatia was mostly procured from three sources: from domestic production, from imports at interconnections and from imports from the LNG terminal, which indicates the diversity of supply.

As an indicator measuring the development of the wholesale market, RSI determines the relationship between the sum of the supply capacities of all but the largest supply source, and the total market demand. RSI measures the market's dependence on the largest supply source by analysing the availability of alternative supply source, to avoid the full reliance of the market on its largest supply source to meet market demands. An RSI equal to or greater than 110% indicates that the market can survive without its largest gas supply source, and in Croatia in 2022 it was at a satisfactory level of 155%.

An overview of the wholesale gas market indicators by year for the period from 2018 to 2022 is shown in Table 5.4.1. The table shows that, with an increase in the number of sources of gas supply, natural gas trading activity on the wholesale market also increased; by activating two-way flows at interconnections, the amount of exported natural gas from Croatia also increased.

Table 5.4.1 Overview of the indicators for the wholesale market of gas by year from 2018 to 2022



Indicator	2018	2019	2020	2021	2022*
<b>Total volume produced in Croatia (GWh)</b>	9,664	8,194	6,675	5,775	6,035
<b>Gas imported at interconnections (GWh)</b>	15,535	19,442	20,821	6,225	5,362
<b>Quantity of gas from the LNG terminal (GWh)</b>	-	-	-	15,703	26,476
<b>Quantity of gas from gas storage facility (GWh)</b>	4,342	3,172	4,985	4,009	3,166
<b>Gas available for sale on the Croatian market (GWh)</b>	29,541	30,807	32,481	31,712	41,040
<b>Total quantity of gas sold on the wholesale market (GWh)</b>	26,117	26,787	26,885	43,643	61,720
<b>of which: on the Croatian market (GWh)</b>	25,963	26,275	26,629	42,413	50,231
<b>exported from Croatia (GWh)</b>	154	512	256	1,230	11,489
<b>Number of gas supply sources</b>	3	3	3	4	4
<b>Number of active suppliers (balance group managers) on the wholesale market</b>	13	13	11	14	15
<b>Shares of the largest balance group managers on transmission system outputs on the wholesale market:</b>					
<b>HEP (HEP-Trgovina d.o.o. and HEP d.d.)</b>	59%	49%	38%	32%	38%
<b>INA d.d.</b>	15%	20%	20%	18%	8%
<b>PRVO PLINARSKO DRUŠTVO d.o.o.</b>	12%	14%	22%	25%	28%
<b>Others (less than 7%)</b>	14%	17%	20%	25%	26%

\*Note: expressed as the gross calorific value

A significant component of Croatia's wholesale gas market is gas trade carried out at the virtual trading point (hereinafter: VTP). The VTP is a gas trading place between the entry and exit points of the transmission system, including the gas storage system, where balance group managers may trade in gas. Transactions are agreed bilaterally and confirmed and carried out via a system provided by the gas market operator HROTE d.o.o. There were 15 active balance group managers at the VTP in 2022, which traded a total of 41,004 GWh of gas (16.6% more than in 2021), as shown in Figure 5.4.9.

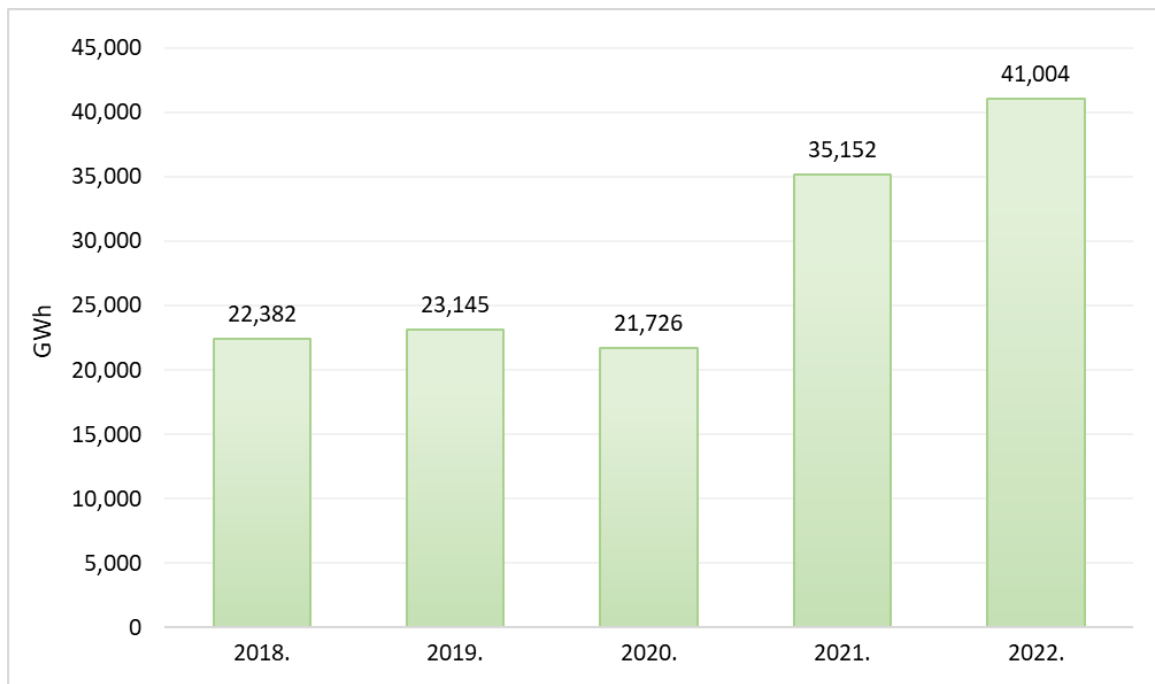


Figure 5.4.9 Quantities of gas purchased/sold in the virtual trading point (VTP) in the 2018-2022 period

The significant increase in VTP trading in 2022 is the result of the operations of the LNG terminal as of 1 January 2021 and related transactions between wholesale gas market participants.

In addition to trading at the VTP, transactions on the wholesale market in Croatia are also carried out on the trading platform. With the implementation of *Commission Regulation (EU) No 312/2014*, a trading platform was established on which all balance group managers and the transmission system operator can trade short-term standardised products. Title products and locational products can be traded daily, and products can be offered and used on a within-day or day-ahead basis. A product is the amount of gas available for trading by the participants on the trading platform.

This trading platform enables transparent, non-discriminatory and anonymous trading; it is also managed by HROTE d.o.o. Since the establishment of the trading platform, i.e. the full implementation of *Regulation 312/2014*, the costs of balancing energy have been significantly reduced thanks to a more efficient model and a more balanced transmission system.

#### 5.4.4. Gas prices on the wholesale market

In order to monitor gas prices on the wholesale market, in 2022, the HERA continued to collect data from gas suppliers and traders in the Republic of Croatia on a quarterly basis through a gas supply and trade questionnaire. The purpose of the questionnaire was to gather data on gas purchase and sale, such as the quantity and prices of gas purchased and sold (delivered) to final customers.

The average gas purchase price net of VAT on the wholesale market in 2022 (purchase under bilateral agreements, at a VTP, on a trading platform, and from imports) was HRK 0.7990/kWh, which represents an increase of 207.0% compared to 2021, when it amounted to HRK 0.2603/kWh expressed as the gross calorific value. In 2022 the highest average purchase price of gas on the wholesale market was recorded in Q3, when it amounted to HRK 1.1881/kWh, and the lowest average purchase price of gas was recorded in Q1 when it amounted to HRK 0.5113/kWh.



The average gas selling price net of VAT on the wholesale market in 2022 (sale under bilateral agreements, at a VTT, on a trading platform, and from exports) was HRK 0.7587/kWh, which represents an increase of 199.4% compared to 2021 when it amounted to HRK 0.2535/kWh expressed as the gross calorific value.

An overview of wholesale gas price trends on the TTF market and the Croatian market, by quarter for 2021 and 2022, is shown in Figure 5.4.10.

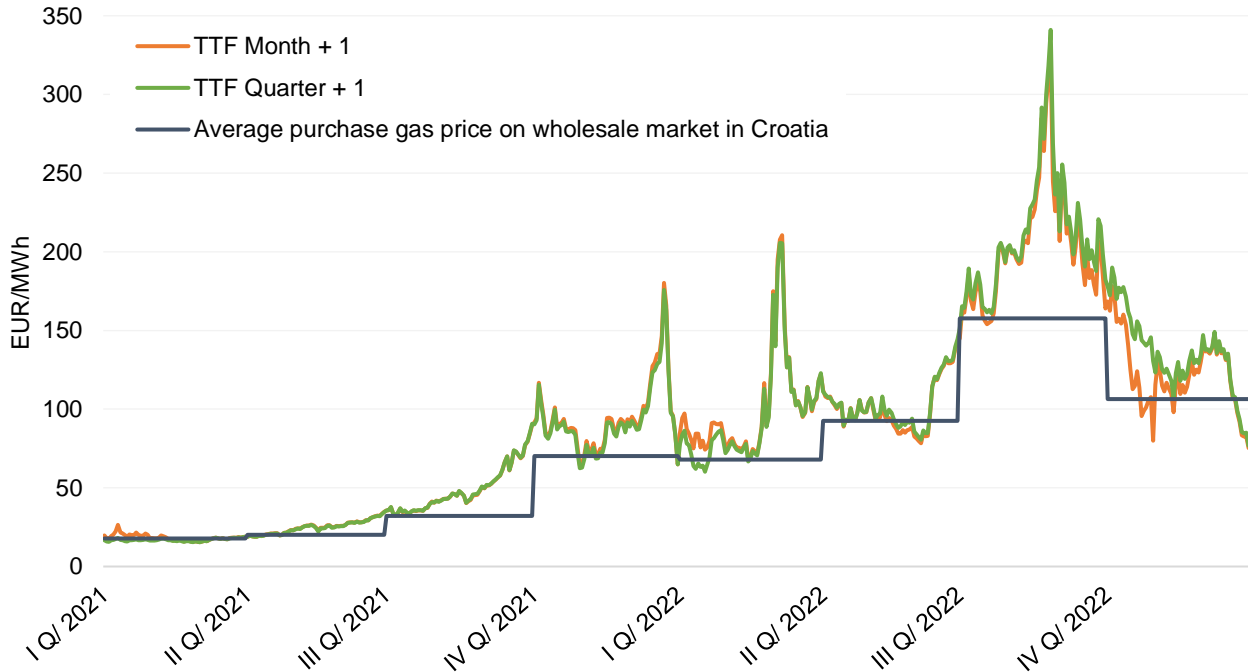


Figure 5.4.10 Overview of wholesale gas price trends on the TTF market and the Croatian market, by quarter for 2021 and 2022

In 2022, a total of 15 suppliers and traders sold gas on the wholesale market. At the level of individual gas suppliers and traders, the highest average selling price of gas on the wholesale market in 2022, including exports from Croatia, was HRK 1.2861/kWh, and the lowest price HRK 0.7595/kWh.

### 5.4.5. Regulatory observations and assessment of the functioning of the wholesale gas market

The wholesale gas market in the European Union in 2022 was marked by the continuation of the energy crisis, with the escalation of gas supply disruptions following Russia's aggression against Ukraine and increased concerns about energy security, which resulted in a strong and record-breaking increase in wholesale gas prices. Gas prices on the European markets fluctuated during 2022 and were recorded at levels of around EUR 80/MWh in Q1 2022 to over EUR 300/MWh in August 2022, when they reached their historically highest levels. In Q4 2022, the mandatory filling rate of European gas storages was better than the Commission's expectations, and the weather conditions were also favourable, which together with *Council Regulation (EU) 2022/1369 of 5 August 2022 on coordinated demand-reduction measures for gas*, resulted in a drop in gas demand, which was also reflected in gas prices trends on European markets, i.e. in their drop. Since August 2022, prices have been continuously dropping, and by the end of the year, they were recorded at levels lower than EUR 100/MWh.





The multiple increases in gas prices on the European wholesale markets was also reflected in the Croatian market, which resulted in a significant increase in gas prices in 2022 compared to 2021.

From Q4 2021 and throughout 2022, the average gas purchase price on the wholesale market was significantly higher than the prices recorded in previous years, with a spike in Q3 2022, which represented an increase of more than 300% compared to the same period of the previous year. It is obvious that the increase in prices on the Croatian market followed the increase in wholesale prices on European markets, but with a certain time lag.

An analysis of the most important measures of healthy function on the wholesale market – HHI, RSI and the number of gas supply sources – shows that the wholesale gas market in Croatia still mostly meets the parameters defined in the ACER's *European Gas Target Model – review and update* from January 2015.

The RSI, an index that shows whether the market can survive without the largest gas supply source, which was the LNG terminal in 2022, is still above 110%, which means that the market is not dependent on only one source and that the security of supply is not threatened. Likewise, the HHI observed at the wholesale level in 2022 is 2,005, which still represents a satisfactory level of concentration and an acceptable level of diversification of the market shares of participants in the wholesale market of the Republic of Croatia.

The LNG terminal is certainly conducive to increased market competitiveness and diversifying market shares, as well as the security of supply in Croatia. The LNG terminal proved to be extremely important for the security of the gas supply in the Republic of Croatia, and in 2022 it became the largest single entrance of gas into the gas transmission system of the Republic of Croatia and covers about 65% of the total gas volumes that entered the transmission system of the Republic of Croatia.

Sources of gas supply are diversified, mostly coming from domestic production (INA d.d.), imports at interconnections, and a large quantity from the LNG terminal (64.5% of the total procured quantity).

It is evident that the launch of the LNG terminal affected the increase in gas supply quantities, which was also reflected in a slightly lower HHI index (2022) compared to 2021, which is an indicator of the further development of competition on the wholesale gas market. The HHI index refers to the share of the balance groups in the total traded quantities of natural gas on the wholesale market of the Republic of Croatia, and the lower index is caused by the activity of the three largest market participants (Prvo plinarsko društvo d.o.o., MVM CEEnergy Croatia d.o.o. and MET Croatia Energy Trade d.o.o.) and the higher level of activity of the participants at the same time (INA d.d., Geoplin d.o.o., HEP Grupa and DXT International S.A.).

Due to the need to move away from dependence on Russian gas and focus on diversifying supply routes, and in order to ensure additional quantities of gas for the needs of the Republic of Croatia, in 2022 the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, which prescribes INA d.d. the provision on increasing gas production by 10% in the coming period, to ensure the security of supply in the Republic of Croatia.

Under the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, in order to ensure gas supplies and increase the availability of natural gas in the Republic of Croatia, the Government of the Republic of Croatia prescribed provisions for INA d.d. that all natural gas produced in the Republic of Croatia by the company INA d.d. shall be sold to the company HEP d.d. (with the exception of fixed contracts), for the purpose of supplying categories of customers determined by the Regulation, during the term of the Regulation, i.e. until 31 March 2024.

Despite the continuation of the energy crisis on the gas market during 2022, the analysis of the criteria for the healthy functioning of the wholesale market shows that the wholesale gas market in the Republic of Croatia continues to meet the most important parameters and that the security and



continuity of supply are not threatened. Likewise, with the further planned investment in storage infrastructure by building the peak gas storage at Grubišno polje, as well as the planned increase in the capacity of the LNG terminal, additional flexibility in the functioning of the gas market will be achieved and new participants will be allowed to enter the market, which should definitely influence the further development of market competition and diversification of the market shares of the wholesale market participants.



## 5.5. Retail natural gas market

### 5.5.1. Quantities of gas delivered to final customers

Transactions associated with the delivery of gas to consumers, for the purpose of consumption by final customers, are made on the retail gas market. Gas supply is regulated by a contract between a final customer and a gas supplier, and gas is delivered at billing metering points.

According to the data collected by the HERA from gas suppliers, the gas supply structure in 2022 was as follows:

- 6,452 GWh were delivered to household final customers<sup>90</sup> connected to the distribution system, which comprises 18.1% of the total gas quantity delivered,
- 5,329 GWh were delivered to non-household final customers connected to the distribution system, which comprises 14.9% of the total gas quantity delivered, and
- 12,456 GWh were delivered to non-household final customers directly connected to the transmission system, which comprises 34.9% of the total gas quantity delivered.
- 11,489 GWh of gas were delivered at the Rogatec (SLO) and Drávaszerdahely (HU) interconnections, which comprises 32.2% of the total gas quantity delivered.

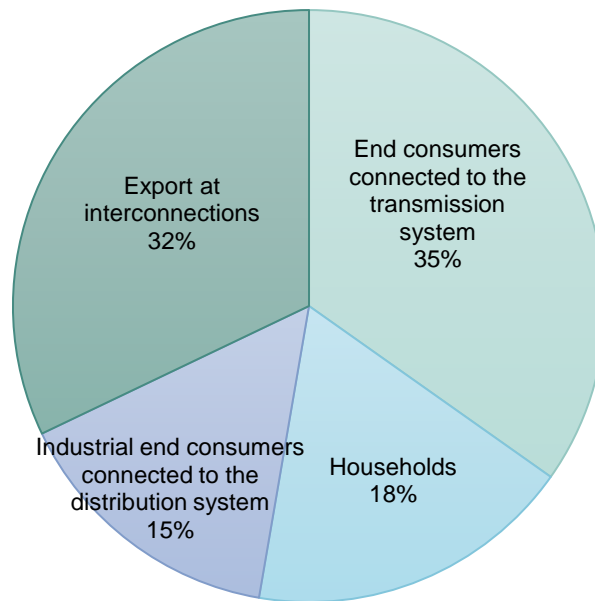


Figure 5.5.1 Structure of natural gas delivery from the transmission system in 2022

The total quantity of natural gas delivered to final customers in Croatia on the retail market in 2022 amounted to 24,237 GWh, which was 17.5% less than in 2021. Of this amount, a total of 6,452 GWh of gas was delivered to household final customers, which represents a decrease of 11.3% compared to 2021. A total of 5,329 GWh of gas was delivered to non-household final customers connected to the distribution system, which represents a decrease of 14.0% compared to 2021. A total of 12,456 GWh of gas was delivered to industrial final customers connected to the transmission system, which represents a decrease of 21.6% compared to 2021.

<sup>90</sup> The household category includes household final customers using the public supply service and household final customers purchasing gas under market conditions.



The structure of natural gas delivery to final customers by consumption category in the Republic of Croatia in 2022 is shown in Figure 5.5.2.

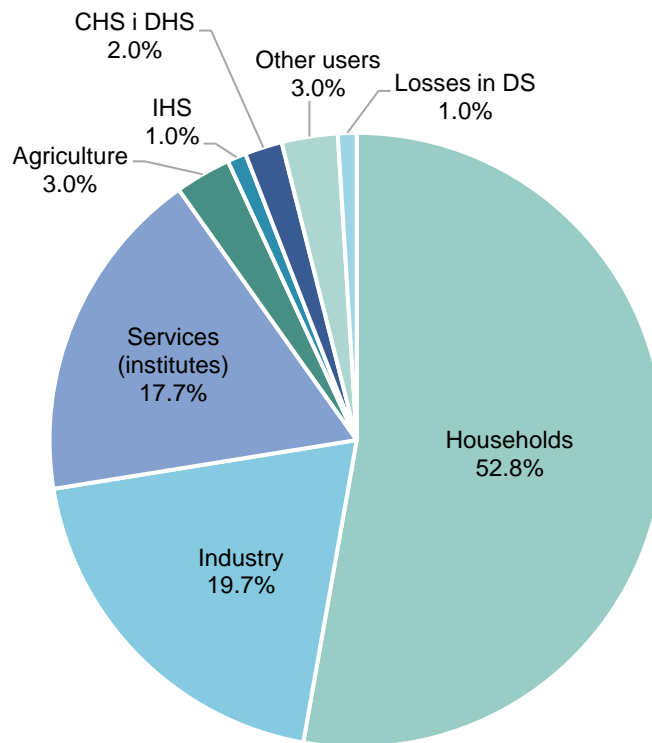


Figure 5.5.2 Structure of natural gas delivery to final customers by consumption category in the Republic of Croatia in 2022

The total number of final gas customers connected to the distribution system at the end of 2022 was 699,786, of which 650,064 were household final customers and 49,722 were non-household final customers. A total of 16 non-household final customers were connected to the gas transmission system.

### 5.5.2. Retail gas market development indicators

#### Market power concentration (HHI)

The HHI score for the retail market for non-household final customers in 2022 was 3,188, which is significantly higher than in 2021. In terms of competitiveness, this indicates an imbalance in the share of suppliers in the total gas trade on the retail market caused by the energy crisis and the reduction of the share of dominant energy entities from previous years. The HHI trend for the Croatian retail gas market in the non-household segment in the period from 2011 to 2022 is shown in Figure 5.5.3.

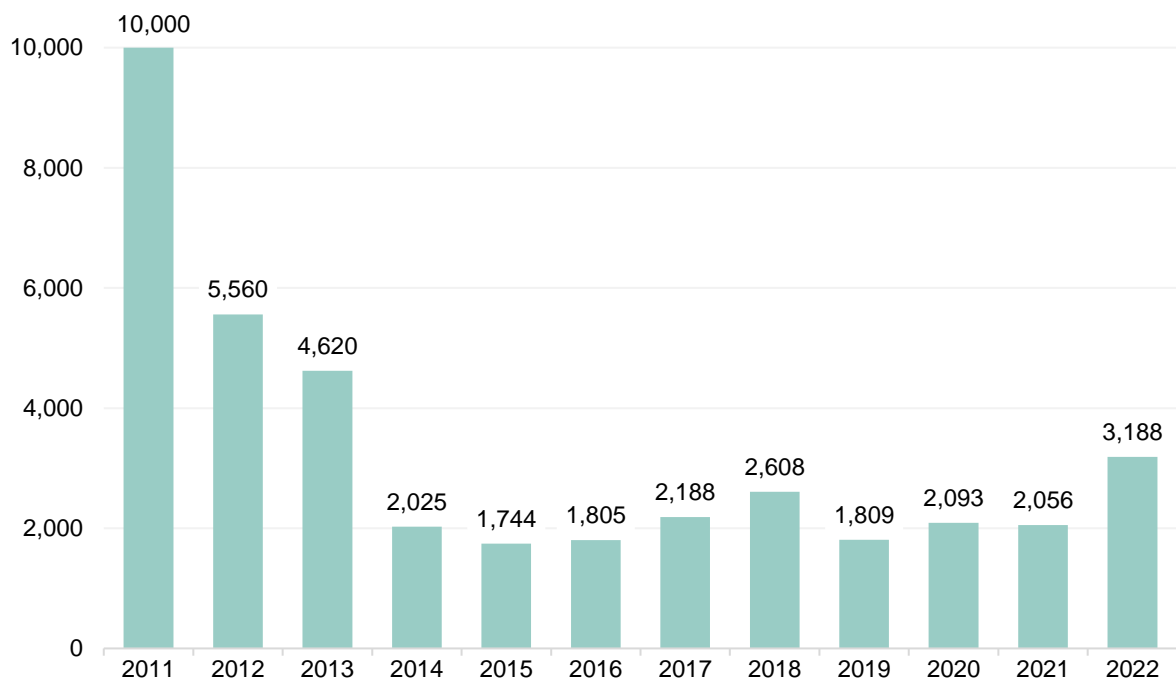


Figure 5.5.3 HHI index trend on the Croatian retail gas market for non-household final customers in the period from 2011-2022

## Gas supplier switching

In addition to the concentration of market power, another important indicator of retail market development and effective retail market competition includes the existence of conditions for fast and simple gas supplier switching. In this sense, the HERA implements the following measures:

- issues rules for supplier switching (*General Terms and Conditions of Gas Supply*) and opinions or binding interpretations of these rules,
- offers information to final customers regarding gas supply contracts, as well as their rights.
- supervises and adopts rules for the functioning of the register of billing metering points (RBMP), which is a unified electronic database of final customer billing metering points for all distribution system operators, transmission system operators and closed distribution system organisers in Croatia, with the purpose of monitoring and improving business processes on the gas market, the better and faster implementation of the supplier switching procedure and allocations of gas energy received at the distribution system entry point.
- continuously improves the RBMP, and the IT system for the implementation of supplier switches, in cooperation with the gas market operator HROTE d.o.o., which organises and maintains the system,
- upon the receipt of complaints, supervises the actions of energy entities during supplier switches and issues decisions on handling complaints (binding decisions, non-binding proposals for action, opinions).

Supplier switching and final customer awareness of the possibility of switching is one of the most important indicators of retail market development, especially in the household category. The indicator can be observed through internal change, as well as through external supplier switching.



Internal change refers to the modification of existing contracts with the current supplier, while external change refers to a change in supplier upon the request of final customers.

According to data on supplier switching collected by HROTE d.o.o., 14,203 supplier switches were completed in 2022, which is 81.5% less than in 2021. In the first half of 2022, the interest of final customers in switching suppliers decreased due to the high price of gas on the market, which made it impossible for suppliers to offer more favourable contracts at market prices compared to gas prices under the public service obligation and guaranteed supply.

Compared to 2021, 2022 saw a significant decrease in the number of supplier switches for household final customers; a total of 9,814 supplier switches were carried out for this category of customer, which amounts to 69.0% of all supplier switches. The reason for the smaller number of supplier switches in 2022 was, as already stated, the high market prices of gas that prevailed during 2022 and the consequent reduced interest in switching from the public gas supply service to the market service.

The proportion of gas distributed to customers who switched gas suppliers in 2022 was 9.4% (1,129 GWh) of the total distributed quantity of gas (12,023 GWh), while the number of successful supplier switches (14,203) accounts for 2.0% of the total number of billing metering points (699,7869) (Figure 5.5.4).

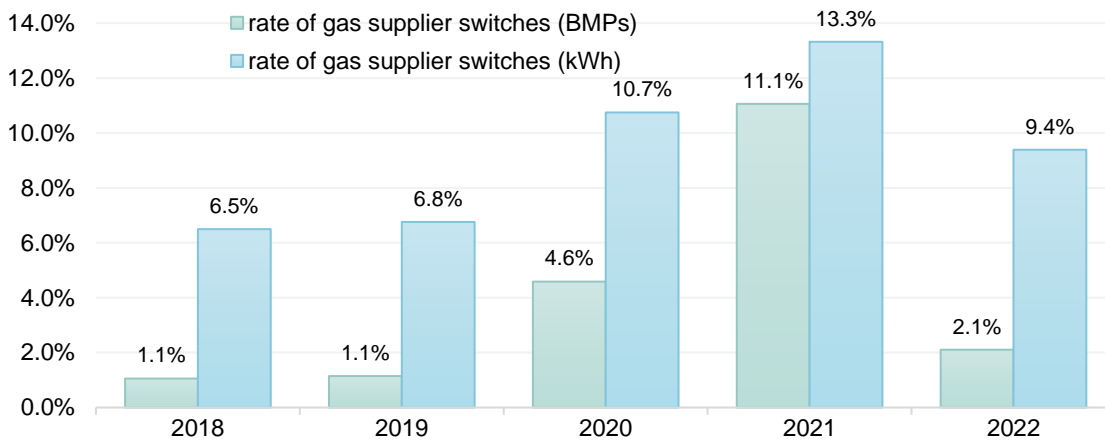


Figure 5.5.4 Rates of gas supplier switches by billing metering points (BMPs) and distributed gas quantities (kWh) in the period 2018-2022

During 2022, a number of supplier switches were cancelled (1,765 procedures), amounting to 12.4% of the total number of supplier switches carried out in 2022. A number of complaints regarding the actions of market participants was also recorded, an overview of which is presented in chapter “5.5.5 Consumer protection” of this Report. The reasons for terminating the supplier switching process relate to due outstanding consumer debt towards existing suppliers and consumers' withdrawal from the supplier switching procedure. An overview of completed and terminated gas supplier switches since the start of retail market liberalisation in Croatia is shown in Figure 5.5.5.

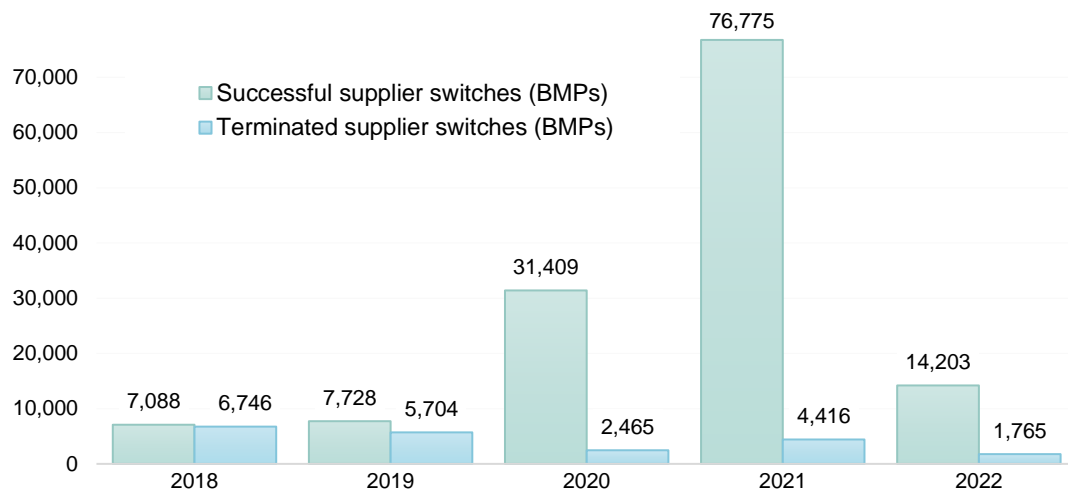


Figure 5.5.5 Number of completed and cancelled gas supplier switches in the 2018-2022 period



## Retail market indicators – according to CEER guidelines

For a comprehensive overview of the most important determinants and indicators of the retail market, the HERA took the indicator categories from the CEER advisory document for national regulators, which contains links to provisions on market monitoring arising from EU regulations.

An overview of retail gas market indicators per year for the period from 2018 to 2022 is shown in Table 5.5.1.

Table 5.5.1 Overview of indicators for the retail market of gas by year from 2018 to 2022

Indicator	2018	2019	2020	2021	2022*
<b>Total amount of gas sold on the retail market (GWh)</b>	25,609	26,498	28,426	26,685	24,479
<b>Of which sold: in the TS (GWh)</b>	14,538	15,583	17,117	14,319	12,456
<b>in the DS (GWh)</b>	11,071	10,914	11,309	12,366	12,023
<b>Remaining gas in storage on 31/12 (GWh)</b>	3,932	4,310	4,055	3,959	5,072
<b>Out of the total gas volume sold in the DS:</b>					
<b>to households (GWh)</b>	5,865	5,781	5,941	6,557	6,452
<b>to non-households (GWh)</b>	5,035	4,933	5,019	5,580	5,329
<b>Losses in the distribution system (GWh)</b>	171	200	349	229	242
<b>Total number of final customers on the retail market (non-household and household)</b>	671,737	679,997	684,955	694,286	699,802
<b>Of which: on the DS</b>	671,716	679,976	684,936	694,269	699,786
<b>on the TS</b>	21	21	19	17	16
<b>Total number of registered suppliers during the year</b>	45	45	51	49	44
<b>Of which active suppliers</b>	45	44	41	42	39
<b>Total number of registered traders during the year</b>	10	12	25	34	38
<b>Of which active traders</b>	-	-	1	1	2
<b>Specified time frame for the supplier switching procedure (in days)</b>	15	15	15	15	15
<b>Average duration of the supplier switching procedure (in days)</b>	10	8	4	4	4
<b>Supplier switching rate (by BMP)</b>	2%	1%	1%	5%	2%
<b>Supplier switching rate according to distributed gas quantities (kWh)</b>	6%	6%	7%	11%	9%
<b>Number of completed supplier switches (by BMP)</b>	13,619	7,088	7,728	31,409	14,203
<b>Number of terminated supplier switches (by BMP)</b>	8,345	6,746	5,704	3,199	1,765

\*Note: expressed as the gross calorific value

An overview of the retail gas market indicators for household final customers per year for the period from 2018 to 2022 is shown in Table 5.5.2.





*Table 5.5.2 Overview of retail gas market indicators for household final customers per year for the period from 2018 to 2022*

Indicator	2018	2019	2020	2021	2022*
<b>Total quantity of gas sold – households (GWh)</b>	5,865	5,781	5,941	6,557	6,452
<b>Of which sold: under the public service (GWh)</b>	5,471	5,388	5,380	5,407	5,472
<b>under market conditions (GWh)</b>	394	393	561	1,150	980
<b>Number of suppliers for households</b>	36	37	33	33	44
<b>Of which: suppliers in the public service</b>	34	34	31	32	13
<b>suppliers under market conditions</b>	9	10	10	20	16
<b>Number of final customers – households</b>	621,748	629,693	634,791	643,823	650,064
<b>Of which: in the public service</b>	582,596	588,799	565,592	510,805	636,274
<b>buy gas under market conditions</b>	39,152	40,894	69,199	133,018	13,790
<b>Number of suppliers with a market share &gt; 5%</b>	3	3	3	5	5
<b>Number of suppliers with a share of customers &gt; 5%</b>	3	3	3	4	4
<b>Share of the three largest suppliers (by number of BMP)</b>	60%	60%	64%	72%	81%
<b>HHI (by quantity of gas sold)</b>	2,138	2,050	2,073	2,220	2,683
<b>HHI (by number of BMP)</b>	2,159	2,137	2,282	2,661	3,693

\*Note: expressed as the gross calorific value

An overview of the retail gas market indicators for household final customers per year for the period from 2018 to 2022 is shown in Table 5.5.3.



*Table 5.5.3 Overview of retail gas market indicators for non-household final customers per year for the period from 2018 to 2022*

Indicator	2018	2019	2020	2021	2022*
<b>Total quantity of gas sold – non-household (GWh)</b>	19,573	20,517	22,136	19,899	17,785
<b>Of which: in the TS (GWh)</b>	14,538	15,583	17,117	14,319	12,456
<b>in the DS (GWh)</b>	5,035	4,933	5,019	5,580	5,329
<b>Number of final customers – non-households</b>	49,989	50,304	50,164	50,463	49,738
<b>Of which: in the TS</b>	21	21	19	17	16
<b>in the DS</b>	49,968	50,283	50,145	50,446	49,722
<b>Number of suppliers for non-households</b>	45	44	41	49	43
<b>Of which: active suppliers in the DS</b>	43	43	40	39	32
<b>active suppliers in the TS</b>	9	9	7	9	8
<b>Number of suppliers with a market share &gt; 5%</b>	4	4	5	5	4
<b>Number of suppliers with a share of customers &gt; 5%</b>	4	4	4	5	4
<b>Share of the three largest suppliers (by quantity of gas sold)</b>	68%	69%	71%	65%	69%

*\*Note: expressed as the gross calorific value*



## Supplier switching in the RBMP under the Regulation and activation of guaranteed supply

A large number of households had concluded contracts according to market conditions expiring on 30 September 2022, and a certain number of customers were also announced the termination of the contract on that date, therefore, during August and September 2022, there was a greater interest in switching from market supply to supply within the public service obligation, because at that moment, it was cheaper and already predetermined for the period until 31 March 2023.

Suppliers in the public service could not systematically process an extremely large number of applications for supplier switching in a short time. Therefore, in September 2022, the HERA adopted the *Decision on the start of providing public gas supply services to end-customers of the household category with a terminated gas supply contract* (HERA 9/22) so that the continuity of gas supply would not be jeopardised and so that end-customers of the household category would be transferred to a public gas supply service that guarantees safe and price-guaranteed supply in a timely manner. The *Decision* prescribes the necessary steps and obligations of participants in the gas market so that customers in the household category are not left without a gas supply from 1 October 2022, and so that they could start using the public gas supply service at a regulated price. Based on the aforementioned *Decision*, HROTE d.o.o. transferred additional BMPs in the RBMP from market supply to public service supply, and thus from 1 October 2022, 103,598 BMPs were additionally transferred, and by the end of 2022, a total of 104,224 BMPs of the household category.

In April and May 2022, the guaranteed supply was activated by decisions of the HERA for final customers of the suppliers in difficulty IVAPLIN d.o.o. and BROD-PLIN d.o.o., and the supplier ZELINSKE KOMUNALIJE d.o.o., because the HERA revoked the licences for the performance of energy activities for the existing suppliers due to their problems with liquidity. Due to the activation of the guaranteed supply in these distribution areas, by the end of 2022, 25,241 BMPs of the household category started using guaranteed gas supply from the guaranteed supplier HEP-PLIN d.o.o., and 25,241 BMPs of the household category through the RBMP system. These changes in the status of household final customers were not recorded as standardised supplier switching, since the switching was performed automatically by HROTE d.o.o., and not at the request of the household final customer using the supplier switching application form.

An overview of the situation by status of gas supply usage and by types of implemented changes in the RBMP during 2022 for household final customers is shown in Figure 5.5.6.

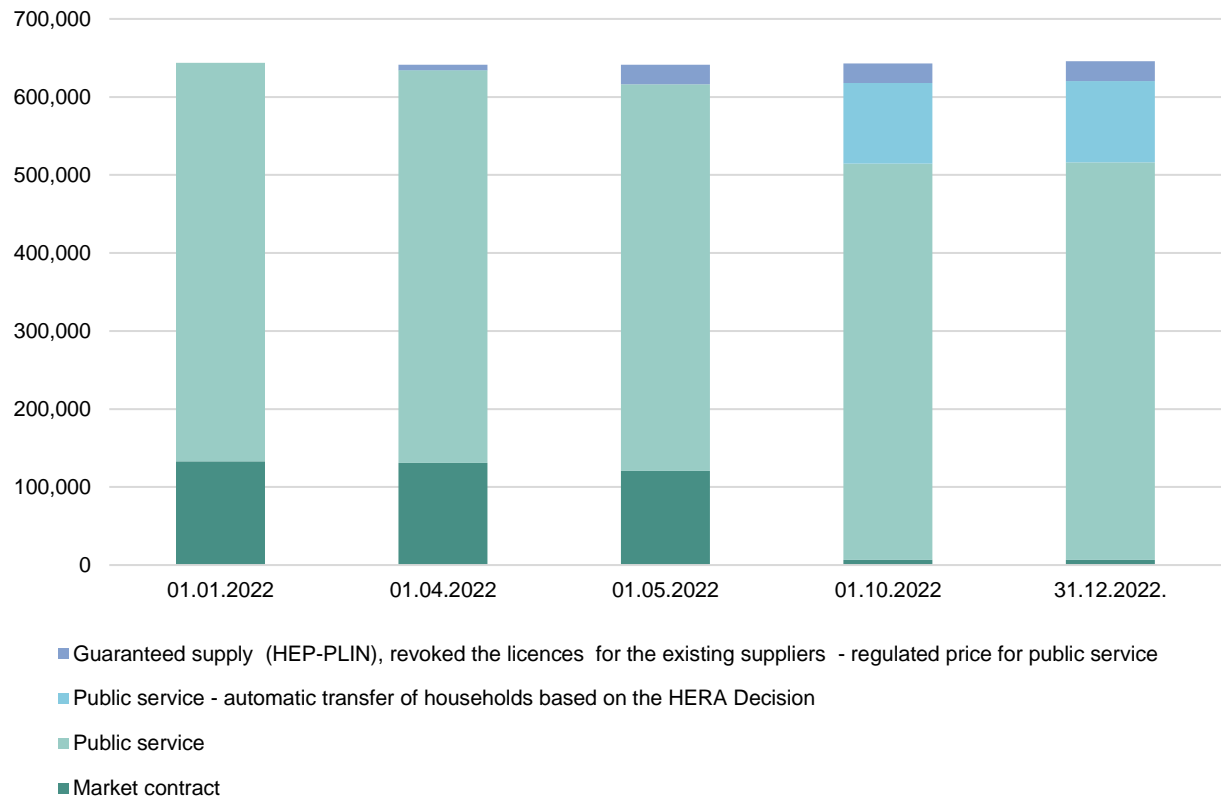


Figure 5.5.6 Situation by status of gas supply usage and by types of implemented changes in the RBMP during 2022 for household final customers

Given that non-household final customers were faced with high market gas prices, and after the expiry of the existing contracts, a significant number of non-household final customers did not receive new offers for gas supply or received offers with very high gas supply prices, in September 2022, in accordance with the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, the Government of the Republic of Croatia issued the *Instruction on action to energy entities regarding the Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22 and 106/22) until the decisions from Article 5a (6) of the Regulation are adopted*. The *Instruction* instructed the existing gas suppliers to update the end date of gas supply for all billing metering points of non-household (business) customers whose gas supply contract ends on 30 September 2022 or ends during the validity of the Regulation in the RBMP no later than the expiry date of the supply contract. Accordingly, the guaranteed supplier HEP-PLIN d.o.o. was ordered to start providing guaranteed gas supply from 1 October 2022 to all non-household customers whose gas supply contract ended on 30 September 2022, and one day after the termination of the contract to all non-household customers whose gas supply contract ends during the validity of the *Regulation*. Based on the above, on 1 October 2022, HROTE d.o.o. updated the status of the marked BMPs whose supply contract ends on 30 September 2022, i.e. one day after the gas supply contract ends, for all billing metering points that will start using the guaranteed gas supply. Thus, on 1 October 2022, the status update was carried out for 9,825 BMPs, i.e. by the end of 2022, for a total of 10,480 BMPs.

