Republic of Croatia

Croatian Energy Regulatory Agency

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1 INTRODUCTION

Dear Readers,

It is my pleasure to present the *Annual Report on the Activities of the Croatian Energy Regulatory Agency for 2019*, which is submitted to Croatian Parliament pursuant to the *Act on the Regulation of Energy Activities* together with the Report on the Execution of the Budget of the Croatian Energy Regulatory Agency.

The Croatian Energy Regulatory Agency (HERA) is the national regulator of energy activities in the Republic of Croatia. In accordance with the relevant principles of the Croatian legal system, EU acquis, and relevant energy policies, HERA was established as an independent regulatory body with public powers. It was assigned the basic task of regulating energy activities in Croatia in accordance with the national legal framework. HERA is also one of the 27 national regulators of the EU Member States, whose rights and obligations (both in the national and European contexts) are based on the principles and basic acts of European energy legislation.

The fundamental principle applicable to the activities of all national energy regulators in the EU is the autonomy in decision-making guaranteed by law, both in relation to the executive government and the interests of economic operators in the energy sector. This legal position of the regulator does not call into question cooperation with other relevant national authorities and the government, who are in charge of establishing general energy policy guidelines. In addition to the autonomy of regulators guaranteed by law, the law also obliges the regulator to comply with its legal obligations, and ensure accountability and transparency in the regulation of the energy sector. Along with regular consultations with participants in the energy market and representatives of competent executive authorities, the requirement to submit reports on its activities to the national parliament is one of the backbones of the regulator's public accountability.

The principal energy regulatory tasks include regulating natural monopolies (by establishing tariffs and charges for the performance of regulated energy activities), monitoring and promoting the development of energy markets, and implementing applicable EU legislation. In the practical sense, the focus of the energy regulator certainly includes the interests of energy consumers and users of energy infrastructure systems (networks), not only with regard to their protection, but also by ensuring an optimum balance between regulated components and market mechanisms.

This annual report of HERA is a combination of overviews showing the execution of obligations by the regulatory body as required by law, and operational results and statistical indicators of regulated entities in the Croatian energy sector, as well as assessments, observations and regulatory recommendations related to the development of energy markets of the Republic of Croatia and their coupling and organisation in accordance with the rules of the single European Union internal market. Although the formal framework of the report is a calendar year, some of the data and comments included inevitably refer to the first part of the current year due to the continuous nature of energy activities.

The structure of the report has been additionally harmonised with the latest recommendations of the Council of European Energy Regulators (CEER); the report's

content and design have thus been developed in accordance with good regulatory reporting practice used by the EU and the Agency for the Cooperation of Energy Regulators (ACER). The long-term goal of the chosen form of reporting is to improve the transparency of regulatory work and make the results of Croatia's national energy sector comparable at the EU level.

At the outset, it is important to note that all the basic functions of regulated Croatian energy systems were in essence stable and reliable, security of supply was satisfactory, and the quality of energy services was acceptable throughout 2019.

The national energy infrastructure is, in principle, satisfactorily developed, functioning at a level that allows for both operational security and the physical and commercial development of the market. In this context, 2019 will be remembered for the construction of several important energy facilities and significant investment decisions related to the expansion of energy infrastructure (e.g. the first gas compressor station and liquefied natural gas terminal on the island of Krk), which give a new dimension to Croatia's security of supply and strategic energy potential.

The first part of 2020 brought completely new and unexpected challenges before the national energy systems due to the direct and indirect consequences of the Covid-19 pandemic. Despite all operational difficulties and decreased energy demand at the projected annual level of at least 10%, in technical and organisational terms, national energy systems have proven robust and reliable.

Wholesale energy markets essentially followed market trends in Europe and the region. As national electricity and natural gas markets are equipped with mechanisms that allow uninterrupted energy trading, differences in wholesale prices are mainly due to the degree of connectivity with surrounding markets. Developmental trends in this regard are moving in the right direction; in addition to the aforementioned infrastructural development, the positive role of the national electricity exchange (CROPEX) on the Croatian market must also be mentioned. As the nominated electricity market operator, in addition to the previously realised cross-border day-ahead market interconnection, CROPEX and the transmission system operator began the process of connecting the cross-border intra-day market. The positive consequences of the increased dynamics on the electricity market are already visible in the components of market balancing and the development of the ancillary services market.

Retail markets showed lower price growth in 2019 due to market growth in energy prices, while the regulated components of final prices (transport / transmission and distribution) generally fell as a result of regulatory efforts to improve and valorise network system efficiency.

Generally speaking, the retail electricity and gas markets are still not developing at the desired pace. The near future will show whether further deregulation processes will additionally activate retail markets. It should not be forgotten that the European Union energy market implies an "active" consumer – one who is not only the recipient of a given energy supply, but dominantly influences the supply of both energy and energy services through his active attitude and interest.

The legal framework of the energy sector at the EU level - which also dictates the development of Croatian legislation - is extremely dynamic. This dynamic environment brings continued challenges before legislators and the implementers of legislation (including national energy regulators), who must accommodate to new situations while continuing to meet previously set goals.

Retail market dynamics in Croatia are a good example of the existence of simultaneous goals, where the right to switch suppliers (as one of the foundations of the EU single internal energy market) often remains an end unto itself. Supplier margins are most often exposed to pressure from parallel goals of energy policy (promoting renewable sources,

energy efficiency obligations, etc.), which result in reduced interest in market participation, and even the departure of individual suppliers from the market. Regulators' concern in this context stems from the resultant lack of benefit from real market competition for end consumers.

Continued growth in the share of electricity production from renewable sources and high-efficiency cogeneration, as well as a noticeable increase in the share of distributed generation connected to distribution systems, certainly require careful and continuous monitoring and timely reactions and accommodation both on the technical and regulatory level, as well as on the level of national goals. At the turn of 2020, ambitious, capital national strategic documents were adopted, such as the Energy Development Strategy and the Integrated National Energy and Climate Plan, which places the development of the Croatian energy market in the context of the European energy strategy and connects national and European development goals.

The European energy sector was marked in the first half of 2019 by the completion of the ambitious *Clean Energy Package* (CEP), a thorough revision of energy policy framework to facilitate the EU energy transition to "cleaner" forms of energy and the meeting of goals to reduce greenhouse gas emissions. In the second half of the year, the new European Commission launched a comprehensive strategic concept, the *European Green Deal*, as a strategy to make the EU economy sustainable by 2050. The goals of economic development, which for the first time are not based on the depletion of natural resources and which should become carbon-neutral by 2050, postulate energy as one of the sectors responsible for the implementation of this concept.

Needless to say, this European economic and energy revolution represents the greatest recent challenge for the energy sector of all EU member states. The scope and details of implementation are yet to come, however it has already become clear that there will many demands and commitments and little time in which to implement them.

As do all European energy regulators, the Croatian Energy Regulatory Agency promotes a rational approach to new concepts based on the completion of current processes required to fully implement functional, interconnected (national) markets, the orderly implementation of prerequisites for the introduction of “smart” (as well as potentially disruptive) technologies, and the selection of the most cost-effective solutions.

HERA thus remains focused on making it possible to transfer benefits resulting from changes in the energy markets to end consumers of energy.

Tomislav Jureković
President of the Board of Commissioners
Croatian Energy Regulatory Agency

2 SUMMARY OVERVIEW OF THE ENERGY SECTOR

2.1 Electricity

Total electricity consumption in the Republic of Croatia in 2019 amounted to 18,169 GWh. After four years of growth, the consumption of the Croatian electricity system in 2019 fell by 1.0% as compared to 2018. The majority of electricity consumption in Croatia in (12,006 GWh, 66.1%) was covered by power plants located in Croatia, while the remainder was covered by physical net imports (6.163 GWh, 33.9%), which is at the level of values from 2018.

Total electricity sold to end consumers amounted to 16,3 TWh, which is a 0.5% decrease as compared to 2018. In 2019, the share of households in total electricity sold to end consumers was 37.6%, while the share of electricity sold to non-household end consumers was 62.4%, which is equivalent to indicators from 2018.

In the last few years (with the exception of 2018), the maximum load of the transmission system has occurred in the summer months due to relatively mild winters and increased consumption in the summer (air conditioning). The maximum load of the transmission system was reached on 25 July 2019 at a level of 3,038 MW. The ratio between the total connection capacity of power plants in Croatia and the maximum load of the Croatian electricity system in 2019 amounted to 1.71.

The total capacity of all power plants in Croatia amounted to 5,211 MW at the end of 2019. 10 thermal power plants with a total connected power of 2,019 MW, 19 hydroelectric power plants with a connected power of 2,127 MW, and 18 wind power plants with a connected power of 671 MW were connected to the transmission network. Over two thousand plants were connected to the distribution network, with a total installed capacity of about 394 MW. At the end of 2019, 1,347 plants were in the incentive system, with a total installed capacity of 877 MW. Wind power plants retained the largest share in the total installed capacity of all eligible producers in the incentive system.

As compared to 2018, 2019 saw an increase in the production of electricity from renewable energy sources. Power plants in the renewable energy and cogeneration incentive system covered about 16% (2,882 GWh) of total electricity consumption in 2019. In recent years, the proportion of production in facilities connected to the distribution network (distributed electricity sources[1]) has significantly increased. In 2019, the supply of electricity from distributed energy sources was nearly 30% higher than in 2018. The proportion of electricity supplied from distributed energy sources in the total consumption of the electricity system in 2019 amounted to 7.4% (1,348 GWh), as compared to 5.8% in 2018.

As of 31, December 2019, there were 60 valid licences for electricity generation, 12 licences for electricity supply, and 30 licences for electricity trade in Croatia. Hrvatska elektroprivreda – dioničko društvo (hereinafter: HEP d.d.) is still the dominant electricity producer, accounting for 83.5% of Croatia's production capacity and 79.8% of generated electricity.HEP d.d. participated in the Croatian wholesale market 2019 with 40.2 TWh; total trading volume amounted to 63.6 TWh.

[1] *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 in the immediate vicinity of energy users and places of consumption, i.e. they are decentralised as compared to "large" energy grids and the "large" sources attached to them.*

The EKO balance group became operational on 1 January 2019.[2] Hrvatski operator tržišta energije d.o.o. (the Croatian energy market operator, hereinafter: HROTE), as the head of the EKO balance group, was thus allowed to sell 30% of the electricity of the EKO balance group on the market, including on Hrvatska burza električne energije d.o.o. (the Croatian electricity exchange, hereinafter: CROPEX). The EKO balance group consists 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). HROTE sells energy from the EKO balance group on the wholesale electricity market. The EKO balance group has imbalances between the electricity produced and the energy sold by HROTE. HROTE is financially responsible to HOPS for imbalances in the EKO balance group.

In 2019, CROPEX's day-ahead market had 20 registered members. Trading volume on this market in 2019 amounted to 5,250 GWh.

The correlation between prices on the Croatian and Slovenian electricity exchange is higher than that between prices on the Croatian and Hungarian exchange, which is a consequence of the day-ahead market coupling between Croatia and Slovenia, which began in 2018. The day-ahead markets between Croatia and Hungary are still not coupled. As of 19 November 2019, the Croatian intraday market is coupled to the European intraday market through the Croatian, Slovenian, and Hungarian electricity exchanges. In accordance with the *CACM Regulation*[3], in December 2019, HERA extended CROPEX's status as nominated electricity market operator in Croatia to implement a single day-ahead and intraday coupling for the next four years, which gives CROPEX the right to participate in all regional and European projects related to coupling national day-ahead and intra-day markets. In addition to the day-ahead market coupling with Slovenia (via the IBWT project[4]), HERA, Hrvatski operator prijenosnog sustava d.o.o. (the Croatian transmission system operator, hereinafter: HOPS), and CROPEX continued activities to further connect the Croatian trading zone on the border with Hungary (via the 4M MC project[5]).

Undoubtedly the most important event in 2019 related to the allocation and use of cross-zonal (cross-border) capacities was the launch of the intraday coupling between the Croatian market and the markets of Slovenia and Hungary in November 2019. As part of the second wave of accession to the XBID[6] project, CROPEX and HOPS have successfully established an implicit intraday allocation regime with its EU neighbours. In addition to

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2 *Balance group is a term indicating a group consisting of one or more electricity market participants for whose imbalances the balance group manager is responsible in accordance with Article 3.2. of the* ***Electricity Market Act (Official Gazette no. 22/13, 102/15, 68/18, and 52/19)****.*
The EKO Balance Group is a balance group that, pursuant to Article 4.2. of the ***Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette no. 100/15 and 111/18)*** *and Article 29.1. and 29.2. of the Rules on electricity market organisation (Official Gazette no. 107/19 and 36/20), consists of producers of electricity and other persons who undertake the activity of producing electricity who have the right to an incentivised price in accordance with a concluded electricity buy-off agreement pursuant to the Tariff system for the production of electricity from renewable energy sources and cogeneration (Official Gazette no. 33/07), the Tariff system for the production of electricity from renewable energy sources and cogeneration (Official Gazette no. 63/12, 121/12, and 144/12), and 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), as well as the right to a guaranteed buy-off price pursuant to an electricity buy-off agreement. HROTE is responsible for planning the production and sale of electricity produced by the members of the EKO balance group.*

3 *Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management.*

4 *Italian Borders Working Table – a day-ahead market coupling initiative in which Croatia is involved via the Croatian-Slovenian border.*

5 *Four Markets Market Coupling Project (a project encompassing the coupling of the day-ahead markets of Hungary, Slovakia, the Czech Republic, and Romania).*

6 *Cross Border Intraday – a project to establish an intraday market between bidding zones in the EU.*

the usual implicit allocation of intraday capacities established by the XBID project, at the request of HERA and the National Energy Regulator of the Republic of Slovenia (hereinafter: AGEN-RS) and in accordance with the CACM Regulation and within the framework of the same project, HOPS and the *Slovenian Transmission System Operator* (hereinafter: ELES) also enabled the parallel functioning of explicit intraday allocation. HOPS earned a net total of HRK 58.5 million from auctions for the allocation of cross-zonal capacities in 2019, which is at the level of previous years. In accordance with Regulation (EU) 2019/943, the funds in question were used to guarantee cross-zonal trade.

In 2019, HEP-Proizvodnja d.o.o. was the only provider of imbalance settlement. Entities outside HEP d.d. also provided the tertiary reserve services for system security as a part of a pilot project. In 2019, HOPS's total costs for imbalance settlement amounted to HRK 75 million.

The total costs of providing ancillary services amounted to HRK 325 million, of which 85.2% was related to balancing reserve capacity. Ancillary system services are reserve power for automatic secondary frequency restoration reserve, reserve capacity for tertiary regulation for balancing, reserve capacity for tertiary regulation for system security, compensation operation for the purpose of voltage and reactive power control, the possibility of starting production units without external power supply, the starting of production units without external power supply, the availability of generating units for insular operation, and delivered electricity in insular operation. Ancillary system services are used for load frequency control with other power systems, voltage and reactive power control, emergency restoration of the power system after black-out, and power system management when its individual parts are operating separately from the rest of the power system.

In 2019, HOPS's charged the balance groups a total of HRK 133 million for imbalance settlement. Imbalances are amounts of energy determined by differences between what balance-responsible parties sold on the wholesale market and what was consumed and/or produced by their consumers and/or producers. As of 1 January 2020, imbalance prices are determined in a new way on the basis of the *Rules on system balancing* (HOPS, 11/2019). Instead of different prices, the same imbalance price is now applied to all balance groups; this price depends on the direction of imbalance of all balance groups and the weighted price of active balancing energy. With this new method of calculating imbalance prices, which are now dependent on the price of active balancing energy, the amount charged to balance groups for imbalances is expected to be lower in 2020 than it was in 2019. Imbalance prices in 2019, excluding balancing energy costs, also covered 20% of reserve power costs. Pursuant to the *EBGL Regulation*[7], HOPS will become involved in the operation of three EU platforms for electricity system balancing: the IN[8] platform (for imbalance exchange), the aFRR[9] platform (for activating balancing energy from the reserve to automatically re-establish frequency) and the mFRR[10] platform (to activate balancing energy from reserves to manually restore frequency).

Electricity transmission and distribution are regulated energy activities performed as public services. In Croatia, HOPS, as the transmission network operator, performs the public electricity transmission service, while HEP-Operator distribucijskog sustava d.o.o. (the Croatian distribution system operator, hereinafter: HEP-ODS) performs the public electricity distribution service as the distribution network operator. System operators are responsible for the operation, management, maintenance, development, and construction of the distribution network and for ensuring the long-term ability of the

7 *Commission Regulation (EU) 2017/2195 establishing a guideline on electricity balancing*

8 *Imbalance Netting*

9 *Automatic Frequency Restoration Reserve*

10 *Manual Frequency Restoration Reserve*

network to satisfy reasonable requirements for the distribution of electricity. Power losses in the transmission network in 2019 amounted to 388 GWh, or 1.8% of total transmitted electricity. The total cost of electricity purchased to cover losses in the transmission network for 2019 amounted to HRK 180.3 million, which yields a unit cost of HRK 464.79/MWh. In 2019, HOPS conducted workshops with market participants in order to identify barriers to participation in public tenders for the procurement of electricity to cover losses. Several obstacles were identified and, in cooperation with HERA, HOPS improved these procedures; as a result, more market participants applied for public tenders to cover losses in 2020, and some of these bids were approved by HOPS. Power losses in the distribution network in 2019 amounted to 1,276 GWh, or 7.6% of electricity taken up by the distribution network from the transfer network and from electricity producers in the distribution network. The total cost of electricity purchased to cover losses in the transmission network amounted to HRK 657 million, which yields a unit cost of HRK 514.77/MWh. The necessary quantities of energy to cover losses in the distribution network were procured by public tender. However, as the same energy entity has always won the tender until now, HERA demanded that HEP-ODS take a more active role in encouraging competition for energy procurement to cover losses. HERA also demanded HEP-ODS hold workshops with suppliers and electricity traders in order to discover which problems they face when providing bids for these public tenders.

At the end of 2019, HOPS and HEP-ODS submitted their ten-year network development plans to HERA for approval. Total planned financial investments into transmission network development across a ten-year period (2020-2029) amount to roughly HRK 7.3 billion. Out of this total amount, investments conditional upon the connection of new users to the network and increasing the connection capacity of existing users amount to approximately HRK 210 million. Total planned financial investments into distribution network development across a ten-year period (2020-2029) amount to roughly HRK 11.5 billion. Out of this total amount, investments conditional upon the connection of new users to the network and increasing the connection capacity of existing users amount to approximately HRK 4 billion. In general, planned investments in the transmission and distribution network were higher than in previous years.

HOPS and HEP-ODS submitted reports to HERA- on monitoring the security of supply in the transmission and distribution system for 2019. These reports and the currently available data supplied to HERA by HOPS and HEP-ODS suggest that the level of security of electricity supply in the Croatian electricity system is satisfactory, given the available production capacity in Croatia and the availability of sufficient electricity imports.

A decision dated 13 December 2018 resulted in a reduction in tariffs for electricity transmission and distribution for individual end consumer categories/models. The average reduction in network usage charges in 2019 amounted to: 13% for high-voltage non-household consumers, 14% for medium-voltage non-household consumers, 14% for Red model low-voltage non-household consumers, and 16% for Red model households. The remaining network usage consumption categories and tariff models did not change. Based on the new tariff items, the realised revenues of HEP-ODS in 2019 are HRK 274 million (8%) lower than revenues in 2018; HOPS' realised revenues are HRK 38 million (3%) lower than in 2018.

The retail electricity market in Croatia is completely open and there are no regulated prices, with the exception of supply of last resort. Supply of last resort is a service providing electricity supply service to non-household end consumers left without a supplier under specific conditions; this service is offered by a guaranteed supplier under regulated conditions. In 2019, the three largest suppliers had a 99% market share in household end consumer supply and a 95% market share in non-household end consumer supply, which represents an increase in concentration in the non-household category as compared to 2018. In 2019, nine suppliers were active on the retail market. 40,640 supplier switches took place in 2019, significantly less than the number of supplier

switches in 2018, which amounted to 85,732. The supplier switch rate in 2019 was 1.67%, which is less than in the previous year, when the rate was 3.51%. consumers from the commercial category accounted for 20,857 supplier switches; household category consumers accounted for 19,783 switches. This is a significant reduction in the number of supplier switches for both categories of consumers as compared to the previous year. All things considered, it can be concluded that the retail electricity market in Croatia is stagnating. The key reasons behind the stagnation are insufficient savings resulting from supplier switches, lack of trust in new suppliers on the part of end consumers, end consumer loyalty to their current suppliers and unstable operating conditions of supplier, such as e.g. the obligation to collect a solidarity charge from household end consumers (HRK 0.03/kWh), the obligation to buy off produced electricity from the incentives system at a regulated price, and frequent modifications to the legal framework. Also, under the **Energy Efficiency Act (Croatian Official Gazette no. 127/14, 116/18, and 25/20)**, suppliers have additional obligations related to the improvement of energy efficiency measures and unforeseeable costs arising therefrom. The mass roll-out of smart metering would accelerate the development of the retail market and enable faster supplier switching and additional opportunities for end consumers to participate in the electricity market. However, although HERA adopted the *Decision to implement a Cost-benefit analysis of smart meters and smart meter roll-out systems* in July 2017, the ministry responsible for the energy sector has not yet affirmed the plan and programme of measure to introduce smart meters for end consumers.

Electricity prices on the Croatian retail electricity market increased in 2019 as compared to 2018. Electricity prices in Croatia have been fully deregulated – this includes the price of electricity under the universal service, except for the price of supply of last resort. Average total sales prices of electricity for end consumers (including transmission and distribution charges and the price of energy, excluding taxes and other charges) increased in 2019 for the non-household category, while they remained at the same level as in 2018 for the household category. Although network usage charges were reduced in 2019, higher energy prices led to a more expensive total selling price of electricity for the non-household category. Energy costs amount to roughly 50% of the total price per kWh of electricity for medium voltage non-household end consumers; these same costs amount to roughly 40% of the price per kWh for low voltage household and non-household end consumers. The expected increase in the amount of energy generated under the incentives system and the introduction of the obligation to settle balancing energy costs for the EKO balance group may result in the need to increase charges paid by all electricity end consumers to stimulate the production of electricity from renewable sources of energy. This charge currently amounts to HRK 0.105 per kWh of electricity sold to end consumers. For example, the charge for stimulating the production of electricity from renewable sources amounts to roughly 11% of the price of 1 kWh of electricity for low-voltage non-household and household end consumers; for medium-voltage end consumers, this share amount to roughly 14% of the price of 1 kWh of electricity.

The quality of electricity supply is defined and monitored in terms of continuity of supply, voltage quality and service quality. Compared to 2018, the number and duration of supply interruptions in the transmission network declined in 2019, as did estimated energy not supplied. HEP-ODS has significantly improved the existing power outage monitoring system. In the distribution network, the annual system average interruption frequency index (SAIFI) and the annual system average interruption duration index (SAIDI) are better than in 2018. A total of 144 written complaints concerning voltage quality in the distribution network were filed in 2019, of which 104 were resolved in a timely manner. Also, a total of 27 requests to measure voltage quality were filed, 16 of which were resolved by HEP-ODS in favour of the applicant. HEP-ODS sent 22 reports on voltage quality measurement to network users in a timely manner. The majority of appeals and complaints received by HERA (65%) in 2019 pertained to the calculation of electricity

consumption, supply switching, loss of consumer status, right to use the power network, or connection to the power network.

The role of HERA in the renewable energy and high-efficiency cogeneration incentives system is to issue a decision granting the facility eligible electricity producer status for a period of 25 years when a suitable facility that uses renewable energy sources or high-efficiency cogeneration is constructed. The duration of the (potential) purchase agreement that the project leader concludes with HROTE is 14 years; this number is not related to the number of years for which the decision granting eligible producer status is issued. Facilities considered simple structures are granted eligible producer status on the basis of evidence (provided by the distribution system operator) that the electricity producer has been granted the right to permanent connection to the electricity network for a generation facility that uses renewable energy sources or high-efficiency cogeneration. In 2019, HERA issued 16 decisions on eligible electricity producer status for a total capacity of 640.21 MW. However, eligible producer status does not imply the right to incentivised prices for delivered electricity; is only one of the conditions to qualify for incentives.

Unified records on renewable energy and high-efficiency cogeneration projects, plants using renewable energy sources, high-efficiency cogeneration plants, and eligible producers in Croatia are kept by the ministry responsible for energy (Ministry of Environmental Protection and Energy) in the Register of Renewable Energy Sources and Cogeneration and Eligible Producers (hereinafter: RES&C Register). The Register is published on the Ministry's website at https://oie-aplikacije.mzoe.hr/Pregledi/, along with an interactive map of Croatia containing the locations of all facilities entered into the Register, accessible at https://oie-aplikacije.mzoe.hr/InteraktivnaKarta/. In December 2019, the Croatian Government adopted the *Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obliged to take up from the electricity market operator (Croatian Official Gazette no. 119/19)*, which stipulates that electricity suppliers are obliged to assume 40% of net delivered electricity from eligible producers as of 1 January 2020; in 2019, this percentage amounted to 70%. *The Regulation on promoting electricity production from renewable energy sources and high-efficiency cogeneration (Official Gazette no. 116/18)* prescribes the manner in which plants access new incentive systems through public tenders for market premium allocations through the conclusion of agreements with a guaranteed buy-off price based upon a decision selecting the lowest bidder. As the by-laws foreseen in the **Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette no. 100/15 and 111/18)** (regulation on quotas for promoting electricity production from renewable sources and cogeneration, and state aid programme) were not adopted in 2019 as planned, HROTE was unable to conclude any new contracts on electricity buy-off from renewable sources and cogeneration. HROTE's liabilities to producers in the incentives system in 2019 amounted to HRK 2.7 billion. The majority of this amount (HRK 1.1 billion) is for wind farms, followed by biomass power plants (HRK 568 million) and biogas power plants (HRK 443 million). The weighted average price of electricity paid in 2019 to eligible producers taking part in the incentives system amounted to HRK 0.93/kWh); this is roughly 2.5 times higher than the annual average electricity price on the day-ahead market on the CROPEX electricity exchange, as well as 5.7% higher than the weighted average price of electricity paid to eligible producers in the incentives system in 2018. With the establishment of the EKO balance group, HROTE became financially responsible for its imbalances as of 1 January 2019. Imbalance costs in 2019 amounted to HRK 45.4 million; members of the EKO balance group paid HROTE HRK 25.5 million to this end.

The 2018 Act on Amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act introduced the definition of a self-supply installation user as a household end consumer with a connected a self-supply installation that generates electricity from renewable energy sources or high-efficiency cogeneration. The difference

between the taken and delivered energy within a billing period (one month) is taken into consideration when calculating electricity consumption, network charges and the charge for renewable energy sources and high-efficiency cogeneration applicable to self-supply installation users. *As this affects the calculation of network charges, and thus HOPS' and HEP-ODS' income,* HERA created a study entitled *The estimated influence of self-supply installation users on the amount of distribution and transmission network usage charges* in order to evaluate the influence of self-supply installation users in the low voltage network (with installed photovoltaic systems on their roofs) on the reduced income of HOPS and HEP-ODS.

At the end of 2019, 146 such users were connected to the distribution network, with a total connection capacity of about 1 MW in network input and about 2 MW in network output.

A public consultation was held in March 2020; in May 2020, the *Regulation on quotas for promoting electricity production from renewable energy sources and high-efficiency cogeneration* (Official Gazette no. 57/20) was adopted (hereinafter: *Quota Regulation*); this regulation rules that production plants with a total capacity of 2,265 MW may enter new incentives systems (877 MW are currently in the incentives system). The prescribed quotas are higher than the targets for 2030. from the **Energy Development Strategy of the Republic of Croatia until 2030 with a view to 2050 (Official Gazette no. 25/20)** (hereinafter: the **Strategy**) and the *Integrated National Energy and Climate Plan for the period 2021 - 2030*. HERA believes it necessary to reconsider current quotas, especially given that the current incentives system already represents a significant burden on end consumers, and because the *Quota Regulation* provides for a manifold increase in this burden.

The guarantee of origin system enables suppliers of electricity to offer end consumers supply contracts or tariff models with a guaranteed share of one or more electricity sources used for electricity generation. End consumers can also rely on this system when choosing a tariff model, as it ensures the sale of electricity of a guaranteed structure. As the competent authority for issuing guarantees of origin in Croatia, HROTE operates a Register of Guarantees of Origin – a computer system that stores guarantees of origin, which is used to issue, transfer, and cancel guarantees of origin as electronic documents. By the end of 2019, six suppliers (five electricity producers and one trader) were registered in the Register. During 2019. 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 organised by CROPEX.

The system of energy savings obligations is prescribed by the **Energy Efficiency Act.** The bond parties in 2019 were energy suppliers that delivered a total of more than 300 GWh of energy in 2017. In 2020 this limit will be reduced to 100 GWh of energy, and in 2021 and each subsequent year it will amount to 50 GWh of delivered energy per year. By 30 June of the current year, the ministry in charge of energy (Ministry of Environmental Protection and Energy) must adopt an ex officio decision determining the required savings in kWh for the following calendar year. For unfulfilled obligations from the previous year exceeding 10% of the obligation, the Ministry determines the amount that the party is obliged to pay in a lump sum into the Environmental Protection and Energy Efficiency Fund (hereinafter: The Fund). *The Ordinance on the energy efficiency obligation system(Official Gazette no. 41/19)* prescribes the elements of the system of energy savings obligations and the manner in which it is to be implemented; it also prescribes the purpose of funds paid for unrealised savings, as well as the conditions necessary for the right to pay funds for unrealised savings in instalments. The suppliers who delivered more than 300 GWh of electricity in 2017 were: HEP ELEKTRA d.o.o., HEP-Opskrba d.o.o., GEN-I Zagreb d.o.o., RWE Energija d.o.o. (new name: E.ON Energija d.o.o.), and Hrvatski

telekom d.o.o. (which is no longer on the market). As the total energy delivered by individual suppliers and all their related parties to end consumers is taken into account, the number of bond parties is much higher because it includes the sale of gas, thermal energy, oil, and other energy sources. As the legal solutions have been known since 2018, suppliers who may not have prepared for the said obligations (who would not have independently realised savings) could buy them on the market. If they failed to do so, they would be required to pay amounts determined by the law into the Fund. It can be assumed that such expenses might result in more suppliers leaving the market, which would further reduce the market share of suppliers outside the HEP group. However, the data supplied to HERA by active suppliers with energy savings obligations show that they all fulfilled their obligations and reported them to the Ministry.

2.2 Natural gas

As in the previous years, the natural gas sector in 2019 was characterised by continued market opening and further improvement of existing by-laws. In 2019, the gas market was characterised by the following:

- moderate level of competition on the wholesale gas market, dominated by several major suppliers,
- liberalisation of the market for household consumers,
- a reduction in gas prices as compared to 2018 by 14.2% on the wholesale gas market and by 10.1% on the retail gas market for industrial consumers,[11]
- an increase in the gas sale price for household end consumers using the public gas supply service (5.5% on average) as compared to 2018,
- a final investment decision to implement a strategic floating terminal project for the receipt and dispatch of liquefied natural gas on the island of Krk (hereinafter: LNG Terminal),
- the continued implementation of Commission *Regulation (EU) 2017/460, of 16 March 2017, establishing a network code on harmonised transmission tariff structures for gas (*hereinafter: *Regulation NC TAR)* through consultation, and the finalisation of the Decision on the elements of the methodology for setting the reference price for gas transmission services and the *Decision on discounts, multipliers, and seasonal factors*,
- further determination of incentives and compensation for gas supply quality pursuant to the *General terms and conditions of gas supply,*
- an increase in the number of completed supplier switches as compared to 2018 and a reduction in the number of complaints related to the supplier switching procedure as compared to 2018.

In 2019, gas was actively supplied by 44 out of 51 licensed energy entities. Likewise, 12 energy entities held a valid license for gas trading, of which three were active on the market.

In 2019, the total quantity of delivered natural gas amounted to 26,297 GWh, which represents an increase of 3.4% as compared to 2018.

The largest share in sold quantities of gas on the wholesale market in 2019 was held by HEP d.d. at 26%, followed by HEP-Trgovina d.o.o. at 22.6%, INA d.d. at 19.9%, and PRVO PLINARSKO DRUŠTVO d.o.o. at 14.3%. The remaining (17.2%) share of the wholesale market was distributed among 10 balance responsible parties.[12]

[11] *Non-household consumers i.e. all end consumers who are not household consumers. The Gas Market Act (Official Gazette no. 18/18 and 23/20) defines non-household end consumers as consumers buying gas not intended for use in their own household.*

[12] *The balance responsible party is an energy entity that organises and manages the balance group and is responsible for harmonising quantities of gas that are submitted to the transmission system and taken up out of the transmission system.*

In 2019, 9 balance responsible parties traded a total of 23,145 GWh of gas at the virtual trading point (hereinafter: VTP[13]), at a total of 3.4% more than in 2018. In addition to trading at the VTP, transactions on the wholesale market in 2019 were also carried out on the trading platform. With the implementation of *Commission Regulation (EU) No 312/2014* of March 2014 *establishing a Network Code on Gas Balancing of Transmission Networks*, a trading platform[14] was established on which all balance responsible parties and the transmission system operator can trade short-term standardised products.

On the retail gas market, some gas suppliers continued offering market-based (unregulated) gas supply contracts to households.

In order to remove obstacles to the development of the retail gas market, HERA implemented a number of measures, the most important of which were:

- in cooperation with HROTE, improving the functionality of HROTE's IT system for supplier switching,
- informing market participants of their rights and obligations,
- improving by-laws governing the supplier switching procedure, and
- collecting opinions and recommendations from the interested public and energy entities through public consultation as a part of the conclusion of amendments to the *Gas Distribution System Network Code (Official Gazette no. 50/18, 88/19, and 36/20)* and the *General terms and conditions of gas supply (Official Gazette no. 50/18, 88/19, and 39/20)*.

In order to monitor and analyse the function of the gas market, HERA collects data quarterly on the quantities and prices of gas purchased and sold (delivered) on the wholesale and retail markets from all gas suppliers and traders in Croatia.

On the wholesale market, the average gas sale price without VAT in 2019 was HRK 0.1704/kWh, which represents a decrease of 14.2% as compared to 2018, when it was HRK 0.1987/kWh.

In 2019. the average retail gas sale price for non-household end consumers amounted to HRK 0,2003/kWh, which represents a decrease of 10.1% as compared to 2018.

Despite the decrease in price, the final gas price for non-household end consumers excluding taxes in Croatia in 2019 was 5.1% higher than the EU average (it was 2.8% lower in 2018), while the final gas price including taxes for non-household consumers in Croatia was 2.0% lower than the EU average in 2019.

In 2019. the final gas price for households excluding taxes in Croatia was still significantly lower than the EU average by 34.7% (it was 37.0% lower in 2018), while the final gas price for households including taxes in Croatia in 2019 was 42.2% lower than the EU average.

In 2019, suppliers in the public service were allowed to purchase gas from suppliers on the wholesale market under regulated conditions for the needs of household end consumers who use the public gas supply service. Pursuant to the provisions of the **Gas Market Act (Official Gazette no. 18/18)**, HERA adopted a *Decision on appointing the wholesale gas market supplier for the period from 1 April 2019 to 31 March 2020* on 8 February 2019 naming energy entity HEP d.d. the wholesale market supplier; during the

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13 *VTP – the virtual trading point is a location for gas trading between the entry and exit points of the transmission system, including the gas storage system, where balance responsible parties may trade in gas. Transactions are agreed bilaterally and confirmed and carried out via a system provided by HROTE.*

14 *The trading platform is an electronic platform provided and managed by HROTE, where a balance responsible party and the transmission system operator may trade nominal and locational products, which are defined as quantities of gas available for trade between parties on the trading platform.*

stated period, HEP d.d. was obliged to sell gas to suppliers in the public service at the referent gas price[15] of HRK 0.1985/kWh (9.7% higher than in the previous period).

Given this 9.7% increase in the wholesale component of the final gas price, the final gas price for households using the public gas supply service (determined by the *Decision on public service gas supply tariff amounts for the period from 1 March to 31 December 2019 and for the period from 1 January to 31 March 2020*, Official Gazette no. 15/19) was higher than the previously valid price by an average of 6.9%.

A decision taken by HERA in October 2019 also defined HEP d.d. as the wholesale market supplier for the period from 1 April 2020 to 31 March 2021. For this period, HERA set the referent price of gas at HRK 0.1924/kWh (3.1% lower than in the previous period). As HERA sets the upper limit of the referent gas price, HEP d.d. decided to implement a referent gas price in the amount of HRK 0.1825/kWh, which is 5.1% lower than the amount set by HERA and 8.1% lower than the referent price of gas in the previous period.

This reduction in the referent price of gas as a regulated wholesale component of the final gas price for households using the public gas supply service, alongside the simultaneous right of suppliers in the public service to purchase gas for their consumers from gas suppliers or traders according to market principles, resulted in a reduction of the final price of gas for households as of 1 April 2020. Pursuant to the provisions of the *Methodology for setting tariffs for public service gas supply and supply of last resort (Official Gazette no. 34/18 and 14/20)*, the principle of the upper price limit is used to determine the final price of gas for households using the public service. This means that suppliers in the public service can independently decide on the amounts of tariff items for public service gas supply, on the condition that these amounts are no higher than the tariff items for the corresponding period determined as the upper price limit by HERA. In accordance with the aforementioned provisions of the *Methodology*, 16 suppliers in the public service obligation took independent decisions on final prices for the period from 1 April 2020 to 31 March 2021. As a result of these decisions, the average decrease in the final gas price for households using the public service in Croatia amounted to 3.9% as of 1 April 2020.

Pursuant to the provisions of the **Gas Market Act**, the gas storage system operator was required to prioritise suppliers in the public service to supply household end consumers using the public service when distributing gas storage system capacities from 1 April 2018 to 31 March 2020. When implementing reservation and distribution procedures for standard bundled units in the gas storage system, the gas storage system operator was required to distribute a particular percentage of the total available number of standard bundled units to suppliers in the public service; it was allowed to offer the remainder of free capacities to other interested users. From 1 April 2020 to 31 March 2021, the gas storage system operator will distribute the available number of standard bundled units to suppliers in the public service based upon a proportional principle, as well as on the basis of historical data on delivered gas quantities.

In 2019, the total average price of natural gas transmission[16] amounted to HRK 0.0125/kWh, which represents a decrease of 27.3% as compared to 2018. In December 2018, upon request of the transmission system operator, HERA conducted an interim revision of allowed revenues of the gas transmission system operator (PLINACRO d.o.o.) for the second regulatory period; it also adopted a *Decision on tariffs for gas transmission in the second regulatory period 2019–2021 (Official Gazette no. 111/18)*. During this process, HERA analysed the economic efficiency of the operator's existing assets, establishing the justified value of the gas pipeline and, accordingly, the justified value of

[15] *The reference price of gas is the highest price at which the wholesale market supplier can sell gas to public service suppliers for household end consumers using the public supply service; it is defined as the sum of the purchase price on the spot market and the premium intended to cover wholesale supplier expenses.*

[16] *The ratio of total calculated charges for the use of the transmission system to the total transported quantity of gas in a given year.*

regulated assets, depreciation, and the return on the operator's regulated assets as elements of the revised allowed revenue. Likewise, the annual capacity calculation coefficient was decreased, which cumulatively resulted in a decrease in average gas transmission tariffs in 2019.

Between 18 December 2018 and 18 February 2019, HERA implemented the *Final consultation on the proposed methodology for setting the reference price for gas transmission services in line with Article 26 of Commission Regulation (EU) 2017/460* and *the Consultation on discounts, multipliers, and seasonal factors in line with Article 28 of Commission Regulation (EU) 2017/460,* based on which it adopted the *Decision on the elements of the methodology for setting the reference price for gas transmission services* and *the Decision on discounts, multipliers, and seasonal factors on 23 May 2019*. In accordance with these decisions, amendments to the *Methodology for setting tariffs for gas transmission* will be adopted during 2020.

In December 2019, again upon request of the transmission system operator (PLINACRO d.o.o.), HERA performed an interim revision of tariffs for gas transmission pursuant to the *Methodology for setting tariffs for gas transmission*; it also issued a *Decision on tariffs for gas transmission (Official Gazette no. 124/19)* setting new tariff amounts for gas transmission for 2020 and 2021. The overall effect of the implementation of this interim revision was a reduction in the average amount of gas transmission tariff items by 0.2% in 2020 as compared to 2019.

In terms of monitoring the quality of supply, HERA has been collecting data on guaranteed gas supply quality standards since October 2014. With the adoption of the *General terms and conditions of gas supply (Official Gazette no. 50/18)*, charges for services offered outside the guaranteed standard began being implemented in 2018; the *Amendments to the General terms and conditions of gas supply (Official Gazette no. 39/20)* in April 2020 prescribed a new guaranteed standard. HERA will continue collecting data, in order to determine incentives and compensation for inadequate service quality for the remaining guaranteed standards in the upcoming period.

The aforementioned gas market trends in Croatia during 2019, especially the significant reduction in gas prices for non-household end consumers on the wholesale and retail markets and the increase in competition on the retail gas market, indicate that the regulatory framework for gas market organisation rules, gas system access rules, and prices for the use of gas infrastructure is satisfactory and transparent. Further improvements to the regulatory framework are expected in coming years in Croatia, in addition to changes directed at market development and competitive gas pricing, especially regarding the deregulation of the public service gas supply for households alongside the simultaneous strengthening of consumer protection and the availability of market tools designed to further develop competition, increase quality of service, and improve the security of supply of gas. In this sense, HERA will continue to aim to ensure the conditions necessary for optimal gas market function, as well as to encourage the development of efficient market competition alongside the creation of stable, predictable business conditions for all market participants.

2.3 Oil, petroleum products, and biofuels

In 2019, the oil, petroleum products, and biofuel sector was marked by a decrease in the production of petroleum products, a continued increase in petroleum product imports, and a continued growth in quantities of crude oil transported via the oil pipeline system.

The total demand for crude oil in 2019 amounted to 2.59 million tonnes, which represents a decrease of 931,000 tonnes, 26.4% lower than in 2018. Imports of crude oil in 2019 amounted to 2.03 million tonnes, which represents a decrease of 940,000 tonnes, 31.6% lower than in 2018. Domestic production of crude oil amounted to 554,000 tonnes in

2019, which is a relative decrease of 56,000 tonnes (9.2%) compared to 2018, when domestic production of crude oil amounted to 610,000 tonnes.

Petroleum product production in 2019 amounted to 2.8 million tonnes, which is a relative decrease of 26.3% as compared to 2018. A total of 1.92 million tonnes of petroleum products were imported, which represents an increase in imports of 428,231 tonnes (28.7%) as compared to 2018; this points to an unfavourable trend towards increased dependence on imported petroleum products as a result of reduced domestic refinery capacities.

The total production of liquefied petroleum gas in 2019 amounted to 197,000 tonnes, which is an increase of 57,000 tonnes (22.4%) as compared to 2018.

Biofuel production in 2019 amounted to just 264 tonnes, which represents a significant decrease of 36.4% as compared to the 415 tonnes produced in 2018. This clearly shows that there has been a recent downward trend in biofuel production in recent years; this trend continued in 2019. The highest biofuel production was recorded in 2012 at 39,476 tonnes. Production declined in following years; in 2013, production amounted to 33,400 t, 35,300 t in 2014, 17,400 t in 2015, 6,031 t in 2016, 367 t in 2017, and 415 t in 2018. The presumed cause of the decrease in biofuel generation lies in adverse market trends, initiated by a termination of incentive payments for biofuel production for transport to biofuel producers, as well as insufficient investment in modernising biofuel production facilities.

2.4 Thermal energy

Although the 2013 **Thermal Energy Market Act (Official Gazette no. 80/13)** introduced substantial changes to the regulation, organisation, and functioning of the thermal energy sector, it did not lead to the expected increased competition in thermal energy supply or thermal energy buyer activities. In centralised and closed heating systems, thermal energy buyer activity and all energy activities related to the thermal energy sector are performed by the same vertically integrated energy entities, with no other thermal energy suppliers or buyers to supply or deliver thermal energy. As far as individual heating systems are concerned, thermal energy buyer activity is most often undertaken by energy entities performing energy activities in the thermal energy sector in a specific area, although other thermal energy buyers do operate in some towns. According to data from HERA's Register of Thermal Energy Buyers, the five largest energy entities (HEP-TOPLINARSTVO d.o.o., Zagreb; GRADSKA TOPLANA d.o.o., Karlovac; GTG VINKOVCI d.o.o., Vinkovci; BROD-PLIN d.o.o., Slavonski Brod; ENERGO d.o.o., Rijeka) purchase thermal energy for more than 97% of end consumers. Of the 42 entities in the Register of Thermal Energy Buyers, 59% actively undertook thermal energy buyer activity in 2019. Four new businesses were recorded in the Register of Thermal Energy Buyers in 2019, while one business was deleted from the register.

HERA issued six new licences for thermal energy production and seven new licences for thermal energy supply in 2019. Similar to the previous year, the new licences issued in 2019 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 2019, HERA issued nine decisions granting eligible electricity producer status to new biogas and biomass cogeneration facilities. The majority of cogeneration facilities participating in the incentives system for electricity production from renewable energy sources and cogeneration use produced thermal energy for their own needs or supply it to a single energy entity (wood processing company or farm). A significant portion of thermal energy used for own needs pertains to the preparation of the primary energy source (wood chip drying or production of biogas). Such use of produced thermal energy

is a consequence of minimal total annual efficiency requirements for incentivised prices of electricity delivered from biomass or biogas facilities. For high-efficiency cogeneration facilities using natural gas, the requirements for incentivised prices of delivered electricity are linked to primary energy savings. Despite the positive trend in thermal energy usage in cogeneration facilities with eligible electricity producer status, such facilities are usually built in order to produce electricity in locations without any significant demand for thermal energy. The exception to this are biomass cogeneration facilities of HEP-P-Proizvodnja d.o.o. in Osijek and Sisak, both facilities at 3 MW of electricity and 10 MW of thermal energy, which ensure that thermal energy produced from renewable energy sources is used in the centralised heating systems of these two cities.

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 centralised heating systems. The total number of end consumers of thermal energy, network length, and the installed plant capacity of existing energy entities essentially did not change as compared to 2018.

Energy entities engaged in thermal energy production and thermal energy distribution in centralised heating systems did not submit any requests to determine tariff amounts for thermal energy production or thermal energy distribution in 2019. However, the *Methodology for setting tariffs for thermal energy production (Official Gazette no. 56/14)* provides for a simplified procedure for changing tariffs in case of changes in the price of fuel used for thermal energy production. In 2019, HERA received a total of six such requests for changes in energy tariff items submitted by four energy entities (one request each from BROD-PLIN d.o.o., Slavonski Brod, and GRADSKA TOPLANA d.o.o, Karlovac, as well as two requests each from TEHNOSTAN d.o.o., Vukovar, and ENERGO d.o.o., Rijeka). These requests resulted in two increases in tariff items in 2019 (an increase of 7.35% for households in Slavonski Brod and an increase of 6.29% for households in Karlovac), as well as two increases in 2020 (an increase of 6.82% for households and an increase of 6.82% for non-household and business consumers in the Gornja Vežica centralised heating system in Rijeka). In the case of the two requests from TEHNOSTAN d.o.o., no increases in tariff items resulted for the two centralised heating systems in Vukovar.

With regard to the allocation and calculation of costs for supplied thermal energy, the volume of work related to the installation of heat exchangers, heat cost allocators (dividers), and thermal energy meters (calorimeter thermometers) has significantly decreased since 2017 as compared to the period before the deadline for installation of this equipment (31 December 2016). This is due to several factors, including upcoming amendments to the **Thermal Energy Market Act (Official Gazette no. 80/13, 14/14, 102/14, 95/15, 76/18, and 86/19) announced by the ministry competent for energy.**

In 2019, in order to ensure that the gas price used for the production of thermal energy for household end consumers is the same as the price used for gas household end consumers, the Croatian Government adopted the **Regulation on Amendments to the Thermal Energy Market Act (Official Gazette no. 86/19)**, which represents a continuation of the implementation of the previously valid **Regulation on the Amendment to the Thermal Energy Market Act (Official Gazette no. 76/18)**. This price relates to the transitional period prior to 31 March 2021 as defined by the **Gas Market Act.**

Regarding bylaws adopted on the basis of the **Thermal Energy Market Act**, an *Ordinance on the preparation of cost-benefit analyses (Official Gazette no. 110/19)* was adopted; in early 2020, an *Ordinance on criteria for issuing energy approvals for power plants (Official Gazette no. 5/20)* was adopted.

The Ordinance on the preparation of cost-benefit analyses determines the detailed content of an economic cost-benefit analysis within the framework of an assessment of national heating and cooling potential at the national level; it also determines the

methodology, assumptions, and principles to be followed when preparing cost-benefit analyses for individual electricity and/or thermal energy production facilities.

The Ordinance on criteria for issuing energy approvals for power plants regulates the issuance of energy approvals for all power plants that produce electricity or thermal energy (power plants, cogeneration facilities, boiler rooms).

These ordinances implement a framework for the execution of cost-benefit analyses from energy efficiency directives *Directive 2012/27/EU* and *Directive 2018/2002/EU*, which include a requirement for the implementation of cost-benefit analyses for thermal energy production facilities with an installed capacity above 20 MW.

The adoption of these ordinances is related to the implementation of a new incentives system from the **Renewable Energy Sources and High-Efficiency Cogeneration Act**. The *Ordinance on the Register of Renewable Energy Sources and Cogeneration and Eligible Producers (Official Gazette no. 87/19)* was adopted in 2019, which now regulates the structure and maintenance of the RES&C Register via a separate act. This *Ordinance* defines data and documentation written into the RES&C Register, as well as the obligations of competent authorities regarding the entry and amendment of data in the RES&C Register. In accordance with this, HERA enters data and documentation into the RES&C Register related to eligible producers of electricity.

Likewise, related to the renewable energy electricity production incentives system, the *Regulation on promoting electricity production from renewable energy sources and high-efficiency cogeneration* adopted in late 2018 provides 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. This *Regulation* does not foresee a group for high-efficiency cogeneration using natural gas. In 2020, the *Amendments to the Regulation on promoting electricity production from renewable energy sources and high-efficiency cogeneration (Official Gazette no. 60/20)* was adopted; this included particular improvements, however it did not change the categorisation of power plants and thus still does not allow incentives for high-efficiency cogeneration using natural gas. Directly related to this, the *Regulation on quotas for promoting electricity production from renewable energy sources and high-efficiency cogeneration* was adopted in May 2020; this regulation defines quotas for biomass and biogas cogeneration facilities, however cogeneration facilities using natural gas are lacking, as are quotas for liquid biofuel power plants (which are in essence cogeneration facilities), cogeneration facilities using waste and other renewable fuels, and cogeneration facilities using industrial waste heat.

Regarding the incentive system for electricity production from renewable energy sources, Article 25 of the **Renewable Energy Sources and High-Efficiency Cogeneration 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. This regulation should replace the *Ordinance on attaining eligible electricity producer status (Official Gazette no. 132/13, 81/14, 93/14, 24/15, 99/15, and 110/15)*, as the provision of the **Electricity Market Act** according to which said *Ordinance* was adopted has not been in force since 1 January 2016.The adoption of said *Regulation on quotas* is of exceptional significance to HERA due to the need to improve procedures for the issuance of decisions on eligible producer status, to clarify the technical conditions of plant use, to significantly elaborate upon the issue of affirming the efficiency of cogeneration, and to regulate other implementation issues related to eligible electricity producer status. Practice has shown that a number of situations exist that are not regulated by the *Ordinance on attaining eligible electricity producer status*, for which reason HERA must seek explanations or instructions for implementation from lawmakers.

In late 2018, the **Act on Amendments to the Energy Efficiency Act** entered into force; this act made significant changes to the energy savings obligation system, as well as enabling the energy efficiency obligation system to begin operating in 2019. However, the *Ordinance on the energy efficiency obligation system* was only adopted in May 2019; this ordinance regulates in detail the energy efficiency obligation system. Decisions imposing obligations on individual bond parties were adopted only in late 2019. Initial difficulties in implementation, uncertainties in decision-making to define savings obligations for particular bond parties, and doubts about the applicability of particular energy efficiency measures to prove savings resulted in the need for changes to the legal framework. As a result, the **Act on Amendments to the Energy Efficiency Act (Official Gazette no. 25/20)** and the *Ordinance on the energy savings monitoring, measuring, and verification system* (Official Gazette no 33/20) were adopted in early 2020.

The Energy Efficiency Act foresees the gradual implementation of the energy efficiency obligation system, according to which bond parties in 2019 were energy suppliers and related persons who supplied a total of more than 300 GWh of energy in 2017; this limit has been reduced to 100 GWh in 2020, and will be finally lowered to the limit of 50 GWh in 2021. Due to these limits, the only entities in the thermal energy sector who were subject to this requirement in 2019 were HEP-Toplinarstvo d.o.o., Zagreb and Brod-plin d.o.o., Slavonski Brod. It should be noted that Brod-plin d.o.o. was a bond party in 2019, for which reason Brod-plin d.o.o. was simultaneously a thermal energy supplier and a gas supplier; as a result, the total delivered gas and thermal energy to end consumers in 2017 (delivery according to which the obligation for 2019 was determined) was higher than the prescribed limit. In 2020, in addition to the aforementioned energy entities, ENERGO d.o.o. Rijeka will also become a bond party due to the lowered limit.

3 ORGANISATIONAL STRUCTURE, AUTHORITY, AND ACTIVITIES OF HERA

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)**.

HERA's activities are carried out in the interest of the Republic of Croatia and in accordance with its official authority.

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

HERA consists of a Board of Commissioners, Office of the President of the Board of Commissioners, Independent Internal Audit Department, core operations divisions, administrative and support services.

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 HERA, he represents HERA 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 HERA, organises and manages HERA's operations, and is accountable for legal compliance of HERA's operations. The President of the Board of Commissioners has a deputy.

The divisions and services are in charge of HERA's core operations, and provision of administrative and support services.

The main organisational units are as follows:

- Electricity Division,
- Gas and Oil Division,
- Thermal Energy Division,
- Legal Affairs and Human Resources, and
- Support Services.

HERA's organisational chart is shown in Figure 3.1.1.

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 to 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.

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)*, 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 the eligible producer status, and charges for settlement of claims, complaints and requests.

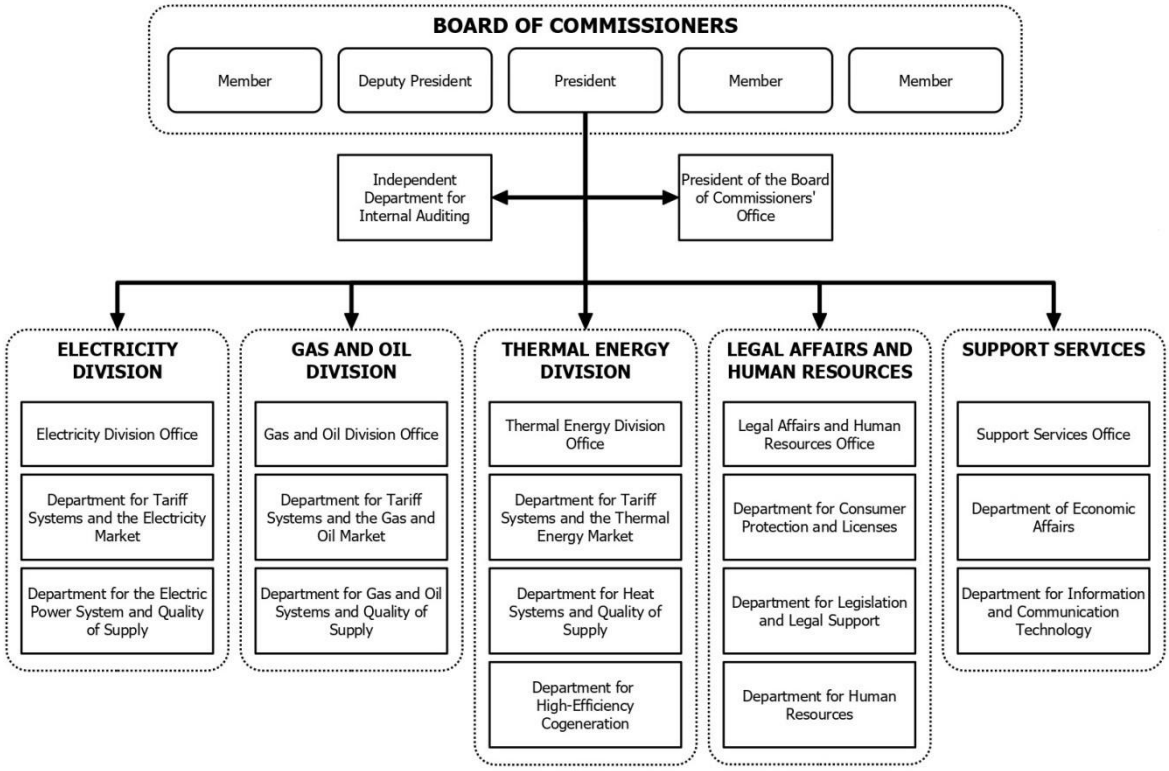

Figure 3.1.1. HERA organisational chart

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

3.2 Framework

The legal framework regulating activities within HERA's area of competence includes of 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, 95/15, 102/15, and 68/18),**
- **Electricity Market Act (Official Gazette no. 22/13, 102/15, 68/18, and 52/19)**,
- **Gas Market Act (Official Gazette no. 18/18 and 23/20)**,
- **Thermal Energy Market Act (Official Gazette no. 80/13, 14/14, 102/14, 95/15, 76/18, and 86/19)**,
- **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, and 94/18)**,

- **Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette no. 100/15 and 111/18)**,
- **Energy Efficiency Act (Official Gazette no. 127/14, 116/18, and 25/20)**,
- **Deployment of Alternative Fuels Infrastructure Act (Official Gazette no. 120/16),**
- **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)**,
- *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)*,
- *Decision on the amounts of charges for the regulation of energy activities (Official Gazette no. 155/08, 50/09, 103/09, and 21/12),* and
- other by-laws adopted pursuant to the **Energy Act** and other legislation regulating particular energy markets.

In July 2018, Croatian Parliament adopted the **Act on Amendments to the Act on the Regulation of Energy Activities (Official Gazette no. 68/18)**, which contains amended provisions concerning HERA's powers and obligations in terms of supervision over energy entities. The **Act on Amendments to the Act on the Regulation of Energy Activities** also obliges all natural and/or legal persons to respond to HERA's requests and submit all requested data, reports and other documents specified in HERA's request within a deadline set by HERA. One of the most important obligations arising from European legislation is *Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency (hereinafter: Regulation (EU) No 1227/2011 or the REMIT Regulation)*, which charges the national regulatory authorities with additional tasks related to monitoring the transparency and function of the European energy market. The 2018 **Act on Amendments to the Act on the Regulation of Energy Activities** has provided HERA with the powers necessary to perform these tasks.

3.3 Activities

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 of 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 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 methodologies and tariff systems under Article 9, paragraph 1, item 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 transport system and transmission system operators with ENTSO-E and ENTSOG 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. 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003 (hereinafter: Regulation (EC) No 714/2009) and Regulation (EC) No. 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 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 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, Paragraph 1, Items 1 through 8 of the **Act on the Regulation of Energy Activities**,
- reporting to other competent national authorities, ACER, the European Commission, and other European Union bodies, i.e. submitting annual reports to ACER and the European Commission, comprising information on activities taken and results achieved in relation to the scope of activities under Article 1, Paragraph 8, Items 1 to 11 of the **Act on the Regulation of Energy Activities**,
- laying down the requirements for the quality of energy supply in accordance with applicable regulations governing specific energy activities,
- laying down general requirements for energy supply,
- specifying and supervising the methodology for setting network/system connection charges for new consumers and for increasing the connection power/capacity for energy entities and end consumers,

- conducting cost-benefit analyses and obtaining opinions from representatives of consumer protection bodies with respect to introduction of smart metering devices for end consumers,
- supervision of the quality of energy supply pursuant to 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 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 such 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 HERA's website.

In 2019, the Board of Commissioners held 30 meetings, at which a total of 373 agenda items were discussed.

3.4 A general overview of HERA's activities and operations in 2019

3.4.1 Consumer protection

Within the area of its competence, 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.

In order to protect their rights, energy consumers may submit to HERA appeals, complaints and other submissions related to energy entities in the fields of electricity, thermal energy, natural gas and oil.

During 2019, HERA received a total of 670 submissions from energy consumers, which included both 184 energy consumers inquiries and 35 other submissions, as well as 451 energy consumer complaints. A total of 5 court proceedings were initiated against HERA's actions in 2019 before the administrative court with jurisdiction over such matters.

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 to introduce HERA as an authority that can be contacted in case of a violation of any right guaranteed by regulations governing the energy sector.

In 2019, HERA worked closely with the Ministry of Economy, Entrepreneurship and Crafts to create and update the *Central Consumer Portal.* HERA also closely cooperated with other public and legal entities in 2019, as well as with various consumer protection associations. 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 Electricity

In 2019, HERA's activities in the electricity sector mainly involved the following:

- drafting and adopting by-laws governing the electricity market,
- implementing European Union 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 networks, and participating in the drafting of reports by the Council of European Energy Regulators (hereinafter: CEER) 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 electricity supply and participating in the drafting of CEER reports on the quality of 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 unbundling of accounts for entities performing electricity-related activities as a public service (HEP-ODS),
- issuing 11 licences to perform energy activities (six licences for electricity generation and five licenses for electricity trade),
- extending 15 licences to perform energy activities (three licences for electricity generation, two licences for electricity supply, and ten licences for electricity trade),
- issuing decisions related to eligible electricity producer status, decisions altering a preliminary decision, decisions to amend a final decision, decisions on planned changes of conditions, decisions to extend a preliminary decision, decisions on granting eligible electricity producer status, and
- resolving appeals, complaints, and inquiries.

After consultation with the concerned stakeholders, HERA adopted the following by-laws in 2019:

- *Amendments to the Methodology for determining the origin of electricity (Official Gazette no. 127/19)*
- *Amendments to the Methodology for setting tariffs for guaranteed electricity supply (Official Gazette no. 20/19)*.

HERA issued the following decisions on tariffs:

- *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 25/19)* (for the period from 1 January to 30 June 2019)
- *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 59/19)* (for the period from 1 July to 30 September 2019)
- *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 82/19)* (for the period from 1 October to 31 December 2019)
- *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 121/19)* (for the period from 1 January to 31 March 2020)

HERA adopted the following opinions and approvals:

- opinion on the *Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obliged to take up from the electricity market operator*,
- opinion on the **Draft final proposal of the Act on Amendments to the** Electricity Market Act,
- opinion on the *Draft proposal for amendments to the Regulation on the establishment of a system of guarantees of origin of electricity*,
- approval for the *Annual energy procurement plan to cover losses in the distribution network for 2020* of the energy entity Hrvatski operator distribucijskog sustava d.o.o.,
- approval for the *Annual energy procurement plan to cover losses in the transmission network for 2020* of the energy entity Hrvatski operator prijenosnog sustava d.o.o.,
- approval for the *commencement of implicit allocation of cross-zonal capacities for intraday trading between Slovenian and Croatian bidding zones and Hungarian and Croatian bidding zones*,
- approval for the *Annual energy procurement plan to cover losses in the distribution network for 2019* of the energy entity HEP-Operator distribucijskog sustava d.o.o., Zagreb,

- prior approval for the *Draft Agreement on the provision of ancillary services for 2020* of the energy entity Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval for the *Draft Agreement on cross-border redispatching between Hrvatski operator prijenosnog sustava d.o.o., Zagreb and HEP- Proizvodnja, Zagreb for 2020,*
- prior approval to the *Draft Rules for the explicit daily allocation of cross-border transmission capacities for the border between the Croatian and Serbian bidding zones* of the energy entity Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval to the *Draft Rules for the allocation of intraday capacities for the border between the bidding zones of Hrvatski operator prijenosnog sustava d.o.o. ("HOPS") and EMS AD Beograd ("EMS")* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- prior approval for the *Draft rules for the intra-day allocation of cross-border transmission capacities between the regulation areas of Hrvatski operator prijenosnog sustava d.o.o. and Nezavisni operator sistema u Bosni i Hercegovini* of energy entity Hrvatski operator prijenosnog sustava, d.o.o., Zagreb,
- prior approval for the *Draft electricity delivery agreement to cover losses in the transmission network in 2020* of HEP-Operator distribucijskog sustava d.o.o., Zagreb,
- prior approval for the *Draft rules for the explicit daily allocation of cross-border transmission capacities for zones AT-CZ, AT-HU, HR-HU, CZ-DE, CZ-PL, PL-SK, PL-DE* of energy entity Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- prior approval for *planned changes to the terms and conditions for use of Solarna elektrana Babić power plant* of K.M.D. BABIĆ d.o.o., Viškovo,
- prior approval for the *Draft Amendments to the Rules on electricity market organisation* of energy subject Hrvatski operator tržišta energije d.o.o., Zagreb,
- prior approval for the *Draft Electricity supply agreement for a period of one year* of energy entity Hrvatski operator prijenosnog sustava d.o.o.., Zagreb,
- prior approval for *planned changes to the terms and conditions for use of Sunčana elektrana Zadravec power plant* of Robert Zadravec, Macinec,
- *prior approval for the Annual report on security of supply in the distribution system for 2018* of the energy entity HEP–Operator distribucijskog sustava d.o.o., Zagreb,
- *prior approval for the Annual Report on Security of Supply in the Distribution System for 2018* of the energy entity Hrvatski operator distribucijskog sustava d.o.o., Zagreb,
- prior approval for the *Draft Rules for using the register of guarantees of electricity origin* of the energy entity Hrvatski operator tržišta energije d.o.o.,
- prior approval for the *Draft ten-year (2019 – 2028) development plan for the HEP-ODS distribution network with a detailed elaboration of the initial three- and one-year periods* of the energy entity HEP-Operator distribucijskog sustava d.o.o., Zagreb,
- prior approval for *planned changes to the terms and conditions for use of Sunčana elektrana Atlantska plovidba power plant* of LUMISS d.o.o., Dubrovnik,
- prior approval for *planned changes to the terms and conditions for use of Spin Valis 1525 kWe power plant* of SPIN VALIS INTERNACIONAL d.o.o., Požega,
- *prior approval for the Draft electricity delivery agreement to cover losses in the transmission network no. 3-00_/2019* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- prior approval for *planned changes to the terms and conditions for use of Sunčana Mipcro power plant* of CONCEPTUS ELECTRICA d.o.o., Varaždin,
- prior approval for the *Draft business space rental agreement* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,

- prior approval for the *Draft Agreement on cross-border redispatching between* Hrvatski operator prijenosnog sustava d.o.o. and HEP-Proizvodnja d.o.o. for 2019,
- denial of prior approval for the *Draft agreement on the termination of preliminary connection agreement no. 31/14* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,

and the following decisions:

- decision on establishing the *Draft Amendment to the Methodology for establishing charges for connection to the electric power network for new network users and for increasing the connection capacity of existing network users*,
- decision on establishing the *Draft General terms and conditions for network usage and electricity supply*,
- decision to adopt the *Amendments to the Methodology for determining the origin of electricity*,
- decision on establishing the *Draft Conditions for the quality of electricity supply*,
- decision approving *deviation from obligations prescribed by Article 16 Paragraph 8 of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity* for Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision approving the *Draft Rules for the suspension and resumption of market activities* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- *Decision on tariffs for guaranteed electricity supply for the period from 1 January to 31 March 2020 for* HEP ELEKTRA d.o.o., Zagreb,
- *Decision on tariffs for guaranteed electricity supply for the period from 1 January to 31 March 2020* for HEP ELEKTRA d.o.o., Zagreb,
- decision approving the *Draft Rules on system balancing* of Hrvatski operator prijenosnog sustava d.o.o.,
- decision approving the *Draft Rules for explicit intraday capacity allocation between bidding zones between Hrvatski operator prijenosnog sustava d.o.o. and ELES d.o.o.,*
- decision approving the *Regional addendum to the Harmonised rules for the allocation of forward transmission rights for the Core region for the capacity budget in accordance with Article 52 of Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision affirming the *Draft Amendments to the Methodology for determining the origin of electricity,*
- *Decision* on *tariffs for guaranteed electricity supply for the period from 1 October to 31 December 2019* for HEP ELEKTRA d.o.o.,
- *Decision on* tariff amounts *for guaranteed electricity supply for the period from 1 October to 31 December 2019* for HEP ELEKTRA d.o.o.,
- Decision approving the *Common proposal of all transmission system operators for the determination of LFC blocks in Continental Europe synchronous area developed in accordance with Article 176.1. and Article 177.1 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation*,
- Decision approving the *Common proposal of all transmission system operators for the determination of LFC blocks in Continental Europe synchronous area developed in accordance with Article 178.1. and Article 179.1 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation*,

- decision approving the *Common proposal of all Continental European transmission system operators for the dimensioning rules for FCR Article 153.2 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation,*
- decision approving the *Draft List of significant grid users whose facilities are subject to mandatory conditions from Regulations (EU) 2016/631, (EU) 2016/1388, and (EU) 2016/1447 or national legislation, as well as a list of measures that these significant grid users must implement as affirmed by HOPS in accordance with Article 1/3 P/123420 11 Paragraph 4(c) and Article 23 Paragraph 4(c) of Regulation (EU) 2017/2196* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision approving the *Draft List of high-priority significant grid users and a list of conditions for their disconnection and re-connection* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision approving the *Draft Working conditions for system defence service providers on a contractual basis* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision approving the *Draft Working conditions for system reset service providers on a contractual basis* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- prior approval for the *Draft ten-year (2019-2028) development plan for the distribution network with a detailed elaboration of the initial three- and one-year periods* of the energy entity Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision approving the *Draft methodology for all transmission system operators for the distribution of congestion income in accordance with Article 57 of Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision approving the *Methodology and Conditions from the Draft working agreement for LFC[17] block SHB[18]* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- *Decision* on *tariffs for guaranteed electricity supply for the period from 1 April to 30 June 2019* for HEP ELEKTRA d.o.o.
- *Decision* on tariff amounts *for guaranteed electricity supply for the period from 1 October to 30 December 2019* for HEP ELEKTRA d.o.o., Zagreb,
- *Decision on electricity prices for low voltage end consumers and electricity prices for high and medium voltage end consumers in accordance with Article 62.2. and 62.3. of the Conditions for the quality of electricity supply (Official Gazette no. 37/17, 47/17, and 31/18),*
- decision on the adoption of a *Report on the use of revenues of Hrvatski operator prijenosnog sustava d.o.o. from the allocation of cross-border transmission capacities during the period from July 2017 to June 2018,*
- decision approving the *Regional addendum to the Harmonised rules for the allocation of forward transmission rights for the Core region for the capacity budget in accordance with Article 52 of Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision approving the *Draft Methodology for cost-benefit analysis to estimate periods during which individuals or groups offering FCR[19] with limited reserves must be available during alert state* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,

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17 *Load Frequency Control*

18 *Regulatory block that includes Slovenia, Croatia, and Bosnia and Herzegovina.*

19 *Frequency Containment Reserves*

- decision approving the *Draft Methodology for budgeting planned exchanges resulting from a single intra-day connection in accordance with Article 56 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- *Decision* on *tariffs for guaranteed electricity supply for the period from 1 April to 30 June 2019* for HEP ELEKTRA d.o.o.
- *Decision on tariff amounts for guaranteed electricity supply for the period from 1 April to 30 June 2019* for HEP ELEKTRA d.o.o., Zagreb,
- decision approving the *Draft Decision on evaluating requests for the general implementation of high-voltage DC transmission system activation and DC-connected power fleet modules* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision approving the *Draft Decision on evaluating requests for general implementation for end consumer connection* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision implementing the *Methodology for setting tariffs for guaranteed electricity supply,*
- decision approving the *Draft Methodology for budgeting planned exchanges resulting from a single intra-day connection in accordance with Article 43 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management* of Hrvatski operator prijenosnog sustava d.o.o., Zagreb,
- decision approving the *Common proposal of all transmission system operators for the key organisational requirements, roles and responsibilities in relation to data exchange in accordance with Article 40.6 of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation*
- and a decision approving the *Draft methodology for setting tariffs for guaranteed electricity supply.*

In addition to the above, HERA undertook the following in 2019:

- issued 11 licences to perform energy activities (six licences for electricity generation and five licenses for electricity trade),
- extended 15 licences to perform energy activities (three licences for electricity generation, two licences for electricity supply, and ten licences for electricity trade),
- issued decisions related to eligible electricity producer status, decisions altering a preliminary decision, decisions to amend a final decision, decisions on planned changes of conditions, decisions to extend a preliminary decision, decisions on granting eligible electricity producer status, and
- resolved 399 complaints, inquiries, and other submissions.

3.4.3 Natural gas

HERA's activities in the gas sector in 2019 were aimed at fulfilling its obligations under the provisions of the **Gas Market Act.** After public consultations in 2019 and in early 2020, HERA adopted the following by-laws:

- *Amendments to the General terms and conditions of gas supply (Official Gazette no. 50/18, 88/19, and 39/20),*
- *Amendments to the Gas Distribution System Network Code (Official Gazette no. 50/18, 88/19, and 36/20)*,
- *Amendments to the Methodology for setting tariffs for public service gas supply and supply of last resort (Official Gazette no. 34/18 and 14/20), and*

- *Amendments to the Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the receipt and dispatch of liquefied natural gas, and public service gas supply (Official Gazette no. 48/18 and 25/19).*

approved the following by-laws:

- *Amendments to the Network code for the gas transmission system (Official Gazette no. 50/18, 31/19, 89/19, and 36/20),*
- *Amendments to the Rules on gas storage system use (Official Gazette no. 50/18 and 26/20), and*
- *Rules on amendments to the Rules for LNG terminal use (Official Gazette no. 60/18 and 39/20)*

adopted the following decisions:

- *Decision on tariffs for gas transmission (Official Gazette no. 124/19),*
- *Decision on public service gas supply tariff amounts for the period from 1 April to 31 December 2019 and for the period from 1 January to 31 March 2020) (Official Gazette no. 15/19),*
- *Decision on appointing the wholesale gas market supplier for the period from 1 April 2019 to 31 March 2020 (HERA 2/2019),*
- *Decision on public service gas supply tariff amounts for the period from 1 January to 31 March 2020 for HEP-PLIN d.o.o., Cara Hadrijana 7, Osijek (Official Gazette no. 124/19),*
- *Decision on gas distribution tariff amounts for HEP-PLIN d.o.o., Cara Hadrijana 7, Osijek (Official Gazette no. 124/19),*
- *Decision on public service gas supply tariff amounts for the period from 1 April to 31 December 2020 and for the period from 1 January to 31 March 2021 (Official Gazette no. 16/20),*
- *Decision on appointing the wholesale gas market supplier for the period from 1 April 2020 to 31 March 2021 (HERA 10/2019),*
- *Decision on the elements of the methodology for setting the reference price for gas transmission services in accordance with Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas (HERA 05/2019), and*
- *Decision on discounts, multipliers, and seasonal factors in accordance with Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas (HERA 05/2019).*

HERA also:

- provided an opinion on the expiry of the *Regulation on requirements for wholesale trade and trade with third countries in certain goods (HERA 08/2019)*,
- provided an opinion on the Draft **Act on Amendments to the Gas Market Act** (HERA 01/2020),
- issued two licences for gas trading activities,
- issued one licence for gas supply activities,
- extended four licences for gas trading activities,
- extended seven licences for gas supply activities,
- extended one licence for gas market organisation,
- issued of one licence for liquefied natural gas terminal management,
- extended 16 licences for gas distribution activities, and
- took one decision on the expiry of a gas trade license,
- took one decision on the expiry of a licence for gas supply, and
- resolved 153 appeals, complaints, and inquiries from end consumers.

3.4.4 Oil and Petroleum Products

In 2019, HERA carried out the following activities in the oil and petroleum products sector:

- issued seven licences for energy activities (five licences for wholesale trade in petroleum products, one licence for oil and petroleum product storage, and one licence liquefied petroleum gas trade), and
- extended 22 licenses for energy activities (seven licences for oil and petroleum product storage, three licenses for wholesale liquefied petroleum gas trade, and 12 licenses for wholesale petroleum product trade), and
- took a decision on the expiry of two licenses for energy activities (one license for wholesale trade in liquefied petroleum gas and one license for oil and petroleum product storage).

3.4.5 Biofuels

In 2019, HERA carried out the following activities related to the biofuel sector:

- issued two licenses for energy activities (one license for the storage of biofuels and one license for wholesale biofuel trade), and
- extended four licenses for energy activities (one license for biofuel production, two for wholesale biofuel trade, and one for biofuel storage).

3.4.6 Thermal energy

HERA issued the following opinions related to applicable legislation in the thermal energy sector, in 2019:

- **Draft Regulation on Amendments to the Thermal Energy Act**,
- **Draft Regulation on Amendments to the Energy Efficiency Act,**
- *Draft Ordinance on the preparation of cost-benefit analyses*,
- *Draft Ordinance on criteria for issuing energy approvals for power plants,*
- *Draft Ordinance on the Register of Renewable Energy Sources and Cogeneration and Eligible Producers*, and
- *Draft Ordinance on the energy efficiency obligation system*.

As concerns the setting of tariffs, energy entities engaged in thermal energy production and thermal energy distribution in central district heating systems did not submit any requests to determine tariff amounts for thermal energy production or thermal energy distribution in 2018. However, the *Methodology for setting tariffs for thermal energy production (Official Gazette no. 56/14)* provides for a simplified procedure for changing tariffs in case of changes in the price of fuel used for thermal energy production. In 2019, HERA received a total of six such requests for changes in energy tariff items submitted by four energy entities.

In addition to the above, HERA undertook the following in 2019:

- issued 13 licences for energy activities (six licences for thermal energy production and seven licences for thermal energy supply),
- extended 10 licences for energy activities (five licences for thermal energy production, one license for thermal energy distribution, and four licences for thermal energy supply),
- recorded four new entities in the Register of Thermal Energy Buyers and updated records on thermal energy buyers,
- issued decisions related to eligible electricity producer status for cogeneration facilities, as well as issuing nine decisions granting eligible electricity producer status (six for cogeneration using biomass, two for biogas, and one for a geothermal power plant), two

decisions denying eligible electricity producer status, and one decision amending a prior decision granting eligible electricity producer status,

- resolved requests related to prior decisions granting eligible electricity producer status for cogeneration facilities, as well as issuing 10 decisions extending prior decisions granting eligible electricity producer status, four decisions denying requests to extend prior decision granting eligible electricity producer status, four decisions amending prior decisions granting eligible electricity producer status, and one decision rejecting a request to amend a prior decision granting eligible electricity producer status,
- issued 14 prior approvals for planned changes to conditions for the use of power plants submitted by eligible electricity producers for biogas and biomass cogeneration facilities,
- supervised eligible electricity producers in achieving prescribed energy efficiency conditions, as well as issuing six decisions defining primary energy savings for high-efficiency cogeneration using natural gas and 33 decisions defining the total yearly energy efficiency of biomass and biogas plants,
- resolved 53 cases – appeals, complaints, and inquiries from thermal energy end consumers, authorised representatives of co-owners, energy entities and thermal energy buyers, institutions, and other parties,
- resolved seven inquiries related to the granting of eligible electricity producer status for cogeneration facilities.

3.4.7 REMIT

On 25 October 2011, the European Parliament and the Council of the European Union adopted the *REMIT* Regulation, which introduced a harmonised framework for monitoring the wholesale electricity and natural gas markets in the European Union. Based on the *REMIT* Regulation, *Commission Implementing Regulation (EU) No 1348/2014 of 17 December 2014 on data reporting implementing Article 8(2) and Article 8(6) of Regulation (EU) No 1227/2011 of the European Parliament and of the Council on wholesale energy market integrity and transparency* (hereinafter: the *Implementing Regulation*) was adopted. *According to REMIT*, a market participant means any person (natural or legal), including transport and transmission system operators, who enters into transactions, including the placing of orders to trade, in one or more wholesale energy markets.

The single European framework in the electricity and natural gas wholesale markets was introduced such that *REMIT*:

- defines market abuse in the form of manipulation or attempts to manipulate the market, as well as insider trading,
- introduces a clear prohibition of market abuse,
- provides that market participants have an obligation to publicly disclose inside information that applies to wholesale energy market products directly or indirectly, and which could significantly impact the formation of wholesale market prices,
- provides that ACER monitors the wholesale markets at the European Union level, and
- governs data collection at the European Union level.

In accordance with the *REMIT Regulation*, provisions have been incorporated into the legislative framework that give HERA the investigative and enforcement powers necessary to carry out these tasks.

Before delivering information on transactions and transaction orders in wholesale markets, participants in the wholesale electricity market must register with the Centralised European Register of Energy Market Participants (CEREMP).

Market participants with business establishments in Croatia and those with business establishments outside of the European Union that are active on the wholesale market within Croatia must register with HERA if they are not already registered with a regulatory agency from another EU member state where they are also active.

HERA made registration of market participants in CEREMP possible as early as the beginning of 2015; by the end of 2019, roughly 100 participants in the electricity and/or natural gas market were registered.

After registration, market participants must:

- publicly disclose inside information,
- furnish ACER and the national regulatory body with information related to transactions made by electricity and natural gas producers, natural gas system operators or liquefied natural gas terminal operators, with the only purpose of covering the current physical loss resulting from unplanned outages, when a market participant would not be able to meet the existing contractual obligations without such covering, or if the measures are taken in agreement with the operator in question, or with the transport or transmission system operators with a view to ensuring secure and reliable system operation, and
- furnish ACER with records on transactions in the wholesale energy market, including orders to trade.

ACER plays a central role in the implementation of the *REMIT* Regulation, as it collects information related to network status and allocations of cross-zonal capacities from transport and transmission system operators, as well as information on transactions and transaction orders from market participants or directly from organised markets as defined by *REMIT*. Based on data relating to the entire European Union, ACER performs analyses and discovers potential misconduct on the energy market in the European Union, reports to national regulatory authorities, which are responsible for further investigation and the possible sanctioning of market participants.

Hera will enable the receipt of all market-sensitive information from ACER, which will be supported by adequate IT systems and BI (Business Intelligence) solutions.

In order to provide timely information to relevant market participants, in 2019, HERA published its "REMIT HERA newsletter", which serves to inform market participants electronically.

In addition, HERA updated its website to allow market participants to report suspicious transactions on wholesale markets, apply for exceptions to the prohibition of insider trading, and to report subsequent disclosures of inside information.

HERA continuously cooperates with regulators in Austria, Slovenia, Hungary, and the Czech Republic, primarily in terms of exchanging experiences in the implementation of the *REMIT* Regulation; Poland joined this regional initiative in 2018.

3.4.8. Implementation of the "Clean Energy for all Europeans Package"

The "Clean Energy for All Europeans" package (CEP) aims to realise the following EU goals by 2030:

- in terms of energy efficiency, the target has been increased to 32.5% in final energy consumption, with a special emphasis on increasing efficiency in buildings, which are the largest energy consumer (40% of final energy consumption and 36% of greenhouse gas emissions in the EU),
- in terms of renewable energy sources, the target has been increased to at least 32% of final energy consumption from renewable sources,
- in terms of greenhouse gas emissions, the goal is to reduce emissions by at least 40%.

With the creation of a national energy climate plan for 2021-2030, each country can decide on how to contribute to these goals from the CEP. The EU rates plans in order to

ensure that all member states are collectively satisfying the requirements of the Paris Accords.

The CEP is also intended to strengthen the rights of end consumers through greater transparency in electricity bills, better opportunities and flexibility in supplier switching, introducing active consumers, aggregators[20], local energy communities, and energy storage to the electricity market.

The Clean Energy Package prescribes procedures for cross-border cooperation and electricity supply security as an answer to demands for increased integration of renewable sources into the electricity supply system.

In March 2020, Croatian parliament adopted the **Strategy**. A foundational implementation document, the **Strategy** is an integrated national energy and climate plan until 2030, which defines implementation measures in order to attain goals. The Ministry of Environmental Protection and Energy has published the *Integrated National Energy and Climate Plan for the period 2021-2030* (hereinafter: NECP) on its website.

Electricity sector

The most important documents in the Clean Energy Package are *Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity* (hereinafter: *Regulation (EU) 2019/943*) and *Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU* (hereinafter: *Directive (EU) 2019/944)*.

According to *Regulation (EU) 2019/943*, 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 capacity must be ensured for cross-zonal trading. The remaining 30% of capacity can be used for confidence limits, circular flows and internal flows at every critical network element. *Regulation (EU) 2019/943* also allows national regulatory authorities may grant a derogation (the delay of implementation) from the aforementioned requirements on foreseeable grounds if necessary for maintaining operational security at the request of the transmission system operators in a capacity calculation region. After consulting with regulators from the Core region[21] for transmission capacity calculation, HERA approved an exception from this requirement for HOPS- for 2020. The reason for this exception is the inability to calculate a minimum capacity with satisfactorily reliability, the lack of a few methodologies in the Core region, and the highly demanding minimum capacity limits. *Regulation (EU) 2019/943* also prescribes that, where a derogation is granted, the relevant transmission system operators shall develop and publish a methodology and projects that shall provide a long-term solution to the issue that the derogation seeks to address. In March 2020, HOPS published a document on its website entitled *Methodology and projects offering long-term solutions to the causes of derogations from requirements prescribed in Article 16.8 of Regulation (EU) 2019/943.*

Regulation (EU) 2019/943 prescribes that, by 5 January 2020, ENTSO-E[22] shall submit to ACER a proposal specifying which transmission system operators, bidding zones, bidding zone borders, capacity calculation regions, and outage coordination regions are covered

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20 *An aggregator is a legal person that brings together various technical units into a group with the aim of providing imbalance settlement on the reserve energy and balancing energy market.*

21 *Region in the EU for the calculation of transmission capacities determined by borders and not by bidding zones, and which 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 (Link to ref. 37 and ref. 53)*

22 *European Network of Transmission System Operators for Electricity*

by each of the system operation regions (SOR). The proposal shall take into account the grid topology, including the degree of interconnection and of interdependency of the electricity system in terms of flows and the size of the region which shall cover at least one capacity calculation region. ACER's decision defines fives SORs: Baltic SOR, Nordic SOR, IU[23] SOR, CE SOR, and SEE SOR. The Croatian bidding zone falls under the CE SOR. Furthermore, *Regulation (EU) 2019/943* prescribes the founding of regional coordinating centres (RCC) by 5 July 2020, as well as their tasks. Regional coordination centres complement the role of transmission system operators by performing the tasks of regional relevance assigned to them in accordance with *Regulation (EU) 2019/943*. Thus, the following step in implementing *Regulation (EU) 2019/943* is for system operators from each SOR to deliver a joint proposal on founding an RCC to the competent regulators.

Regulation (EU) 2019/943 also prescribes that, as of 1 January 2021, the imbalance settlement period must be 15 minutes in all scheduling areas, unless regulatory authorities have granted a derogation or an exemption. Requests for exemptions are submitted for the period from 1 January 2021 to 31 December 2022, or by 1 January of the year following the satisfaction of necessary requirements defined in the request. In March 2020, HOPS delivered HERA a request for exemption from the implementation of the 15-minute imbalance settlement period, which it considered impossible to implement in the aforementioned time period. To introduce a 15-minute imbalance settlement period, data security is required to plan the work of market participants on a 15-minute level, IT systems of market participants must be adjusted, internal and inter-zonal electricity trade must be enabled on a 15-minute level, and the *Rules for the application of alternative load curves* (HEP-ODS, 12/16) must be amended. In June 2020, HERA approved HOPS' request.

The provisions of *Directive (EU) 2019/944* must be implemented in Croatian legislation by 31 December 2020. The main novelties introduced by *Directive (EU) 2019/944* are provisions regarding citizen energy communities, active consumers, the right to dynamic electricity price contracts, supplier switches within 24 hours (by 2025 at the latest), aggregation contracts, consumption management through aggregated consumption, a regulatory framework to stimulate flexibility in distribution networks, integrated electromobility, data management in the distribution and transmission network and cooperation between systems operators, ownership and management of energy storage, and devices to offer (frequency and non-frequency)[24] ancillary services, etc.

Thermal energy sector

In 2018, three directives from the Clean Energy Package were adopted that have a significant impact on the development of the thermal energy sector.

Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency (hereinafter: *Directive (EU) 2018/2002)* introduces new, more refined provisions on measuring thermal energy consumption in multi-apartment buildings, as well as new provisions related to thermal energy billing. *Directive (EU) 2018/2002* also introduces changes related to required energy savings schemes.

The Croatian government has included a draft **Act on Amendments to the Energy Efficiency Act** in its Legislative Activities Plan for 2020, considering that the deadlines for harmonising national legislation with *Directive (EU) 2018/2002* expire in 2020.

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23 SOR which takes into account the contractual framework applicable in relations between the United Kingdom and the European Union.

24 Frequency services used in Croatia are frequency containment reserve (FCR), automatic frequency restoration reserve (aFRR), frequency restoration via manual activation (mFRR), as well as energy derived from them alongside imbalance netting (IN), while non-frequency services include compensation operation for the purpose of voltage and reactive power control, the possibility of starting production units without external power supply, the starting of production units without external power supply, the availability of generating units for insular operation, and delivered electricity in insular operation.

The goal of the **Act on Amendments to the Energy Efficiency Act (Official Gazette no. 25/20)**, which was adopted in early 2020 by urgent procedure, is to clarify calculations on the basis of which the Ministry will determine unfulfilled obligations in the energy efficiency obligation system. However, it did not take into account changes in the energy efficiency obligation system and alternative energy savings policy measures in final consumption foreseen by *Directive (EU) 2018/2002*; thus, further amendments to the **Act** are expected.

Directive (EU) 2018/2002 stipulates that, by 1 January 2021, the European Commission shall carry out an assessment of the potential for energy efficiency in conversion, transformation, transport, transmission, and storage of energy, and shall submit a report to the European Parliament and to the Council. Thus, in 2019, the *Commission Delegated Regulation (EU) 2019/826 of 4 March 2019 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* was adopted (hereinafter: *Commission Delegated Regulation (EU) 2019/826*).

According to *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* (hereinafter: *Directive 2012/27/EU), at the* request of the European Commission, assessments of the potential for energy efficiency are updated and submitted to the Commission every five years ; the deadline for the delivery of the first comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling implemented by member states was 31 December 2015.

The Ordinance on the preparation of cost-benefit analyses was adopted in 2019; it determines the detailed content of business cost-benefit analyses within the framework of assessments of the potential for heating and cooling on the national level. This *Ordinance* transposes the provisions of *Directive 2012/27/EU* and *Directive (EU) 2018/2002*, as well as ensuring the implementation of *Commission Delegated Regulation (EU) 2019/826*.

Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (hereinafter: *Directive (EU) 2018/2001)* introduces targets for the increase of the share of renewable energy in heating and cooling. The *Directive* also regulates the issue of disconnection of thermal energy end consumers from thermal systems (i.e. disconnection of consumers from centralised heating or cooling systems, according to the terminology from the *Directive*). It simultaneously regulates the connection of production facilities using renewable energy sources to existing thermal systems. The deadline for the harmonisation of national legislation with *Directive (EU) 2018/2001* is 30 June 2021. The Croatian government's Legislative Activities Plan for 2020 includes the creation of a draft **Renewable Energy Sources and High-Efficiency Cogeneration Act.**

Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and *Directive 2012/27/EU on energy efficiency* (hereinafter: *Directive (EU) 2018/844*) introduces the obligation to establish long-term strategies for the renovation of the national stock of residential and non-residential buildings, both public and private, in order to ensure a highly energy-efficient and decarbonised building stock, and facilitate the cost-effective transformation of existing buildings into nearly zero-energy buildings. *Directive (EU) 2018/844* also improves the requirements applicable to new buildings, the requirements concerning technical building systems, and improves the inspections of heating systems and air-conditioning systems.

The **Act on Amendments to the Construction Act (Official Gazette no. 125/19)** was adopted in late 2019, which transposes *Directive (EU) 2018/844* into Croatian legislation,

as well as ensuring the implementation of *Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council.* In addition to other amendments, the **Act** improves the framework for energy efficiency in buildings, introduces provisions promoting electromobility and the establishment of infrastructure for charging electric vehicles in buildings, and improves and supplements provisions on the regular inspection of heating and air conditioning systems; it also includes provisions on equipping buildings with building automation and management systems. Additionally, the **Act** defines the framework for new public policy related to building renovation, including a framework for the adoption of a Long-term strategy for the renovation of the national building fund by 2050 and a Programme of building energy renovation for the period from 2021-2030.Also related to Directive (EU) 2018/844, the Ordinance amending the Ordinance on verifying building energy certificates and reports on regular heating and cooling or air conditioning systems in buildings (Official Gazette no. 73/15 and 54/20) was adopted.

3.4.9 Regulatory Affairs and Consumer Protection Council

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

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

During 2019, one session of the Council was held; it involved a discussion of the position of consumers in the CEP, the role of the billing metering point register on the gas market, and by-laws in the field of renewable energy sources and their implementation plans.

3.4.10 Cyber security

In 2015, the Croatian government adopted the *National Cyber Security Strategy and the Action Plan for the Implementation of the National Cyber Security Strategy (Official Gazette no. 108/15),*[25] which aim to achieve a balanced and coordinated response to security threats in modern 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*".[26]

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

[25] *Decision implementing the National Cyber Security Strategy and the Action Plan for the Implementation of the National Cyber Security Strategy (Official Gazette no. 108/15)*

[26] *Act on the Cyber Security of Key Service Operators and Digital Service Providers (Official Gazette no. 64/18)*

systems across the Union (hereinafter: *NIS Directive*) and the **Act on the Cyber Security of Key Service Operators and Digital Service Providers (Official Gazette no. 64/18)** (hereinafter: **Cyber Security Act**) are of especial importance to the energy sector, as is the corresponding *Regulation on the cyber security of key service operators and digital service providers (Official Gazette no. 68/18)* (hereinafter: *Cyber Security 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 cyber security in key service sectors, which includes the energy sector (electricity, oil, and gas). The aforementioned *Cyber Security 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.

Key service operators, as defined by the **Cyber Security Act**, are "*any public or private entity that provides any of the key services from the List in Annex I.* ***of the Cyber Security Act****, in which the key services offered by said entity depend on network and information systems, and an incident would have a significant negative impact on the provision of key services*".

The Cyber Security Act regulates procedures and measures by which to attain a high common level of cyber security for key service operators and digital service providers, outlines the jurisdiction and authorities of competent sector bodies, defines a single national contact point, defines 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 by which to achieve a high common level of cyber security 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 *Cyber Security 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 sector.

Sector	Sub-sector	Key service	Criteria	Thresholds
Energy	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^3
			Reduced petroleum product storage capacity at a particular storage facility	12,000 m^3
	Gas	Gas distribution	Interruption of distribution to end consumers	More than 20,000 billing metering points
		Gas transmission	Transmission interruption	Without exception
		Gas storage	Reduction in storage capacity	5% of gas consumption in Croatian in the previous year
		Receipt and dispatch of LNG	Reduced LNG regasification capacity in m^3/h	More than 100,000 m^3/h
		Natural gas production	Reduced gas production delivered to the transmission system at a single entry point	20%

In accordance with the aforementioned definition, the **Cyber Security Act** distinguishes between a few competent authorities for key service operators, as defined in Annex III of the Cyber Security 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 CSIRTs (IT System Security Department [ZSIS] and the National CERT), and
- technical conformity assessment bodies (ZSIS and the National CERT).

Table 3.4.2. List of competent bodies for key services – energy sector

Sector of key services	Competent sector body	CSIRT	Technical conformity assessment body
Energy	State body with jurisdiction over the energy sector – Ministry of Environmental Protection and Energy	IT System Security Department	IT System Security Department

One of the requirements of key service operators arising from the **Cyber Security Act** and the *Cyber Security 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 a key service, two Croatian CSIRTs (ZSIS and the National CERT) have developed *Guidelines for the submission of reports on incidents with significant impact on key service operators and digital service providers*[27], which contain a protocol for reporting to the competent CSIRT, criteria for defining significant impact, incident reporting forms, and other key information for successful communication between key service operators and the competent CSIRTs.

If data on the state of cyber security available in CEER's Cybersecurity Benchmark[28] are compared, Croatia does not lag behind other member states in terms of national legislation related to cyber security. In fact, it has gone a step further in some segments. One example of this is the definition of an additional key service sector – *Business services for state bodies*, in addition to the mandatory seven sectors from the *NIS Directive*, as well as the prediction of a real situation in which the competent authorities required to

27 *Republic of Croatia, Information Systems Security Bureau: https://www.zsis.hr/UserDocsImages/Prijava_incidenata/Smjernice%20za%20dostavu%20obavijesti%20o%20incidentima%20sa%20znatnim%20učinkom%20operatora%20ključnih%20usluga%20i%20davatelja%20digitalnih%20usluga.pdf*

28 *CEER Cybersecurity Work Stream (CS WS): Cybersecurity Benchmark, Ref: C19-CS-56-03, 18 December 2019, Dostupno na: https://www.ceer.eu/documents/104400/-/-/f301a06f-2224-353f-fed9-eee50a10d78d*

conduct regular conformity assessments of key service operators do not have sufficient resources (either human resources or required competences related to the revision of cyber security); this situation was avoided with the introduction of the term "technical body for conformity assessment", which is not foreseen by the *NIS Directive*.

Additionally, in order to gain better insight into the real state of cyber security of key service operators focused only on the energy sector, the proposal is to strengthen mutual communication between the Ministry of Environmental Protection and Energy and HERA on the cyber security of key service operators in the energy sector. This need is most apparent in some issues from the aforementioned Cybersecurity Benchmark document, to which HERA currently does not have an adequate, clear answer as it does not possess all the necessary information. For example, one of these is the issue on implementing security measures with key service operators based on security standards, the implementation of readiness tests related to security incidents in such organisations, reporting on past security incidents (of which ZSIS has been informed as the competent CSIRT for the energy sector), or information on whether a risk assessment has been done related to cyber security with key service operators, etc. Additionally, information would be useful on the estimated compliance of key service operators with measures prescribed by the **Cyber Security Act**, the efficiency of the implementation of security measures, the results of security and IT systems audits, and conformity assessments of security and IT systems. If HERA received the aforementioned information, either on the basis of the mutual exchange of information or through direct exchange with key service operators (for whom no such legal obligation exists) or with the competent sector body (Ministry of Environmental Protection and Energy), it would be possible to provide more precise answers and better participate in discussions on the topic of the cyber security of key service operators in the energy sector.

4 ELECTRICITY

4.1 Regulation of the Legal Framework for the Thermal Energy Market

In February 2019, HERA adopted the *Methodology for setting tariffs for guaranteed electricity supply (Official Gazette no. 20/19*), which takes into account expected price changes in the retail electricity market and whose implementation will result in tariffs that provide a higher average price for supply of last resort than the one on the retail electricity market.

In March 2019. HERA adopted a *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 25/19)*, which have been implemented as of 1 April 2019.

In April 2019, the Ministry of Environmental Protection and Energy adopted the *Ordinance on the energy efficiency obligation system*, which prescribes elements of the energy efficiency obligation system and its implementation.

In May 2019, the Croatian government adopted the *Regulation on amendments to the Regulation on the establishment of a system of guarantees of origin of electricity (Official Gazette no. 55/19),* which allows auctions of electricity guarantees of origin via the CROPEX trading platform.

In May 2019, Croatian Parliament adopted the **Act on Amendments to the Electricity Market Act *(Official Gazette no. 52/19)***, which supplements oversight provisions.

In June 2019, HERA adopted a *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 59/19),* which have been implemented since 1 April 2019.

In July 2019, with prior approval from HERA, HROTE adopted the *Rules on using the register of electricity guarantees of origin* (HROTE 12.07.2019.) in order to enable the sale of electricity guarantees of origin issued for electricity produced in plants in the electricity production incentives system, which are sold on the market.

In July 2019, the Ministry of Environmental Protection and Energy adopted the *Ordinance on the Register of Renewable Energy Sources and High-Efficiency Cogeneration and Eligible Producers* in order to monitor and supervise the implementation of renewable energy source and high-efficiency cogeneration projects, as well as to offer administrative support to project leaders and public bodies.

In July 2019, in accordance with *Commission Regulation (EU)2017/2196of 24 November 2017 establishing a network code on electricity emergency and restoration (*hereinafter: NCER Regulation*)*, with HERA's approval, HOPS published five documents that are part of the *Plan to defend the electrical system against major disruptions*.

In August 2019, HERA adopted a *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 82/19)*, which has been implemented since 1 October 2019.

In October 2019, after obtaining approval from HERA, HROTE adopted the *Rules on electricity market organisation (Official Gazette no. 107/19)* in order to comply with the EBGL Regulation.

In October 2019, after obtaining approval from HERA, HOPS adopted the *Rules on system balancing* in order to comply with the *EBGL Regulation*.

In November 2019, HERA gave approval for the commencement of the implicit allocation of cross-zonal capacities for intraday trading between Slovenian and Croatian bidding zones and Hungarian and Croatian bidding zones.

In December 2019, HERA adopted the *Amendments to the Methodology for determining the origin of electricity (Official Gazette no. 133/14 and 127/19)* in order to comply with the **Renewable Energy Sources and High-Efficiency Cogeneration Act.**

In December 2019, HERA adopted the *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 121/19)* which has been in force since 1 January 2020.

In December 2019, the Croatian Government adopted the *Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obliged to take up from the electricity market operator*, stipulating that the share of net delivered electricity of eligible producers electricity suppliers are required to take up from the electricity market operator is reduced from 70% to 40%.

In December 2019, the Ministry of Environmental Protection and Energy published the *Croatian Integrated National Energy and Climate Plan for the period 2021-2030*.

In December 2019, the Ministry of Environmental Protection and Energy adopted the *Ordinance on criteria for issuing energy approvals for power plants*, which regulates the procedure of issuing energy approvals for power plants.

In December 2019, HERA adopted the *Decision granting HOPS a derogation from the provisions of Article 16.8 of Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity*, which prescribes that a minimum of 70% of capacity must be offered for cross-zonal trading.

In February 2020, Croatian Parliament adopted the **Act on Amendments to the Energy Efficiency Act (Official Gazette no. 25/20)**, which clarifies the calculation process for determining unfulfilled obligations in the field of energy savings for entities in the energy savings obligation system.

In March 2020, Croatian Parliament adopted the **Strategy**, which represents a step towards realising the vision of low-carbon energy and ensures a transition to a new period of energy policy, ensuring accessible, safe, and high-quality energy supply without an additional burden on the state budget in the framework of state support and incentives.

In February 2020, HERA adopted *Amendments to the Conditions for the quality of electricity supply (Official Gazette no. 16/20)*, which improves the calculation of the average duration of interruption per consumer.

In February 2020, public consultations ended on the *Draft Amendments to the Methodology for establishing charges for connection to the electric power network for new network users and for increasing the connection capacity of existing network users* and the *Draft General terms and conditions for network usage and electricity supply.*

In March 2020, HERA adopted a *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 121/19)*, which has been implemented as of 1 April 2020.

In March 2020, after receiving prior consent from HERA, HROTE adopted the *Amendments to the Rules on electricity market organisation (Official Gazette no. 36/20)* in order to enable natural and legal persons to supply electricity to the electricity network while their plants are in trial operation.

In April 2020, HERA adopted the *Amendments to the General terms and conditions for network usage and electricity supply (Official Gazette no. 49/20)*, which abolishes penalties for exceeding planned peak active power and redefines the calculation of peak active power during states of emergency in order to somewhat ease the position of businesses and entrepreneurs (electricity buyers) in Croatia during the Coronavirus epidemic.

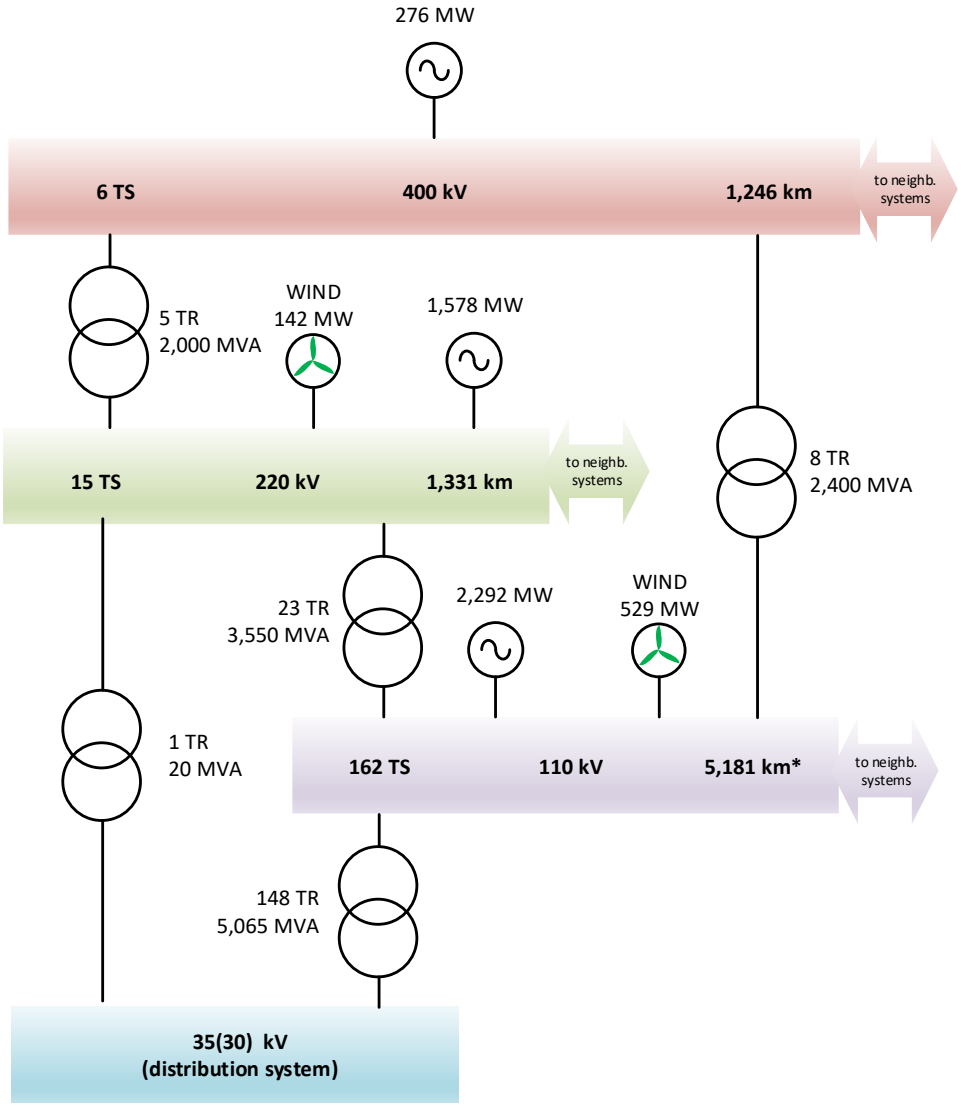
4.2 Regulated network activities and the technical function of the electricity system

4.2.1 Transmission and distribution system

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.



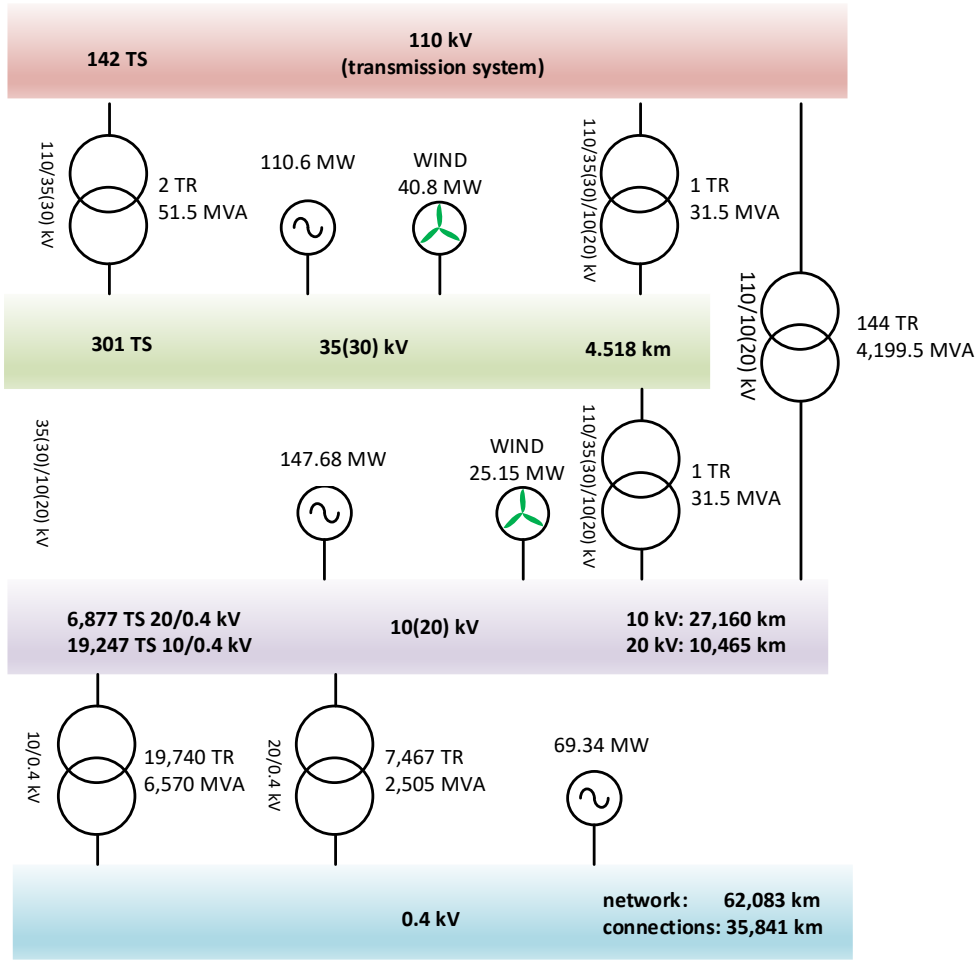
**110kV medium-voltage transmission lines are not included*

Source: HOPS

Figure 4.2.1. Basic information about the transmission system as of 31 December 2019

In the Republic of 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.



Source: HEP-ODS

Figure 4.2.2. Basic information on the distribution system as of 31 December 2019.

Table 4.2.1. shows indicators for the transmission and distribution system in the Republic of Croatia from 2015 to 2019.

Table 4.2.1. Indicators for the transmission and distribution system in the Republic of Croatia from 2015 to 2019

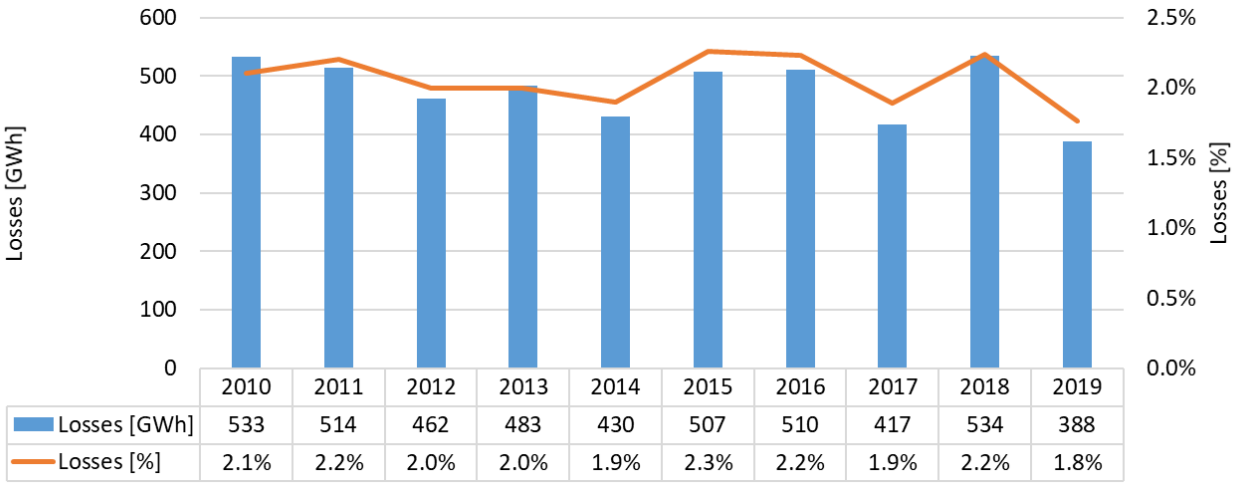
Indicator	2015	2016	2017	2018	2019
Maximum daily electricity consumption (GWh/day)	-	59.0	63.1	64.6	61.4
Number of transmission systems operators	1	1	1	1	1
Length of transmission network (km)	7,648	7,660	7,683	7,791	7,758
Number of distribution systems operators	1	1	1	1	1
Length of distribution network (km)	136,732	141,345	140,436	138,789	140,067

4.2.2 Losses in the transmission and the distribution network

Losses in the transmission network in 2019

Power losses in the transmission network in 2019 amounted to 388 GWh, or 1.8% of total transmitted electricity (22,058 GWh).

Figure 4.2.3. shows losses in the transmission network from 2010 to 2019.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Losses [GWh]	533	514	462	483	430	507	510	417	534	388
Losses [%]	2.1%	2.2%	2.0%	2.0%	1.9%	2.3%	2.2%	1.9%	2.2%	1.8%

Source: HOPS

Figure 4.2.3. Power losses in the distribution network from 2010 to 2019

A significant reduction in absolute and relative losses is apparent in 2019 (the lowest in the past 10 years). HOPS explains this reduction through lower production in the transmission network (poor hydrology) and reduced imports and exports in the transmission network as compared to the previous year. This represents a reduction in total transmitted energy in the transmission network (from 23,830 GWh in 2018 to 22,058 GWh in 2019), as well as a reduction in transit (from 6,532 GWh in 2018 to 5,237 GWh in 2019).

The electricity to cover losses in the transmission network in 2019 was purchased on market principles by long-term contract awarded by public tender with given quantities and a lowest-price criterion, as well as through short-term trading on CROPEX.

In the long-term, HOPS procured energy in 2019 through three contracts with the lowest bidder, HEP d.d., at 5 MWh/h at HRK 348.38/MWh, 10 MWh/h at HRK 370.28/MWh, and 20 MWh/h at HRK 467.24/MWh. HOPS also procured energy for losses through short-term purchase (intra-day and day-ahead); the difference between purchased and realised energy to cover losses was subject to imbalance settlement.

The total cost of electricity purchased to cover losses in the transmission network for 2019 amounted to HRK 180.3 million, which yields a unit cost of HRK 464.79/MWh. The unit cost exceeds the planned values for 2019 (HRK 428/MWh), however, the total cost is lower due to significantly lower losses.

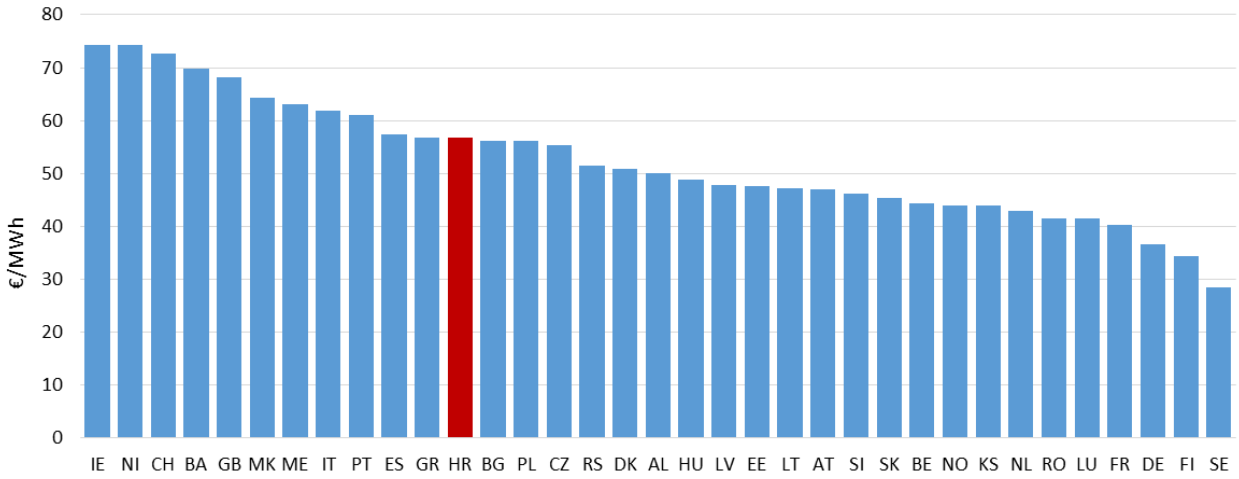
Table 4.2.2. shows the costs and revenues related to the procurement of electricity to cover losses in the transmission network for 2019.