In accordance with the *Regulation on Eliminating Disturbances on the Domestic Energy Market* and the *Decision on the price and allocation of natural gas capacities taken over by Hrvatska elektroprivreda d.d. from natural gas producers*, the company HEP-PLIN d.o.o. is required to sell gas to non-household customers referred to in Article 2 (3) of the Regulation starting from 1 October 2022. In order for this to be feasible, it was necessary to identify the non-household customers referred to in Article 2 (3) of the Regulation in the RBMP, which was performed by HROTE d.o.o. in accordance with the *Instruction on action to energy entities regarding the implementation of the Decision on the price and allocation of natural gas capacities taken over by Hrvatska*



*elektroprivreda d.d. from natural gas producers.* After identifying the specified category of customers, HROTE d.o.o. carried out the status update on 1 October 2022 for an additional 4,851 BMPs, i.e. for a total of 7,484 BMPs by the end of 2022.

Based on the activation of the guaranteed supply in April and May 2022, the guaranteed supply for final customers of the suppliers in difficulty IVAPLIN d.o.o. and BROD-PLIN d.o.o., and the supplier ZELINSKE KOMUNALIJE d.o.o., until the end of 2022, 1,095 BMPs also started using the guaranteed gas supply service of the supplier HEP-PLIN d.o.o.

These changes in the status of non-household final customers were not recorded as standardised supplier switching, since the switching was performed automatically by HROTE d.o.o., and not at the request of the non-household final customer using the supplier switching application form.

An overview of the situation by status of gas supply usage and by types of implemented changes in the RBMP during 2022 for non-household final customers is shown in Figure 5.5.7.

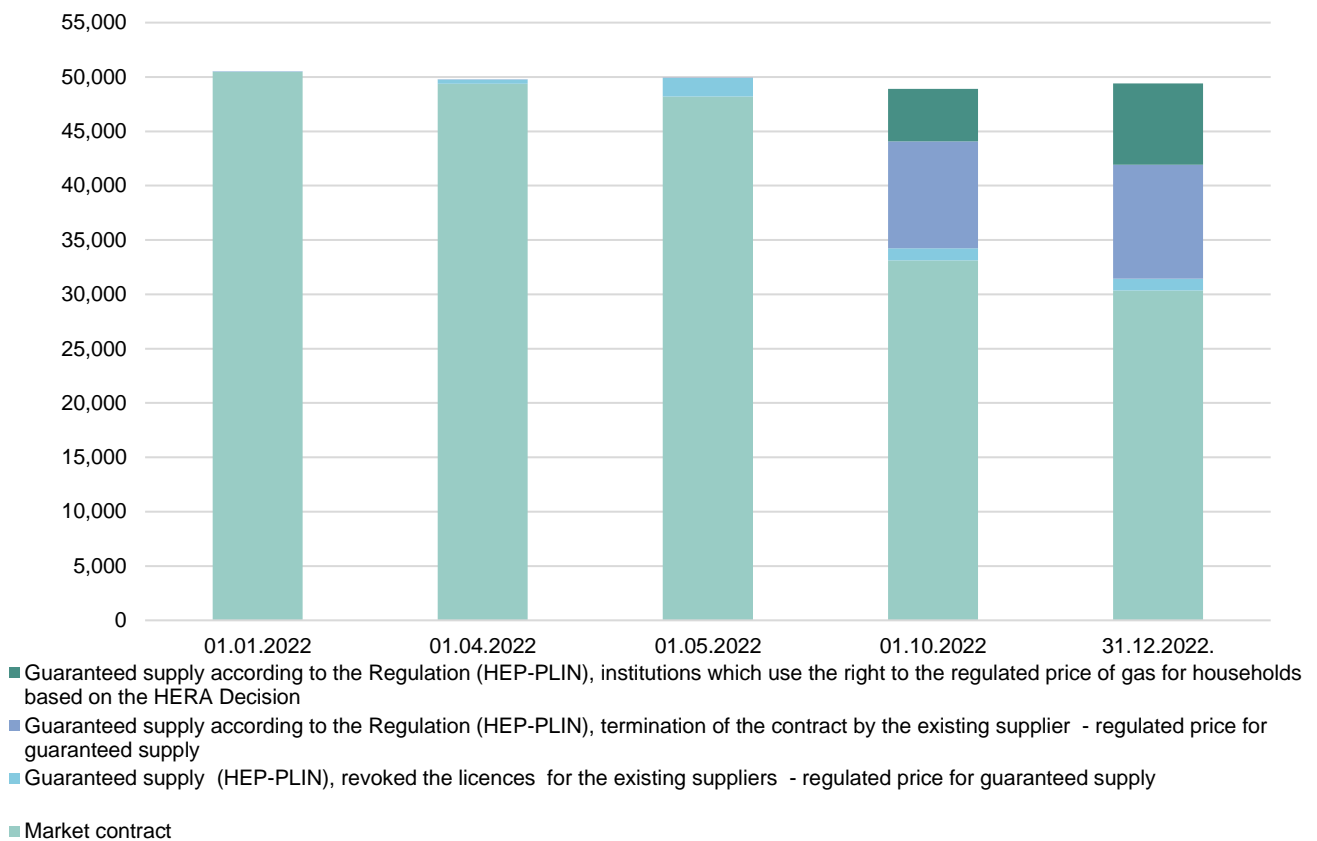


Figure 5.5.7 The situation by status of gas supply usage and by types of implemented changes in the RBMP during 2022 for non-household final customers

### 5.5.3. Gas prices on the retail market

#### Gas prices in the Republic of Croatia

Gas supply for household customers can be performed as a public service supply or as a market supply. A feature of the public service supply is the sale of gas under regulated conditions and gas prices. A feature of the market supply is the free negotiation of the price and terms of gas delivery.



A household final customer can buy gas from a gas supplier in the public service or from a gas supplier according to market conditions. Household final customers have the right to decide whether to buy gas under regulated conditions from a supplier in the public service or freely on the market from the same or any other gas supplier active in the retail market. The list of all gas suppliers is available on the HERA's website at the following link: [https://www.hera.hr/hr/html/registar\\_dozvola\\_18.html](https://www.hera.hr/hr/html/registar_dozvola_18.html).

The regulated retail gas price, which is applied to household final customers using the public service, is established pursuant to *the Methodology for setting tariffs for public service gas supply and guaranteed supply*.

Tariffs for public service gas supply and guaranteed supply for all public service gas suppliers in Croatia were established during 2022 according to the relevant decisions on tariffs for gas supply as a public service.

In 2022, the average gas selling price for household final customers<sup>91</sup> using the public gas supply service in Croatia was HRK 0.3702/kWh, net of VAT, expressed as the gross calorific value, which represents an increase in the average price of 51.7% compared to 2021. The price is stated without taking into account the measures of the Government of the Republic of Croatia, i.e. without tax relief and subsidising the price of gas for household final customers.

For one part of the 2021/2022 and 2022/2023 regulatory years, according to the *Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette no. 108/20 and 20/22)*, the *Decision on tariffs for gas supply as a public service for the period from 1 March to 31 December 2022 (Official Gazette no. 141/21 and 147/21)* and the *Decision on tariffs for gas supply as a public service for the period from 1 April to 31 December 2022 and the period from 1 January to 31 March 2023 (Official Gazette no. 32/22)* were adopted. The *Decisions* that were valid in the stated period determined the gas price for final customers using the public service, and the price consists of the gas procurement cost, the gas distribution cost and the gas supply cost.

The share of the gas procurement cost in 2022 was 71.2% of the total in the average regulated final gas price, net of VAT. The share of the gas distribution cost in the average final gas price in 2022 (net of VAT) was 14.4%, while the gas supply cost (which includes the cost of transmission, storage, other related costs, and the supply margin) amounted to 14.4%. Figure 5.5.8. shows the structure of the final gas price for households in the public supply service in Croatia in 2022.

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<sup>91</sup> The weighted average by delivered gas quantities for household final customers using the public service, for each particular public service gas supplier.

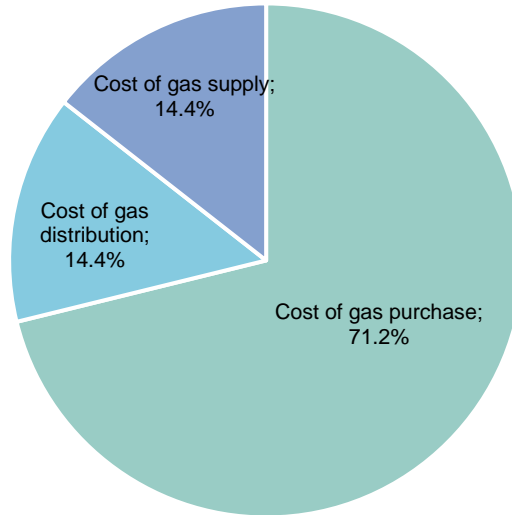


Figure 5.5.8 Structure of the retail gas price for households in the public service supply in the Republic of Croatia in 2022

Despite the increase in the price of gas on the wholesale market and, consequently, on the retail gas market, in the 2021/2022 and 2022/2023 regulatory years, in times when the highest price levels were recorded on the European markets and on the gas market in the Republic of Croatia, the household final customers who use the public gas supply service were protected from high, fluctuating and unpredictable gas prices, because due to the decisions on the amounts of tariffs for the public gas supply service, the prices were guaranteed and unchangeable, thus guaranteeing security for household final customers for a certain period.

Changes in the final price of gas for households using the public service supply in the Republic of Croatia for the 2018-2022 period by year and structure are shown in Figure 5.5.9.

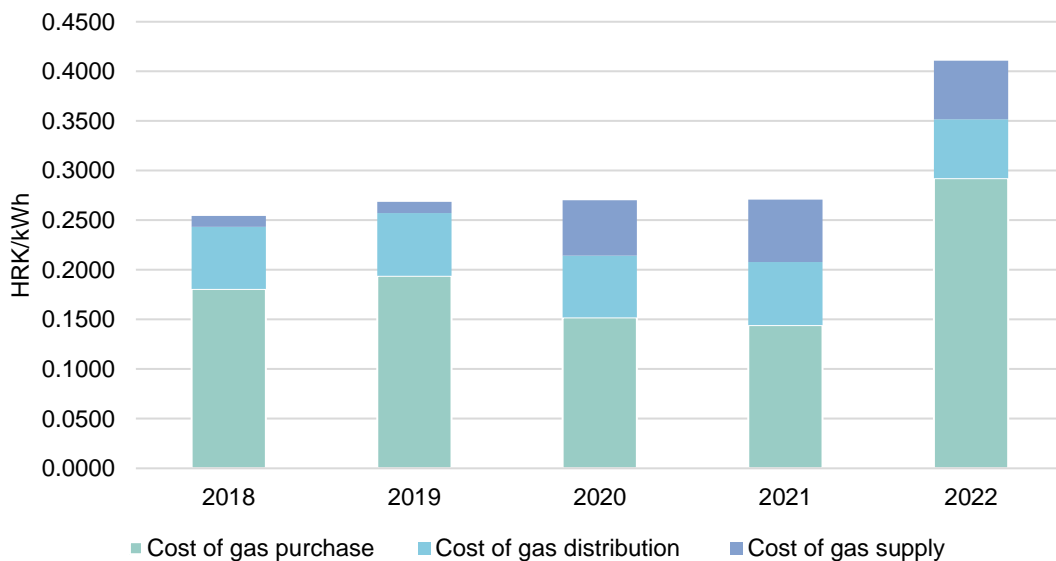


Figure 5.5.9 Amount and structure of the retail gas price for households in the public service supply in the Republic of Croatia in the 2018-2022 period



Figure 5.5.10 shows the structure of the final gas price for households, VAT inclusive, by consumer category D1 - D3 according to EU Directive 2012/27/EU and EU Regulation 2016/1952, i.e. according to EUROSTAT's methodologies, encompassing households in the public supply service and households with market contracts.

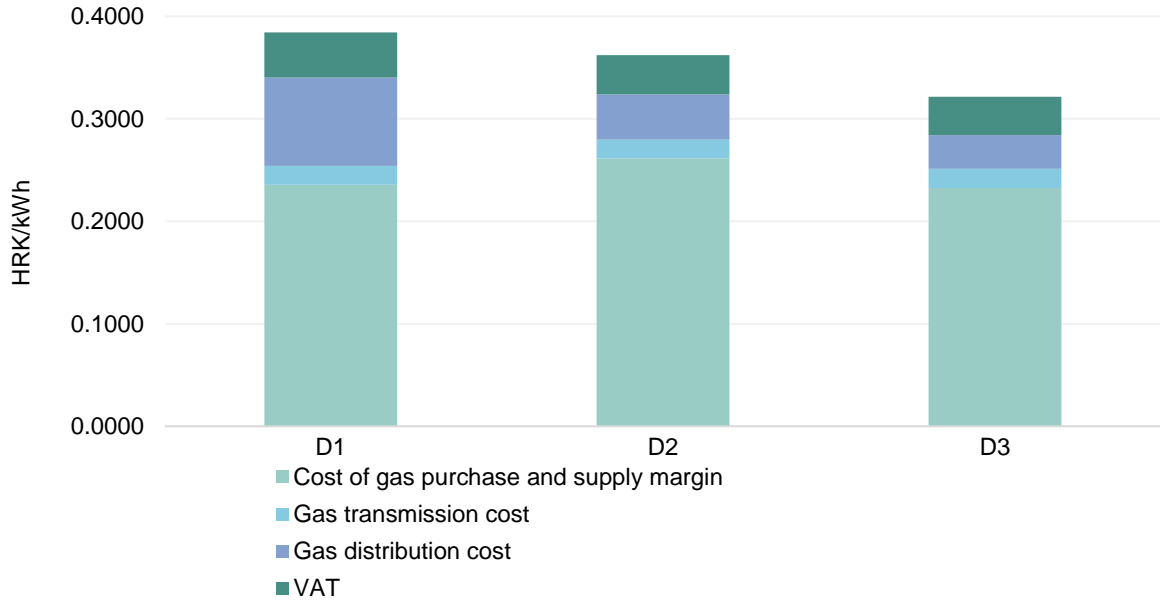


Figure 5.5.10 Structure of the final gas price for households in the Republic of Croatia in 2022 – consumer categories D1 – D3 (according to EUROSTAT categorisation)

The movement of the average price of gas for households, VAT inclusive, including households in the public supply service and households with market contracts, in the 2018-2022 period is shown in Figure 5.5.11.

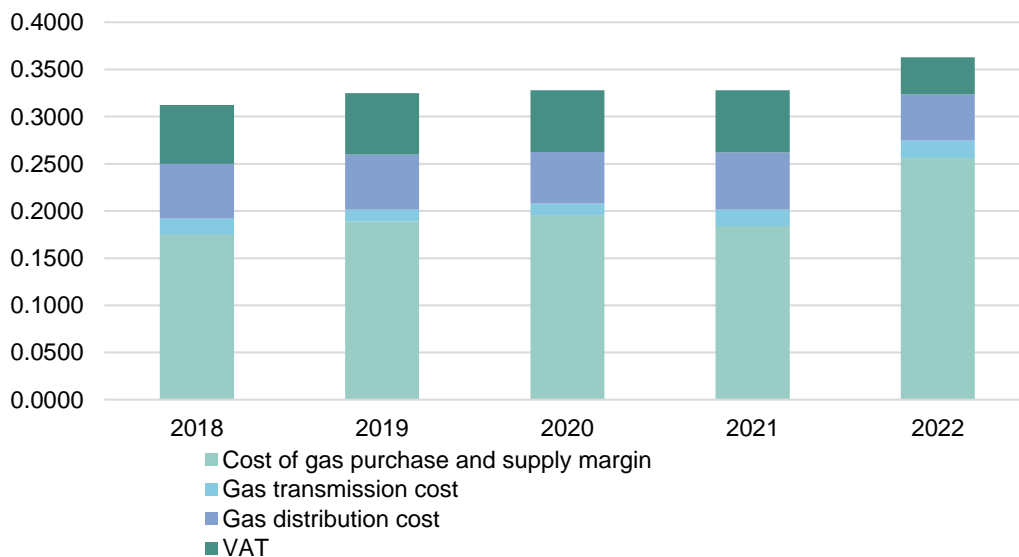


Figure 5.5.11 Amount and structure of the average gas price for all households (in the public supply service and households with market contracts) in the Republic of Croatia in the 2018-2022 period





In 2022, the average gas selling price for non-household final customers connected to the distribution system<sup>92</sup> in Croatia was HRK 0.5775/kWh, expressed as the gross calorific value, which represents a price increase of 104.8% compared to 2021. The lowest price was in Q1 – HRK 0.4788/kWh, and the highest was in Q4 – HRK 0.8431/kWh.

In 2022, the average gas selling price in the Republic of Croatia for non-household final customers connected to the transmission system<sup>93</sup> was HRK 0.6797/kWh, or 165.0% more than in 2021; this price was at its lowest in Q1 (HRK 0.4816/kWh) and its highest in Q4 (HRK 0.9179/kWh).

Table 5.5.4 shows the average gas sale prices (net of VAT) in Croatia in 2022 for final customers on the market (non-household) by the HERA's categorisation, separately for final customers connected to the transmission system and final customers connected to the distribution system, as well as the total average sale prices of gas for all final customers on the market in Croatia.

*Table 5.5.4 Average gas sale price for non-household final customers on the market in Croatia in 2022, net of VAT*

Categories (by annual consumption in kWh)		Final customers connected to the transmission system (HRK/kWh)	Final customers connected to the distribution system (HRK/kWh)	TOTAL (HRK/kWh)
<i>I1-1</i>	≤ 100,000	*	0.7880	0.7880
<i>I1-2</i>	100,001 - 250,000	*	0.5768	0.5769
<i>I2</i>	250,001 - 2,500,000	*	0.6095	0.6132
<i>I3-1</i>	2,500,001 - 10,000,000	*	0.5308	0.5273
<i>I3-2</i>	10,000,001 - 25,000,000	*	0.4946	0.4791
<i>I4-1</i>	25,000,001 - 50,000,000	*	0.5363	0.5150
<i>I4-2</i>	50,000,001 - 250,000,000	0.5615	0.3514	0.4482
<i>I5</i>	250,000,001 - 1,000,000,000	*	-	*
<i>I6</i>	> 1,000,000,001	*	-	*
<b>Total:</b>		<b>0.6797</b>	<b>0.5775</b>	<b>0.6468</b>

\* the HERA does not publish the average price for this category for reasons of confidentiality, as there were less than three final customers in this category on 31 December 2022

The HERA also analyses the structure of the final gas price for non-household consumers. In 2022, the cost of goods, which includes the cost of gas purchase and the supply margin, accounted for 82.5% of the total average gas price for all final customer categories on the market (net of VAT). The cost of gas transmission and the cost of gas distribution accounted for 4.8% and 12.7%, respectively. Figure 5.5.12 shows the structure of the final gas price in 2022 for non-household final customers on the market in Croatia according to EUROSTAT consumer category.

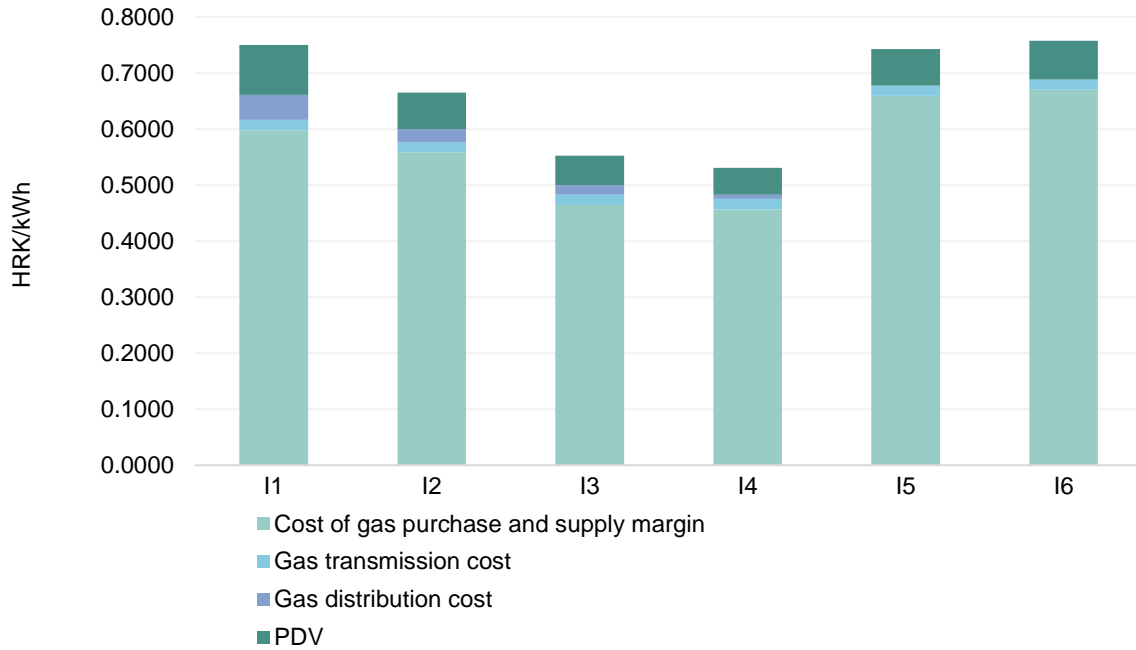
<sup>92</sup> The weighted average by delivered gas quantity for final customers on the market connected to the distribution system, for each gas supplier.

<sup>93</sup> The weighted average by delivered gas quantity for final customers on the market connected to the transmission system, for each gas supplier.



Figure 5.5.12 shows the structure of the final gas price for non-household final customers in Croatia in 2021, according to EUROSTAT consumer categories I1 - I6, according to EU Directive 2012/27/EU and EU Regulation 2016/1952 (EUROSTAT methodologies).

Figure 5.5.12 Structure of the final gas price for non-household final customers in the Republic of Croatia in 2022 – EUROSTAT consumer categories I1 – I6



The movement of the average price of gas for non-household final customers, VAT inclusive, in the 2018-2022 period is shown in Figure 5.5.13.

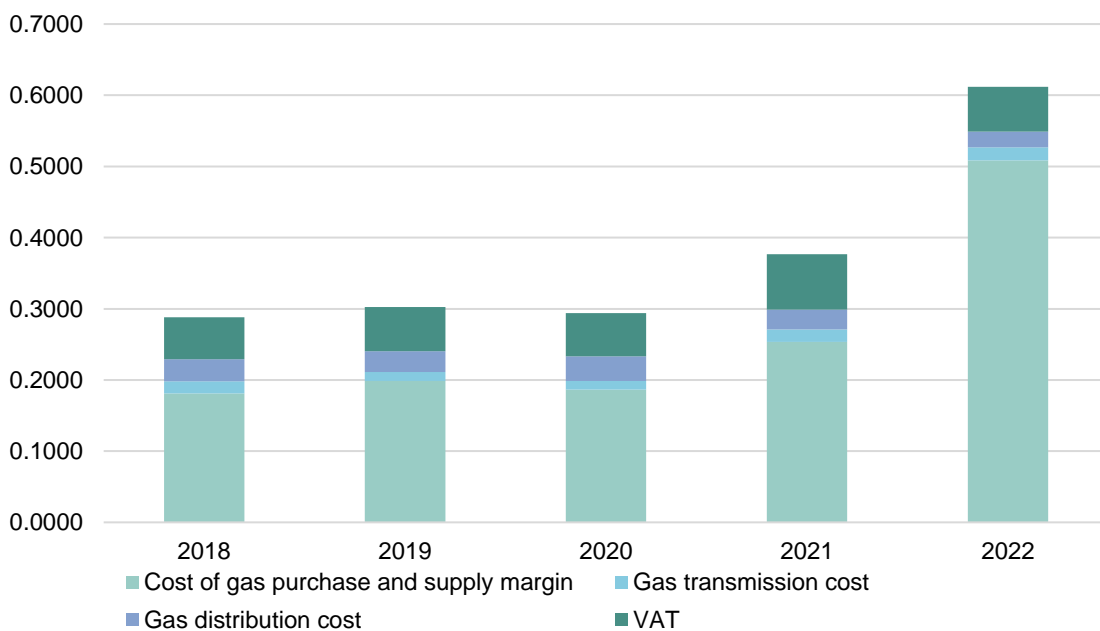


Figure 5.5.12 Amount and structure of the average gas price on the market for non-households in the Republic of Croatia in the 2018-2022 period



An overview of the categorisation of tariff models according to the *Methodology for setting tariffs for gas distribution* and the categorisation of final customers for monitoring natural gas prices according to EUROSTAT is given in Table 5.5.5.

**Table 5.5.5 Tariff models according to the Methodology for setting tariffs for gas distribution and the categorisation of final customers for monitoring natural gas prices according to EUROSTAT**

Tariff models according to the Methodology for setting tariffs for gas distribution		Final customer categorisation for monitoring natural gas prices (D - households; I - non-households) - in compliance with EUROSTAT	
Tariff model designation	Consumption range (kWh)	Category designation	Consumption range (kWh)
TM1	≤ 5,000	D1	≤ 5,000
TM2	5,000 – 25,000	D2	5,001 – 50,000
TM3	25,000 – 50,000		
TM4	50,000 – 100,000	D3	> 50,000
TM5	100,000 – 1,000,000		
TM6	1,000,000 – 2,500,000		
TM7	2,500,000 – 5,000,000		
TM8	5,000,000 – 10,000,000		
TM9	10,000,000 – 25,000,000		
TM10	25,000,000 – 50,000,000		
TM11	50,000,000 – 100,000,000		
TM12	> 100,000,000		
TM1	< 5,000		
TM2	5,000 – 25,000		
TM3	25,000 – 50,000		
TM4	50,000 – 100,000		
TM5	100,000 – 1,000,000	I1-2	100,001 – 250,000
TM6	1,000,000 – 2,500,000	I2	250,001 – 2,500,000
TM7	2,500,000 – 5,000,000	I3-1	2,500,001 – 10,000,000
TM8	5,000,000 – 10,000,000		
TM9	10,000,000 – 25,000,000	I3-2	10,000,001 – 25,000,000
TM10	25,000,000 – 50,000,000	I4-1	25,000,001 – 50,000,000
TM11	50,000,000 – 100,000,000	I4-2	50,000,001 – 250,000,000
TM12	> 100,000,000		
		I5	250,000,001 – 1,000,000,000
		I6	> 1,000,000,001

Quarterly trends in the average retail gas prices in 2022 for non-household final customers on the market are shown in Figure 5.5.14. The average retail price of gas (net of VAT) for non-household



final customers in 2022 was HRK 0.6468/kWh, which is an increase of 144.7% compared to the average retail price in 2021.

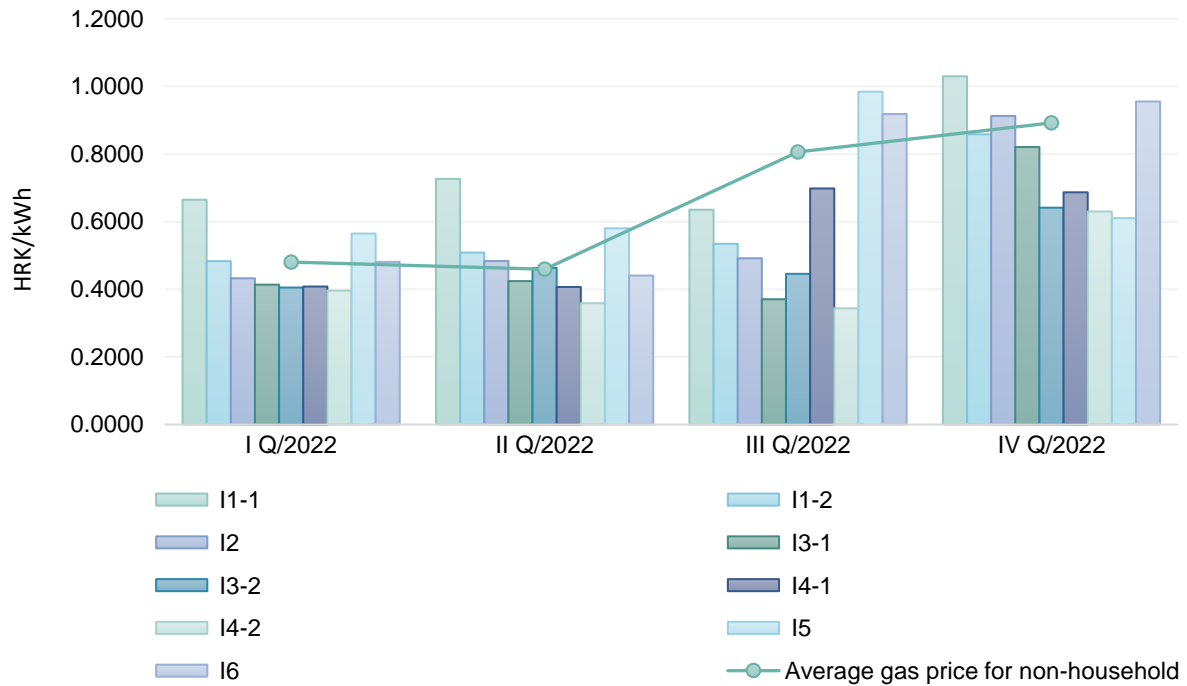


Figure 5.5.14 Average retail gas prices (net of VAT) for categories of non-household final customers on the market in the Republic of Croatia by quarter in 2022

Figure 5.5.15. shows the average retail market gas prices in the Republic of Croatia for non-household final customers according to gas consumption by quarter from 2018 to 2022.

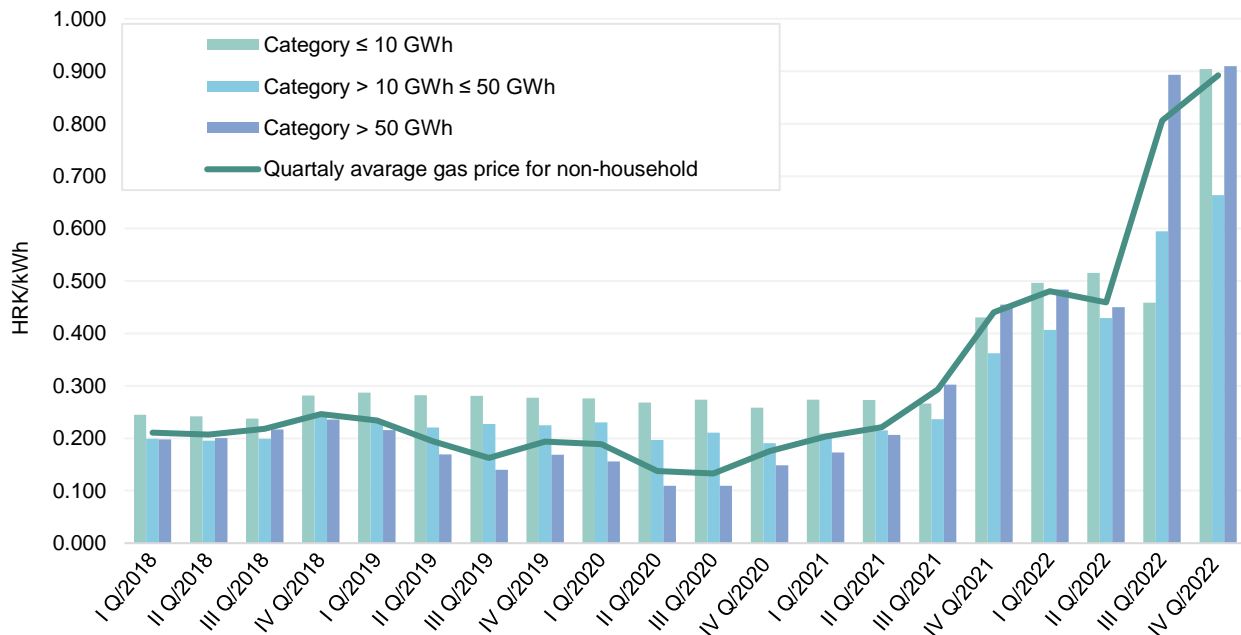


Figure 5.5.13 Average retail gas prices (net of VAT) for categories of non-household final customers on the market in the Republic of Croatia by quarter in the 2018-2022 period



A comparison of the retail and wholesale market prices of gas for non-household final customers in 2022 shows that the average retail price of gas was 14.8% lower than the average wholesale price.

A comparison of the average sale price of gas for households on the public service obligation and households with market agreements, as well as a comparison of the average sale price of gas on the retail market for non-household final customers with the average sale price of gas on the wholesale market (net of VAT) from 2018 to 2022 is shown in Figure 5.5.16.

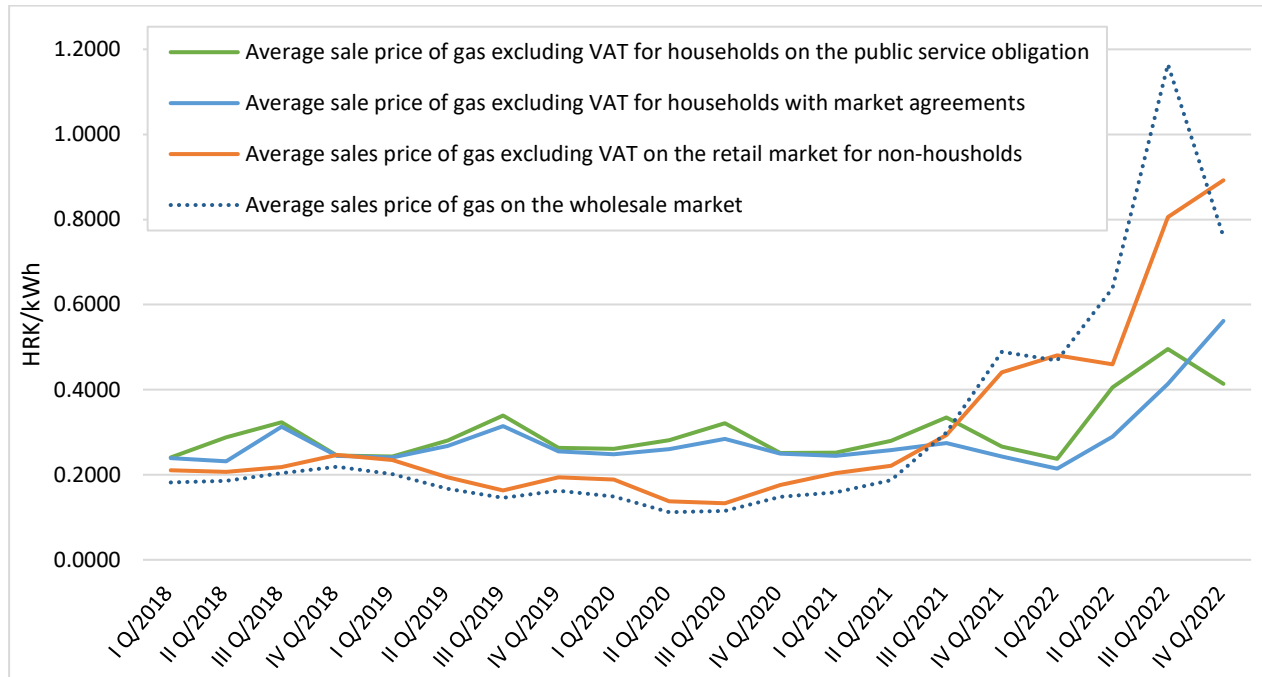


Figure 5.5.16 Trends in the average retail gas prices for final customer categories compared to the average wholesale price of gas on the market in the 2018-2022 period

## Guaranteed gas supply prices

Guaranteed gas supply is a public service of supplying gas to a final customer who, under certain conditions, has been left without a supplier, and therefore, in order to ensure the continuity of gas supply, such a customer is supplied by a guaranteed supplier under regulated conditions.

By the decision of the HERA from March 2022, the energy entity HEP-PLIN d.o.o., Osijek, was designated as the guaranteed gas supplier for the period from 10 March 2022 to 30 September 2024.

Amounts of the tariff items for guaranteed supply for final customers entitled to a public gas supply service (households) according to the *Methodology for setting tariffs for public service gas supply and guaranteed supply* are determined in amounts equal to the amounts of tariff items for public gas supply service set by the HERA for the supplier with the public service obligation in the respective distribution area. Households can use the guaranteed supply for an indefinite period of time, or until the conclusion of a supply contract according to market conditions or until the selection of a new supplier with the obligation of public gas supply service for the respective distribution area, based on a public tender procedure conducted by HERA in accordance with the **Gas Market Act**.

In the case of businesses, i.e. non-household final customers, the price of guaranteed supply is determined by appropriate decisions for guaranteed gas supply adopted by the HERA.



The cost of gas procurement for the guaranteed supply for non-household final customers, as a wholesale component of the end price of guaranteed supply, is determined for each subsequent quarter based on the prices of futures contracts on the TTF market for the delivery of gas in the next quarter, and is publicly published in the Official Gazette and on the HERA's website, at least ten days before the beginning of the quarter. According to the provisions of the *Methodology for setting tariffs for public service gas supply and guaranteed supply*, the gas procurement cost is billed to final customers increased by 10%, 20% or 30%, depending on the length of use of the guaranteed supply service, so that final customers will use this service short-term and be motivated to contract the most favourable supply service for themselves on the market.

In 2022, the guaranteed supply was activated by the decisions of the HERA for the distribution area of the distribution system operator IVAPLIN d.o.o., Ivanić-Grad, for the distribution area of the distribution system operator BROD-PLIN d.o.o., Slavonski Brod, and for the distribution area of the distribution system operator ZELINA-PLIN d.o.o., Sveti Ivan Zelina. In addition, with the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, the Government of the Republic of Croatia enabled all non-household customers who were left without a supply contract, or who did not receive a single offer from a gas supplier for the period until 31 March 2024, to be able to switch to a guaranteed gas supply in accordance with the conditions that apply to guaranteed supply until 31 March 2024.

As of 31 December 2022, the guaranteed gas supply was used by 11,515 non-household final customers (businesses), whose share of gas consumption in the total volumes sold to businesses was 0.6%.