Table 4.2.2. Costs and revenues from the purchase of electricity to cover losses in the transmission network in 2019

Item	Quantity [GWh]	Cost [mil. HRK]	Unit cost [HRK/kWh]	Unit cost [EUR/MWh]	Share of quantity [%]	Share of cost [%]
Long-term agreements	306.6	129.6	422.70	57.04	79.0%	71.9%
Short-term purchase on CROPEX	112.7	42.2	374.31	50.51	29.1%	23.4%
Imbalance settlement	31.4	8.5	270.47	36.50	8.1%	4.7%
Incurred losses	**387.9**	**180.3**	**464.79**	**62.73**	**100.0%**	**100.0%**

** The average exchange rate in 2019 amounted to EUR 1 = HRK 7.41*

Figure 4.2.4. provides a price comparison for the ITC agreement[29], in accordance with *Commission Regulation (EU) no. 838/2010 of 23 September 2010 on laying down guidelines relating to the inter-transmission system operator compensation mechanism and a common regulatory approach to transmission charging*, for 2019 between individual countries.



Source: ENTSO-E

Figure 4.2.4. Unit prices for covering losses for 2019 for the needs of the ITC mechanism

Observations on the losses in the transmission network for 2019

The procurement plan for 2019 foresaw absolute losses of 465 GWh, which is significantly higher than the realised amount. As the quantities in the plan are founded only on average values from previous years, the difference between the plan and realised figures in 2019 show that the loss planning methodology in the transmission network is unsatisfactory. There are also large variations in monthly realised losses in particular years.

In 2019, HOPS conducted workshops with market participants in order to identify barriers to participation in public tenders for the procurement of electricity to cover losses. Several obstacles were identified and, in cooperation with HERA, HOPS improved these procedures (organising tenders via the CROPEX platform, shortening the time required to approve tenders, splitting procurement into multiple products, etc.). As a result, more market participants are applying to public tenders to cover losses in 2020. Furthermore, until 2019, tenders submitted by HEP d.d. were almost always chosen in public tenders; multiple tenders from multiple energy entities have been accepted in 2020. HROTE is one of these energy entities, who participates with a share of energy from the incentives system (as the manager of the EKO balance group). HOPS has also split procurement into multiple long-term products – yearly, and for the first time, quarterly.

HOPS is working to improve its tender procedures, using various products and tender procedures, as well as varying implementation times for public tenders (while the wholesale price of electricity is lower).

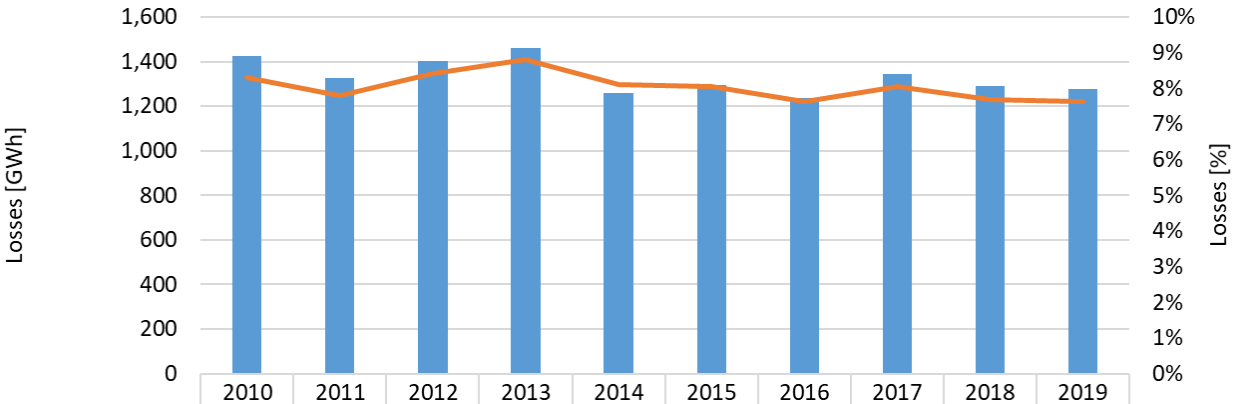
In 2019, HERA approved the electricity procurement plan for the coverage of losses for 2020, which anticipates losses in the amount of 454 GWh, at the price of HRK 442.65/MWh. HOPS calculated this price using prices from already signed long-term agreements for 2020 and average prices from CROPEX.

[29] *ITC, ITC Agreement, ITC Mechanism – Inter-Transmission System Operator Compensation (ITC) mechanism*

Losses in the distribution network in 2019

Power losses in the distribution network in 2019 amounted to 1.276 GWh, or 7.6% of electricity taken up by the distribution network from the transmission network and from electricity producers in the distribution network. These losses are at the level of losses in 2018 in absolute and relative terms (0.1% difference in the relative amount). The total energy taken up in the distribution system in 2018 amounted to 16,764 GWh, while it amounted to 16,703 GWh in 2019.

Figure 4.2.5 shows the amounts of losses in the distribution network from 2010 to 2019.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Losses [GWh]	1,424	1,325	1,402	1,459	1,257	1,295	1,235	1,343	1,288	1,276
Losses [%]	8.3%	7.8%	8.4%	8.8%	8.1%	8.1%	7.6%	8.0%	7.7%	7.6%

Source: HEP-ODS

Figure 4.2.5. Power losses in the distribution network from 2010 to 2019

The procurement of necessary quantities of energy to cover losses in the distribution network was carried out by a public tender in the form of two long-term products – for 1 January to 30 June 2019 at the price of HRK 563,57/MWh, and for 1 July to 31 December 2019 at the price of HRK 457.88/MWh. The total cost of electricity purchased to cover losses amounted to HRK 657 million, which yields a unit cost of HRK 514.77/MWh. This also includes the cost of imbalance as, under the concluded procurement agreement, the supplier covers the cost of imbalances and incorporates it into the price offered in the bid.

The unit cost is at the level of the approved electricity procurement plan to cover losses for 2019 (the planned unit cost was HRK 521.10 / MWh), while the total cost is slightly lower (the planned total cost was HRK 681.34 million).

Table 4.2.3.shows costs for the purchase of electricity to cover losses in 2019.

Table 4.2.3. Costs for the purchase of electricity to cover losses in the distribution network in 2019

Item	Quantity [GWh]	Cost [mil. HRK]	Unit cost [HRK/kWh]	Unit cost* [EUR/MWh]	Share of quantity [%]	Share of cost [%]
Energy January-June	686.8	387.07	563.57	76.06	53.8%	58.9%
Energy July-December	589.1	269.74	457.88	61.79	46.2%	41.1%
Incurred losses	**1,275.9**	**656.82**	**514.77**	**69.47**	**100.0%**	**100.0%**

** The average exchange rate in 2019 amounted to EUR 1 = HRK 7.41*

Observations on losses in the distribution network for 2019

The electricity procurement plan for the coverage of losses for 2019 anticipates losses in the amount of 1,308 GWh at a price of HRK 521.10/MWh. The realised price was somewhat lower (in volume and in unit and total cost of energy to cover losses), although it is approximately at the level specified in the plan.

In December 2019, HERA provided approval for the *Annual energy procurement plan to cover losses in the distribution network for 2020*, in which HEP-ODS foresaw a loss amount of 1,340 GWh and a price of energy to cover losses of HRK 500.94/MWh.

The main novelty in energy procurement for 2020 is that HEP-ODS bears the cost of imbalances that result as the difference between realised and planned distribution system load, including losses in the system. Previously, HEP-ODS transferred this cost to suppliers. Throughout 2019, HEP-ODS took preparatory measures to be able to independently plan load and losses, such as the procurement of programmes and employee training. Analysis of the results of this will be possible at the end of 2020.

In the *Decision approving the Annual energy procurement plan to cover losses in the distribution network for 2019*, HERA indicated a few problems with loss calculations and energy procurement that repeat every year.

The issue of unrealistic monthly loss coefficients remains unresolved, as this implies a change in the legislative framework. HEP-ODS believes the solution to this problem requires the introduction of the possibility of differential monthly obligations for end consumers with a bi-annual billing period.

By paying the imbalance costs for energy losses independently, it can be said that HEP-ODS reduces the risk to market participants when participating in public tenders to procure electricity to cover losses in the distribution network, which makes it possible for more market participants to submit bids. However, there is still the problem of procuring total quantities of electricity to cover losses as one long-term product, which is a significant amount for the Croatian market and can represent an obstacle to market participants. By undertaking the obligation to plan and cover the costs of imbalances itself, HEP-ODS enabled procurement to be divided into several products, as well as combined with short-term procurement if this proves to be a more favourable option. Nevertheless, some progress towards procurement in line with transparent, impartial market principles is apparent.

The unit cost of electricity to cover losses is higher compared to the transmission network (including imbalance costs). Some of this can certainly be attributed to the curve by which HEP-ODS must procure losses, in which the majority is procured while the price is highest, as well as to the time when public tenders are held. Procurement for the first six months of 2019 was implemented in late 2018, which resulted in a very high energy price to cover losses in the distribution network.

For HEP-ODS, at the end of 2020, it will be apparent what effect changes to methods of procurement and the determination of prices for energy to cover losses in the distribution network had on the unit cost of procurement.

As concerns non-technical losses, which are estimated at up to 49% of total losses, HEP-ODS provided HERA with a statement on measures undertaken to reduce non-technical losses. So far, these measures have included appointing a special working group with the task of defining activities to reduce non-technical losses of electricity in the distribution network, the adoption of new *Rules of procedure in case of the unauthorised consumption and production of electricity*, defining an unambitious plan to reduce non-technical loses by a minimum of 1% in the four-year period from 2018-2021, implementing strengthened, directed checks of billing metering points, and a systematic analysis of billing metering data, other measures, and operating events, implementing systematic checks of billing metering points that exceed connected power, harmonising metering devices with current consumption, and installing smart meters that enable additional controls over unauthorised consumption, asymmetry in consumption, and incorrect measured quantities.

In 2020, HERA intends to begin drafting a study entitled "Guidelines for the regulatory treatment of electricity losses in the distribution and transmission networks in Croatia", which will analyse the existing treatment of the amount and quantity of losses in setting

tariffs for network use, as well as provide suggestions for improvement, which is also closely related to the planning and procurement of electricity to cover losses.

4.2.3 Development and optimisation of the transmission and distribution network

Ten-year development plan for the transmission network (2020 – 2029)

After several revisions and the delivery of all requested supporting documents, in mid-2019, HERA approved the *Ten-Year development plan for the transmission network from 2019 to 2028, with a detailed elaboration of the initial three-year and one-year period.*

In September 2019, HOPS delivered to HERA for prior approval a *Ten-year development plan for the HEP-ODS distribution network from 2020 to 2029, with a detailed elaboration of the initial three- and one-year periods.* Total planned financial investments into transmission network development across a ten-year period (2020-2029) amount to roughly HRK 7.3 billion. Out of this total amount, investments conditional upon the connection of new users to the network and increasing the connection capacity of existing users amount to approximately HRK 210 million. HOPS plans to co-finance the investments through EU grants in the amount of around HRK 80 million for the SINCRO.GRID project.[30]

Table 4.2.4. shows realised annual investments in the HOPS network from 2015 to 2019. During this period, the amount of yearly investment amounted to HRK 451 million. In 2019, HRK 558.5 million was invested into the transmission network.

Table 4.2.4. Realised annual investments in the distribution network from 2015 to 2019 in millions of HRK

Type of investment	2015	2016	2017	2018	2019
Investment preparation	8.4	12.6	8.9	12.3	18.3
Replacements and reconstruction	189.2	166.2	159.6	161.6	262.8
Revitalisation	61.5	59.0	72.5	72.0	105.5
New facilities	90.3	71.1	85.9	97.1	103.9
Other investments	37.9	34.9	55.3	60.7	31.3
Electric power grid conditions and connections	64.2	33.7	61.1	18.8	36.7
Total	**451.5**	**377.5**	**443.3**	**422.5**	**558.5**

Source: HOPS

Ten-year development plan for the distribution network (2020 - 2029)

In mid-2019, HERA gave prior approval for a *Ten-year development plan for the HEP-ODS distribution network (2019-2028) with a detailed elaboration of the initial three- and one-year periods*.

In November 2019, HEP-ODS delivered to HERA for prior approval a *Ten-year development plan for the HEP-ODS distribution network (2020-2029) with a detailed elaboration of the initial three- and one-year periods*.

Total planned financial investments into distribution network development across a ten-year period (2020-2029) amount to roughly HRK 11.5 billion. Out of this total amount, investments conditional upon the connection of new users to the network and increasing the connection capacity of existing users amount to approximately HRK 4 billion.

Table 4.2.5. shows realised annual investments in the HEP-ODS network in the period from 2015 to 2019. The average amount of realised investments amounted to HRK 925 million. There was a significant increase in total investments in 2019, which is the result of investments in electricity (technical) conditions in the network and connections.

[30] *Project financed by 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.*

Table 4.2.5. Realised annual investments in the distribution network from 2015 to 2019 in millions of HRK

Type of investment	2015	2016	2017	2018	2019
Investment preparation	10.7	20.0	27.9	11.1	6.8
Replacements and reconstruction	268.6	268.9	228.0	206.1	223.4
Revitalisation	16.8	21.9	19.2	23.3	15.6
Repairs and renovations	0.8	0.4	0.1	2.3	0.5
New facilities	146.6	153.2	126.9	138.2	132.4
Other investments and development	225.2	191.3	208.2	191.6	193.5
Electric power grid conditions and connections	250.0	301.1	313.3	305.0	378.3
Total	**918.7**	**956.8**	**923.5**	**877.6**	**950.5**

Source: HEP-ODS

Observations on the development plans for transmission and distribution networks

The ten-year development plan creates preconditions for an efficient preparation of construction, timely planning and ensuring financing, as well as harmonisation of timelines and competences in the construction of joint facilities of transmission and distribution system operators. HOPS and HEP-ODS continued the good practice of harmonised their plans in terms of construction dynamic and financing of joint facilities (TS 110/x kV).

In the ten-year plan for the transmission network, all projects specified in TYNDP 2018[31] were considered on an equal basis as other HOPS investments. With regard to the construction of new cross-zonal lines, HERA considers the existing cross-zonal capacities to be sufficient, given that the sum of average net transfer capacities (hereinafter: NTC) at all borders amounts to roughly 4,000 MW for both import and export. In terms of their significance and sources of investment, the SINCRO.GRID project and replacement of all submarine cables stand out.

SINCRO.GRID was declared a PCI project[32] of common interest for the European Union and 51% of the project value was financed through CEF grants.

This investment into the 220 kV network in Croatia includes the installation of three reactive power compensation devices (VSR and SVC devices) at 220 kV voltage level at TS Konjsko, TS Melina, and TS Mraclin, the installation of a system for dynamically determining power line transmission voltage, and the implementation of a smart virtual cross-border control centre (VCBCC) to optimise the amount of voltage in the power systems of Croatia and Slovenia. The installation of compensation devices at a total reactive power of 550 Mvar are planned in:

- TS Konjsko, 250 Mvar, SVC technology;
- TS Melina, 200 Mvar, VSR technology;
- TS Mraclin, 100 Mvar, VSR technology;

The project of replacing all 110 kV submarine cables, the realisation of which has been planned in a few phases during the ten-year period, aims to increase the reliability of electricity supply on the islands.

As part of measures for increasing energy efficiency, HEP-ODS also emphasised the measures for reducing losses in the distribution electricity grid. HEP-ODS initiated the implementation of the smart grid[33] pilot project, co-financed by EU funds. As part of the

31 *Ten-Year Network Development Plan for the European Union transmission network from 2018*

32 *Projects of Common Interest*

33 *A smart grid is an electricity grid that includes various activities and metering methods that include smart meters, smart applications, smart devices, renewable energy sources, energy efficient resources, and high-efficiency devices.*

project, an investment of HRK 204 million is planned for the development of smart networks over a ten-year period.

In general, planned investments in the transmission and distribution network were higher than in previous years. Based on the plans submitted, HERA is of the opinion that the planned total income of HOPS and HEP-ODS is sufficient to cover the annual investments in the next three-year period.

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

Average network charges

Average transmission and distribution charges are determined according to the realised income by end consumer category, calculated by applying appropriate tariffs from the tariff systems for the transmission and distribution of electricity. Table 4.2.6. shows average transmission network charges, while Table 4.2.7. shows average distribution network charges from 2015 - 2019 by end consumer category.

For 2019, the calculation approach was changed such that the calculation of the average charge also included excessive reactive energy and, for high voltage, the consumption of RHE Velebit.

Table 4.2.6. Average transmission network usage charges for the period from 2015 to 2019[34]

End consumer category	2015 [lp/kWh]	2016 [lp/kWh]	2017 [lp/kWh]	2018 [lp/kWh]	2019 [lp/kWh]
Non-household – high-voltage	8.9 (7.1)	8.8 (6.6)	7.7 (6.7)	8.0 (7.2)	7.0
Non-household – medium voltage	7.8 (7.8)	7.7 (7.7)	7.6 (7.6)	7.6 (7.6)	7.0
Non-household – low-voltage	8.9 (8.9)	8.9 (8.9)	8.9 (8.9)	9.0 (9.0)	9.1
Households	8.9 (8.9)	8.9 (8.9)	8.9 (8.9)	8.9 (8.9)	8.9
Average for all categories	**8.6 (8.5)**	**8.6 (8.5)**	**8.5 (8.4)**	**8.5 (8.5)**	**8.3**

Table 4.2.7. Average distribution network usage charges for the period from 2015 to 2019[35]

End consumer category	2015 [lp/kWh]	2016 [lp/kWh]	2017 [lp/kWh]	2018 [lp/kWh]	2019 [lp/kWh]
Non-household – high-voltage	-	-	-	-	-
Non-household – medium voltage	14.3 (13.9)	14.0 (13.7)	14.0 (13.7)	14.0 (13.7)	11.7
Non-household – low-voltage	27.3 (26.3)	27.5 (26.5)	27.7 (26.7)	28.1 (26.8)	24.7
Households	24.4 (24.4)	24.5 (24.5)	24.5 (24.5)	24.6 (24.6)	24.6
Average for all categories	**22.8 (22.3)**	**22.7 (22.4)**	**22.6 (22.2)**	**22.7 (22.2)**	**21.0**

Depending on consumption category and tariff model, end consumers in Croatia are charged tariffs for the use of the transmission and distribution network for the following tariff elements:

- energy at high/low/uniform daily tariff (HRK/kWh),
- settled peak active power (HRK/kWh),
- excess reactive energy (HRK/kVarh), and
- billing metering point charge (HRK/mo).

[34] *The numbers in parentheses are average charges without excessive reactive energy and, for high voltage, without the consumption of RHE Velebit.*

[35] *Average charges without excessive reactive energy are shown in parentheses.*

Figure 4.2.6. shows the share of tariff items in the total network usage charge (transmission and distribution), while Figure 4.2.7. shows average prices per tariff element for particular consumer categories and tariff models.

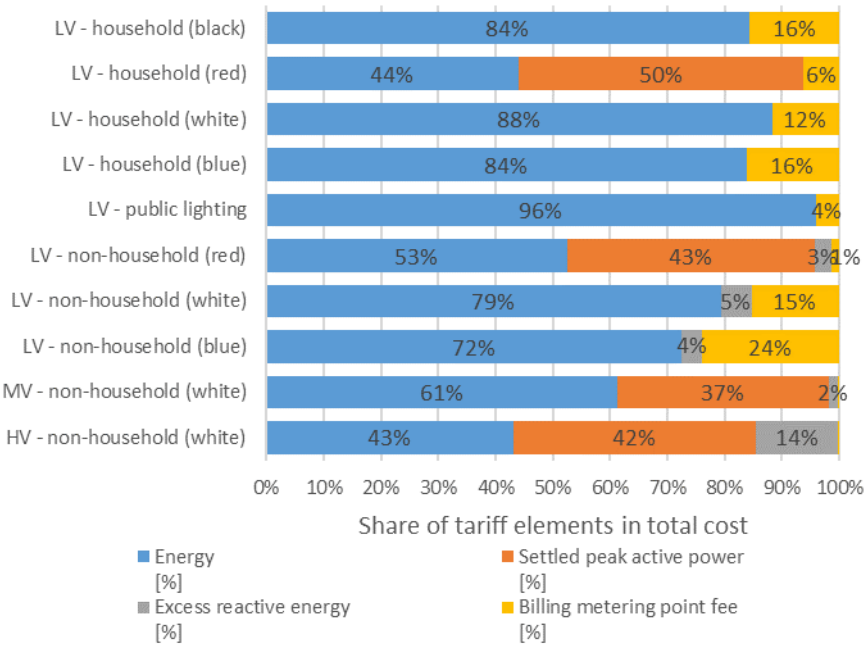


Figure 4.2.6. Share of tariff items in the total network usage charge (transmission and distribution)

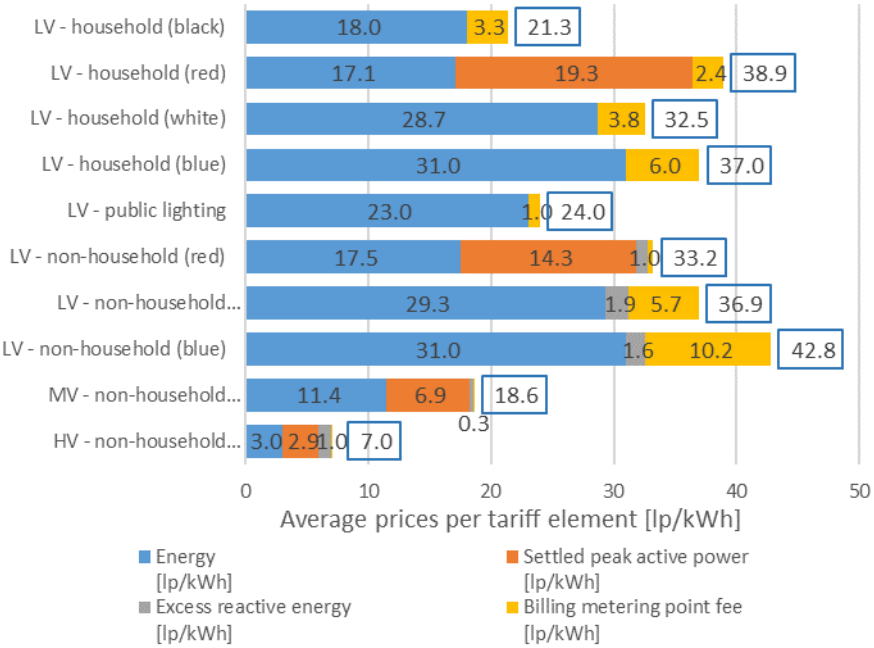
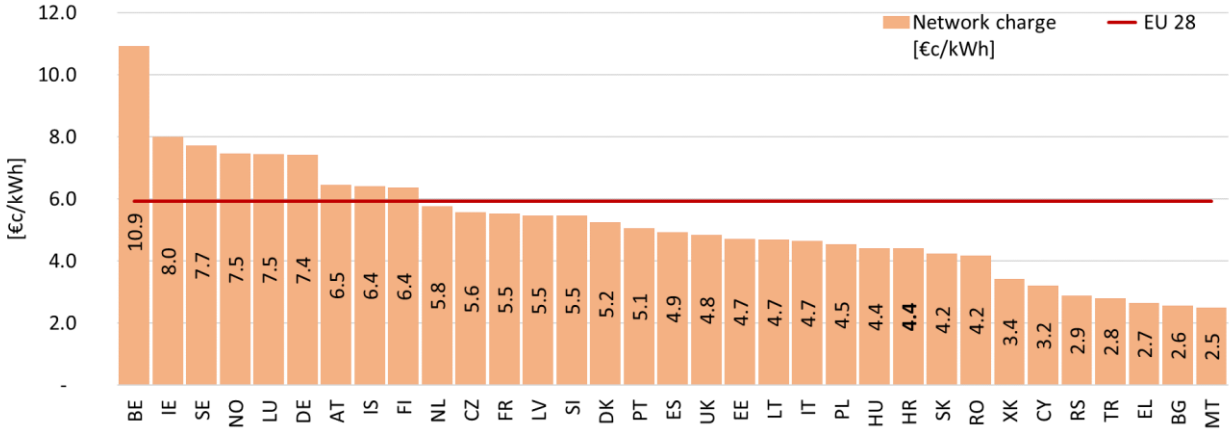


Figure 4.2.7. Average prices by tariff element for consumption categories and tariff models in 2019.

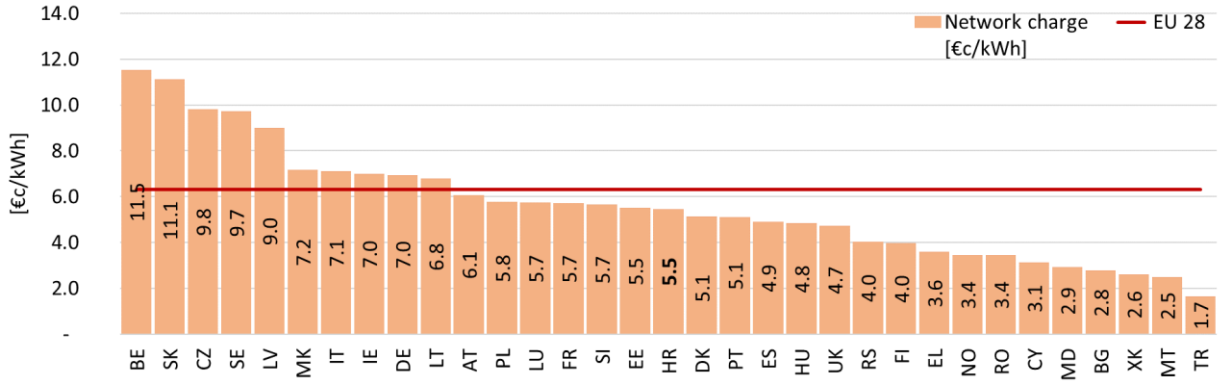
Figures 4.2.8. to 4.2.14. show average network usage charges in European countries for end consumers in EUROSTAT's consumption categories *Dc, Ia, Ib, Ic, Id, Ie*, and *If*[36].

36 *These consumption categories are in accordance with the differentiation among consumption categories and household/non-household end consumer billing metering point, with the corresponding characteristics as noted in Tables 4.4.3. and 4.4.4. of this report.*



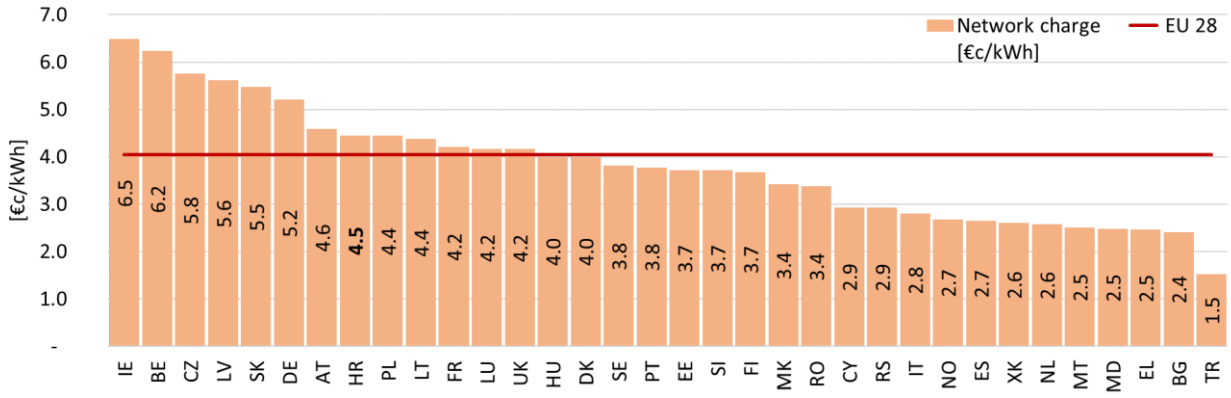
Source: EUROSTAT; data processing: HERA

Figure 4.2.8. Average network usage charges in European countries for household end consumers in the Dc consumption category in 2019[37]



Source: EUROSTAT; data processing: HERA

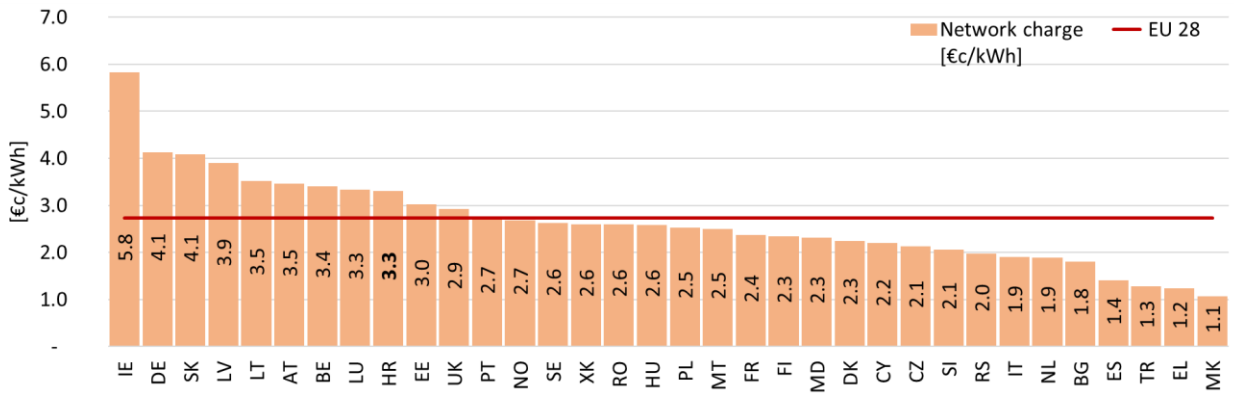
Figure 4.2.9. Average network usage charges in European countries for household end consumers in the Ia consumption category in 2019



Source: EUROSTAT; data processing: HERA

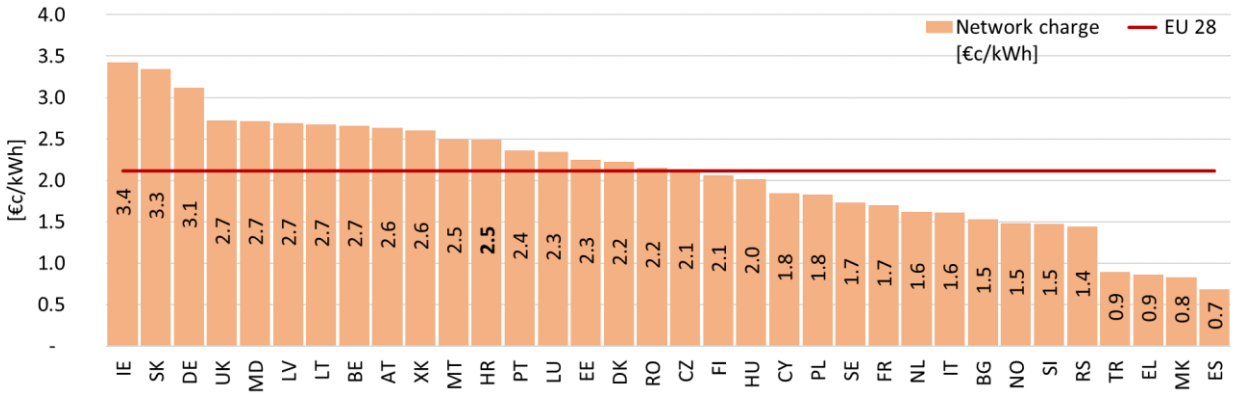
Figure 4.2.10. Average network usage charges in European countries for household end consumers in the Ib consumption category in 2019

[37] *ISO state and 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.*



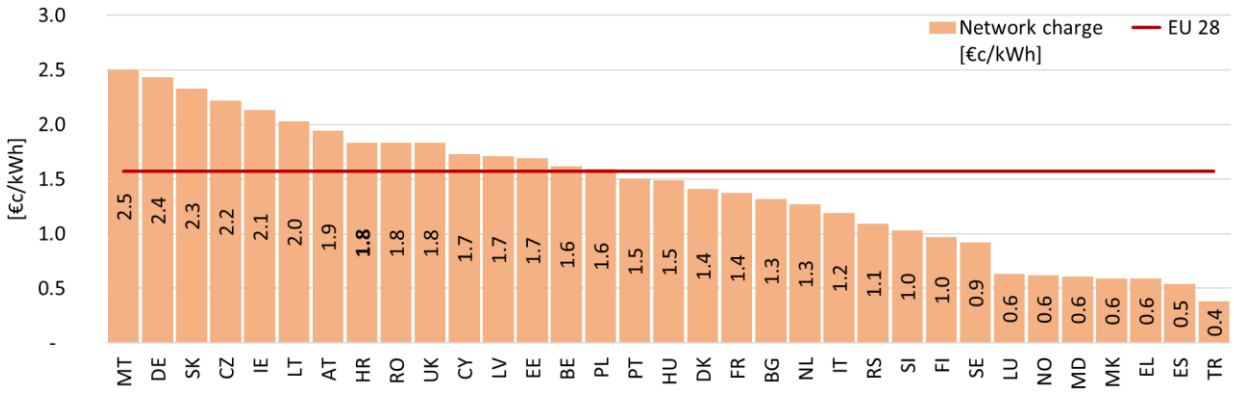
Source: EUROSTAT; data processing: HERA

Figure 4.2.11. Average network usage charges in European countries for household end consumers in the Ic consumption category in 2019



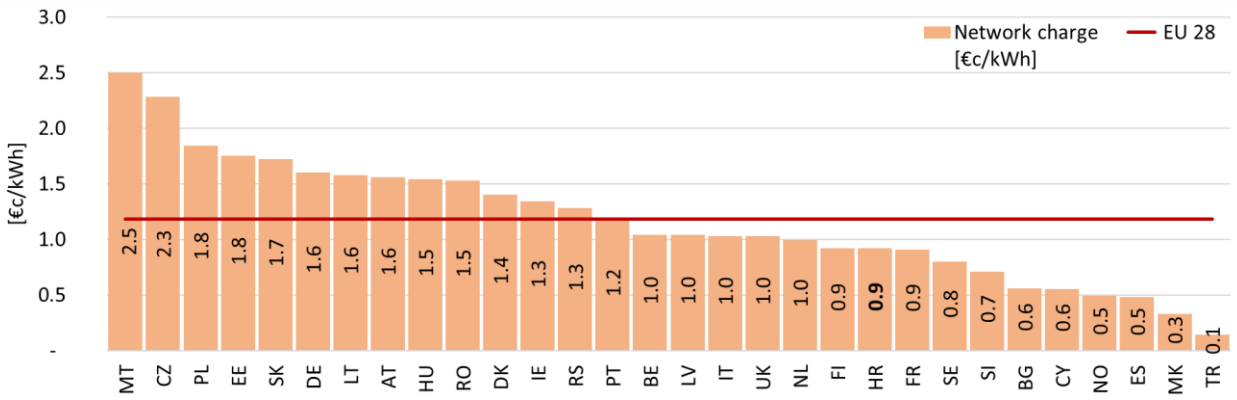
Source: EUROSTAT; data processing: HERA

Figure 4.2.12. Average network usage charges in European countries for household end consumers in the Id consumption category in 2019



Source: EUROSTAT; data processing: HERA

Figure 4.2.13. Average network usage charges in European countries for household end consumers in the Ie consumption category in 2019



Source: EUROSTAT; data processing: HERA

Figure 4.2.14. Average network usage charges in European countries for end consumers in the If consumption category in 2019

The share of individual consumption categories in system operator revenues from transmission network charges and distribution network charges in 2019 are shown in Figure 4.2.15. Figure 4.2.16. shows the proportions of individual tariff components in the revenues from transmission network charges and distribution network charges in 2019.

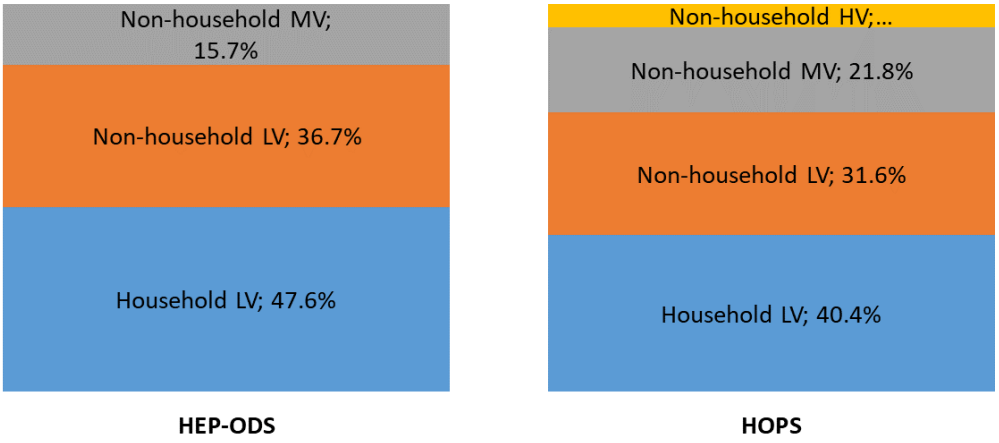


Figure 4.2.15. Proportions of individual consumption category in system operator revenues from transmission network charges and distribution network charges in 2019

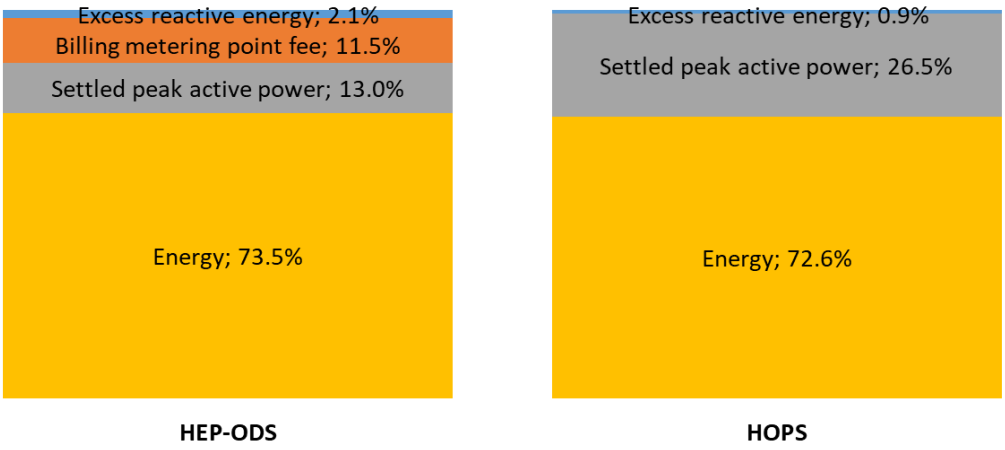


Figure 4.2.16. Proportions of individual tariff elements in system operator revenues from transmission network charges and distribution network charges in 2019

Transmission and distribution network connection charges

Consumers connecting to the transmission or distribution network or requesting an increase in connection capacity pay a connection charge which is defined in the *Methodology for establishing charges for connection to the electric power network for new network users and for increasing the connection capacity of existing network users (Official Gazette no. 51/17 and 31/18)*. The connection charge is intended to finance new connections, create technical conditions in the network, and develop the network. For end consumers with a connection capacity of up to 20 kW (inclusive) who are connecting to the low voltage network within a radius of up to 400 metres (inclusive) from an existing transformer substation, the connection charge or the charge for increasing connection capacity amounts to HRK 1,350/kW excluding VAT, except in the city of Zagreb, where the charge amounts to HRK 1,700/kW.

However, for other end consumers, if planned connection costs exceed the funds collected from the charges by 20% or more, the consumer pays the actual costs of the connection. If HEP-ODS determines that there is a need for the connection capacity of existing and/or new end consumers, and/or other direct benefits for the power plant and/or the development of the medium and/or low voltage network, low-voltage end consumers pay a share of the cost of creating technical conditions in the network. End consumers who connect to the same transformer station play a share in existing technical conditions until the collected amount for creating technical conditions in the medium-voltage network reaches the value of their expenses, or a maximum of five years from the day the usage permit of the transformer station becomes valid.

Electricity producers always pay the actual connection costs.

A special zone is a geographical area in accordance with the valid spatial plan in which multiple entities have an interest in connecting to the network as participants in the special zone, and for which there exists a zone organiser who, based on a contract concluded with all entities in the special zone or other valid documents, represents the participants in the special zone to the transmission or distribution system operator. The cost of creating technical conditions in the network due to the connection of special zones are calculated in the same way as for end consumer/producer connections if all participants in the special zone are end consumers/producers. If the participants in the special zone are end consumers and producers, the creation of technical conditions in the network is based on a technical solution that satisfies the conditions for the connection of all its participants. The distribution of connection costs among the zone organiser and participants is subject to a special agreement between the zone organiser and participants.

Observations on transmission and distribution charges and connection charges

In early November 2018, pursuant to *the Methodology for setting tariffs for electricity transmission (Official Gazette no. 104/15 and 84/16)* and the *Methodology for setting tariffs for electricity distribution (Official Gazette no. 104/15)*, HERA initiated an independent procedure to set tariffs for 2019, of which it informed HOPS and HEP-ODS. HERA took into account the necessity of maintaining the level of financing necessary for regular execution of the operators' business and investment activities.

A decision dated 13 December 2018 resulted in a reduction in tariffs for electricity transmission and distribution for individual end consumer categories/models.

The average reduction in network usage charges in 2019 amounted to:

- 13% for high-voltage non-household consumers,
- 14% for medium-voltage non-household consumers,
- 14% for Red model low-voltage non-household consumers,
- 16% for households – Red model.

The remaining network usage consumption categories and tariff models did not change.

Based on the new tariff items, the realised revenues of HEP-ODS in 2019 (HRK 3.206 million) are HRK 274 million lower (7.9%) than revenues in 2018 (HRK 3.480 million); HOPS' realised revenues in 2019 (HRK 1.371 million) are HRK 38 million lower (2.7%) than in 2018 (HRK 1.409 million).

HOPS and HEP-ODS did not submit a request to change tariffs for 2020, however, they provided the data needed to determine planned total costs.

Revenues from tariff items in 2020 are likely to be lower than planned, given the expected reduction in electricity consumption caused by the COVID-19 pandemic in 2020.

4.2.5 Unbundling of activities

Transmission system operator

On 22 February 2016, having obtained an opinion from the European Commission, HERA adopted the *Decision on the certificate issued to HOPS under the Independent Transmission Operator (ITO) model*.

Pursuant to the **Electricity Market Act**, the commercial and financial relations between vertically integrated subjects and HOPS must comply with market conditions. In accordance with the **Electricity Market Act**, HOPS is obliged to submit for approval all commercial and financial contracts with vertically integrated subjects. HERA is obliged to verify whether the contracts are market-oriented under impartial conditions.

During 2019, organisational and personnel changes were implemented at HOPS; the new *Ordinance on the organisation and systematisation of the Organisation* entered into force on July 1. This *Ordinance* regulates the internal organisation of HOPS, the scope of the work of organisational units and their jurisdiction, responsibilities, and management, job positions and number of executors, hiring conditions and evaluation coefficients, and other issues related to the organisation and systematisation of HOPS.

- Commencement of work of the HOPS audit committee: In accordance with the provisions of *Regulation (EU) 537/2014*[38] and the **Audit Act (Official Gazette no, 127/17)**, for HOPS as a public interest entity, on the basis of the **Accounting Act (Official Gazette no. 78/15, 134/15, 120/16, and 116/18)** and a decision of the Supervisory Board dated 14 January 2019, the Audit Committee was appointed for a period of three years. The basic tasks of the Audit Committee are: report to the Supervisory Board on the outcome of the audit of accounts; monitor the financial reporting process; monitor the effectiveness of established internal controls, internal audits, and the risk management system; monitor the audit of annual financial and consolidated reports; monitor the independence of the auditing company; suggest an auditing company to the Assembly; discuss plans and the Internal Audit annual report.

***- Unbundling of business premises*:** as of 31 December 2019, HOPS was the owner of all business premises it used.

- Independence of the IT system: During 2019, HOPS executed all tasks related to maintaining and upgrading its IT systems completely independently. The internal organisation of IT security tasks was adjusted in accordance with the requirements of the ENTSO-E European Network for Cyber Security. HOPS also implements the *NIS Directive*. A person has been appointed at the Management Board Office to coordinate IT security at HOPS. During 2019, a draft *Ordinance on the security of the HOPS IT system* was prepared. HOPS actively participated in the *ENTSO-E European Network for Cyber Security*, as well as in the Cyber Security training for industrial control systems organised by the *European Network for Cyber Security*.

[38] *Regulation (EU) No 537/2014 of the European Parliament and of the Council of 16 April 2014 on specific requirements regarding statutory audit of public-interest entities and repealing Commission Decision 2005/909/EC*

- Telecommunications sector unbundling: During 2019, the telecommunication system unbundling model continued in the same manner as in 2018. On 31 December 2018, the following agreements for 2019 and 2020 were signed by HOPS and HEP-Telekomunikacija:

- Mutual relations agreement,
- Agreement on the provision of telecommunications capacity rental services,
- Agreement on the rental of radio telecommunications capacities,
- Rental agreement for the needs of housing telecommunications equipment and optical telecommunications infrastructure,
- Agreement on telecommunications system maintenance.

- Procurement of electricity to cover losses**:** In order to procure energy to cover losses for 2019, HOPS conducted three public tenders, after which three agreements were concluded for the supply of electricity to cover losses. The parties to all three agreements were HOPS and HEP d.d. HOPS procured electricity to cover losses on a daily and intra-day basis on CROPEX.

- Procurement of ancillary services: HOPS and HEP Proizvodnja d.o.o. concluded six ancillary service agreements in December 2018 for ancillary services needed in 2019.

- Agreement on the provision of services of compensation operation for the purpose of voltage and reactive power control,
- Agreement on island operation services,
- Agreement on the provision of black start services,
- Agreement on the provision of reserve operating capacity for tertiary regulation for system security,
- Agreement on the provision of reserve operating capacity for tertiary regulation for system balancing,
- Agreement on the provision of reserve capacity for the automatic secondary regulation of frequency and power,

Prices in the agreements were defined according to the *Methodology for establishing prices for the provision of ancillary services (HOPS, 7/2016).*

- Electric power system balancing: With the implementation of the balance scheme from 1 January 2019, in accordance with the Rules on system balancing (HOPS, 11/2019), and with the launch of the EKO balance group, HOPS is no longer financially responsible for deviations from the planned production of renewable energy sources that have concluded a buy-off agreement with HROTE-.

- Relations with transmission network users and the connection of new users: In order to solve problems with the calculation of network usage charges through the implementation of the "complex billing metering point", during 2019, network usage agreements were concluded with HEP--Proizvodnja d.o.o for the following facilities: HE Peruča, HE Kraljevac, HE Đale, HE Orlovac, HE Dubrovnik ,TE Plomin, TE Rijeka, HE Rijeka, HE Vinodol, HE Senj, HE Gojak, HE Lešće, HE Dubrava, HE Varaždin, HE Čakovec, EL TO Zagreb, TE TO Sisak, and KTE Jertovec.

- Financial and other commercial relationships between HOPS and other companies from the vertically integrated entity: HOPS carried out activities in 2019 related to the implementation of regulatory compliance obligations in the following areas:

- Offering vertically integrated entity services to HOPS and offering HOPS services to the vertically integrated entity,
- Implementation of special conditions and requirements in the procurement of services related to IT systems and equipment, secure access systems, and audit services for HOPS accounts.

- Financing the activities of HOPS, and
- Creating the HOPS financial plan for 2018.

- Offering vertically integrated entity services to HOPS and offering HOPS services to the vertically integrated entity: After the procurement procedure for electricity to cover losses in the transmission network for 2020 and with the prior approval of HERA, HOPS chose HEP d.d. as the lowest bidder for two agreements to deliver electricity to cover a portion of losses in the transmission network in 2020, as well as for agreements to deliver electricity to cover a portion of losses in the transmission network for 2020, 2021, and 2022. After a public tender carried out for one-year electricity supply, pursuant to the **Public Procurement Act (Official Gazette no. 120/16)** and with the prior approval of HERA, HOPS concluded an Agreement on end consumer supply for a one-year period with HEP-Opskrba d.o.o.

Distribution system operator

Pursuant to the **Electricity Market Act**, HEP-ODS is responsible for monitoring the implementation of all its tasks, and especially in terms of compliance with the principles of transparency, objectivity and impartiality, and is obliged to publish annual reports in accordance with HERA's prior approval.

On 27 April 2020, HERA received a report from HEP-ODS for 2019 on compliance with the principles of transparency, objectivity, and impartiality, according to the adopted compliance programme of HEP-ODS.

- Financial and other commercial relationships between HOPS and other companies from the vertically integrated entity: With regard to its organisation and its relation to HEP d.d. as its parent company, HEP-ODS is a subsidiary company, which is independent from HEP d.d. in terms of its legal form, organisation, and structure, as well as from other companies within the HEP Group.

HEP-ODS has concluded a model agreement on mutual relations with all electricity suppliers, including the suppliers within the HEP group (HEP Elektra d.o.o., HEP -Opskrba d.o.o.). HEP-ODS has concluded a special agreement on mutual relations with HEP d.d.-, which regulates mutual relations between HEP-ODS and the sectors of HEP d.d., including the methodology for calculating the costs of services provided to HEP-ODS.

HEP-ODS prepares distribution network development plans with prior approval from HEP d.d. regarding the financial framework and established debt projections. 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.

HEP-ODS also provided HERA with notes alongside financial reports and other required documentation for 2019, pursuant to obligations from the *Decision on the manner and procedure for keeping separate accounts of energy entities (Official Gazette no. 111/18)* and the *Methodology for setting tariffs for electricity distribution*.

- Development of the IT system with users: As concerns consumer relations, during 2019, systematic work was carried out to develop the Aseba application[39] in order to adapt to user demands.

As concerns the IT system, a higher level of independence is suggested in order to improve business efficiency.

- Relations with transmission network users and the connection of new users: Suppliers have concluded a Mutual Relations Agreement with HEP-ODS- regarding the exchange of data and the calculation and billing of network usage charges from end consumers; this agreement regulates the calculation and billing of network usage charges for all low-voltage end consumers, consumers with own production, and electricity producers

[39] *Aseba is an application used by the help desk that enables easier contact with users.*

connected to the distribution network when they use the distribution network for their own needs as end consumers of electricity.

4.2.6 Quality of electricity supply

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

In the Conditions for the quality of electricity supply, 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 electricity supply to HERA. *The Conditions for the quality of electricity supply* also stipulate the gradual introduction of general, minimum, and guaranteed standards of quality of electricity supply and the gradual introduction of financial compensation to consumers following the introduction of guaranteed quality standards for electricity supply. To this end, operators and suppliers must prepare and publish the appropriate forms on their websites. Beginning in 2020, end consumers can receive financial compensation if the guaranteed standard of network connection time and technical services are exceeded; as of 2021, end consumers will be eligible for financial compensation if the guaranteed standards of individual long-term interruption duration and the total duration of all of individual interruptions in the observed year are exceeded, Figure 4.2.17.

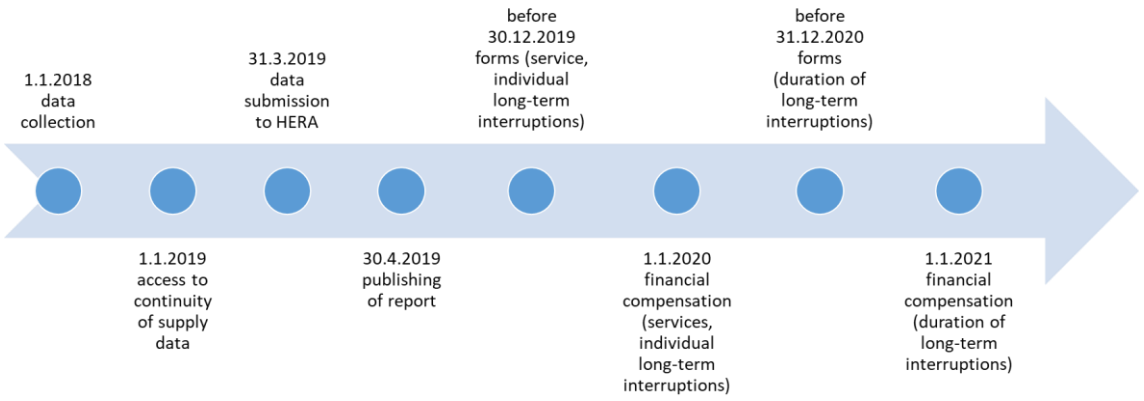


Figure 4.2.17. Activities to establish financial compensation after the introduction of guaranteed standards through the implementation of the Conditions for the quality of electricity supply.

A group of regulations consisting of the *Network Code for the transmission system*, *Network Code for the distribution system*, *Rules on connection to the transmission network*, and *Rules on connection to the distribution network* provide technical requirements and parameters to be fulfilled by the facilities to be connected to the electricity network in order to ensure the safe operation and optimal functioning of the system.

The transmission system operator, distribution system operator, and suppliers are obliged to submit a yearly report on the quality of electricity supply and quality of service pursuant to the *Conditions for the quality of electricity supply*.

Continuity of supply in 2019

Continuity of supply is measured by the number and duration of supply interruptions. The quality of continuity is inversely proportional to the number of supply interruptions and the duration of such interruptions. A supply interruption is considered planned if it is announced in the manner and within the time frame defined in *the General terms and*

conditions for network usage and electricity supply; otherwise it is considered an unplanned supply interruption.

The Conditions for the quality of electricity supply stipulate 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 the duration of supply interruptions in the transmission network, and estimates the volume of electricity not supplied during the interruption, Table 4.2.8. In 2019, ENS amounted to 326 MWh, while AIT amounted to 7.77 minutes, which is within the allowed general standard.

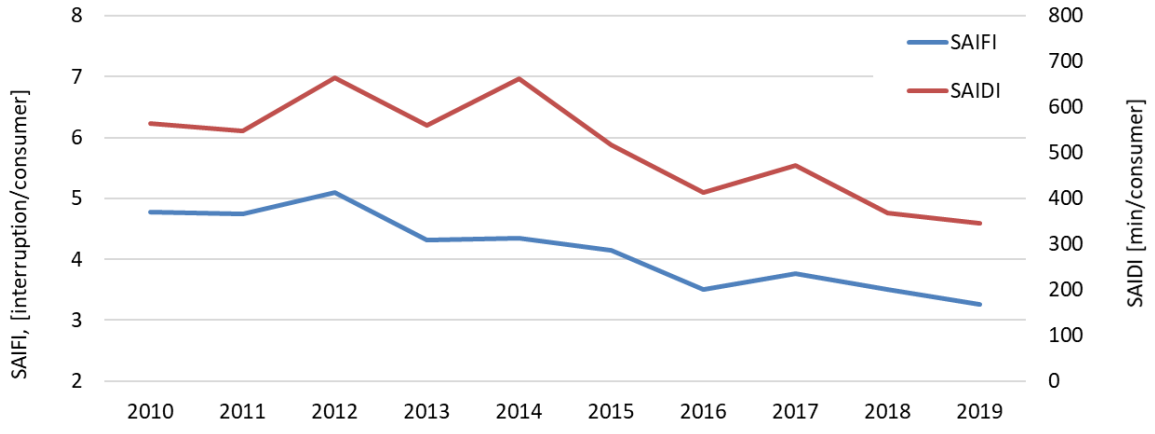
Table 4.2.8. Supply interruptions in the HOPS network from 2010 to 2019

Year	Number of supply interruptions	Duration of supply interruptions [min]	Estimated undelivered electricity [MWh]
2010	109	4,916	867
2011	115	3,587	256
2012	200	11,855	1,056
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

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 2019, SAIFI amounted to 3.26 supply interruptions per consumer in the HEP-ODS network, of which 32% were planned interruptions. SAIDI amounted to 345 minutes per consumer, of which 44% related to planned interruptions. SAIFI and SAIDI indicators show an improving trend in supply in the HEP-ODS, Figure 4.2.18.