The trends in the cost of gas procurement for guaranteed supply for non-household final customers in the Republic of Croatia for the period from 1 March 2022 to 31 December 2022 and for 2023 according to the HERA's Decisions are shown in Figure 5.5.17 which shows that in 2022, the cost of gas procurement for the guaranteed supply for non-household customers was determined in the range of HRK 0.6390 to HRK 1.5627/kWh, and was linked to the trends of gas prices on the TTF reference gas market. Until the end of June 2023, the cost of gas procurement for guaranteed gas supply was EUR 0.0592/kWh, i.e. HRK 0.4460/kWh

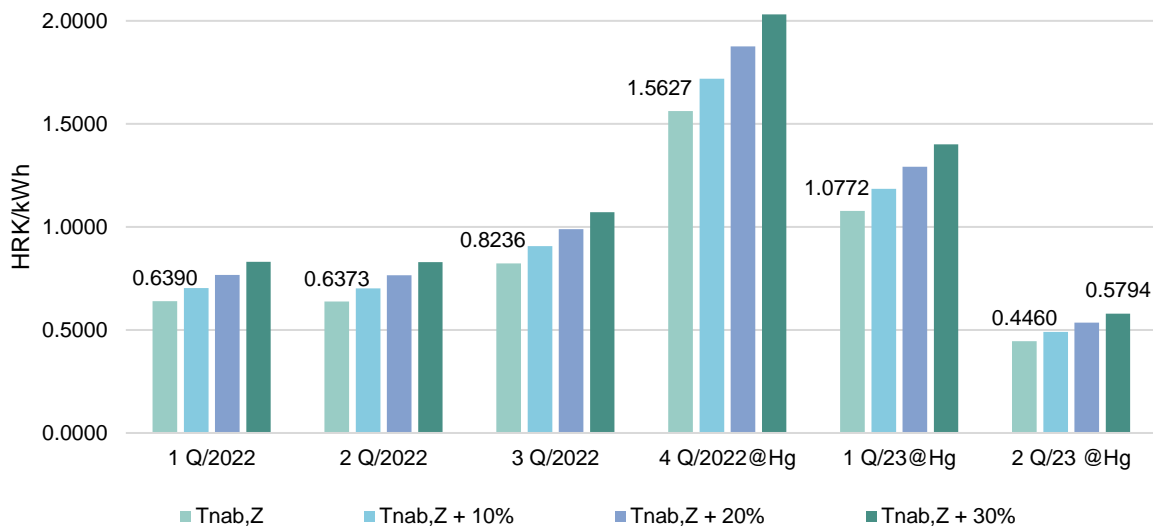


Figure 5.5.17 The amount of the basic and increased cost of gas procurement for the guaranteed gas supply for non-household final customers, in the period from 1 March 2022 until 30 June 2023, according to the HERA's decisions

Since the average retail price of gas (net of VAT) for non-household final customers in 2022 was HRK 0.6468/kWh, due to the relatively small share (less than 1% of the gas volumes sold) and the



lower level of the determined procurement cost in the first nine months of 2022, the impact of the guaranteed supply price on the average retail price of gas for non-household customers in 2022 was not significant.

### Gas prices in European countries

According to EUROSTAT, the prices of natural gas (excluding taxes) for household final customers in the European Union increased on average by 68.2% in 2022 compared to 2021. The price of natural gas (excluding taxes) for households in Croatia was still 51.9% below the European average in 2022.

In 2022, the average sale price of natural gas including taxes for households in the D2<sup>94</sup> category was highest in Sweden (EUR 68.98/GJ), Denmark (EUR 49.90/GJ) and the Netherlands (EUR 40.01/GJ); it was lowest in Hungary (EUR 8.89/GJ), Croatia (EUR 11.98/GJ), and Slovakia (EUR 13.70/GJ). The price of natural gas for households in category D2 (including taxes) in Croatia was 56.8% below the European average in 2022.

The share of taxes in the total price of natural gas for this consumer category varied greatly; it was highest in the Netherlands (35.7%), Sweden (31.3%) and France (25.9%). In the Republic of Croatia, the share of taxes in the total gas price for this category of consumers amounted to 10.2%.

Figure 5.5.18 shows the average natural gas prices for households in the D2 consumer category in 2022, both including and excluding taxes.

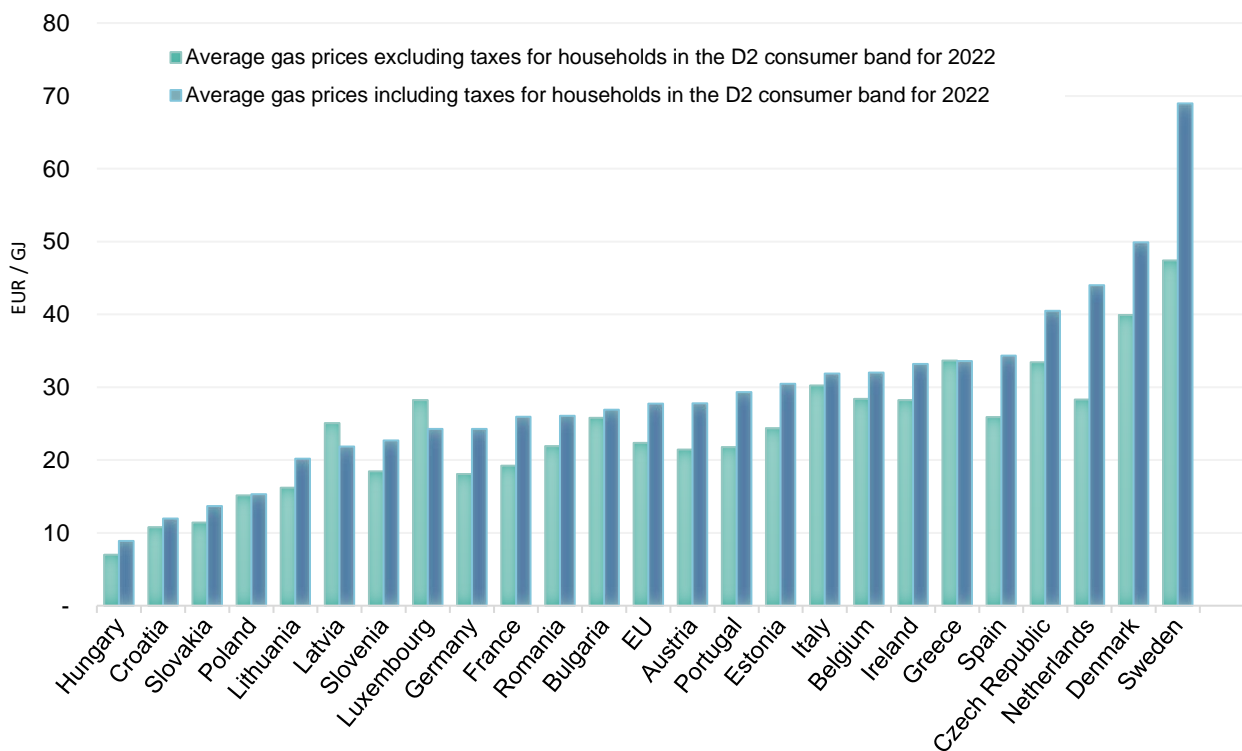


Figure 5.5.18 Average natural gas prices for households in the D2 consumer category in 2022 (including and excluding taxes)

<sup>94</sup> The D2 consumption category includes households whose annual natural gas consumption ranges from 20 to 200 GJ, which approximately corresponds to natural gas consumption of 5,001 to 50,000 kWh (i.e. households in TM2 and TM3 tariff classes).



If the price of natural gas for households in the D2 consumer category is expressed using the international PPS/GJ unit<sup>95</sup>, in order to eliminate differences in the prices of goods/services across countries, in 2022, the price was highest in Sweden (56.02 PPS/GJ) and lowest in Hungary (14.99 PPS/GJ). Taking into account the purchasing power standard expressed in PPS, the final price of gas including taxes for households in the D2 consumer category in Croatia in 2022 was 17.61 PPS/GJ, which is 39.6% lower than the European average. Figure 5.5.19 shows a comparison of European natural gas retail prices, including taxes for households in the D2 consumer category for 2021 and 2022, expressed in PPS/GJ.

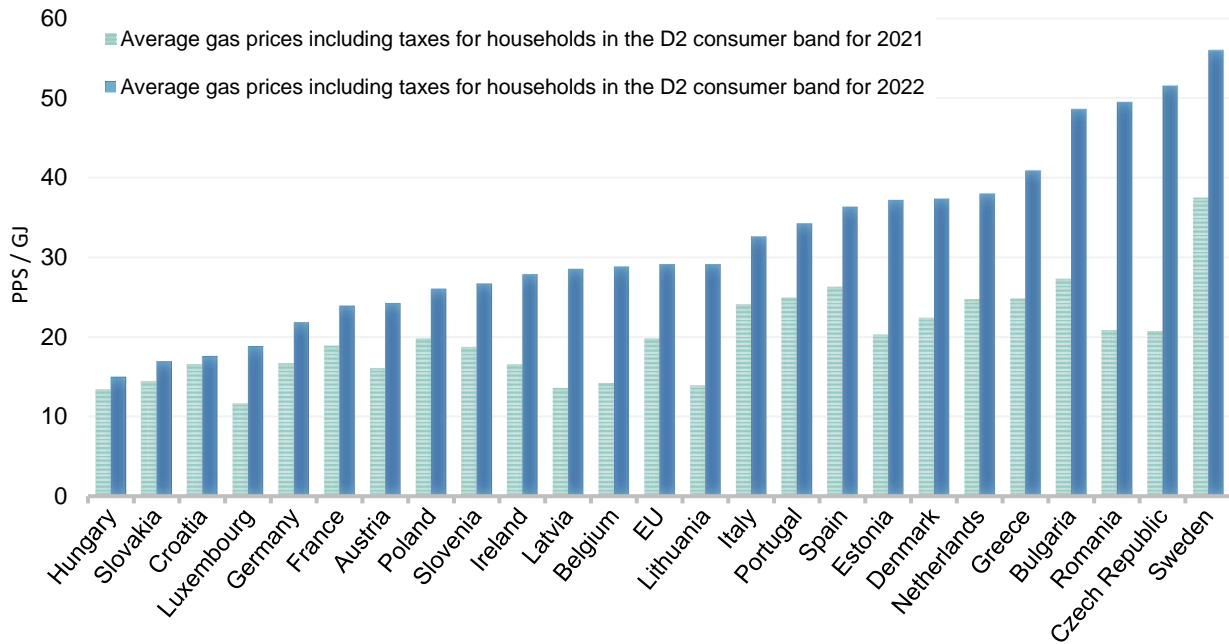


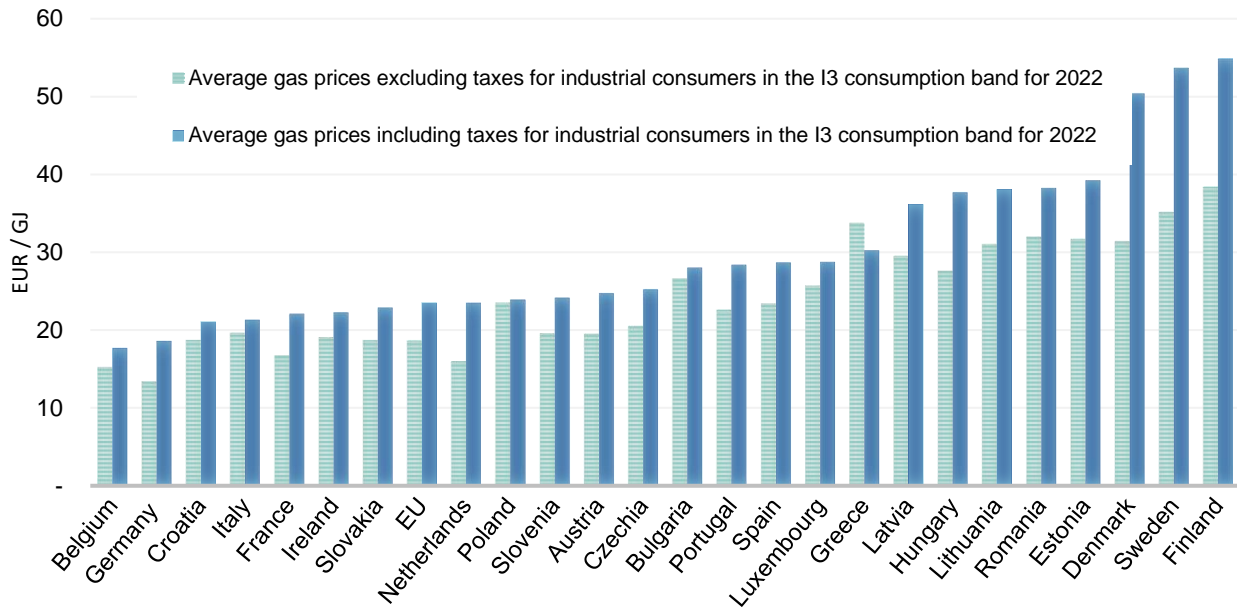
Figure 5.5.14 Natural gas prices for households in the D2 consumer category in relation to the price of goods/services in European countries (including taxes) for 2021 and 2022

According to EUROSTAT, the prices of natural gas (excluding taxes) for non-household final customers in the I396 consumer category in the European Union increased in 2022 by 112.1% compared to 2021. Figure 5.5.20 shows average natural gas prices for non-household consumers in the I3 consumer category in EU countries for 2022, with and without taxes.

<sup>95</sup> PPS (purchasing power standard) is a unit that equalises the purchasing power of different countries.

<sup>96</sup> The I3 consumption category includes non-household final customers whose annual natural gas consumption ranges from 10,000 to 100,000 GJ, which approximately corresponds to natural gas consumption of 280,000 to 2,800,000 kWh.





+Figure 5.5.15 Average natural gas prices for non-household consumers in the I3 consumer band for 2022 (including and excluding taxes)

In 2022, the average sale price of natural gas including taxes for non-household consumers in the I3 consumer category was highest in Finland (EUR 54.86/GJ), Sweden (EUR 53.67/GJ), and Denmark (EUR 50.41/GJ); and it was lowest in Belgium (EUR 17.69/GJ), Germany (EUR 18.62/GJ), and Croatia (EUR 21.05/GJ). In Croatia, the average natural gas sale price including taxes for non-household consumers in the I3 consumer band in 2021 was EUR 21.05/GJ, which is 10.3% less than the EU average.

The share of taxes in the total price of natural gas for this consumer category varied greatly; it was highest in Denmark (37.7%), Sweden (34.5%), and the Netherlands (31.7%). In Croatia, the share of taxes in the total gas price for this category of consumers amounted to 11.0% in 2022.

If the price of natural gas for non-household consumers in the I3 category is expressed in PPS/GJ, in 2022, the price of gas was highest in Romania (72.65 PPS/GJ) and lowest in Belgium (15.92 PPS/GJ). Taking into account the purchasing power standard expressed in PPS, the final price of gas including taxes for non-household consumers in the I3 consumer category in Croatia in 2022 was 27.98 PPS/GJ, which is 5.6% lower than the European average. Figure 5.5.21 shows a comparison of European natural gas retail prices including taxes for non-household consumers in the I3 consumer category for 2021 and 2022, expressed in PPS/GJ.

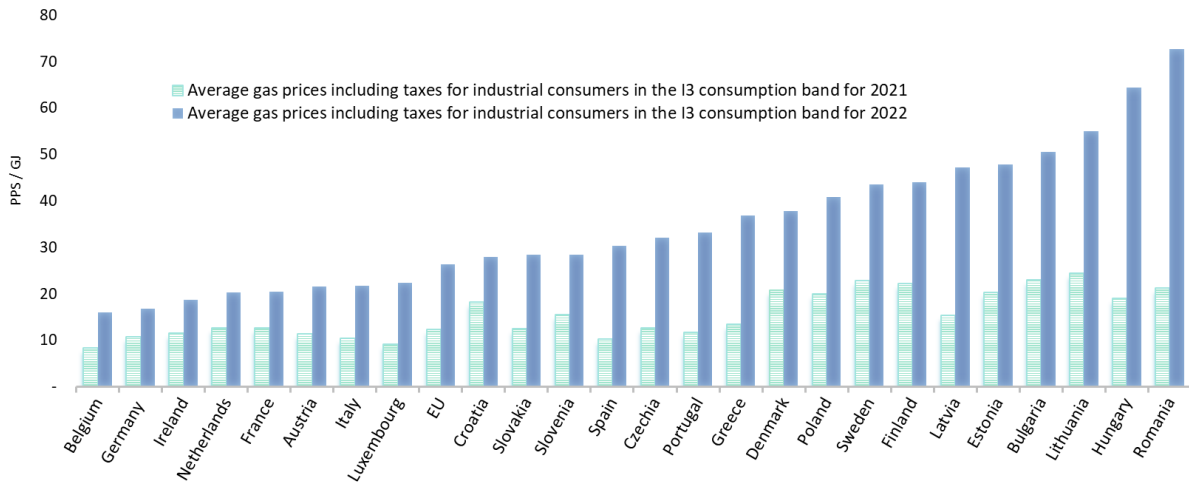


Figure 5.5.21 Natural gas prices (including taxes) for non-household consumers in the I3 consumer category in relation to the price of goods/services in European countries for 2021 and 2022

### 5.5.4. Quality of the gas supply

The **Gas Market Act** sets out the obligations of gas producers, the transmission system operator, distribution system operator, closed storage system operator, gas storage system operator, LNG terminal system operator, and LNG and/or CNG supply point operator (hereinafter: system operators), as well as the obligations of gas suppliers, with regard to the disclosure and maintenance of agreed gas supply quality parameters. The quality of the gas supply comprises quality of service, reliability of delivery, and quality of gas. The framework for ensuring the quality of gas provided by system operators and gas suppliers is set out in the *General Terms and Conditions of Gas Supply*.

Further, the transmission system operator and the gas supplier are also obligated to establish a system of data collection concerning the quality of the gas supply and to publish digitised annual reports on the quality of the gas supply. In this way, data on the fulfilment of the general and guaranteed standards of quality of supply is monitored and collected. The general standards of supply quality serve to measure the general level of gas supply quality of individual system operators or gas suppliers, whereas guaranteed standards of supply quality determine the minimum level of gas supply quality they are obligated to provide to individual system users, final customers or the gas market operator. As of 1 April 2020, system operators or gas suppliers are required to offer a minimum level of gas supply service, including to the gas market operator.

At the request of the gas market operator, gas supplier and final customer, if the guaranteed standard of quality of supply is not met, the distribution system operator, closed distribution system organiser, or gas supplier is required to pay a charge in accordance with the *General Terms and Conditions of Gas Supply*.

The HERA continuously monitors compliance with the prescribed gas supply quality standards, while improving the prescribed incentive measures.

System operators and gas suppliers are obligated to provide the HERA with data on realised quality of supply indicators for guaranteed standards of quality of supply no later than 30 days after the end of the relevant quarter to which a particular indicator of quality of gas supply relates. Likewise, gas system operators and suppliers are obligated to provide the HERA with annual reports on the quality of the gas supply for the previous year by 1 March of the current year and to publish them on their websites.



With respect to system operators, the HERA collects data on the quality of the gas supply in order to monitor:

- general standards of supply quality: reliability of delivery (monitoring supply interruptions, system leak tests, gas odourisation and emergency responses), quality of service (connection to the distribution system), and gas quality (gas quality control), and
- guaranteed standards of supply quality: reliability of delivery (planned supply interruptions) and quality of service (connection to the distribution system, intervention by an authorised person, submission of readings to the supplier, supplier's order to suspend gas delivery, resumption of gas supply on the order of the supplier, entry and updating of data in the Register of Billing Metering Points).

With respect to the gas suppliers, the HERA collects data on the quality of the gas supply in order to monitor:

- general standards of supply quality: quality of service (resolution of complaints and inquiries from final customers, correction of gas supply invoices), and
- guaranteed standards of supply quality: quality of service (correction of gas supply invoices, resumption of gas supply after the settlement of obligations, entry and updating of data in the Register of Billing Metering Points).

Incentives and reimbursements for services rendered beyond the guaranteed standard are planned for the upcoming periods; by that time, the values and criteria for the adjustment of general standards of gas supply quality must be established, including reimbursement amounts for particular guaranteed standards of gas supply quality.

With the aim of improving the collection of data on guaranteed gas supply quality standards, in 2022, the HERA sent new questionnaires to all the distribution system suppliers and operators related to meeting the guaranteed gas supply quality standard.

## Gas quality

Gas quality includes the technical requirements for gas supply quality, with the observance of which the gas system operator, the LNG terminal operator, the LNG and/or CNG supply point operator, and the closed distribution system operator ensure to the system user or the final customer that the gas quality parameters comply with the standard gas quality prescribed in Table 3 from Annex 2 to the *General Terms and Conditions of Gas Supply*.

Gas quality implies that the parameters of gas delivered into the gas system are in line with the standard gas quality as described in the *General Terms and Conditions of Gas Supply*. Gas producers, suppliers, and traders are obligated to ensure the standard quality of the gas that they deliver into the transmission or distribution systems.

With the aim of harmonising with practice in EU member states regarding the calculation of the delivered gas energy, harmonising with *Commission Regulation (EU) 2015/703 of 30 April 2015 establishing a network code on interoperability and data exchange rules*, simplification of trade procedures, capacity leasing and uninterrupted gas flow, and the integration of the regional gas market, the HERA adopted the *Amendments to the General Terms and Conditions of Gas Supply*, which changed the standard gas quality, in the sense that only certain gas quality parameters essential for use are prescribed, such as carbon dioxide content, oxygen content, sulphur content, gross calorific value, the gross Wobbe index, relative density, dew point and methane number.

As of 1 October 2021, the methane number has been introduced as a gas quality standard parameter, with a prescribed minimum of 75. Some of the users of the LNG terminals indicated that the application of the methane number with a minimum of 75 could result in a reduction in the diversification of LNG supply routes, or in a decrease in the number of LNG export terminals from which it is possible to deliver LNG to the Republic of Croatia, which resulted in the adoption of



*Amendments to the General Terms and Conditions of Gas Supply* in 2022. These *Amendments to the General Terms and Conditions of Gas Supply*, among other things, prescribed the lower value of 70 as the minimum methane number with the aim of increasing the number of LNG exporting countries from which it is possible to deliver LNG to the Republic of Croatia, thereby increasing the security of the gas supply.

Prescribing the methane number and defining the Wobbe index aligns the rules of standard gas quality with the European guidelines, and at the same time enables the supply of gas from new supply routes that include the majority of LNG suppliers on the global market, and enables the continuation of gas exploitation and the acceptance of gas from domestic production into the transmission system.

With the aim of harmonising with European practice and *Commission Regulation (EU) 2015/703*, which applies to the calculation of delivered gas quantities and capacity reservation at interconnections through auction platforms, and one of the goals of which is the establishment of a European gas quality standard, the HERA changed the calculation and billing requirements for the delivered gas. From 1 October 2022, instead of using the net calorific value, the gross calorific value (kWh/m<sup>3</sup>) is used for the calculation and billing of the delivered gas, and the energy of the delivered gas is determined as the product of the volume of gas flow through the billing metering point, the gas volume correction factor prescribed by Annexes 1 and 2 to the *Gas Distribution System Network Code* and the gross calorific value. For the purpose of the uniform application of the calculation of delivered gas energy by all stakeholders on the gas market, on 3 November 2022, the HERA issued the *Binding decision for energy entities for the application of the General Terms and Conditions of Gas Supply and the Gas Distribution System Network Code regarding the calculation of the delivered gas energy* for the purpose of unambiguously determining the delivered gas energy and gas billing to final customers and adjusting the invoices for delivered gas in accordance with the aforementioned changes.

## Reliability of delivery

The reliability of delivery implies the continuity of gas delivery from the transmission or distribution system in a period of time, and is expressed in the number of gas delivery interruptions and their duration.

During 2022, distribution system operators recorded a total of 447 planned gas supply interruptions, with a total duration of 2,278 hours, which, according to the data received from the distribution system operators, had an impact on 42,122 final customers, and 1,281 unplanned gas supply interruptions, with a total duration of 2,565 hours. The trend in the number and duration of planned and unplanned gas supply interruptions of the distribution system operators for the five-year period from 2018 to 2022 is shown in table 5.5.6.

*Table 5.5.6 Planned and unplanned gas supply interruptions of the distribution system operators from 2018 to 2022*

Year	Total number of planned gas supply interruptions	Total number of unplanned gas supply interruptions	Total duration of all gas supply interruptions (hour)
2018	302	480	5,633
2019	585	563	17,296
2020	718	1,221	9,327
2021	564	1,190	3,890
2022	447	1,281	4,843



On average, during 2022, distribution system operators recorded 14 planned gas supply interruptions, with an average duration of 41 hours, and 36 unplanned gas supply interruptions, which lasted an average of 69 hours. Figure 5.5.22 shows the total planned and unplanned gas supply interruptions, as well as the average duration of the planned and unplanned gas supply interruptions for the five-year period from 2018 to 2022.

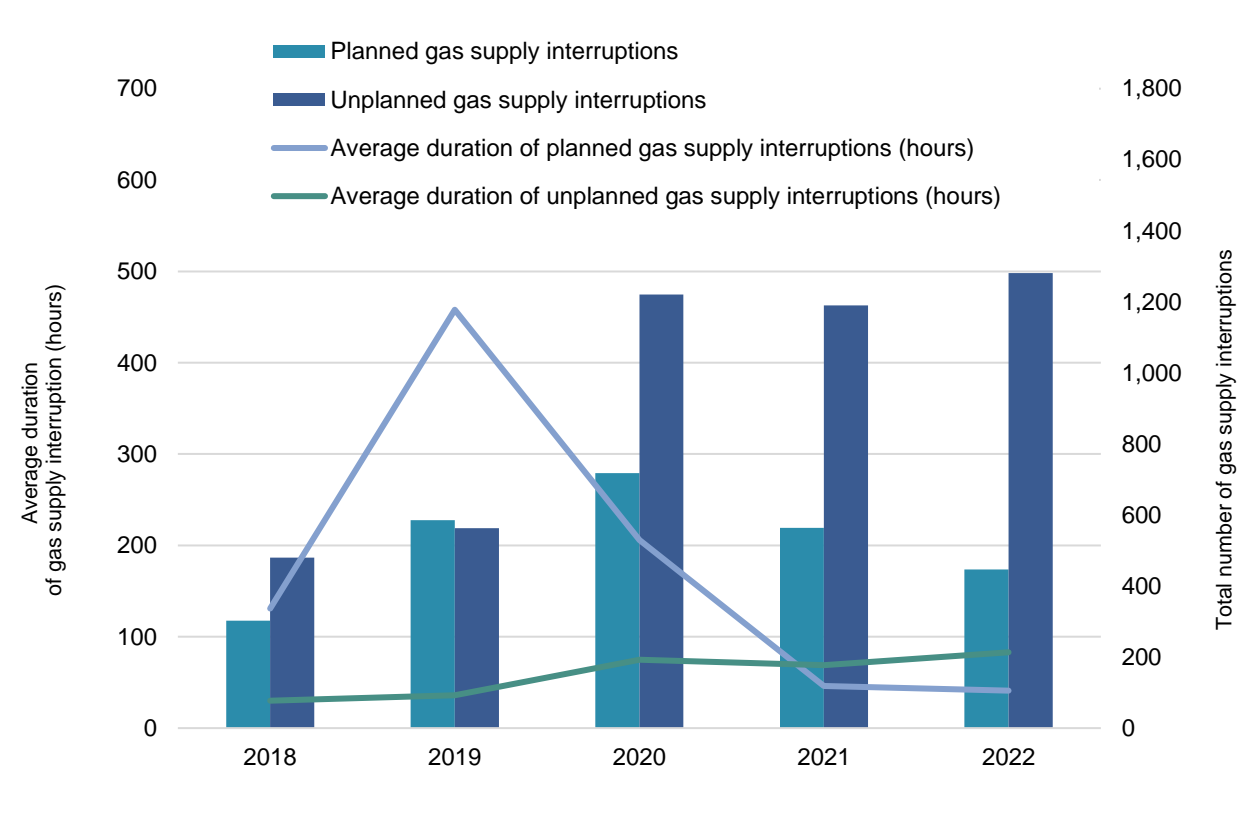


Figure 5.5.22 Gas supply interruptions from 2018 to 2022

According to the data received from the distribution system operators, it was established that the reliability indicators of gas delivery were exceeded, and are shown in Table 5.5.7.

Table 5.5.7 Indicators of the gas supply reliability of the distribution system operators

Guaranteed standard	Standard	Average realisation	Number of announcements/confirmations/interruptions outside the guaranteed standard	Average duration outside the guaranteed standard
<b>Announcement of a planned gas supply interruption</b>	at least 10 business days in advance	10.6 days	149	1.7 days
<b>Confirmation of a planned interruption</b>	at least 24 hours in advance	25.3 hours	8	4.9 hours



<b>Re-establishment of supply after a planned gas supply interruption</b>	the actual number of days of interruption must be less than or equal to the number of days of the planned interruption	/	4	5.4 days
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In 2022, the transmission system operator recorded 15 planned and 2 unplanned gas supply interruptions in the gas transmission system. The total duration of all supply interruptions in 2022 was 160 hours. The trend in the number and duration of planned and realised gas supply interruptions of the transmission system operators for the five-year period from 2018 to 2022 is shown in table 5.5.8.

*Table 5.5.8 Planned and realised gas supply interruptions of the transmission system operators from 2018 to 2022*

Year	Total number of planned gas supply interruptions	Total number of unplanned gas supply interruptions	Total duration of all gas supply interruptions (hour)
2018	11	-	783
2019	22	-	545
2020	13	-	145
2021	12	2	124
2022	15	2	160

According to the data received from the transmission system operators, it was established that the reliability indicators of gas delivery were exceeded, and are shown in Table 5.5.9.

*Table 5.5.9 Indicators of gas supply reliability of the transmission system operators*

Guaranteed standard	Standard	Average realisation	Number of announcements/confirmations/interruptions outside the guaranteed standard	Average duration outside the guaranteed standard
<b>Announcement of a planned gas supply interruption</b>	at least 42 days before gas supply interruption	39.3 days	3	13 days
<b>Confirmation of a planned interruption</b>	at least 48 hours before the planned	166.7 hours	0	0 days



	supply interruption			
<b>Re-establishment of supply after a planned gas supply interruption</b>	the actual number of days of interruption must be less than or equal to the number of days of the planned interruption	/	0	0 days

During 2022, the operator of the LNG terminal recorded one planned gas supply interruption, lasting 24 hours, for which the reliability indicators of gas delivery were not exceeded.

## Service quality

Service quality encompasses the commercial requirements of gas supply quality, which, when respected by the system operator or gas supplier, ensure a satisfactory level of services provided to system users or final customers.

Connection to the distribution system is monitored through the prescribed guaranteed standards, which are the deadline for issuing special conditions and/or connection requirements, the deadline for issuing the connection approval and the deadline for connection.

Table 5.5.10 shows the total number of resolved requests for issuing special conditions and/or connection requirements, applications for connection approval, and requests for connection in 2022.



*Table 5.5.10 Number of resolved requests for issuing special conditions and/or connection requirements, applications for connection approval, and requests for connection in 2022*

Distribution system operator	Request for issuing special conditions and/or connection requirements	Application for connection approval	Request for connection
BROD-PLIN, Slavonski Brod	346	325	319
ČAPLIN, Čazma	6	3	5
DUKOM PLIN, Dugo Selo	134	68	60
ENERGO METAN, Samobor	45	112	26
ENERGO, Rijeka	97	82	24
EVN CROATIA PLIN, Zagreb	71	13	13
GRADSKA PLINARA BJELOVAR, Bjelovar	109	265	65
GRADSKA PLINARA ZAGREB, Zagreb	1,796	3,394	659
HEP-PLIN, Osijek	3,415	3,087	1,977
HUMPLIN, Hum na Sutli	7	7	7
IVAPLIN, Ivanić Grad	115	66	71
IVKOM-PLIN, Ivanec	29	42	32
KOMUNALIJE-PLIN, Đurđevac	65	24	22
KOPRIVNICA PLIN, Koprivnica	94	148	67
MEĐIMURJE-PLIN, Čakovec	338	360	0
MONTCOGIM-PLINARA, Sv. Nedjelja*	166	266	75
MOSLAVINA PLIN, Kutina	39	32	34
PAPUK PLIN, Orahovica	-	-	-
PLIN KONJŠČINA, Konjščina	54	25	22
PLIN VRBOVEC, Vrbovec*	-	-	-
PLIN, Garešnica*	-	-	-
PLINARA ISTOČNE SLAVONIJE, Vinkovci	319	289	271
PLINARA, Pula	43	43	44
PLINKOM, Pitomača	6	8	8
PLIN-PROJEKT, Nova Gradiška*	197	93	67
RADNIK-PLIN, Križevci	22	34	22
TERMOPLIN, Varaždin	44	281	132
ZAGORSKI METALAC, Zabok*	-	-	-
ZELENJAK PLIN, Klanjec	11	11	11
ZELINA-PLIN, Sv. I. Zelina	14	33	51
<b>Total</b>	<b>7,705</b>	<b>9,111</b>	<b>4,084</b>

\*data not submitted

The indicators of meeting the supply quality standards for each guaranteed standard are shown in Table 5.5.11.

*Table 5.5.11 Indicators of gas supply quality standard of the distribution system operators – connection to the distribution system*





Guaranteed standard	Standard	Total number of requests	Average realisation (days)	Number of request outside the guaranteed standard	Average duration outside the guaranteed standard (days)
<b>Request for issuing special conditions and/or connection requirements</b>	15 days	7,705	3.9	97	14.3
<b>Application for connection approval</b>	5 business days for connection to the LT and MT system, and 10 business days for connection to the HT system	9,111	2.7	284	5.8
<b>Request for connection</b>	30 business days for connection to the LT and MT system, and for connection to the HT system in accordance with the contract	4,084	6.9	108	28.7

Figure 5.5.23 shows the average number of days required by an individual distribution system operator to resolve an individual request for connection to the distribution system.

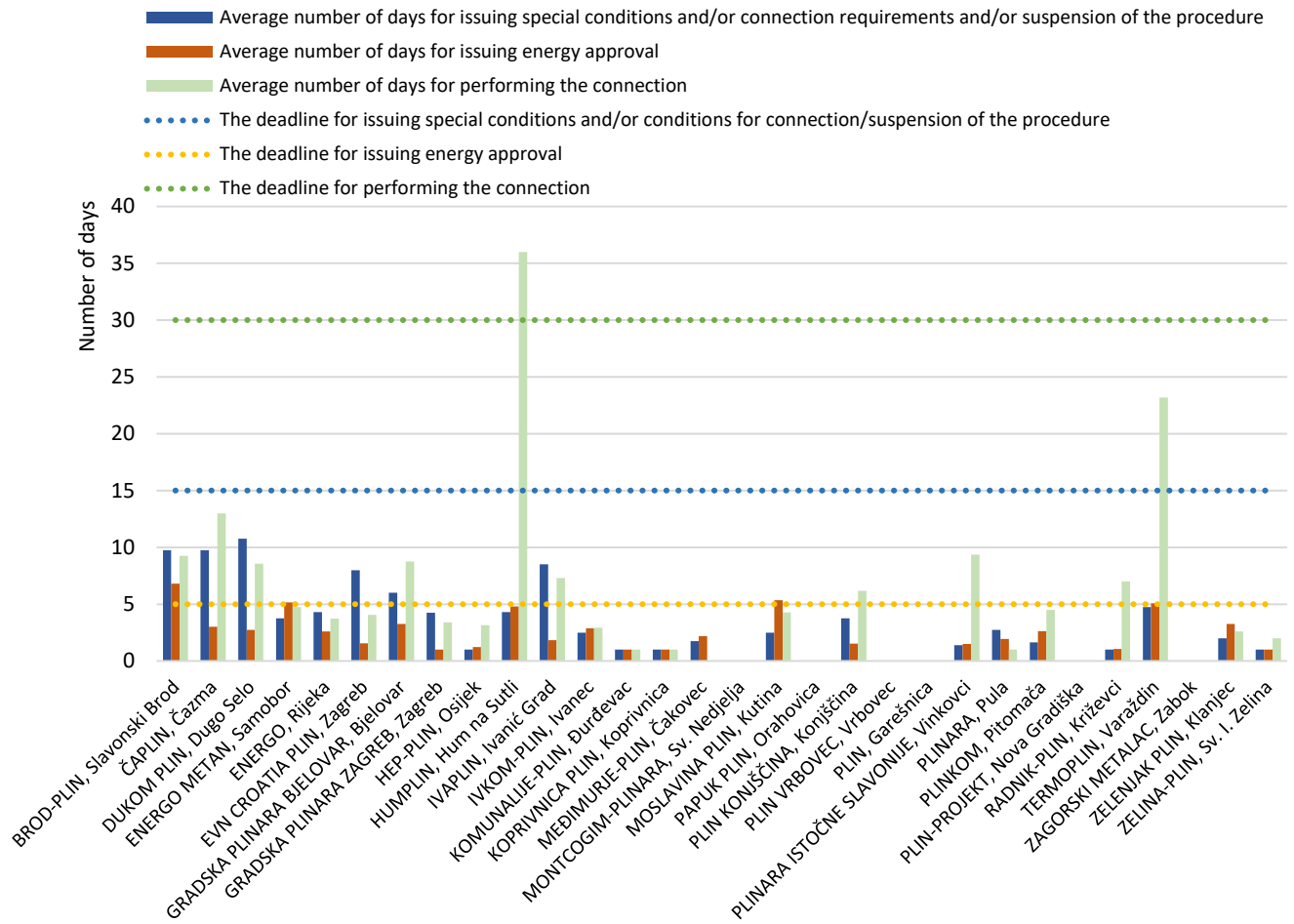


Figure 5.5.23 Average number of days required by the distribution system operator to issue special conditions and/or connection requirements, connection approval and connection execution

The suspension of gas supply is monitored by the number of business days from the date of receipt of the gas supplier's order to suspend the gas supply by the distribution system operator until the day of suspension of gas supply to the final customer within the guaranteed standard, while the continuation of the gas supply is monitored by the number of business days from the date of receipt of the supplier's order to continue gas supply until the date of resumption of gas supply to the final customer within the guaranteed standard.



Table 5.5.12 Total number of orders to suspend gas supply and orders to resume gas supply

Distribution system operator	Number of suppliers' gas supply suspension orders	Number of suppliers' gas supply resumption orders
BROD-PLIN, Slavonski Brod	24	4
ČAPLIN, Čazma	0	0
DUKOM PLIN, Dugo Selo	10	1
ENERGO METAN, Samobor	43	3
ENERGO, Rijeka	28	4
EVN CROATIA PLIN, Zagreb	1	1
GRADSKA PLINARA BJELOVAR, Bjelovar	47	7
GRADSKA PLINARA ZAGREB, Zagreb	3,724	9
HEP-PLIN, Osijek	849	3
HUMPLIN, Hum na Sutli	0	0
IVAPLIN, Ivanić Grad	10	4
IVKOM-PLIN, Ivanec	15	2
KOMUNALIJE-PLIN, Đurđevac	3	4
KOPRIVNICA PLIN, Koprivnica	149	3
MEĐIMURJE-PLIN, Čakovec	184	2
MONTCOGIM-PLINARA, Sv. Sunday	87	49
MOSLAVINA PLIN, Kutina	18	11
PAPUK PLIN, Orahovica	-	-
PLIN KONJŠČINA, Konjščina	18	1
PLIN VRBOVEC, Vrbovec	-	-
PLIN, Garešnica	-	-
PLINARA ISTOČNE SLAVONIJE, Vinkovci	100	2
PLINARA, Pula	0	0
PLINKOM, Pitomača	12	2
PLIN-PROJEKT, Nova Gradiška	31	21
RADNIK-PLIN, Križevci	31	4
TERMOPLIN, Varaždin	126	1
ZAGORSKI METALAC, Zabok	-	-
ZELENJAK PLIN, Klanjec	4	3
ZELINA-PLIN, Sv. I. Zelina	15	1
<b>Total</b>	<b>5,655</b>	<b>2,015</b>

\*data not submitted

According to the data provided by distribution system operators, in 2022 a total of 5,655 suppliers' orders to suspend gas supply were received. 3,736 orders were outside the guaranteed standard, of which 3,646 (70%) were not executed. The distribution areas where the execution of the gas supply suspension orders is difficult are the distribution area of GRADSKA PLINARA ZAGREB



d.o.o. and ENERGO d.o.o. where 94% of the gas supply suspension orders were not executed due to the fact that in the mentioned distribution areas, the billing metering points for which the gas supply suspension was not successfully implemented are mostly located inside apartments in residential buildings with several independent user units, which makes the billing metering points unavailable for the execution of the suspension.

According to the submitted data, the distribution system operators received a total of 2,015 suppliers' gas supply resumption orders in 2022, of which 404 were executed outside the guaranteed standard. Table 5.5.13. shows the gas supply quality indicators in the part that refers to the actions of the distribution system operators related to the suspension of gas supply, as well as the resumption of gas supply pursuant to the suppliers' orders.

*Table 5.5.13 Indicators of the gas supply quality standard of the distribution system operators – gas supply suspension and gas supply resumption orders*

Guaranteed standard	Standard	Total number of requests (executed and unexecuted)	Average order execution time (days)	Number of orders outside the guaranteed standard (executed and unexecuted)	Average order execution time outside the guaranteed standard (days)
<b>Suppliers' gas supply suspension order</b>	15 business days	5,655	3.9	3,736	18.7
<b>Resumption of supply based on the suppliers' orders</b>	2 business days	2,015	3.6	404	6.5

Figure 5.5.10. shows the average number of business days required by a distribution system operator to suspend gas supply after receiving a supplier's gas supply suspension order, as well as the average number of business days required by a distribution system operator to resume gas supply after receiving a supplier's gas supply resumption order.

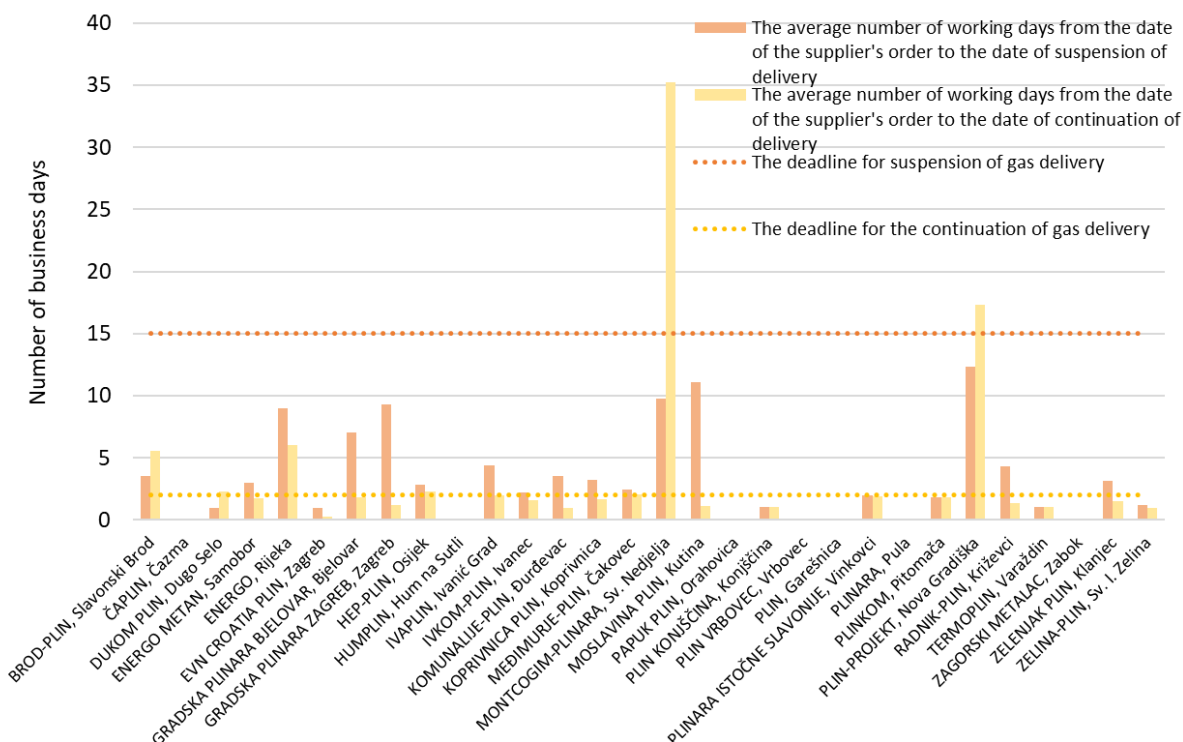


Figure 5.5.24 Average number of business days required by a distribution system operator to suspend and resume gas supply pursuant to the suppliers' orders – executed requests

According to the data provided by the distribution system operators, in 2022, a total of 118 submissions of consumption data for the billing period were outside the guaranteed standard, that is, the distribution system operator did not submit the consumption data to the gas supplier within the prescribed period, namely, by the 8th day of the following month for final customers whose billing metering points are read on a monthly basis, or by the 20th day of the following month for household final customers whose billing metering points are read quarterly or semi-annually.

Table 5.5.14 Indicators of the gas supply quality standard of the distribution system operators – submission of readings to the supplier

Guaranteed standard	Standard	Number of readings submitted outside the guaranteed standard	Average number of days outside the guaranteed standard
<b>Submission of readings to suppliers</b>	<ul style="list-style-type: none"> <li>- by the 8th day of the following month for billing metering points that are read on a monthly basis</li> <li>- by the 20th day of the following month for billing metering points that are read on a 3-month or 6-month basis</li> </ul>	118	2.3

Gas suppliers are obliged to apply the guaranteed supply quality standard, which refers to the correction of the gas supply bill at the request of the final customer and the submission of gas supply resumption orders to the gas system operator to whose system the final customer is connected.



Table 5.5.15. shows gas supply quality indicators referring to the actions of the distribution system operators related to gas supply suspension and gas supply resumption pursuant to the suppliers' orders.

*Table 5.5.15 Indicators of suppliers' gas supply quality standards – correction of the gas supply bill and gas supply resumption orders to the gas system operator*

Guaranteed standard	Standard	Total number of requests	Average realisation (days)	Number of corrections/orders outside the guaranteed standard	Average duration outside the guaranteed standard (days)
<b>Gas supply bill correction</b>	10 business days	72,969	2	36	24.6
<b>Gas supply resumption order</b>	1 business day	1,300	0.47	52	10.6

In 2022, the information system of the gas market operator corrected 8,768 errors of distribution system operators due to noncompliance with the guaranteed standard of data entry and updating in the register of billing metering points. The number of corrected errors by error type is shown in Table 5.5.16.

*Table 5.5.16 Overview of the number of errors corrected by the gas market operator due to noncompliance with the guaranteed supply quality standard in 2021 and 2022*

Type of error	Standard	Number of errors corrected by the gas market operator	
		2021	2022
<b>Supplied volume of gas</b>	0 errors	24,088	6,871
<b>Gas loss rate</b>		0	0
<b>Annual gas consumption</b>		3,411	1,897
<b>Tariff model designation</b>		0	0
<b>Total errors</b>		<b>27,499</b>	<b>8,768</b>



### 5.5.5. Consumer protection

Another precondition for effective competition is the availability of information for market participants. It is particularly important to make information on gas consumption available to final customers, and in this sense, the HERA establishes relevant rules (*General Terms and Conditions of Gas Supply*):

- on the mandatory content of invoices for delivered gas, and
- on the gas suppliers' obligation to periodically inform consumers of past gas consumption in the previous year and of the estimated gas consumption in the current year (by 1 March each year).

The HERA also informs consumers of their rights and obligations:

- by regularly publishing information on the HERA's official website,
- by monitoring information published on energy entities' websites,
- by responding to consumer inquiries, and
- via the tariff calculator (iPlin) for consumers supplied under the public service obligation regime.

In this regard, the HERA implemented a series of measures and activities, the most important of which were informing gas market participants about their rights and obligations, especially regarding gas supply contracting for final customers, and published information for final customers on its website about the method of contracting gas supply, the supplier switching procedure, as well as fulfilling the prescribed obligations of gas suppliers in the event of a change of supplier.

In September 2022, the HERA had initiated the creation of a specialised gas price comparison tool, which was finished in early 2023. The obligation to create a specialised web application is prescribed by the *General Terms and Conditions of Gas Supply*, all with the aim of making it easier for final customers to compare the available offers for gas supply, including gas prices and gas supply conditions. The application will also serve to facilitate decision-making on the choice of gas supplier, as well as access to gas supplier contacts. The final customers for whom the gas price comparison tool is intended are customers in the household category and customers in the non-household category (the business category) with an annual gas consumption of up to 100,000 kWh. Also, for the purposes of the establishment and functioning of the gas price comparison tool, the HERA will enable gas suppliers to enter data on the final gas prices and gas supply conditions, as well as data on their changes, into the gas price comparison tool in a standardised format. Due to extraordinary measures and disruptions on the gas market, the application is not yet available to users. In the coming period, the HERA plans to familiarise gas suppliers with the web application and inform them about the purpose and use of the application with the aim of filling the application with the available gas supply offers. Also, the HERA will make a public announcement for the final customers of gas about the possibility of comparing gas prices and gas supply conditions, as well as access to gas supplier contacts.

From July 2021 to January 2022, the HERA undertook an analysis of offers, standardised contracts, and conditions offered by gas suppliers who supply household final customers under market conditions. By January 2022, the gas suppliers encompassed by the above analysis had harmonised their standard contracts and contractual conditions, of which they were also obligated to inform their final customers. In 2022, in the procedures for extending permits for the performance of gas supply energy activities, the HERA continued with its activities for harmonising standard contracts and the terms and conditions of contracts of other gas suppliers that supply household final customers.

In 2022, the HERA received a total of 673 submissions from natural and legal persons within its area of competence in the gas sector, as shown in Table 5.5.17.



Table 5.5.17 Customer submissions by type in 2022

Case type	Number	Share, %
Complaints	255	37.9
Inquiries	280	41.6
Other customer submissions	138	20.5
<b>Total:</b>	<b>673</b>	<b>100</b>

Of the 673 complaints and other customer submissions, 96 complaints were submitted by legal persons related to the change in gas prices, and 155 were complaints from citizens (natural persons). Table 5.5.18 shows the most common reasons for complaints from natural persons.

Table 5.5.18 Complaints received from natural persons in 2022

Complaints from natural persons	Number	Share, %
Gas billing	50	32.3
Gas price	26	16.8
Unauthorised gas consumption	8	5
Supplier switching	12	7.8
Gas quality	1	0.7
Gas supply suspension	14	9
Other	44	28.4
<b>Total:</b>	<b>155</b>	<b>100</b>

The final customer protection framework in the gas sector is laid down in *Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC, Directive (EU) 2019/692 of the European Parliament and of the Council of 17 April 2019 amending Directive 2009/73/EC concerning common rules for the internal market in natural gas*, and the measures listed in Annex 1. "Consumer protection measures". The provisions of the *Directive* and Annex 1 have been transposed into the Croatian legal system through the following acts and by-laws:

- **Energy Act** (in force as of 21 September 2018)
- **Gas Market Act** (in force as of 6 March 2020)
- **Act on the Regulation of energy activities** (in force as of 21 November 2018),
- **Consumer Protection Act** (in force as of 21 October 2015), and
- **General Terms and Conditions of Gas Supply** (in force as of 17 September 2021).

The measure protecting gas customers and gas system users against the actions of gas system operators and suppliers, pursuant to Article 88 of the **Gas Market Act**, stipulates that a final customer dissatisfied with an action or failure to take action on the part of the transmission system





operator, distribution system operator, gas storage operator, LNG terminal operator, gas market operator or supplier may initiate an administrative dispute. The procedure before the administrative court will be heard urgently.

In addition, the measure protecting gas consumers against the actions of the gas supplier, pursuant to Article 24 of the *General Terms and Conditions of Gas Supply*, stipulates that final customers who are dissatisfied with an act or failure to act on the part of the supplier may file a written complaint with the supplier.

Complaints may be filed in particular against the following:

- failure to comply with the obligation to inform final customers of modifications to the contract terms and the right to terminate the gas supply contract,
- failure to comply with the obligation to provide timely information to household final customers about the termination of the concluded gas supply contract,
- the content of an invoice issued for delivered gas,
- non-fulfilment of the provisions of a public service obligation gas supply contract,
- failure to re-establish gas delivery within the defined time frames, upon the payment of overdue amounts from the warning letter, due to which gas delivery was suspended, and
- supplier switching not carried out pursuant to the *General Terms and Conditions of Gas Supply*.

On the basis of the complaint, the HERA may take the following measures:

- issue a binding decision on how to handle the complaint,
- provide instructions on how to handle the complaint, or
- issue an opinion on the complaint.

In order to protect final customers, the HERA continuously reminded and asked all gas suppliers to ensure that their final customers are protected from unfair and misleading purchasing methods, that the provisions of gas supply contracts are fair to final customers, and that they clearly, simply, and unambiguously describe the rights and obligations of both the supplier and the customer. The HERA also performed an analysis of offers, standardised contracts, and conditions offered by gas suppliers who supply household final customers. These activities resulted in gas suppliers harmonising standardised supply agreements and conditions, of which they were also required to inform their customers. The HERA continuously analyses offers, standardised contracts and contractual conditions of gas suppliers in the procedures for issuing and extending licences for performing gas supply activities.

Within the framework of the activities of monitoring the actions of gas suppliers and ensuring the rights and obligations of final customers in accordance with the provisions of the *General Terms and Conditions of Gas Supply (Official Gazette no. 50/18, 88/19, 39/20, 100/21 and 103/22)*, at the end of 2021, the HERA started and at the beginning of 2022 completed the monitoring procedure over the energy entity GRADSKA PLINARA ZAGREB - OPSKRBA d.o.o., on the basis of which the energy entity was ordered to undertake actions in dealing with non-household final customers, namely, in cases of disputed gas price increases, final customers cannot be prevented from changing the gas supplier, and an order to suspend their gas supply cannot be issued. During 2022, the HERA initiated monitoring procedures over four other energy entities with the aim of determining potential noncompliance with the provisions that prescribe the amendment of the contractual conditions, change of gas supplier and the fulfilment of obligations when giving offers, with the aim of protecting end-customers from unfair sales methods.

Upon receiving complaints and inquiries from final customers and other participants in the gas market, the HERA collects additional information and statements from stakeholders in specific



cases, informs the final customers of their rights, and if necessary, gives instructions and orders to energy entities with the aim of eliminating the identified deficiencies in procedures.

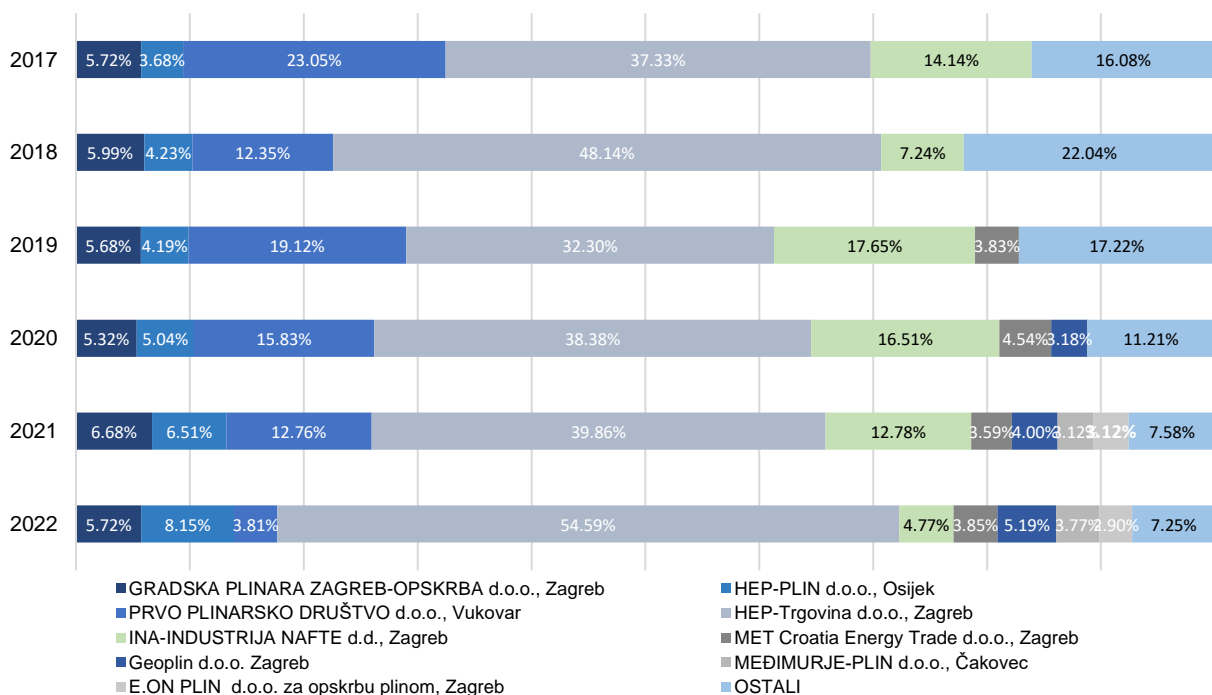
### 5.5.6. Regulatory measures and observations

The retail gas market is characterised by several main indicators, of which it is necessary to highlight: the HHI market concentration indicator, the gas supplier switching rate, the impact of regulation on the entire retail market, and the informedness of final customers about the market opportunities.

The HHI score for the non-household category, which the HERA designated as relevant for assessing the retail gas market, was 3,188 in 2022, which represents a significant increase compared to 2021, when it was 2,056, and represents a departure from the target, recommended HHI level of 2,000. The change in market concentration is the result of a decrease in the share of individual participants, whose shares in 2021 exceeded 10% of the total share in the quantity of gas sold on the retail market, which contributed to the diversification of concentration in 2021.

The change in 2022, i.e. the reduction of the market shares of individual participants, is the result of a significant reduction in the supply of gas for the needs of Petrokemija d.d., but also the implementation of Government measures to eliminate disturbances on the domestic energy market, where one of these measures included the sale of all natural gas produced in the Republic of Croatia to Hrvatska elektroprivreda d.d. with the aim of ensuring and increasing the availability of natural gas in the Republic of Croatia. At the same time as the sales volume of one of the largest participants in the retail market increased by 25% compared to the previous year, its dominance in the retail market also increased and its market share exceeded 50% in 2022, which additionally influenced the increase of HHI compared to the year 2021, since a significant share is concentrated in only one participant.

The HHI trends in the past five years clearly show that the level of retail gas market concentration in the non-household category is still mostly the result of changes in the market share distribution among several of the largest market participants, which is clearly apparent in Figure 5.5.25, which shows the share of individual retail gas market participants in Croatia from 2017 to 2022.





*Figure 5.5.25 Share of individual retail gas market participants in the Republic of Croatia from 2017 to 2022*

An important indicator of the activity of the retail market is the gas supplier switching rate, which shows how familiar the final customers are with the possibilities on the market and how actively they participate in the market through supplier switching procedures. The share of supplier switches per BMP in 2022 represents 2% of the total number of BMPs on the retail market, which is a significant decrease compared to 2021, when it was recorded at the level of 11.1%. The reason for the reduced interest in switching suppliers is the high market prices of gas that prevailed in 2022, so the household customers that use public service supply chose to stay with the existing suppliers with a public service obligation, given that the price of gas for the needs of public service supply was set at a fixed amount until 31 March 2023. Namely, gas prices on the wholesale market started to rise significantly already in Q2 2022, and peaked in August 2022 when they reached the level of 300 EUR/MWh. Since 2018, retail and wholesale gas prices have correlated in such a way that the retail price of gas for the household and non-household final customers was continuously higher than the wholesale price of gas, until Q4 2021, when, due to the aforementioned disturbances on the energy market, the wholesale price of gas was recorded at levels above the retail gas prices, which was especially pronounced during Q2 and Q3 2022. The retail gas prices followed the significant growth of the wholesale gas prices, but with a lower intensity and reached the highest growth in Q4 2022, which resulted in the reduced activity of final customers on the market in terms of the desire and need to switch suppliers, i.e. moving from safer conditions of the public gas supply service to gas supply under market conditions.

At the same time, during the time of the highest gas prices, a large number of household final customers had market-based contracts, i.e. with a price formed according to market trends, with a term until 30 September 2022. Since after the expiration of the contract, a large number of customers expressed interest in switching to the public gas supply service, this caused an overload of the suppliers with a public service obligation. Even though the supplier switching procedure is a standardised and simple process, it was nevertheless impossible to process such a large number of requests in a short period of time, and HROTE d.o.o. had to systematically transfer a large number of additional BMPs in the RBMP simultaneously.

The HERA played a significant role in the process of the transition of final customers from market supply to the public service supply. For the purpose of enabling the transition and in order to ensure the continuity of gas supply, the HERA implemented the measure in the *Decision on the start of providing public gas supply services to final customers of the household category with a terminated gas supply contract*, thus enabling the automatic switching of a significant number of additional BMPs. Also, with regard to the activation of the guaranteed gas supply by the guaranteed supplier HEP-PLIN d.o.o., non-household and household customers who had been supplied by suppliers in difficulty were transferred to the guaranteed gas supply in the RBMP.

Since the switching of additional final customers (on the basis of the *Decision* and the transition to a guaranteed supply) was performed automatically by HROTE d.o.o., and not initiated through the supplier switching application form submitted by the final customer and in a standardised procedure, it was not recorded along with the other recorded switches.

Pursuant to the above, in addition to the standardised recorded switching of supplier, 129,465 billing metering points of household final customers, and 19,059 billing metering points of non-household final customers were additionally transferred by the end of 2022.

The majority of the households in Croatia still purchase gas under regulated conditions (99% of the total number of household final customers as of 31 December 2022), considering the regulation model of the final price of gas, which protects household final customers on the gas supply public service from fluctuations on the gas market, ensuring a predictable, guaranteed final price of gas throughout the regulatory year, as well as considering the other regulated conditions of gas supply.

The regulation of the end price of gas for household final customers proved to be of significant importance for the entire market during the energy crisis, given that the final customers in the



household category were protected from fluctuations and the uncertainty of price movements in the most critical period of high prices on the gas market.

Due to disturbances in the energy market and high gas prices on European markets, and with the aim of protecting customers and the entire retail market, the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market*, which stipulates that INA d.d. shall sell all produced gas to HEP d.d. for the purposes of supplying certain prescribed categories of customers. Likewise, the *Regulation* prescribes the price of gas at which INA d.d. shall sell the produced gas for supplying certain categories of customers.

In accordance with the adopted *Regulation*, the HERA monitors its implementation and monitors the allocation of gas quantities for certain categories of customers on a monthly level through the received reports. The HERA also supervises energy entities in the performance of energy activities in order to eliminate the observed deficiencies in their actions. With the aim of informing final customers about their rights, especially in unstable market conditions such as those recorded during 2022, the HERA published information for final customers on its website about the method of contracting gas supply, the supplier switching procedure, as well as fulfilling the prescribed obligations of gas suppliers in the event of a change of supplier.

Considering the instability of prices on the gas market and the significant increase in gas prices in 2022, and in order for household final customers to be additionally protected from high gas prices, in the period after 31 March 2023, the HERA recognised the need for amendments to the *Methodology for setting tariffs for public service gas supply and guaranteed supply*, and in April 2023, after a public consultation, the HERA adopted the *Amendments to the Methodology for setting tariffs for public service gas supply and guaranteed supply*. The *Amendments to the Methodology* prescribe a new method of determining the cost of gas procurement for the 2023/2024 regulatory year and for the 2024 regulatory year, which reflects the current gas prices on the market. For the 2023/2024 regulatory year, this will mean the supply of gas to the final customers of the household category at reasonable prices, since gas prices on the European markets have had a downward trend since December 2022.

Although both the Government of the Republic of Croatia and the HERA, by implementing measures, adopting decisions and supervising the implementation of measures and supervising the actions of energy entities, reacted in a timely manner to the challenging situation on the retail gas market, thus protecting the final customers from the market instability and very high gas prices, it was observed that the informedness of final customers in general, and especially in times of instability, is extremely important for the optimal functioning of the retail market.

In order for final customers to be informed about the gas market options even better and for them to have an overview of the suppliers' available offers in one place, the HERA saw the possibility of improvement in establishing the web application "Gas Price Comparison Tool", which is planned to be established in 2023. In cooperation with an IT company, the HERA developed the application at the end of 2022 and the beginning of 2023, but due to unpredictable fluctuations in the gas market, the market conditions were not suitable for its launch. The announcement and launch of the "Gas Price Comparison Tool" and its use by the final customers for whom it is intended should also have an impact on the gas supplier switching rate, as it can be assumed that, with better information, final customers could become more active in choosing the most suitable offer for their needs.



## 5.6 Security of natural gas supply

The basic framework on the security of the natural gas supply in Croatia is laid down in *Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of the gas supply and repealing Regulation (EU) No 994/2010* (hereinafter: *Regulation (EU) 2017/1938*) which entered into force on 1 November 2017, and *Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage* (hereinafter: *Regulation (EC) No. 2022/1032*). The objective of *Regulation (EU) 2017/1938* is to boost solidarity and trust between the member states and put in place measures needed to achieve these aims, while *Regulation (EU) 2022/1032* introduced the obligation of filling gas storages before the winter of 2022. More specifically, the targets for filling underground gas storages for member states are defined in such a way that for the year 2022, on 1 November 2021, at least 80% of the storage must be filled, and for each subsequent year, on 1 November, at least 90% of the storage must be filled. Underground gas storage systems contribute to the security of the gas supply, and well-filled underground gas storage systems provide security of supply by providing additional gas in the event of high demand or supply disruptions. Gas storage facilities are starting to be considered critical infrastructure, and all gas storage system operators must be certified. In accordance with this requirement, on 14 February 2023, the HERA sent a draft decision on the certification of the only storage system operator in the Republic of Croatia, the energy entity Podzemno držište plina d.o.o., to the European Commission

Pursuant to the provisions of the **Gas Market Act**, market participants are responsible for the security of the gas supply within the scope of their activities. The competent authority in charge of implementing measures under *Regulation (EU) 2017/1938 and Regulation (EU) 2022/1032* in the Republic of Croatia is the ministry competent for energy, and together with regional self-government units, it is responsible for implementing measures for the security of the gas supply.

On 31 October 2022, the Government of the Republic of Croatia published the *Intervention Plan on Measures to Safeguard the Security of the Gas Supply of the Republic of Croatia* in accordance with *Regulation (EU) 2017/1938*, i.e. *Regulation (EU) 2022/1032 and Council Regulation (EU) 2022/1369 of 5 August 2022 on coordinated demand-reduction measures for gas*. The Intervention Plan defines the procedures, roles and responsibilities of the competent authorities and all involved participants in the gas market in the event of gas supply disruptions. The Intervention Plan regulates the measures to eliminate or mitigate the impact of gas supply disruptions, measures to ensure a reliable and efficient natural gas supply, criteria and method of determination of sufficient quantities of natural gas to ensure a reliable supply of natural gas to protected customers, and the order of reduction or suspension of natural gas supply to certain categories of customers in the event of a crisis.

In order to determine the criteria for acquiring the status of a protected customer and protection measures with the aim of ensuring a reliable supply to protected customers, the Government of the Republic of Croatia adopted the *Regulation on the criteria for acquiring the status of a protected customer in gas supply crisis situations (Official Gazette no. 65/15)* on 11 June 2015.



## 5.7 Energy efficiency in the natural gas sector

### Energy efficiency in the gas infrastructure

Energy efficiency in Croatia is regulated by the **Energy Efficiency Act**. With the adoption of this Act, the EU acquis in the field of energy efficiency has been fully transposed into Croatian legislation. The energy efficiency of the gas infrastructure predominantly relates to losses of natural gas from the system and to the system's own energy consumption (gas and electricity consumption).

In the context of assessing potentials and proposing measures to increase the energy efficiency of the gas infrastructure, Article 16 (1) of the **Energy Efficiency Act** provides that the HERA will take energy efficiency into account when making decisions in areas under its jurisdiction. This applies in particular to decisions on tariff methodology, wherein cost-effective measures to increase energy efficiency must be considered in order to offer incentives that will increase the efficiency of the gas infrastructure and abolish those that are harmful to the infrastructure's efficiency.

In its *Methodology for setting tariffs for gas distribution*, the HERA defined operating costs as all justified business expenses related to gas distribution, including the cost of procuring gas to cover allowed losses of up to 3% of the total amount of gas at entrances to the distribution system. In the *Methodology for setting tariffs for gas transmission*, the HERA defined operating costs as all justified business expenses related to gas transmission; this does not include amortisation costs, while it does include the cost of procuring gas necessary to maintain an operational accumulation, plant consumption, and to cover allowed operating losses and differences in measurements. Allowed operating losses and differences in measurement amount to a maximum of 0.3% of the total amount of gas at entrances to the transmission system confirmed on the basis of measurement data on the use of transmission system capacities. These provisions encourage the energy efficiency of transmission system operators and distribution system operators by requiring them to develop, maintain, and operate a system that takes energy savings into account, endeavouring to reduce gas losses to the prescribed levels.

The deadlines for the introduction of the considered measures to increase the energy efficiency of the gas infrastructure are determined by the ten-year plans for the development of the gas transmission system approved by the HERA, as well as the plan of the gas storage system operators and distribution system operators, which the HERA analyses and accepts in the procedures for setting tariffs for a regulatory period of 5 years, taking into account the technical and economic justification of the planned investments and the potential improvement of the gas infrastructure.

Applicable and cost-effective measures to increase the energy efficiency of gas infrastructure stem from the need to reduce gas losses. In the transmission system, examples of such measures are:

- connection to the low-pressure system (during the reconstruction and maintenance of the existing system),
- improvements to the pneumatic valve system, the evaluation and possible replacement of overpressure valves,
- the replacement of gas preheating boilers at MRSs.

In the analysis of distribution system development plans the HERA noticed that the potential for increased energy efficiency is fairly high in the distribution system, especially in the part related to:

- the replacement of existing steel piping with PE piping, and
- the evaluation and possible replacement of overpressure valves.

As concerns the gas storage system, activities directed towards increasing energy efficiency are:



- improvements to the energy efficiency of compressors,
- dehydration and hydration units, and
- preheating systems at RRSs.

## The energy obligation system in the gas sector – suppliers with a public service obligation

In accordance with the provisions of Article 13 (2) of the **Energy Efficiency Act**, the parties to the system of obligations in 2022 are energy suppliers and all related persons who are energy suppliers, if in the year before last, they delivered a total of more than 50 GWh of energy to final customers or distribution stations that sell energy to final customers, and all those responsible for putting biofuel on the market, i.e. distributors who market diesel fuel or petrol for powering motor vehicles, who, according to a special law regulating excise duties, are considered excise duty payers.

The **Energy Efficiency Act** also stipulates that, if the obligated parties fail to realise savings not exceeding 10% of their total obligation in the previous year, the Ministry will increase the obligation in the next year by the unrealised savings from last year. However, for the unfulfilled part of the obligation, the Ministry will ex officio determine the amount that the obligated party must pay to the Environmental Protection and Energy Efficiency Fund (hereinafter: the Fund). The payment for the unrealised share of the energy savings obligation from the preceding year is determined by multiplying the unrealised part of the obligation from the preceding year in kWh with a unit fee, expressed in HRK/kWh. The unit fee for the first and second cumulation periods of energy savings is HRK 1.2/kWh, but is adjusted every year, starting from 1 January 2022, in relation to the determined adjusted unit fee from the preceding year, by multiplying it with the Consumer Price Index published by the Croatian Bureau of Statistics for the previous calendar year.

The **Amendments to the Energy Efficiency Act** specify the cumulation periods of energy savings as follows:

1. the first cumulation period of energy savings lasts from 1 January 2014 to 31 December 2020;
2. the second cumulation period of energy savings lasts from 1 January 2021 to 31 December 2030;
3. the third and each subsequent cumulation period of energy savings is the subsequent ten-year period.

It is important to note that, under the current provisions of the **Act**, energy savings realised in one cumulation period cannot be carried over to another cumulation period.

## Introduction of advanced electricity meters

Pursuant to the provisions of the **Energy Act**, the distribution system operator determines the technical requirements and the costs of deploying advanced meters and submits them to the HERA, which performs a cost-benefit analysis and obtains the opinion of the representatives of consumer protection bodies to enable the minister responsible for energy to set out a programme of measures to introduce advanced meters for final customers.

During 2022, 8 distribution system operators of a total of 15 distribution system operators who provided statements to the HERA on the measures taken to increase energy efficiency carried out pilot projects to introduce smart metering devices and systems to network them. Distribution system operators have not provided detailed information on the funds invested and the savings achieved, as the pilot projects are still underway and the real impact cannot yet be determined precisely.



An overview of the abilities and specific minimum functional requirements for smart meters and the technologies that enable such functionality will be the subject of public consultation with distribution system operators conducted by the HERA with the aim of identifying functionalities and technologies that are acceptable to distribution system operators in Croatia. A final cost-benefit analysis must be carried out with regard to acceptable functionality and the optimal technology by which to enable such functionality.

The HERA plans to conduct a study that will include an analysis of the necessary and acceptable functionality of the devices, as well as a proposal of the minimum functional requirements for advanced metering devices.

## Energy efficiency and the energy savings obligation system of energy entities in the gas sector

In order to monitor the activities of energy entities related to gas distribution and gas transport as concerns fulfilling energy savings obligations, the HERA issued a questionnaire to collect data on measures taken by energy entities in accordance with the provisions of the **Energy Efficiency Act**, as well as on the impact of the energy savings obligations system on their operations in 2021.

In 2022, the HERA continued to collect data on the implemented savings measures. Out of all the collected answers to the questionnaire, a total of 15 energy entities that perform the energy activity of gas distribution, one energy entity that performs the energy activity of gas transmission, and one energy entity that performs the energy activity of gas storage declared themselves as energy savings obligated parties.

Regarding the operation of transmission system operators, a measure was taken in accordance with the guidelines of the Government of the Republic of Croatia and following the instructions of the PLINACRO Management that all thermostats in the business building at the address Savska cesta 88a, Zagreb should be limited to a maximum of 23°C while in heating mode. Furthermore, the main design “Solar power plant for self-consumption in PO Savska cesta 88a, Zagreb” was prepared, and the boiler rooms were switched to summer and winter modes of operation with the aim of improving the boilers’ energy performance.

Aside from introducing advanced meters and networking systems, as concerns the operations of the distribution system operators, measures were taken to inform customers about the efficient use of gas through leaflets and brochures, as well as the participation of individual distribution system operators in projects co-financing the procurement of more efficient gas heating systems, such as the replacement of atmospheric boilers with more efficient condensing boilers with digital temperature regulation. Some distribution system operators reconstructed gas pipelines, replacing worn-out steel gas pipelines with new gas pipelines made of high-density polyethylene (HDPE), thus improving the security of the distribution systems. The impact of these measures will be more accurately measurable after the two-year usage period.

As concerns the operations of gas suppliers, measures were taken to implement the automatic delivery of information to final customers in the public sector through an energy management information system (ISGE), as well as through providing notifications on gas invoices, alongside the annual delivery of data, or through informative leaflets as a part of energy efficiency measures campaigns.

Data in the Energy Savings Monitoring, Measurement, and Verification System (hereinafter: SMIV) operated by the Ministry established that 13 energy operators in the gas sector (gas suppliers) were in the energy savings obligation system in 2022. Energy savings were implemented through the measures listed in Table 5.7.1.

*Table 5.7.1 Overview of implemented energy savings measures in the gas sector with associated codes*





Measure code	Name of the energy savings measure
<b>M1</b>	Integral renovation of existing buildings
<b>M2</b>	Renovation of thermal insulation
<b>M18</b>	Informing customers about improving energy efficiency through leaflets
<b>M24</b>	Introduction of smart metering systems to monitor the consumption of electricity and thermal energy, gas-derived energy, and water consumption
<b>M49</b>	Motivational workshops
<b>T1</b>	Replacement of existing vehicles and purchase of new vehicles
<b>T8</b>	Filling tyres to the optimal value for passenger vehicles
<b>T99</b>	Measures in transport

Energy savings were achieved in the building industry (72,288,913 kWh) and transport (3,205,052 kWh) sectors. The total energy savings in the gas sector in 2022 amounted to 75,493,965 kWh. Table 5.7.2 shows the amount of energy savings by obligated party in the gas sector, the measures by which the savings were achieved, and the savings in the sectors of energy consumption (use in transport and building industry).



*Table 5.7.2 Overview of the amount of energy savings by obligated party in the gas sector in 2022, measures by which the savings were achieved, and the savings by sector (transport and building industry)*

Name of the obligated party	Energy savings measure designation	Total energy savings (kWh)	Sector and amount of energy savings	
			Transport (kWh)	Building industry (kWh)
BROD-PLIN d.o.o.	M18	2,026,216	–	2,026,216
E.ON Hrvatska d.o.o.	M18	2,947,972	–	2,251,592
	M24		–	696,380.18
EVN Croatia Plin d.o.o.	M18	2,045,856	–	2,041,162
	T1		4,694	–
GRADSKA PLINARA ZAGREB - OPSKRBA d.o.o.	M18	18,866,252	–	15,666,071
	M24		–	346,319
	T99		1,387,505	–
	T1		1,465,234	–
	M2		–	1,121
HEP-PLIN d.o.o.	M18	11,299,231	–	648,706
	M24		–	10,650,525
IVKOM-PLIN d.o.o.	M18	242,650	–	204,197
	M24		–	14,277
	T8		22,807	–
	M49		–	1,368
MEĐIMURJE-PLIN d.o.o.	M18	28,154,070	–	27,962,000
	M24		–	192,070
PLIN KONJŠČINA d.o.o.	M18	541,547	–	316,200
	M24		–	54,130
	T8		4,181	–
	M2		–	165,848
	M49		–	1,186
PLINARA d.o.o.	M24	1,724,353	–	25,008
	T8		263,121	–
	M1		–	1,436,223
PLINARA ISTOČNE SLAVONIJE d.o.o.	M24	216,900	–	216,900
TERMOPLIN d.d.	M18	6,135,230	–	5,457,500
	T8		18,039	–
	T1		11,315	–
	M24		–	648,375
ZAGORSKI METALAC d.o.o.	M18	814,695	–	651,000
	T8		8,388	–
	T1		19764	–
	M24		–	135,542
ZELINSKE KOMUNALIJE d.o.o.	M18	147,075	–	147,075
<b>Total energy savings (kWh)</b>		<b>75,493,965</b>	<b>3,205,052</b>	<b>72,288,913</b>

Source: Ministry (SMIV)

# 6

## OIL AND PETROLEUM PRODUCTS





## 6. OIL AND PETROLEUM PRODUCTS

### 6.1. Legal framework for oil and petroleum products

The oil and petroleum product market and energy activities in the oil and petroleum product sector are governed by:

- the **Energy Act**,
- the **Act on the Regulation of Energy Activities**,
- the **Oil and Petroleum Products Market Act (Official Gazette no. 19/14, 73/17, and 96/19)**, and
- and regulations subordinate to these acts.