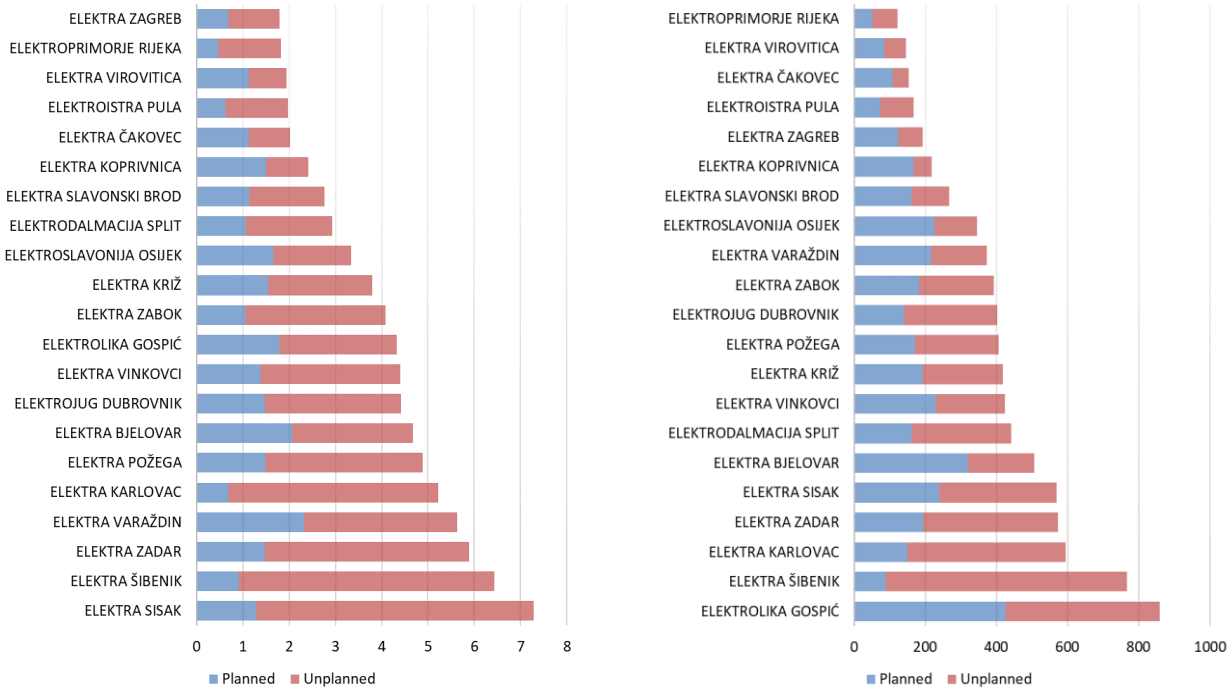


Source: HEP-ODS

Figure 4.2.18. Supply continuity indicators in the HEP-ODS- network from 2010 to 2019

Viewed by distribution area, DP Elektra Zagreb had the best SAIFI score in 2019, while DP Elektroprimorje Rijeka had the best SAIDI score. Elektra Sisak had the worst SAIFI indicator, as shown in Figure 4.2.19. DP Elektrolika Gospić has a lower SAIDI score because of the harsh weather conditions in that area and its specific network characteristics (long

overhead lines). DP Elektra Karlovac and DP Elektra Sisak are also among distribution areas with poor SAIDI and SAIFI indicators. A total of 83 written complaints concerning continuity of supply were filed, of which 71 were resolved in a timely manner.



System average interruption frequency index – SAIFI

System average interruption duration index – SAIDI

Source: HEP-ODS

Figure 4.2.19. Indicators of continuity of supply in the HEP-ODS network per distribution area in 2019

Voltage quality in 2019

According to the *General terms and conditions for network usage and electricity supply*, voltage quality is described as the variation of measured voltage characteristics at a supply terminal from the values listed in the Croatian standard HRN EN 50160.

A network user may submit a written request once a year to HOPS or HEP-ODS, depending on the used network, for a report on voltage quality at the given supply terminal.

HOPS or HEP-ODS must perform measurements, prepare and deliver a report on voltage quality at the supply terminal to the network user within 30 days.

In 2019, HEP-ODS received a total of 144 written complaints concerning voltage quality in the distribution network. Also, a total of 27 requests to measure voltage quality were filed, of which 16 were founded and resolved in favour of the applicant.

Quality of service in 2019

The Conditions for the quality of electricity supply specify the guaranteed quality standards for network connection services: time for resolving applications for a report on the optimal technical solution for connecting to the network depending on connection capacity (from 30 to 180 days), time for resolving applications for grid connection approvals (15 days) and time foreseen for the connection of a building to the network with a simple connection (30 days).

The report on the quality of services in 2019 submitted to HERA by HOPS and HEP-ODS shows that 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 only one request to issue a study on the optimal technical solution for network connection (hereinafter: EOTRP).

Table 4.2.9. General indicators of operators' quality of service regarding network connections in 2019

General quality of service indicators	HOPS	HEP-ODS	General standard of service quality
Percentage of applications for EOTRP resolved in a timely manner in the observed year	100%	41%	95%
Share of requests to issue electricity consent resolved in a timely manner in the observed year	n/d[40]	62%	95%
Proportion of timely connections in the case of simple connections of buildings in the observed year	n/d	36%	95%

Source: HOPS and HEP-ODS

Table 4.2.10. shows resolved applications for a report on the optimal technical solution for grid connection (EOTRP) and grid connection approvals (EES). Table 4.2.11. shows simple connections of buildings to the network for HEP-ODS network end consumers in 2019 with the total number of new connections and the number of connections realised within the period prescribed in the *Conditions for the quality of electricity supply*.

Table 4.2.10. Resolved requests to issue EOTRP and EES in the HEP-ODS network in 2019

Type of request	No. of decisions issued	No. of decisions issued in a timely manner
EOTRP	1,283	527
EES	27,305	17,046

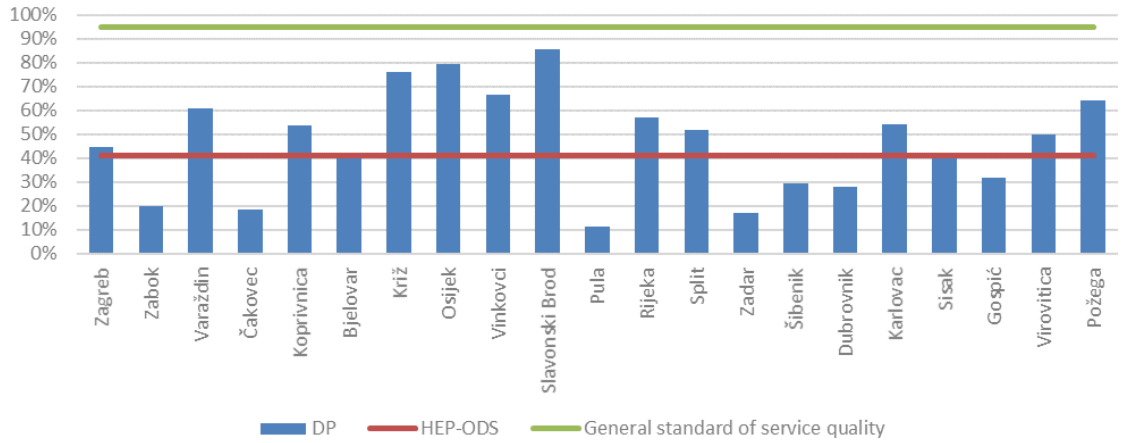
Source: HEP-ODS

Table 4.2.11. Simple connections of buildings in the HEP-ODS network- in 2019

Number of connected consumers	Number of timely connections
10,358	3,769

Source: HEP-ODS

Viewed by distribution area, the share of applications for EOTRP resolved in a timely manner is the lowest in DP Pula and the highest in DP Slavonski Brod; however, none of the distribution areas achieved the required general standard of service quality for resolving applications for EOTRP, Figure 4.2.20.

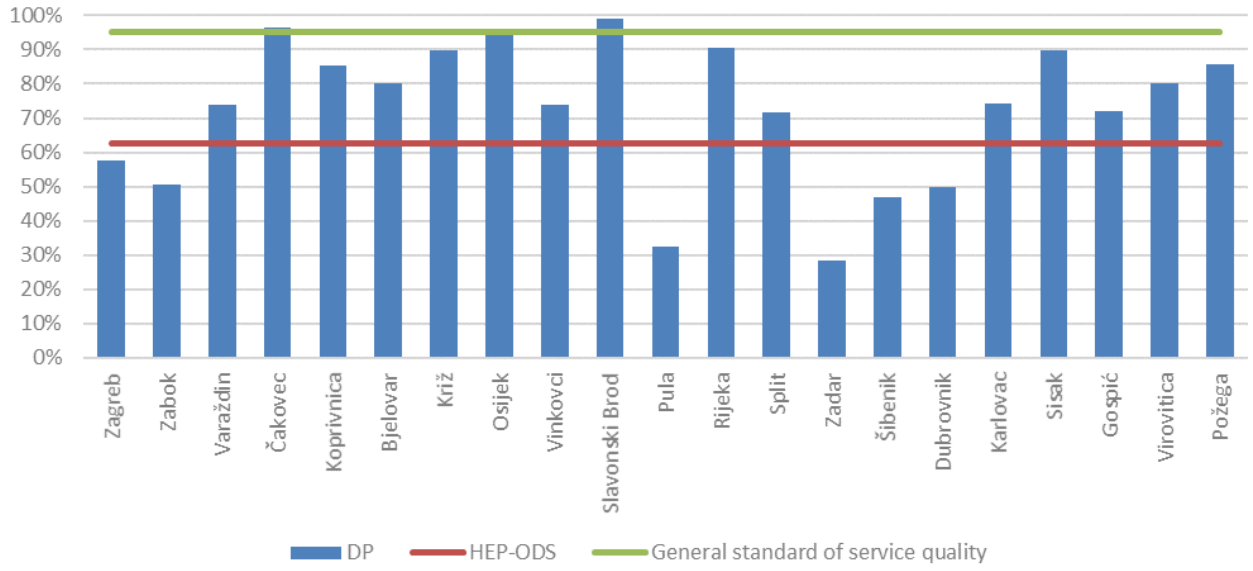


Source: HEP-ODS

Figure 4.2.20. Applications for EOTRP resolved in a timely manner in the HEP-ODS network in 2019 by distribution area

[40] *Not applicable - n/a*

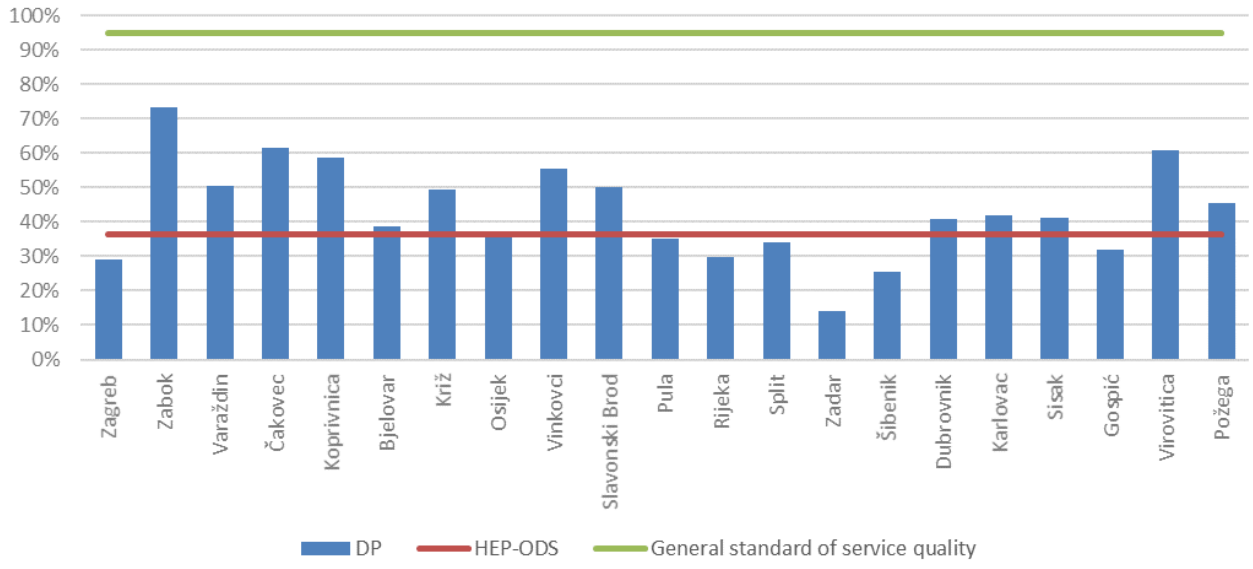
In terms of distribution areas, the proportion of applications for EOTRP resolved in a timely manner is lowest in DP Pula and highest in DP Slavonski Brod. DP Slavonski Brod and DP Čakovec achieved the required general standard of service quality for issuing EES, Figure 4.2.21.



Source: HEP-ODS

Figure 4.2.21. Proportion of applications for grid connection approvals resolved in a timely manner in the HEP-ODS network per distribution area in 2019

The proportion of timely connections in case of simple connections of buildings to the network is lowest in DP Zadar and highest in DP Zabok, however none of the distribution areas achieved the required general standard of service quality for simple connections, Figure 4.2.22.



Source: HEP-ODS

Figure 4.2.22. Proportion of timely connections in the case of simple connections of buildings by HEP-ODS per distribution area in 2019

Observations on the quality of electricity supply in 2019

Compared to 2018, the number and the duration of supply interruptions in the transmission network declined in 2019, as did the estimated energy not supplied. AIT and ENS scores are within the stipulated general standard, and they have improved significantly.

The SAIDI indicator for the distribution network is also better than in previous years. HEP-ODS scores for quality of connection services are below the required general standard of service quality and should be improved.

The poorest SAIFI and SAIDI scores for HEP-ODS were recorded at DP Elektra Sisak and Elektrolika Gospić. Elektra Šibenik and Elektra Zadar also have poor SAIDI and SAIFI indicators.

The highest number of written complaints regarding continuity of supply (48 of 83 submitted complaints) and written complaints regarding voltage quality (36 of 144 submitted complaints) resolved in a timely manner was recorded at DP Elektra Zagreb. Service quality indicators were lower than in the previous year.

HEP-ODS has upgraded the existing system for monitoring supply interruptions. However, in order to significantly improve 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.

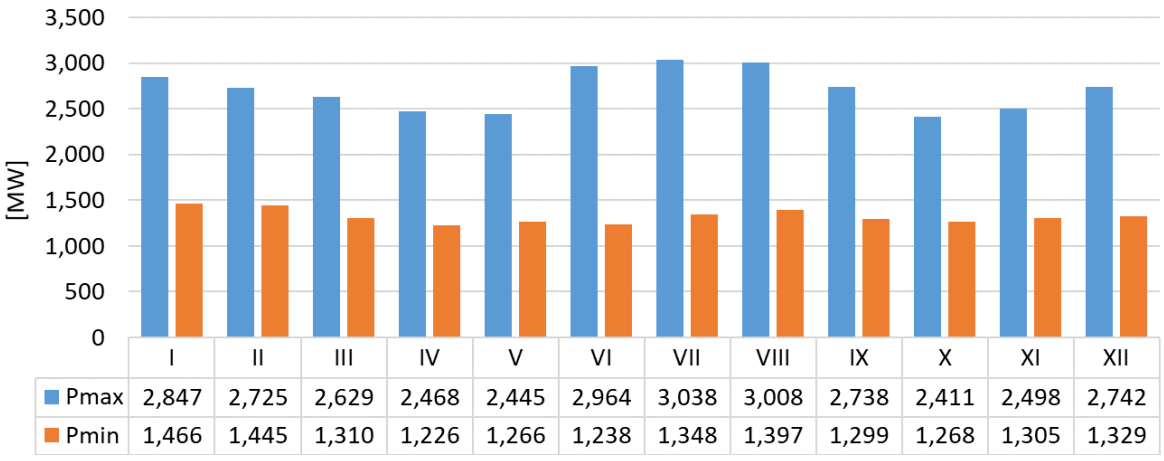
4.2.7 Monitoring the balance of production and consumption of electricity

System load characteristics

Table 4.2.12. shows important characteristics of the Croatian electricity system, such as the maximum and minimum loads (P_{max} and P_{min}), the times when they occur, and corresponding electricity imports and exports in the past 5 years. Figure 4.2.23. shows the maximum and minimum loads in the Croatian electricity system in 2019 by month. In the last few years (with the exception of 2018, the maximum load has occurred in the summer months due to relatively mild winters and increased consumption in the summer (air conditioning).

Table 4.2.12. Maximum and minimum loads of the Croatian transmission system

Year	Maximum load				Minimum load			
	P_{max} [MW]	Date, time	Imports with P_{max} [MW]	Exports with P_{max} [MW]	P_{min} [MW]	Date, time	Imports with P_{min} [MW]	Exports with P_{min} [MW]
2015	3,009	22/07, 13:00	2,296	474	1,188	22/06, 06:00	1,339	600
2016	2,869	12/07, 14:00	2,142	441	1,155	22/05, 06:00	1,022	641
2017	3,079	04/08, 14:00	1,657	270	1,305	18/09, 04:00	906	543
2018	3,168	26/02, 20:00	2,147	1,363	1,249	20/05, 06:00	1,008	606
2019	3,038	25/07, 14:00	1,973	428	1,226	22/04, 04:00	1,663	1,118



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Pmax	2,847	2,725	2,629	2,468	2,445	2,964	3,038	3,008	2,738	2,411	2,498	2,742
Pmin	1,466	1,445	1,310	1,226	1,266	1,238	1,348	1,397	1,299	1,268	1,305	1,329

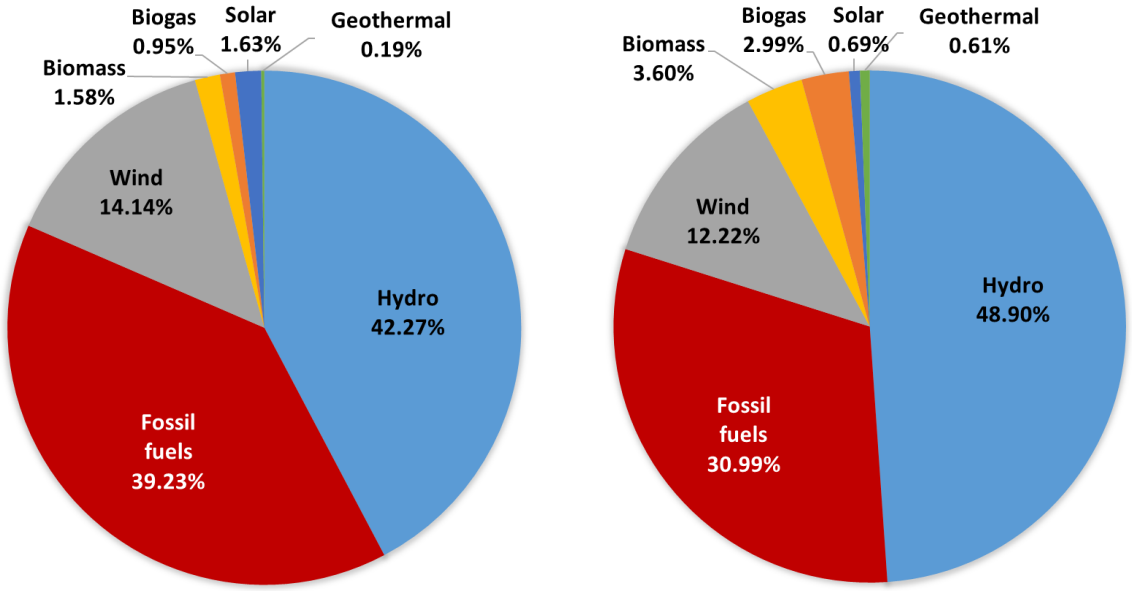
Source: HOPS

Figure 4.2.23. Maximum and minimum loads of the Croatian transmission system in 2019

Adequacy of production and imports

The total capacity of all power plants in Croatia amounted to 5,211 MW at the end of 2019. 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. The ratio between the total connection capacity of power plants in Croatia and the maximum load of the Croatian electricity system in 2019 amounted to 1.71.

Figure 4.2.24. shows a breakdown of all primary power sources in the total capacity and generated electricity of power plants located in Croatia at the end of 2019 (including power plants in test mode). A significant share of renewable energy sources is evident.

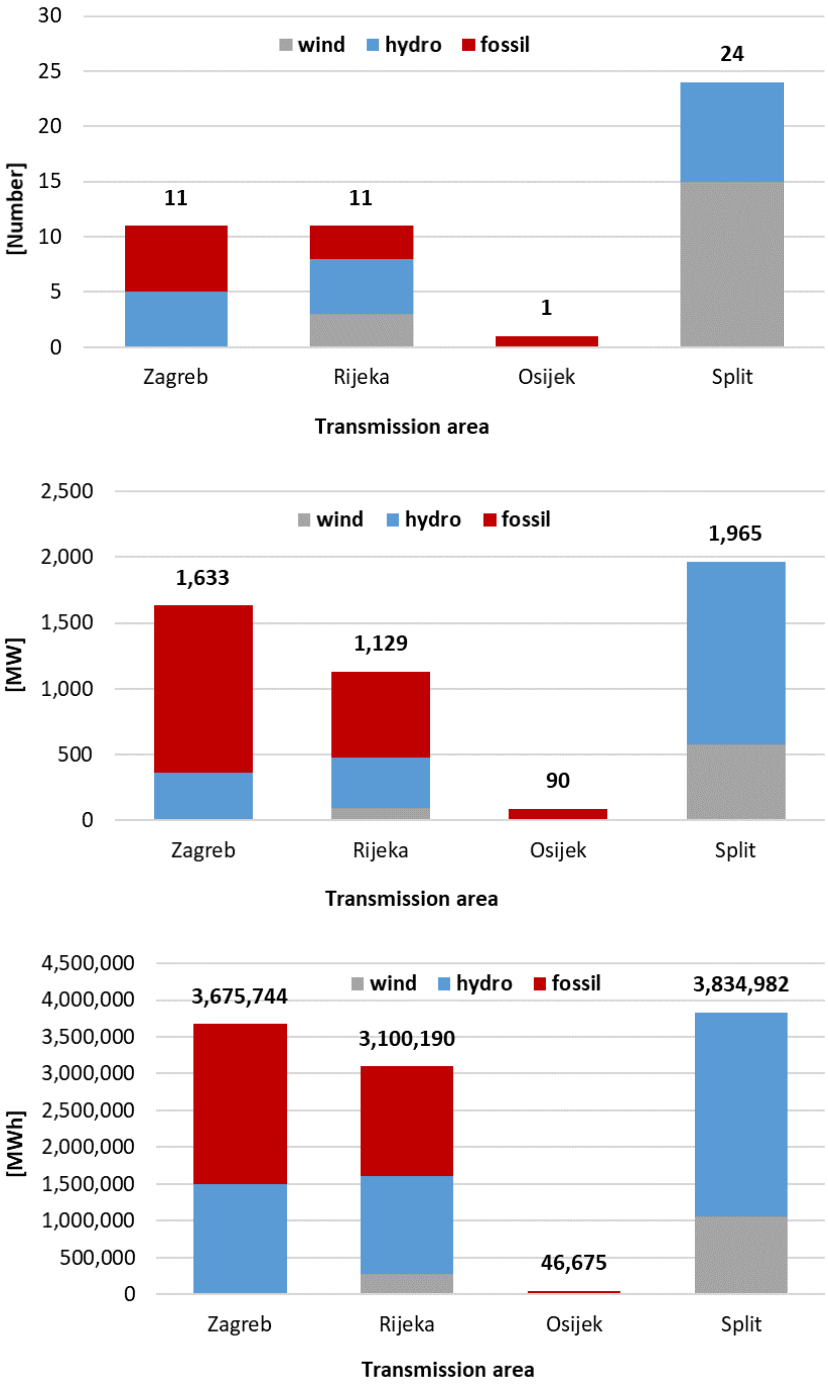


Connection capacity *Generated electricity*

Source: HOPS and HEP-ODS

Figure 4.2.24. Share of individual energy sources in the capacity and generated electricity of power plants located in Croatia at the end of 2019

At the end of 2019, 10 thermal power plants with a total connected power of 2,019 MW, 19 hydroelectric power plants with a connected power of 2,127 MW, and 18 wind power plants with a connected power of 671 MW were connected to the transmission network. Figure 4.2.25. shows the layout of power plants by transmission area.

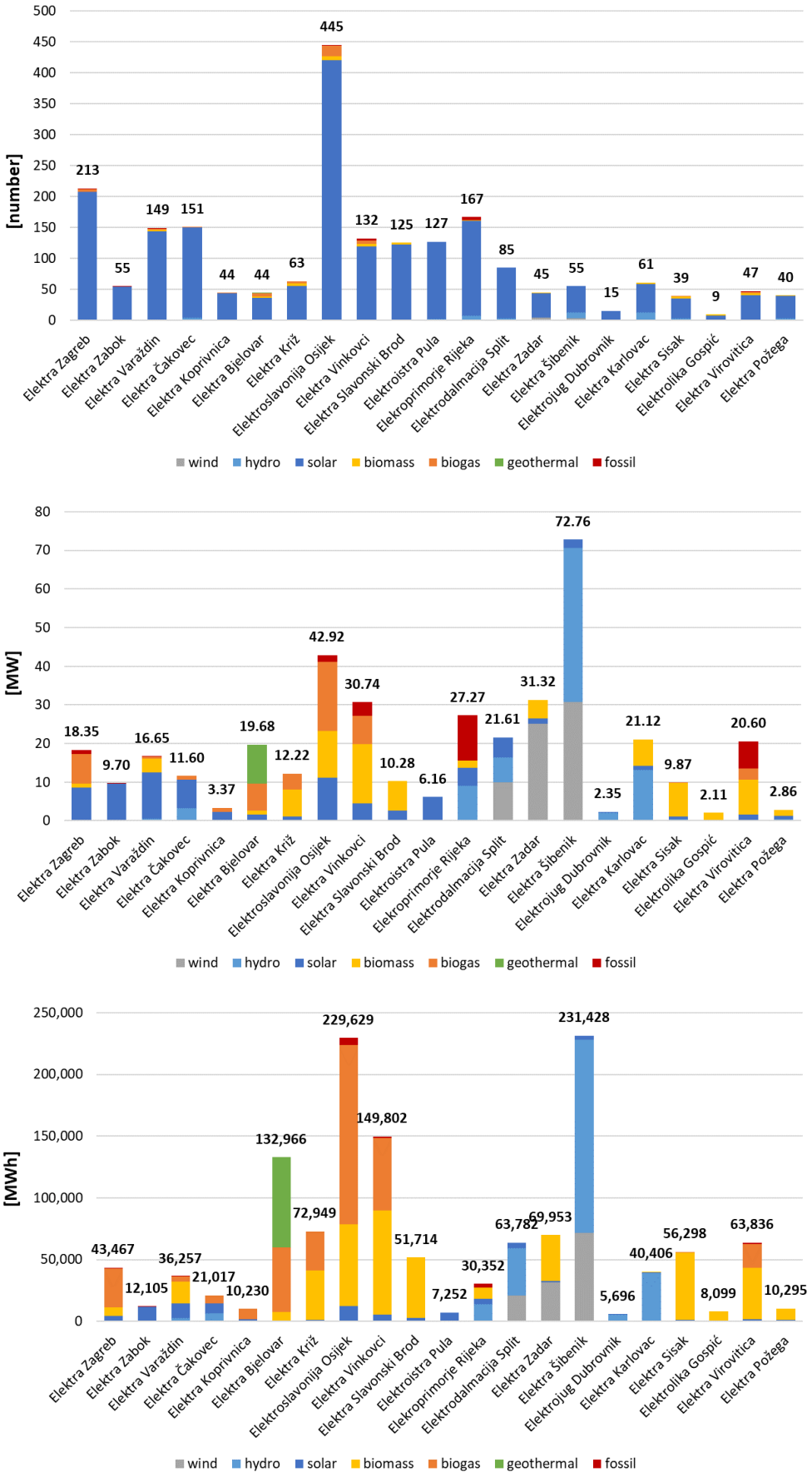


Source: HOPS

Figure 4.2.25. Number, connected power, and production of power plants by HOPS transmission region in 2019.

In recent years, the proportion of production in facilities connected to the distribution network (distributed electricity sources) has significantly increased; these are usually located near electricity consumers and consumption points. In 2019, the total quantity of electricity delivered from distributed sources amounted to 1,348 GWh, which represents an increase of 30% as compared to 2018. The majority of the delivered electricity was from power plants using renewable energy sources (1,336 GWh). The share of delivered electricity from distributed energy sources in the total consumption of the electricity system (18,169 GWh) in 2019 amounted to 7.4% (in 2018, this share amounted to 5.8%).

Figure 4.2.26. shows the layout of power plants by distribution area.



Source: HEP-ODS

Figure 4.2.26. Number, connected power, and production of power plants by HEP-ODS transmission region in 2019.

Of the 2,011 production facilities connected to the distribution network at the end of 2019 with a total connection capacity of 394 MW, 427 plants with a connection capacity of 63 MW (in network input) have the status of consumers with own production.

Since 2019, the **Renewable Energy Sources and High-Efficiency Cogeneration Act** has introduced the category of "self-supply installation user" – a household end consumer of electricity who has a self-supply installation using renewable sources of energy or high-efficiency cogeneration, the main condition of which is that the amount of energy distributed to the network is less than or equal to the amount of energy taken from the network within a calendar year. At the end of 2019 146 such users were connected to the distribution network, all with solar power plants within their installations, with a total connection capacity of roughly 1 MW when injecting into the network and about 2 MW when withdrawing from the network. This means that the average connected power of self-supply users when injecting into the network amounted to around 6.75 kW in 2019.

Observing daily values of production and consumption in the transmission system in Figure 4.2.27., it is apparent that the majority of consumption is met by production from hydroelectric power plants and from imports, while thermal power plants offer a certain base production, especially coal power plants. An increasing share of electricity is being produced by power plants connected to the distribution network. At the end of the year, there was a significant increase in the production of hydroelectric power plants, which, alongside production from wind power plants (which are a variable source of electricity), resulted in Croatia being a physical net exporter of electricity (negative values in the figure) at certain hours.

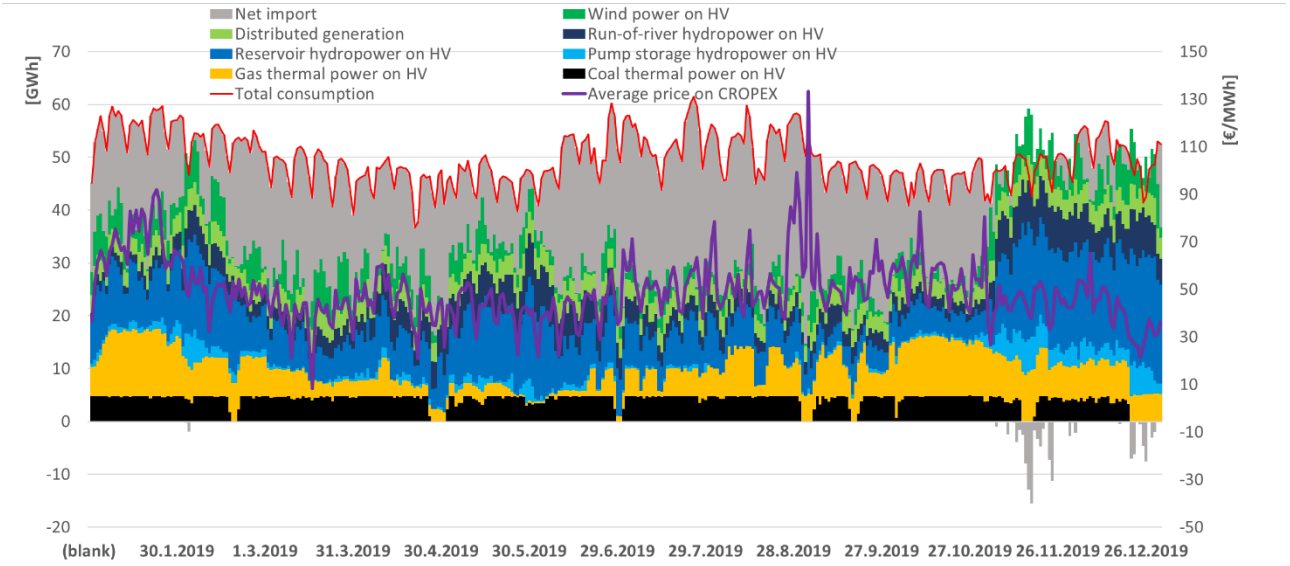
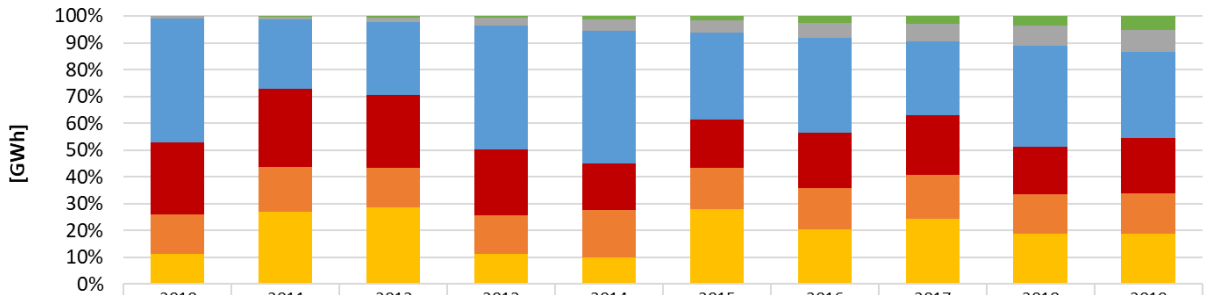


Figure 4.2.27. Daily values of production and consumption of electricity in Croatia's electricity system in 2019

Figure 4.2.28. shows the share of electricity sources in electricity procured for the requirements of the Croatian electricity system. The amount produced by the Krško Nuclear Power Plant for HEP d.d. is presented separately from net imports.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Other RES	16	33	85	132	194	298	454	535	681	947
Wind	138	201	329	517	730	794	1,002	1,204	1,335	1,467
Hydro	8,305	4,578	4,772	8,054	8,356	5,715	6,250	5,025	6,959	5,871
Fossil	4,825	5,184	4,791	4,228	2,912	3,192	3,625	4,054	3,216	3,720
NPP Krško	2,690	2,953	2,622	2,518	3,030	2,685	2,715	2,984	2,745	2,766
Net import without NPP	1,986	4,752	5,002	1,973	1,642	4,948	3,628	4,395	3,415	3,397

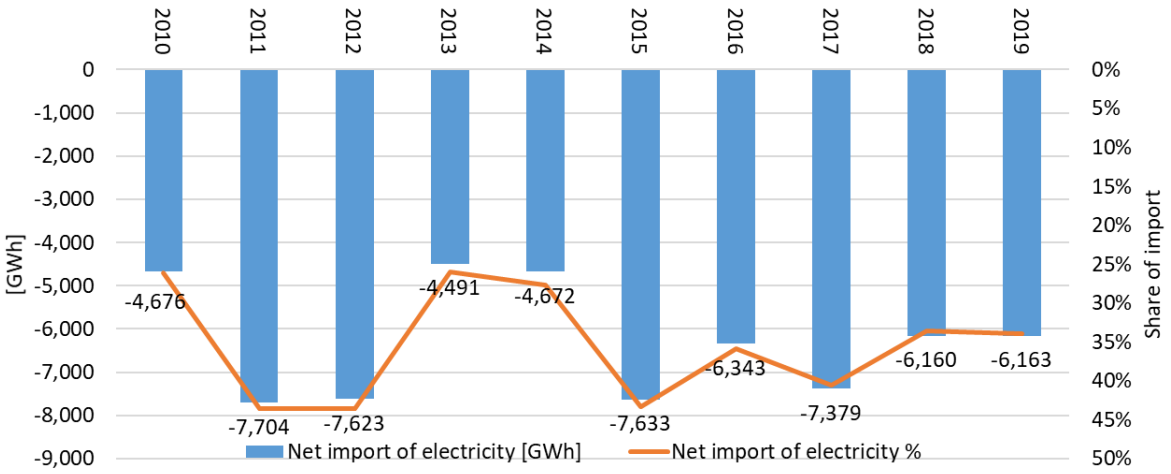
Figure 4.2.28. Share of electricity sources (GWh) in electricity procured for the requirements of the Croatian electricity system from 2010 to 2019

After four years of growth, the consumption of the Croatian electricity system in 2019 decreased as compared to 2018 (by around 1%).

As compared to 2018 (which was extremely favourable hydrologically), 2019 saw an increase in the production of wind power plants and other renewable energy sources (sun, biomass...), while the production of hydroelectric power plants was lower. The production of thermal power plants was slightly higher, while net imports were on the same level as in 2018.

Figure 4.2.29. shows net electricity imports into the Croatian electricity system over the past 10 years, including electricity generated at Krško Nuclear Power Plant for HEP d.d.

Net electricity imports in 2019 amounted to 33.9% of the total consumption of the Croatian electricity system (the same as in 2018).



Source: HOPS

Figure 4.2.29. Net electricity imports required for domestic consumption and share of imports in total consumption in Croatia

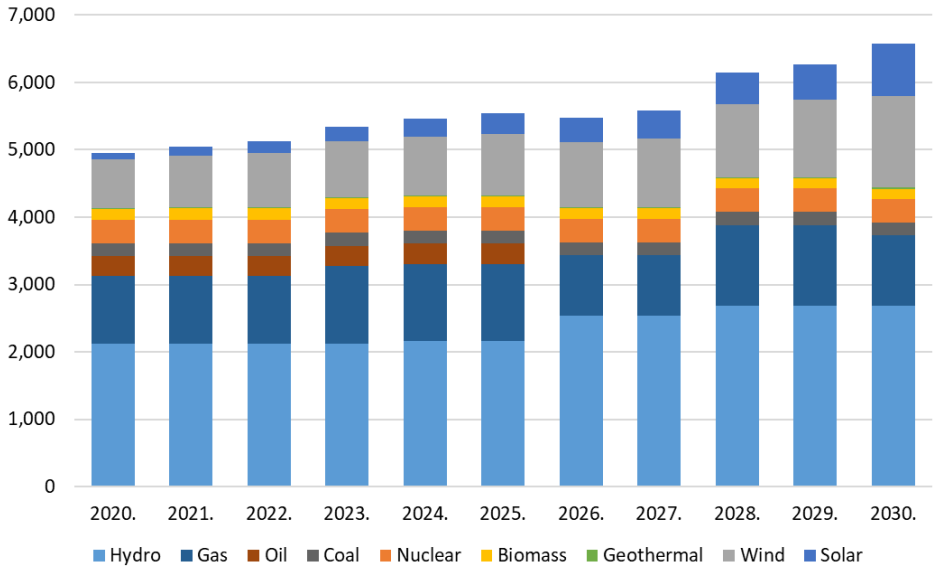
Energy Development Strategy and Integrated National Energy and Climate Plan

In December 2019, the Ministry of Environmental Protection and Energy published the *Croatian Integrated National Energy and Climate Plan for the period 2021-2030*.

Furthermore, on 6 March 2020, the **Strategy** was published in the Official Gazette, in which three development scenarios were considered: S0, S1, and S2. Scenario S2 –

moderate energy transition scenario was used as the referential scenario in the **Strategy** (and in the *NECP* related to the production of electricity).

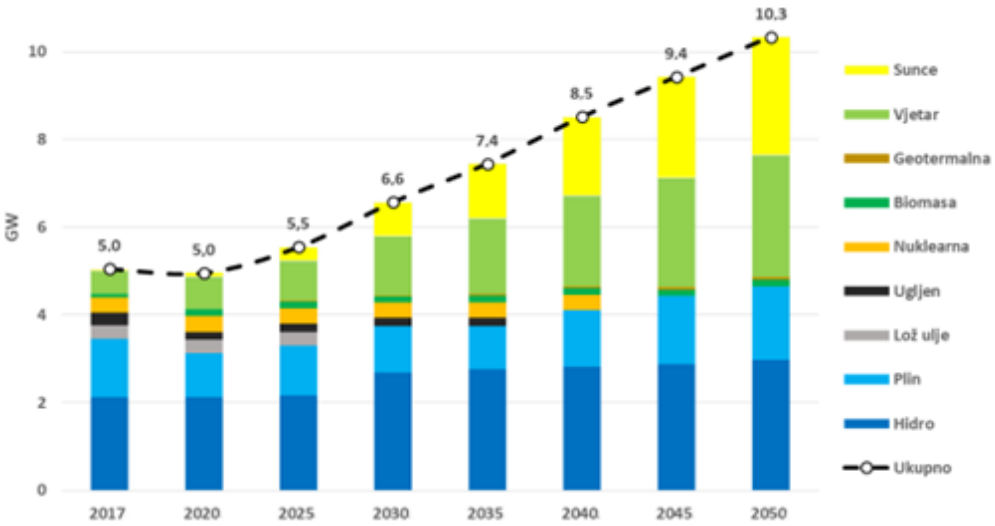
Figure 4.2.30. shows the expected capacity of power plants by 2030 according to *NECP*.



Source: NECP

Figure 4.2.30. Expected capacity of power plants by 2030 according to NECP.

Figure 4.2.31. shows the capacity of power plants by 2050 according to scenario S2 from the **Strategy.**



Source: ***Strategy***

Figure 4.2.31. Expected capacity of power plants by 2050 according to scenario S2

The development and construction of power plants using renewable energy sources is expected to increase - scenario S2 projects the share of renewables in electricity production at 61% by 2030 or 83% by 2050.

Notes on monitoring the balance of production and consumption of electricity

In the first half of 2020, HOPS and HEP-ODS submitted requests to HERA for prior approval for reports on monitoring the security of supply in the transmission and distribution system for 2019. These reports and the currently available data supplied to HERA by HOPS and HEP-ODS suggest that the level of security of electricity supply in the Croatian

electricity system is satisfactory, given the available production capacity in Croatia and the availability of sufficient electricity imports.

In accordance with the *ERNC Regulation*, HOPS, with the approval of HERA, published five documents that are part of the *Plan to defend the electrical system against major disruptions* in 2019. At the end of 2019, HOPS submitted a draft *Plan on testing equipment and capabilities relevant to the system defence plan and the restoration plan* to HERA for approval.

In 2019, *Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC* was published as part of the Clean Energy Package. This *Regulation* stipulates rules for cooperation between member states regarding the preparedness, prevention, and management of electricity crises, taking into account the demands of the internal electricity market; it also prescribes national and regional measures that will be contained in the risk preparedness plans of all member states.

Cybersecurity in the electricity system

From the aspect of cyber security in the electricity sector, HOPS and HEP-ODS (as well as Croatia's sole large electricity producer, HEP-Proizvodnja d.o.o.) are considered key service operators and have obligations arising from the **Cyber Security Act** and the *Cyber Security Regulation.* HOPS and HEP-ODS reported to HERA on the specific actions they have taken to achieve a high level of cyber security of their services and to prevent or mitigate the effects of incidents on the security of network and IT systems.

In addition to upgrading network and security infrastructure, an IT security coordinator has been named at HOPS. A draft *Ordinance on the security of HOPS IT system* has been drafted in accordance with the *NIS Directive* and the aforementioned national legislation. Also, in June 2019, the *SCADA system risk management and risk assessment methodology* was adopted. The risk management process includes activities to establish the scope of risk assessment (equipment and systems), risk assessment, catalogue of threats and vulnerabilities, evaluation and risk management plan, communication and consultation on risks, and risk acceptance and possible risk processing methods.

As regards the smart metering devices that HEP-ODS installs in households, the remote reading system is protected at all levels. Physical communication is encrypted, while data protection is applied at application level. All IP communications are protected with corporate access to HEP's VPN. Meters cannot be accessed or changed without the proper applications and passwords. Access to applications and databases is protected by access data and passwords.

HERA plays a supporting role in power system cyber security. The regulator does not have a prescribed direct role in cyber security (aside from data protection), however its basic goal is to establish an efficient electricity market and market competition, as well as to protect energy consumers and energy entities. Therefore, the support of regulators is vital in developing the cyber security of energy subjects, raising awareness, and supporting inter-sector and international communication and information exchange.

4.2.8 Implementation of network codes and guidelines

The development of EU Commission regulations from the set of network codes and guidelines is a key element building a common internal energy market under the Third Package. Eight regulations have been adopted, which can be divided into the following groups:

1. Market rules:

- *Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management* (*CACM Regulation*),

- *Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation*, (hereinafter: *FCA Regulation*),
- *Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing* (hereinafter: *EBGL Regulation*),

2. Network codes for grid connection:

- *Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators* (hereinafter: *RFG Regulation*),
- *Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a network code on demand connection* (hereinafter: *DCC Regulation*),
- *Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for high voltage direct current system and direct current-connected power park module grid connections* (hereinafter: *HVDC Regulation*),

3. Network codes for systems operation:

- *Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation* (hereinafter: *SOGL REGULATION*),
- *Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration* (hereinafter: *ERNC Regulation*).

The *CACM*, *FCA*, *EBGL*, and *SOGL* regulations are guidelines, while the *RFG*, *DCC*, *HVDC*, and *ERNC* regulations are network codes. Similarities between guidelines and network codes lie in that all regulations are legally binding and directly applicable, and have the same approval procedure. Differences lie in the procedure by which regulations are developed, the legal basis for their adoption, the topics they cover, and the work that must be done in the implementation phase regarding the adoption of necessary by-laws on the national level (network codes are more detailed, while guidelines require the adoption of a large number of by-laws in the implementation phase). The status of the implementation of particular regulations in Croatia is as follows.

CACM Regulation

The CACM Regulation lays down detailed guidelines for the allocation of cross-zonal capacity and congestion management in the day-ahead and intraday markets, including requirements for the development of common methodologies for determining the amount of capacity available simultaneously between bidding zones and performance evaluation criteria. Bidding zones are the largest geographical region within which market participants can trade energy without capacity allocation.

The basic objective of the *CACM Regulation* is to define minimum harmonised rules with the ultimate goal of unifying the day-ahead and intra-day interconnections to ensure a clear legal framework for an efficient, modern capacity allocation and congestion management system, which will facilitate electricity trading throughout the EU to the benefit of consumers, enable more efficient use of the network, and increase competition.

From the *CACM Regulation*'s entry into force in 2015 until the end of March 2020, HERA participated in the adoption or approval of a total of 27 acts that include certain methodologies, rules, or regulations. This total number of acts also contains amendments to particular acts.

In accordance with the provisions of the *CACM Regulation*, when adopting most of the acts, HERA's role was to approve them either at the level of the CORE capacity calculation region or at the pan-European level. In some cases, if national regulatory energy agencies were unable to agree on the approval of the terms and conditions or methodologies jointly proposed by all relevant transmission system operators, ACER adopted the act in question.

HERA continues to adopt and approve revised or new acts; the most important act currently in process relates to determining the regional activation of redispatching and countertrading, as well as cost-sharing.

FCA Regulation

The FCA Regulation lays down detailed rules for the allocation of cross-border capacity in long-term markets, for the establishment of a common methodology for determining long-term cross-border capacity, for the establishment of a single European allocation platform offering long-term transmission rights, as well as for the possibility of returning long-term transmission rights for the subsequent allocation of long-term capacities or for the possibility of transferring long-term transmission rights between market participants.

The main objectives of the *FCA Regulation* are: to promote effective long-term cross-zonal trading while providing long-term opportunities to limit cross-zonal risk for market participants; to optimise the budgeting and allocation of long-term cross-zonal capacity; to respect the need for fair and orderly long-term capacity allocation and fair and orderly pricing; to contribute to the efficient long-term operation and development of the electricity transmission system and the electricity sector in the EU.

From the *FCA Regulation*'s entry into force in 2016 until the end of March 2020, HERA participated in the adoption or approval of a total of 13 acts that include certain methodologies, rules, or regulations. This total number of acts also contains amendments to particular acts.

When adopting all of these acts, HERA's role was to approve them either at the level of the CORE capacity calculation region or at the pan-European level. In some cases, if national regulatory energy agencies were unable to agree on the approval of the terms and conditions or methodologies jointly proposed by all relevant transmission system operators, ACER adopted the act in question.

HERA continues to adopt and approve revised or new acts; the most important act currently in process relates to determining the regional calculation of long-term capacities.

EBGL Regulation

The EBGL Regulation defines a set of technical, operational, and market rules for the regulation of balancing markets, i.e. balancing capacity markets and balancing energy markets.

For the purpose of trading balancing capacity and balancing energy across borders, the *EBGL Regulation* prescribes the adoption of a framework for the use of cross-zonal transmission capacities.

According to the *EBGL Regulation*, markets will be managed through European platforms. However, trading balancing capacities outside the borders of Croatia is not mandatory, and HOPS will be able to obtain balancing energy without these platforms from non-standard (special) balancing capacities.

The EBGL Regulation will lead towards a regulated framework for imbalance settlement for balance responsible parties, which will encourage them to maintain system balance.

Since the *EBGL Regulation*'s entry into force on 18 December 2017, HERA has participated in the adoption of 13 European regulations. In addition to this, HERA ensured the adaptation of national regulations (electricity system balancing rules and electricity market organisation rules) in accordance with Article 18 of the *EBGL Regulation*.

Three documents with EU significance were adopted by ACER, as the national regulatory agencies could not agree on approving these documents and had objections to their content. Of these three documents, two relate to balancing energy trade, while one defines the framework for determining the price of balancing energy and the price of cross-zonal transmission capacities.

In 2020, HOPS prepared a national report on balancing in accordance with Article 60 of the *EBGL Regulation*, the summary of which will become a part of ENTSO-E's report according to Article 59.6 of the *EBGL Regulation* and will be published on the internet.

RFG Regulation

The RFG Regulation sets requirements for the connection of power plants (synchronous generation modules), power park modules, and offshore power park modules to the interconnected system network. It aims to ensure fair competition in the internal electricity market, systems security, the integration of renewable energy sources, and to facilitate electricity trade across the EU. It also prescribes obligations to ensure that system operators make appropriate use of plant capacity in a transparent, non-discriminatory manner in order to ensure level market conditions across the EU.

From the *RFG Regulation*'s entry into force in 2016 until the end of March 2020, HERA declared three production modules emerging technologies, adopted criteria for granting derogations from the implementation of the *RFG Regulation*, and approved national thresholds and requests for the general implementation of all types of production module.

HERA also approves revised transmission system network codes and distribution system network codes, which incorporate additional technical requirements for the connection of new production units in accordance with the *RFG Regulation* and general application requirements already approved by HERA.

DCC Regulation

The DCC REGULATION will help meet requirements related to the increased acceptance of renewable energy sources, ensuring the security of the electricity system and the electricity market by relying on the implementation of smart networks. *The DCC Regulation* was created with the aim of defining shared (general) requirements tied to functionality; it mainly focuses on the connection of non-household loads and distribution networks.

The DCC Regulation consolidates requirements that are set when connecting a consumer's plant to the transmission network. From the perspective of transmission system operators, consumers are individual non-household loads that are connected directly to the transmission network or distribution networks. An increase in distributed generation makes it possible to return energy from the distribution network into the transmission network, i.e. reverse power flows; the *DCC Regulation* thus contains special provisions to ensure the stability of the network in case of reverse flows. The *DCC Regulation* also sets limit values that make it easier to offer flexible loads to end consumers, thus contributing to network stability.

The DCC Regulation covers requirements related to frequency, voltage, allowable short-circuit power, reactive power, relay protection, regulation, information exchange, power quality, and applicable simulation models, all of which must be met by production facilities.

Facilities that offer consumption management services to the competent system operators must meet requirements related to the regulation of operating power, reactive power, and frequency.

From the *DCC Regulation's* entry into force in 2016 until the end of March 2020, HERA adopted criteria for granting derogations from the implementation of the *DCC Regulation*, and has also approved general implementation requirements for consumer connection.

HERA participated in the process of implementing requirements arising from the *DCC Regulation* and general implementation requirements by developing and approving draft amendments to network codes. HERA provided prior approval for the draft *Amendments to the Distribution System Network Code*, and is nearing completion of the process of

providing prior approval to the draft Amendments to the Transmission System Network Code.

HVDC Regulation

The HVDC Regulation defines requirements for grid connections of high-voltage DC (HVDC) transmission systems and DC-connected power park modules. It integrates all the requirements and rules that are set when connecting HVDC systems and DC-connected power park modules to the transmission network, thus contributing to the maintenance, protection, and security of the system in order to facilitate the proper functioning of the internal electricity market within and between synchronous areas and achieve cost efficiency.

From the *HVDC Regulation's* entry into force in 2016 until the end of March 2020, HERA adopted criteria for granting derogations from the implementation of the *HVDC Regulation*.

HERA also approves revised transmission system network codes and, which incorporate additional technical requirements for the connection of new HVDC systems and DC-connected power park modules in accordance with the *HVDC Regulation* and general implementation requirements already approved by HERA.

SOGL Regulation

The SOGL Regulation establishes guidelines for the operation of the electricity transmission system in order to maintain operational safety, frequency, quality, and efficient use of the grid and resources. It prescribes a common set of minimum requirements for systems operations in the EU, cross-border cooperation between transmission system operators, and the exploitation of the relevant characteristics of connected distribution system operators and significant grid users.

From the *SOGL Regulation's* entry into force in 2017 until the end of March 2020, HERA participated in the approval of a total of 14 acts that include certain methodologies, rules, or regulations. This total number of acts also contains amendments to particular acts.

When adopting all of these acts, HERA's role was to approve them either at the pan-European level or the level of the LFC block SHB, which consists of the electricity systems of Croatia, Slovenia, and Bosnia and Herzegovina. In some cases, if national regulatory energy agencies were unable to agree on the approval of acts jointly proposed by all relevant transmission system operators, ACER adopted the act in question.

HERA continuously works to approve revised or new acts according to the *SOGL Regulation*.

ERNC Regulation

The ERNC Regulation was adopted with the aim of maintaining operational safety, preventing the spread or worsening of incidents in order to avoid widespread emergency state and blackout state, and to enable efficient and rapid system restoration from emergency state or blackout state. Applies to HOPS, HEP -ODS, significant grid users, system defence service providers, system restoration service providers, balance responsible parties, balancing service providers, nominated electricity market operators (CROPEX), and other entities designated to carry out market activities in accordance with the *CACM Regulation* and the *FCA Regulation*.

In accordance with the *ERNC Regulation*, HOPS was required to submit the following documents to HERA for approval:

- terms and conditions to act as defence service providers on a contractual basis,
- terms and conditions to act as restoration service providers on a contractual basis,
- a list of significant grid users responsible for implementing measures at their facilities that result from mandatory requirements set out in the RFG, DCC, and HVDC regulations

and/or from national legislation and the list of measures to be implemented by these significant grid users,

- a list of high priority significant grid users and the terms and conditions for disconnecting and re-energising high priority grid users;
- rules for suspension and restoration of market activities,
- specific rules for imbalance settlement and the settlement of balancing energy in the case of the suspension of market activities, as well as a
- test plan.

In 2019, HERA approved the first five documents, while the rules for imbalance settlement and settlement of balancing energy in the event market activities are suspended are incorporated into the *Rules on system balancing*. In late 2019 HERA received a test plan, which is currently in the approval process.

4.3 Wholesale electricity market

4.3.1 Development of the wholesale electricity market

Electricity balance in Croatia

Table 4.3.1. shows an excerpt from Croatia's electricity balance; it is apparent that the largest share of total electricity consumption in Croatia in 2019 (18,169 GWh) was covered by power plants in Croatia (12,006 GWh, 66.1%), while the remainder was covered by physical net imports (6,163 GWh, 33.9%).

Table 4.3.1. Electricity balance in Croatia in 2018 and 2019 in GWh

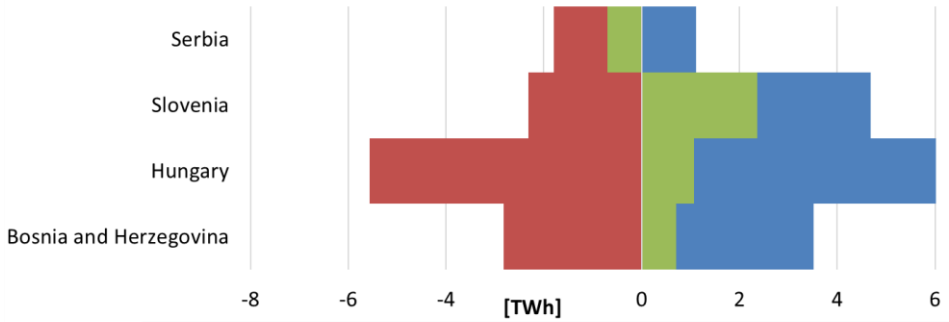
No.	Electricity balance	2018	2019
1	Total production	12,192	12,006
2	Imports into Croatia	12,692	11,400
3	**Total supply (1+2)**	**24,884**	**23,406**
4	Exports from Croatia	6,532	5,237
5	**Physical net imports (2-4)**	**6,160**	**6,163**
6	**Total consumption (3-4)**	**18,352**	**18,169**
7	Direct supply in the distribution network	1,055	1,348
8	Losses in the transmission network	534	388
9	**Transmission consumption (6-7-8)**	**16,764**	**16,433**
10	Delivery to end consumers in the transmission network and power plant consumption	931	902
11	RHE pumping work	129	176
12	**Net delivery to the distribution network from the transmission network (9-10-11)**	**15,704**	**15,355**

Source: HOPS, HEP-ODS

Trade at Croatian borders

Figure 4.3.1. shows the volumes of cross-zonal (cross-border) trading with neighbouring countries in 2019 (imports, exports and net exchange) at the Croatian borders according to volumes from contractual schedules. Net imports exist at all borders, except the border with Serbia.

Imports from Slovenia include electricity from NPP Krško (2.8 TWh) for HEP d.d. Total (trade) net exchange including electricity from NPP Krško amounted to 3.4 TWh.



	Bosnia and Herzegovina	Hungary	Slovenia	Serbia
Net exchange	0.7 TWh	1.1 TWh	2.4 TWh	-0.7 TWh
Export	-2.8 TWh	-5.6 TWh	-2.3 TWh	-1.8 TWh
Import	3.5 TWh	6.6 TWh	4.7 TWh	1.1 TWh

Source: HROTE

Figure 4.3.1. Cross-zonal trade on the borders between Croatia and neighbouring countries in 2019 by volumes from the contractual schedules of energy entities

CROPEX (Hrvatska burza električne energije d.o.o.)

In 2019, CROPEX's day-ahead market had 20 registered members. Trading volume on this market in 2019 amounted to 5.250 GWh.

Figure 4.3.2. shows the correlation between CROPEX prices on the day-ahead market in relation to the Hungarian (HUPX) and Slovenian (BSP) exchanges in 2019. It is apparent that prices on CROPEX correlate more strongly with prices on the Slovenian exchange; the reason this is the coupling of the day-ahead market between the Slovenian and Croatian bidding zones.