Petroleum products placed on the market must meet the conditions laid down in the regulations on the quality of liquid fuels. The quality of liquid petroleum fuels is verified by an accredited legal entity.

Regulations adopted by the Ministry regulating the quality control of liquid petroleum fuels are:

- the **Air Protection Act (Official Gazette no. 127/19 and 57/22)**,
- the *Regulation on liquid petroleum fuel quality (Official Gazette no. 131/21)*, and
- the *Programme for monitoring liquid petroleum fuel quality for 2022*.

### 6.2. Transmission of oil through pipelines

In Croatia, oil transmission through pipelines is performed by Jadranski naftovod d.d. (hereinafter: JANAF d.d.). Pursuant to the **Oil and Petroleum Products Market Act**, JANAF d.d. is obligated to provide legal and natural persons with access to the transmission system in an impartial and transparent manner.

Oil is imported by tanker ships via the offshore terminal in Omišalj on the island of Krk, and then further transported through JANAF's oil pipeline system to oil refineries in Rijeka and Sisak, as well as for the needs of refineries in Bosnia and Herzegovina, Serbia, Slovenia and Hungary, as shown in Figure 6.2.1. In addition, the system can be used for oil imports by land.

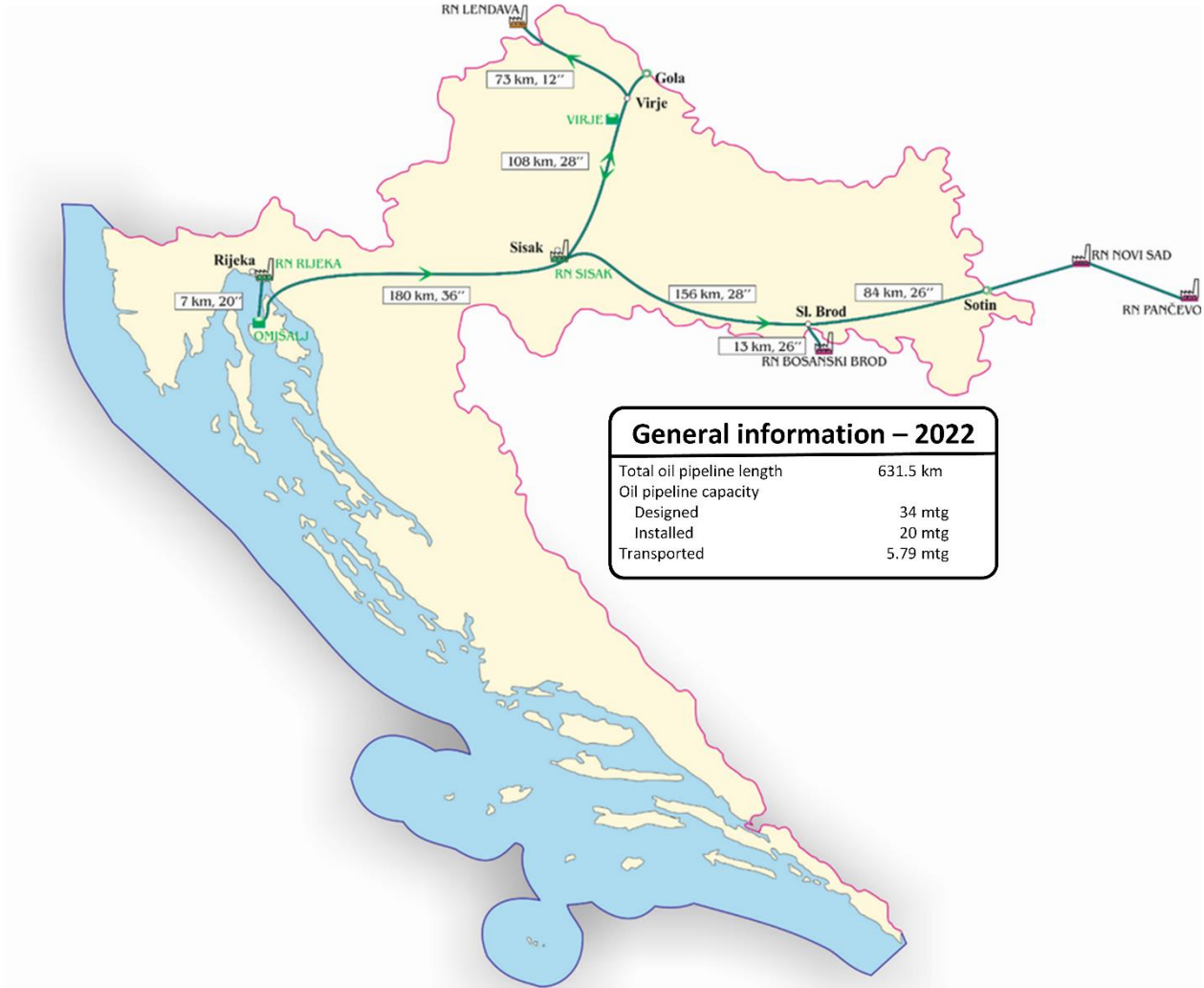


Figure 6.2.1 The JANAF d.d. oil pipeline system

In 2022, a total of 5.79 million tonnes of crude oil were transported through the oil pipeline system, which is a decrease of 14.9% compared to the previous year. The oil quantities transported from 2018 to 2022 and planned quantities for 2023 are shown in Figure 6.2.2.

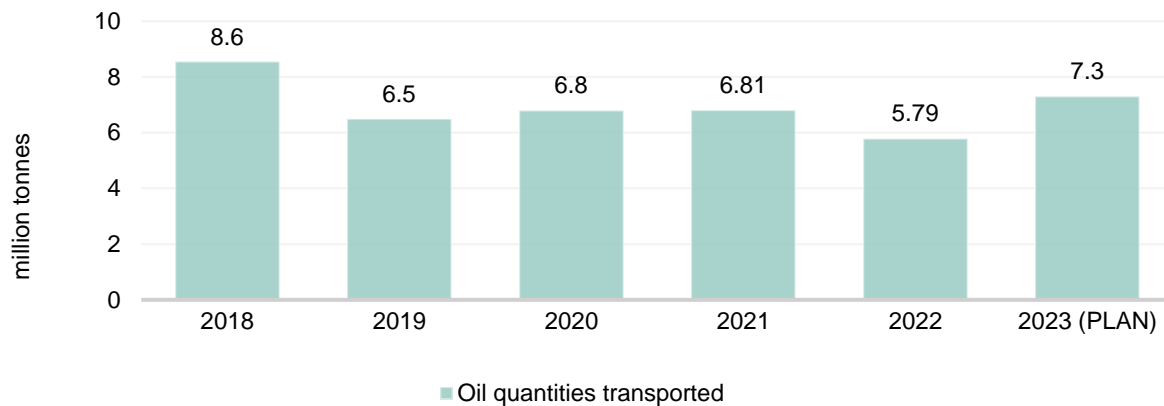


Figure 6.2.2 JANAF oil pipeline system – transported quantities [mil.t] in the period from 2018 to 2022, and planned quantities for 2023

## 6.3. Production of crude oil and petroleum products

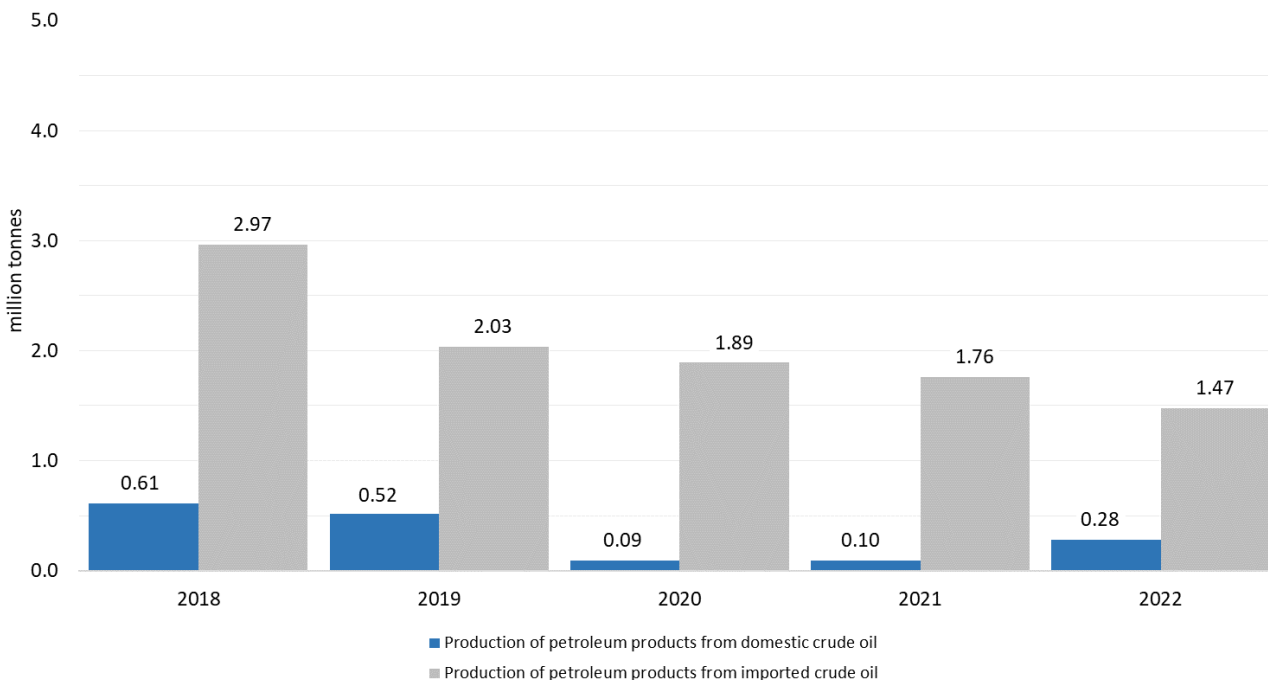
### Crude oil production

Even though it is not considered an energy activity, in accordance with the Energy Act, the production of crude oil is a significant factor for energy security in every country, including Croatia. In Croatia, crude oil is produced by INA d.d. at hydrocarbon production fields in the continental part of Croatia.

The HERA does not collect data on the total domestic production of crude oil, but it does have data on the raw material structure that is refined, processed and used in the production of petroleum products.

During 2022, the Rijeka Oil Refinery refined 248,000 tonnes of crude oil, 32,000 tonnes of domestically produced condensates, 593,000 tonnes of other raw materials (domestic and imported), and 1.47 million tonnes of imported crude oil from Azerbaijan and Kazakhstan. The aforementioned quantity of imported crude oil in 2022 was 16.3% less than the quantity of imported crude oil in 2021. The total demand for raw materials for the production of petroleum products in Croatia in 2022 amounted to 2.31 million tonnes.

Figure 6.3.1 shows trends in imported quantities of crude oil and quantities of crude oil from domestic production processed in Croatia from 2018 to 2022, where a constant slight decline in the production of petroleum derivatives from imported crude oil can be observed in the last few years, while the quantity from domestic crude oil slightly increased in the last three years. As a result of the above, in 2022, an increase in the share of domestic crude oil in domestic refinery processing was recorded and it amounted to 280,000 tonnes, while in 2021 it amounted to only 63,000 tonnes. The reason for the increase in the share of domestic crude oil in domestic refinery processing lies in the fact that, due to the global disruption in the oil market caused by the Russian-Ukrainian conflict, during 2022 there was a significant increase in the prices of imported oil that is not of Russian origin. Due to these circumstances, the share of domestic crude oil in the domestic refinery processing and production of oil derivatives increased, as the economic analysis showed higher profitability of domestic oil processing compared to sales on the foreign market, i.e. export.



*Figure 6.3.1 Imported quantities of crude oil and quantities of crude oil from domestic production processed in Croatia between 2018 and 2022 [mil.t]*

## Production of petroleum products

In the Republic of Croatia, petroleum products are produced by the energy entity INA d.d. at the oil refinery in Rijeka and at the Etan ethane facility in Ivanić Grad. Available petroleum products from imports and domestic production are used in industry, transport, households, services, agriculture, in construction as fuel, and in energy transformation, as well as for non-energy purposes.

Raw materials used in the production of petroleum products include imported crude oil and crude oil and condensates produced in Croatian oil and gas fields. The shares of raw materials used for refinery processing in 2022 are shown in Figure 6.3.2.

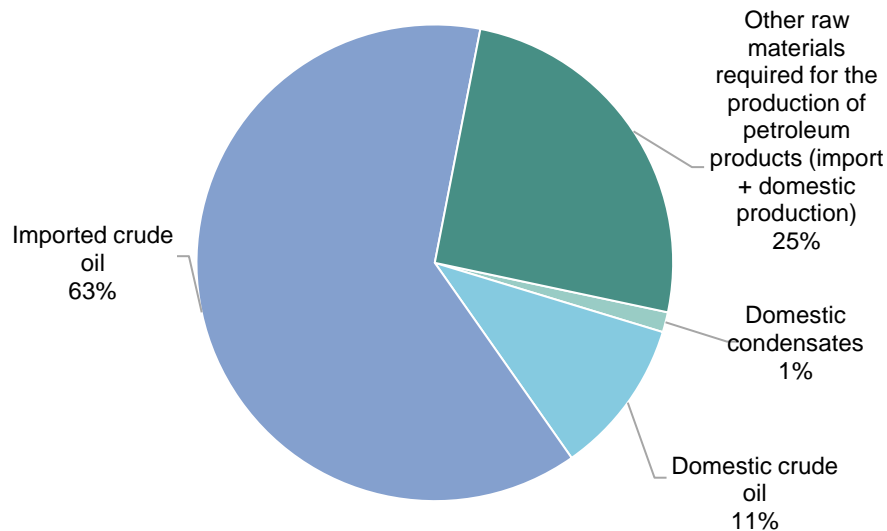


Figure 6.3.2 Shares of raw materials used for refinery processing in 2022

The domestic production of petroleum products amounted to 2.1 million tonnes in 2022, which is 0.3 million tonnes (9%) less than in 2021. This represents a continued negative trend and an increasing dependence on petroleum product imports as a result of reduced domestic refinery processing capacity. In addition to the aforementioned decline in the production of petroleum products, the closure of the Sisak Refinery negatively affected the refinery capacity for the production of petroleum products, which was thus reduced from 8.3 million tonnes/yr to 4.5 million tonnes/yr. The total quantities of petroleum products produced from 2006 to 2022 are shown in Figure 6.3.3.

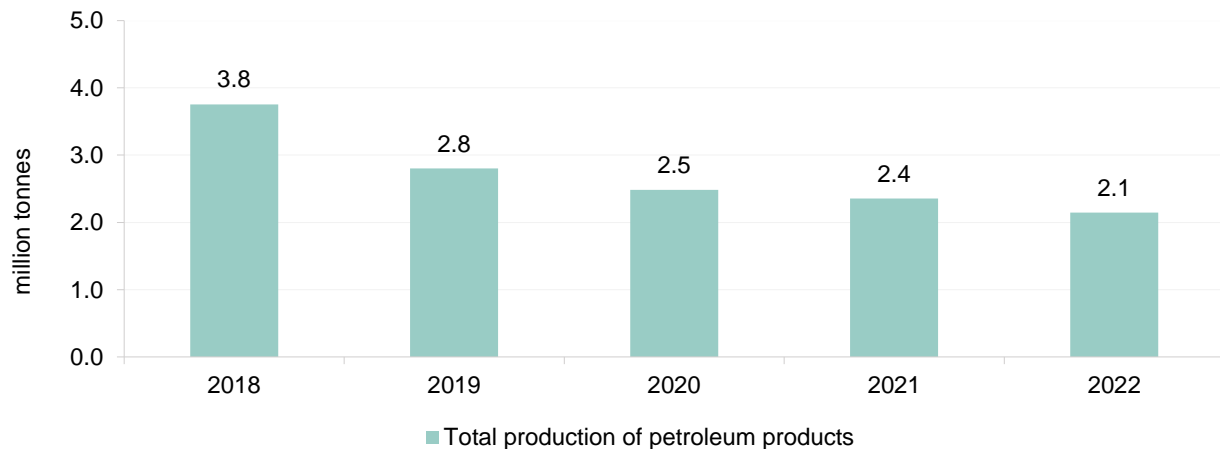


Figure 6.3.3 Quantities of petroleum products produced from 2018 to 2022 [in millions of tonnes]

Liquefied petroleum gas is produced by the energy entity INA d.d., in the Rijeka Oil Refinery and at the Etan plant. The total production of liquefied petroleum gas in 2022 amounted to 159,000 tonnes, which is a decrease of 41,000 tonnes (+34.7%) compared to 2021. Figure 6.3.4 shows the quantities of liquefied petroleum gas (hereinafter: LPG) produced from 2018 to 2022.



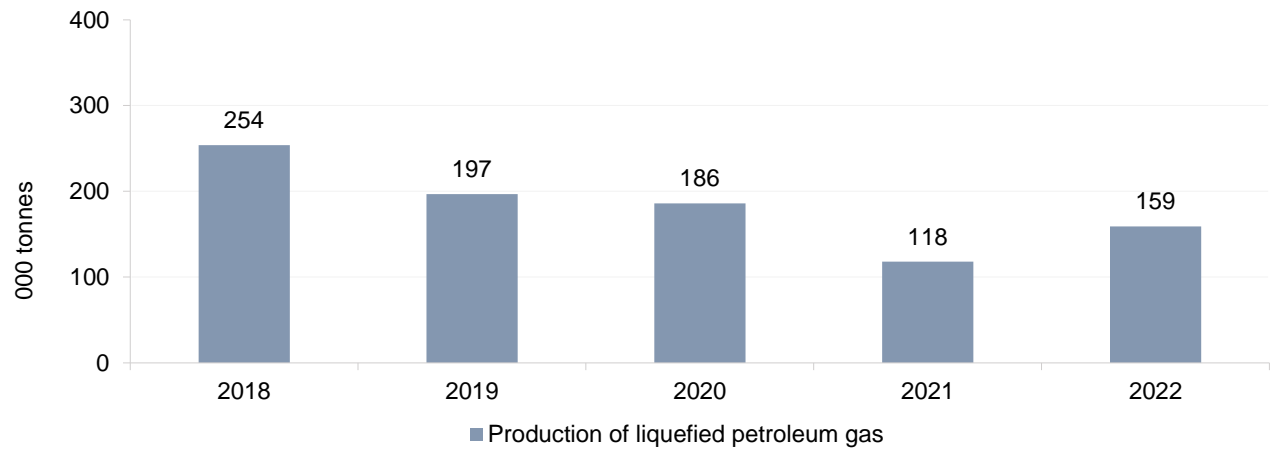
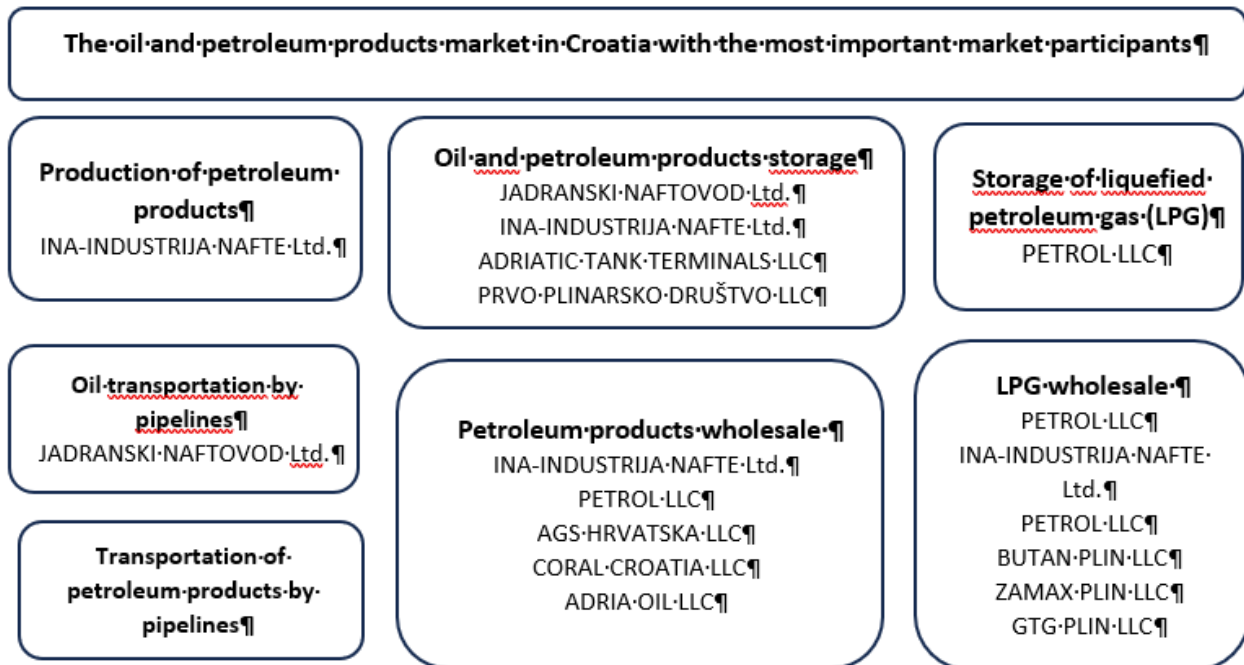


Figure 6.3.4 Quantities of LPG produced from 2018 to 2022 [in thousands of tonnes]



## 6.4. Competitiveness and functioning of the petroleum products market

Energy activities in the oil and petroleum product market are defined in the **Oil and Petroleum Products Market Act**. In order to perform certain energy activities, it is necessary to obtain a licence from the HERA.



In addition to energy activities for which it is necessary to obtain a licence from the HERA, in accordance with the **Oil and Petroleum Products Market Act** there are other energy activities for which it is not necessary to obtain a licence from the HERA, namely: transportation of oil, petroleum products and biofuels by road vehicles, transportation of oil, petroleum products and biofuels by rail, transportation of petroleum, petroleum products and biofuels by waterways, retail trade in petroleum products, and retail trade in liquefied petroleum gas.

### 6.4.1. Storage of oil and petroleum products

In 2022, 22 energy entities performed the energy activity of storing oil and petroleum products, and 4 energy entities performed the energy activity of liquefied petroleum gas storage. According to the data provided by the energy entities, the total available storage capacities for storing oil, petroleum products and liquefied petroleum gas in 2022 amounted to 3.14<sup>97</sup> million m<sup>3</sup> compared to the total capacity in 2021 of 3.24 million m<sup>3</sup> (excluding storage capacities within INA's refineries). The geographical

<sup>97</sup> This data on the total available storage capacities is incomplete given that the requested data required for the preparation of this Annual Report was not submitted by the following energy entities: ZAGREBAČKI PROMETNI ZAVOD d.o.o., FUEL trading d.o.o. za usluge i NAFTA CENTAR d.o.o. za trgovinu i usluge.



locations of the most important oil and petroleum products storage facilities in Croatia, according to the type of goods stored, are shown in Figure 6.4.1.



Figure 6.4.1 The geographical locations of the most important oil, petroleum products and liquefied petroleum gas storage facilities in the Republic of Croatia in 2022, according to the type of goods stored

Table 6.4.1 below gives an overview of the storage capacities with locations and oil and petroleum product storage operators in 2022.



Table 6.4.1 Overview of storage capacities with locations and oil and petroleum product storage operators in 2022

STORAGE OPERATOR	LOCATION - City/municipality	TYPE OF RAW MATERIAL	CAPACITY (m <sup>3</sup> )
Adriatic Tank Terminals d.o.o.	Ploče	Petroleum products	72,000
		Biofuels	200
AGS HRVATSKA d.o.o.	Sesvetski Kraljevec, Ploče	Petroleum products	26,500
		Biofuels	400
BIODIZEL VUKOVAR d.o.o.	Vukovar	Biofuels	800
BIOTRON d.o.o.	Ozalj	Petroleum products	200
		Biofuels	700
BRALA d.o.o.	Islam Latinski	LPG	430
BUTAN PLIN d.o.o.,	Novigrad, Žminj	LPG	266
DELTA TERMINALI d.o.o.	Zadar	Petroleum products	52,000
		Biofuels	8,600
ETRADEX d.o.o.	Potpićan, Pazin	Petroleum products	70
G.S. PLIN d.o.o.	Baška Voda	LPG	40
INA – Industrija nafte d.d.	Rijeka, Sisak, Osijek, Solin - Sv. Kajo, Solin - Vr. Blato, Sustjepan, Ploče, Zabok, Zagreb	Petroleum products	472,802
INA MAZIVA d.o.o.	Zagreb	Petroleum products	6,598
JADRANSKI NAFTOVOD d.d.	Omišalj, Sisak, Virje, Zagreb-Žitnjak	Oil	2,100,000
		Petroleum products	237,454
KEPOL TERMINAL d.o.o.	Zadar	Petroleum products	16,387
Lukoil Croatia d.o.o.	Vukovar	Petroleum products	8,000
NAFTNI TERMINALI FEDERACIJE d.o.o.	Ploče	Petroleum products	1,250
NAUTICA VUKOVAR d.o.o.	Vukovar	Petroleum products	4,381
PETROL d.o.o.	Velika Gorica; Strmec Samoborski	Petroleum products	600
		LPG	7,981



PRVO PLINARSKO DRUŠTVO d.o.o.	Ploče	Petroleum products	104,000
RIJEKA TRANS d.o.o.	Kukuljanovo	Petroleum products	906
SIROVINA BENZ TRANSPORT d.o.o.	Ploče	Petroleum products	300
TERMINAL SLAVONSKI BROD d.o.o.	Slavonski Brod	Petroleum products	4,700
TIFON d.o.o.	Zabok	Petroleum products	15,000
VITREX d.o.o.	Virovitica	Biofuels	300
ZAGREBAČKI PROMETNI ZAVOD d.o.o.	Karlovac	LPG	200
ZAMAX PLIN d.o.o.	Križevci	LPG	200

Figure 6.4.2 shows the shares of the 4 largest oil and petroleum products storage companies in Croatia in 2022, which together account for more than 95% of the total storage capacity, with JADRANSKI NAFTAOVOD d.d. being the largest storage company with a share of 72%, followed by INA d.d. with 14.6%, ADRIATIC TANK TERMINALS d.o.o. with 5.4% and PRVO PLINARSKO DRUŠTVO d.o.o. with 3.2%.

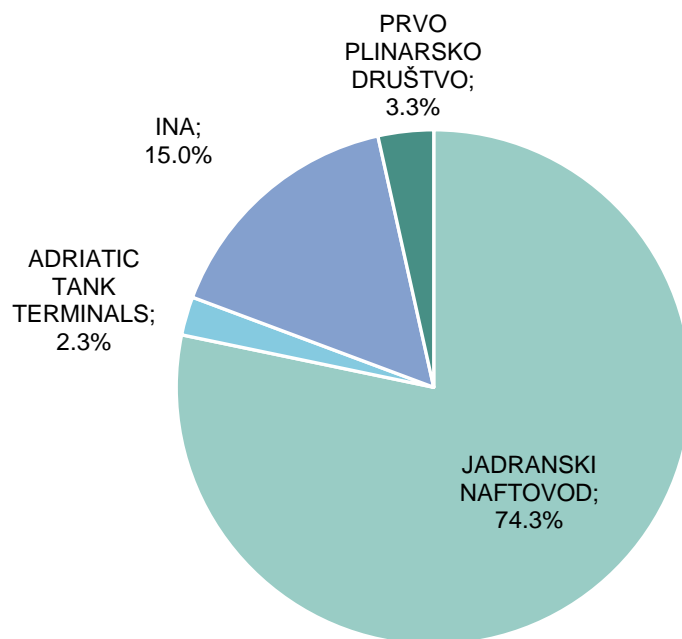
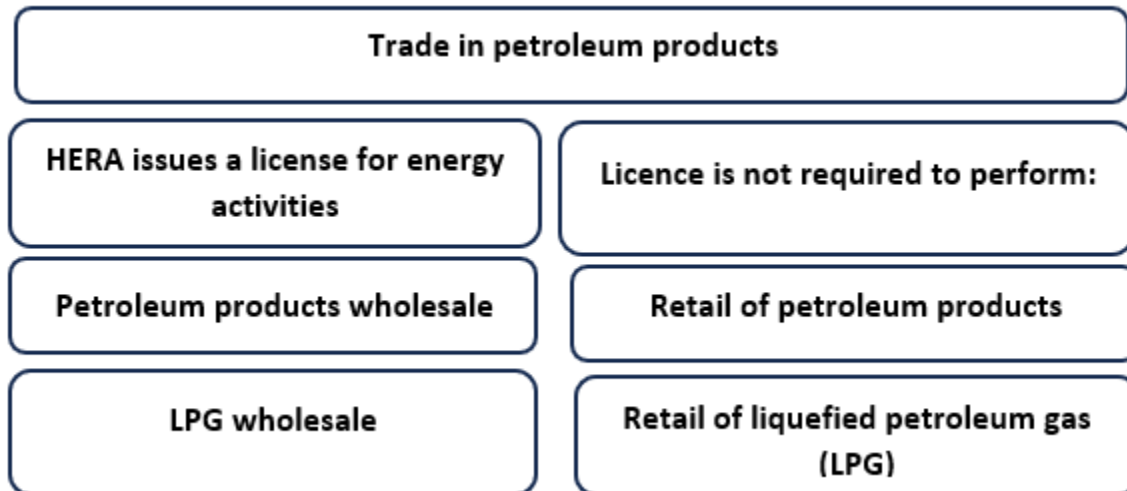


Figure 6.4.2 Overview of the share of the largest oil and petroleum products storage companies in the Republic of Croatia in 2022



## 6.4.2. Wholesale trade in petroleum products

Petroleum products trading covers the following energy activities:



In 2022, wholesale trade in petroleum products was performed by 52 energy entities, while wholesale trade in liquefied petroleum gas (LPG) was performed by 17 energy entities.

The total sales of petroleum products in 2022 amounted to 1.96 million tonnes, which represents an increase of 0.39 million tonnes or 24.5% compared to 2021, when it amounted to 1.57 million tonnes. The aforementioned growth in the quantities of petroleum products sold is the direct consequence of economic and social recovery and an increase in citizens' activities and mobility through the easing and later lifting of measures against the Covid-19 pandemic.

In addition to petroleum products from domestic production, imported petroleum products account for a significant share of the Croatian market. According to data supplied to the HERA by the energy entities, a total of 2.3 million tonnes of petroleum products were imported in 2022, which represents an increase in imports of 0.709 million tonnes (44.3%) compared to 2021. Figure 6.4.3 shows the imported quantities of petroleum products in the period from 2018 to 2022.

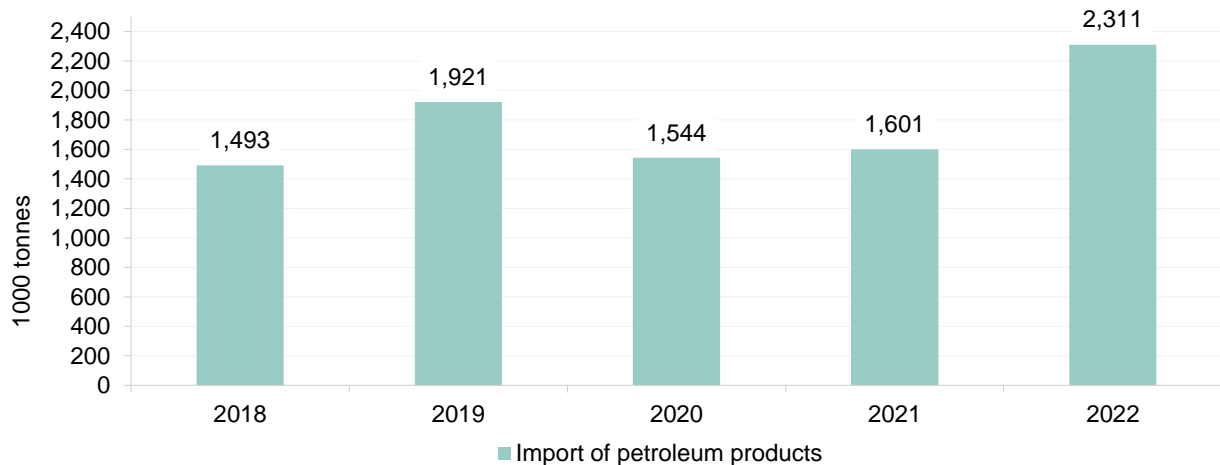


Figure 6.4.3 Imports of petroleum products from 2018 to 2022 in [thousands of tonnes]

Among the more significant events in 2022 that marked the petroleum product market is the takeover of CRODUX DERIVATA DVA d.o.o. by PETROL d.o.o., through which the market share of PETROL d.o.o. in Croatia increased to more than 25%. Figure 6.4.4. shows the shares of the 5 largest petroleum product traders on the wholesale market, whose total share is 90%; INA d.d. has the largest market share with over 60%, followed by PETROL d.o.o. with over 25% (after the takeover of CRODUX DERIVATA DVA d.o.o.), AGS HRVATSKA d.o.o. with 4.3% and CORAL CROATIA d.o.o. with 2.3%.

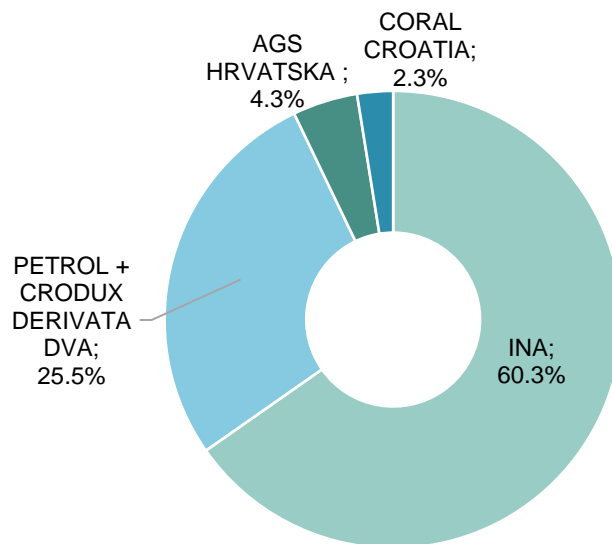


Figure 6.4.4 Market shares of the largest petroleum product traders in the Republic of Croatia in 2022



## Wholesale market prices of petroleum products

Since the **Oil and Petroleum Products Market Act** entered into force in 2014, the prices of petroleum products on the Croatian market are market-based.

In order to monitor prices of petroleum products on the wholesale market, in 2021, the HERA began collecting data on the average prices of petroleum products (net of VAT) by administering questionnaires to the wholesale traders of petroleum products registered in Croatia. The purpose of the questionnaire was to gather information on the quantities and prices of petroleum products purchased and sold on the wholesale market.

An overview of the trends in the average purchase and average selling prices of petroleum products (net of VAT) by individual type of petroleum product in the 2020-2022 period is shown in Figure 6.4.5.

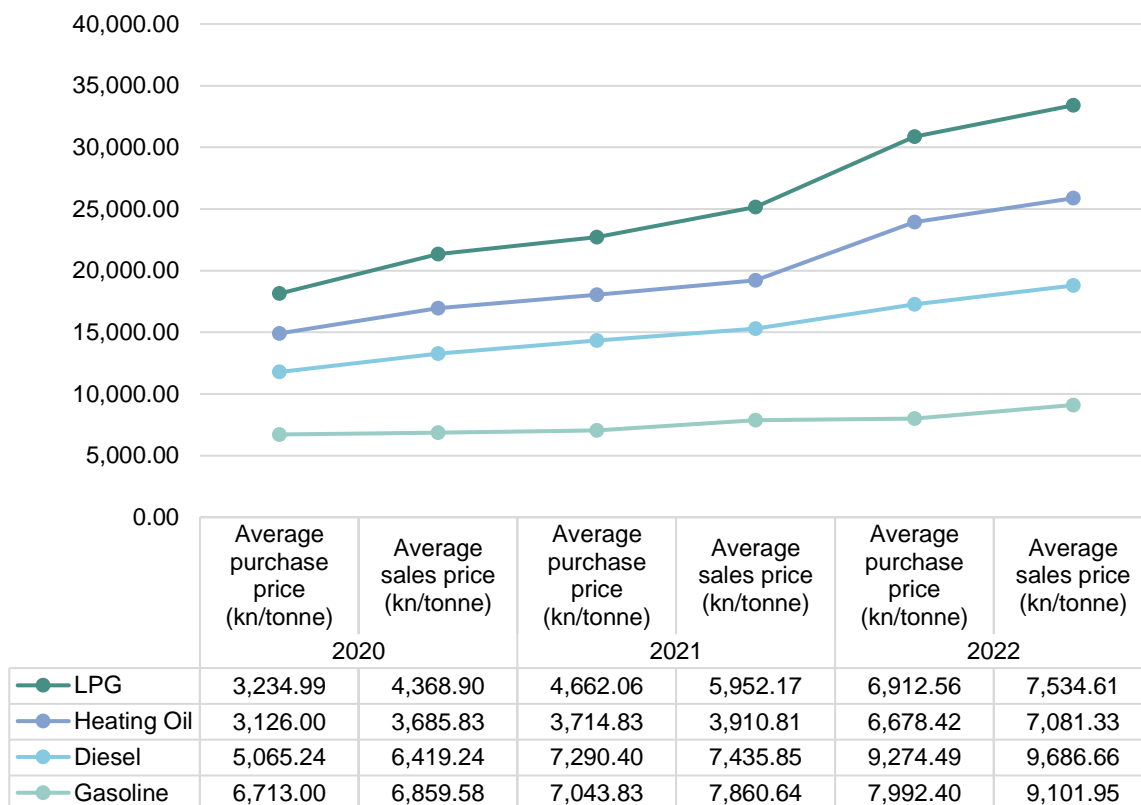


Figure 6.4.5 Trends in the average purchase and average selling prices of petroleum products (net of VAT) by individual type of petroleum product from 2020 to 2022

The average purchase price (net of VAT) of petrol on the wholesale market in 2022 (purchase under bilateral agreements and from imports) was HRK 7,992.4/t, compared to HRK 7,043.83/t in 2021, which represents a price increase of 13.5%.





The average purchase price (net of VAT) of diesel fuels on the wholesale market in 2022 (purchases under bilateral agreements and from imports) was HRK 9,274.49/t, compared to HRK 7,290.4/t in 2021, which represents a price increase of 27.2%.

The average purchase price (net of VAT) of fuel oil on the wholesale market in 2022 (purchase under bilateral agreements and from imports) was HRK 6,678.42/t, compared to HRK 3,714.83/t in 2021, which represents a price increase of 79.8%.

The average purchase price (net of VAT) of LPG on the wholesale market in 2022 (purchase under bilateral agreements and from imports) was HRK 6,912.56/t, compared to HRK 4,662.06/t in 2021, which represents a price increase of 48.3%.

In 2022, wholesale trade in petroleum products was performed by 72 wholesale traders in petroleum products (including wholesale traders in LPG).

### Energy efficiency and the energy savings obligation system of energy entities in the oil and petroleum products sector

In order to monitor the activities of energy entities related to wholesale trade in petroleum products as concerns fulfilling the energy savings obligations, in 2021, the HERA started collecting data on measures taken by energy savings obligated parties towards their final customers, as well as on measures undertaken to reach their goals in increasing energy efficiency and the savings realised. In order to gain a more detailed insight into the achieved energy savings, HERA plans to improve the questionnaire.

Of the collected responses to the questionnaire, a total of 15 energy entities who perform wholesale trade in petroleum products responded as energy savings obligated parties, and the measures they had undertaken were as follows:

- the addition of additives to petrol and diesel fuels to reach energy efficiency goals.