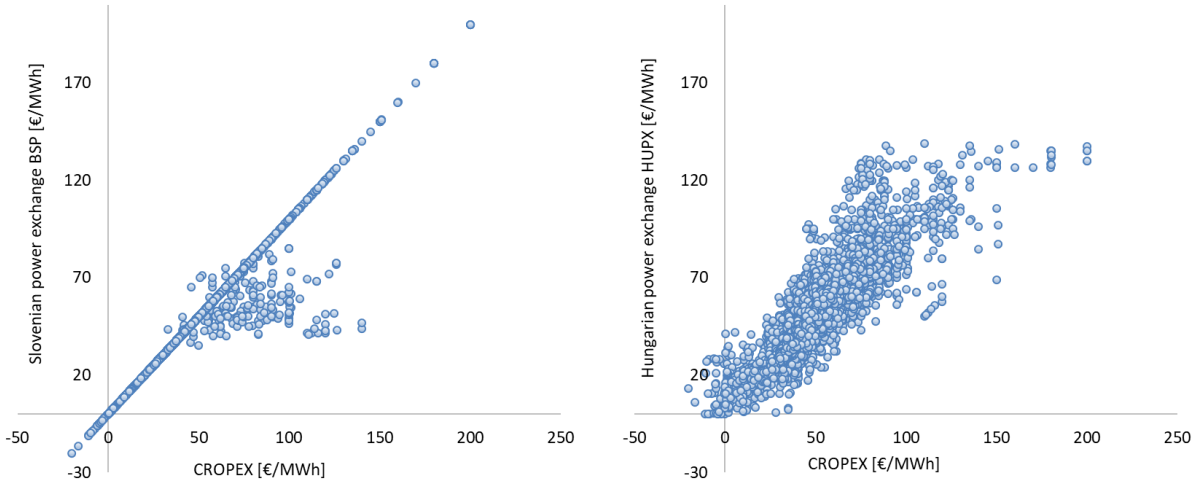


Figure 4.3.2. Correlation between CROPEX prices on the day-ahead market in relation to the Hungarian and Slovenian exchanges in 2019.

On 19 November 2019, CROPEX was coupled with the European intraday market via the Slovenian and Hungarian exchanges.

In 2019, CROPEX's intraday market had 11 registered members, who bought 94.4 GWh from CROPEX. Additionally, the Slovenian exchange bought 26.0 GWh from CROPEX on an intraday basis in the same year, while the Hungarian exchange bought 58.5 GWh.

In 2019, HROTE began trading on the CROPEX day-ahead and intraday markets (share of energy from the incentives system).

In February 2019, Croatian, Serbian, and Bulgarian transmission system operators (HOPS, EMS, and ESO EAD), power exchanges (CROPEX, SEEPEX, and IBEX), and energy regulatory

agencies (HERA, AERS, and EWRC) confirmed their joint commitment coupling the particular markets within the MRC[41] framework.

In February 2019, HOPS and CROPEX submitted a report to the 4M MC parties with a request to include the Croatian-Hungarian border into the project. In March 2019, CROPEX was informed that the Croatian-Hungarian border would not be included in the project, so as not to expand the pre-defined scope of the project and thus jeopardise deadlines for establishing a new capacity allocation regime. The coupling of the day-ahead market is expected in summer of 2021 as part of Core FB MC.[42]

The coupling of the Croatian and BiH markets via CROPEX was not realised in 2019.

Six tenders to procure losses in the HOPS network were held on the CROPEX platform in 2019. CROPEX offered the same to HEP-ODS, however this was not implemented as HEP-ODS did not accept the offer. In addition to the established practice of selling HROTE's energy from the incentive system on the day-ahead and intraday markets, the first auction for energy from the EKO balance group for 2020 was held on 25 November 2019 (for 60 MWh/h of base product); it was attended by seven market participants.

Electricity market concentration indicators

Table 4.3.2. shows the shares production capacities and electricity generated by power plants in Croatia in 2019 by energy entity. HEP d.d. has the largest share, amounting to 83.5% of production capacities and 79.8% of generated electricity.

Table 4.3.2. Shares in production capacities and electricity generated by power plants in Croatia in 2019 by energy entity

Energy entity	Production capacities	Generated electricity
HEP d.d.	83.5%	79.8%
Other	16.5%	20.2%

As of 31, December 2019, there were 60 valid licences for electricity generation, 12 licences for electricity supply, and 30 licences for electricity trade in Croatia.

The total trading volume on the Croatian market in 2019 was 63.6 TWh (including the quantities of CROPEX, HROTE, HOPS, and HEP-ODS); HEP d.d. participated with 40.2 TWh (market share of trading volume).

Observations on the development of the wholesale market

In October 2019, the *Rules on electricity market organisation* were adopted, which were key for coupling the intraday markets of Croatia, Slovenia, and Hungary.

The Rules introduced the following novelties: terms were adopted from the *EBGL Regulation*; the *Rules* were adapted for the transition from market operation with a time interval of one hour to an interval of 15 minutes[43]; producers in the incentive system have the ability to trade system services; owners of plants and owners of energy storage units are expressly allowed to trade with HOPS and HEP-ODS; simplifications were introduced to the process of attaining electricity market participant status; provisions have been improved for the planned and unplanned exit of suppliers from the market (e.g. informing end consumers of their options when switching suppliers).

The EKO balance group became operational on 1 January 2019. HROTE was thus enabled to sell 30% of the electricity of the EKO balance group on the wholesale market (including on CROPEX). In 2020, that share was increased to 60%. The EKO balance group has

41 *Multi-Regional Coupling*

42 *Core Flow-based Market Coupling*

43 *In June 2020, HERA granted a derogation from the implementation of the 15-minute interval, which will be implemented as of 1 January 2023.*

imbalances between the electricity produced and the energy sold by HROTE. HROTE is financially responsible to HOPS for imbalances in the EKO balance group.

The development of the wholesale market would be facilitated by a full termination of regulated sale of electricity from the incentives system directly to suppliers.

During 2019, the base price electricity for 2020 on the Hungarian Derivative Energy Exchange (HUDEX) ranged from ca. EUR 54/MWh to ca. EUR 63/MWh[44]. As compared to 2018, the base price of electricity on CROPEX'S day-ahead market fell from EUR 52.0/MWh to EUR 49.3/MWh in 2019.

CROPEX's contribution to the development of competition is apparent in trading volume, the amount of purchase and sale offers, the number and share of market participants in buying and selling, and prices, which were on par with prices on neighbouring exchanges.

In late 2019, the Croatian intraday market was coupled with the Hungarian and Slovenian intraday markets.

In March 2020, after receiving prior consent from HERA, HROTE adopted the *Amendments to the Rules on electricity market organisation* in order to enable natural and legal persons to supply electricity to the electricity network while their plants are in test mode.

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 this data on the central platform for information transparency would enable greater transparency in the wholesale electricity market, and thus improve the operation of the market.

The website http://remit.hep.hr/ publishes data on the availability of generating units in the territory of Croatia that are owned by HEP d.d., thereby increasing transparency.

Table 4.3.3. shows wholesale electricity market indicators from 2015-2019.

44 *Source: https://hudex.hu/uploads/riportok/HUDEX%20Power%20Annual%20Report%20Year%202018%20Public.pdf, accessed 2 April 2019*

Table 4.3.3. Wholesale electricity market indicators from 2015-2019

Indicator	2015	2016	2017	2018	2019
Electricity production[GWh]	9,999	11,331	10,818	12,192	12,006
Number of active participants in the wholesale market	27	35	35	41	35
Total electricity consumption[GWh]	17,632	17,674	18,197	18,352	18,169
Imports[GWh]	13,165	12,397	12,157	12,692	11,400
Exports [GWh]	5,532	6,054	4,778	6,532	5,237
Share of HEP-Proizvodnja d.o.o. in electricity production [%]	77%	73%	79%	83%	80%
Number of active traders on the wholesale market	15	16	20	24	21
Trade of electricity on the electricity market[GWh]	0	258	190	2,460	5,429
Total electricity traded[TWh]	43	47	53	67	58
Average price of electricity on the market[EUR/MWh]	n/d	n/d	52	52	49
Structure of production capacities by source[GWh]					
· Coal	0.34	0.34	0.34	0.34	0.34
· Natural gas/Fuel oil	1.79	1.79	1.79	1.85	1.85
· Nuclear	0.00	0.00	0.00	0.00	0.00
· Hydro	2.03	2.15	2.15	2.20	2.21
· Wind	0.42	0.48	0.47	0.58	0.73
· Solar	0.05	0.06	0.06	0.07	0.08
· Other	0.05	0.06	0.08	0.13	0.14
Share of electricity production on the market (%)	77%	84%	67%	79%	73%
Total installed plant capacity [GW]	4.69	4.87	4.89	5.17	5.37

Source: HOPS, HEP-ODS, CROPEX

4.3.2 Allocation of cross-zonal capacities and congestion management

Cross-zonal capacity allocation regimes in 2019

Pursuant to the **Act on the Regulation of Energy Activities**, and in co-operation with the regulatory authorities of the neighbouring countries with whose electricity systems Croatia is connected, HERA monitors the allocation and use of connection line capacities and the system to address congestion within the national transmission network. The supervision of the allocation of cross-zonal capacities is one of the regulator's duties as provided by EU legislation, especially by *Regulation (EC) 714/2009*.

Table 4.3.4. Cross-zonal capacity allocation regimes and offices on borders between Croatia and neighbouring countries in 2019

Border	Yearly auction	Monthly auctions	Daily auctions	Intraday allocations
Slovenia	JAO	JAO	CROPEX[45] (MC)	ELES/CROPEX (XBID)
Hungary	JAO	JAO	JAO	HOPS/CROPEX (XBID)
Serbia	JAO	JAO	JAO	EMS
Bosnia and Herzegovina	SEE CAO	SEE CAO	SEE CAO	HOPS

Legend:
Coordinated Bilateral

Table 4.3.4 shows that Croatia's allocation of cross-zonal capacities in all time frames functions under market principles. Regional auction offices (JAO for the borders with Slovenia, Hungary, and Serbia and SEE CAO for the border with Bosnia and Herzegovina) are tasked with organising annual, monthly, and daily auctions. The exception is the border with Slovenia, where there an implicit capacity allocation regime has been established through the day-ahead coupling of the Croatian and Slovenian markets. HOPS

[45] *Implicit capacity allocation.*

carries out bilateral allocation of total intraday capacities in both directions and on the border with Bosnia and Herzegovina, while the neighbouring transmission system operators are in charge of organising intraday allocations on the borders with Slovenia and Serbia. In November 2019, Croatia's borders with Slovenia and Hungary were included in the coupling of the intraday markets of EU countries through the XBID project.

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.

When electricity exchanges implicitly allocate available capacity given to them by transmission system operators (both cross-zonal transmission capacity and energy are allocated) as part of the day-ahead market coupling, neighbouring transmission system operators then 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 by the EUPHEMIA algorithm.[46]

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

Table 4.3.5 shows offered and allocated cross-zonal capacities and HOPS's income from annual auctions per border.

Table 4.3.5. Offered and allocated cross-zonal capacities, and HOPS income from yearly auctions per border for 2019

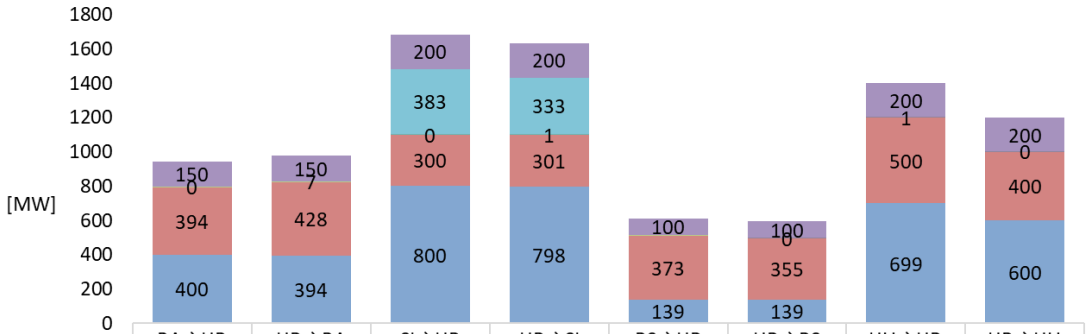
Direction[47]			Offered capacity [MW]	Number of participants	Number of participants with accepted offers	Allocated [MW]	HOPS income [mil. HRK]
BA	→	HR	400	18	8	400	6.6
HR	→	BA	400	17	13	394	0.5
SI	→	HR	800	23	12	800	3.9
HR	→	SI	800	25	21	800	0.8
RS	→	HR	150	19	9	150	2.0
HR	→	RS	150	20	7	150	1.0
HU	→	HR	700	25	12	699	9.7
HR	→	HU	600	23	16	600	6.2
							30.7

Source: HOPS

Figure 4.3.3. shows already allocated capacities (AAC) on an annual basis that have been reported for use, capacities allocated on a monthly basis ("Allocated"), capacities specifically intended for allocation on a daily basis after additional analyses ("Intended for daily"), transmission reliability margin (TRM), and the capacity not allocated at monthly auctions ("Unallocated"). Time periods of reduced capacity due to planned maintenance of parts of the network were taken into account when calculating the average capacities.

46 *Algorithm for calculating prices on the electricity market.*

47 *The tables use two-letter ISO codes for countries: HR (Croatia), SI (Slovenia), HU (Hungary), BA (Bosnia and Herzegovina) and RS (Serbia).*



	BA→HR	HR→BA	SI→HR	HR→SI	RS→HR	HR→RS	HU→HR	HR→HU
TRM	150	150	200	200	100	100	200	200
Intended for daily	0	0	383	333	0	0	0	0
Unallocated	1	7	0	1	1	0	1	0
Allocated	394	428	300	301	373	355	500	400
AAC	400	394	800	798	139	139	699	600

Source: HOPS

Figure 4.3.3. Average monthly cross-zonal capacities per border in 2019

Due to the disconnection of DV 400 kV Ernestinovo – S. Mitrovica for planned maintenance from 11 March 2019 to 13 April 2019, it was not possible to use cross-zonal trading on the border with Serbia in either direction, as only this transmission line is used for cross-zonal trading. As usual, the least amount of capacity was offered on this border as compared to other neighbouring borders.

At the border with Serbia, 150 MW was allocated in both directions at the yearly auction. However, as there were a few periods of reduced capacity on this border due to grid maintenance and trading was not possible on particular days, the average AAC size amounted to 139 MW.

At the export route from Croatian to Slovenia, capacities purchased at yearly auction were re-sold in certain months, in which case this capacity was returned to the auction office that offered it at monthly auction.

Capacities on the border with Hungary in both directions were the most stable; no problems were experienced during the year, which is a result of the excellent coupling between the neighbouring systems. The capacities offered on the market are relatively modest considering the total cross-zonal transfer of thermal power of all 400 kV transmission lines.

In September 2019, at the export point from Croatian to Bosnia and Herzegovina, there were no revenues from monthly auctions as traders expressed interest for only 530 MW of the total of 606 MW offered at monthly auction. All traders who submitted bids for capacities offered at this auction received the capacities with no charges.

Capacity unallocated at monthly auction, which is intended for daily auctions, as well as capacity not reported for use, is offered at daily auctions. Leftover capacity from daily auctions, taking into account transactions in the opposite direction, was allocated without a charge in the day of delivery on all borders, in the order in which requests were received.

A breakdown of HOPS's income and costs from auctions for the allocation of cross-zonal capacities can be seen in Table 4.3.6.

Table 4.3.6. Breakdown of HOPS' income and costs from auctions for the allocation of cross-zonal capacities in 2019

Income/cost	Amount [million HRK]
Yearly auctions	30.7
Monthly auctions	30.6
Daily auctions	41.8
Resale of capacities	-29.2
JAO and SEE CAO costs	-2.7
Corporate income tax	-12.8
Total	**58.4**

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

There was no significant increase in revenues from capacity allocation in 2019; dedicated funds for HOPS from the allocation of cross-zonal capacities have amounted to ca. HRK 60 million in the past few years.

In accordance with *Regulation (EC) 714/2009*, these funds should be used primarily to increase or guarantee cross-zonal capacities. In April 2019, HERA published a *Report on the use of HOPS revenues from the allocation of cross-border transmission capacities in the period from July 2017 to June 2018* and confirmed that HOPS used the funds in question in accordance with said *Regulation*.

2019 was the first calendar year in which the day-ahead capacity allocation between Croatia and Slovenia was organised throughout the year as a part of market coupling. Based on data from CROPEX and HOPS, it can be concluded that prices corresponded fully between CROPEX and BSP in most hours during the year. In such situations, neighbouring transmission system operators earn no congestion revenue. Following the establishment of an implicit allocation of capacities on the border with Slovenia, HOPS generated revenues from the allocation of capacities only in hours when there was a market spread between the Croatian and Slovenian markets; these revenues amounted to HRK 16.9 million.

Undoubtedly the most important event in 2019 related to the allocation and use of cross-zonal (cross-border) capacities was the launch of the intraday connection between the Croatian market and the markets of Slovenia and Hungary in November 2019. As part of the second wave of accession to the XBID project, CROPEX and HOPS have successfully established an implicit intraday allocation regime with Croatia's EU neighbours.

In addition to the usual implicit allocation of intraday capacities established by the XBID project, at the request of HERA and the National Energy Regulator of the Republic of Slovenia and in accordance with the *CACM Regulation*, HOPS and the Slovenian Transmission System Operator (hereinafter: ELES) also enabled the parallel functioning of explicit intraday allocation. This allowed traders to take advantage of both implicit and explicit capacity allocation regimes in certain situations. This was preceded by HERA's approval to HOPS to move to an implicit intraday capacity allocation regime.

In late 2019, HERA provided its prior approval for the following rules regulating the allocation of capacities in 2020:

- *Draft Rules for intraday allocation of cross-border transmission capacities between the regulation areas of Hrvatski operator prijenosnog sustava d.o.o. and Nezavisni operator sistema u Bosni i Hercegovini*,
- *Draft rules for the explicit daily allocation of cross-border transmission capacities for zones AT-CZ, AT-HU, HR-HU, CZ-DE, CZ-PL, PL-SK, and PL-DE*,
- *Draft Rules for the explicit allocation of intraday capacities for the border between the bidding zones of Hrvatski operator prijenosnog sustava d.o.o. and EMS AD Beograd* and

the *Draft Nomination rules for the border between the Croatian and Serbian bidding zones*, and

- *Rules for the explicit daily allocation of cross-border transmission capacities for the Croatian and Serbian bidding zones*.

In accordance with the *CACM Regulation*, in December 2019, HERA extended CROPEX's status as nominated electricity market operator in Croatia to implement a single day-ahead and intraday connection for the next four years, which gives CROPEX the right to participate in all regional and European projects related to coupling national day-ahead and intra-day markets.

During 2019, HOPS ordered a limitation of production in the total amount of 2.9 GWh from renewable energy sources due to a system security threat. HERA and HOPS are collaborating to develop congestion management rules within the Croatian power system, including interconnectors that will provide network users with compensation for redispatching their production and consumption.

HOPS is currently participating in the non-compulsory multilateral cross-zonal redispatching activity of TSCNET[48], which can address congestion in the transmission network. With the entry into force of methodologies related to the activation and cost allocation of all corrective measures in the Core region, HOPS will address congestion at grid elements relevant to cross-zonal trading and system security in coordination with other transmission system operators.

According to Regulation (EU) 2019/943, 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 capacity must be ensured for cross-zonal trading. The remaining 30% of capacity can be used for confidence limits, circular flows, and internal flows at every critical network element.

Due to the inability to calculate a minimum capacity with satisfactorily reliability due to the lack of a few methodologies in the Core region and the highly demanding minimum capacity limits, HERA approved a derogation from this requirement for HOPS for 2020.

4.3.3 Electric power system balancing and ancillary services

Imbalance settlement for balance responsible parties

In October 2019, the *Rules on system balancing* were adopted in order to comply with the *EBGL Regulation*. With the adoption of these rules, the *Methodology for establishing balancing energy prices* and the *Methodology for establishing prices for providing imbalance settlement* were abolished. The method of calculating prices defined in these methodologies is now contained in the *Rules on system balancing* in a new form.

As of 1 January 2020, imbalance prices are determined in a new way on the basis of the *Rules on system balancing*. Instead of different prices, the same imbalance price is now applied to all balance groups ($C_{1,i}$). This price depends on the imbalance of all balance groups ($\Delta E_{BG,i}$), which can be positive, negative, or equal to zero, as well as on active positive ($\Delta E_{Euukp+,i}$) and negative ($\Delta E_{Euukp-,i}$) balancing energy from the FRR. On this basis, the weighted price of positive ($C_{EU+,i}$) or negative balancing energy ($C_{EU-,i}$) in an observed hour is used. The price from CROPEX on the day-ahead for the same hour ($C_{CROPEX_{DA},i}$) is used as a limit. The financial neutrality coefficient (p) is equal in all hours of an observed month; it cannot be less than zero or greater than one, and it is not applied to negative

48 *Regional Security Coordinator for Central Europe.*

prices. The goal is to attain financial neutrality between the amount of costs paid by HOPS for balancing energy and balancing costs paid to HOPS by the balance groups.

Figure 4.3.4. shows the average monthly prices of positive and negative imbalances in 2019. The highest average weighted monthly price for negative imbalances C_n was achieved in January (EUR 100/MWh), while the highest average weighted monthly price for positive imbalances C_p was achieved in the same month (EUR 46/MWh).

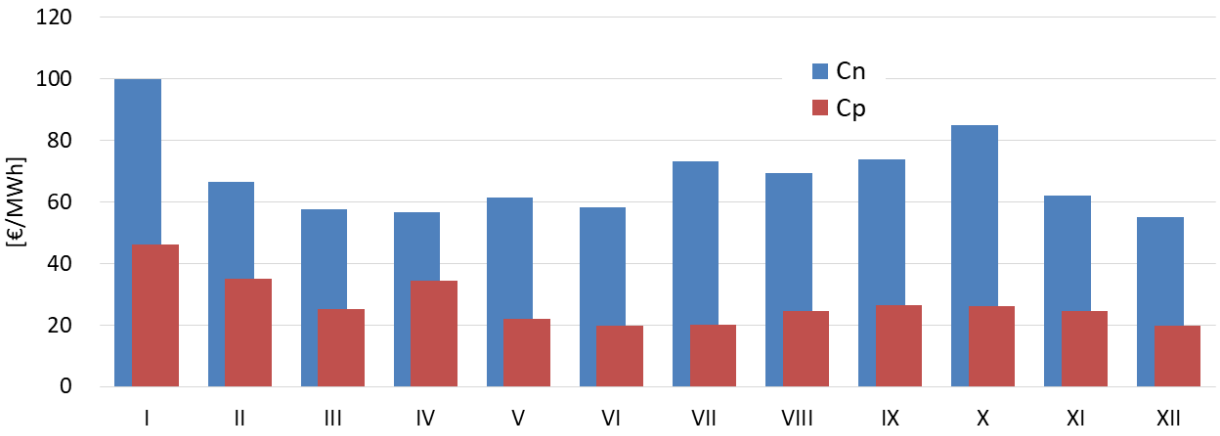


Figure 4.3.4. Average weighted monthly prices of positive and negative imbalances in 2019

Figure 4.3.5. shows a monthly breakdown of imbalance amounts invoiced by HOPS in 2019 (I_{uk} – total amount, I_n – amount of negative imbalances, I_p – amount of positive imbalances). For all months of 2019, the total amount of balance settling calculated by HOPS was HRK 133 million, of which HRK 45.4 million pertained to imbalances of the EKO balance group, while HRK 8.5 million pertained to imbalances in energy procurement to cover losses in the transmission network.

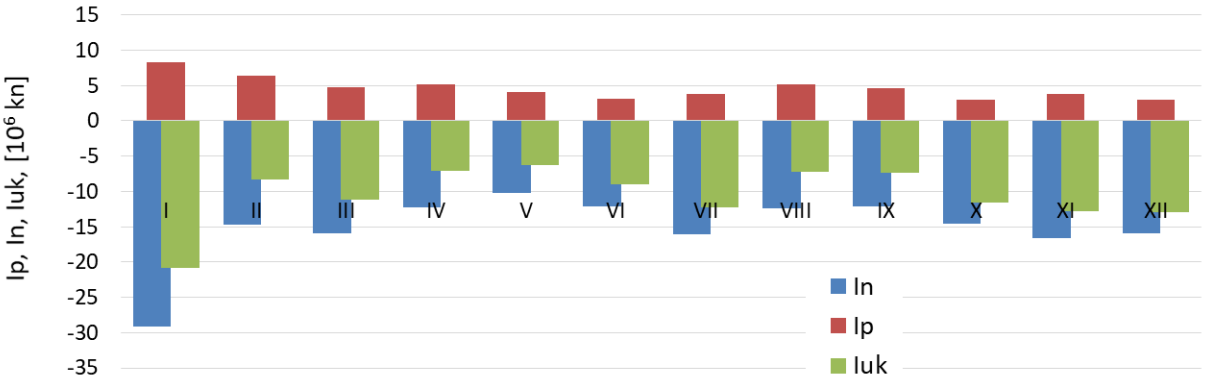


Figure 4.3.5. Invoiced imbalance amounts in 2019

Provision of imbalance settlement

In 2019, the price of balancing energy for HEP-Proizvodnja d.o.o. was determined according to the *Methodology for establishing prices for the provision of imbalance settlement*.

The Rules on system balancing abolished the *Methodology for establishing prices for imbalance settlement*, which is now contained in the *Rules on system balancing* in a different form. Changes in the calculation of balancing energy involve changes in the reference price, for which the price from CROPEX is used; if the CROPEX price is unavailable, the prices from the Hungarian and Slovenian exchanges are used. The new method of calculating prices has been implemented since 1 January 2020.

The Rules on system balancing specify provisions that define market procurement of balancing energy, which includes independent aggregators. Grid users are required to

inform suppliers and/or purchasers and the competent system operator before approaching an independent aggregator.

HEP-Proizvodnja d.o.o. is so far the only provider of imbalance settlement from secondary and tertiary balancing power reserves; entities outside HEP d.d. also provided the tertiary reserve services for system security within the framework of the pilot project. A total of 189 GWh of balancing energy was activated to increase electricity production, while 106 GWh was activated to decrease production. Additionally, within the framework of imbalance exchanges with other regulatory areas, 74 GWh was exchanged for increases and 69 GWh for decreases.

In 2019, HOPS's total costs for imbalance settlement amounted to HRK 75 million. This amount does not include the HRK 500,000 cost of the compensation exchange plan, nor does it include the HRK 115,000 cost of the imbalance exchange procedure.

On 1 February 2019. HOPS and Slovenia transmission system operator ELES began exchanging imbalances of national energy systems within the IGCC[49] project together with Germany, Denmark, the Netherlands, Switzerland, the Czech Republic, Belgium, Austria, and France.

Ancillary services

In late 2018, due to a provision on the ITO model by which HOPS was certified, HERA was asked to provide approval for the conclusion of ancillary services agreements between HOPS and HEP-Proizvodnja d.o.o. These agreements referred to 2019, and are based on the *Methodology for establishing prices for the provision of ancillary services*. HERA approved agreements for 2020 using the same procedure.

The Rules on system balancing specify provisions that define market procurement of power reserves.

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 325 million, of which 85% was related to power reserves for system balancing.

Observations on electricity system balancing

The EBGL Regulation and *SOGL Regulation* stipulate the provision of HERA's approval for the rules and methodologies regulating the balancing mechanism.

Pursuant to the *EBGL Regulation*, HOPS must become involved in the operation of three EU platforms for electricity system balancing: the IN platform (for imbalance exchange), the aFRR platform (for activating balancing energy from reserves to automatically re-establish frequency) and the mFRR platform (to activate balancing energy from reserves to manually restore frequency). It will have the opportunity to become involved in projects involving the exchange of power reserves, such as the FCR platform. In 2019, HERA received EU documents to regulate the operation of the platforms for approval from HOPS; it also implemented activities involving these documents with the national regulators. In December 2019, in accordance with the *EBGL Regulation*, HOPS delivered documents leading to the exchange of power reserves in the Core region to HERA for approval. Additionally, as the national regulatory agencies could not agree on approving these documents involving the exchange of balancing energy, ACER published three decisions regarding the aFRR and mFRR platforms in January 2020.[50] These two platforms must become operational 30 months from the day these documents are approved.

With the establishment of the EKO balance group, whose members are eligible producers in the incentives system, HROTE became financially responsible for its imbalances as the leader of the group on 1 January 2019. The imbalance costs of the EKO balance group amounted to HRK 45.4 million in 2019; members of the EKO balance group paid HROTE

[49] *International Grid Control Cooperation*

[50] *https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Pages/Individual-decision.aspx, accessed 5/3/2020*

HRK 25.5 million to this end. HROTE used the day-ahead and intraday markets on CROPEX for trading. In 2019, 70% of energy was sold to suppliers by regular procedure; in 2020, this share will be reduced to 40%. The full termination of the regulated sale of this electricity to suppliers would have a positive impact on the balancing system.

With this new method of calculating imbalance prices, which are now dependent on the price of active balancing energy, the amount charged to balance groups for imbalances is expected to be lower in 2020 than it was in 2019. Imbalance prices in 2019, excluding balancing energy costs, also covered 20% of reserve power costs.

In June 2020, HERA granted a derogation from the application of the 15-minute interval, which will be implemented as of 1 January 2023.

According to the *Rules on system balancing*, as of 1 January 2020, the price of energy in the "second (yearly) imbalance settlement" is defined as the weighted price from CROPEX on the day-ahead market. The load curve of the distribution system is used to calculate the weighted price. Until now, it has been calculated as the arithmetic mean from the day-ahead market.

In order to plan consumption and production, HEP-ODS and HOPS must establish an efficient design of historical data for billing metering points, as well as deliver this data more frequently. This would provide for better planning of balance groups, reserve capacity demands would decrease, and the ability to accept renewable energy sources would increase.

In 2019, imbalance settlements were recalculated at least once in four months due to errors metering data from HEP-ODS (e.g. there were four versions in April). A total of nine complaints were received, and a total of five balance groups submitted complaints.

4.4 Retail electricity market

4.4.1 Basic features of electricity consumption

Sale of electricity in 2019

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

Table 4.4.1. Number of metering points and the sale, average sale, and share in the sale of electricity to end consumers by consumption category in Croatia in 2019

Consumption category	Number of BMPs	Sale [MW]	Sale per BMP [kWh]	Share in total sale [%]	Change in sale 2019/2018 [%]
High voltage-110 kV[51]	145	1,212,757.9	8,340,982	7.4	0.9
Medium voltage	2,324	4,304,283.6	1,851,955	26.1	0.1
Total high and medium voltage	**2,470**	**5,517,041.5**	**2,233,998**	**33.4**	**0.3**
Low voltage – non-household users (blue)	41,433	201,087.9	4,853	1.2	7.0
Low voltage – non-household users (white)	124,519	1,089,706.2	8,751	6.6	7.3
Low voltage – non-household users (red)	29,486	3,099,135.8	105,107	18.8	2.4
Low voltage – public lighting (yellow)	21,884	387,040.0	17,686	2.3	4.6
Total low voltage – non-household	**217,322**	**4,776,969.9**	**21,981**	**29.0**	**1.0**
Low voltage – households (blue)	707,715	1,423,342.2	2,011	8.6	1.5
Low voltage – households (white)	1,496,894	4,738,223.0	3,165	28.7	0.4
Low voltage – households (red)	1,668	34,220.9	20,519	0.2	34.5
Low voltage – households (black)	2,948	6,168.2	2,092	0.0	3.7
Total low voltage – households	**2,209,224**	**6,201,954.2**	**2,807**	**37.6**	**0.1**
Total low voltage	**2,426,546**	**10,978,924.1**	**4,525**	**66.6**	**0.4**
Total	**2,429,016**	**16,495,966.6**	**6,791**	**100.0**	**0.2**

Source: HEP-ODS, HOPS

Table 4.4.2. shows the sale of electricity to end consumers from 2010 to 2019.

Table 4.4.2. Sale of electricity to end consumers in the period from 2010 to 2019

Year		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
End consumers	[GWh]	15,721	15,602	15,353	15,187	14,932	15,485	15,570	16,158	16,407	16,320
Change	[%]		0.8%	1.6%	1.1%	1.7%	3.7%	0.5%	3.8%	1.5%	0.5%
RHE Velebit	[GWh]	163	227	273	152	171	236	290	284	129	176
Total	[GWh]	15,884	15,829	15,626	15,339	15,103	15,721	15,860	16,442	16,536	16,496

Distribution by EUROSTAT consumption categories

Table 4.4.3. shows consumption and billing metering points for household end consumers per EUROSTAT consumption category.

Table 4.4.3. Consumption and billing metering points for household end consumers in Croatia by EUROSTAT consumption category in 2019

Consumption category	Minimum consumption [kWh/year]	Maximum consumption [kWh/year]	Consumption [%]	Number of BMPs [%]
Da – very small households	1	< 1,000	3.7	30.4
Db – small households	1,000	< 2,500	17.0	27.1
Dc – medium households	2,500	< 5,000	35.4	27.1
Dd – large households	5,000	< 15,000	39.3	14.8
De – very large households	≥ 15,000		4.6	0.6

[51] *145 BMPs of non-household and transport (Croatian Railway electric locomotives) end consumers are connected to high voltage, as are power plants that are in this case end consumers (own consumption). High voltage sales also include RHE Velebit.*

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

The largest share of electricity sold falls in bands *Dd* (large households) and *Dc* (medium households), while the largest share in the number of billing metering points falls in bands *Da* (very small households), *Db* (small households), and *Dc* (medium households).

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 end consumers according to EUROSTAT

Consumption category	Minimum consumption [MWh/year]	Minimum consumption [MWh/year]	Lower value [kW]	Upper value [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 end consumers in Croatia by EUROSTAT consumption category in 2019

Consumption category	Non-household – low voltage		Non-household – medium voltage		Non-household – high voltage		Total	
	Consumption [%]	BMP [%]	Consumption [%]	BMP [%]	Consumption [%]	BMP [%]	Consumption [%]	BMP [%]
Ia	8.56	78.21	0.00	0.04	0.00	0.00	8.56	78.25
Ib	28.52	20.20	0.19	0.19	0.04	0.01	28.74	20.40
Ic	9.58	0.48	1.55	0.25	0.07	0.00	11.21	0.73
Id	1.47	0.03	19.32	0.50	0.23	0.00	21.02	0.53
Ie	0.00	0.00	16.14	0.07	2.54	0.00	18.68	0.08
If	0.00	0.00	4.58	0.01	7.21	0.00	11.79	0.01
> 150,000 MWh	0.00	0.00	0.00	0.00	3.43	0.00	3.43	0.00
All bands	**48.1**	**98.9**	**41.8**	**1.1**	**10.1**	**0.0**	**100.0**	**100.0**

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

In the low voltage category of non-household end consumers, the largest share of electricity sold was in the *Ib* consumption category, whereas the share of end consumers in the exceptionally small industry band (*Ia*) is by far the highest.

In the medium voltage category of non-household end consumers, the most electricity was sold in the *Id* consumption category, which also includes the largest number of end consumers (in terms of metering points). In the category of high voltage end consumers, 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 end consumers in Croatia by tariff model and EUROSTAT consumption category in 2019. The following is apparent from the table:

- the *Ia* consumption category mainly involves the *White low-voltage* tariff model
- the *Ib* consumption category mainly involves the *Red low-voltage* tariff model,
- the *Ic* consumption category mainly involves 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 and billing metering points for low, medium, and high voltage non-household end consumers in Croatia by tariff model and EUROSTAT consumption category in 2019

Consumption band	HV	MV	LV	LV	LV	LV	Total
	White	Bilateral	Blue	White	Red	Yellow	[MW]
Ia	0.00002%	0.00152%	1.30322%	5.07591%	0.71951%	1.17141%	8.27160%
Ib	0.03576%	0.18421%	0.65035%	5.52144%	18.79975%	2.57087%	27.76239%
Ic	0.07173%	1.49815%	0.00000%	0.00991%	9.22332%	0.02327%	10.82638%
Id	0.31890%	18.66247%	0.00000%	0.00000%	1.41931%	0.00000%	20.40069%
Ie	2.45150%	15.58813%	0.00000%	0.00000%	0.00000%	0.00000%	18.03963%
If	6.96326%	4.42350%	0.00000%	0.00000%	0.00000%	0.00000%	11.38676%
> 150,000 MWh	3.31255%	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%	3.31255%
Total	**13.15373%**	**40.35798%**	**1.95358%**	**10.60726%**	**30.16189%**	**3.76556%**	**100.00000%**

Observations on the main characteristics of electricity sales in 2019

Electricity sales in 2019 were 0.5% lower than in 2018. The decrease in total consumption was particularly influenced by reductions in non-household consumers.

The share of households in total electricity sold to end consumers was 37.6%, while the share of electricity sold to non-household end consumers was 62.4%.

4.4.2 Development of the retail electricity market

Public service of electricity supply

For end consumers who have not chosen an electricity supplier on the market, two categories have been established in Croatia for electricity supply: universal service (for households) and supply of last resort (for non-household consumers).

Household end consumers 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 end consumers supplied by a market supplier can switch to the universal service. The price of electricity in the universal service is not regulated and is freely determined, which is in accordance with the recommendations of the European Commission and practice in the majority of EU member states.

The supply of last resort backstop measure is activated when an electricity supplier ceases operation, ensuring that its consumers have a continuous supply of electricity. **The Electricity Market Act** provides that the supply of last resort tariff must be higher than the average price on the electricity market.

In 2013, HERA adopted the *Methodology for setting tariffs for guaranteed electricity supply (Official Gazette no. 158/13)*. Tariff amounts for guaranteed electricity supply adopted by HERA in the *Decision on tariffs for guaranteed electricity supply (Official Gazette no. 102/18)* of 15 November 2018*,* which were supposed to be valid from 1 January 2019 until 30 June 2019, were based on this *Methodology* and satisfied the legal condition of being higher than the average price on the retail electricity market.

In 2018, there was a sudden increase in the prices of electricity on the wholesale market; tariffs, calculated pursuant to the *Methodology* applicable at the time, were lower than market prices in the second half of 2018. Due to new circumstances on the electricity

market, HERA adopted a new *Methodology for setting tariffs for guaranteed electricity supply (Official Gazette no. 20/19)*, the implementation of which resulted in a higher average price of supply of last resort than the price on the retail electricity market.

During 2019, HERA took decisions on the amounts of tariff items for supply of last resort from 1 April 2019 and for each subsequent quarter based on this new *Methodology*.

In 2019, the public supply within the universal service and supply of last resort were both provided by HEP Elektra d.o.o.

The retail market in 2019

The retail electricity market in Croatia is completely open and there are no regulated prices, with the exception of supply of last resort, which was explained in the previous chapter. Of the total electricity sold to households in 2019, 12% was sold outside the universal service (market), while the share of supply outside the supply of last resort for non-household consumers amounted to 93%, as shown in Figure 4.4.1. The share of suppliers from HEP d.d. (HEP-Opskrba d.o.o. and HEP-Elektra d.o.o.) in the supply of all consumers in 2019 was 91%.

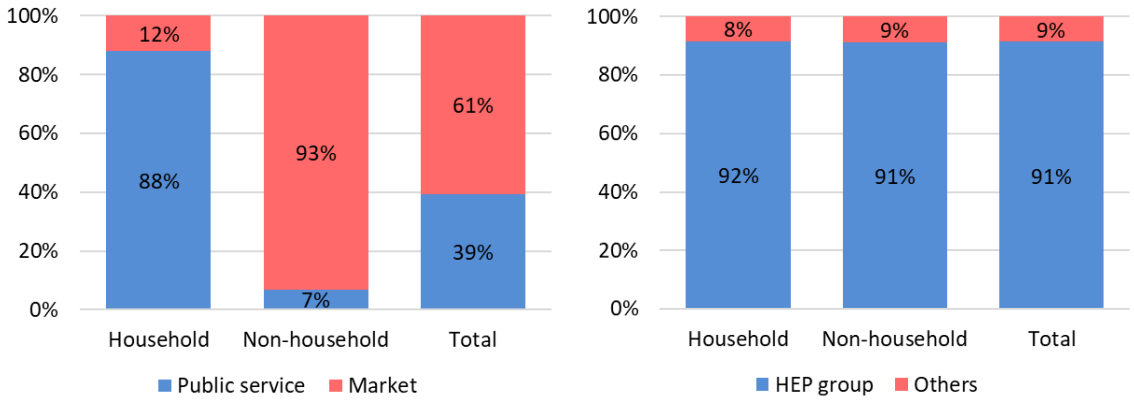


Figure 4.4.1. Proportions of energy sold to household and non-household end consumer categories in 2019

Introduction of smart meters

According to the **Energy Act**, HEP-ODS sets out the technical requirements and determines the costs of introducing smart meters and mass roll-out of smart metering systems, and communicates these requirements to HERA. 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 end consumers.

At its Board of Commissioners meeting held on 21. July 2017. and based on study results, HERA adopted the *Cost-benefit analysis of smart meters and smart meter roll-out systems*, which was submitted to the Ministry of Environment and Energy. Based on the Analysis, the minister is required to set out a plan of measures for the installation of smart meters for end consumers. The state of the introduction of smart metering devices as of 31 December 2019 is shown in Figure 4.4.2.; improvements in 2019 are shown in Figure 4.4.3.

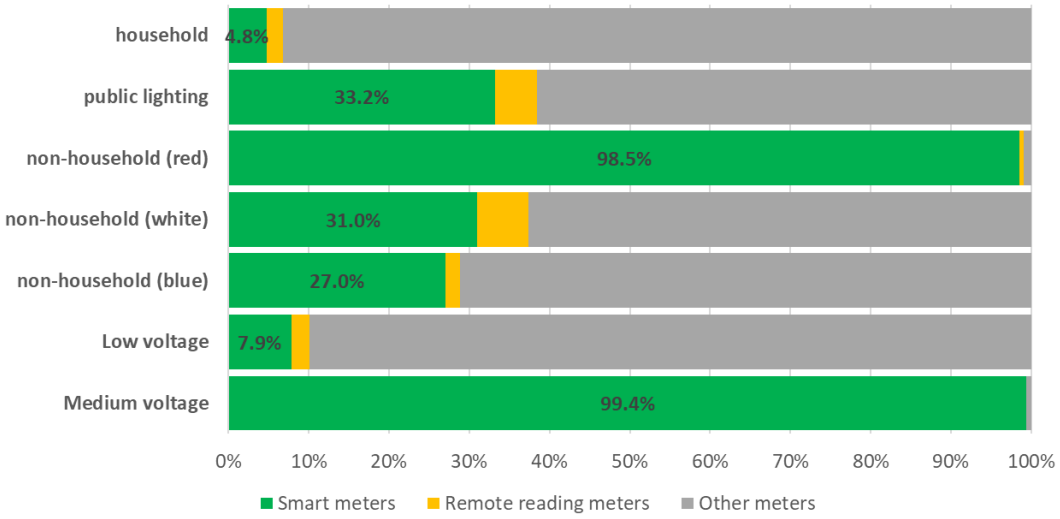


Figure 4.4.2 Share of smart meters, remote reading meters, and other meters in the distribution network as of 31 December 2019

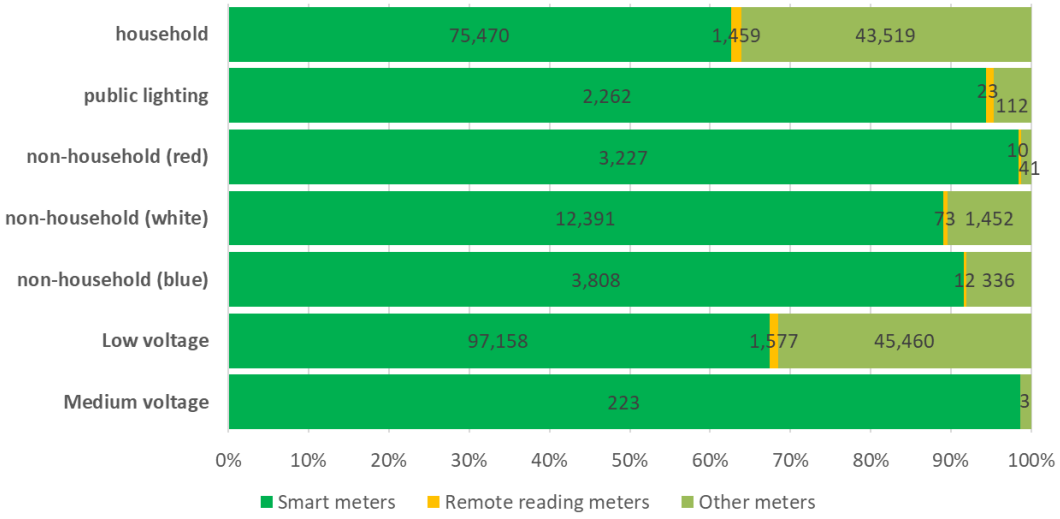


Figure 4.4.3 Share of smart meters, remote reading meters, and other meters installed in the distribution network in 2019

A comparison of retail and wholesale prices in the Republic of Croatia

Retail and wholesale prices in Croatia from 2017 to 2019 are shown in Table 4.4.7.

Table 4.4.7. Average prices of electricity for end consumers on the market (outside public service) and within the universal service (households) in the period from 2017 to 2019 [HRK/kWh]

Type of supply	2017	2018	2019
Market (high and medium voltage)	0.31	0.32	0.39
Market (low voltage, non-household)	0.34	0.35	0.42
Universal service (households)	0.45	0.45	0.45
CROPEX base wholesale price	0.39	0.39	0.37

Source: Suppliers on the market (suppliers who are not under the public service obligation), CROPEX, (7.5 HRK/EUR)

Observations on the development of the retail market in 2019

In 2019, the three largest suppliers had a 99% market share in household end consumer supply, which is the same as in 2018.

The three largest suppliers in 2019 had a 95% market share in non-household end consumer supply, which represents an increase in concentration compared to 2018, when the share was 94%.

In 2019, a total of nine suppliers were active on the wholesale market. Significant changes in this sector took place in 2020 when electricity supplier Petrol d.o.o. took over the consumer portfolio of supplier Crodux plin d.o.o., and when an electricity market participation agreement between HROTE and Proenergy d.o.o. was terminated, resulting in this business no longer participating in the electricity market in Croatia.

40,640 supplier switches took place in 2019, significantly less than the number of supplier switches in 2018, which amounted to 85,732. The supplier switch rate in 2019 was 1.67%, which is less than in the previous year, when the rate was 3.51%. consumers from the commercial category accounted for 20,857 supplier switches; household category consumers accounted for 19,783 switches. This is a significant reduction in the number of supplier switches for both categories of consumers as compared to the previous year.

All things considered, it can be concluded that the retail electricity market in Croatia is stagnating.

The key reasons behind the stagnation are insufficient savings resulting from supplier switches, lack of trust in new suppliers on the part of end consumers, end consumer loyalty to their current suppliers and unstable operating conditions of supplier, such as e.g. the obligation to collect a solidarity charge from household end consumers (HRK 0.03/kWh), the obligation to buy off produced electricity from the incentives system at a regulated price, and frequent modifications to the legal framework.

Among other reasons, insufficient savings are a result of the fact that, of the total sales price of HRK 1 for 1 kWh charged to average household consumers, only 44.5% pertains to the costs of electricity and supply. The remainder consists of regulated network charges (33.4%) and taxes and charges (22.1%).

The unstable operating conditions of suppliers include suppliers' obligation to collect a solidarity charge from household end consumers (HRK 0.03/kWh) and frequent changes to the legal framework. Furthermore, under the **Energy Efficiency Act**, suppliers have additional obligations related to the improvement of energy efficiency measures and unforeseeable costs arising therefrom.

In order to stimulate the retail market for household end consumers, a tariff calculator for household electricity is available on HERA's website to enable a comparison between different electricity suppliers' offers based on annual consumption of households, in accordance with CEER's recommendations.

However, although HERA adopted the *Decision to implement a cost-benefit analysis of smart meters and smart meter roll-out systems* in July 2017, the ministry responsible for the energy sector has not yet affirmed the plan and programme of measures to introduce smart meters for end consumers. However, HEP-ODS has continued its activities in preparation for the introduction of smart meters for end consumers. Nearly all BMPs of medium voltage end consumers and Red model low voltage non-household consumers have been outfitted with smart meters. 7.9% of all BMPs on low voltage (non-household and household) have been outfitted with smart meters. Smart meters were mostly installed for all categories and tariff models of end consumer in 2019, especially non-household consumers.

Table 4.4.8. shows wholesale market development indicators in Croatia from 2015 to 2019 for household end consumers, while table 4.4.9. shows indicators for non-household consumers.

Table 4.4.8. Wholesale market development indicators in the Republic of Croatia from 2015 to 2019 for household end consumers

Indicator	2015	2016	2017	2018	2019
Total electricity consumption [TWh]	6.10	6.05	6.30	6.09	6.20
Number of end consumers	2,165,965	2,186,350	2,176,843	2,215,296	2,209,224
Number of registered electricity suppliers	22	18	18	16	13
Number of active electricity suppliers	11	11	11	12	9
Share of the three largest suppliers by BMP [%]	98%	98%	98%	99%	99%
Number of suppliers with market share >5%	2	2	2	2	2
Number of suppliers with share of consumers >5%	1	1	3	2	2
Number of completed supplier switches	50,377	52,098	57,972	54,348	19,783
Legal time limit necessary for supplier switch [days]	21	21	21	21	21
Average time necessary for supplier switch [days]	37	16	39	46	42
Number of electricity consumers supplied at a regulated price	1,997,662	0	0	0	0
HHI for sales	8,055	7,990	7,982	7,774	7,792
HHI for number of BMPs	8,519	8,441	8,306	8,238	8,221
Number of temporary disconnections due to non-payment	28,915	25,814	17,444	12,896	33,765
Average price of electricity (universal supply) [HRK/kWh]	0.45	0.45	0.45	0.45	0.45
Share of the three largest suppliers by energy	97.41%	97.44%	0.45%	99.07%	92.36%

Table 4.4.9. Wholesale market development indicators in the Republic of Croatia from 2015 to 2019 for household end consumers

Indicator	2015	2016	2017	2018	2019
Total electricity consumption [TWh]	9.28	9.05	9.71	10.02	10.29
Number of end consumers	214,744	220,495	221,519	218,313	219,792
Number of registered electricity suppliers	22	18	18	16	13
Number of active electricity suppliers	11	11	11	12	9
Share of the three largest suppliers by energy [%]	85.82	84.66	87.31	94.72	91.12
Number of suppliers with market share >5%	4	3	3	2	2
Number of suppliers with share of consumers >5%	3	3	3	3	3
Number of completed supplier switches	33,140	33,817	31,066	31,384	20,857
Legal time limit necessary for supplier switch [days]	21	21	21	21	21
Average time necessary for supplier switch [days]	17	9	5	6	4
Number of electricity consumers supplied at a regulated price	73,891	75,991	79,010	87,797	88,494
HHI for sales	5,398	5,480	5,618	6,627	7,172
HHI for number of BMPs	3,371	3,371	3,371	3,371	4,097
Number of temporary disconnections due to non-payment	28,698	22,512	21,655	4,364	8,313

4.4.3. Electricity prices for end consumers

Electricity prices in the Republic of Croatia in 2019

The average total selling prices for end consumers[52] by tariff category and voltage from 2015 to 2019. are shown in Table 4.4.10. 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. Table 4.4.11. shows average electricity prices (excluding the network usage charge, other charges, and taxes) for end consumers on the electricity market (non-household consumers) and for end consumers within the universal supply (households) from 2015 to 2019.

Table 4.4.10. Average total selling prices of electricity for end consumers from 2015 to 2019 [HRK/kWh]

End consumer category	2015	2016	2017	2018	2019
Medium voltage consumers	**0.57**	**0.55**	**0.52**	**0.54**	**0.58**
Low voltage consumers – non-household	0.74	0.73	0.68	0.70	0.75
Low voltage consumers – households	0.79	0.78	0.78	0.78	0.78
Low voltage consumers	**0.77**	**0.76**	**0.76**	**0.76**	**0.77**

Source: HEP-ODS, suppliers on the market

Table 4.4.11. Average prices of electricity for end consumers on the market (outside public service) and within the universal service (households) in the period from 2015 to 2019 [HRK/kWh]

Type of supply	2015	2016	2017	2018	2019
Market (high and medium voltage)	0.34	0,33	0.31	0.32	0.39
Market (low voltage, non-household)	0.38	0.37	0.34	0.35	0.42
Universal service (households)	0.45	0.45	0.45	0.45	0.45

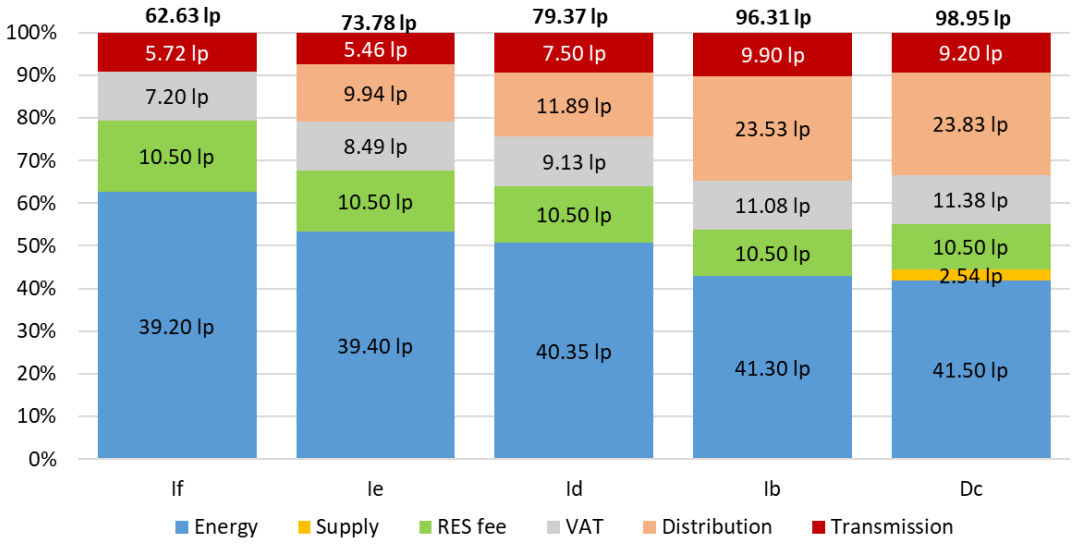
Source: Suppliers on the market

Table 4.4.12. shows the characteristics of typical end consumers in Croatia by EUROSTAT consumption category in 2019, while Figure 4.4.4. shows the structure of the total electricity price for end consumers, including all charges and taxes, for different consumption categories according to EUROSTAT.

Table 4.4.12. Characteristics of typical electricity end consumers in Croatia in 2019

End consumer type	Consumption band	Consumption [MWh/yr]	Settled peak active power [MW]	Consumption ratio HT/LT	Tariff system category
Very large non-household	*If*	100,000	15.00	60/40	Non-household high voltage – White
Large non-household	*Ie*	24,000	4.00	60/40	Non-household medium voltage (35 kV) – White
Medium non-household	*Id*	2,000	0.50	65/35	Non-household medium voltage (10 kV) – White
Small non-household	*Ib*	150	0.05	70/30	Low voltage non-household – Red
Medium households	*Dc*	3.5		70/30	Low voltage households – White

[52] *The total selling price includes transmission and distribution network charges and the price of energy.*

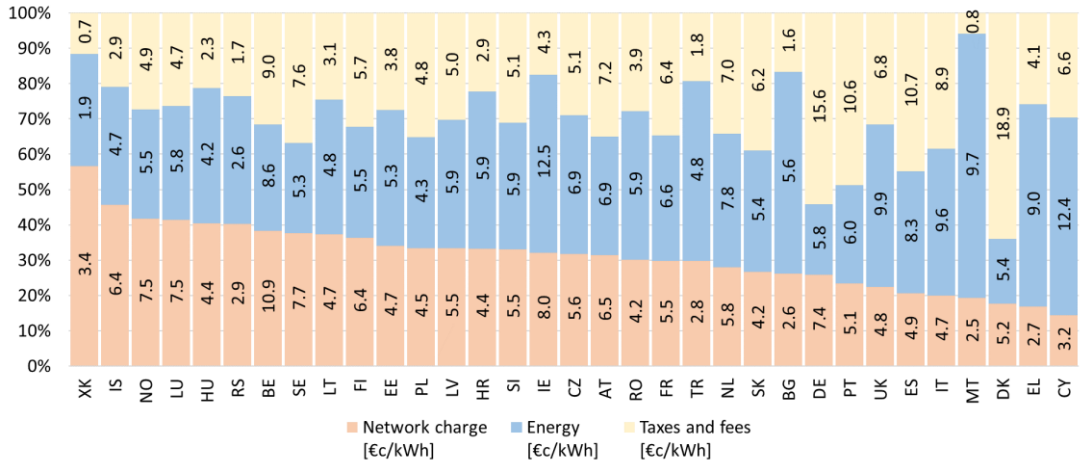


Source: HOPS, HEP-ODS, HEP ELEKTRA, suppliers on the market

Figure 4.4.4. Structure of the total selling price of 1 kWh of electricity for end consumers in Croatia according to EUROSTAT consumption categories in 2019

Electricity prices in European countries in 2019

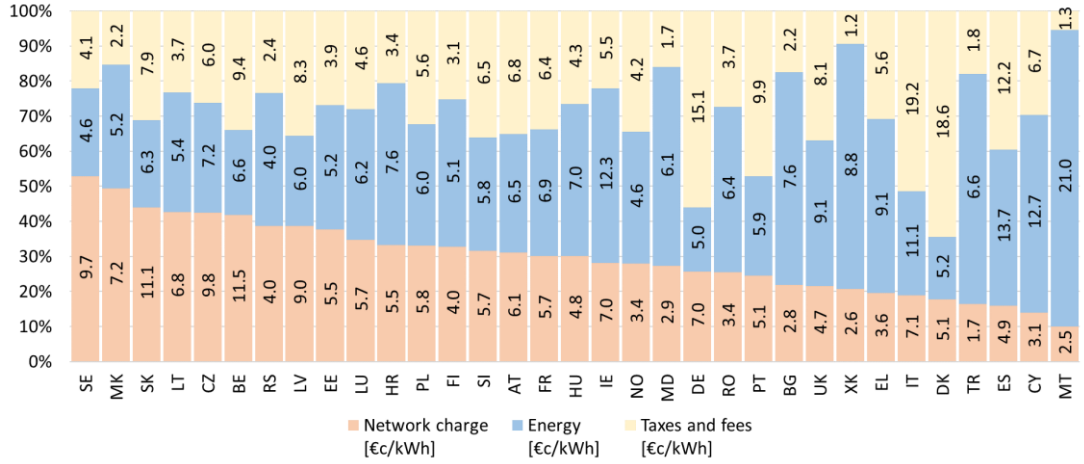
Figures 4.4.5. to 4.4.11. show the structure of the total price of electricity in European countries for end consumers in EUROSTAT's consumption categories *Dc, Ia, Ib, Ic, Id, Ie*, and *If*.