By examining data in SMIV, it was established that 13 energy entities in the petroleum products sector were in the energy savings obligation system in 2022 (wholesale traders of petroleum products, wholesale traders of LPG). Energy savings were implemented through the measures listed in Table 6.4.2.

*Table 6.4.2 Overview of implemented energy savings measures in the petroleum products sector with associated codes*

Measure code	Name of the energy savings measure
T9	Adding additives to diesel fuel (HRN EN 590)
T10	Adding additives to petrol (HRN EN 228)

Energy entities in the petroleum products sector achieved energy savings in the transport sector; total energy savings in 2022 amounted to 145.8 GWh. An overview of the implemented energy savings measures in the petroleum products sector related to the transport sector in 2022 is shown in Table 6.4.3.



*Table 6.4.3 Overview of implemented energy saving measures, economic sectors in which savings were implemented, and the total energy savings implemented by energy entities in the petroleum products sector in 2022 according to SMIV*

Name of the obligated party	Energy savings measure designation	Savings in the transportation sector (kWh)
ADRIA OIL d.o.o.	T9	2,125,907
AGS HRVATSKA d.o.o.	T9	2,411,889
	T10	204,520
BENZINSKA PUMPA BREBRIĆ d.o.o.	T10	5,092
Coral Croatia d.o.o.	T9	10,615,614
	T10	2,718,119
ETRADEX proizvodnja i trgovina d.o.o.	T9	2,811,754
	T10	147,811
GAS OIL d.o.o.	T9	382,613
	T10	83,020
INA-INDUSTRIJA NAFTE, d.d.	T9	25,300,337
	T10	20,108,824
KTC d.d.	T9	12,908
LUKOIL Croatia d.o.o.	T9	13,365,165
	T10	4,463,770
PETROL d.o.o.	T9	15,522,891
	T10	20,477,638
RIJEKA TRANS d.o.o.	T9	1,742,916
	T10	123,014
TIFON d.o.o.	T9	18,129,200
	T10	4,818,479
TRI BARTOLA d.o.o.	T9	130,846
	T10	49,735
<b>Total (kWh)</b>		<b>145,752,074</b>

Source: Ministry (SMIV)



## Assessment of the functioning of the wholesale petroleum products market

The petroleum products wholesale market in Croatia was fully liberalised in 2014 after the entry into force of the **Oil and Petroleum Products Market Act**. It is organised on a commercial basis as in other EU Member States.

Indicators of the level of functioning of the wholesale market manifest primarily in the concentration of traders of petroleum products on the market. The HHI index is the most important measure applicable to the Croatian market.

According to data collected by the HERA, the HHI score was 3,996 in 2022, and 3,575 in 2021. This indicates that the Croatian petroleum products market continues to be moderately concentrated with relatively low competitiveness, and that it is still dominated by a small number of large traders.

The HHI trend in Croatia's wholesale petroleum products market in the period from 2018 to 2022 is shown in Figure 6.4.6. From the movement of the HHI in the period from 2018 to 2019, its growth is visible, while in the period from 2019 to 2021, a continuous decline is noticeable, which can certainly be partly attributed to the impact of the COVID pandemic on the market trends, and from 2022, market recovery is visible after the effects of the COVID pandemic subsided.

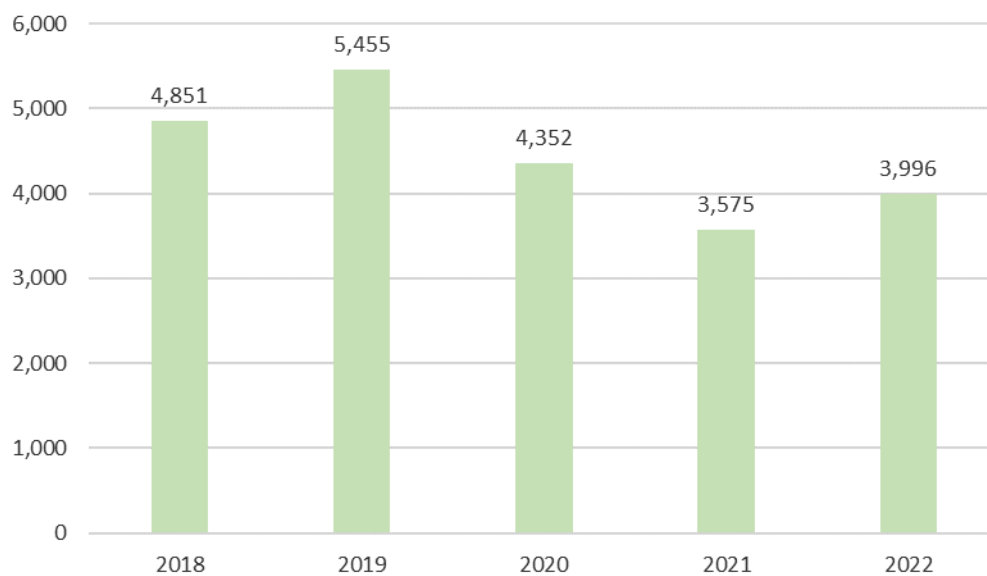


Figure 6.4.6 HHI trends in Croatia's wholesale petroleum products market in the period from 2018 to 2022



The diversity of sources of petroleum products is also an indicator of the level of development of the wholesale market. According to data collected by the HERA for 2022, petroleum products were mostly purchased from two sources – from domestic production (the refinery in Rijeka) and from imports (Italy, Hungary, Slovakia and Switzerland), which can be viewed as an indicator of healthy competition and security of supply.

An analysis of HHI and the number of supply sources (as the most important measures of the healthy functioning of the petroleum products wholesale market) shows that the Croatian wholesale market for petroleum products is relatively small and that it is mainly dependent on the operations of INA, the largest trader in petroleum products.

It is apparent that competition cannot reach its full expression, as indicated by the HHI index score, which is somewhat higher than in 2021 (3,996), which relates to the share of the five largest petroleum product traders who dominate the market (INA d.d., CRODUX DERIVATI DVA d.o.o., PETROL d.o.o., CORAL CROATIA d.o.o., and AGS HRVATSKA d.o.o.). Sources of procurement of petroleum products are diversified; the majority of petroleum products are produced in the only remaining oil refinery in Rijeka, which is owned by INA d.d., or procured through imports of petroleum products from surrounding countries, which indicates that the market is not dependent on only one source, i.e. the security of supply is not at risk and does not rely on only one source of procurement of petroleum products.

The rise in the prices of petroleum products and the consequent intervention of the Government of the Republic of Croatia, which manifested itself through the adoption of the Regulation on Limiting the Highest Retail Prices of Petroleum Products, as well as the adoption of the Regulation on Limiting the Increase of Excise Duties, and the takeover of the energy company CRODUX DERIVATA DVA d.o.o. by PETROL d.o.o., are the main events that marked the petroleum product market in 2022. The effect of the aforementioned regulations was reflected in limiting the increase of the prices of petroleum products, which had a positive effect on the consumption of final customers, while it caused difficulties for certain wholesalers in achieving the expected revenues because they were forced to sell petroleum products with a negative margin, so they raised the amounts of excise duties, which resulted in higher final prices at gas stations.



## 6.5. Security of the supply of oil and petroleum products

The requirements for the secure supply of oil and petroleum products on the Croatian market are laid down in the **Oil and Petroleum Products Market Act**, transposing *Council Directive 2009/119/EC of 14 September 2009 imposing an obligation on member states to maintain minimum stocks of crude oil and/or petroleum products* into the Croatian legal system; this directive requires member states to maintain minimum stocks of crude oil and/or petroleum products. In accordance with the **Act on Amendments to the Act on the Establishment of the Croatian Hydrocarbon Agency (Official Gazette no. 84/21)** and the **Act on Amendments to the Oil and Petroleum Products Market Act (Official Gazette no. 96/19)**, the CHA is the central authority in Croatia for compulsory oil and petroleum product stocks, and it is a single authority authorised to form, maintain and sell compulsory stocks.

In this context, the competent ministry establishes the necessary conditions and monitors the secure, regular and quality supply of the oil and petroleum products market in Croatia, and is responsible for coordination and cooperation with the European Commission and the International Energy Agency, while expert assistance to the ministry is provided by the CHA.

A representative of the HERA takes part in an expert committee for monitoring the regular market supply of oil and petroleum products. The committee puts into action the *Emergency Plan in Case of Unexpected Supply Disruption in the Oil and Petroleum Products Market (Official Gazette no. 111/12)*. The *Emergency Plan* lays down the procedures and criteria for identifying unexpected disruptions, as well as competencies and responsibilities in the event of a disruption in supply and procedures for the normalisation of supply in the oil and petroleum products market. These involve measures to reduce the consumption of petroleum products, as well as conditions for the consumption and renewal of compulsory oil and petroleum product stocks. At the session held on 28 February 2022, the Government of the Republic of Croatia adopted the *Decision on the appointment of the President, Deputy President and members of the Expert Committee for monitoring the security of supply for the oil and petroleum products market (Official Gazette no. 26/22)*. The expert committee for monitoring the regular supply of the oil and petroleum products market did not meet in 2022.

The CHA is obligated to determine compulsory oil and petroleum product stocks equal to 90 days of average consumption. Pursuant to the provisions of the **Oil and Petroleum Products Market Act**, the CHA issues a decision determining the quantity and shares of compulsory stocks for each year. The CHA issued no decision regarding the quantity and shares of compulsory oil and petroleum product stocks for 2022. In 2022, the AZU adopted the *Decision on releasing mandatory stocks of oil and petroleum products on the market (Official Gazette no. 46/22)*, which defined the releasing of mandatory stocks of 32,000 tonnes of diesel fuel.

7

# BIOFUELS





# 7. BIOFUELS

## 7.1. Legal framework for biofuels

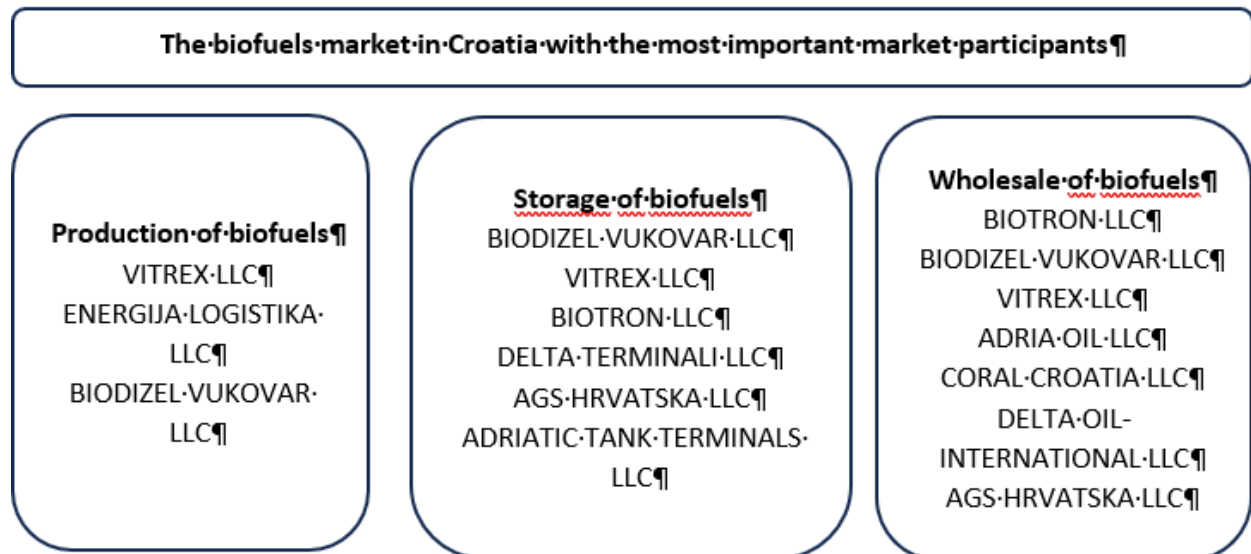
The biofuel market and energy activities related to biofuels are governed by:

- the **Energy Act**,
- the **Act on the Regulation of Energy Activities**,
- the **Act on Biofuels for Transport (Official Gazette no. 65/09, 145/10, 26/11, 144/12, 14/14, 94/18, and 52/21)**, and
- regulations subordinate to these acts.

The **Act on Biofuels for Transport** governs the production, trade and storage of biofuels, the use of biofuels for transport, and the adoption of programmes, plans and measures promoting the production and use of biofuels for transport.

## 7.2. Development of the biofuels market

The following energy activities are distinguished in the field of biofuels:



In order to perform the energy activities of biofuel production, biofuel storage, wholesale trade in biofuels and retail trade in biofuels, it is necessary to obtain a licence from the HERA. A licence is not required for the production of biofuels exclusively for own needs or if less than 1 TJ is produced annually, retail trade in biofuels and storage of biofuel exclusively for own needs.



The licenses to perform these energy activities were held by three energy entities in 2022; they produced a total of 372 tonnes of biodiesel in 2022, which represents a decrease in production of 4.6% compared to 2021. The quantities of biofuel produced from 2018 to 2022 are shown in Figure 7.2.1.

Energy entities have a total of 11,000 m<sup>3</sup> of storage capacity. Regarding the storage and the wholesale trade of biofuels, an increase in the storage capacities for the storage of biodiesel can be observed at certain petroleum product wholesalers, for example DELTA TERMINALI d.o.o., AGS HRVATSKA d.o.o. and Adriatic Tank Terminals d.o.o., which significantly increased the biodiesel storage capacities; these are used for mixing into diesel fuels, thus influencing the reduction of harmful gas emissions and contributing to meeting the environmental requirements in their operations. In 2022, the total biofuel production capacity remained unchanged at 184 tonnes per day, with waste edible oil being the only raw material used to produce biofuel.

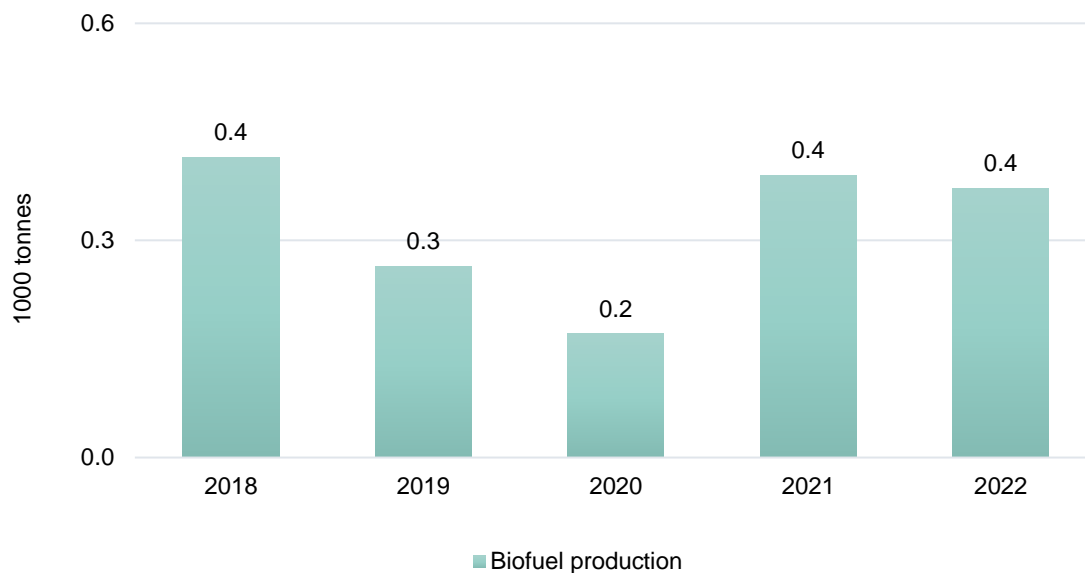


Figure 7.2.1 Quantities of biofuel produced from 2018 to 2022 [in thousands of tonnes]

## Biofuels as a supplement or substitute for diesel fuel or gasoline for transportation purposes

The **Oil and Petroleum Products Market Act** recognises the utilisation of biofuels as a supplement to petroleum products provided that they meet the legal requirements regarding the quality of biofuels.

The *Regulation on the Quality of Biofuels* (Official Gazette no. 141/05 and 33/11) sets threshold values for the quality of biofuels intended for use as a supplement or substitute for diesel or petrol for transport purposes.

The **Act on Biofuels for Transport** provides incentives for the production and consumption of biofuels in Croatia, particularly in terms of promoting the utilisation of biofuels and other renewable fuels for transport, thus aligning Croatian legislation with the European Union acquis.



# 8

# THERMAL ENERGY





## 8. THERMAL ENERGY

### 8.1. Legal framework for thermal energy

#### Basic information on the legal framework for thermal energy

The legal framework for the thermal energy sector and thermal energy production, distribution and supply activities in Croatia consists of: the **Energy Act**, the **Act on the Regulation of Energy Activities**, the **Thermal Energy Market Act**, and by-laws adopted pursuant to these acts.

The HERA has adopted by-laws that regulate certain activities in the thermal energy sector in detail, namely: the *General Requirements for Thermal Energy Supply* (Official Gazette no. 35/14), the *General Requirements for Thermal Energy Delivery* (Official Gazette no. 35/14 and 129/15), and the *Network Codes for Thermal Energy Distribution* (Official Gazette no. 35/14).

The manner and conditions of performing energy activities in the heating sector (thermal energy production, distribution and supply) depend on the type of heating system used to supply final customers of thermal energy. The **Thermal Energy Market Act** differentiates between central, closed and independent heating systems. Central district heating systems (DHS) are large heating systems encompassing multiple buildings/structures; they consist of production facilities (boilers and cogeneration facilities), as well as a hot water and/or steam distribution network longer than 2000 metres, to which more than 500 independent users are attached. In a central district heating system, only one energy entity distributes thermal energy on the basis of a concession. A closed heating system (CHS) is smaller than a district heating system and covers multiple industrial and/or commercial and residential buildings/structures with less than 500 independent consumer unit connections, connected by external installations consisting of a hot water, warm water and/or steam network distribution pipeline shorter than 2000 m. Closed heating systems do not perform the energy activity of thermal energy distribution. Independent heating systems are systems for one building/structure with its own boiler and multiple independent users.

In addition to the energy activities related to the heating sector, the activity of a thermal energy buyer is also regulated by the **Thermal Energy Market Act**, however, this activity is not considered an energy activity. Thermal energy buyers are legal or natural persons who undertake the activity of purchasing thermal energy in an independent, closed or central district heating system on behalf of the owner and/or co-owners of a given building/structure. The activity of purchasing thermal energy encompasses the professional management, handling and maintenance of internal installations, delivery of thermal energy for thermal energy billing, and issuing invoices to final customers in the building/structure in an independent, closed or central district heating system on the basis of a thermal energy consumption agreement signed with an authorised representative of the co-owners. Thermal energy buyers purchase energy for the production of thermal energy in an independent district heating system, or they purchase thermal energy from a thermal energy supplier in a closed or central district heating system.



In accordance with the **Thermal Energy Market Act**, in independent and closed heating systems, the prices of thermal energy delivered to the buyers of thermal energy or final customers are contracted freely.

The HERA adopts tariffs for regulated activities (the production and distribution of thermal energy) which must be applied by the energy entity performing these activities as a public service in a district heating system. Charges for thermal energy supply and the fee for performing thermal energy buyer activities are contracted freely. In cases where the final customer mostly uses thermal energy for commercial purposes, the prices of all energy activities in central district heating systems are determined by agreement.

Tariffs for the production and distribution of thermal energy in central district heating systems are determined according to the *Methodology for setting tariffs for thermal energy production* (Official Gazette no. 56/14) and the *Methodology for setting tariffs for thermal energy distribution* (Official Gazette no. 56/14) adopted by the HERA. Furthermore, the HERA has also adopted the *Methodology for Calculating the Charge for Connection to the Thermal Distribution Network and for an Increase in the Connection Capacity* (Official Gazette no. 42/16).

With regard to the construction of thermal energy production facilities, the *Ordinance on the criteria for issuing energy approvals for production facilities* (Official Gazette No. 5/20) was adopted pursuant to the **Electricity Market Act**. This *Ordinance* regulates the issuing of energy approvals for all production facilities generating electricity and/or thermal energy, i.e. it regulates the issuing of energy approvals for power plants, cogeneration installations and boiler stations.

The *Ordinance on the criteria for issuing energy approvals for production facilities* establishes the requirement for a cost-benefit analysis (*inter alia*) for production facilities as a precondition for an energy approval. The **Thermal Energy Market Act** stipulates that a cost-benefit analysis is required for:

- new electricity and thermal energy production facilities with a total thermal capacity of more than 20 MW in order to estimate the costs and benefits of ensuring the facility operates as a high-efficiency cogeneration facility,
- significant renovations of existing production facilities for electricity and thermal energy with a total thermal capacity of more than 20 MW in order to estimate the costs and benefits of its transformation into a high-efficiency cogeneration facility,
- new non-household facilities or those undergoing significant renovations with a total thermal capacity of more than 20 MW that produce waste heat at a useful temperature, in order to estimate the costs and benefits of using waste heat in order to satisfy economically justifiable demand through the use of cogeneration and the connection of such facilities to closed and central district heating systems, and
- new closed and central district heating systems, or if existing closed and central district heating systems plan new production facilities for thermal energy with a total thermal capacity of over 20 MW, or if an existing facility is being significantly renovated, in order to estimate the costs and benefits of using waste heat from neighbouring non-household facilities.

Exemptions from the obligatory cost-benefit analyses are identified in Article 15 (13) and Article 15 (14) of the **Thermal Energy Market Act** and in the *Decision on the procedure for verifying criteria for exemptions from obligatory cost-benefit analyses for electricity and thermal energy production facilities used for peak loads and for facilities that produce reserve energy* (Official Gazette no. 153/13), which was adopted by the HERA in 2013.

The cost-benefit analysis for individual facilities required to obtain an energy approval is carried out according to the *Ordinance on the preparation of cost-benefit analyses* (Official Gazette No. 110/19).



This *Ordinance* specifies the details of the economic cost-benefit analysis within the framework of assessing the national potentials for heating and cooling on the state level, pursuant to the provisions of the *Energy Efficiency Directive 2012/27/EU*, the Directive amending the Energy Efficiency Directive 2018/2002/EU, and *Commission Delegated Regulation (EU) 2019/826 amending Annexes VIII and IX to Directive 2012/27/EU of the European Parliament and of the Council on the contents of comprehensive assessments of the potential for efficient heating and cooling*.

For the operation of energy entities in the thermal energy sector, the changes in obligations for the system of energy savings prescribed in the **Act on Amendments to the Energy Efficiency Act (Official Gazette no. 41/21)** are important, and are regulated in detail by the *Ordinance on the System for Monitoring, Measuring and Verifying Energy Savings (Official Gazette no. 98/21)*. Provisions were adopted for a new cumulation period (the period in which the implementation of measures is monitored) from 1 January 2021 to 31 December 2030. At the same time, on the date of the entry into force of that **Act**, the *Ordinance on the Energy Efficiency Obligation System (Official Gazette no. 41/19)* whose provisions were included in the **Energy Efficiency Act**, which was adopted in September 2021, ceased to be valid.

It is important to point out that the obligations to increase the share of renewable energy sources in the heating and cooling sector are prescribed in the **Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette no. 138/21)**, by approximately 1.1 percentage points as an annual average calculated for the period from 2021 to 2025 and from 2026 to 2030, starting from the share of renewable energy in the heating and cooling sector in 2020.

With the goal of decarbonising the energy system, the **Act** includes provisions on the sustainability of the production and use of energy and energy resources, the role of renewable energy sources in reducing energy dependence, as well as incentivising citizens to participate in the energy transition in terms of independent energy production for their own needs or joining energy communities.

The setting of a binding renewable energy target of a minimum of 32% renewables by 2030 for the European Union represents a continued incentive for the development of renewable energy technologies for the heating and cooling sectors.

In the context of the stronger inclusion of renewable energy in heating and cooling, measures are expected to be implemented involving the installation of high-efficiency heating and cooling systems using renewable sources in buildings, or the use of renewable energy or waste heat and cold energy in industrial heating and cooling processes.



## 8.2. Thermal energy sector: organisation, activities and indicators

### 8.2.1. Thermal system features

Energy entities for thermal energy generation, distribution and supply in Croatia provide the services of space heating and the preparation of sanitary hot water for more than 160,000 final customers, 95% of whom fall under the household category.

Thermal energy used for space heating and the preparation of sanitary hot water is produced in cogeneration thermal power plants, as well as in local heating plants, i.e. separate boiler rooms. In 2022, energy entities supplied more than 2.006 TWh of thermal energy to households and non-household consumers (Figure 8.2.1.). The total length of the distribution network and external installations is more than 446.67 kilometres.

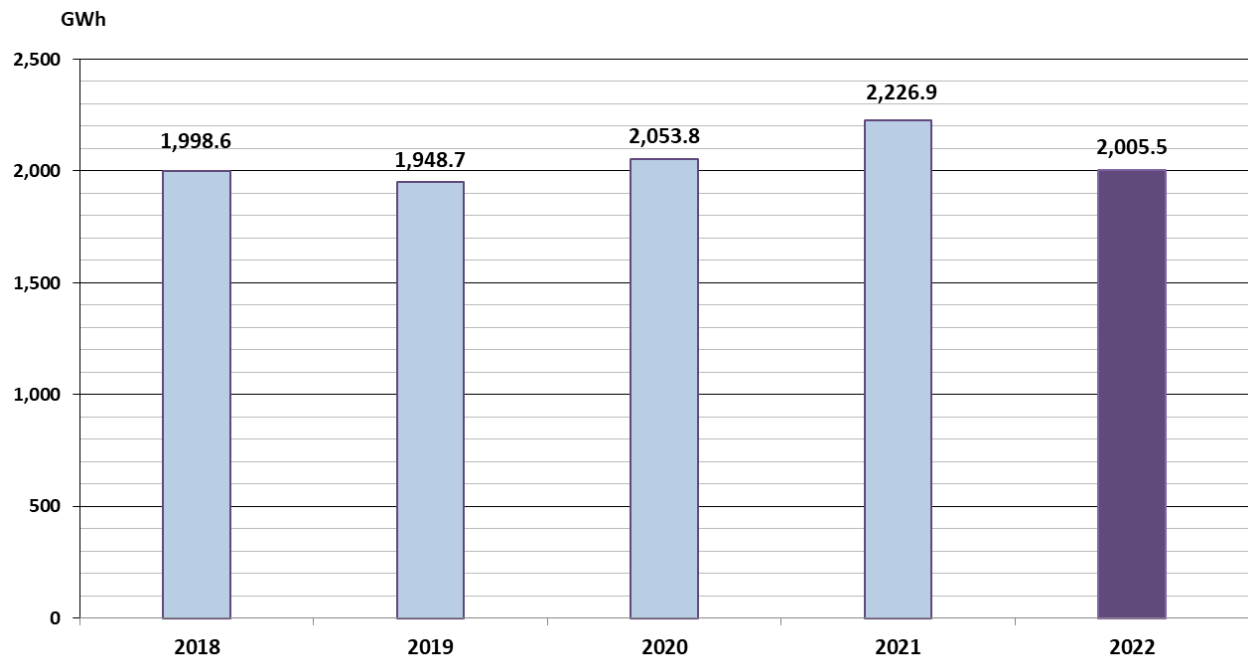


Figure 8.2.1 Supplied thermal energy in the Republic of Croatia from 2018 to 2022



Table 8.2.1 contains data on the energy entities supplying thermal energy to households, non-household and commercial consumers; Figures 8.2.2, 8.2.3 and 8.2.4 show the thermal energy they supplied, the number of final customers, the installed capacity of the thermal energy production facilities, and contracted capacity in 2022. However, Table 8.2.1 does not include data pertaining to energy entities supplying thermal energy exclusively to non-household and commercial consumers, nor data for energy entities who were not involved in this activity in 2022.

The average losses in thermal energy production and distribution for thermal systems, i.e. the energy entities from Table 8.2.1, amounted to 19.6% in 2022.

The average losses in the distribution networks in 2022 amounted to 17.8%, while the average losses in 2021 amounted to 15.8%.

*Table 8.2.1 Data concerning energy entities in the thermal energy sector in 2022*

ENERGY ENTITY	Number of final customers	Network length	Total installed capacity	Produced thermal energy	Supplied thermal energy	Surface area	Fuel*
		km	MWt	GWh/year	GWh/year	m2	
<b>HEP-Proizvodnja d.o.o.</b>			1,568.00	2,173.09			NG, FO
<b>Zagreb</b>			1,228.00	1,796.90			NG, FO
<b>Osijek</b>			230.00	219.96			NG, FO
<b>Sisak</b>			110.00	156.24			NG
<b>HEP-Toplinarstvo d.o.o.</b>	131,912	391.40	268.78	90.65	1,838.24	10,125,234	NG, ELFO, LFO
<b>Zagreb</b>	106,360	285.91	19.12	9.22	1,433.73	8,220,679	NG, ELFO
<b>Osijek</b>	11,876	57.19	140.50	3.86	194.84	1,101,197	NG, ELFO, LFO
<b>Sisak</b>	4,008	30.10	0.00	0.00	138.75	280,088	NG
<b>Velika Gorica</b>	5,903	12.31	65.65	50.02	45.60	335,778	NG, ELFO, LFO
<b>Samobor</b>	1,383	3.35	18.11	12.34	11.34	78,848	NG, ELFO
<b>Zaprešić</b>	2,382	2.53	25.40	15.22	13.98	108,645	NG, ELFO
<b>Energo d.o.o., Rijeka</b>	9,551	15.66	100.10	60.03	56.39	614,688	NG, ELFO, FO
<b>Gradska toplana d.o.o., Karlovac</b>	7,817	21.20	88.63	48.29	48.29	503,183	NG
<b>Brod-plin d.o.o., Slavonski Brod</b>	3,711	5.48	33.96	27.65	26.38	189,629	NG
<b>Tehno stan d.o.o., Vukovar</b>	3,655	7.67	37.99	20.77	17.98	210,756	NG, FO



ENERGY ENTITY	Number of final customers	Network length	Total installed capacity	Produced thermal energy	Supplied thermal energy	Surface area	Fuel*
		km	MWt	GWh/year	GWh/year	m2	
Vartop d.o.o., Varaždin	850	1.57	24.29	0.00	4.77	42,066	NG
GTG Vinkovci d.o.o., Vinkovci	1,676	1.60	17.83	7.79	7.58	88,179	NG, FO
Poslovni park Virovitica d.o.o., Virovitica	444	0.90	4.08	3.08	3.08	28,311	NG
Komunalac d.o.o., Požega	417	0.61	2.78	1.94	1.94	19,838	NG
SKG d.o.o., Ogulin	90	0.58	4.40	0.81	0.81	6,483	LFO
<b>TOTAL</b>	<b>160,123</b>	<b>446.67</b>	<b>2,150.83</b>	<b>2,434.12</b>	<b>2,005.48</b>	<b>11,828,367</b>	

\* NG-natural gas, FO-fuel oil, ELFO-extra-light fuel oil, LFO-light fuel oil

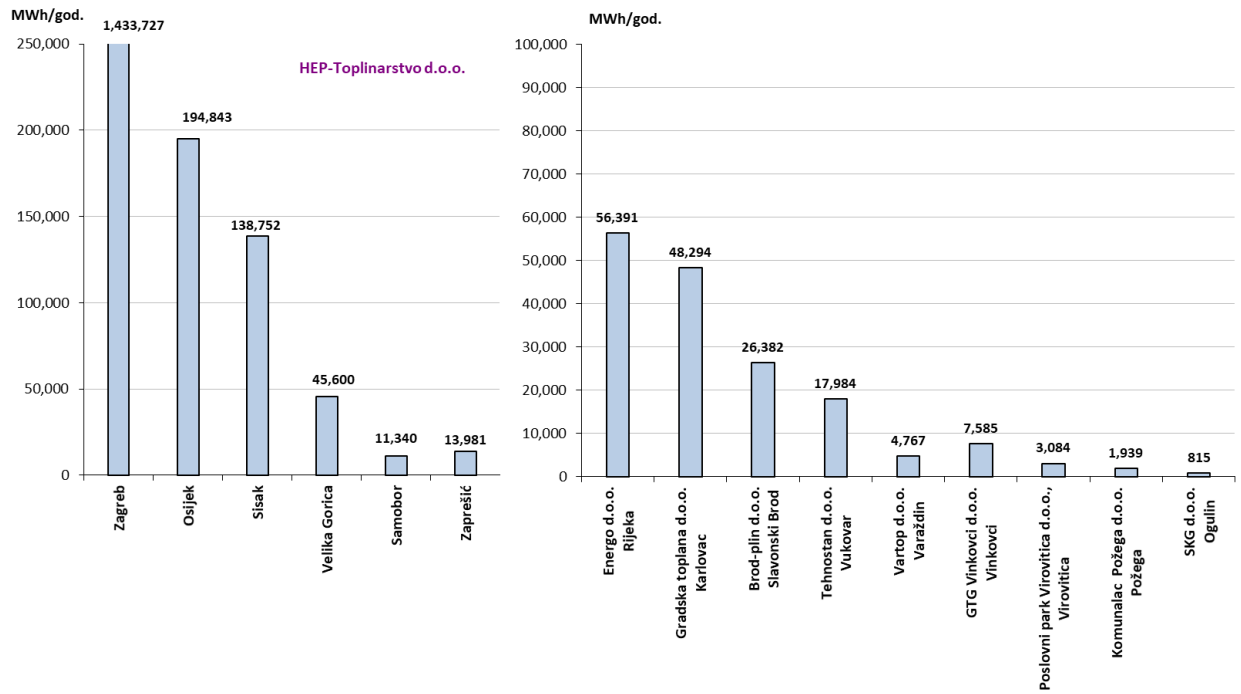


Figure 8.2.2 Supplied thermal energy in 2022

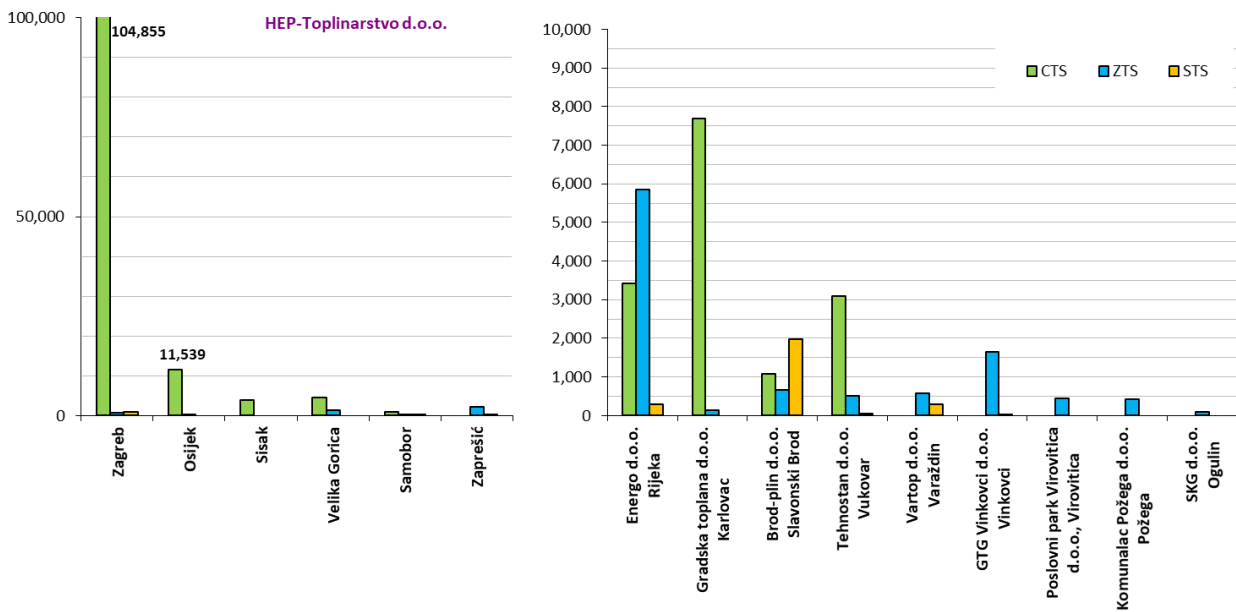


Figure 8.2.3 Number of final customers in 2022

The majority of energy entities in the thermal energy sector have a considerable installed capacity reserve in relation to the connection capacity. Although HEP-Toplinarstvo d.o.o. is the largest district heating energy entity in the thermal energy sector, it generates only a small portion of the supplied thermal energy in its own plants; it purchases and assumes the remainder of the thermal energy from





HEP-Proizvodnja d.o.o., a thermal energy producer. In 2022, HEP-Proizvodnja d.o.o. delivered 2,173.09 GWh of thermal energy to HEP-Toplinarstvo d.o.o.

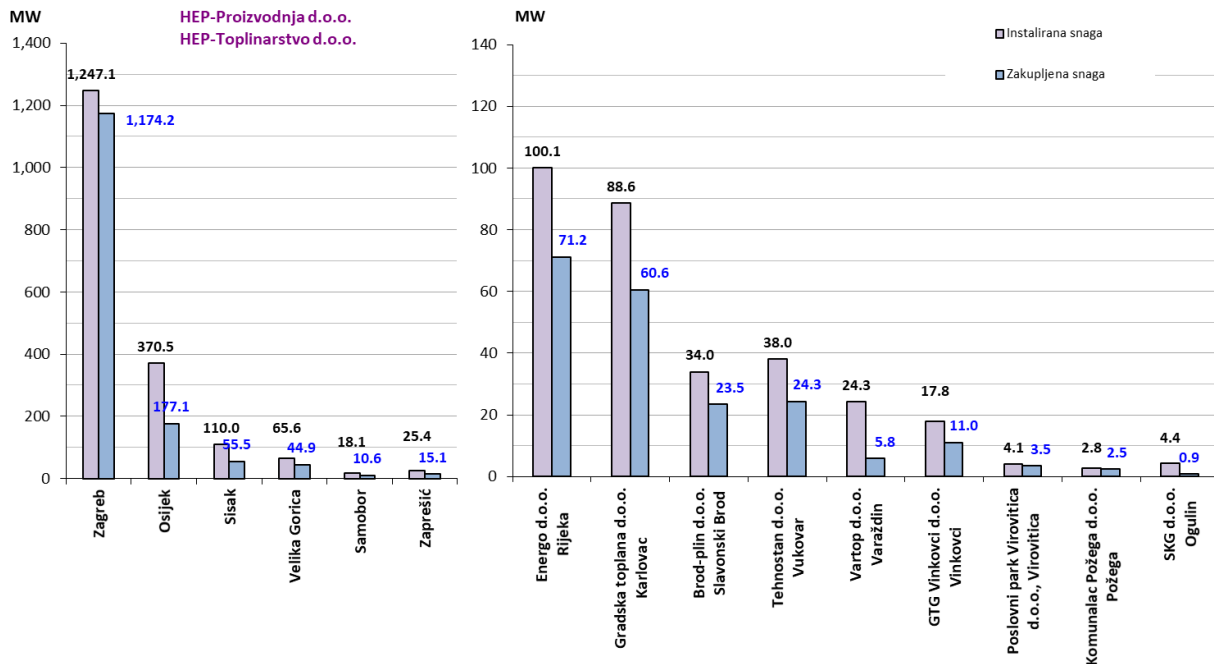
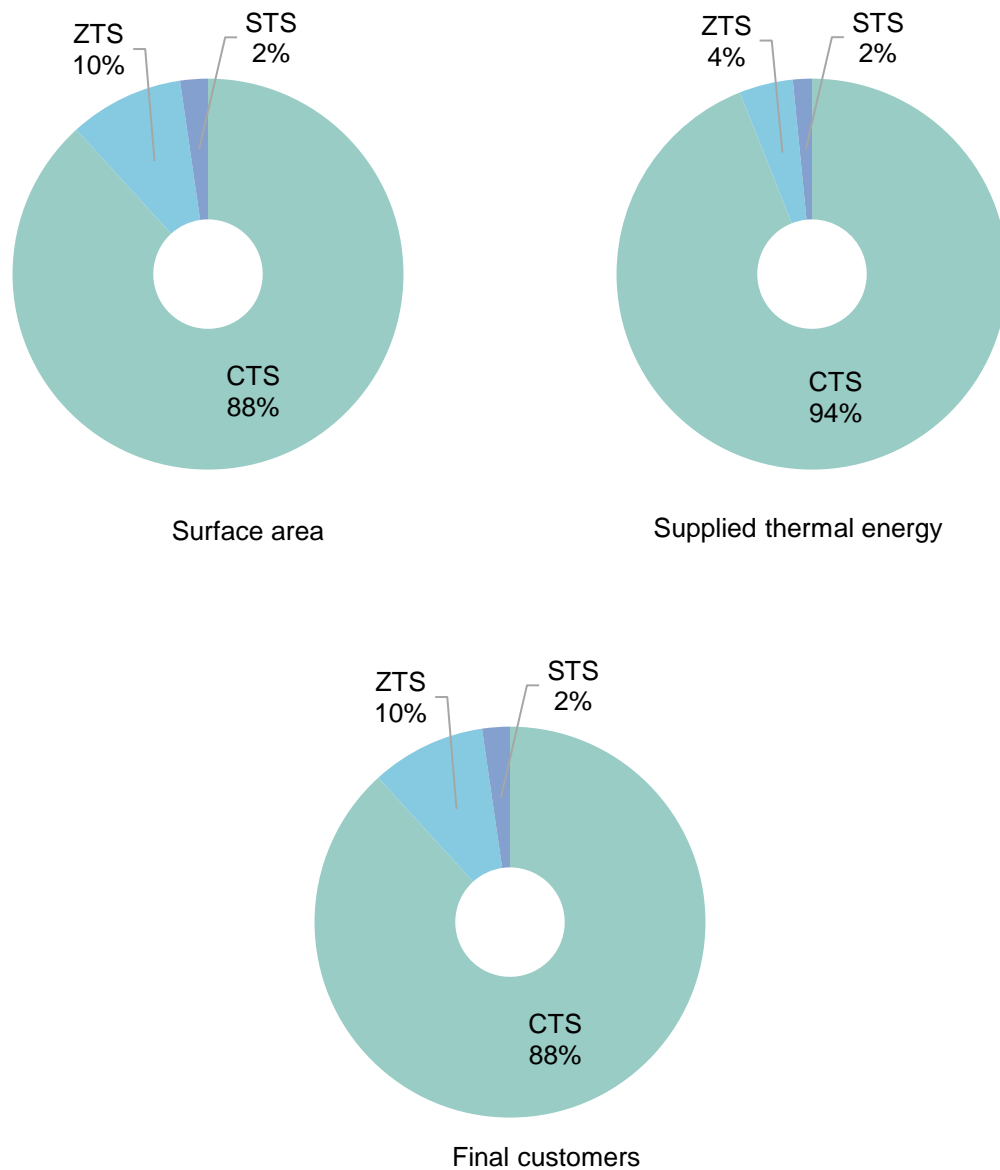


Figure 8.2.4 Installed capacity of thermal energy production facilities and contracted capacity in 2022

The majority of the energy entities engaged in thermal energy production, distribution and supply are owned by units of local government or the state, while a smaller portion of the energy entities are partially privately owned. In addition to thermal energy, the activities of these energy entities most frequently include gas distribution, public utilities, and building management.

Of all the district heating systems listed in Table 8.2.1, the centralised district heating systems in Zagreb, Osijek, Sisak, Samobor, Velika Gorica, Rijeka, Karlovac, Slavonski Brod and Vukovar account for more than 88% of the final customer connections, 91% of the heated surface area, and 94% of the supplied thermal energy, as shown in Figure 8.2.5.



*Figure 8.2.5 Share of final customers, surface area, and supplied thermal energy per district heating system*

Given the insufficient use of renewable energy sources for heating and cooling in households, progress is needed towards the greater use of new technologies using green energy, which can also meet the need for interior heating and/or hot water, as well as cooling.

An additional challenge lies in the share of renewables in heating and cooling, which must be introduced in the coming decade in accordance with Directive 2018/2001/EU so that each member state endeavours to increase the share of renewables in this sector by roughly 1.3% as a yearly



average calculated for the period from 2021 to 2025 and from 2026 to 2030, compared to the share of renewable energy in the heating and cooling sector in 2020.

## 8.2.2. Overview of activities in the thermal energy sector

In 2022, 16 licences for the performance of energy activities were issued in the thermal energy sector:

- 8 licences for thermal energy production (DIN ENERGO d.o.o., Križ, CEP Belišće 2 d.o.o., Zagreb, NIZA d.o.o., Niza, KIRCEK ENERGY d.o.o., Ljubešćica, PANA ENERGY d.o.o., Čakovec, PELET GRUPA d.o.o., Zagreb, LIKA ENERGO EKO d.o.o., Udbina, NOVOPROS d.o.o., Osijek), and
- 8 licences for thermal energy supply (DIN ENERGO d.o.o., Križ, KIRCEK ENERGY d.o.o., Ljubešćica, PANA ENERGY d.o.o., Čakovec, MIAGRO ENERGO d.o.o., Našice, ENERGANJA ŽUPANJA d.o.o., Županja, PELET GRUPA d.o.o., Zagreb, LIKA ENERGO EKO d.o.o., Udbina, NOVOPROS d.o.o., Osijek).

In 2022, 11 licences for the performance of energy activities were extended:

- 4 licences for thermal energy production (ĐURO ĐAKOVIĆ Energetika i infrastruktura d.o.o., Slavonski Brod, SAVA d.o.o., Stara Gradiška, STAMBENO KOMUNALNO GOSPODARSTVO d.o.o., Ogulin, ĐAKOVO HRAST d.o.o., Đakovo), and
- 7 licences for thermal energy supply (VARTOP d.o.o., Varaždin, Toplota Slatina d.o.o., Slatina, Elektrana Grubišno Polje d.o.o., Grubišno Polje, Brod-plin d.o.o., Slavonski Brod, Energija Gradec d.o.o., Zagreb, Biomasa Vukovar d.o.o., Vukovar., A&A BIOENERGY VIRO d.o.o., Darda).

In 2022, one Decision was issued on the rejection of a request for the issuance of a thermal energy supply licence ("ČAČIĆ" obrt za stam. gosp., Zadar, vl. Antonio Čačić) and the issuance of one licence for thermal energy production was suspended ("ČAČIĆ" obrt za stam. gosp., Zadar, vl. Antonio Čačić). As of 31 December 2022, the number of licences in the thermal energy sector was as follows:

- 46 licences for thermal energy production,
- 6 licences for thermal energy distribution, and
- 40 licences for thermal energy supply.

New licences for thermal energy production and thermal energy supply are related to the construction of new cogeneration facilities in the incentives system for the production of electricity from renewable energy sources and cogeneration, for which the HERA has issued decisions on eligible electricity producer status. Namely, in 2022, the HERA issued two decisions granting eligible electricity producer status to new biogas (1 decision) and biomass (1 decision) cogeneration plants.

Pursuant to the **Thermal Energy Market Act**, the HERA manages a register of thermal energy buyers, which is accessible on its website. During 2022, not a single thermal energy buyer was entered in the Register, and four thermal energy buyers were deleted. As of 31 December 2022, 43 businesses were recorded in the register (legal and natural persons). In addition to this register, the HERA also keeps records on thermal energy buyers containing data relevant for monitoring thermal energy consumption; these records are also used to resolve claims and complaints related to thermal energy supply in buildings and structures.



### 8.2.3. Tariffs for thermal energy

Pursuant to the provisions of the **Thermal Energy Market Act**, and based on the *Methodology for setting tariffs for thermal energy production* and the *Methodology for setting tariffs for thermal energy distribution*, the HERA defines tariff amounts for thermal energy production and distribution exclusively for district heating systems.

Energy entities engaged in thermal energy production and thermal energy distribution in district heating systems requested a change in the tariffs for thermal energy production in 2022 in accordance with the *Methodology for setting tariffs for thermal energy production* and the *Methodology for setting tariffs for thermal energy distribution*. An application to change the amount of the tariff items for the production of thermal energy and an application to change the amount of tariff items for the distribution of thermal energy, primarily due to the increase in the price of natural gas and the cost of purchasing CO<sub>2</sub> emission units, was submitted by the energy entity Gradska toplana d.o.o. for the Karlovac central heating system. The *Methodology for setting tariffs for thermal energy production* provides a simplified procedure for changing tariffs in case of changes in the price of fuel used for thermal energy production of more than  $\pm 5\%$  compared to the price of the fuel for which the energy tariffs have been approved. In 2022, the HERA received four applications to change the amount of tariff items for energy, two applications for the Olajnica and Borovo Naselje central heating systems from the energy entity Tehnostan d.o.o., one application for the Slavonija central heating system from the energy entity Brod-plin d.o.o. and one application for the Karlovac central heating system from the energy entity Gradska toplana d.o.o. As a result of all the received applications, there was no increase in the amounts of the tariff items in 2022 and these procedures were suspended, because in the meantime, the Government of the Republic of Croatia adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22, 106/ 22, 121/22 and 156/22)*, which stipulates in Article 4 (1) that the final price of delivered thermal energy, which includes fees and value-added tax, for final customers of thermal energy in thermal systems, except for thermal energy used for technological purposes (hot water, warm water or steam) will remain unchanged in the 2022/2023 heating season in relation to the final prices valid on the date of adoption of this Regulation, namely in the period from 1 October 2022 to 31 March 2023.

Table 8.2.2 shows the tariff amounts for thermal energy production and thermal energy distribution for district heating systems as of 31 December 2022. These amounts represent the regulated portion of the thermal energy price, whereas the charges for thermal energy supply and charges for thermal energy buyer activities are contracted freely pursuant to the provisions of the **Thermal Energy Market Act**. Therefore, the final price of thermal energy in district heating systems, in addition to the regulated portion, consists of charges for thermal energy supply and for performing thermal energy buyer activities, which make up the market component of thermal energy prices and are contracted freely.

A chart showing the average shares of individual components in the total price of thermal energy for household final customers for district heating systems in Croatia is provided in Figure 8.2.6. The shares of different thermal energy price components were calculated based on the data on supplied thermal energy, connection capacity, surface area, and number of final customers for each district heating system in 2022, tariffs for the production and distribution of thermal energy, charges for thermal energy supply, and charges for thermal energy buyers.



Table 8.2.2 Amounts of the tariff items for thermal energy production and thermal energy distribution for district heating systems as of 31 December 2022 (net of VAT)

ENERGY ENTITY	DISTRICT HEATING SYSTEM	TARIFF MODELS (TM)**	Amounts of tariff items on 31 December 2022					
			PRODUCTION		DISTRIBUTION		PRODUCTION + DISTRIBUTION	
			Energy [HRK/kWh] [HRK/t]	Power [HRK/kW] [k/t/h]	Energy [HRK/kWh] [HRK/t]	Power [HRK/kW] [k/t/h]	Energy [HRK/kWh] [HRK/t]	Power [HRK/kW] [k/t/h]
Ergo d.o.o. Rijeka	GORNJA VEŽICA	TM1	0.2961	9.50	0.0500	4.00	0.3461	13.50
		TM2	0.2961	9.50	0.0500	4.00	0.3461	13.50
	VOJAK	TM1	0.2912	11.00	0.0500	5.50	0.3412	16.50
		TM2	0.2912	11.00	0.0500	5.50	0.3412	16.50
Gradska toplana d.o.o. Karlovac	TINA UJEVIĆA	TM1	0.2345	11.60	0.0400	4.40	0.2745	16.00
		TM2	0.3497	12.60	0.0400	4.40	0.3897	17.00
Brod-plin d.o.o. Slavonski Brod	SLAVONIJA	TM1	0.2956	11.60	0.0500	5.20	0.3456	16.80
		TM2	0.3494	11.60	0.0500	5.20	0.3994	16.80
Tehno stan d.o.o. Vukovar	BOROVO NASELJE	TM1	0.3530	9.50	0.0470	5.00	0.4000	14.50
		TM2	0.4030	9.50	0.0470	5.00	0.4500	14.50
	OLAJNICA	TM1	0.3530	9.50	0.0470	5.00	0.4000	14.50
		TM2	0.4030	9.50	0.0470	5.00	0.4500	14.50
HEP-Toplinarstvo d.o.o. Zagreb	SAMOBOR	TM1	0.2605	7.24	0.0395	3.73	0.3000	10.97
		TM2	0.2952	7.69	0.0448	3.97	0.3400	11.66
	VELIKA GORICA	TM1	0.2760	7.88	0.0240	3.27	0.3000	11.15
		TM2	0.3128	8.97	0.0272	3.73	0.3400	12.70
	DUBRAVA	TM1	0.1569	3.96	0.0131	2.64	0.1700	6.60
		TM2	0.3137	7.36	0.0263	4.90	0.3400	12.26
HEP-Proizvodnja d.o.o. Zagreb HEP-Toplinarstvo d.o.o. Zagreb	ZAGREB	TM1	0.1525	2.30	0.0175	3.45	0.1700	5.75
		TM2	0.3050	5.86	0.0350	6.17	0.3400	12.03
		TM3	232.5521	3,980.57	55.7079	4,194.64	288.2600	8,175.21
	OSIJEK	TM1	0.1492	4.32	0.0108	4.11	0.1600	8.43
		TM2	0.2891	7.01	0.0209	6.20	0.3100	13.21
		TM3	207.2821	3,222.26	58.2879	4,953.16	265.5700	8,175.42
	SISAK	TM1	0.1089	3.44	0.0711	4.11	0.1800	7.55
		TM2	0.2058	5.65	0.1342	6.61	0.3400	12.26
		TM3	174.4590	5,233.29	113.8010	8,905.09	288.2600	14,138.38

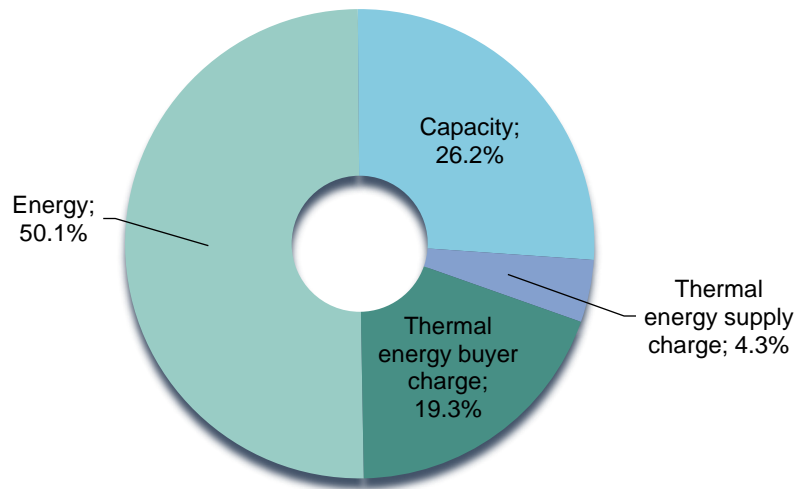
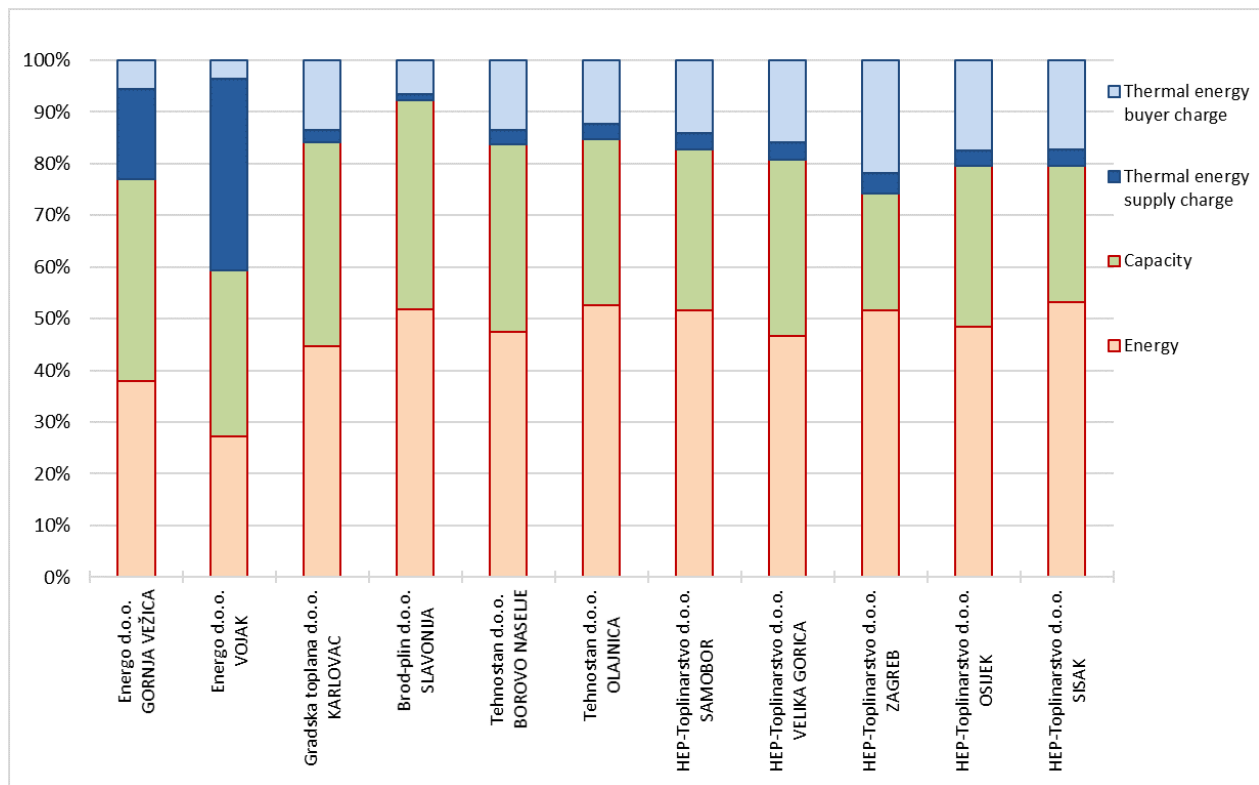


Figure 8.2.6 Average shares of individual components in the total price of thermal energy for household final customers of district heating systems

Figure 8.2.6 shows that the average regulated portion of the thermal energy price for all district heating systems amounts to around 76.3% (capacity plus energy). Figure 8.2.7 provides a more detailed breakdown of the total price of thermal energy and its different components for household final customers across district heating systems in Croatia in 2022.





Charge for a TE customer	5.6%	3.5%	13.6%	6.5%	13.4%	12.4%	14.2%	16.0%	21.7%	17.5%	17.2%	Market share
Supply fee	17.3%	37.2%	2.4%	1.2%	2.8%	2.9%	3.1%	3.2%	4.1%	3.0%	3.2%	
Capacity	39.2%	32.0%	39.3%	40.5%	36.3%	32.1%	31.1%	34.2%	22.5%	31.0%	26.4%	Regulated share
Energy	37.9%	27.3%	44.8%	51.8%	47.4%	52.6%	51.7%	46.6%	51.7%	48.5%	53.2%	

\*TE – Thermal energy

Figure 8.2.7 Shares of particular components in the total price of thermal energy for final customers in the household category for individual district heating systems in 2022

In accordance with the **Thermal Energy Market Act**, in independent and closed heating systems, the prices of thermal energy delivered to the buyers of thermal energy or final customers are determined in accordance with the contracts. Given that the HERA does not define any of the components of thermal energy prices for closed and independent heating systems, Table 8.2.2 does not show prices for those systems, and Figure 8.2.7 does not show the price structure in such systems.

#### 8.2.4. Consumer protection

With the aim of protecting thermal energy customers, the Government adopted the *Regulation on Eliminating Disturbances on the Domestic Energy Market (Official Gazette no. 104/22, 106/22, 121/22, 156/22)* by which it “froze” the prices of thermal energy for final customers, and based on a special Decision, the Government determined that the difference between the market and the “frozen” unit prices for central and closed heating systems will be subsidised, while for independent heating systems, gas quantities will be provided at the price of the public service.

In accordance with the *Regulation*, the HERA collects data from all energy entities under the jurisdiction of the DHS and CHS: data on the produced and delivered thermal energy in the 2021/2022 and 2022/2023 heating seasons, production plants, heating systems, final customers, structure of end prices by tariff models, income and expenses during the 2021/2022 heating season and the estimate for the 2022/2023 heating season; the price of input energy and the price of emission units of greenhouse gases, copies of invoices and contracts for the purchase of energy from which the purchase prices for the 2021/2022 heating season can be seen, contracts for the purchase of energy for the 2022/2023 heating season that show the prices and cost structure, and copies of invoices showing the valid prices applicable to households, industry and business consumers.

The relevant data on the basis of which the unit price for the production of thermal energy for DHS and CHS was calculated are:

- the quantity of delivered thermal energy according to the TM1, TM2 and TM3 tariff models
- the price of energy products (fuel) for the 2021/2022 heating season determined on the basis of submitted copies of invoices and energy purchase contracts, which show the purchase prices for the 2021/2022 heating season



- the price of energy products (fuel) for the 2022/2023 heating season determined on the basis of submitted energy purchase contracts, which show the purchase prices for the 2022/2023 heating season
- amounts of VAT: 13% on the date of adoption of the Regulation (valid for the 2021/2022 season and 5% for the 2022/2023 season)

The calculations adopted by the HERA Decisions or Government Decisions (Official Gazette no. 28/23 and 43/23) are fully in accordance with the Regulation and the data submitted by energy entities.

On the basis of the aforementioned decisions, the energy entities issued invoices for thermal energy to the final customers. The amount of the subsidy for the delivered thermal energy was stated on the invoices, and the price remained unchanged compared to the period before the entry into force of the Regulation, thus protecting the final customers from the increase in the prices of energy products.

In accordance with the regulations, the HERA supervises the implementation of the Regulation, as well as the application of prices determined by the provisions of the Regulation.

In 2022, the HERA received 112 submissions (1 appeal, 38 complaints, 55 inquiries, 17 other submissions and 1 request for supervision) concerning the thermal energy sector. Submissions were submitted by thermal energy final customers, authorised representatives of co-owners, energy entities, thermal energy buyers, institutions and other parties.

Table 8.2.3 shows the received submissions addressed to the thermal energy sector, and are classified according to the basic categories of submissions and reasons for submission, with the corresponding shares. Compared to 2021, which was marked by complaints regarding billing for thermal energy and requests for opinions and interpretations of the **Thermal Energy Market Act** and by-laws from final customers and other legal and natural persons, the number of complaints received in 2022 regarding payment for fixed costs of thermal energy was higher due to disruptions in the domestic energy market. The complaints and appeals primarily related to specific cases regarding the actions of energy entities and thermal energy buyers. The total number of submissions related to the thermal energy sector was 36.6% higher than in the previous year.





Table 8.2.3 Submissions (appeals, complaints, inquiries and other submissions) regarding the thermal energy sector received in 2022

Description	Number	Share in category [%]	Share of all submissions [%]
<b>Appeals</b>	<b>1</b>		<b>0.87%</b>
<b>Complaints</b>	<b>38</b>		<b>33.04%</b>
Complaints related to billing, calculation and allocation	24	63.16%	
Complaints related to activities of thermal energy buyers	3	7.89%	
Complaints related to meter/heat cost allocator reading	1	2.63%	
Complaints related to suspension, connection and disconnection	10	26.32%	
<b>Inquiries</b>	<b>55</b>		<b>47.83%</b>
Inquiries related to billing, calculation and allocation	10	18.18%	
Inquiries related to activities of thermal energy buyers	9	16.37%	
Inquiries related to meter/heat cost allocator reading	4	7.27%	
Inquiries related to suspension, connection and disconnection	2	3.64%	
Inquiries related to energy licences, energy activities, etc.	3	5.45%	
Inquiries related to eligible producers	12	21.82%	
Inquiries related to energy prices	15	27.27%	
<b>Other</b>	<b>17</b>		<b>14.88%</b>
Opinions and instructions from the HERA	3	2.61%	
<b>Supervision</b>	<b>1</b>		<b>0.87%</b>

The subject matter of the largest number of inquiries and complaints is the *Ordinance on the Method of Allocating and Calculating the Costs of Supplied Thermal Energy (Official Gazette no. 99/14, 27/15, and 124/15)*. In 2022, the majority of submissions concerned thermal energy billing and the allocation and calculation of the costs of supplied thermal energy, as well as to the obligations of thermal energy buyers. Due to disruptions in the domestic energy market, the pricing conditions and methods for certain categories of thermal energy customers are changing, so there is a large number of submissions for the interpretation of the adopted Regulation in this regard. In particular, the *Regulation on Eliminating Disturbances on the Domestic Energy Market* stipulates that the final price of delivered thermal energy for final customers of thermal energy connected to heating systems remains unchanged. Most of the complaints are not directly within the scope of the HERA's powers, competences and responsibilities prescribed by energy laws and the related by-laws, such as issues of civil obligations, ownership and co-ownership, etc.

In terms of jurisdiction, it should be noted that an energy inspection unit for the sector of heating and gas was established at the State Inspectorate, tasked with, inter alia, monitoring the implementation of regulations governing:



- conditions for the energy activities of production, distribution, supply of thermal energy, and thermal energy buyer activities,
- the obligations of energy subjects and thermal energy buyers during the performance of electricity-related activities and the use of thermal energy in meeting the requirements for the security, reliability, consistency and quality of the thermal energy supply, as well as the professional management, handling and maintenance of internal installations and all equipment located at the internal installation, and
- measures to protect final customers of thermal energy, as well as the powers and responsibilities of the co-owners and final customers of thermal energy.

However, consumer protection is made significantly more difficult by the complex organisation of activities as laid down in the **Thermal Energy Market Act**. The protection of final customers' rights differs depending on whether the final customer is part of an independent heating system, closed heating system or district heating system, as the requirements and manner in which activities are performed in these systems differ. Given that the framework for the performance of energy activities of thermal energy production, thermal energy distribution and supply, and the activity of buyers of thermal energy differ depending on the type of heating system, final customers of thermal energy are often unsure whom to address to resolve issues or protect their rights. Moreover, such differences often prevent a direct comparison of prices and requirements for the performance of the said activities, especially bearing in mind that the prices and tariffs for thermal energy production and distribution are regulated only in district heating systems (constituting only a part of the final price of thermal energy, as demonstrated in section 8.2.3.).

In blocks of flats, an additional issue related to consumer protection is the complexity of the relationships between the owners (final customers of thermal energy), representatives of owners, building management agencies, persons reading heat cost allocators and meters, thermal energy buyers, and energy entities, with some roles in most buildings being exercised by the same person. Most commonly, the thermal energy supplier is also a thermal energy buyer. However, there are also other situations, e.g. where a thermal energy buyer is also the person reading heat cost allocators; it is also possible for the thermal energy buyer to be both a supplier and a building manager.

Moreover, the situation in blocks of flats is characterised by a specific relationship between the thermal energy buyer and the final customer of thermal energy, which is regulated by a "thermal energy consumption agreement" based on a decision of the majority of owners, but which is binding for all owners (i.e. final customers of thermal energy). There are also buildings in which thermal energy suppliers supply thermal energy without having concluded an agreement on thermal energy consumption, as well as buildings in which gas suppliers supply gas for the needs of common boiler stations and allocate the supplied gas to the owners of these buildings and boiler stations. The reading of heat cost allocators and separate meters is also of importance to final customers, though this is not mentioned in the **Thermal Energy Market Act** and is thus not one of the required activities of thermal energy buyers. Reading meters/heat cost allocators is only touched upon in the *Ordinance on the method of allocating and calculating the costs of supplied thermal energy*, according to which reading is to be performed by the authorised representative of owners, or a natural or legal person authorised by the said representative. In practice, meter/heat cost allocator reading (frequently combined with the installation of heat cost allocators) is contracted with business entities in different ways; reading is sometimes contracted with individual final customers, and sometimes collectively for all owners (with the form of the agreement differing from building to building or from manager to manager).

As a result, the various ways in which the supply and calculation of thermal energy is organised in blocks of flats, together with management or decision-making issues, significantly interfere with the protection of the final customers' rights. It is thus necessary to improve the legislation and practice in the heating sector in order to simplify the management and maintenance of heating systems in



buildings and thermal energy billing, bearing in mind the considerable similarities between the activity of the thermal energy buyer and the role of the building manager.



## 8.3. Energy efficiency in district heating systems

### 8.3.1. Energy efficiency in district heating systems

As explained in the previous chapters, the HERA sets tariffs for thermal energy production and thermal energy distribution, which are then applied by thermal energy producers and thermal energy distributors in district heating systems. It follows from the above that the final price of thermal energy in district heating systems is only partly regulated, as the charges for thermal energy supply and for performing thermal energy buyer activities are contracted freely.

Tariffs for the production and distribution of thermal energy in central district heating systems are determined according to the *Methodology for setting tariffs for thermal energy production* and the *Methodology for setting tariffs for thermal energy distribution*; all the individual decisions on the amounts of tariffs for thermal energy production and thermal energy distribution for individual central district heating systems are available on the HERA's website. As tariff items are adopted for an individual central district heating system and not for an individual energy entity, tariffs reflect the costs of an individual central district heating system. Each central district heating system has its own expenses, which are ultimately related to the technical characteristics of production and distribution, including losses in the transformation and distribution of thermal energy.

The aforementioned methodologies for individual tariff groups or tariff models are determined by only two items – tariffs for energy and tariffs for power. According to the *Methodology for setting tariffs for thermal energy production*, revenue from the energy tariff should cover the variable costs, while revenue from the capacity tariff should cover the fixed costs. The capacity tariff is applied to the amount of purchased or connected power, and as such defines the fixed part of the end price of thermal energy.

According to the *Methodology for setting tariffs for thermal energy distribution*, the HERA recognises realised losses in the hot water/warm water distribution network of up to 10% of the total thermal energy taken up at the entrance to the distribution network. Realised losses in the steam distribution network are also recognised, though up to a maximum of 18%. In exceptional cases, the HERA may approve larger losses in the distribution network, taking into account the specific business conditions and characteristics of the distribution network, whereby the thermal energy distributor is required to provide an operative plan to reduce the losses in the distribution network within a specific, feasible time frame. According to the above *Methodology*, thermal energy losses in the distribution network for the regulatory year are calculated as the difference between the measured thermal energy taken up in the base year at the points of demarcation between thermal energy producers and distributors or at the entrance to the distribution network and delivered thermal energy in the base year at the points of demarcation between the distributor and supplier of thermal energy, i.e. at the exit from the distribution network.

According to the *Methodology for setting tariffs for thermal energy production*, thermal energy producers in a central district heating system are required to prove thermal energy production losses for each type of fuel used to produce thermal energy; in affirming variable expenses, the HERA will confirm the amount and justifiability of these losses. On the basis of an analysis of variable costs and calculated losses in thermal energy production, the HERA can rule a part of the amount of variable costs as justifiable, taking into account the specificity of the business conditions and the characteristics of the production facilities.



### 8.3.2. Increasing the energy efficiency of district heating systems

European and national strategic objectives highlight the requirement to increase energy efficiency in all sectors as one of the most important levers of sustainable development. Increased energy efficiency in thermal systems in the Republic of Croatia is planned through projects to renovate the hot water network and thermal systems from 2020 to 2023. As part of the Competitiveness and Cohesion 2014-2020 operational programme, funds were approved for projects to reduce thermal losses and increase the reliability of the thermal energy supply to more than 120,000 households; implementation of these projects began in Zagreb, Osijek, Rijeka and Karlovac.

HEP-TOPLINARSTVO d.o.o. is implementing the *“Revitalization of the hot water network in the city of Zagreb”* project, which will renovate 68.5 km of worn hot water pipelines out of the total network of 227.3 km in the city of Zagreb. This HRK 700 million project, of which HRK 471.5 million comes from the European Regional Development Fund, will contribute to a reduction in energy consumption and greenhouse gas emissions, as well as improve the security of supply in Zagreb's district heating system.

The HEP-Toplinarstvo d.o.o. Osijek Plant is implementing the *“Replacement of the connecting hot water pipeline from the Osijek Thermal Power and District Heating Plant to the Osijek District Heating Plant”*, which will replace a worn 4.4 km, 550 mm diameter hot water pipeline with a new, more modern one with a diameter of 800 mm. This HRK 78.91 million project, of which HRK 46 million comes from the European Regional Development Fund, will contribute to a reduction in energy consumption and greenhouse gas emissions, as well as the security of supply and increased efficiency in Osijek's district heating system.

ENERGO d.o.o. is implementing the *“Renovation of Rijeka's district heating systems”* project, which will renovate the existing distribution network through new connecting heat pipelines and the connection and reconstruction of 7 district heating systems (63% of current production). The project foresees the installation of a cogeneration plant and the full transition to fuel oil from natural gas, the installation of solar panels, tanks, a full automation system, and increased efficiency to optimise production and decrease losses in distribution. In addition to renovating 7.9 km of the existing hot water distribution network, a new 2.5 km connecting network will be built, linking three district heating systems in the eastern part of the city with three in the western part into unified systems. This HRK 112.27 million project, of which HRK 83.9 million comes from the European Regional Development Fund, will contribute to a reduction in energy consumption and greenhouse gas emissions, as well as increased security of supply and increased efficiency in Osijek's district heating system through the use of renewable energy sources.

GRADSKA TOPLANA d.o.o. Karlovac is implementing the *“Revitalising the hot water network in the city of Karlovac”* project, which will replace 15.7 km of the hot water network, revitalise equipment in hot water substations, modernise the pumps at the distribution facility and the chemical water preparation system, and install a central control system to manage and monitor the network. This HRK 133.87 million project, of which HRK 103.59 million comes from the European Regional Development Fund, will contribute to a reduction in energy consumption and greenhouse gas emissions, as well as increased security of supply and increased efficiency in Karlovac's district heating system, as well as preparations for the use of renewable energy sources.

### 8.3.3. High-efficiency cogeneration

According to the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, legal or natural persons who simultaneously produce electricity and thermal energy in a highly energy-efficient manner in a single production facility may attain eligible electricity producer status. The criteria for



acquiring the eligible electricity producer status are specified in the provisions of the **Act** and in the *Ordinance on acquiring eligible electricity producer status*, as well as in the *Regulation on the Use of Renewable Energy Sources and High-Efficiency Cogeneration (Official Gazette no. 28/2023)* from Article 41 of the **Act**, which entered into force and replaced the aforementioned *Ordinance* at the beginning of 2023.

Producers with eligible electricity producer status for natural gas cogeneration facilities must realise a minimum primary energy savings indicator. The procedure and parameters for defining primary energy savings have been harmonised with the following EU regulations related to high-efficiency cogeneration:

- *Directive 2012/27/EU and Directive (EU) 2018/2002,*
- *Commission Delegated Regulation (EU) 2015/2402 of 12 October 2015 reviewing the harmonised efficiency reference values for the separate production of electricity and heat in the application of Directive 2012/27/EU of the European Parliament and of the Council and repealing Commission Implementing Decision 2011/877/EU, and*
- *2008/952/EZ: Commission Decision of 19 November 2008 establishing detailed guidelines for the implementation and application of Annex II to Directive 2004/8/EC of the European Parliament and of the Council (notified under document number C(2008) 7294).*

On the basis of the *Ordinance on acquiring eligible electricity producer status*, the HERA has so far issued decisions on the acquisition of the status of a privileged electricity producer for a total of six natural gas cogeneration plants, five of which had the eligible producer status in 2022.

In accordance with the *Ordinance on attaining eligible electricity producer status*, the HERA conducts the yearly supervision of primary energy savings and issues decisions affirming the amount of primary energy savings for individual cogeneration facilities.

In 2022, the HERA issued decisions on determining the primary energy savings for all five cogeneration plants for 2021. All five plants achieved primary energy savings higher than the required minimum. All decisions are published on the HERA's website.

The decision on eligible electricity producer status for the energy entity Hrvatska industrija šećera d.d. expired in 2022. The energy entities HEP-Proizvodnja d.o.o. for the plant Kombi kogeneracijski Blok L and Osatina grupa d.o.o. for the plants Kogeneracija Tomašanci and Staklenik for the hydroponic cultivation of tomatoes terminated their contracts with HROTE, and at the end of 2022, only 1 cogeneration plant remained in the electricity production incentive system, which has a corresponding contract for the purchase of electricity with HROTE.

In accordance with the *Memorandum of understanding on mutual data exchange* concluded between the HERA and the Croatian Bureau of Statistics on 12 June 2017, the HERA delivered aggregate data on primary energy savings for the five aforementioned cogeneration facilities to the Bureau of Statistics. The Bureau of Statistics uses this aggregate data to complete EUROSTAT questionnaires in accordance with *Directive 2012/27/EU*.

According to the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, when electricity delivered from plants into the electricity grid needs to be limited, the transmission system operator or the distribution system operator are required to ensure that plants with eligible producer status have priority over other plants for the delivery of electricity into the grid, unless such priority delivery significantly undermines the reliability and stability of the grid. In other words, cogeneration plants with eligible electricity producer status have priority in delivery. Similar provisions exist in the **Thermal Energy Market Act** and the **Electricity Market Act**.



Also, on the basis of the *Ordinance on acquiring eligible electricity producer status*, the HERA has issued decisions on eligible electricity producer status for 43 biomass cogeneration plants and 44 biogas cogeneration plants.

Below is an overview of the installed capacity of thermal energy in cogeneration plants with the eligible electricity producer status.

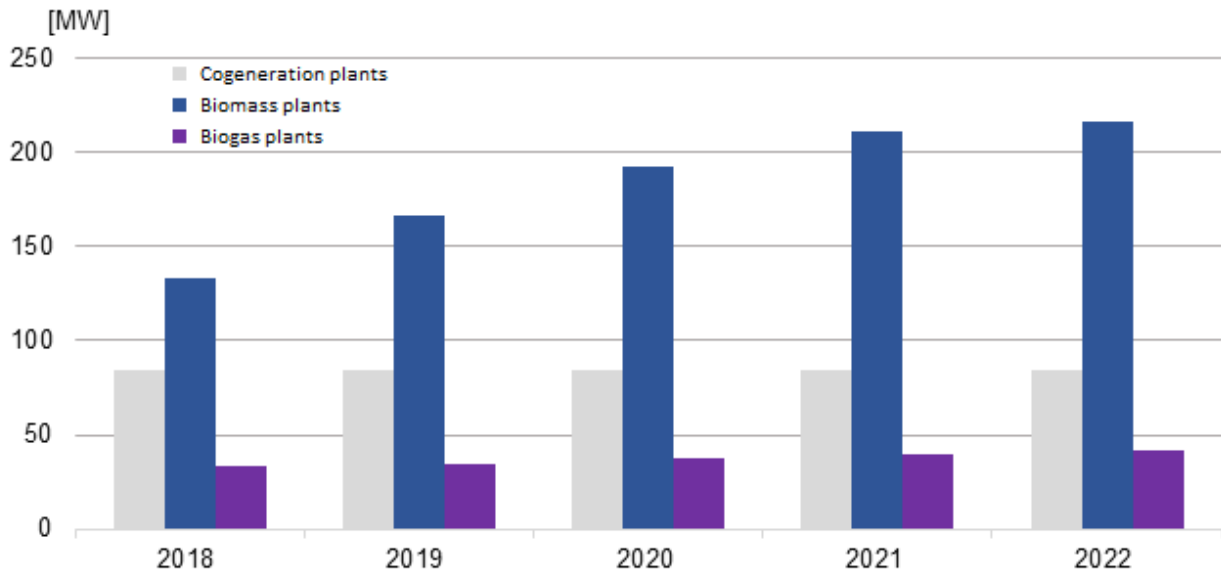


Figure 8.3.1 Eligible electricity producers – installed thermal capacity of plants in the period from 2018 to 2022 according to the type of plant

Biomass plants simultaneously produce electricity and thermal energy, and use solid biomass primarily in the form of wood chips as fuel. These plants use the thermal energy produced in various ways. Part of the plant uses thermal energy in its own dryers for drying energy sources for its own needs and for the service of drying wood chips, pellets, briquettes and timber, as well as for heating the premises, and part of the plant transfers thermal energy to other legal entities who then use it for wood processing plants, dryers and space heating. The exception is the plants owned by HEP-Proizvodnja d.o.o., which deliver the produced thermal energy to the heating systems of the cities of Sisak and Osijek.