Source: EUROSTAT; data processing: HERA

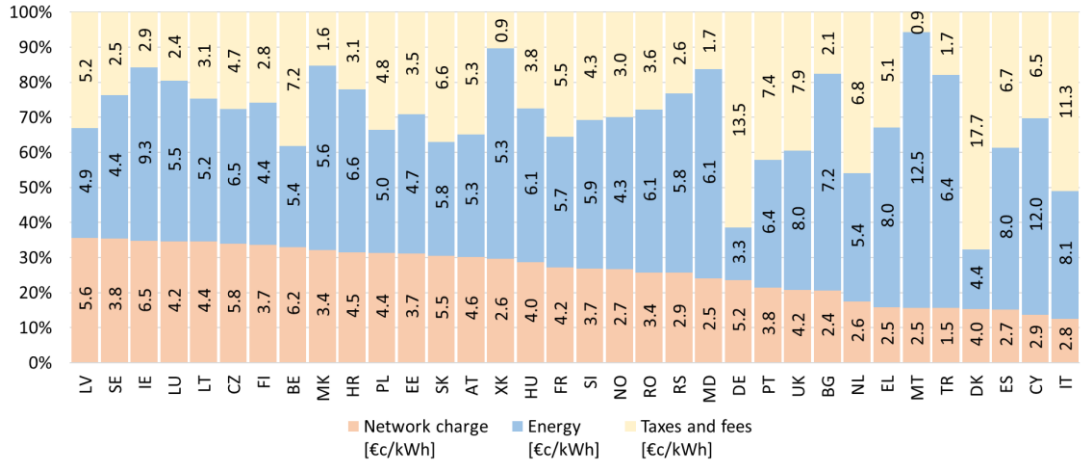
Figure 4.4.5. Overview of the structure of total electricity prices in European countries for household end consumers in the Dc consumption category in 2019[53]

53 *ISO state and 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.*



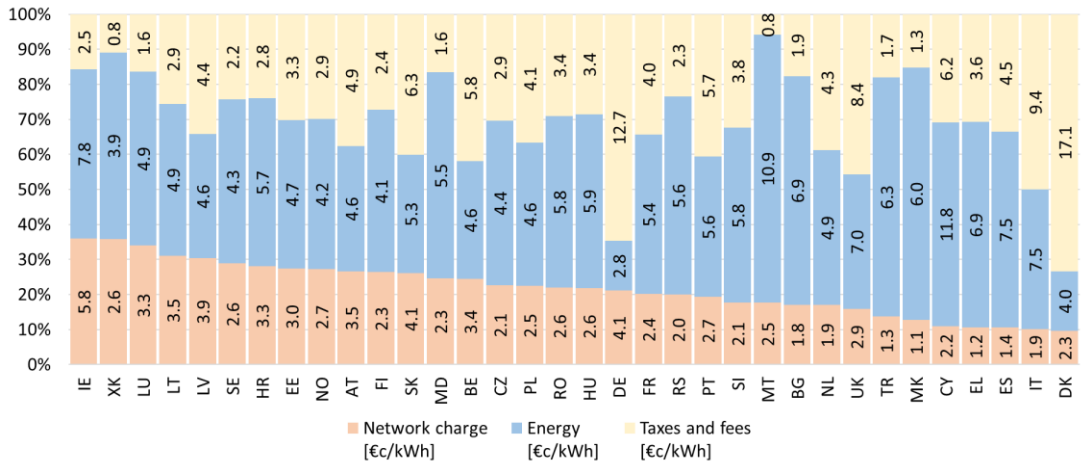
Source: EUROSTAT; data processing: HERA

Figure 4.4.6. Overview of the structure of total electricity prices in European countries for household end consumers in the Ia consumption category in 2019



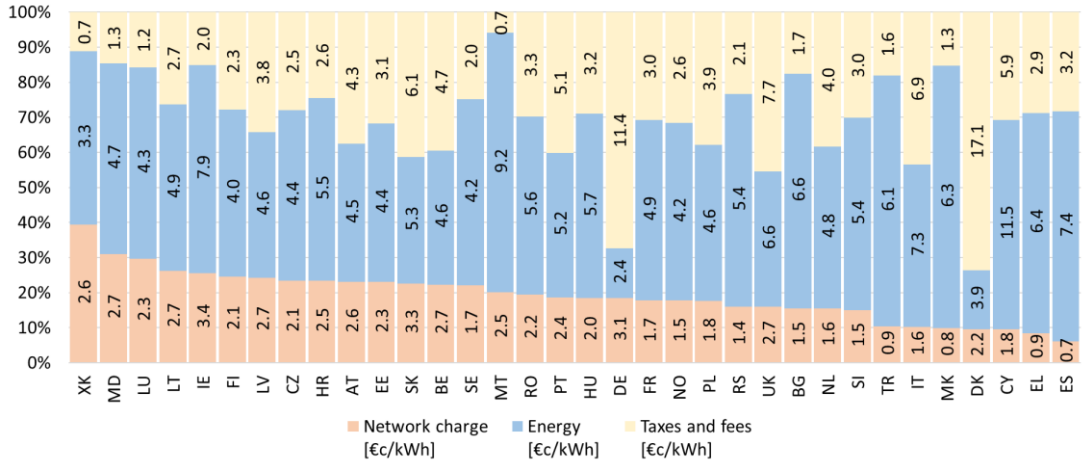
Source: EUROSTAT; data processing: HERA

Figure 4.4.7. Overview of the structure of total electricity prices in European countries for household end consumers in the Ib consumption category in 2019



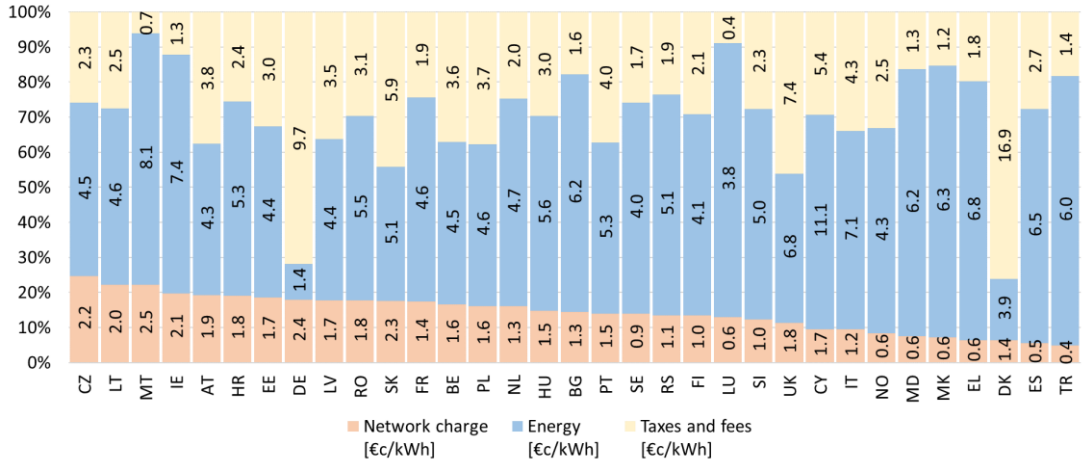
Source: EUROSTAT; data processing: HERA

Figure 4.4.8. Overview of the structure of total electricity prices in European countries for household end consumers in the Ic consumption category in 2019



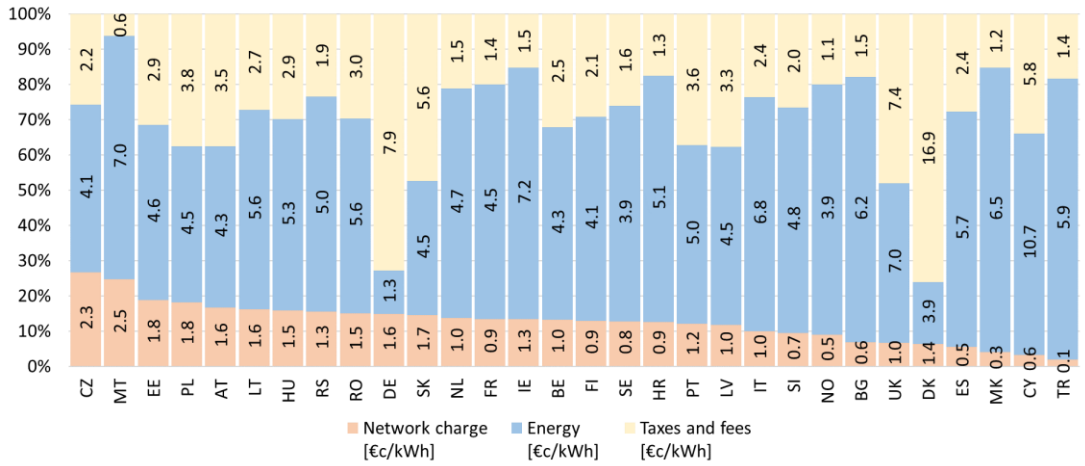
Source: EUROSTAT; data processing: HERA

Figure 4.4.9. Overview of the structure of total electricity prices in European countries for household end consumers in the Id consumption category in 2019



Source: EUROSTAT; data processing: HERA

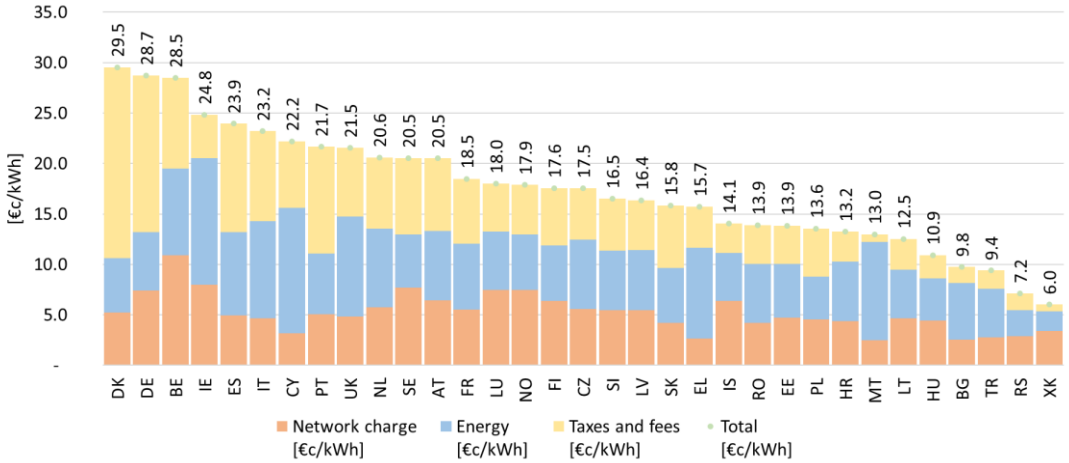
Figure 4.4.10. Overview of the structure of total electricity prices in European countries for household end consumers in the Ie consumption category (White tariff model, medium voltage) in 2019



Source: EUROSTAT; data processing: HERA

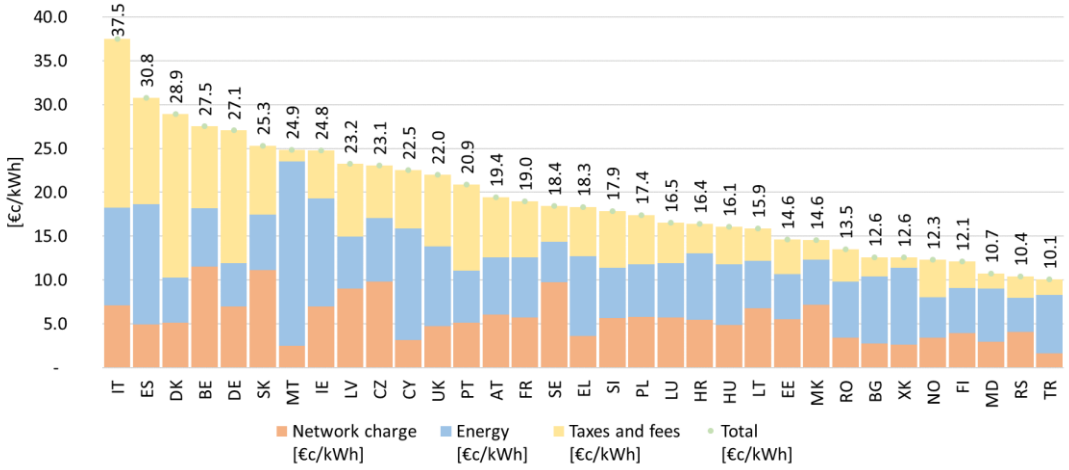
Figure 4.4.11. Overview of the structure of total electricity prices in European countries for household end consumers in the If consumption category in 2019

Figures 4.4.12. to 4.4.18. show the structure of the total price of electricity in European countries for end consumers in EUROSTAT's consumption categories *Dc, Ia, Ib, Ic, Id, Ie,* and *If*.



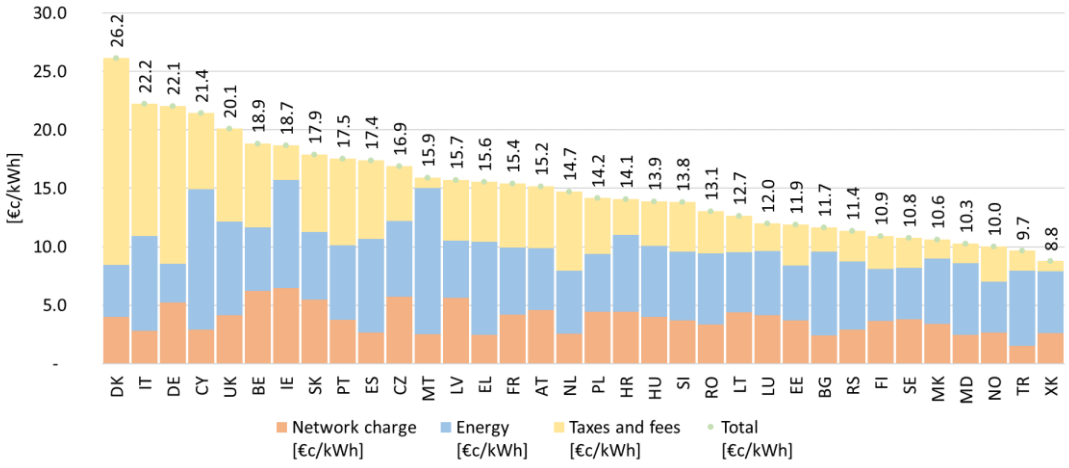
Source: EUROSTAT; data processing: HERA

Figure 4.4.12. Overview of the structure of total electricity prices in European countries for household end consumers in the Dc consumption category in 2019



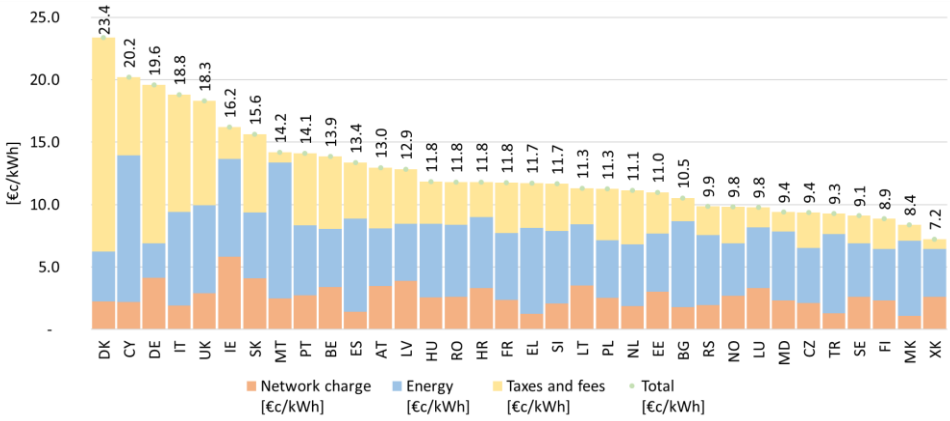
Source: EUROSTAT; data processing: HERA

Figure 4.4.13. Overview of the structure of total electricity prices in European countries for non-household end consumers in the Ia consumption category in 2019



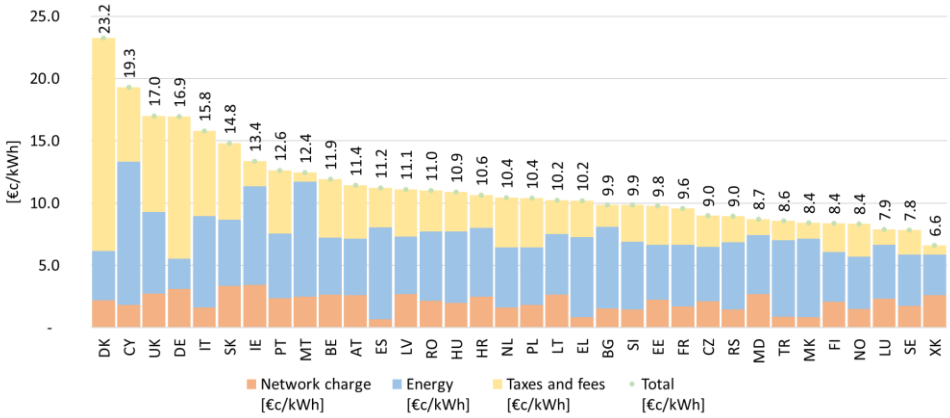
Source: EUROSTAT; data processing: HERA

Figure 4.4.14. Overview of the structure of total electricity prices in European countries for non-household end consumers in the Ib consumption category in 2019



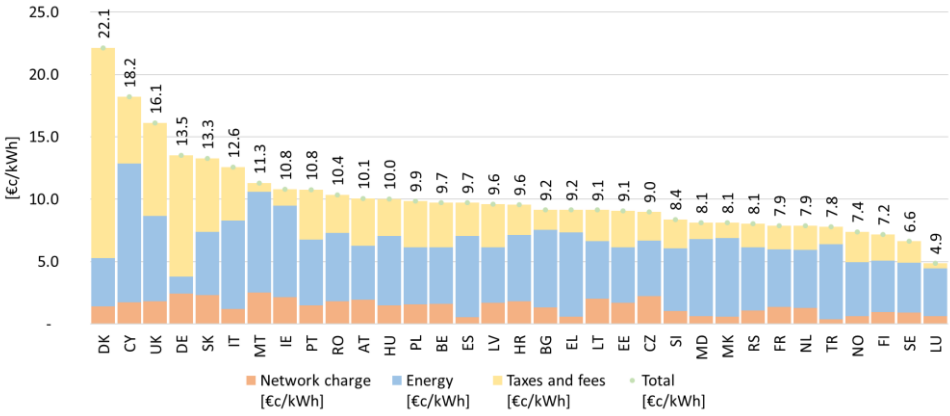
Source: EUROSTAT; data processing: HERA

Figure 4.4.15. Overview of the structure of total electricity prices in European countries for non-household end consumers in the Ic consumption category in 2019



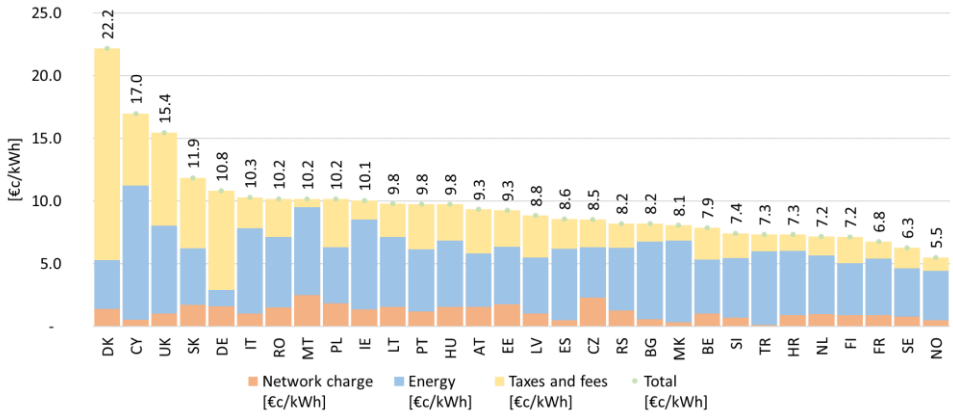
Source: EUROSTAT; data processing: HERA

Figure 4.4.16. Overview of the structure of total electricity prices in European countries for non-household end consumers in the Id consumption category in 2019



Source: EUROSTAT; data processing: HERA

Figure 4.4.17. Overview of the structure of total electricity prices in European countries for non-household end consumers in the Ie consumption category in 2019



Source: EUROSTAT; data processing: HERA

Figure 4.4.18. Overview of the structure of total electricity prices in European countries for non-household end consumers in the If consumption category in 2019

Observations on electricity prices for end consumers in 2019

Compared to 2018, electricity prices on the Croatian retail electricity market increased in 2019, as a consequence of higher wholesale prices. Electricity prices in Croatia have been fully deregulated, including the price of electricity under the universal service.

There is currently no unified product in Croatia which would encompass both electricity and natural gas supply.

4.4.4 Consumer protection

End consumer submissions in the electricity sector in 2019

Table 4.4.13. shows the classification of consumer submissions received by HERA in the electricity sector in 2019, while Table 4.4.14. shows statistics on appeals and complaints filed by end consumers in the electricity sector.

Table 4.4.13. Classification of end consumer submissions in the electricity sector received by HERA in 2019

Description	Number	Proportion [%]
Complaints	354	77.5%
Appeals	10	2.2%
Inquiries	83	18.2%
Extraordinary legal remedies	1	0.2%
Other submissions	9	2.0%
TOTAL	**457**	**100.0%**

Table 4.4.14. Statistics on end consumer complaints in the electricity sector received by HERA in 2019

Description	Number	Proportion [%]
Billing	67	18.9%
Supplier switching	61	17.2%
Loss of consumer status / network usage rights	55	15.5%
Connection	48	13.6%
Temporary grid disconnection	27	7.6%
Records of grid users / buyers of electricity	24	6.8%
Right to use property not owned by energy entities	18	5.1%
Termination of supply contract and conduct of sales representatives	11	3.1%
Quality of electricity supply	6	1.7%
Records in the public service	4	1.1%
Unauthorised consumption	4	1.1%
Other	29	8.2%
TOTAL	**354**	**100.0%**

The majority of appeals and complaints received by HERA in 2019 pertained to the calculation of electricity consumption, supply switching, loss of consumer status, right to use the power network, or connection to the power network. A significant number of complaints were received regarding the work of the electricity supplier, specifically regarding supplier switches, supply agreement termination, and the conduct of sales representatives.

Operator and supplier reports pursuant to the *Conditions for the quality of electricity supply*

The transmission and distribution system operator, as well as electricity suppliers, are required to submit a quality of service report to HERA for 2019 in accordance with the *Conditions for the quality of electricity supply*; they are also required to publish quality of service indicators for end consumers for the previous year on their website once yearly, thus enabling the systematic and transparent monitoring of the work of operators and suppliers in this important segment. Statistics regarding complaints received regarding the work of suppliers taken from the 2019 quality of service reports submitted by suppliers to HERA is shown in Table 4.4.15. The number of complaints received has doubled; there has been an especially large increase in the number of complaints regarding billing, billing collection, and debt collection, the majority of which are related to one supplier. The number of complaints regarding consumer support have also increased significantly, while the remainder of complaints remained on the same level or decreased. As 2019 was the second year after the introduction of the quality of service reporting requirement and the first full year of reporting, this likely does not represent an actual sudden increase in the number of complaints, but rather results from the more accurate management of data regarding complaints.

Table 4.4.15. Data on complaints regarding the work of electricity suppliers in 2018 and 2019

Subject of complaint	Number of complaints 2018	Number of complaints 2019
Unfair commercial practice	260	101
Contracts and sales	1,901	1,884
Initial connection	2	0
Disconnection due to late payment or non-payment (suspension of electricity supply)	924	881
Calculation, collection, and debt claim proceedings	3,813	9,516
Tariffs	12	18
Compensation for damages	2	0
Supplier switching	3	2
consumer service	49	1,018
TOTAL	**6,966**	**13,420**

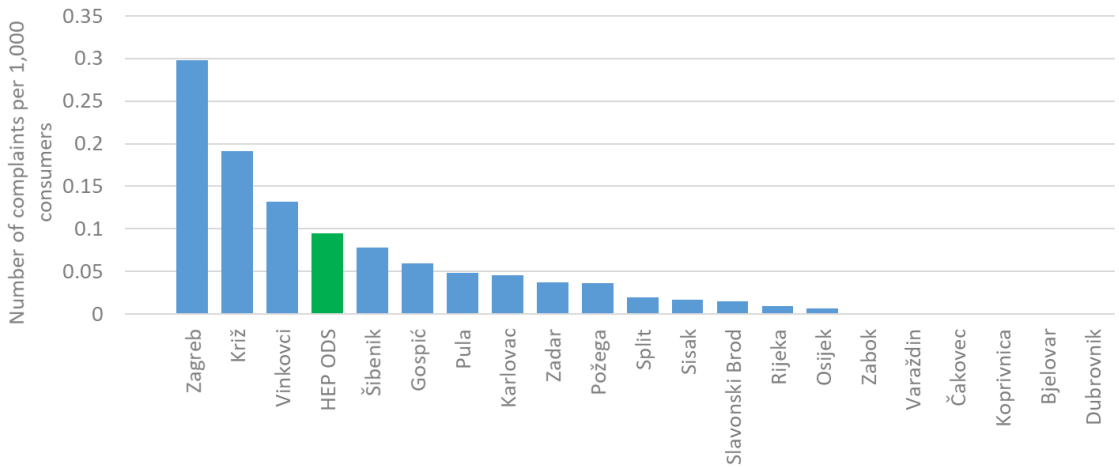
Source: Electricity suppliers

The work of the HEP-ODS Consumer Complaints Committee in 2019

The HEP-ODS Consumer Complaints Committee for consumers in HEP-ODS' distribution areas was founded in accordance with the **Consumer Protection Act (Official Gazette no. 41/14, 110/15, and 14/19)**. Members of the committee are representatives of distribution areas and consumer associations.

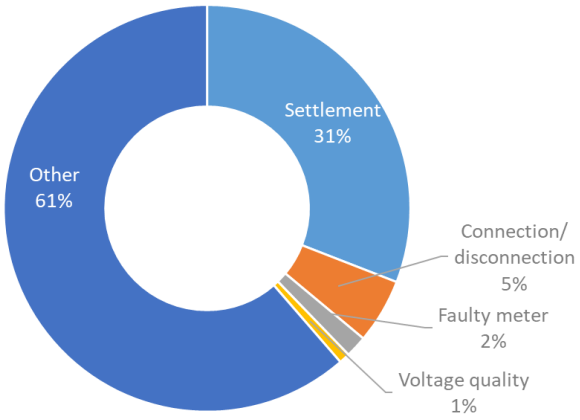
The Consumer Complaints Committee resolves complaints related to electricity billing, meter malfunction, connection/disconnection, voltage conditions, etc. HEP-ODS has ensured that complaints can be received and processed via e-mail.

Figure 4.4.19. shows the number of complaints per 1,000 consumers per distribution area, while Figure 4.4.20. shows the structure of consumer complaints in HEP-ODS's distribution areas in 2019.



Source: HEP-ODS

Figure 4.4.19. Number of consumer complaints per 1,000 consumers per HEP-ODS distribution area in 2019

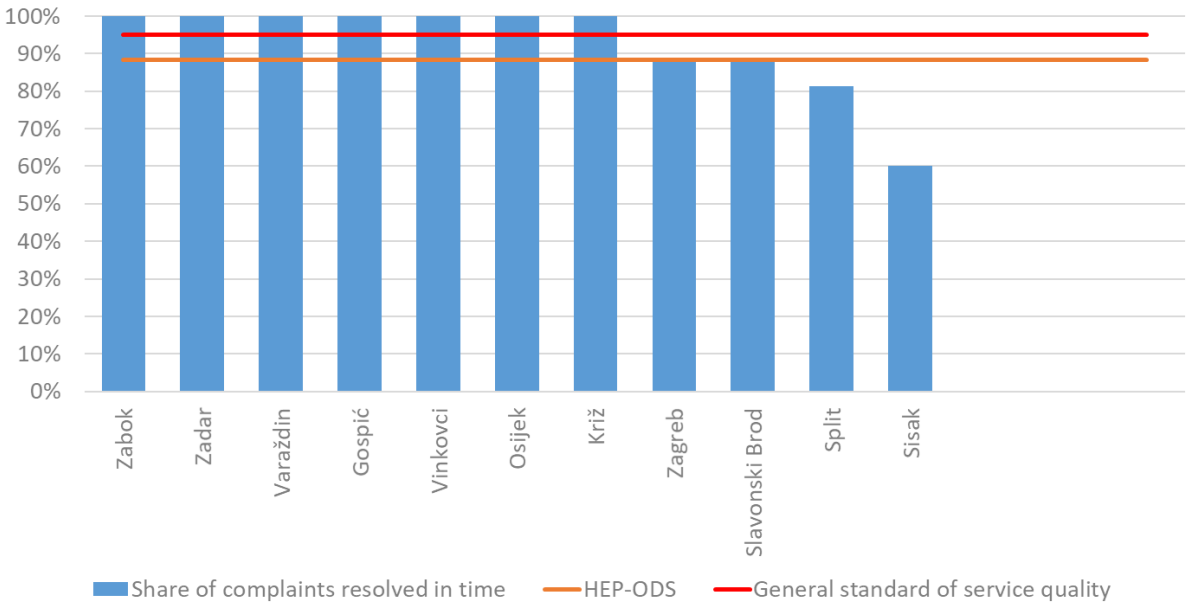


Source: HEP-ODS

Figure 4.4.20. Structure of complaints processed by consumer complaints committees for HEP-ODS distribution areas in 2019

Complaints from network users regarding network access are resolved by the centralised Complaints Processing Committee of HEP-ODS. This greatly standardises access to appeal resolution and the application of by-laws and regulations in all of HEP-ODS' distribution areas. In 2019, 58 consumer complaints were received regarding network access, 35 of which HEP-ODS resolved in a timely manner.

Figure 4.4.21. Proportion of complaints resolved in a timely manner as compared to the required general standard of service for HEP-ODS distribution areas in which there were resolved complaints in 2019, not including complaints regarding network access.



Source: HEP-ODS

Figure 4.4.21. Share of complaints resolved in a timely manner as compared to the required general standard of service per HEP-ODS distribution area in 2019

The figures above show that there has been an improvement, but that there are still differences among distribution areas in how the prescribed general standard of service is fulfilled as regards the timely resolution of complaints; this results in the failure to fulfil the prescribed general standard by HEP-ODS as a whole.

Observations on end consumer protection in 2019

Unlike previous years, when initial connection was the dominant problem, in 2019, as in 2018, the largest number of appeals related to billing and collection, for which there was a 250% increase in complaints.

The *Conditions for the quality of electricity supply* were first implemented in 2019 in terms of the delivery of data and publication on websites. The preparation of data and reports overlapped with multiple significant activities of energy entities (the introduction of business IT applications and applications for consumer support, company acquisitions and mergers). The speed and quality of reporting in 2019 regarding results from 2018 was partly satisfactory.

The reports submitted to HERA in 2020 regarding achievements from 2019, in accordance with the provisions of the *Conditions for the quality of electricity supply*, were of significantly higher quality than those for 2018.

As a result of the implementation of the **Act on Procedures Involving Illegally Built Buildings (Official Gazette no. 86/12, 143/13, 65/17, and 14/19)**, the legalisation process continued for structures built outside of construction areas and far from existing electricity infrastructure. Once legalised, these buildings now comply with the basic preconditions for the connection to the distribution network. Resolution of requests for connecting such buildings to the distribution network is very demanding, sometimes even impossible, as the structures are not accessible from public areas and/or they are not located in areas where spatial plans provide for the construction of structures and access roads. For these reasons, HEP-ODS cannot obtain permits to build its infrastructure, or this process is long and very expensive, as it implies the resolution of legal ownership rights with the private owners of the land on which the corresponding infrastructure should be built. This results in a number of appeals filed by owners of legalised structures regarding the conditions of prior electricity consent or refusals to issue such consent. A large number of such appeals are also expected in the coming years, which is why local authorities should adopt new spatial plans that would also include the legalised structures and their infrastructure, for which access roads should be provided.

In addition to the set of energy laws and by-laws, household end consumers are also protected by the **Consumer Protection Act**.

Table 4.4.16. shows indicators of the position of household end consumers in Croatia from 2015 to 2019.

Table 4.4.16. Indicators of the position of household end consumers in Croatia from 2015 to 2019

Indicator	2015	2016	2017	2018	2019
Number of household end consumers	2,171,110	2,186,999	2,223,119	2,220,180	2,240,916
Number of end consumers supplied under the universal service	1,998,117	2,005,536	2,003,916	2,008,848	2,026,349
Number of working days in practice between debt notifications and temporary disconnection due to non-payment [days]	19.55	16.90	17.41	14.06	11.72
Number of temporary disconnections for household consumers due to non-payment	28,915	25,814	17,444	12,896	33,765
Number of socially disadvantaged end consumers	55,471	71,764	66,072	-	-
Number of BMPs with smart metering devices	-	-	-	66,612	149,436
Number of households with photovoltaic systems installed for self-supply	-	-	-	-	146
Installed capacity of photovoltaic systems installed for households for self-supply [MW]	-	-	-	-	1.0

4.4.5 Guarantee of electricity origin system

Development of the guarantee of origin system

The guarantee of origin system enables suppliers of electricity to offer end consumers supply contracts or tariff models with a guaranteed share of one or more electricity sources used for electricity generation. In addition, end consumers can rely on this system when choosing a tariff model, as it ensures the sale of electricity of a guaranteed structure.

The Methodology for determining the origin of electricity requires electricity suppliers to submit a relevant annual report to end consumers describing the structure of the electricity supplied during the previous year, between 1 and 31 July of the current year. According to HERA's knowledge, those suppliers who sent reports to their end consumers 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 end consumers on HROTE reports:

- *Annual report on the structure of total remaining electricity for the previous year*, and
- *Annual report on the generation of electricity under the incentives system for the previous year*.

These reports are published on HROTE's website, together with the *Annual report on the origin of electricity in the Republic Croatia for 2019*, which provides an overview of the structure of the electricity produced and sold in Croatia, information on suppliers' reports regarding the origin of electricity, the use of guarantees of 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.

Eligible electricity producers in Croatia that are not in the electricity generation incentives system may request the issuance of a 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 used only to prove the structure of electricity.

The origin of electricity, i.e. the structure of electricity sold to the end consumer, is proven according to the *Methodology* and through the use of guarantees of origin, and excludes the use of other certificates, certificates of generation of electricity, or contracts tracing the origin of electricity.

Register of Guarantees of Origin

As the authority competent for issuing guarantees of origin in Croatia, HROTE operates a Register of Guarantees of Origin – 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.

HROTE issues guarantees of origin in accordance with the *Regulation on the establishment of a system of guarantees of origin of electricity* and the *Rules for using the Register of Guarantees of Origin*.

The register has been fully in force since 2 February 2015. By the end of 2019, five electricity producers, six suppliers, and one trader were registered in the Register. Table 4.4.17 provides an overview of registrations.

Table 4.4.17. Registrations in the Register of Guarantees of Origin

Type of registration	New registrations in 2019	Total registrations
User accounts of electricity producers	2	5
User accounts of other Register users	0	7
Total user accounts	2	12
Total registered production plants	5	18

Source: HROTE

In 2019, six registered suppliers traded in guarantees of origin, and guarantees of origin were issued for 18 production plants (HE Lešće, HE Varaždin, HE Orlovac, HE Dubrava, HE Čakovec, HE Vinodol, HE Rijeka, HE Dubrovnik, HE Gojak, HE Senj, HE Golubić, HE Zakučac, HE Miljacka, RHE Velebit, Vjetroelektrana Trtar-Krtolin, Mala vjetroelektrana Ravna 1, mTEO, MHE Roški slap). An overview of transactions in guarantees of origin is provided in Table 4.4.18.

Table 4.4.18. Activities in the Register of Guarantees of Origin in 2019.

Activity	No. of guarantees (1 guarantee = 1 MWh)
Number of issued guarantees of origin for electricity generated in Croatia in 2019	4,633,694
Number of imported guarantees of origin	19,874
Number of exported guarantees of origin	2,385,597
Number of cancelled guarantees of origin for consumption in 2019	1,623,600
Number of expired guarantees of origin	0

Source: HROTE

In 2019, HROTE generated income of HRK 2,099,211 in charges from registered users. The cost of operating the Register and other activities in the guarantee of origin system amounted to HRK 778,119. The ratio between revenues and costs suggests that the guarantees of origin system further improved in terms of financial sustainability.

The introduction of auctions of guarantees of origin of electricity

In accordance with the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, HROTE began selling some electricity from the incentives system on the CROPEX electricity exchange in 2019. The transition to the market sale of a portion of electricity from the incentives system also made it possible to sell guarantees of origin for this electricity on the basis of market principles. It is possible to issue guarantees of origin for energy produced in the incentives system and sell them to electricity market participants on the basis of market principles, i.e. via auctions of guarantees of origin.

During 2019, 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. After the conclusion of auctions and the sale of guarantees of origin, the funds collected were transferred into the incentives system fund.

In 2019, 30% of the energy of eligible producers and 899,199 guarantees of origin were sold at auction. The funds collected from the sale of guarantees of origin amounted to HRK 3,079,479.69.

Based on a change in the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, which, among other things, affected the method by which the structure of the remaining electricity was determined, HERA adopted *Amendments to the Methodology for determining the origin of electricity*, which entered into force on 1 January 2020.

Observations on the guarantees of origin system

A further increase in activities was notable in 2019 due to the registration of the Zakučac and Miljacka hydroelectric power plants, the Velebit reversible hydroelectric power plant (all run by HEP-Proizvodnja d.o.o.), as well as the registration of producers and their facilities: Zagrebački holding (with the mTEO facility) and Hidro-Watt (with the mHE Roški slap facility). Unlike previous year, when a wind power plant that had exited the incentives system was entered into the Register, these new facilities were not a part of the incentives system, but rather producers on the electricity market.

It should be noted that the legal framework governing the guarantee of origin system still requires improvement. Specifically, the **Energy Act** and the **Electricity Market Act** stipulate only the adoption of by-laws that regulate the guarantee of origin system, however they fail to identify what would be regulated by these by-laws, particularly in terms of obligations. The lack of misdemeanour provisions in the **Energy Act** ensuring that suppliers comply with the provisions of the *Methodology for establishing the origin of electricity* is a particular problem.

Even greater interest in the market for guarantees of origin is expected in 2020 due to the registration of new production facilities that are exiting the renewable energy incentives system. Increased exports of guarantees of origin are also expected, as the share of electricity from eligible producers in the incentives system sold by HROTE via the EKO balance group on the electricity market has been increased from 30% to 60% in 2020. In accordance with this, the volume of guarantees of origin offered by HROTE at guarantee of origin auctions will also increase. While HROTE sold 900,000 guarantees of origin (30%) in 2019 (exclusively from wind power plants in the incentive system), it is expected that ca. 2,000,000 guarantees (60%) will be offered for sale in 2020.

4.5 Incentives for the production of electricity from renewable energy sources and cogeneration

Eligible electricity producers

When a suitable facility that uses renewable energy sources or high-efficiency cogeneration is constructed, HERA issues a decision granting the facility the eligible electricity producer status for a period of 25 years.

In case of facilities which are considered as simple structures according to regulations on spatial planning and construction (currently only in the case of solar power plants on existing buildings), project coordinators for such facilities are not required to obtain a decision. Instead, pursuant to the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, they are granted eligible producer status based on evidence that the electricity producer has been granted the right by HEP-ODS to permanent connection to the electricity network for a generation facility that uses renewable energy sources or high-efficiency cogeneration.

Table 4.5.1. shows the number of decisions on eligible electricity producer status granted by HERA in 2019.

Table 4.5.1. Decisions granting eligible electricity producer status issued by HERA in 2019

Type of facility / primary energy source	No. of decisions issued[54]	Plant capacity [MW]
Solar power plants	1	1.00
Hydroelectric power plants	4	581.83
Wind power plants	2	30.00
Biomass power plants	6	15.39
Geothermal power plants	1	10.00
Biogas power plants	2	1.99
Cogeneration	0	0.00
Other plants using renewable sources	0	0.00
Total	**16**	**640.21**

Source: HERA

For wind power plants, hydroelectric power plants, and solar power plants, in 2019, HERA issued two decisions extending a previous decision, two decisions amending a previous decision, one decision on the change of a project coordinator, one decision amending a decision, eight decisions on the transfer of rights and obligations, and four prior approvals for planned changes. In two cases, decisions to suspend proceedings were taken at the request of the party.

Additionally, as regards cogeneration, nine decisions on eligible electricity producer status were issued (six for biomass cogeneration, two for biogas, and one for a geothermal power plant), as were two decisions rejecting applications for eligible electricity producer status and one decision amending a decision on eligible electricity producer status.

Table 4.5.2. provides an overview of decisions granting eligible electricity producer status issued by HERA from 2007 to 2019.[55]

Table 4.5.2. Decisions granting eligible electricity producer status issued by HERA from 2007 to 2019

Type of facility / primary energy source	Number of facilities	Total capacity [MW]
Solar power plants	230	24.39
Hydroelectric power plants	35	1,961.11
Wind power plants	28	617.80
Biomass power plants	34	73.71
Geothermal power plants	1	10.00
Biogas power plants	40	45.45
Cogeneration	6	112.94
Other renewable source power plants (landfill gas, and gas from waste-water treatment plants, etc.)	1	2.50
Total	**375**	2,847.91

Source: HERA

In addition to securing priority rights in the delivery of electricity into the electricity system, eligible producer status was one of the requirements for incentives in accordance with the tariff systems for electricity generation from renewable energy sources and cogeneration, and is one of the requirements for the incentives system from the **Renewable Energy Sources and High-Efficiency Cogeneration Act**. However, eligible producer status does not imply the right to incentivised prices for delivered electricity; is

54 *Includes decisions on guarantee of origin.*

55 *The data refers to decisions issued by HERA, and therefore the number and the total capacity of facilities do not necessarily match the number of facilities in the incentives system (e.g. eligible producers who are not in the incentives system, integrated solar power plants which are not require to apply for a decision by HERA, etc.).*

only one of the conditions to qualify for incentives through the conclusion of a buy-off agreement with HROTE.

If eligible electricity producers do not meet the conditions to qualify for incentives, they may participate in the guarantee of origin system pursuant to the *Regulation on the establishment of a system of guarantees of origin of electricity*. Power plants cannot participate in the incentives system and simultaneously sell guarantees of origin of electricity, except for facilities that will conclude a market premiums agreement with HROTE.

However, the **Act on Amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette no. 111/18)**, which entered into force in late 2018, introduced the possibility for HROTE to issue guarantees of origin for energy from the incentives system and the guaranteed purchase system sold on the market in 2019, as well as for these guarantees to be sold. The revenues from the sale of such guarantees of origin are then added to the funds for the disbursement of incentives.

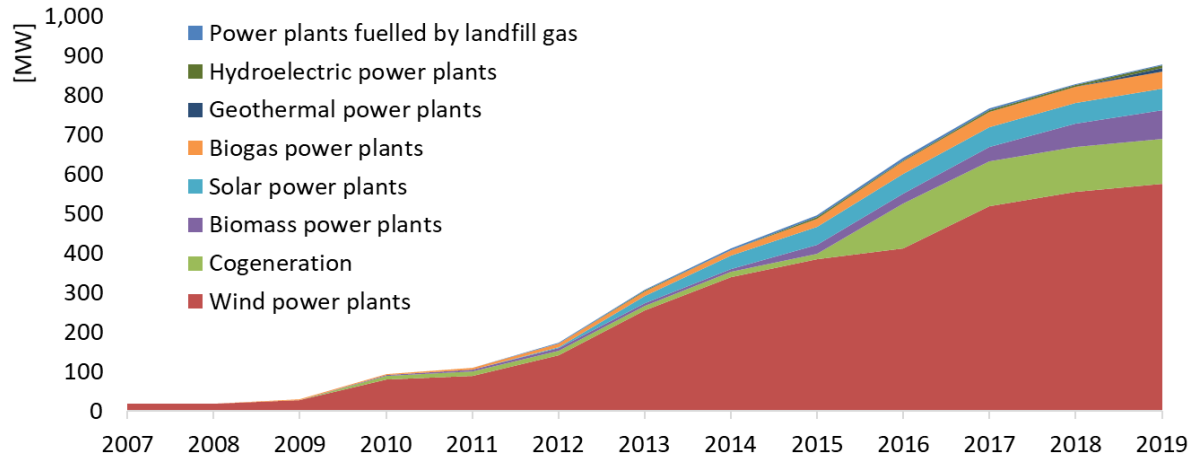
Incentives for the production of electricity from renewable energy sources and cogeneration

Pursuant to the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, the Croatian government adopted the *Regulation on promoting electricity production from renewable energy sources and high-efficiency cogeneration* in late 2018, which elaborates in detail the method and conditions for the implementation of new incentive models consisting of market premiums and buy-offs at a guaranteed price, setting maximum reference values, maximum guaranteed buy-off prices, and contracting procedures. Pursuant to the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, the Croatian government also adopted the *Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obliged to take up from the electricity market operator*, which stipulates that electricity suppliers are obliged to assume 40% of net delivered electricity from eligible producers from HROTE as of 1 January 2020; in 2019, this percentage amounted to 70%.

The Regulation on promoting electricity production from renewable energy sources and high-efficiency cogeneration prescribes the manner in which plants access new incentive systems through public tenders for market premium allocations through the conclusion of agreements with a guaranteed buy-off price based upon a decision selecting the lowest bidder. Since the by-laws foreseen in the **Renewable Energy Sources and High-Efficiency Cogeneration Act** (regulation on quotas for promoting electricity production from renewable sources and cogeneration, and state aid programme) were not adopted in 2019 as planned, HROTE was not able to conclude any new contracts on electricity buy-off from renewable sources and cogeneration.

A total of 12 electricity buy-off agreements with a total capacity of 48.5 MW were activated in 2019, while 10 contracts with a total capacity of 6.3 MW were terminated.

Figure 4.5.1. shows the gradual entry of generation facilities into the incentives system since its introduction in 2007, while Table 4.5.3. shows basic indicators related to the incentives system.



Source: HROTE

Figure 4.5.1. Installed capacity of facilities in the incentives system from 2007 to 2019 by type of facility

Table 4.5.3. Generation and paid incentives to eligible producers in 2019 by type of facility

Type of facility / primary energy source	Number of facilities	Installed capacity [MW]	Share of installed capacity	Electricity production [MW]	Share of production	Paid incentives (VAT excluded)- [mil. HRK]	Share of disbursements
Solar power plants	1,230	53.4	6.1%	72,016	2.5%	139	5.2%
Hydroelectric power plants	14	5.9	0.7%	24,198	0.8%	25	0.9%
Wind power plants	22	575.8	65.6%	1,402,331	48.7%	1,098	41.2%
Biomass power plants	34	73.7	8.4%	431,692	15.0%	568	21.3%
Geothermal power plants	1	10.0	1.1%	64,830	2.2%	102	3.8%
Biogas power plants	39	42.7	4.9%	336,642	11.7%	443	16.6%
Power plants fuelled by landfill gas and gas from waste-water treatment plants	1	2.5	0.3%	77	0.0%	0	0.0%
Cogeneration	6	113.3	12.9%	550,441	19.1%	293	11.0%
Total	**1,347**	**877.4**	**100%**	**2,882,229**	**100%**	**2,667**	**100%**

Source: HROTE

Wind power plants also retained the largest share of total installed capacity of all eligible producers in the incentive system in 2019, however the share of biomass production increased, and geothermal power plants were put into operation for the first time.

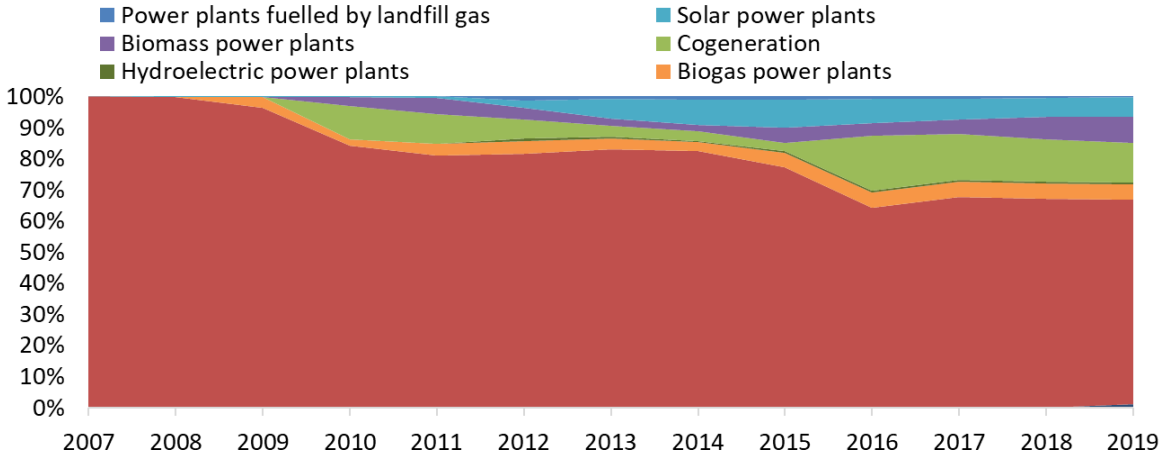
A total of 12 facilities with a total capacity of 48.5 MW became permanently operational in 2019.

Of all technologies, the largest number of activations in 2019 involved biomass cogeneration facilities, with six facilities at a total installed capacity of 15.39 MW.

In 2020, a significant increase is expected in the share of wind power plants in installed capacity and production, as the last wind power plants are expected to enter the feed-in system.[56]

56 *Feed-in (in this text) refers to a system/mechanism of encouraging research, technological development, and renewable energy source projects through which the expenses of producing electricity from renewable energy sources is partially or fully socialised*

Shares of installed capacity in the incentives system by facility type and by year are shown in figure 4.5.2.



Source: HROTE

Figure 4.5.2. Installed capacity of facilities in the incentives system from 2007 to 2019 by type of facility

In 2019, the share of energy generated in plants which participated in the incentives system corresponded to 15.9% of total electricity consumption in Croatia (18,169 GWh).

Figure 4.5.3. shows average prices for delivered electricity by plant type in the incentives system as compared to the annual average price of electricity on the day-ahead market on CROPEX in 2019 (HRK 0.37kWh). The average incentivised price amounted to HRK 0.93; the highest incentivised price (HRK 1.94/kWh) was paid for electricity from solar power plants, while the lowest incentivised price was for electricity from landfill gas power plants (HRK 0.45/kWh). The average incentivised price paid for electricity from wind power plants amounted to HRK 0.78/kWh.

Although it is important to compare incentivised prices with the actual electricity market price from the point of view of market efficiency, it should be noted that incentivised prices should reflect the levelised cost of electricity (LCOE), which includes the cost of building technologies which are not yet competitive, costs connected with project financing, revenue generated from the sale of thermal energy from cogeneration facilities, etc.

and covered, thus offering these sources price security and/or contracts for selling the energy they produce under market conditions until the moment when such sources themselves become competitive with other sources of electricity on the market.

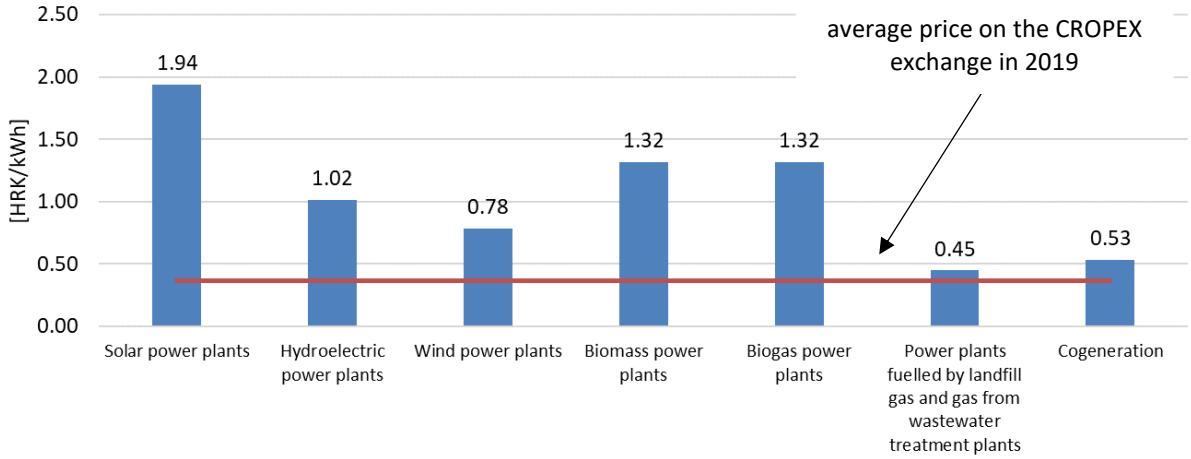


Figure 4.5.3. Weighted average buy-off price of electricity in the incentives system by facility type in 2019

In 2019, HROTE bought off electricity from eligible producers in the incentives system using funds collected on the following bases:

- all end consumers of electricity in Croatia pay a charge of HRK 0.105/kWh for promoting the production of electricity using renewable energy sources and cogeneration; this charge amounts to HRK 0.007/kWh for consumers required to obtain greenhouse gas emission permits.
- all suppliers must buy off 70% of electricity generated in the incentives 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 facilities 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 3 months) for all other suppliers, and (in cases of exception)
  - by allocating planned day-ahead values for HEP Elektra d.o.o. and HEP-Opskrba d.o.o.
- revenues from the sale of 30% of electricity produced from renewable energy sources and cogeneration on 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 CROPEX through the EKO balance group, and
- revenues from the membership of eligible producers with capacity greater than 50 kW that are in the incentives system in the EKO balance group.

Table 4.5.4. shows an increase in HROTE's expenses in 2019 resulting from the continued addition of new generation plants to the incentives system and the launch of the EKO balance group.

Table 4.5.4. Revenues and expenditures related to the incentive system [mil. HRK]

Income/expenses	2016	2017	2018	2019
Incentives system income				
Income from end consumers of electricity (from RES&C charges)	514.70	890.73	1,602.34	1,598.65
Income from the sale of electricity from the incentives system to suppliers	724.89	956.47	1,042.66	847.38
Income from the sale of electricity on the market	-	-	-	315.31
Income from the sale of guarantees of origin	-	-	-	3.08
Income from charges paid by members of the EKO balance group	-	-	-	25.50
Incentives system expenses				
Cost of electricity bought from eligible producers	1,546.55	1,912.79	2,176.32	2,667.11
Costs of financing HROTE's activities in the RES&C incentives system	9.00	12.45	11.10	11.00
Balancing energy costs	-	-	-	45.36
Annual difference	**-315.96**	**-78.02**	**457.58**	**66.45**

Source: HROTE

Register of renewable energy sources and cogeneration and eligible producers

RES&C is a unified register of renewable energy and high-efficiency cogeneration projects, production facilities using renewable energy sources, high-efficiency cogeneration facilities, and eligible producers operating in Croatia. It is established and maintained by the Ministry of Environment and Energy (hereinafter: 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, and 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 facilities entered into the Register, accessible at https://oie-aplikacije.mzoe.hr/InteraktivnaKarta/, Figure 4.5.5.