Biogas plants also produce electricity and thermal energy simultaneously, and use biogas produced by the fermentation process from various materials of organic origin as fuel, e.g. slurry, manure, corn silage, biodegradable waste, leftovers from food production, leftovers from kitchens, etc.

The thermal energy produced is usually used by biogas plants for their own needs, primarily for heating the fermenter as part of the biogas production process and heating the office and other premises of the plant itself. Part of the plant uses the remaining thermal energy for heating domestic animal breeding facilities (for example, poultry houses and pig farms), heating greenhouses, and for dryers in which grass mixtures and agricultural products are dried.



According to the current tariff systems, biomass and biogas cogeneration plants are required to achieve a total annual energy efficiency of at least 50%. Total annual energy efficiency is defined on the annual level as efficiency in converting primary fuel energy into electricity and useful heat.

On the basis of the submitted reports on the realisation of the annual production plans that the plants are obliged to submit to the HERA and other available documentation and information, the HERA determines the total annual energy efficiency for biomass and biogas cogeneration plants that have concluded electricity buy-off agreements in accordance with the *Tariff system for the production of electricity from renewable energy sources and cogeneration (Official Gazette no. 133/13, 151/13, 20/14, 107/14, and 100/15)* and the *Tariff system for the production of electricity from renewable energy sources and cogeneration (Official Gazette no. 63/12, 121/12 and 144/12)*.

In addition, in line with the regulations governing the renewable energy and cogeneration incentive system, the minimum total annual facility efficiency is a condition for incentivised prices for electricity delivered from facilities using biomass or biogas. For high-efficiency cogeneration facilities using fossil fuels, primary energy savings are a condition for the right to incentivised prices for delivered electricity.

In 2022, the HERA issued 65 decisions affirming the total annual efficiency of such plants, and 5 decisions affirming primary energy savings.

### 8.3.4. Energy efficiency obligation system

The legal framework for the energy efficiency obligation system is defined in the **Energy Efficiency Act**; its implementation began in 2019.

Given the gradual implementation of the energy efficiency obligation scheme, in 2022, obligated parties were energy suppliers and their affiliated persons who had supplied a total of more than 50 GWh of energy in 2019. Entities in the heating sector subject to the obligation in 2021 were HEP-Toplinarstvo d.o.o., Zagreb; Energo d.o.o., Rijeka; and Brod-plin d.o.o., Slavonski Brod. It should be noted that Brod-plin d.o.o. and Energo d.o.o. were obligated parties in 2022 because they simultaneously acted as suppliers of thermal energy and gas, with their total gas and thermal energy delivered to final customers in 2019 (as the criterion for the obligation in 2022) being higher than the predefined threshold.

The district heating sector in Croatia has great potential for improving energy efficiency, and increasing the reliability and security of supply through new, modern technologies. This mainly refers to the use of thermal energy from renewable sources, high-efficiency cogeneration, heat pumps, the replacement of old, inefficient pipeline networks with new, pre-isolated pipelines, system automation, and amendments to the legislative and regulatory framework.

Table 8.2.5. shows data on energy savings and carbon dioxide (CO<sub>2</sub>) emission savings that savings-obligated parties (energy entities with a licence to perform the corresponding energy activity) in the thermal energy sector realised by individual type of measure in 2022. The data was taken from the System for the Monitoring and Verification of Energy Savings (SMIV), which is managed by the Ministry.

*Table 8.3.1 Realised energy and CO<sub>2</sub> emissions savings of energy savings-obligated parties in 2022 in the thermal energy sector, by individual measure*





Holder of the savings	Description of the measure	Energy savings, (kWh)	CO <sub>2</sub> emissions savings (t)
<b>HEP-Toplinarstvo d.o.o. za proizvodnju i distribuciju toplinske energije</b>	Reconstruction of the thermal substation for heating the Maintenance Sector	282,834.64	92.20
	Reconstruction of the thermal substation for DHW of the Maintenance Sector	28,380.42	9.25
	Reconstruction of the thermal substations of the Special heating plant	415,152.86	135.34
	Revitalization of the hot water network in the Osijek Plant	1,290,824.90	509,866.05
	Revitalization of the hot water network in the Sisak Plant	113,932.11	3,998.00
	Revitalization of the hot water network of the Thermal Network plant	10,890,701.32	38,666,004.32
<b>Gradska toplana d.o.o.</b>	Revitalization of the heating network – Groups 2 and 3	3,339,060.00	3,512,036.33
<b>Total</b>		<b>16,360,886.25</b>	<b>42,692,141.50</b>

Source: Ministry, SMIV

# 9

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# 10

## ABBREVIATIONS AND GLOSSARY





# 10. ABBREVIATIONS AND GLOSSARY

Abbreviation	Meaning
4M MC	and/or 4M MC Project - Four Markets Market Coupling Project (Hungary, Slovakia, Czech Republic and Romania)
AAC	Already Allocated Capacity
ACER	Agency for the Cooperation of Energy Regulators
aFRR	Automatic Frequency Restoration Reserve
aFRRIF	implementation framework for a European platform for the exchange of balancing energy from frequency restoration reserves with automatic activation
AGEN-RS	national energy regulator of the Republic of Slovenia
Aggregator	A natural or legal person who combines multiple consumer loads or generated electricity for sale, purchase or auction in any electricity market
AIB	Association of Issuing Bodies
AIT	Average Interruption Time
APLACA	Allocation of Cross-zonal Capacity and Procurement of aFRR Cooperation Agreement
APT	Advanced Persistent Threat
ARIS	ACER's platform for receiving and processing data, and preparing reports
ATC	Available Transfer Capacity
CHA	Croatian Hydrocarbon Agency
BI	Business Intelligence
BSP	Slovenian Power Exchange
canyon curve	a canyon-like price curve
CEER	Council of European Energy Regulators
CEF	Connecting Europe Facility
CEF-TC	CEF Telecom call
CEGHIX	a price index of the Austrian gas exchange CEGH based on exchange orders and day-ahead contracts, and in practice it is used as a reference indicator of gas exchange prices in Central Europe
CEP	Clean Energy Package – The “Clean energy for all Europeans” package
CEREMP	Centralised European Register of Energy Market Participants
CHP	Cogeneration through combined heat and power
CMF	Capacity Management Function
CNE	Critical Network Element
CNEC	Critical Network Element with Contingency





Core FB MC	Core Flow-based Market Coupling
Core Region	the region in the EU for the calculation of transmission capacities determined by borders and not by bidding zones, and that includes the following cross-zonal borders (borders marked with ISO codes of countries and countries): FR-BE, BE-NL, FR-DE/LU, NL-DE/LU, BE-DE/LU, DE/LU-PL, DE/LU-CZ, AT-CZ, AT-HU, AT-SI, CZ-SK, CZ-PL, HU-SK, PL-SK, HR-SI, HR-HU, RO-HU, HU-SI, DE/LU-AT
CROPEX	Hrvatska burza električne energije d.o.o. (the Croatian electricity exchange)
DHS	district heating system
DA	Day-ahead Market
DG ENER	Directorate-General of the European Commission for Energy
<i>Directive 944</i>	<i>Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 concerning common rules for the internal market in electricity and amending Directive 2012/27/EU</i>
DA (Distribution area)	distribution area
duck curve	a duck-like price curve
EES	grid connection approval
EIC	Energy Identification Coding Scheme - joint identification scheme of participants and facilities on the European energy market in order to enable electronic data interchange (EDI)
EC	European Commission
EKO Balance Group	a balance group operated by HROTE consisting of eligible producers of electricity and other entities performing electricity production activities who have concluded an agreement for electricity buy-off from renewable sources and high-efficiency Cogeneration with HROTE (renewable energy and cogeneration incentive system)
ELES	Slovenian transmission system operator
EMS	Serbian transmission system operator
ENER	see DG ENER
ENS	Energy Not Supplied
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSOG	European Network of Transmission System Operators for Gas
EOTRP	report on the optimal technical solution for connecting to the network
E-PASIS	System for Prevention and Analysis of HOPS's communication networks' security incidents, see CEF-TC
EPC	Energy Performance Contract
EQS WS	CEER's Energy Quality of Supply Work Stream
EU	European Union
EUPHEMIA	algorithm for calculating prices on the electricity market
EUROSTAT	Statistical office of the European Union / European Statistics
Ex-ante	a phrase meaning "before the event". Here, it relates to the approval of development and investment plans and the setting of tariffs and charges for future periods



Ex-post	a phrase meaning “after the event”. Here, it relates to the analysis and/or revision of results, realised plans and investments, and the justification of applied tariffs and charges after the conclusion of a particular period
FB	Flow-Based
FCA	Forward Capacity Allocation
FCR	Frequency Containment Reserves
feed-in	incentive system or mechanism with a guaranteed purchase price
Fund	Environmental Protection and Energy Efficiency Fund
FRR	Frequency Restoration Reserve (divided into the power reserve for frequency restoration with automatic activation (aFRR) and the power reserve for frequency restoration with manual activation (mFRR))
FSKAR	common settlement rules applicable to all intended and unintended exchanges of energy
FSRU	
HANDA	Hrvatska agencija za obvezne zalihe nafte i naftnih derivata (Croatian Agency for Required Stocks of Crude Oil and Petroleum Products)
HE	hydroelectric power plant
HEP d.d.	Hrvatska elektroprivreda – joint stock company
HEP-ODS	HEP-Operator distribucijskog sustava d.o.o. (distribution system operator)
HERA	Hrvatska energetska regulatorna agencija (the Croatian Energy Regulatory Agency)
HHI	the Herfindahl-Hirschman Index, a common measure of market concentration that serves as an indicator of the market power of individual entrepreneurs
HOPS	Hrvatski operator prijenosnog sustava d.o.o. (Croatian transmission system operator)
HROTE	Hrvatski operator tržišta energije d.o.o. (Croatian energy market operator)
HTLS	High-temperature Low-sag
HUDEX	Hungarian Derivative Energy Exchange
HUPX	Hungarian electricity exchange
IBWT	Italian Borders Working Table
ID	Intra Day Market
IGCC	International Grid Control Cooperation
IN	Imbalance Netting
INA d.d.	
INIF	implementation framework for a European platform for the imbalance netting process
IoT	Internet of Things) - a multifunctional integrated platform for managing “smart” things, a network infrastructure that connects devices via the internet for communication, mutual interaction, new possibilities for control, monitoring and the provision of advanced services
iPLIN	an application available on the HERA’s website – a calculator for household gas consumers using gas supply as a public service



ISO codes	ISO country codes
HVDC	high voltage direct current
IT	Information Technology
ITC	and/or ITC Agreement – Inter-Transmission System Operator Compensation (ITC) mechanism
ITO	Independent Transmission Operator
JANAF	Jadranski naftovod d.d.
JAO	Joint Allocation Office
JKC	Central HEP-ODS Contact Centre
LCOE	Levelised Cost of Electricity
MAVIR	Hungarian transmission system operator
MC	Market Coupling
MEKH	national energy regulator of the Republic of Hungary
mFRR	Manual Frequency Restoration Reserve (it is divided into mFRR for balancing and mFRR for safety)
mFRRIF	implementation framework for a European platform for the exchange of balancing energy from frequency restoration reserves with manual activation
Moja mreža	web application of HEP-ODS intended for network users ( <a href="https://mojamreza.hep.hr/">https://mojamreza.hep.hr/</a> )
MRS	metering and reduction station
Ripple control	imprinting, transmission and reception of control signals via the transmission and distribution network for controlling devices and equipment
n/a	not applicable
NCV	net calorific value of gas under normal conditions – heat freed during the combustion of natural gas in air, at a combustion temperature of 15°C and a natural gas temperature of 15°C
NECP	Croatian integrated National Energy and Climate Plan for 2021-2030
NEMO	Nominated Electricity Market Operator
<i>NIS Directive</i>	<i>Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union</i>
LV	low voltage level / low voltage network
NOP	National policy framework for establishing infrastructure and developing the alternative transport fuels market
NRRP	National Recovery and Resilience Plan
LT	lower daily tariff
NTC	Net Transfer Capacity
RES	Renewable energy source(s)
RSE&C	renewable energy sources and cogeneration
RES&HEC	renewable energy sources and high-efficiency cogeneration
BMP	billing metering point



Open Season	call for subscription/participation in the application-based allocation mechanism that enables transparent and non-discriminatory capacity allocation for access to the infrastructure and dimensioning of the offer as needed
WMS	wholesale market supplier
PCI	Projects of Common Interest
PPA	Power Purchase Agreement
PPIF	a methodology for pricing balancing energy resulting from the activation of balancing energy product bids for the frequency restoration process and for pricing cross-zonal capacity used for the exchange of balancing energy or operating the imbalance netting process
PPS	Purchasing Power Standards
PRISMA	platform for capacity booking at interconnections of gas transmission systems
UGSF Okoli	Okoli - Podzemno skladište plina d.o.o.
PTDF	Power Transfer Distribution Factor
RAM	Remaining Available Margin
RBP	platform for capacity booking at interconnections of gas transmission systems
RCC	Regional Coordinating Centre
RES&C Register	Register of renewable energy sources and cogeneration, and eligible producers
RES	Renewable energy sources
RH	Republic of Croatia
PSH	pumped storage hydroelectric power plant
RBMP	Register of Billing Metering Points
RSC	Regional Security Coordinator
RSI	Residual Supply Index
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
Council	Regulatory Affairs and Consumer Protection Council
SBU	Standard bundled unit
SCADA	Supervisory Control and Data Acquisition system
SEE CAO	South East Europe Coordinated Auction Office
SEE	South East Europe
SHB	Regulatory block consisting of Slovenia, Croatia and Bosnia and Herzegovina
SINCRO.GRID	project financed through the CEF fund; the goal of the project is to improve the voltage quality in the electric power system and use the dynamic transmission capacity of the existing transmission lines by using advanced technical systems and algorithms
Smart grid	smart grid
SMIV	System for Monitoring and Verification of Energy Savings
MV	medium voltage level / medium voltage network



SOR	System Operation Region
Strategy	<i>Energy Development Strategy of the Republic of Croatia until 2030 with a view to 2050 (Official Gazette, no. 25/20)</i>
IHS	independent heating system
STUM	creating technical requirements in the network
SUKAP	Yearly, quarterly, monthly, daily and intraday capacity management system
TM	tariff model
TRM	Transmission Reliability Margin
TS	transformer station
TSC; TSCNET	TSC - Transmission System Operator Security Cooperation (An initiative of 13 transmission system operators from 10 continental European countries, one of which is HOPS; its goal is to increase system security by developing multilateral procedures to eliminate congestion in the transmission system);
TYNDP 2020	Ten-Year Network Development Plan (2020)
LPG	liquefied petroleum gas
PES	Primary Energy Savings
LNG	Liquefied Natural Gas
<i>Regulation 1854</i>	<i>Council Regulation (EU) 2022/1854 of 6 October 2022 on Emergency Intervention to Address High Energy Prices</i>
<i>Regulation 943</i>	<i>Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity</i>
<i>CACM Regulation</i>	<i>Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management</i>
<i>DCC Regulation</i>	<i>Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a network code on demand connection</i>
<i>EBGL Regulation</i>	<i>Commission Regulation (EU) 2017/2195 establishing a guideline on electricity balancing</i>
<i>ERNC Regulation</i>	<i>Commission Regulation (EU) 2017/2196 establishing a network code on electricity emergency and restoration</i>
<i>FCA Regulation</i>	<i>Commission Regulation (EU) 2016/1719 establishing a guideline on forward capacity allocation (FCA GL Guideline on Forward Capacity Allocation)</i>
<i>HVDC Regulation</i>	<i>Commission Regulation (EU) establishing a network code on requirements for the high voltage direct current system and direct current-connected power park module grid connections</i>
<i>NC TAR Regulation</i>	<i>Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on the harmonised transmission tariff structures for gas</i>
Regulation on surplus market revenues	<i>Regulation on the Act on Emergency Intervention to Address High Electricity Prices (Official Gazette no. 156/22)</i>
<i>REMIT Regulation</i>	<i>Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency</i>
<i>RFG Regulation</i>	<i>Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators</i>



<i>SOGL Regulation</i>	<i>Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation</i>
VCBCC	virtual cross-border control centre
HV	high voltage level / high voltage network
HT	higher daily tariff
VTP	Virtual Trading Point – a virtual place within the gas system (gas transmission systems and storage systems) where balance-responsible parties can mutually trade gas
XBID	Cross-Border Intraday
CHS	closed heating system

11

# APPENDIX

Licences for the  
performance of energy  
activities





# 11. APPENDIX – LICENCES FOR THE PERFORMANCE OF ENERGY ACTIVITIES

## List of issued licences

List of licences issued from 01/01/2022 to 31/12/2022	Number of issued licences
<b>Electricity production</b>	<b>21</b>
DIN ENERGO d.o.o., Park hrvatskih mučenika 4, 10315 Novoselec	
BIOINTEGRA d.o.o., Antuna Mihanovića 23, Medinci, 33520 Slatina	
KIRCEK ENERGY d.o.o., Ivanovo polje 1D, 42222 Ljubešćica	
OSILOVAC d.o.o., Ferićeva 16, 31512 Feričanci	
PANA ENERGY d.o.o., Ulica Ivana Mažuranića 2, 40000 Čakovec	
MATVEJ d.o.o., Lonjička ulica 2A, 10000 Zagreb	
MAKSIM TRADE ENERGIJA d.o.o., Žakanje 58, 47276 Žakanje	
BIO ENERGANJA BJELOVAR d.o.o., Hrvatskog proljeća 3, 43000 Bjelovar	
BIOPLINSKA ELEKTRANA OREHOVEC d.o.o., Sveti Petar Orehovec 97A, 48267 Sveti Petar Orehovec	
ENERGO d.o.o. za proizvodnju i distribuciju toplinske energije i plina, Dolac 14, 51000 Rijeka	
VJETROELEKTRANA LJUBAČ d.o.o. za trgovinu i usluge, Krpanjska cesta 8, 22000 Šibenik	
BIOPLIN PROIZVODNJA dioničko društvo za proizvodnju i izgradnju, Gregurovec 23, 48265 Gregurovec	
BE-TO GLINA d.o.o. za proizvodnju, trgovinu i usluge, Žrtava Domovinskog rata 74/A, 44400 Glina	
SOLIDA CERJE d.o.o., Trg hrvatskih ivanovaca 9A, 42240 Ivanec	
KLASA d.o.o., Trg hrvatskih ivanovaca 9A, 42240 Ivanec	
CEP Belišće 2 d.o.o., Ilica 164, 10000 Zagreb	
BIOPLIN-MAKS d.o.o., Trg žrtava fašizama 6, 10000 Zagreb	
LIKA ENERGO EKO d.o.o., Udbina 15, 53234 Udbina	
BIOEL d.o.o., Velika Maslenjača 46, 43531 Maslenjača	





List of licences issued from 01/01/2022 to 31/12/2022	Number of issued licences
NOVPROS d.o.o., Frankopanska 99, 31000 Osijek	
SOLEKTRA d.o.o., Trg Eugena Kvaternika 9, 40000 Čakovec	
<b>Electricity supply</b>	<b>1</b>
IE-ENERGY d.o.o., Korzo 40, 51000 Rijeka	
<b>Aggregation</b>	<b>3</b>
Nano Energies Hrvatska d.o.o. za usluge, Puževa ulica 11, 10000 Zagreb	
IE-ENERGY d.o.o. Korzo 40, 51000 Rijeka	
KOER d.o.o., Dužice 24, 10000 Zagreb	
<b>Electricity trade</b>	<b>6</b>
MET Austria Energy Trade GmbH, Karl-Waldbrunner-Platz 1, 1210 Vienna, Republic of Austria	
Second Foundation a.s., Ovocný trh 1096/8, 110 00 Prague, Czech Republic	
ENCRO TRGOVINA d.o.o., Jurišićeva ulica 1A, 10000 Zagreb	
Renewable Energy Solutions d.o.o., Tratinska ulica 80A, 10000 Zagreb	
MaxiCommodities, a.s., Vinohradská 35/25, Vinohrady, 120 00 Prague 2, Czech Republic	
KOER d.o.o., Dužice 24, 10000 Zagreb	
<b>Closed Distribution System Operator</b>	<b>1</b>
HELB d.o.o., Industrijska ulica 1, 10370 Božjakovina	
<b>Gas trade</b>	<b>7</b>
TOTAL ENERGY d.o.o., Celine 2, 49210 Zabok	
Shell Energy Europe B.V., Carel van Bylandtlaan 30, 2596 Den Haag, Kingdom of the Netherlands	
HOLDING SLOVENSKE ELEKTRARNE d.o.o., Kopraska ulica 92, 1000 Ljubljana, Republika Slovenija	
INCERGO d.o.o., Hruševečka ulica 9, 10000 Zagreb	
CROATIAN SPACE FOUNDATION-ZAKLADA, Vankina 21, 10000 Zagreb	
Telantes Limited, 53 Office 2, Sir Adrian Dingli Street, Sliema SLM 1902, Malta	
Marco Polo International d.o.o., Ulica kralja Zvonimira 73, 10000 Zagreb	
<b>Gas supply</b>	<b>3</b>
TOTAL ENERGY d.o.o., Celine 2, 49210 Zabok	
Slovenský plynárenský priemysel, a.s., Mlynské nivy 44/a, 825 11 Bratislava, Republic of Slovakia	
ENERGY PRIME d.o.o., Vlaška ulica 9, 10000 Zagreb	
<b>Management of liquefied natural gas and/or compressed natural gas supply points</b>	<b>1</b>



<b>List of licences issued from 01/01/2022 to 31/12/2022</b>	<b>Number of issued licences</b>
ENERGY PRIME d.o.o., Vlaška ulica 9, 10000 Zagreb	
<b>Thermal energy production</b>	<b>8</b>
NIZA d.o.o., Kolodvorska 42, 31224 Niza	
DIN ENERGO d.o.o., Park hrvatskih mučenika 4, 10315 Novoselec	
KIRCEK ENERGY d.o.o., Ivanovo polje 1D, 42222 Ljubešćica	
PANA ENERGY d.o.o., Ulica Ivana Mažuranića 2, 40000 Čakovec	
PELET GRUPA d.o.o., Vlaška ulica 9, 10000 Zagreb	
CEP Belišće 2 d.o.o., Ilica 164, 10000 Zagreb	
NOVPROS d.o.o., Frankopanska 99, 31000 Osijek	
LIKA ENERGO EKO d.o.o., Podudbina 15, 53234 Udbina	
<b>Thermal energy supply</b>	<b>8</b>
DIN ENERGO d.o.o., Park hrvatskih mučenika 4, 10315 Novoselec	
KIRCEK ENERGY d.o.o., Ivanovo polje 1D, 42222 Ljubešćica	
MIAGRO ENERGO d.o.o., Ribnjak, Stjepana Radića 1, 31500 Našice	
PANA ENERGY d.o.o., Ulica Ivana Mažuranića 2, 40000 Čakovec	
ENERGANA ŽUPANJA d.o.o., Industrijska 7, 32270 Županja	
PELET GRUPA d.o.o., Vlaška ulica 9, 10000 Zagreb	
LIKA ENERGO EKO d.o.o., Podudbina 15, 53234 Udbina	
NOVPROS d.o.o., Frankopanska 99, 31000 Osijek	
<b>Wholesale trade in biofuels</b>	<b>2</b>
DELTA OIL-INTERNATIONAL d.o.o., Kaptol 19, 10000 Zagreb	
AGS HRVATSKA d.o.o., Zagrebačka avenija 100A, 10000 Zagreb	
<b>Storage of biofuels</b>	<b>1</b>
AGS HRVATSKA d.o.o., Zagrebačka avenija 100 A, 10000 Zagreb	
<b>Wholesale trade in petroleum products</b>	<b>6</b>
IRA GRAD d.o.o., Davora Zbiljskog 26, 10000 Zagreb	
INCERGO d.o.o., Hruševička ulica 9, 10000 Zagreb	
GEMINI GLOBAL ISW d.o.o., Peroj 1056, 52215 Vodnjan	
HEP-Proizvodnja d.o.o. za proizvodnju električne i toplinske energije, Ulica grada Vukovara 37, 10000 Zagreb	



List of licences issued from 01/01/2022 to 31/12/2022	Number of issued licences
SANICEN TRADE d.o.o., Zelinska ulica 7, 10000 Zagreb	
E 2 SUS d.o.o. za usluge, Miramarska cesta 24, 10000 Zagreb	
<b>Wholesale trade in liquefied petroleum gas</b>	<b>3</b>
GTG plin d.o.o., Kalinovac 2a, 47000 Karlovac	
GEMINI GLOBAL ISW d.o.o., Peroj 1056, 52215 Vodnjan	
Marco Polo International d.o.o., Ulica kralja Zvonimira 73, 10000 Zagreb	
<b>TOTAL</b>	<b>71</b>



## List of extended licences

List of licences extended from 01/01/2022 to 31/12/2022	Number of extended licences
<b>Electricity production</b>	<b>10</b>
SELAN d.o.o. za građevinarstvo, proizvodnju i opskrbu električnom energijom, Ulica Abatovo 7, 53270 Senj	
VELIKA POPINA d.o.o. za usluge, Jurišićeva 1/a, 10000 Zagreb	
VJETROELEKTRANE GLUNČA d.o.o. za trgovinu i usluge, Savska Opatovina 36, 10000 Zagreb	
SAVA d.o.o. za proizvodnju, trgovinu i usluge, Trg hrvatskih branitelja 1, 35435 Stara Gradiška	
VJETROELEKTRANA KATUNI d.o.o. za proizvodnju električne energije, Dr. Franje Tuđmana 75, 21250 Šestanovac	
VRBOVSKO EKO ENERGIJA d.o.o. u stečaju, Tvornička 31, 51326 Vrbovsko	
DRVNI CENTAR GLINA d.o.o. za proizvodnju, trgovinu i usluge, Žrtava Domovinskog rata 71, 44400 Glina	
POŠTAK d.o.o. za usluge, Jurišićeva 1A, 10000 Zagreb	
ĐAKOVO HRAST d.o.o. proizvodnja namještaja, Petra Preradovića 217, 31400 Đakovo	
Geo Power Energy Development d.o.o., Radnička cesta 34a, 10000 Zagreb	
<b>Electricity market organisation</b>	<b>1</b>
HRVATSKI OPERATOR TRŽIŠTA ENERGIJE d.o.o. za organiziranje tržišta električne energije i plina, Ulica grada Vukovara 284, 10000 Zagreb	
<b>Electricity supply</b>	<b>1</b>
MET Croatia Energy Trade d.o.o. za trgovinu i usluge, Radnička cesta 80, 10000 Zagreb	
<b>Electricity trade</b>	<b>3</b>
AYEN ENERGIJA, trgovanje z električno energijo, d.o.o., Zemljemerska ulica 12, 1000 Ljubljana, Republic of Slovenia	
ENERGI DANMARK A/S, Tangen 29, 8200 Aarhus N, Denmark	
Petrol d.d., Ljubljana, Dunajska cesta 50, 1000 Ljubljana, Slovenia	
<b>Gas trade</b>	<b>6</b>
GEOPLIN d.o.o. Ljubljana, Družba za trgovanje in transport zemeljskega plina, Cesta Ljubljanske brigade 11, 1000 Ljubljana, Republika Slovenija	
RWE Supply & Trading GmbH, RWE Platz 6, 45141 Essen, Germany	
ALPIQ ENERGY SE, Jungmannova 26/15, Nové Město, 110 00 Praha 1, Czech Republic	



List of licences extended from 01/01/2022 to 31/12/2022	Number of extended licences
PPD Hungária Energiakereskedő KFT, Montevideo utca 3/B, 1037 Budapest, Hungary	
WIEE Hungary Kft., Váci út 37, III. em., 1134 Budapest, Hungary	
ERDAL TRADING LTD, 53, Office 2, Sir Adrian Dingli Street, Silema SLM 1092, Malta	
<b>Gas supply</b>	<b>8</b>
RADNIK građevinarstvo i građevinska industrija d.d., Ulica kralja Tomislava 45, 48260 Križevci	
ENERGO d.o.o. za proizvodnju i distribuciju toplinske energije i plina, Dolac 14, 51000 Rijeka	
MEĐIMURJE-PLIN d.o.o. za opskrbu plinom, Obrtnička 4, 40000 Čakovec	
HEP-PLIN d.o.o., Cara Hadrijana 7, 31000 Osijek	
IVKOM-PLIN d.o.o. za distribuciju i opskrbu plinom, Vladimira Nazora 96/b, 42240 Ivanec	
Geoplin d.o.o., Radnička cesta 177, 10000 Zagreb	
E.ON Plin d.o.o. za opskrbu plinom, Capraška ulica 6, 10000 Zagreb	
BUTAN PLIN d.o.o. za trgovinu nafte i naftnim derivatima na veliko i malo, Ulica rijeke Dragonje 23, 52466 Novigrad	
<b>Thermal energy production</b>	<b>4</b>
ĐURO ĐAKOVIĆ Energetika i infrastruktura d.o.o. za proizvodnju i usluge, Dr. Mile Budaka 1, 35000 Slavonski Brod	
STAMBENO KOMUNALNO GOSPODARSTVO d.o.o. za komunalne djelatnosti, upravljanje zgradama i poslovanje nekretninama, Ivana Gorana Kovačića 8, 47300 Ogulin	
SAVA d.o.o. za proizvodnju, trgovinu i usluge, Trg hrvatskih branitelja 1, 35435 Stara Gradiška	
ĐAKOVO HRAST d.o.o. proizvodnja namještaja, Petra Preradovića 217, 31400 Đakovo	
<b>Thermal energy supply</b>	<b>7</b>
Brod-plin d.o.o., Trg pobjede 5, 35000 Slavonski Brod	
VARTOP d.o.o. za održavanje, upravljanje i toplinarstvo, Stanka Vraza 6, 42000 Varaždin	
Toplota Slatina d.o.o. za proizvodnju, trgovinu i usluge, Trg Sv. Josipa 10, 33520 Slatina	
Elektrana Grubišno Polje d.o.o., Poduzetnička cesta I. 4, 43290 Grubišno Polje	
Energija Gradec d.o.o., Trg Dražena Petrovića 3, 10000 Zagreb	
Biomasa Vukovar d.o.o., Gospodarska zona Vukovar 17, 32000 Vukovar	
A&A BIOENERGY VIRO d.o.o., Ulica Antunovac 11A, 33000 Virovitica	
<b>Wholesale trade in biofuels</b>	<b>2</b>
ADRIA OIL d.o.o. za prodaju naftnih derivata, Spinčići 38, 51215 Kastav	
DELTA OIL-INTERNATIONAL d.o.o., Kaptol 19, 10000 Zagreb	



<b>List of licences extended from 01/01/2022 to 31/12/2022</b>	<b>Number of extended licences</b>
<b>Wholesale trade in petroleum products</b>	<b>11</b>
GAS OIL d.o.o. za prodaju naftnih derivata, Liburnijska 6, 51414 Ičići	
BENZIN PERIĆ, d.o.o. za trgovinu naftnim derivatima, Trogirska cesta 1/a, 21220 Trogir	
TROMILJA BENZIN d.o.o. za trgovinu i usluge, Tromilja 1/a, 22221 Lozovac	
RI-BENZ d.o.o. za trgovinu i prijevoz nafte i naftnih derivata, Martinkovac 143/3, 51000 Rijeka	
DREZGA d.o.o., Obrtnička 2, 10437 Rakitje	
AUTOPRIJEVOZNIK KLJAJIĆ d.o.o. za prijevoz, trgovinu i usluge, Ježdovečka 118 B, 10250 Ježdovec	
EKO-FLOR PLUS d.o.o., Mokrice 180C, 49243 Oroslavje	
ISTRAŽIVAČ BENZ d.o.o., Križnog puta 151A, 32221 Nuštar	
VELIS d.o.o. za graditeljstvo, trgovinu i usluge, Rudolfa Matza 1, 10360 Sesvete	
FLASH ENERGY d.o.o. za trgovinu, Trg hrvatske bratske zajednice 2, 21000 Split	
NAFTA CENTAR d.o.o. za trgovinu i usluge, Mirka Kleščića 7, 10430 Samobor	
<b>Wholesale trade in liquefied petroleum gas</b>	<b>1</b>
PROPAN-BUTAN d.o.o. za usluge, Put sv. Jurja 74, 21217 Kaštel Novi	
<b>TOTAL</b>	<b>54</b>



List of licences terminated from 01/01/2022 to 31/12/2022	Number/reason for termination
<b>Electricity production</b>	<b>1</b>
BIOINTEGRA društvo s ograničenom odgovornošću za proizvodnju, trgovinu i usluge, Antuna Mihanovića 23, Medinci, 33520 Slatina	Expiry
<b>Electricity supply</b>	<b>1</b>
Eko Reciklažni Park d.o.o., Gospodarska zona 13, 32000 Vukovar	Expiry
<b>Electricity trade</b>	<b>3</b>
JAS Budapest Kereskedelmi és Szolgáltató Zrt., Mogyoródi út 168, 1141 Budapest, Hungary	Expiry
ADRIA SOL d.o.o. za proizvodnju, trgovinu i usluge, Industrijska zona bb, 51223 Kukuljanovo	Expiry
E D F TRADING LIMITED, 80 Victoria Street, Cardinal Place, 3rd floor, London SW1E 5JL, UK	Expiry
<b>Gas distribution</b>	<b>3</b>
Gradska plinara Krapina d.o.o. za distribuciju i opskrbu plinom, Frana Galovića 7 B/II, 49000 Krapina	On request
PAKRAC-PLIN d.o.o. za distribuciju i opskrbu plina, Ulica križnog puta 18, 34550 Pakrac	On request
DARKOM DISTRIBUCIJA PLINA d.o.o. za distribuciju plina, Josipa Kozarca 19, 43500 Daruvar	On request
<b>Gas trade</b>	<b>3</b>
gaSolutions GmbH, Mariahilferstraße 123/3, A-1060 Vienna, Austria	Expiry
MET Slovakia, a.s., Rajska 7, 811 08 Bratislava, Slovakia	Expiry
OMS - Upravljanje d.o.o., Radnička cesta 80, 10000 Zagreb	Permanent licence revocation
<b>Gas supply</b>	<b>12</b>
KOMUNALAC, društvo s ograničenom odgovornošću za pružanje komunalnih usluga, Ulica križnog puta 18, 34550 Pakrac	On request
MOSLAVINA PLIN d.o.o. za gradnju plinovoda i distribuciju plina, Trg kralja Tomislava 6, 44320 Kutina	On request
PLIN-PROJEKT d.o.o. za izgradnju plinovoda i distribuciju plina, Alojzija Stepinca 36, 35400 Nova Gradiška	On request
Gradska plinara Krapina d.o.o. za distribuciju i opskrbu plinom, Frana Galovića 7 B/II, 49000 Krapina	On request
DARKOM DISTRIBUCIJA PLINA d.o.o. za distribuciju plina, Josipa Kozarca 19, 43500 Daruvar	On request
Axpo Trgovina d.o.o. za trgovinu i usluge, Bosutska 30, 10000 Zagreb	Expiry
PAPUK d.o.o. za obavljanje komunalnih djelatnosti, Vladimira Nazora 14, 33515 Orahovica	Expiry
HUMPLIN d.o.o. za distribuciju plina, Lastine 1, 49231 Hum na Sutli	Expiry



List of licences terminated from 01/01/2022 to 31/12/2022	Number/reason for termination
ZELINSKE KOMUNALIJE d.o.o., Katarine Krizmanić 1, 10380 Sveti Ivan Zelina	Permanent licence revocation
ENERGIA GAS AND POWER d.o.o., Ulica Alexandera von Humboldta 4B, 10000 Zagreb	Permanent licence revocation
IVAPLIN d.o.o. za distribuciju i opskrbu plinom, Ulica Krešimira IV 10, 10310 Ivanić Grad	Permanent licence revocation
Brod-plin d.o.o., Trg pobjede 5, 35000 Slavonski Brod	Permanent licence revocation
<b>Thermal energy supply</b>	<b>1</b>
Međunarodna zračna luka Zagreb d.d., Ulica Rudolfa Fizira 1, 10410 Velika Gorica	Expiry
<b>Wholesale trade in petroleum products</b>	<b>2</b>
Santini društvo s ograničenom odgovornošću za trgovinu, Starčević Ante 79, 32100 Vinkovci	Expiry
NIKICA PETROL d.o.o., Berislavićeva 5, 35000 Slavonski Brod	Expiry
<b>Wholesale trade in biofuels</b>	<b>1</b>
RIJEKA TRANS društvo s ograničenom odgovornošću za trgovinu i poslovanje nekretninama, Kukuljanovo 337, 51227 Kukuljanovo	Expiry
<b>Storage of oil and petroleum products</b>	<b>2</b>
NAFTA CENTAR d.o.o. za trgovinu i usluge, Dr. Franje Tuđmana 16, 10431 Sveta Nedjelja	Expiry
ZAGREBAČKI PROMETNI ZAVOD d.o.o., Ljubljanska avenija 1, 10000 Zagreb	Extension request denied
<b>TOTAL:</b>	<b>29</b>





Status of licences for the performance of energy activities as of 31/12/2022 / Energy activity	Number of valid licences – status as of 31/12/2022
Electricity production	90
Electricity transmission	1
Electricity distribution	1
Electricity market organisation	1
Electricity supply	11
Aggregation	3
Electricity trade	37
Energy storage	0
Organisation of a Citizen Energy Community	0
Closed Distribution System Operator	1
Natural gas production	1
Gas transmission	1
Gas storage	1
LNG terminal management	1
Gas distribution	30
Gas market organisation	1
Gas trade	38
Gas supply	39
LNG and/or CNG supply point management	5
Thermal energy production	46
Thermal energy supply	40
Thermal energy distribution	6
Production of biofuels	3
Wholesale trade in biofuels	8
Storage of biofuels	6
Production of petroleum products	1
Transmission of oil through pipelines	1
Transmission of petroleum products through product pipelines	0
Wholesale trade in petroleum products	50
Storage of oil and petroleum products	20
Storage of liquefied petroleum gas,	4
Wholesale trade in liquefied petroleum gas	17
<b>TOTAL:</b>	<b>464</b>

The status of licences for the performance of energy activities as of 31/12/2022 was: **464 licences**.

Information on licences granted to perform energy activities is available in the licence register hosted by the HERA:

[https://www.hera.hr/hr/html/registar\\_dozvola.html](https://www.hera.hr/hr/html/registar_dozvola.html).