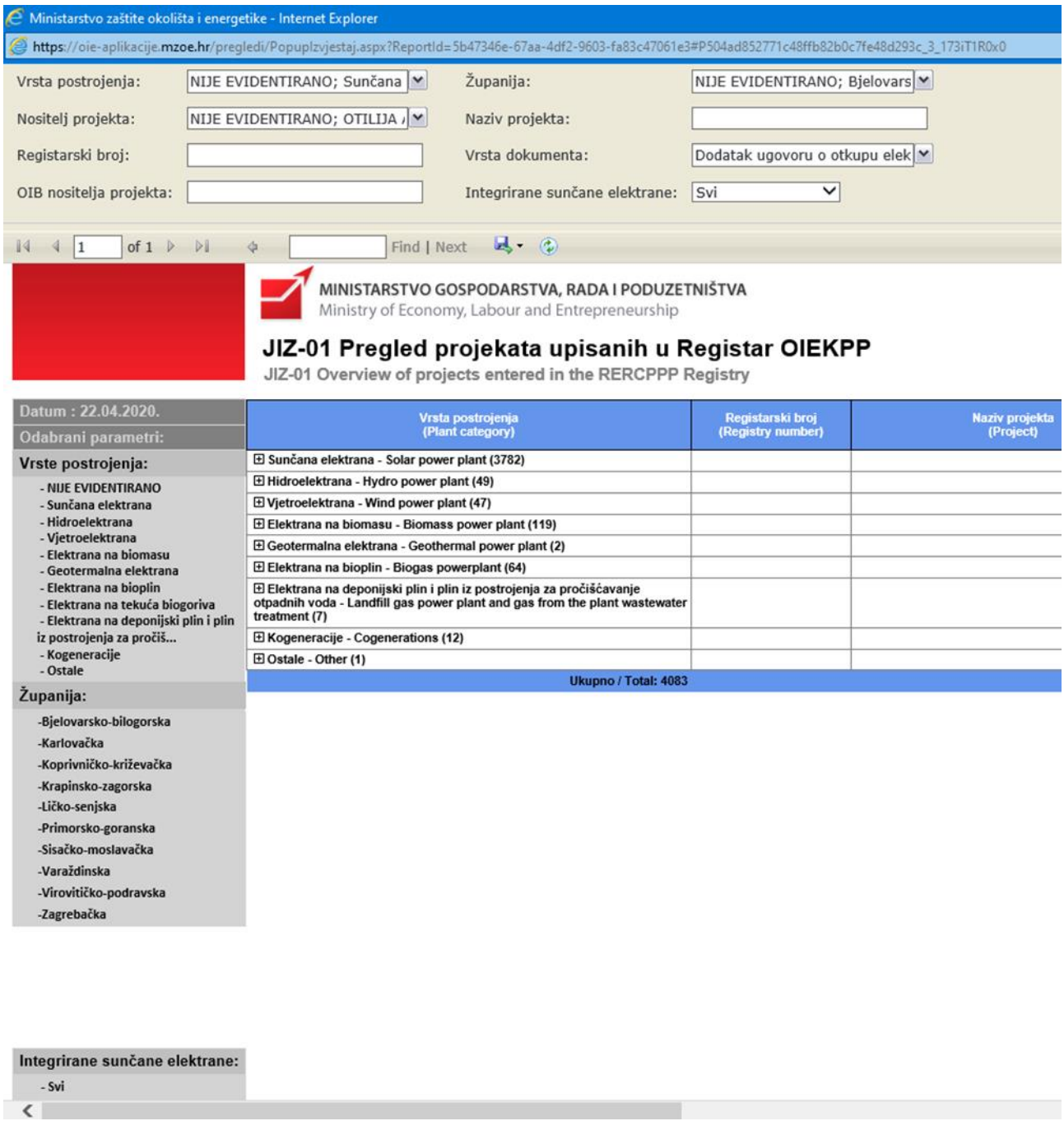


Figure 4.5.4. Review of data from the Register, https://oie-aplikacije.mzoe.hr/Pregledi/

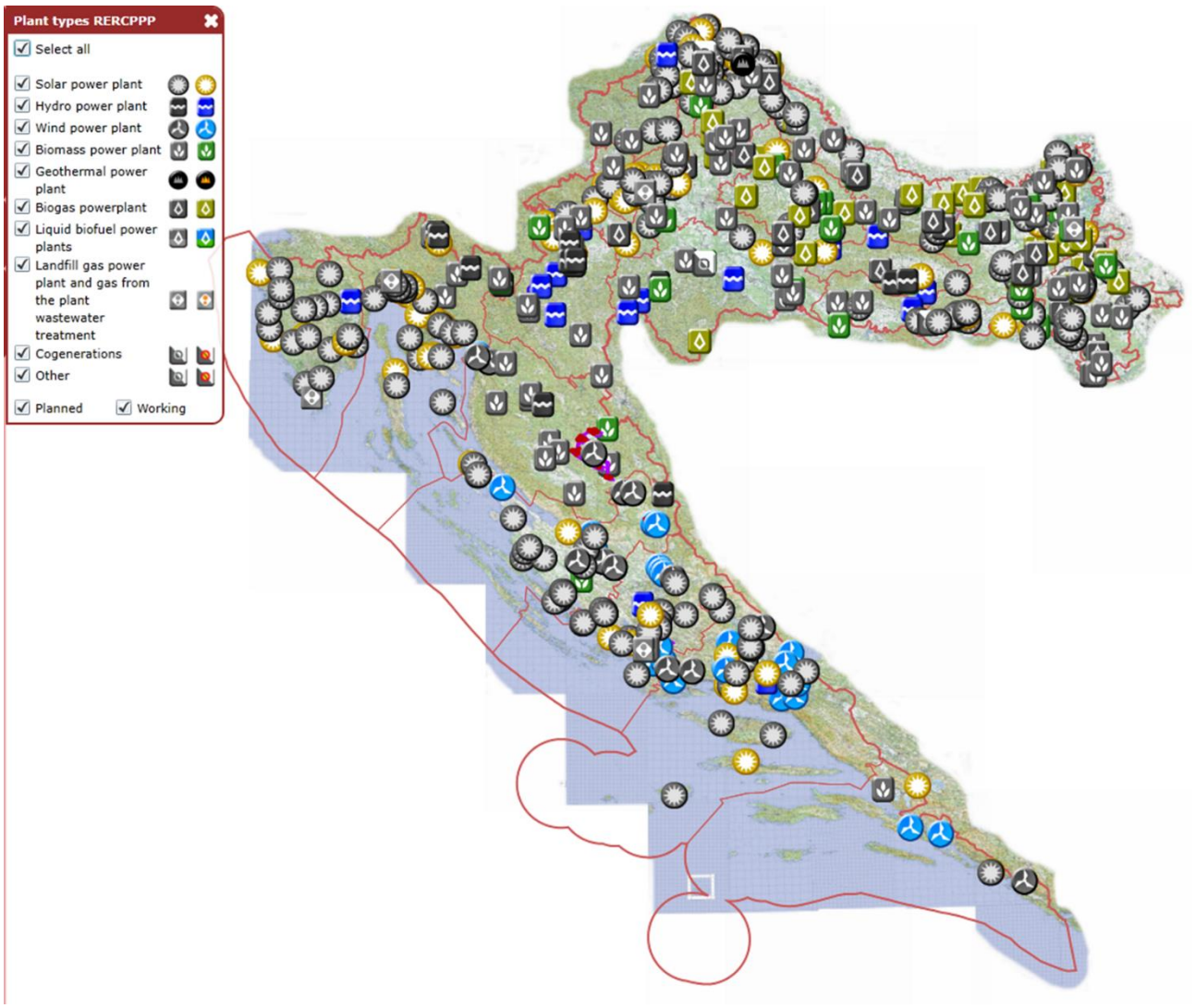


Figure 4.5.5. Interactive map of the Republic of Croatia with marked locations of all plants within the Register, https://oie-aplikacije.mzoe.hr/InteraktivnaKarta/

Pursuant to the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, the entities authorised to enter data and related documents into the Register are the Ministry, HERA, HROTE, HOPS and HEP-ODS. However, project operators and facilities must first be entered into the Register by the Ministry.

In accordance with the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, during September 2019, Ministry adopted an *Ordinance on the Register of Renewable Energy Sources and Cogeneration and Eligible Producers*, which regulates the structure and management of the RES&C register, data entry methods, the content of the register (information, data, certificates, and documents entered into and stored in the Register), the obligations of all competent authorities tasked with data entry and modification to the RES&C Register, as well as the procedure and deadlines for entry into the RES&C Register. In accordance with this *Ordinance*, HERA enters information, data, certificates, and documents for eligible producers into the RES&C Register. By May 2020, HERA had entered a total of 1,026 various decisions related to eligible producer status into the Register for 373 production facilities (previous decisions, final decisions, extensions, changes of coordinator, amendments to decisions, and other decisions), together with the data from these solutions, as well as 199 technical descriptions of facilities.

Table 4.5.5. shows an overview of projects from the publicly available section of the RES&C Register and the Guarantee of Origin Register as of 23 May 2020. The table shows

projects entered into the RES&C Register and constructed production facilities in the incentives system and guarantee of origin system.

Table 4.5.5. Overview of projects entered into the RES&C Register and Guarantee of Origin Register

Type of facility / primary energy source	Total registered in the RES&C Register		Constructed and in the incentives system		Constructed and in the guarantee of origin system	
	Number of facilities	Installed capacity [MW]	Number of facilities	Installed capacity [MW]	Number of facilities	Installed capacity [MW]
Solar power plants	3,782	307.53	1,230	53.4		
Hydroelectric power plants	49	1,676.35	14	5.9	15	1,859.5
Wind power plants	47	2,021.45	22	575.8	2	17.2
Biomass power plants	119	218.32	34	73.7		
Geothermal power plants	2	20.00	1	10.0		
Biogas power plants	64	69.50	39	42.7		
Power plants fuelled by landfill gas and gas from waste-water treatment plants	7	9.60	1	2.5	1	3.0
Cogeneration	12	1,068.99	6	113.3		
Other	1	1.00	0	53.4		
Total	**4,083**	**5,392.74**	**1,347**	**877.4**	**18**	**1,879.7**

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 incentivised price in accordance with electricity buy-off agreements.

The Act on Amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act in December 2018 affirmed the launch of the EKO balance group's operations at the start of 2019. In December 2018, the *Regulation on promoting electricity production from renewable energy sources and high-efficiency cogeneration* and the *Regulation on the share of net electricity delivered by eligible producers that electricity suppliers are obliged to take up from the electricity market operator (Official Gazette no. 116/18)* were also published. This regulation defines the charges for balancing energy costs in the amount of HRK 0.015/kWh for wind power plants, HRK 0.01/kWh for solar power plants, and HRK 0.003kWh for all other facilities. In line with the 2019 *Regulation on the share...*, electricity suppliers are required to take up 70% of net electricity delivered to HROTE by eligible electricity producers participating in the incentives system. 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. Due to the relatively small share, all energy was sold through the electricity exchange (CROPEX).

In case the production of the EKO balance group deviates from planned production, HROTE is obliged 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.

Self-supply installation users

The Act on Amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act of December 2018 introduced the definition of a self-supply installation user as a household end consumer with a connected a self-supply installation generating own electricity from renewable energy sources or high-efficiency cogeneration, whose energy surpluses can be taken over within a billing period by a supplier or market participant under a relevant contract, provided that the total volume of electricity delivered to the network in a calendar year is less than or equal to the electricity taken from the network.

Suppliers are obliged to conclude a supply contract with self-self-supply installation users at the users' request; this agreement must contain provisions on the buy-off of surplus electricity produced by the production facility. When calculating electricity consumption, network usage charges, and charges for renewable energy sources and high-efficiency cogeneration of the self-supply user, the quantity of electricity representing the difference between energy taken up and delivered in a billing period (one month) for a particular tariff is taken into account.

As this affects the calculation of network usage charges, and thus HOPS' and HEP-ODS' income, in late 2018, HERA ordered the creation of a study entitled *The estimated influence of self-supply installation users on the amount of distribution and transmission network usage charges*. The study was completed in March 2020. This study evaluated the influence of self-supply users in the low voltage network (with installed rooftop photovoltaic systems) on the reduction of HOPS and HEP-ODS' income. The criteria for the installation of photovoltaic systems for household and non-household end consumers used in the study (simple ROI period less than 10 years and internal profitability rate higher than or equal to 8%) foresaw a total of 63,321 photovoltaic systems with a total capacity of 277 MW for households and 3,460 photovoltaic systems with a total capacity of 92 MW for non-household end consumers. Regarding household self-supply installation users, the study predicts that the installation of this number of photovoltaic systems would reduce HEP-ODS' revenues in the first year of use from HRK 77.2-91.5 million (depending on the orientation of the photovoltaic modules), or 2.5-2.8% of their revenues from network usage charges in 2018. The reduction in HOPS' revenues in this case would amount to HRK 34.6-41.1 million, or 2.5-2.9% of their revenues from network usage charges in 2018.

Considering current tariff amounts, this study estimates that each installed kW of photovoltaic systems in households will result in a reduction in HEP-ODS' revenues of HRK 279-331 yearly, and a reduction in HOPS' revenues from HRK 125-148 yearly.

Observations on incentives for electricity production from renewable sources and cogeneration

The weighted average price of electricity paid in 2019 to eligible producers taking part in the incentives system was roughly 2.5 times higher than the annual average electricity price on the day-ahead market on the CROPEX electricity exchange, as well as 5.7% higher than the weighted average price of electricity paid to eligible producers in the incentives system in 2018. During this same period, the annual average price of electricity on CROPEX fell by 5%.

In 2019, 12 new facilities using renewable energy sources with a total capacity of 48.5 MW were connected to the electricity system. Plants in the incentives system using renewable energy sources and high-efficiency cogeneration have continued to show growth in energy production.

As HOPS is obliged to enable the connection of all wind power plants that have signed an electricity buy-off agreement with HROTE, after the two remaining wind power plants that have signed an agreement with HROTE were built and entered the incentives system, the production of electricity from wind power plants will increase further, thus increasing the required amount of funds for the payment of incentives.

The expected increase in the amount of energy generated under the incentives system and the introduction of the obligation to settle balancing energy costs for the EKO balance group may result in the need to increase charges paid by all electricity end consumers to stimulate the production of electricity from renewable sources of energy. In addition, once suppliers are fully relieved of the obligation to purchase electricity from the incentives system at a regulated price, supplier procurement costs will be reduced and charges for promoting electricity production from renewable sources and cogeneration will increase, provided that market prices remain lower than regulated prices.

The Act on Amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act of January 2018 increased the capacity limit of facilities eligible to join the incentives system with buy-off at a guaranteed price from 30 kW to 500 kW. In its opinion on the draft of this act, HERA warned the Ministry that the new limit would significantly increase the number of facilities joining the new incentives system, which is quite similar to the old feed-in system, and which may represent a step backwards in market development.

Public consultation was held in March 2020; in May 2020, the *Regulation on quotas for promoting electricity production from renewable energy sources and high-efficiency cogeneration* and the *Regulation on amendments to the Regulation on promoting electricity production from renewable energy sources and high-efficiency cogeneration were passed.* HERA provided opinions on both documents. *The Regulation on quotas* allows high-powered plants (2,265 MW) to enter new incentives systems (market premiums and buy-off at a guaranteed price). The explanatory memorandum to the draft *Regulation* states that the quotas have been with the **Strategy** and the *NECP* in mind, however these quotas are higher than the targets for 2030 listed in the two documents. HERA has no information regarding whether an analysis has been carried out of the potential impact of high-powered plants using renewable energy sources and high-efficiency cogeneration entering incentives system at the expense of end consumers. HERA believes such an analysis would be important to carry out, alongside a potential revision of current quotas, especially taking into account that the current incentives system already represents a significant burden on end consumers.

4.6 Energy efficiency in the electricity sector

Criteria for energy efficiency in network tariffs and regulations

In 2019, implementation of the *General terms and conditions for network usage and electricity supply* continued, which classify end consumers, including households with connection capacity above 20 kW, into tariff models for network use which take into account the calculation of peak loads. The calculation of peak loads (maximum power used in the higher daily tariff period over a billing period) used as one of the tariff elements directly encourages end consumers to monitor and decide when and how they use their devices and how they use major energy consuming devices, thus indirectly controlling electricity consumption.

Enabling and promoting responses to demand

In terms of consumption management, in accordance with the **Energy Act**, all users of the distribution network are provided metering of electricity consumption in their housing units using separate meters. If one housing unit is divided into two separate units, a separate billing metering point is created for each unit. This allows consumers easy access to their electricity consumption data, on the basis of which they can manage their consumption in order to save money or earn additional income.

HEP-ODS submits billing metering data from meter readings to suppliers, who, in accordance with the provisions of the **Electricity Market Act**, issue their end consumers a single bill for electricity and network use for each billing metering point, in accordance

with tariff systems, prescribed charges, and contracted prices. If a billing metering point cannot be accessed or read, electricity consumption is estimated, and the estimated value on the bill is specially marked.

Household consumers can also access their meter readings and electricity consumption data for past periods via the web portal (*Moja mreža* app), which also allows them to deliver meter readings.

Energy efficiency in network design and operation

Pursuant to the **Energy Efficiency Act**, HERA must take energy efficiency into account when implementing regulatory tasks in accordance with legal provisions regulating the electricity and gas markets.

Pursuant to the **Energy Efficiency Act**, HERA must:

- ensure that the potential for increasing energy efficiency of gas and electricity infrastructure is assessed, in particular related to transport/transmission, distribution, load management, interoperability and connection of facilities for energy generation, including access for energy microgenerators, and
- determine specific measures and investments for introducing cost-effective energy efficiency improvements into the network infrastructure, including deployment target dates.

The term "energy efficiency of electricity infrastructure" refers to the reduction of technical losses in the transmission and distribution networks resulting from the operation of the transmission and distribution systems. Technical loses are classified as permanent (load independent – losses in transformer cores, losses due to corona and leakage current over insulators in transmission lines, dielectric losses of cables and capacitors, losses in low-voltage coils of electricity meters) and variable (proportional to the square of the current – losses in overhead lines and underground cables, losses in transformer windings).

In order to implement these tasks, HERA commissioned a study entitled *An Assessment of the Potential for Increasing the Energy Efficiency of the Electricity Infrastructure*.

The potential for decreasing electricity losses is calculated as the difference between future losses without the implementation of measures and future losses with implemented energy efficiency measures.

The study analysed measures affecting technical losses (decreases and increases) from the ten-year development plans for the transmission and distribution systems for the period from 2016 to 2025, with a detailed elaboration of the initial three- and one-year periods. These measures arise from the need to increase the safety of operations and compliance with technical regulations; thus, investments are not solely based on savings from loss reduction.

The study also considered specific measures and investments that would affect losses in the transmission and distribution networks.

The target deployment dates for the considered measures are established by ten-year development plans for transmission and distribution networks, with a detailed elaboration for the initial three- and one-year periods, which HERA approves each year, taking into account cost-effective improvements to the network infrastructure.

Once preconditions are met for the introduction of smart technologies (e.g. load management technologies), HERA will revise the assessed potential and deployment dates for increases in energy efficiency of the electricity infrastructure.

The approved *Ten-year development plan for the transmission network from 2019 to 2028, with a detailed elaboration of the initial three- and one-year periods* contains measures for investments into the network, such as the replacement of old power transformers with new lower-loss units, the revitalisation of old overhead lines through

the replacement of conductors, the use of high-temperature low-sag (HTLS) conductors with a larger aluminium clad cross-section for reduced losses, the replacement of worn out submarine cables, the construction of new lines, the installation of reactive power compensation devices, and the replacement of overhead lines with cables. It also proposes measures for electricity system management.

The approved *Ten-year (2019-2028) distribution network development plan with a detailed elaboration of the initial three and one-year periods* also foresees other measures for to improve energy efficiency: rebuilding parts of the grid with small conductor diameter and long sections of line; upgrading voltage levels for some parts of the network from 10 kV to 20 kV; replacing old power transformers with new units with lower losses; further implementing reactive power compensation. In addition, it proposes measures for electricity system management, (e.g. the optimisation of network reconnect status, automatic voltage regulation, etc).

Savings from all energy supply measures

The Energy Efficiency Act prescribes a system of energy savings obligations.

In 2019, the bond parties were energy suppliers and related persons who supplied a total of more than 300 GWh of energy in 2017 to end consumers or distribution stations that sell energy to end consumers. In 2020, this limit is 100 GWh of energy; as of 2021, it will amount to 50 GWh of energy.

The Ministry of Environmental Protection and Energy shall issue a decision to the bond parties defining their savings obligations in the following calendar year in kWh by 30 June of the current year (hereinafter: the Obligation). For the unfulfilled part of the Obligation from the previous year exceeding 10%, the Ministry will determine the amount that the party is obliged to pay in a lump sum into the Environmental Protection and Energy Efficiency Fund.

The Ministry has adopted an *Ordinance on the energy efficiency obligation system*. This *Ordinance* regulates elements of the energy savings obligation system and its implementation. This includes determining the share of new savings that will be realised through the obligations system and the manner and periods within which they will be realised, as well as reporting deadlines for the bond parties. *The Ordinance* defines methods by which energy savings are calculated, rules for the transfer of realised savings, the scope of the concept and obligations of related parties, and the manner in which obligations are distributed among them. It also defines the duration of the cumulation period, compensation for savings unrealised in the obligations system, the priority incentivisation of energy efficiency in energy-poor households or in social housing, trading in confirmed energy savings, and the conditions under which energy efficiency must be invested in and incentivised. *The Ordinance* also defines the purpose of funds paid for unrealised savings, as well as the conditions necessary for the right to pay funds for unrealised savings in instalments. It also defines savings culmination periods, the first of which ends on 31 December 2020.

The suppliers who delivered more than 300 GWh of electricity in 2017 were: HEP ELEKTRA d.o.o., HEP-Opskrba d.o.o., GEN-I Zagreb d.o.o., RWE Energija d.o.o. (new name: E.ON Energija d.o.o.), and Hrvatski telekom d.o.o. (which is no longer on the market).

As the **Energy Act** takes into account the total energy delivered to end consumers by individual suppliers and all their related parties, the number of bond parties is much higher because it includes the sale of gas, thermal energy, oil, and other energy sources.

As the legal solutions have been known since 2018, suppliers who may not have prepared for said obligations (who would not have independently realised savings) could buy them on the market. If they failed to do so, they would be required to pay amounts determined by the law into the Fund. It can be assumed that such expenses might result in more suppliers leaving the market, which would further reduce the market share of suppliers outside the HEP group. However, the data supplied to HERA by active suppliers with

energy savings obligations show that they all fulfilled their obligations and reported them to the Ministry.

Currently, electricity suppliers are not publicly offering end consumers any models with tariff elements that would be different from the tariff systems for the transmission and distribution of electricity. In other words, despite the fact that some end consumers have installed meters capable of monitoring consumption in shorter intervals or in several tariff periods, the offer of electricity suppliers does not include special products targeting specific groups of end consumers and their consumption patterns (e.g. tariff models adapted to vacation homes).

Although electricity suppliers provide advice on the efficient use of energy through their communication channels with current and future end consumers, it should be ensured that electricity suppliers provide more information regarding electricity consumption in personal communication, which would enable end consumers to save energy, change their behaviour, or make better decisions and purchase energy efficient devices.

Financing energy efficiency measures in energy supply

The basic sources from which energy efficiency measures can be financed are own funds, loans (credit and leasing), and energy performance contracts (EPCs). Energy efficiency measures are most often financed through loans. In addition to conventional loans, in which financial and commercial risk is borne by the end user, models are also used in which risk is shared among the participants in the project (in addition to the end user, this may include contractors, equipment suppliers, energy suppliers, and occasionally third parties who ensure financing). Different variants and combinations of basic financing options are used for households. These may include:

- financing equipment suppliers, wherein leasing is the most common financial form of financing of equipment manufacturers,
- energy mortgages (this implies financing through a mortgage on a house/flat, which takes into account that increasing energy efficiency increases the value of the house/flat; these mortgages are tied to individual properties and not their owners, thus enabling investments with longer payback periods),
- financing through electricity bills – integrated repayment of energy efficiency improvement loans in monthly bills,
- financing through special bank credit lines for improving energy efficiency in households (EBRD),
- pooled procurement of equipment to improve the energy efficiency of buildings, and
- Carbon finance – Green investment schemes/domestic carbon offsets.

Aside from this, regional and local authorities often encourage investments into energy efficiency improvement through various types of incentives (subsidies, soft loans, tax breaks, exemptions, etc.). Steps such as these should serve as an example and pave the way for private investment, not serve as a substitute for it. Subsidy programs (investment co-financing or interest rate subsidies) are a very common form of financing that supports high start-up costs in energy efficiency projects. Co-financing start-up costs increases the return on investment rate, thus also increasing the demand for this type of investment. These are mostly used as subsidies for energy efficient renovations of existing buildings or for the use of renewable energy sources (RES). Measures such as these are directed at investments into existing, mature technologies (e.g. thermal insulation) and new technologies (e.g. RES or micro-cogeneration). Subsidies are provided for: replacement of unacceptable heating sources in buildings (e.g. electric heaters), the implementation of individual technologies (e.g. installing solar panels, heat elevators), renovation of existing buildings to realise a net reduction in energy consumption (typically 20-30%) or to fulfil obligations from current legislation. Aside from subsidies directed at improving the energy efficiency of buildings regardless of the social status of their users, special programmes are aimed at particular social groups (e.g. households with elderly residents). Discounted

loans are usually used to implement energy efficiency measures. They are characterised by:

- extended repayment periods,
- low interest rates or zero interest, and
- a grace period.

5 NATURAL GAS

5.1 Legal framework for natural gas

The legal framework of the gas sector and gas market in the Republic of Croatia includes the **Energy Act**, **Act on the Regulation of Energy Activities, Gas Market Act**, **Act on the Liquefied Natural Gas Terminal**, and by-laws adopted pursuant to these laws.

In February 2018, Croatian Parliament adopted the **Gas Market Act (Official Gazette no. 18/18)**; in February 2020, it adopted the **Act on Amendments to the Gas Market Act (Official Gazette no. 23/20).**

The Act on Amendments to the Gas Market Act, the draft of which HERA provided an opinion for in January 2020, implements the provisions of *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*, which defines procedures in the event of cross-border disputes concerning the refusal of access to the production pipeline network, as well as the obligation to consult with other EU Member States, or third countries if the production pipeline network originates in a third country.

It also prescribes the decision-making process for HERA's derogations for new infrastructure, which includes both EU member states and third countries, as well as the European Commission authorisation process in the case of negotiations between transmission system operators or other bodies or business entities from Croatia with representatives of third countries for the purpose of amending, extending, adjusting, renewing, or concluding agreements on the operations of transmission pipelines from third countries.

Particular provisions of the **Gas Market Act** have also been amended and harmonised; inter alia, this relates to the exchange of data between distribution system operators, transmission system operator, and gas storage system operator on end consumer consumption in the public service gas supply as concerns the process of allocating and contracting storage capacities for the period from 1 April 2020 to 31 March 2021. Additionally, it defines the period for which a public service gas supplier is defined after the creation of a new distribution area or the expansion of an existing one, the period for which HERA must hold a public tender to select a supplier for public service gas supply after 31 March 2021, and more clearly defines the area in which the public service gas supplier supplies gas to household end consumers until 1 April 2021.

In 2019 and early 2020, with a view to the continuous improvement of the gas market in Croatia, HERA adopted amendments to the following by-laws:

- *Amendments to the General terms and conditions of gas supply (Official Gazette no. 50/18, 88/19, and 39/20)*,
- *Amendments to the Gas Distribution System Network Code (Official Gazette no. 50/18, 88/19, and 36/20)*,
- *Amendments to the Methodology for setting tariffs for public service gas supply and supply of last resort (Official Gazette no. 34/18 and 14/20), and*
- *Amendments to the Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the receipt and dispatch of liquefied natural gas, and public service gas supply (Official Gazette no. 48/18 and 25/19).*

Amendments to the General terms and conditions of gas supply (Official Gazette no. 50/18, 88/19, and 39/20)

Amendments to the General terms and conditions of gas supply (Official Gazette no. 88/19), adopted by HERA in September 2019, prescribes new data kept in the Billing Metering Point Register (hereinafter: BMPR) necessary for the implementation of the *Methodology for predicting gas uptake and gas energy distribution at transmission system*

exit points that are entry points into the distribution system - Annex 2*, Network code for the gas transmission system (Official Gazette no.* 50/18, 31/19, 89/19) (hereinafter: *Methodology for gas energy distribution*). The data kept in the BMPR and access rights to the BMPR are elaborated upon and improved, and the method by which this data is entered and updated is explained in better detail. Provisions governing the storage of historical data in the BMPR have also been improved.

The methods by which supplier switching request forms are implemented, received, and approved have been further clarified. When initiating the supplier switching process, the new supplier is required to enter the end date of gas supply according to the Gas Supply Agreement, such that the IT system of the gas market operator can inform the gas system operator of the end date of gas supply in a timely manner.

It additionally prescribes and clarifies procedures if end consumers decide to withdraw their request to switch suppliers during the supplier switch procedure; if a new gas supply agreement is terminated after the procedure is carried out, a requirement to implement a new supplier switch process is prescribed.

The mandatory content of invoices for the delivered gas has been supplemented with the addition of the name of the connection or exit from the transmission system through which the distribution system operator (or end consumer) is connected to the transmission system; this name must be identical to the name specified in the BMPR.

Amendments to the General terms and conditions of gas supply (Official Gazette no. 39/20), which HERA adopted in March 2020, prescribes additional data to be kept in the BMPR necessary to implement the *Methodology for gas energy distribution*, as well as advanced measures for ensuring data in the BMPR necessary to implement the *Methodology for gas energy distribution* are complete, accurate, and up-to-date.

Furthermore, provisions are laid down to improve the quality of gas supply for distribution system operators, closed distribution system operators, and gas suppliers who do not meet the obligations laid down in Article 27 of the *General terms and conditions of gas supply* with regard to the entry and updating of data in the BMPR, so that the data might serve as a complete, accurate, up-to-date, and valid basis for the correct and successful implementation of the *Methodology for gas energy distribution*.

Additionally, the *Amendments to the General terms and conditions of gas supply* include additions to the provisions of Article 40 of the *General terms and conditions of gas supply* related to the tool used to compare gas prices; the purpose of the tool is additionally explained and the users and function of the tool are defined to make it more easily accessible and simpler. The amendments to these provisions enable all gas suppliers to enter data on final gas prices and gas supply conditions into the tool used to compare gas prices in a standardised format, while end consumers have access to and insight into standardised offers; the data entered will be checked and verified by HERA.

Amendments to the Gas Distribution System Network Code (Official Gazette no. 50/18, 88/19, and 36/20)

The Amendments to the Gas Distribution System Network Code (Official Gazette no. 88/19), adopted by HERA in September 2019, prescribe in detail data exchange required for compliance with the *Transmission system network code* in order to implement the *Methodology for gas energy distribution*.

Furthermore, the publication of data on gas quality verification implemented by the transmission system operator has been harmonised with new deadlines for the release of data in accordance with the *Amendments to the Network code for the gas transmission system*.

Additionally, additions have been made to the provisions of the *Gas Distribution System Network Code* regarding conditions for connection and special conditions for harmonisation with the provisions of the **Spatial Planning Act (Official Gazette no. 153/13, 65/17, 114/18, and 39/19)** and the **Construction Act (Official Gazette no.**

153/13, 20/17, and 39/19).

The provisions of the *Amendments to the Gas Distribution System Network Code* prescribe more precise, clearer conditions and procedures for concluding gas distribution agreements in order to emphasise the importance of concluding such agreements during supplier switches or when concluding gas supply agreements. It introduces charge for gas suppliers who begin supplying gas to end consumers without having signed a distribution agreement.

The implementation of the *Methodology for gas energy distribution* has enabled distribution system operators to read end consumer billing metering points on a tri-monthly or bi-yearly basis for household end consumers who are not in the public supply service. An obligation has been added to deliver readings to end consumers in tariff models TM6 to TM12 upon request.

Amendments to the Gas Distribution System Network Code (Official Gazette no. 36/20), which HERA adopted in March 2020, prescribes the implementation of the Methodology for predicting gas uptake and gas energy distribution at transmission system exit points as of 1 October 2020; the provisions have been updated such that the existing method of energy distribution can remain in use under the new circumstances on the gas market after 1 April 2021.

The metering rights included in the Amendments to the Gas Distribution System Network Code were adopted in order to allow the gas energy distribution methodology to also apply appropriately to distribution systems that uptake gas directly from the production pipeline network in addition to the transmission system.

Methodology for setting tariffs for public service gas supply and supply of last resort (Official Gazette no. 34/18 and 14/20)

In February 2020, HERA adopted the *Amendments to the Methodology for setting tariffs for public service gas supply and supply of last resort (Official Gazette no. 14/20)*. The draft amendments to the *Methodology for setting tariffs for public service gas supply and supply of last resort* were subject to public consultations from 21 January to 2 February 2020. The amendments to the *Methodology* change the cost of gas supply as an element in the final price structure of gas supply, which has amounted to HRK 0.0145/kWh since 1 April 2020.

In 2020, HERA provided approval to the ***Rules on amendments to the Rules for LNG terminal use (Official Gazette no. 60/18 and 39/20).***

In March 2020, with HERA's approval, LNG HRVATSKA d.o.o. issued the *Rules amending the Rules for LNG terminal use (Official Gazette no. 39/20)*, which change regulations tied to the yearly process of concluding LNG receiving and dispatching agreements (hereinafter: LNG) and short-term LNG regasification capacity agreements as regards capacity allocation rules, such that capacities are allocated according to the order in which requests are received; they also define more clearly the period for which particular services are contracted. Furthermore, interested terminal users are allowed to submit an application for the allocation of free yearly LNG regasification capacity on an annual basis, for a period of at least one to a maximum of 15 gas years, by 15 June of each year.

Upon completion of the annual contracting procedure for the receipt and dispatch of LNG and the publication of information on free capacities, short-term LNG regasification capacity is allocated for each individual month within the gas year.

In 2020, HERA approved the ***Amendments to the Rules on gas storage system use (Official Gazette no. 50/18 and 26/20).***

In March 2020, with HERA's approval, PODZEMNO SKLADIŠTE PLINA d.o.o. adopted *Amendments to the Rules on gas storage system use (Official Gazette no. 26/20)* in order to comply with the provisions of the **Act on Amendments to the Gas Market Act (Official Gazette no. 23/20)**, which entered into force on 4 March 2020. *The Amendments to the*

Rules additionally define the proportional allocation procedure for storage capacities available for suppliers in the public service for the needs of public service gas supply for household end consumers from 1 April 2020 to 31 March 2021. It also defines the process by which public service suppliers may assign their rights to contract storage services to a wholesale gas market supplier or gas supplier or gas trader from which they purchase gas to supply household end consumers in the public service, as well as defining the duration of storage agreements and amounts and delivery dates for payment insurance funds the system operator may define in accordance with the gas storage user's solvency.

In 2019, HERA approved the ***Amendments to the Network code for the gas transmission system (Official Gazette no. 50/18, 31/19, 89/19, and 36/20).***

In March 2019, with HERA's approval, PLINACRO d.o.o. adopted the *Amendments to the Network code for the gas transmission system (Official Gazette no. 31/19)*, in order to shift the deadline for the use of non-standard service for interruptible capacity on the Croatian-Hungarian interconnection from Croatia to Hungary from 1 April 2019 to 1 January 2020.

In September 2019, with HERA's approval, PLINACRO d.o.o. adopted the *Amendments to the Network code for the gas transmission system (Official Gazette no. 89/19)* in order to comply with the connection conditions and special conditions affirmed in the **Act on Amendments to the Spatial Planning Act (Official Gazette no. 153/13, 65/17, 114/18, and 39/19)** and the **Act on Amendments to the Construction Act (Official Gazette no. 153/13, 20/17, and 39/19).**

Furthermore, it prescribes a new methodology for forecasting gas uptake by transmission system users without daily measurements, as well as new allocation rules in order to meet obligations of *Regulation no. 312/2014*. Additionally, balancing rules have been amended such that they now contain provisions regarding the criteria according to which transmission system operators choose products on the gas market operator's platform; it introduces a new system for affirming and monitoring gas quality through the use of process gas chromatographs; it also amends rules on guarantee auctions and payment insurance funds, thus easing the process of contracting transmission system capacities and reducing the financial burden on transmission system users.

In March 2020, with HERA's approval, PLINACRO d.o.o. adopted the *Amendments to the Network code for the gas transmission system (Official Gazette no. 36/20)*, which improved provisions related to the use of gas transmission services without contracted capacities, as well as provisions on the methodology for predicting gas uptake and gas energy distribution at transmission system exit points that are entry points into the distribution system.

In 2019, HERA implemented ***Commission Regulation (EU) 2017/460 establishing a network code on harmonised transmission tariff structures for gas (NC TAR Regulation)***

The NC TAR Regulation, as a binding legislative act transposing the European Union acquis into the Croatian regulatory system for gas transmission, lays down the requirements based upon which national regulatory authority HERA issued its *Decision on the elements of the methodology for setting the reference price for gas transmission services* and its *Decision on discounts, multipliers, and seasonal factors* on 23 May 2019 (hereinafter: *the Decisions*).

Prior to the adoption of the *Decisions*, a final consultation was held in the period from 18 December 2018 to 18 February 2019 on the proposed elements of the methodology and on discounts, multipliers, and seasonal factors. The final consultation was held in relation to the methodology setting the reference price for standard capacity products for annual firm capacity and the method of allocating allowed revenue and calculation tariffs for annual capacity lease at entry and exit points of the gas transmission system in the Republic of Croatia. The final consultation encompassed the period from 2021 to 2026, with 2021 representing the start of a new tariff period with regard to the applicable *Decision on tariffs for gas transmission (Official Gazette no. 124/19)* for energy entity

PLINACRO d.o.o. during the second regulation period from 2020-2021, considering the planned launch of the LNG terminal on 1 January 2021.

The consultation on discounts, multipliers, and seasonal factors, which included not only the interested public, but also national regulatory authorities of the neighbouring Member States connected via an interconnector with Croatia, was held in relation to the proposed discount levels at entry and exit points of the transmission system, multiplier levels and levels of seasonal factors used to calculate lease charges for short-term capacities of the transmission system on a quarterly, monthly, daily and intraday basis, as well as the calculation of the reserved prices of standard capacity products for interruptible capacity.

Within the specified period of one month following the end of the consultation, HERA published a summary of submissions received in the final consultation forwarded the consultation documents to the Agency for the Cooperation of Energy Regulators (ACER) for analysis in accordance with Article 27 of *Regulation 2017/460*.

ACER's analysis, submitted to HERA and published on 17 April 2019 showed that the proposed methodology elements were fully consistent with the provisions in force, that the elements complied with the requirements set out in Articles 4 and 7 of the *NC TAR Regulation*, and that all the relevant information from Article 26.1. of the *NC TAR Regulation* had been published.

In accordance with the elements adopted in these *Decisions*, in 2020 HERA will adopt amendments to the *Methodology for setting tariffs for gas transmission (Official Gazette no. 48/18 and 58/18)*, based on which a new decision on tariffs for gas transmission will be issued; its entry into force is planned for 1 January 2021, simultaneously with the planned launch of the LNG Terminal.

5.2 Regulated activities in the natural gas sector

5.2.1 Gas transmission

Gas transmission is a regulated energy activity performed as a public service. The state-owned energy entity PLINACRO d.o.o. is Croatia's transmission system operator.

PLINACRO d.o.o. manages the system of main and regional gas pipelines through which natural gas from domestic production (the northern part of continental Croatia and the Northern Adriatic) and from imports via the interconnections with Slovenia (Zabok–Rogatec) and Hungary (Donji Miholjac–Dravaszerdahely) is transported to exit metering-reducing stations, where the gas is delivered to gas distribution systems and to end (non-household) consumers directly connected to the transmission system. The Croatian gas transmission system is shown in Figure 5.2.1.

Figure 5.2.1. The Croatian gas transmission system

The total length of the gas transmission system in the Republic of Croatia at the end of 2019 was 2,531 km, of which 952 km were gas pipelines with a working pressure of 75 bar and 1,579 km were gas pipelines with a working pressure of 50 bar.

Gas is received into the transmission system from nine connection points at entry measuring stations, six of which are used to receive gas from production fields in Croatia, two connection points are international connection points and are used to receive gas from import routes, while one is used to withdraw gas from the Okoli underground gas storage facility (UGSF Okoli).

Gas from the transmission system is delivered to 164 connection points (at 157 exit pressure reducing metering stations), 35 of which are used to deliver gas to non-household consumers connected to the transmission system; 128 connection points are used to deliver gas to distribution systems operated by 35 distribution system operators, while one connection point is used to inject gas into the Okoli underground gas storage facility.

In 2019, transmission system operator PLINACRO d.o.o. intensified work on the preparation of projects related to new import routes for natural gas and gas pipeline projects, pressure reducing metering stations, gas knots, and compression stations in order to increase the regional security of gas supply.

In 2019. activities continued on the construction of the KS1 compressor station in Velika Ludina with the aim of ensuring permanent two-way capacity on the international gas pipeline between Croatia and Hungary, as well as ensuring gas transmission from the future LNG terminal on the island of Krk. The investment was completed at the end of 2019, at which point the first compressor station on the Croatian gas transmission system began to operate, thus establishing permanent two-way capacity on the existing interconnection between Croatia and Hungary.

The following investments were also realised in 2019:

- construction and commissioning of the Kneginec - Varaždin II and Omanovac-Daruvar gas pipelines,
- construction of the Donji Miholjac - Osijek and Donji Miholjac - Belišće gas pipelines,

- reconstruction of the Slobodnica - Slavonski Brod gas pipeline and the branch pipeline for MRS Slavonski Brod istok, for which the main project and detailed design have been prepared and for which a construction permit is in progress,
- equipment delivery has been contracted for the Omišalj-Zlobin main gas pipeline, for which construction began in mid-December,
- the construction of the Kuknjevac, Brezine, Slavonski Brod, Donji Andrijevci, Kutina II, and Dugo Selo II measuring and reduction stations,
- reconstruction of the Zagreb Jug and Ivanja Reka measuring and reduction stations,
- preparatory design work for the reconstruction of the Molve Selo, Hampovica, Čađavica, and Sirač measuring and reduction stations,
- as concerns gas node investments, a usage permit has been obtained to reconstruct the Kozarac gas node; project documentation for Slobodnica gas node has been completed, and procurement has begun for equipment and construction services. The completion of this project will allow gas delivery to supply oil refineries in Bosanski Brod.

In 2019, 47 gas transmission system users associated into 14 balance groups used the gas transmission service.

In 2019, a total of 1,044 applications for yearly, quarterly, monthly, daily, and intraday capacity bookings were received via the capacity management system (SUKAP) and via auctions on online platforms for capacity lease and trade (PRISMA at the interconnection with Slovenia and RBP at the interconnection with Hungary).

Annual capacity reservations for 2019 were an average of 2.5% lower than in 2018, whereby users contracted lower amounts of annual capacities at the entrances to the transmission system at interconnections, while simultaneously contracting higher amounts of exit capacities in Croatia.

This decrease in annual capacity reservations resulted in an increase in capacity reservations for short-term products, which increased at the overall level by 11.2% as compared to 2018. Daily capacity products at entries to the transmission system are used more intensively in December, January, and February, mainly at interconnections, in order to meet demands for increased quantities of gas due to low temperatures. In 2019, daily entry capacities at interconnections in August and intraday capacities in October were contracted in significant amounts due to low wholesale gas prices on foreign markets. In addition to such increased reservations of short-term capacity products at exits from the transmission system in January and February, there is a notable decrease in capacity reservations in summer months due to favourable hydrological conditions and subsequent reduced needs of thermo-energetic facilities.

There are daily exchanges of data with the neighbouring transmission system operators at interconnection points with Hungary (*Donji Miholjac – Dravaszerdahely*) and Slovenia (*Zabok-Rogatec*) on the process of matching gas quantities nominated by both operators, as well as data on measured gas quantities, gas content, and other obligations under mutually agreed rules.

In 2019, the number of transmission system users according to input and output capacity was as follows:

- 9 users using entries into the transmission system at interconnections,
- 1 user using an entry to the transmission system from an upstream pipeline network,
- 44 users using exits from the transmission system to the distribution systems,
- 11 users using exits from the transmission system to end consumers.

According to data submitted to HERA by energy entity PLINACRO d.o.o., the total quantity of gas transported in Croatia in 2019 amounted to 30,808,530,548 kWh, which represents a 4.3% increase as compared to the total transported quantity in 2018. Total losses and imbalances in gas metering in 2019 amounted to 0.24%. The largest quantity of gas for

end consumption[57] transported in a single day was 132,978,855 kWh/day, which represents a 15.3% decrease as compared to 2018. The maximum utilised capacity at all entries to the transmission system in 2019 was 7,163,334 kWh/h, which is 4.7% less than in 2018. The maximum used capacity at the level of particular transmission system entry points was recorded at the UGSF Okoli entry point amounted to 2,078,968 kWh/h, which represents a 5.1% decrease as compared to the maximum used capacity at the same entry point in 2018. Compared to 2018, there was also a significant increase in maximum used capacity at the Rogatec entry point (by 83.6%), as well as a decrease at the Dravaszerdahely entry point (by 31.9%).

The quantities of transported gas by transmission system entry groups per month in 2019 are shown in Figure 5.2.2.

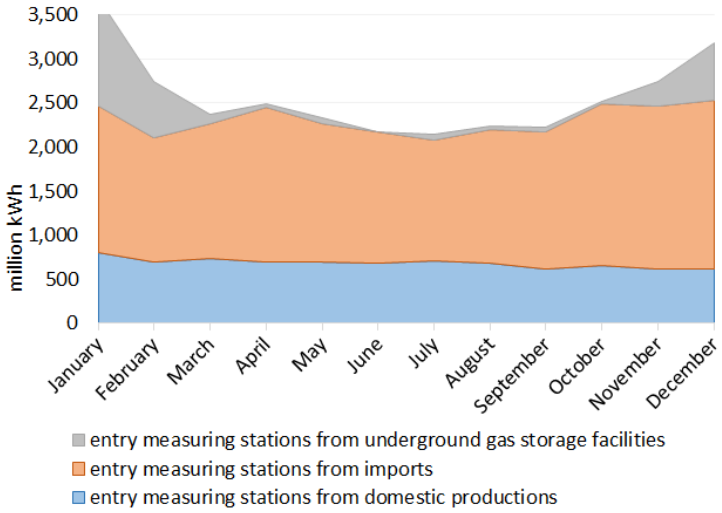


Figure 5.2.2. Quantities of transported gas by transmission system entry group by month in 2019

The maximum used capacity at all transmission system exits in 2019 amounted to 7,156,161 kWh/h, which represents a 12.9% decrease as compared to 2018; the highest maximum used capacity was recorded at exits to distribution systems in the amount of 3,155,716 kWh/h, which represents a 22.5% decrease as compared to 2018.

The quantities of transported gas per transmission system exit group by month in 2019 are shown in Figure 5.2.3.

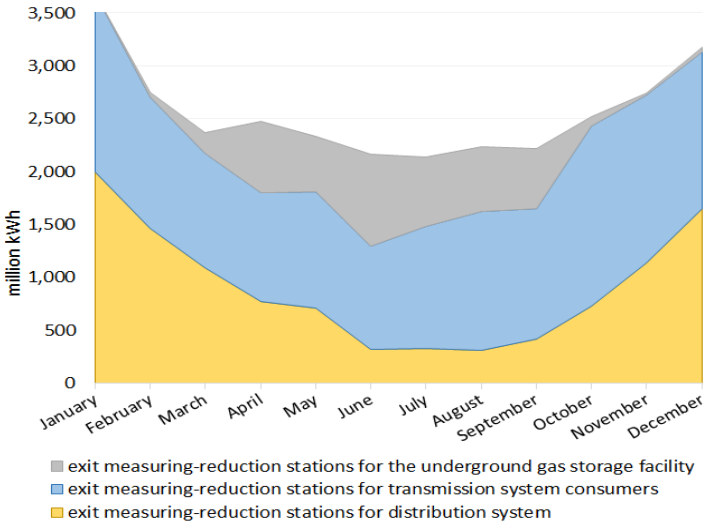


Figure 5.2.3. Quantities of transported gas by transmission system exit group by month in 2019

[57] *Exits to distribution systems and exits to consumers directly connected to the transmission system.*

The total annual quantities of transported gas by end consumer group are shown in Figure 5.2.4.

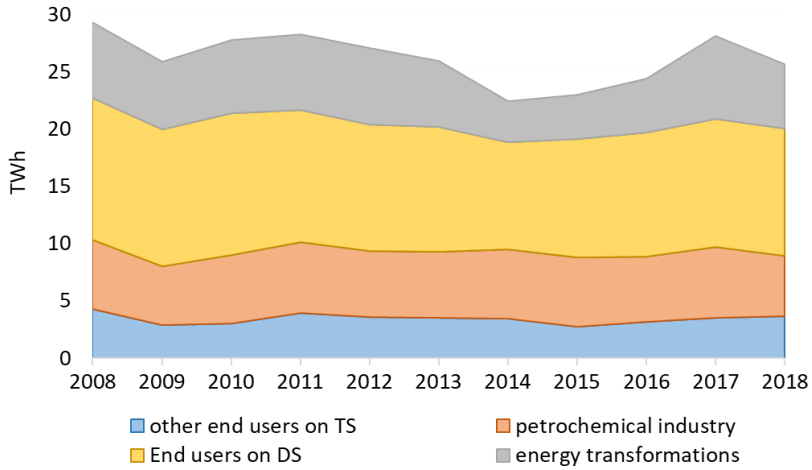


Figure 5.2.4. Total annual quantities of transported gas by end consumer group

As of January 2019, in addition to the current firm physical capacity for gas transmission from Slovenia to Croatia, firm physical capacity for gas transmission from Croatia to Slovenia has been enabled at the Zabok-Rogatec interconnection in the quantity of 280,253 kWh/h.

At the Donji Miholjac – Dravaszerdahely interconnection, in addition to firm physical capacity for gas transmission from Hungary to Croatia, non-standard interruptible capacity use service of decreased interruptibility has been enabled for gas transmission from Croatia to Hungary, which was replaced by a firm physical capacity service from Croatia to Hungary in the amount of 505,952 kWh/h after the construction of a compression station in Velika Ludina (put into operation in January 2020).

Transmission system balancing

Transmission system balancing was managed in accordance with the *Gas Market Code (Official Gazette no 50/18)*. The implementation of *Commission Regulation (EU) No. 312/2014* continued, which defines balancing rules.

Transmission system balancing in 2019 was undertaken in accordance with the valid *Rules*, according to which the transmission system operator intervened via the gas market operator's trading platform by activating standardised short-term products in periods when balancing group managers did not balance their portfolios. The number of transmission system operator interventions into the system in 2019 was equal to the number of interventions in 2018.

For 2019. the transmission system operator did not contract imbalance settlement on an annual basis, and there was no need to use the contracted imbalance settlement on an annual basis as the short-term products offered through the trading platform were always sufficient.

A total of 206 million kWh of positive balancing energy and 221 million kWh of negative balancing energy were activated in 2019. As compared to the total amount of gas taken up into the transmission system, 0.72% of negative balancing energy and 0.67% of positive balancing energy was activated in 2019.

Gas transmission regulation methods

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* and is based on the incentive regulation method, which defines the maximum allowed levels of transmission system operator revenues in a regulatory period. The distribution of allowed revenues

and the determination of tariff amounts is based on the input-output model, without taking into account 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 value of regulated assets for a regulation period is determined with the *ex-ante* approach of approving investments according to ten-year development plan for transmission system, 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 cost and efficiency analyses of transmission system operators in the region surrounding Croatia.

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 is defined as a multi-annual period for which allowed revenues and tariffs are determined independently for each regulatory year. The second regulatory period has been underway since 1 January 2017; in early 2021 (which is also the last year of the current regulatory period), the elements of the *Methodology* that have been harmonised with the *NC TAR Regulation* will enter into force; these were adopted on 23 May 2019 through the *Decision on the elements of the methodology for setting the reference price for gas transmission services* and the *Decision on discounts, multipliers, and seasonal factors*. In accordance with the above decisions, amendments will be made to the *Methodology for setting tariffs for gas transmission* in order to adopt applicable tariff item amounts for gas transmission in 2021 and the years of the third regulatory period in line with the *NC TAR Regulation*.

Gas transmission price and connection charge

In 2019, the price of gas transmission was established based on the *Methodology for setting tariffs for gas transmission*. Pursuant to the *Methodology*, gas transmission tariffs are set by HERA and they are the same for all users of the transmission system.

The Methodology provides for eight tariff items, categorised into the following groups: tariff items for annual contracted firm capacity for entries into the transmission system, tariff items for annual contracted firm capacity for exits from the transmission system, and one tariff item for gas quantities at exits from the transmission system.

In December 2017, pursuant to the *Methodology*, HERA performed a regular revision of tariffs for gas transmission and issued a *Decision on tariffs for gas transmission (Official Gazette no. 127/17)* setting tariff amounts for gas transmission in the second regulation period of 2018-2021.

In December 2018, at the request of transmission system operator PLINACRO d.o.o., HERA performed an interim revision of tariffs for gas transmission pursuant to the *Methodology* and issued a *Decision on tariffs for gas transmission (Official Gazette no. 111/18)*, setting new tariff amounts for gas transmission in the second regulation period of 2019-2021. During this process, HERA analysed the economic efficiency of the operator's existing assets, establishing the justified value of the gas pipeline and, accordingly, the justified value of regulated assets, depreciation, and the return on the operator's regulated assets as elements of the revised allowed revenue. Likewise, the annual capacity calculation coefficient was decreased, which cumulatively resulted in a cumulative decrease of 23.2% in average gas transmission tariffs in 2019 as compared to 2018.

In December 2019, also at the request of transmission system operator PLINACRO d.o.o., HERA performed an interim revision of tariffs for gas transmission pursuant to the

Methodology and issued a *Decision on tariffs for gas transmission (Official Gazette no. 124/19)*, setting new tariff amounts for gas transmission in 2020 and 2021. This interim revision was based on maintaining elements of allowed revenues, planned gas quantities at transmission system exits, and coefficients to calculate tariffs for capacity on a yearly basis according to the amounts defined in HERA's previous *Decision on tariffs for gas transmission (Official Gazette no. 111/18)* of December 2018, in addition to the revision of planned transmission system capacities for 2020 and 2021. The overall effect of the implementation of this interim revision was a reduction in the average amount of gas transmission tariff items by 0.2% in 2020 as compared to 2019.

Figure 5.2.5. shows tariff amounts excluding VAT for gas transmission pursuant to decisions on tariffs for gas transmission issued by HERA for the first and second regulatory periods.

The total average price of gas transmission in 2019 for all transmission system users amounted to HRK 0,0125/kWh, which was a decrease of 27.3% compared to the total average gas transmission price in 2018.

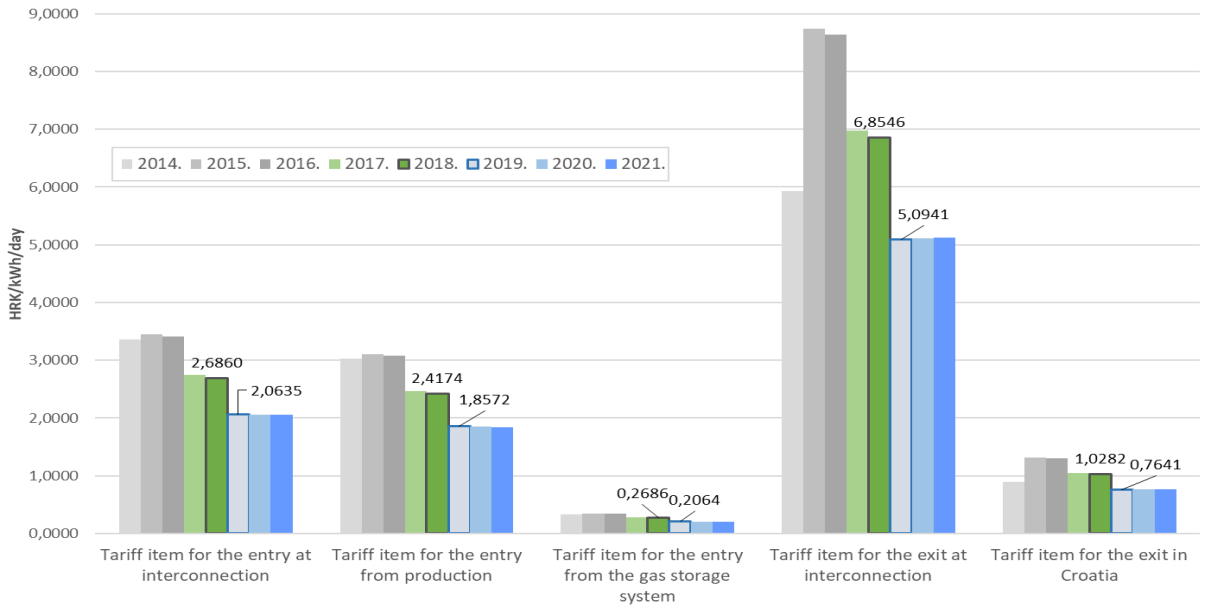


Figure 5.2.5. Tariff amounts for gas transmission for the first and second regulatory period 2014-2021, net of VAT

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 (Official Gazette no. 48/18)*. 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 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 particular connecting categories of users of the transmission system.

Connection charges consist of the cost of the extraordinary creation of technical conditions in the transmission system and the cost of implementing connections to the transmission system. The cost of the extraordinary creation of technical conditions, 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 charge is determined by HERA for a regulatory period of five years; in 2019, it was calculated by the transmission system operator based on HERA's *Decision on charges for connection to the gas distribution or transmission and for increasing connection capacity for the 2017-2021 regulation period (Official Gazette no. 122/16)* of 16 December 2016.

5.2.2 Management of liquefied natural gas terminal

During 2019, activities related to the project implementation and construction of LNG terminal continued after the completion of activities regarding the receipt of binding bids for the long-term contracting of terminal capacity (*Open Season*[58] procedure) in 2018, in which indicative tariffs for the receipt and dispatch of LNG were applied for energy entity LNG HRVATSKA d.o.o. for the period 2021-2040 in accordance with the *Decision on the indicative amounts of tariff items for the receipt and dispatch of liquefied natural gas (Official Gazette no. 56/18)*, which HERA adopted in June 2018.

The financial framework of the project, the total estimated value of which is EUR 233.6 million, consists of approved grants from the European Commission in the amount of EUR 101.4 million, grants in the amount of EUR 100 million awarded by a decision of the Croatian government on the financing of the first phase of the floating LNG terminal on the island of Krk, which was adopted on 30 January 2019; a smaller part of the investment in the amount of EUR 32.2 million will be financed by HEP d.d. and PLINACRO d.o.o. After the receipt of the binding offers according to indicative tariffs and with the aforementioned approved subsidies, the final investment decision on the realisation of the floating LNG terminal on the island of Krk was made on 31 January 2019.

Furthermore, on 31 July 2019, the European Commission approved the decision of the Croatian government on financing the terminal, as well as a provision regarding possible compensation for supply security from the **Liquefied Natural Gas Terminal Act**, assessing that the adopted measures are justified and necessary, as well as in line with EU state subsidy rules. The European commission assessed that these measures contribute to key EU strategic goals, including the diversification of gas supply sources and increased gas supply security in the EU without the unjustified distortion of competition.

Management of the liquefied natural gas terminal regulation method

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 receipt and dispatch of liquefied natural gas*, which is based on the incentive regulation method, which defines the maximum allowed levels of LNG terminal operator revenues in a regulatory period. The allowed operating costs are determined according to the aforementioned *Methodology* by applying incentive mechanisms of efficiency coefficients and allocation of actual savings, while the 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 model of energy activity regulation when, due to significant planned investments in the development of the LNG

[58] *The transparent and non-discriminatory allocation of capacity for access to infrastructure and dimensioning of required infrastructure capacity.*

terminal, a lengthy ROI period is foreseen for the operator, given that the amount of tariff items for the receipt and dispatch of LNG without the implementation of a regulatory account may result in a non-competitive price that hinders the development of the project.

This *Methodology* includes the economic efficiency of the operator's existing assets, as well as foreseeing the possibility of determining the justified value of long-term material and non-material assets on the basis of economic efficiency analyses of the LNG terminal operator's assets.

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 LNG terminal are determined by the *Rules for LNG terminal use*. As the need arose in 2019 to amend the *Rules for LNG terminal use (Official Gazette no. 60/18)* in order to clarify necessities in the annual and short-term contracting of free capacity, simplify the capacity allocation procedure and the extension of deadlines for applications, LNG Hrvatska d.o.o. held a public consultation in the period from 6 to 23 March 2020 in accordance with the provisions of the **Gas Market Act**; with the consent of HERA, the *Rules on amendments to the Rules for LNG terminal use (Official Gazette no. 39/20) entered into force on 2 April 2020.*

Price of the receipt and dispatch of liquefied natural gas

Indicative tariffs for the receipt and dispatch of liquefied natural gas are defined in the *Decision on indicative tariffs for the receipt and dispatch of liquefied natural gas*, which was adopted by HERA on 15 June 2018 for the needs of implementing the binding phase of the Open Season procedure. Indicative tariffs are defined according to the *Methodology for setting tariffs for the receipt and dispatch of liquefied natural gas* upon the request of operator LNG Hrvatska d.o.o. This *Decision* encompasses the period from 2021 to 2040; the regulatory account model was used to define tariff amounts. Indicative tariffs for a terminal lease scenario up to gas amounts of 1.7 billion m^3/yr are set at EUR 1.39/MWh at NCV[59] and EUR 1.25/MWh at GCV.[60]

This indicative tariff for the receipt and dispatch of LNG is defined for standard terminal service, which encompasses berthing service for LNG transmission, transshipment, storage, regasification, and dispatch from the terminal. In accordance with the provisions of the *Methodology*, HERA will determine the applicable tariff amounts for the receipt and dispatch of gas prior to the outset of commercial terminal operations, which is expected in early 2021.

5.2.3 Gas storage

Gas storage is a regulated energy activity performed as a public service. The function of the Croatian gas storage system operator is performed by the energy entity PODZEMNO SKLADIŠTE PLINA d.o.o., which uses UGSF Okoli for natural gas storage. The geographical position of the facility is shown in Figure 5.2.1.

UGSF Okoli consists of underground gas reservoirs (geological formations), operating and control wells, and the overground part of the plant with well platforms, connection pipelines, regulation station, gas drying station, measuring station, compression station and ancillary facilities. 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.

[59] Net calorific value of gas under standard conditions – heat released during the combustion of natural gas with air, at a combustion temperature of 15°C and a natural gas temperature of 15°C

[60] Gross calorific value of gas under normal conditions – heat released during the complete combustion of natural gas with air, at a combustion temperature of 25°C and a natural gas temperature of 0°C

The technical capacity[61] of the gas storage system in working volume amounts to 5,050,000 MWh, the technical withdrawal capacity amounts to 2,274 MWh/h (54,576 MWh/day), while the technical injection capacity amounts to 1,705 MWh/h (40,920 MWh/day).

In 2019, a total of 3,881,225 MWh of natural gas were injected into UGSF Okoli, while 2,751,412 MWh of natural gas were withdrawn. There were several operating cycles in UGSF Okoli in 2019 – three periods of gas withdrawal, two stand-by periods, and two periods of gas injection. The day marking the end of the natural gas withdrawal cycle and the beginning of the injection cycle, as determined according to the minimum gas quantity in the storage facility for the calendar year, was 15 March 2019, when the operating volume was 1,259,575 MWh. The beginning of the final gas withdrawal cycle was 30 October 2019, when the working volume balance amounted to 4,985,530 MWh, which was the highest working volume balance of UGSF Okoli in 2019. Natural gas stocks at UGSF Okoli on specific dates in 2019 are shown in Figure 5.2.6. The largest gas withdrawal capacity achieved in 2019 was 2,129 MWh/h, while the largest gas injection capacity achieved was 1,620 MWh/h.

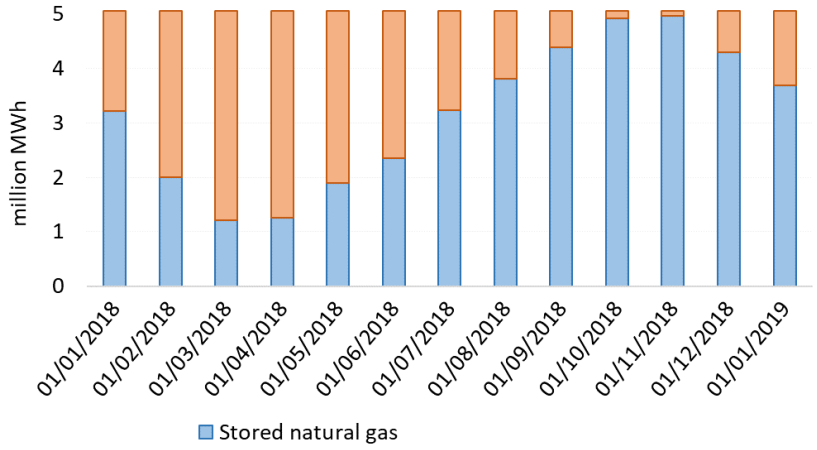


Figure 5.2.6. Natural gas stocks at UGSF Okoli on specific dates in 2019

The following investments were begun and realised in 2019:

- the project of upgrading the PSP Okoli compressor station was completed with the issuance of a usage permit in September 2019. After the commissioning of a new electric motor compressor unit in 2017 and the installation of two new gas engine powered compressor units in 2018, the realisation of this project (completed in 2019) increased the maximum gas injection capacity at PSP Okoli from 160,000 m³/h to 180,000 m³/h, in addition to modernisation in the form of reduced harmful gas emissions and diversification of fuel type;
- the project of connecting UGSF Okoli to the public access network by optical fibre cables was launched for the purpose of ensuring a steady and reliable connection for the needs of the command room, installation of a server at UGSF Okoli and a dispatch centre, and for the purpose of communication with the energy entity PLINACRO d.o.o. In 2019, a building permit was obtained and an optical cable lease agreement was signed with Odašiljači i veze d.o.o. After the resolution of property ownership issues, the project is slated for completion in 2020;
- a project has been launched to improve technical safety systems at PSP Okoli. Systems design was completed in 2019; initial works on the physical realisation of the project are expected to begin in early 2020 and end by August 2020;

[61] 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.

- by the end of 2019, additional surveying was completed at the Grubišno Polje gas field in order to determine the possibility of hydrocarbon storage in geological structure. Work on the project to construct a new underground gas storage facility at Grubišno Polje continued in 2020. The issuance of a location permit, a natural gas storage permit for the Grubišno Polje gas field, and a construction permit for the first phase of the project (initial extraction of gas from the original field) are also planned. Initial construction work on structures and facilities is expected in the last quarter of 2020.

The market role and the significance of gas storage is 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 throughout 2019, when the gas storage service was used by 10 users (nine gas suppliers and the transmission system operator).

It should be noted here that the gas storage system operator was obliged[62] to allocate, as a priority, a part of the gas storage system capacities, i.e. the standard bundled units (SBUs), to the supplier in the wholesale market from 1 April 2018 to 31 March 2020. Thus, from 1 April 2014 to 31 March 2017, the wholesale market supplier was allocated 70% of the total available number of standard bundled units, and this share was reduced to 60% of the total available number of standard bundled units as of 1 April 2017 and on through 2018. During 2019, the wholesale market supplier was allocated 60% of the total available capacity. From 1 April 2020 to 31 March 2021, the gas storage system operator will distribute the available number of standard bundled units to suppliers in the public service using a proportional principle based on historical data on delivered gas quantities. The allocation of standard bundled units (SBUs) during those periods is shown in Figure 5.2.7.

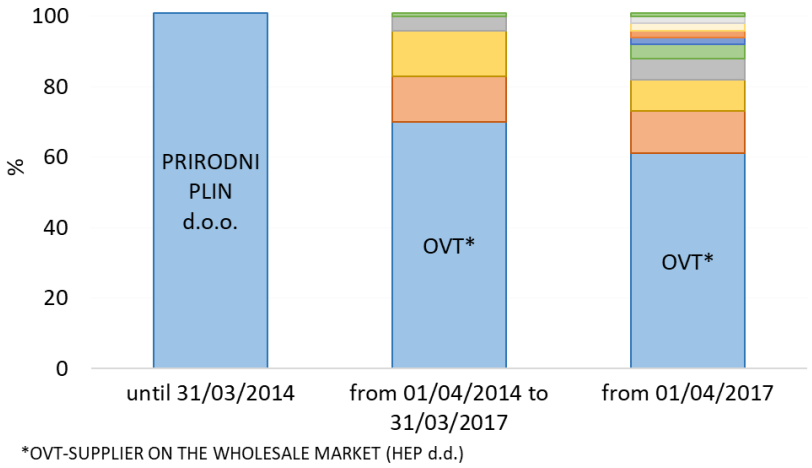


Figure 5.2.7. Allocation of gas storage system capacities, i.e. standard storage capacity packages of UGSF Okoli

To adapt to market demands and the new balancing rules, the gas storage system operator enabled gas storage system users a number of renominations for the use of storage capacities in a gas day, the reversal of nominations, and changing of storage operating cycles.

62 *Decision of the Republic of Croatia on determining priorities in implementing the procedure for gas storage system capacity allocation for wholesale gas supplier (Official Gazette no. 29/14), Article 31 paragraph 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 methods

Aside from the **Gas Market Act** and other energy-related legislation, gas storage is also regulated by the *Methodology for establishing tariff items for setting tariffs for gas storage (Official Gazette no. 48/18).* 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 the 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. Operational conditions for gas storage facilities in 2019 were defined by the *Rules on gas storage system use (Official Gazette no. 50/18)*. As the **Gas Market Act** was amended in early 2020 as concerns public service supplier access to storage capacities, it also became necessary to amend the *Rules*. As a result of these changes, which involve the proportional allocation of storage capacities for the public service gas supply, as well as additional amendments to improve the rules, PODZEMNO SKLADIŠTE PLINA d.o.o. held public consultations on the suggested amendments to the *Rules* from 14 February to 5 March 2020; with HERA's approval, the *Amendments to the Rules on gas storage system use (Official Gazette no. 26/20) entered into force on 11 March 2020.*

Gas storage price

In December 2016, pursuant to the *Methodology for setting tariffs for gas storage*, HERA issued the *Decision on tariffs for gas storage (Official Gazette no. 122/16)*, which sets out tariffs for gas storage in the second regulatory period 2017–2021. Pursuant to this *Decision*, the average tariff amounts for gas storage in 2019 have not changed significantly as compared to 2018 (1.1% decrease). Figure 5.2.8. shows tariff amounts excluding VAT for contracted annual standard bundled units (SBUs) pursuant to decisions on tariffs for gas storage issued by HERA for the first and second regulatory periods.

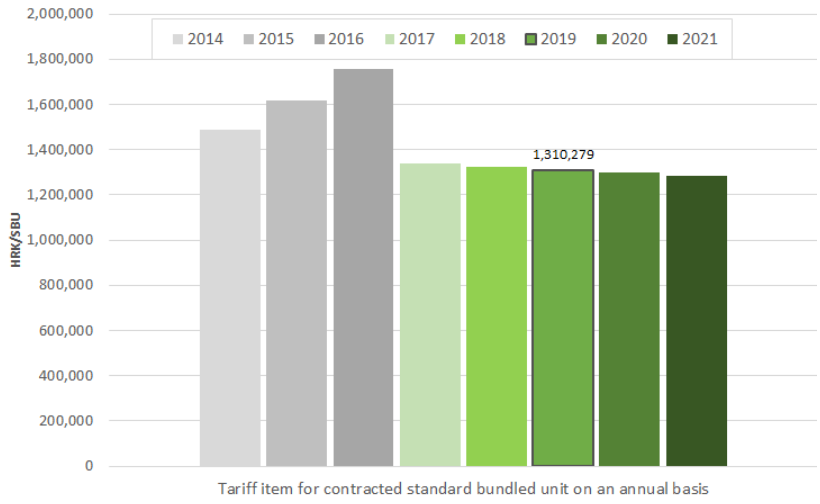


Figure 5.2.8. Tariff amounts for contracted annual SBUs for the first and second regulatory periods 2014-2021, net of VAT

The total calculated amount of the charge based on the tariff item for the contracted annual SBU accounted for 99.6% of the total gas storage charges in 2019 charged to users by the gas storage system operator, while the remaining 0.4% referred to individual interruptible daily services and to non-standard services.

5.2.4 Gas distribution

Gas distribution is a regulated energy activity performed as a public service. In 2019, gas distribution in Croatia was performed by 35 energy entities (distribution system operators).

According to data collected by HERA from 35 distribution system operators, the total quantity of gas distributed[63] in Croatia in 2019 amounted to 10,914 million kWh, which was a 1.4% decrease in comparison to the total distributed quantity in 2018.

Of the total quantity of distributed gas, the largest quantities were distributed to the TM2 (4,074 million kWh), TM5 (1,283 million kWh), and TM3 (1,097 million kWh) tariff model users.

The total number of billing metering points for end consumers connected to the distribution system amounted to 679,976 in 2019, which was an increase of 1.2% as compared to the total number of billing metering points in 2018. Of the total number of billing metering points in 2019, 673,943 were under TM1-TM4 tariff models (with annual consumption up to 100,000 kWh), while 6,033 were under TM5-TM12 tariff models (with annual consumption exceeding 100,000 kWh).

The total length of all gas distribution systems in Croatia was 19,673 km at the end of 2019, which represents a 1.2% increase compared to 2018 according to data collected from distribution system operators. Of the total length of distribution systems at the end of 2019, low-pressure gas pipelines accounted for 16.1%, medium-pressure gas pipelines accounted for 77.3%, and high-pressure gas pipelines accounted for 6.6%. In terms of material type, 16.3% of the total distribution system at the end of 2019 was made of steel pipes, 83.5% was made of polyethylene pipes, and 0.2% was made of other materials. Compared to 2018, there is a noticeable increase in the share of polyethylene pipes (from 82.8% in 2018), which points to a continuous improvement of the distribution systems based on the realised reconstruction of gas distribution networks. The total number of odourisation stations in all distribution systems at the end of 2019 was 132. A comparison

63 *Natural gas and non-standard gas.*

of the length of distribution systems, total technical capacity of entries into distribution systems, and gas losses by distribution system operators in Croatia in 2019 is shown in Figure 5.2.9. The geographical layout of the distribution system operators' distribution areas in 2019 is shown in Figure 5.2.10.

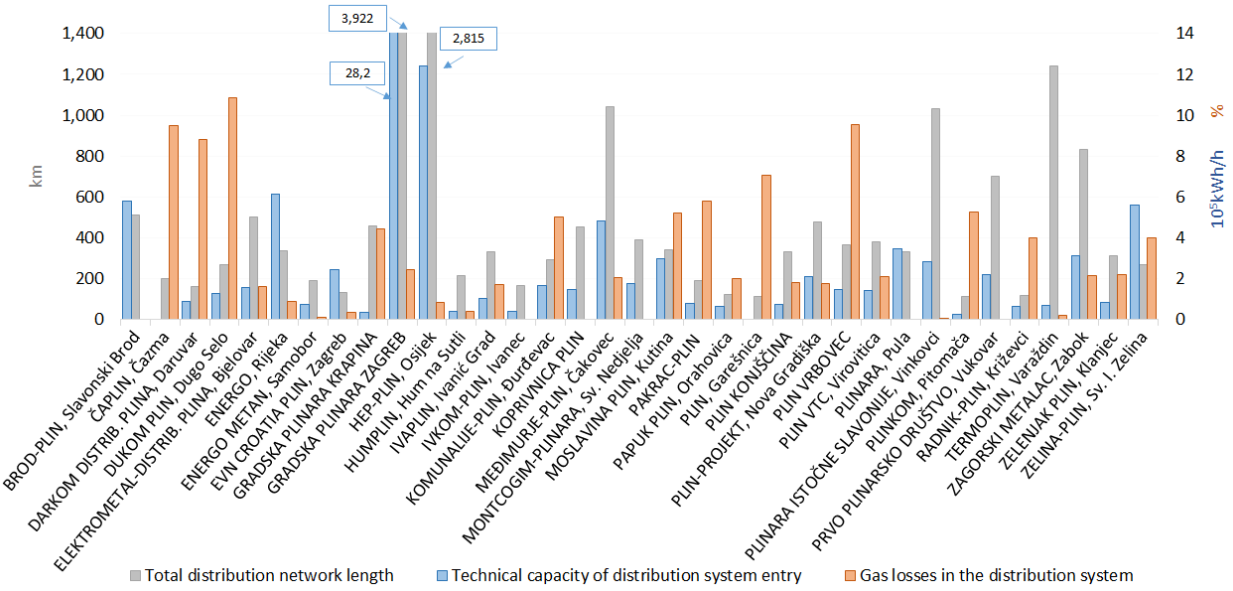


Figure 5.2.9. Comparison of the length of distribution systems, the total technical capacity of entries into distribution systems, and gas losses by distribution system operators in the Republic of Croatia in 2019

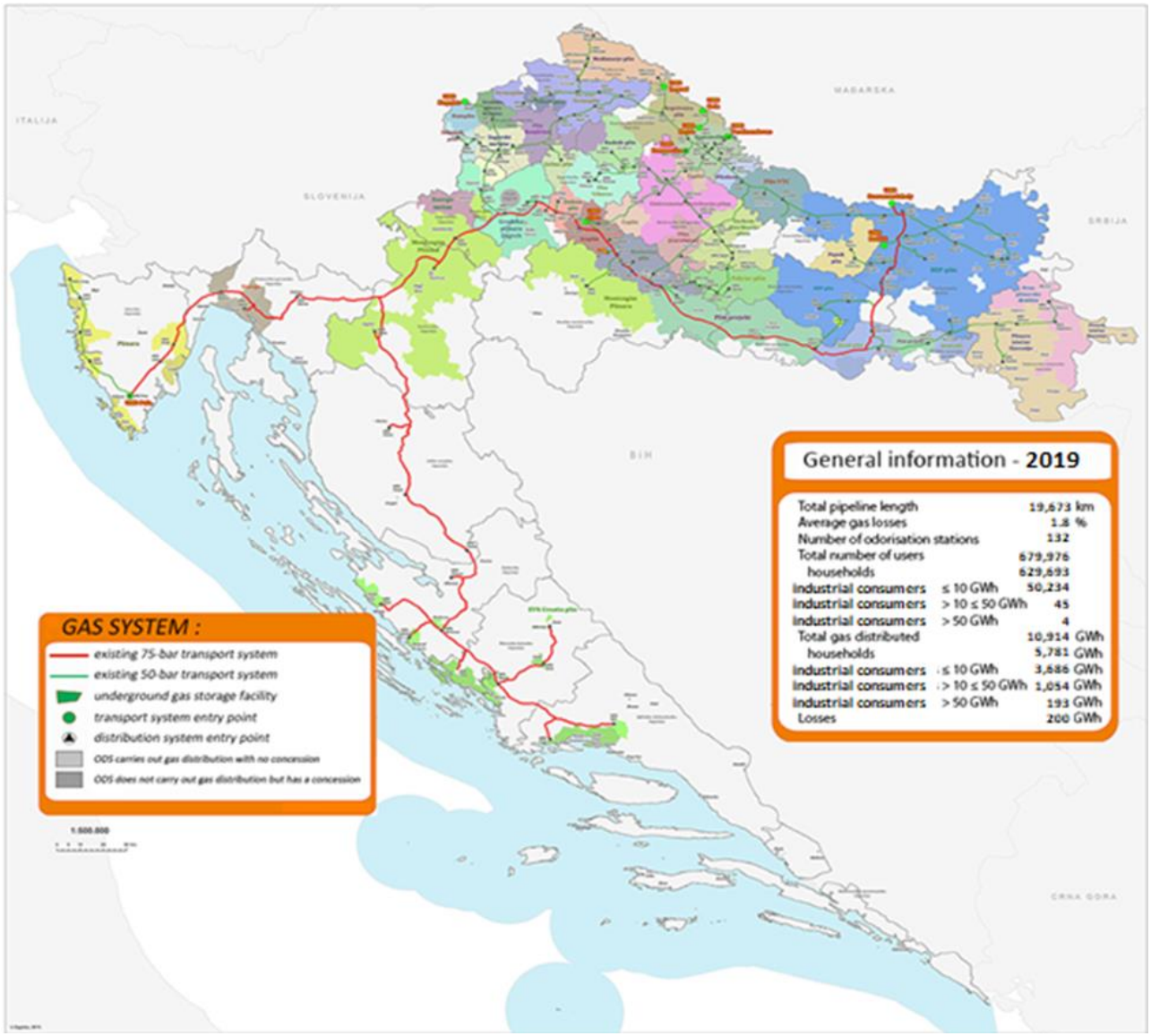


Figure 5.2.10. Locations of the distribution system operators' distribution areas and basic information on gas distribution activities in the Republic of Croatia in 2019

Gas distribution regulation methods

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 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 value of regulated assets for a regulation period of five years is determined with 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, 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 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 distribution is defined as a multi-annual period for which allowed revenues and tariffs are determined independently for each regulatory year. The second regulatory period is currently underway; it began on 1 January 2017 and will last until 31 December 2021.

The Methodology classifies billing metering points into 12 tariff models according to annual gas consumption; an overview of tariff models is provided in Table 5.3.1. 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 charge

The price of gas distribution in 2019 was established according to the *Methodology for setting tariffs for gas distribution*. The gas distribution tariffs for the period from 1 January to 31 December 2019 were established in the *Decision on gas distribution tariff amounts (Official Gazette no. 127/17)*. The aforementioned *Decision on gas distribution tariff amounts* defined tariff amounts for gas distribution for energy entities during the second regulatory period 2018-2021*; it was adopted by* HERA after the regular revision of the allowed revenues of distribution system operators for the first regulatory period 2014-2016.

The total average weighted price of gas distribution in the period from 1 January to 31 December 2019 of all distribution system operators in Croatia was HRK 0.0493/kWh, which represents an increase of 1.6% compared to the total average weighted price of gas distribution in 2018 which amounted to HRK 0.0485/kWh.

Figure 5.2.11. shows the average gas distribution tariffs excluding VAT for 2017-2019 per distribution system operator in Croatia.

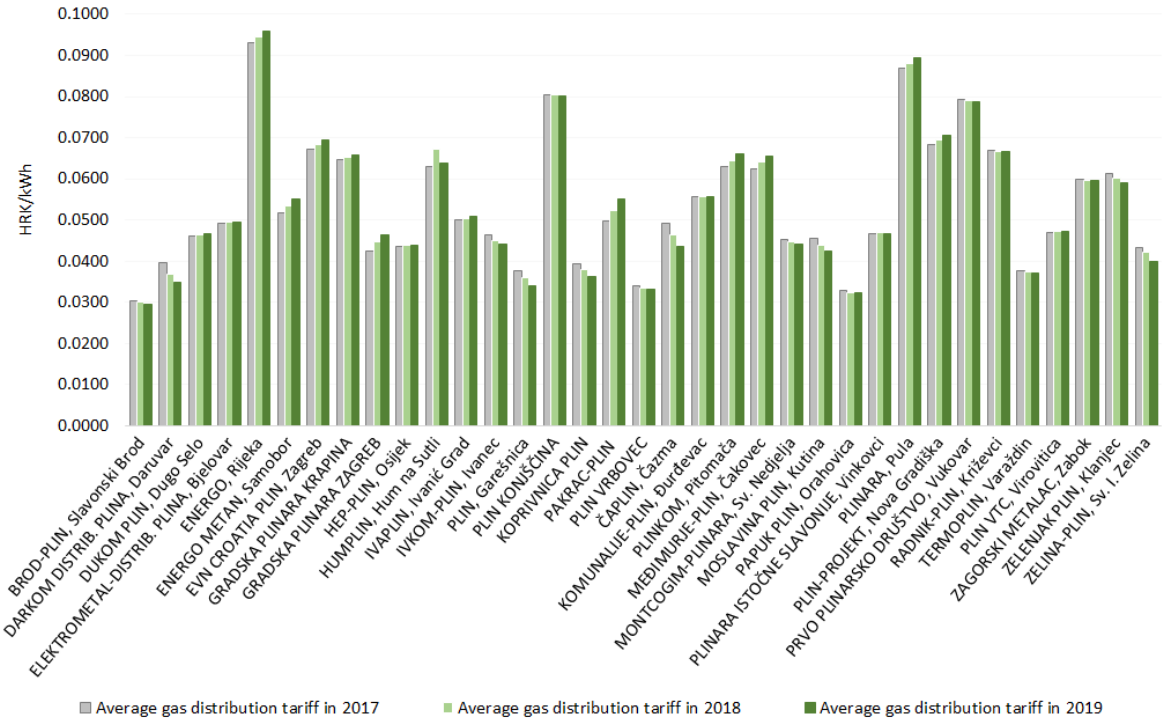


Figure 5.2.11. Average gas distribution tariffs (net of VAT) in 2019 as compared to 2018 and 2017 per distribution system operator in Croatia

The charge for connection to the gas distribution system 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 distribution system; categories of operations according to complexity; methods, elements, and criteria for calculating charges for gas distribution 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 connection charges and charges for the adoption, publishing, and implementation of connection charges. *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.

Connection charge consist of the cost of the extraordinary creation of technical conditions 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.

The distribution system operator calculates charges for this service during the current regulatory period according to HERA's *Decision on charges for connection to the gas distribution or transmission and for increasing connection capacity for the regulation period 2017-2021 (Official Gazette no. 122/16)* of 16 December 2016.

According to the data collected by HERA from 35 distribution system operators, the total number of billing metering points of end consumers connected to the distribution system in 2019. increased by 1.2% compared to the total number of billing metering points in 2018. which will bring the level of these revenues in 2019 approximately to the same level as in 2018, when a total of HRK 18 million in revenues was generated from charges for connection and increases in connection capacity, which represents a share of 2.5% of the total revenues of all distribution system operators in 2018.

5.2.5 Energy entities in the gas sector and energy activities

Pursuant to the provisions of the Gas Market Act on the unbundling of energy activities, activities of the transmission system operator, distribution system operators, gas storage system operator, and LNG system operator, including operator that is part of a vertically integrated energy entity, must be organised into independent legal entity independently of other activities in the gas sector.

In 2019, the energy activity of gas transmission was performed by the energy entity PLINACRO d.o.o., while the energy activity of gas storage was performed by the energy entity PODZEMNO SKLADIŠTE PLINA d.o.o.

In 2019, gas was distributed by 35 energy entities, while gas was actively supplied by 44 out of 51 licensed energy entities. Of the 35 distribution system operators, twelve were organised as independent legal entities engaged only in gas distribution, whereas 23 energy entities were organised as vertically integrated legal entities with fewer than 100,000 consumers and were active both in gas distribution and gas supply. The structure of energy entities in the gas sector as of 1 April 2020 with respect to their energy activities and unbundling requirements pursuant to the **Gas Market Act** is shown in Figure 5.2.12.

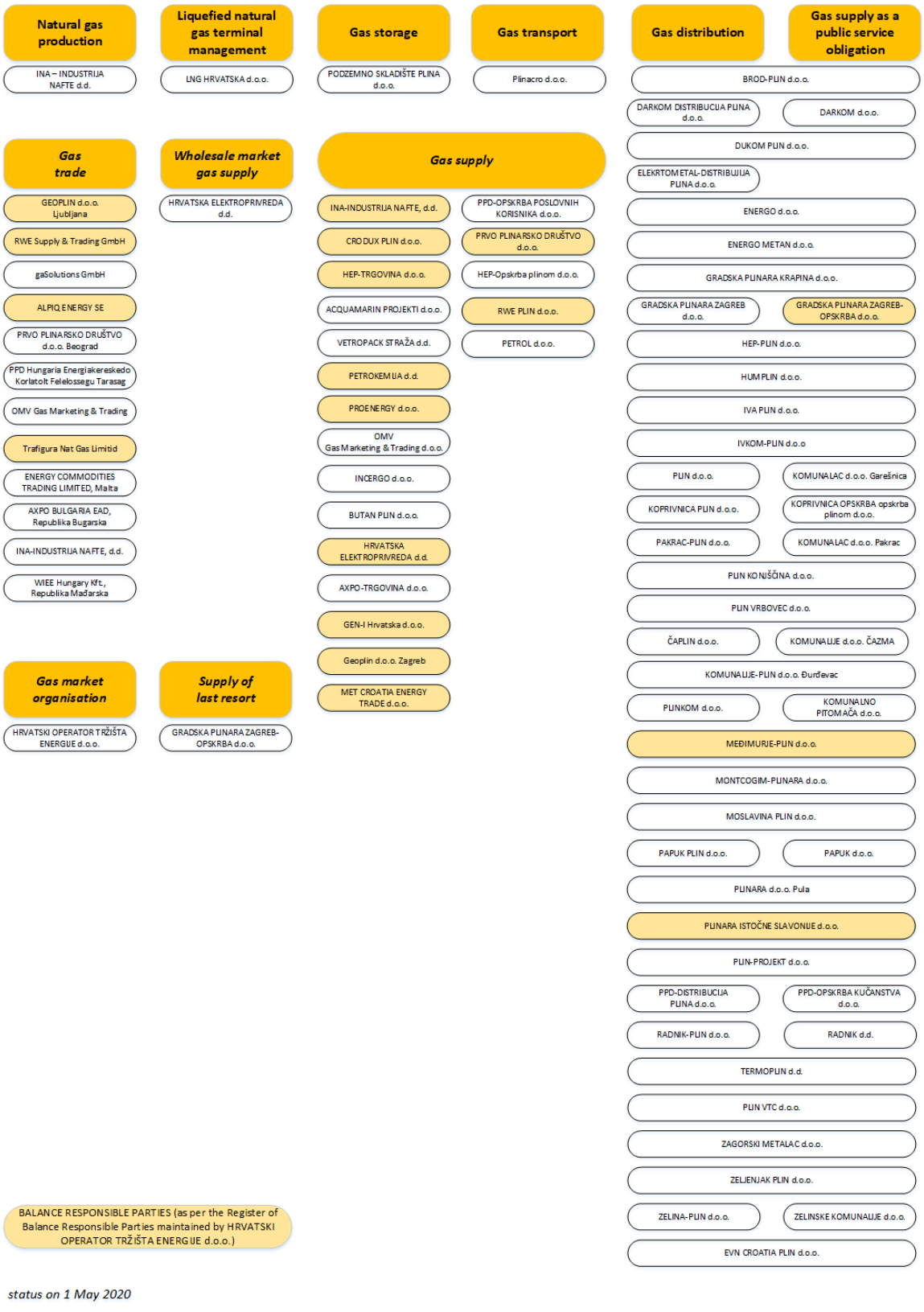


Figure 5.2.12. Structure of energy entities by their role in the Croatian gas market

The certification of the energy entity PLINACRO d.o.o. is a process based on the principles of the European Union single internal electricity and gas market, through which HERA, as the national energy regulator, confirms the conformity of the transmission system operator with the provisions of the **Gas Market Act**, which govern the unbundling, independence, and organisational structure of the gas transmission system operator. **The**

Gas Market Act lays down three possible models according to which the operator can be certified:

- as a transmission system operator unbundled in terms of ownership,
- as an independent system operator, or
- as an independent transmission operator.

In May 2013, PLINACRO d.o.o. submitted an application for certification as a gas transmission system operator to HERA, according to the model of an operator unbundled in terms of ownership, and it met the majority of requirements. PLINACRO d.o.o. withdrew the application in April 2015, only to resubmit it in June 2015 according to the same model. Certification has not yet been completed because the final requirement has not been fulfilled – the unbundling of public authorities that simultaneously control PLlNACRO d.o.o. and some entities engaged in the production, trade, and supply of energy, as well as natural gas production. HERA continuously cooperates with PLINACRO d.o.o. and with relevant Croatian institutions in order to finalise the certification process of the Croatian transmission system operator as soon as possible.

5.3 Competition and function of the natural gas market

Natural gas balance

In 2019, the total natural gas quantity that entered the transmission system amounted to 30,808 million kWh, which was 4.3% more than in 2018. Of the total quantity, 8,194 million kWh or 26.6% of total transported natural gas came from domestic production, which is 15.2% less than in 2018; 19,442 million kWh or 63.1% of the total transported quantity of natural gas entered the transmission system from imports, which is 25.2% more than in 2018; 3,172 million kWh of natural gas entered the transmission system from UGSF Okoli, or 10.3% of the total transported quantity, which is 27.0% less than in 2018 (Figure 5.3.1.)

The total gas quantity that exited the transmission system in 2019 amounted to 30,808 million kWh, which is 4.3% more than in 2018. Out of these quantities, end consumers directly connected to the transmission system received 15,583 million kWh or 50.6% of the total quantity of natural gas, which is 7.2% more than in 2018; 10,914 million kWh or 35.4% of the total amount of natural gas was delivered to consumers connected to the distribution system, which is 1.4% less than in 2018; 4,311 million kWh of natural gas was delivered to UGSF Okoli, or 14% of the total amount, which is 9.6% more than in 2018.

According to the data obtained from gas suppliers in Croatia, a total of 10,714 million kWh of natural gas was delivered to end consumers from the distribution systems in 2019, of which 5,781 million kWh (54.0%) was delivered to households and 4,933 million kWh (46.0%) was delivered to non-household consumers.

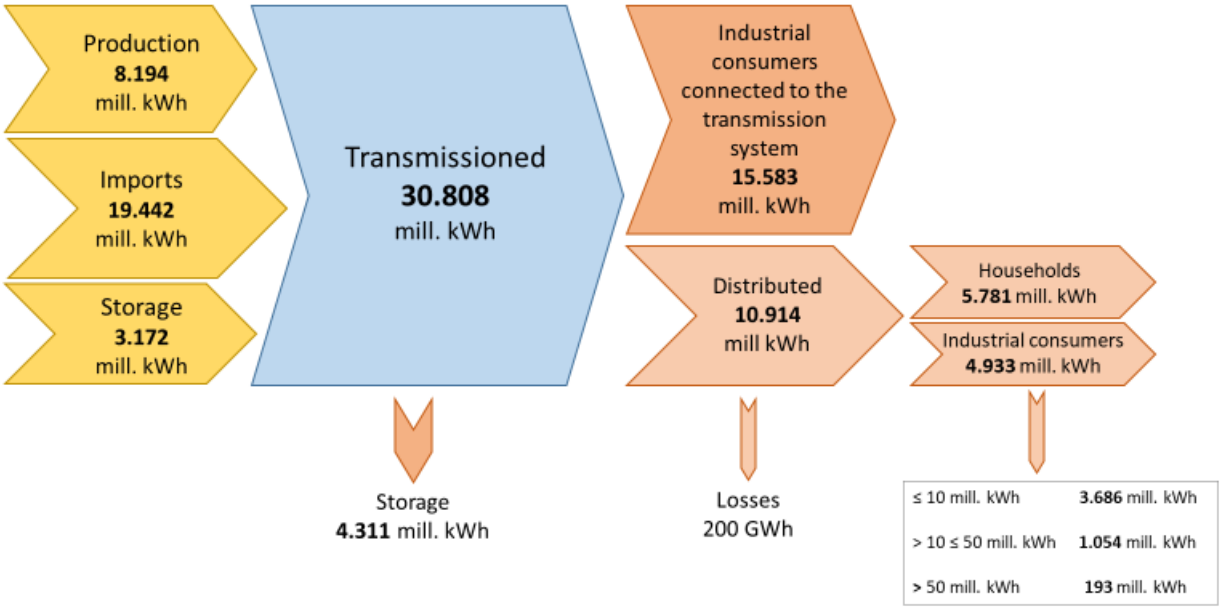


Figure 5.3.1. Natural gas balance in Croatia in 2019

In 2019, requests for transmission system capacity booking were submitted by 47 transmission system users, i.e. gas suppliers associated into 14 balance groups. According to the shares of individual balance groups in the quantity of gas transported by transmission system exit groups, balance responsible party HEP d.d. took over 26.0% of gas from the transmission system, balance responsible party HEP Trgovina d.o.o. took over 22.6% of gas, balance responsible party INA d.d. took over 19.9%, and balance responsible party PRVO PLINARSKO DRUŠTVO d.o.o. took over 14.3% of gas, while the remaining ten balance groups took over 17.2% of gas. The shares of individual balance groups in total natural gas quantities delivered by the transmission system in 2019 are shown in Figure 5.3.2.

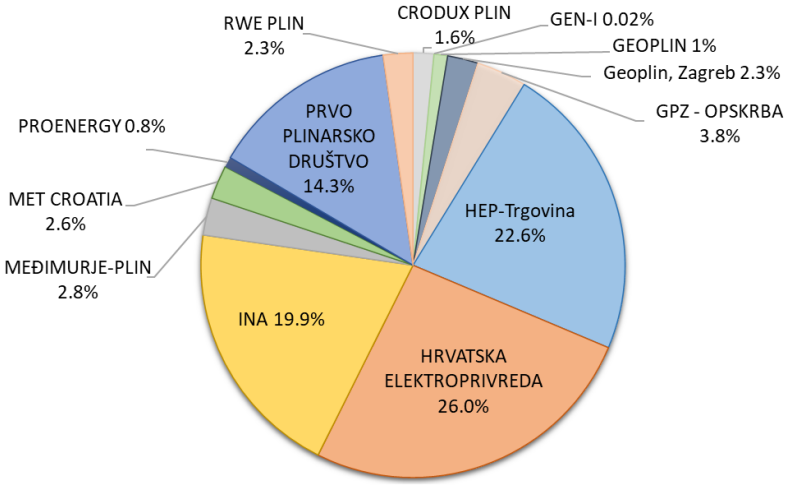


Figure 5.3.2. The share of balance groups in total natural gas quantities delivered by the transmission system in 2019

5.3.1 Wholesale natural gas market

Wholesale market development indicators

The wholesale gas market in Croatia is organised according to the balance group model, representing an interest group of participants on 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.

Performance indicators of the wholesale market are reflected in the diversity of gas supply sources, 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 measures applicable to the Croatian market. These three closely related and interdependent measures indicate whether there is healthy market competition.

HHI measures the level of market concentration and is the most commonly used indicator for determining the concentration of market power. A higher HHI indicates greater concentration and measures the market share held by a few of the largest suppliers. An HHI value below 2,000 is an indicator of a competitive market and an indicator that no market participant has a predominant market influence. According to data collected by HERA in 2019, the HHI on Croatia's wholesale gas market (not including sale for the public supply service) is 2.729; this indicator amounted to 2,942 in 2018, which indicates that a small number of suppliers are still relatively dominant on the wholesale gas market . The HHI trend for the Croatian wholesale gas market in the period from 2011 to 2019 is shown in Figure 5.3.3.

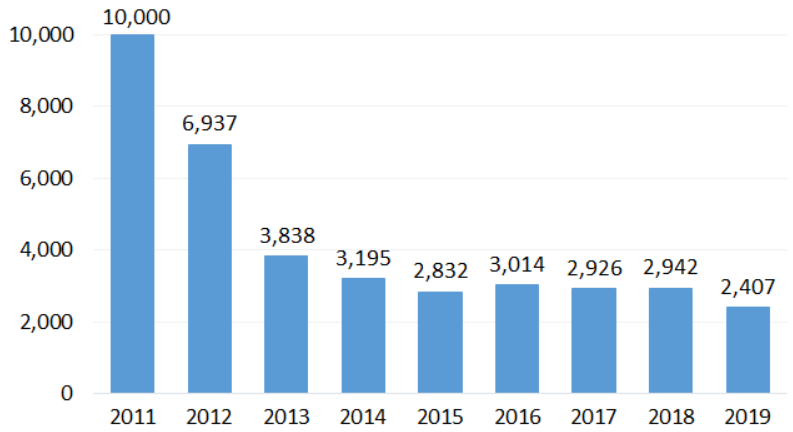


Figure 5.3.3. HHI trend for the Croatian wholesale gas market from 2011-2019

The number or diversity of gas supply sources is another wholesale market development indicator. According to data collected by HERA for 2019, gas in Croatia was mostly procured from three sources: from domestic production, from imports from Russia, and from imports of gas purchased on the Austrian gas exchange, which is certainly an indicator of healthy competition and security of supply.

Another indicator used to evaluate the development of a wholesale market is RSI, a measure determining the relation between the sum of supply capacities of all but the largest supplier, and total market demand. The Remaining Supply Index measures market dependence on the main supplier through an analysis of available alternative suppliers, such that the market does not rely completely on its largest supplier to meet market demand. An RSI equal to or greater than 110%, indicates that the market can survive without its largest supplier. According to ACER's report for 2018 (*ACER Market monitoring Report Gas Wholesale Market Volume*), Croatia's RSI was over 110% in 2018, the same as in the period from 2013 to 2017, which indicates that the market does not rely on its

largest gas supplier. Likewise, according to HERA's calculations, RSI was also above 110% in 2019.

A significant component of Croatia's wholesale gas market is gas trade carried out at the virtual trading point. The VTP is a location for gas trading between the entry and exit points of the transmission system, including the gas storage system, where balance responsible parties may trade in gas. Transactions are agreed bilaterally and confirmed and carried out via a system provided by gas market operator HROTE d.o.o. In 2019, 9 balance responsible parties were active on the VTP; they traded a total of 23,145 million kWh of gas (3.4% more than in 2018), as shown in Figure 5.3.4.

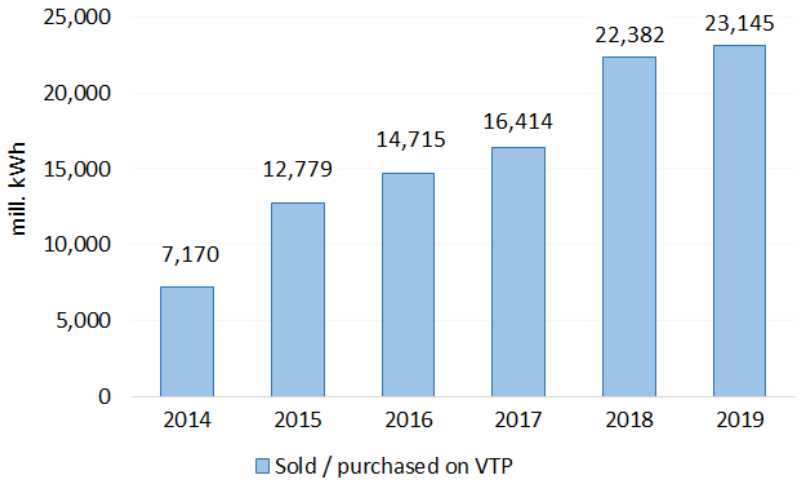


Figure 5.3.4. Gas quantities traded at the virtual trading point (VTP) from 2014-2019

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 responsible parties 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 within 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, 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 and the achievement of a more favourable unit price through transparent market competition.

Gas prices on the wholesale market

In the period from 1 January to 31 December 2019, the wholesale gas price for all end consumers using the public service was regulated and established in the decisions on the gas price at which the wholesale market supplier was obliged to sell gas to public service gas suppliers for household consumers, which was set at HRK 0,1809/kWh; from 1 April to 31 December 2019, this same price amounted to HRK 0.1985/kWh.

In order to monitor gas prices on the wholesale market, in 2019, 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 end consumers.

The average gas purchase price excluding VAT on the market in 2019 (purchase under bilateral agreements, at a virtual trading point, on the trading platform, and from imports) was HRK 0.1562/kWh, which represents a decrease of 21.0% as compared to 2018, when

it amounted to HRK 0.1978/kWh. In 2019, the average purchase price of gas on the market was the highest in Q1 at HRK 0.1953/kWh and the lowest in Q3 at HRK 0.1303/kWh.

The average gas sale price excluding VAT on the wholesale market in 2019 (sale under bilateral agreements, including trading at virtual trading points, sale on the trading platform, and exports from Croatia) was HRK 0.1704/kWh, which represents a decrease of 14.2% as compared to 2018 when the average price was HRK 0.1987/kWh.

In 2019, a total of 13 suppliers and traders sold gas on the wholesale market. At the level of individual gas suppliers and traders, the highest average sale price of gas on the wholesale market in 2019, including exports from Croatia, amounted to HRK 0.2273/kWh, while the lowest amounted to HRK 0.1462/kWh.

Assessment of wholesale gas market function

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 ACER's *European Gas target model - Review and update*, while bearing in mind that the Croatian market is relatively small.

It is apparent that competition cannot come to its full expression, as indicated by the HHI index score of 2,729 (lower than 2018, although still high), which relates to the share of balance groups in the overall delivered quantity of natural gas at entries to the transmission system due to the dominance of the three largest market participants (PRVO PLINARSKO DRUŠTVO d.o.o., INA d.d., and GEOPLIN d.o.o. Ljubljana, excluding HEP d.d. as the WMS). Sources of gas supply are diversified, mostly coming from domestic production (INA d.d.) and from Russia, while the third largest source of gas supply is through the Austrian exchange. The RSI index is still above 110%, showing that the market is not dependent on only one source, that security of supply is not at risk and does not rely on a single source for gas supply.

The construction of the LNG terminal will certainly be conducive to increased market competitiveness and security of supply; the terminal is planned to begin operations as of 1 January 2021, which would mean an additional supply route and increased diversification in gas source supply for Croatia.

5.3.2 Retail natural gas market

Quantities delivered to end consumers

Transactions associated with the delivery of gas to consumers, for the purpose of consumption by end consumers, are made on the retail gas market. Gas supply is regulated by a contract between an end consumer and a gas supplier, and gas is delivered at billing metering point.

According to the data collected by HERA from gas suppliers, the gas supply structure in 2019 was as follows:

- 5,781 million kWh were delivered to household end consumers[64] connected to the distribution system, which comprises 22% of the total gas quantity delivered,
- 4,933 million kWh were delivered to non-household end consumers connected to the distribution system, which comprises 19% of the total gas quantity delivered,
- 15,583 million kWh were delivered to non-household end consumers directly connected to the transmission system, which comprises 59% of the total gas quantity delivered.

[64] *The household category includes household end consumers using the public supply service and household end consumers purchasing gas under market conditions.*

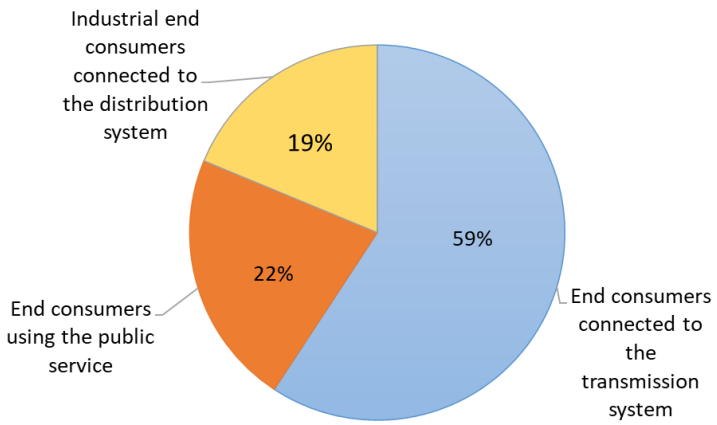


Figure 5.3.5. Structure of natural gas delivery from the transmission system in 2019

In 2019, the total gas quantity that gas suppliers delivered to end consumers connected to the distribution system amounted to 10,714 million kWh. Of this amount, a total of 5,781 million kWh of gas were delivered to household end consumers, which represents a decrease of 1.4% as compared to 2018. A total of 4,933 million kWh of gas were delivered to non-household end consumers connected to the distribution system, which represents a decrease of 2.0% as compared to 2018. A total of 15,583 million kWh of gas were delivered to end consumers connected to the transmission system, which represents an increase of 7.2% as compared to 2018.

The total number of end consumers on the gas market at the end of 2019 was 679,997 of which 629,693 were household end consumers, 50,283 were non-household end consumers connected to the distribution, and 21 were non-household end consumers connected directly to the transmission system.

Retail gas market development indicators

The market concentration indicator (HHI) for non-household consumers on the retail market was lower than 2,000 (1.809) in 2019, which represents a decrease of 30.6% as opposed to 2018. In terms of competitiveness, this indicates a good distribution of market share amongst all suppliers in the total gas trading volume on the retail market. The HHI trend for the Croatian retail gas market in the non-household consumer segment in the period from 2011 to 2019 is shown in Figure 5.3.6.

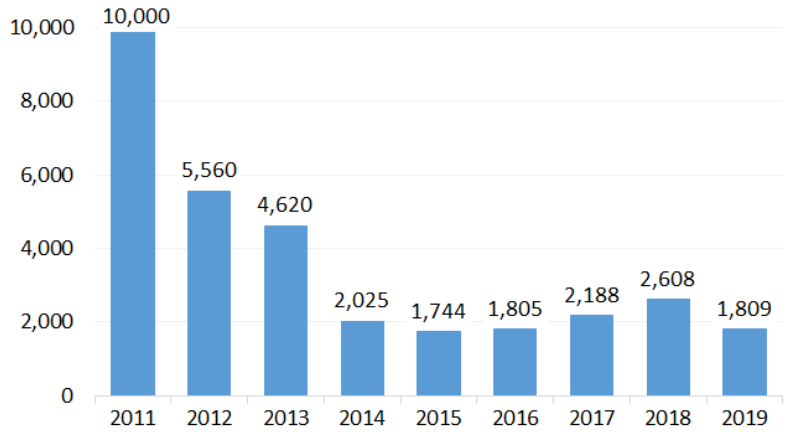


Figure 5.3.6. Overview of HHI on the Croatian retail gas market for non-household end consumers from 2011-2019

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, 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,
- continuously improves the IT system for the implementation of supplier switches, in cooperation with the gas market operator, which organises and maintains the system, and
- 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 end consumer 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 end consumers.

According to data on supplier switching collected by HROTE, there was a total of 7,728 supplier switches in 2019, which represents an increase of 9.0% as compared to 2018

The proportion of gas distributed to consumers who switched gas suppliers in 2019 was 6.8% (724 million kWh) of the total distributed quantity of gas (10,714 million kWh), while the number of successful supplier switches (7,728) accounts for 1.1% of the total number of billing metering points (679,976) (Figure 5.3.7.).

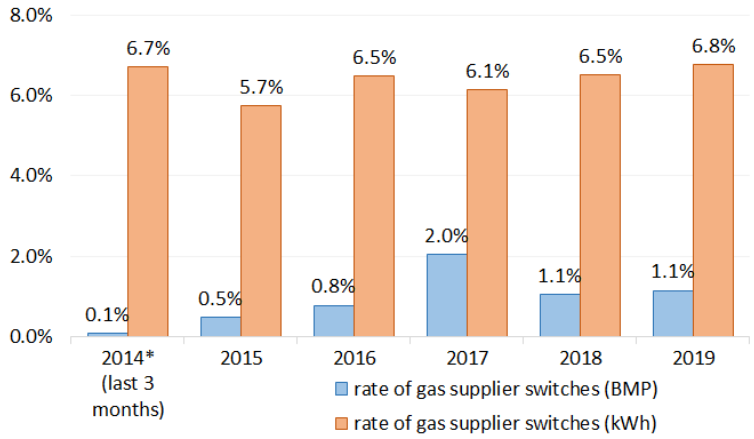


Figure 5.3.7. Rates of gas supplier switches by billing metering points (BMPs) and distributed gas quantities (kWh) since the beginning of retail market liberalisation in Croatia

A certain number of terminated supplier switching procedures (5,704 procedures) were noted in 2019; the number of terminated procedures was 15% lower than in 2018. A number of complaints regarding the actions of market participants were also recorded, an overview of which is presented in Chapter 5.3.6. Consumer protection. 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 5.3.8.

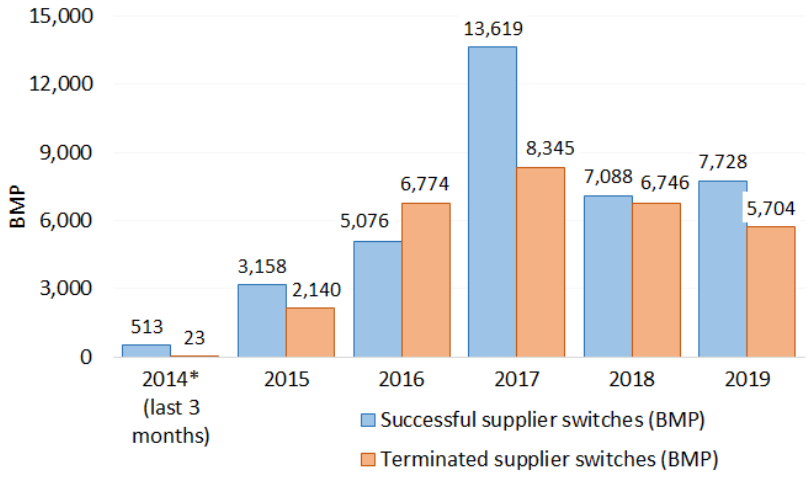


Figure 5.3.8. Number of completed and terminated gas supplier switches since the start of retail market liberalisation in Croatia

In consultation with HERA, HROTE has put in place security mechanisms to eliminate observed deficiencies and improve the functioning of the software within the gas market operator's information system. Also, on 1 October 2018, HROTE established the *Register of Billing Metering Points* (hereinafter: RBMP), which it maintains based on the General terms and conditions of gas supply. RBMP is a unique electronic database of end consumer billing metering points for all distribution system operators, transmission system operator and closed distribution system organisers in Croatia, with the purpose of monitoring and improving business processes on the gas market, better and faster implementation of the supplier switching procedure and allocations of gas energy received at the distribution system entry point. In addition, since 1 October 2018, based on the *General terms and conditions of gas supply*, the following additional preconditions were established for continued market liberalisation:

- the procedure of supplier switching has been simplified and shortened, which was made possible by improving the IT system used for the supplier switching procedure, developed and managed by HROTE, which is linked to RBMP, and
- the desired start date of supply has been introduced, which is agreed between the buyer and the new supplier, meaning that the procedure of supplier switching and concluding a gas supply contract can be carried out months before the beginning of gas supply by the new supplier.

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 end consumers, and in this sense, HERA establishes relevant rules (*General terms and conditions of gas supply*):

- on mandatory content of invoices for delivered gas, and
- on gas suppliers' obligation to periodically inform consumers of past gas consumption in the previous year and of estimated gas consumption in the current year (by 1 March each year).

HERA also informs consumers of their rights and obligations:

- by regularly publishing information on HERA’s official website,
- by supervising information published on energy entities’ websites,
- by responding to consumer inquiries, and
- via the tariff calculator (iPlin) for consumers who use the public supply service.

In addition, the development of an informative application is planned that would objectively and clearly present a comparison of tariff models and gas prices, and

standardised gas offers by individual gas suppliers. Based on the provisions of the *General terms and conditions of gas supply* and with the aim of promoting competition, HERA is obliged to establish an appropriate gas price comparison tool to make it easier for end consumers to select a gas supplier, compare gas prices and gas supply conditions, and to make gas supplier contact information more accessible.

5.3.3 Natural gas prices

Gas prices on the retail gas market

The regulated retail gas price, which is applied to household end consumers using the public service, is established pursuant to the *Methodology for setting tariffs for public service gas supply and supply of last resort*.

Tariffs for public service gas supply and supply of last resort all public service gas suppliers in Croatia for the period during 2019 were established according to relevant decisions on tariffs for gas supply as a public service.

In 2019, the average gas sale price for household end consumers[65] using the public gas supply service in Croatia was HRK 0.2684/kWh (net of VAT), which represents an increase in the average price of 5.5% compared to 2018.

Pursuant to the *Methodology for setting tariffs for public service gas supply and supply of last resort*, the gas price for end consumers using the public service consists of the reference gas price, the cost of gas distribution, and the cost of gas supply. The reference price of gas is the highest price at which the wholesale market supplier can sell gas to public service suppliers for household end consumers, and is determined as the sum of the purchase price and the premium as the fixed part of the reference price of gas. The share of the reference price of gas in 2019 averaged 72% of the total regulated final price of gas excluding VAT. Furthermore, the share of the cost of gas distribution in the average final gas price in 2019 was 24% VAT exclusive, while the gross supply margin of public service suppliers was 4%. Figure 5.3.9. shows the structure of the final gas price for households in the Republic of Croatia in 2019.

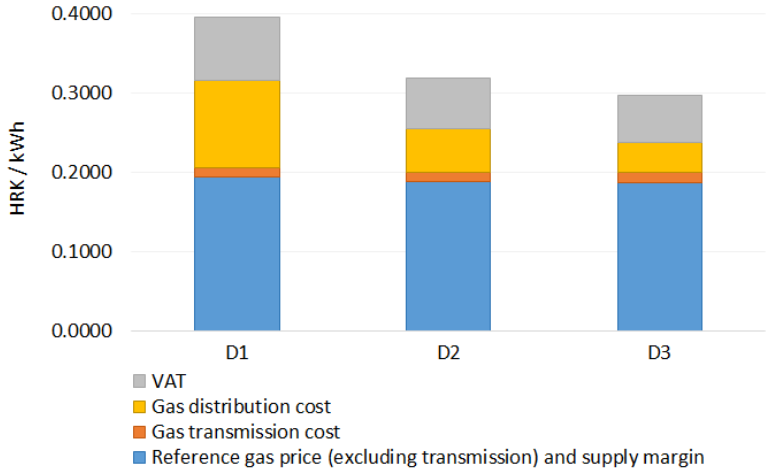


Figure 5.3.9. Structure of final gas prices for household end consumers in Croatia in 2019 – consumer categories D1-D3 (according to EUROSTAT)

An overview of the categorisation of tariff models according to the *Methodology for setting tariffs for gas distribution* and harmonisation with EUROSTAT's categorisation of end consumers for monitoring the price of natural gas is shown in Table 5.3.1.

65 *The weighted average by delivered gas quantities for household end consumers using the public service, for each particular public service gas supplier.*

Table 5.3.1. An overview of the categorisation of tariff models according to the Methodology for setting tariffs for gas distribution and EUROSTAT's categorisation of end consumers for monitoring the price of natural gas

Tariff models according to the Methodology for setting tariffs for gas distribution			**Categorisation of end consumers for monitoring the price of natural gas (D - household; I - non-household) - harmonised with EUROSTAT**		
Tariff model ID	**Consumption category (kWh)**		**Category ID**	**Consumption category (kWh)**	
Households					
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				
Non-household:					
TM1	< 5.000		I1-1	≤ 100,000	
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	> 1,000,000,000		I5	250,000,001	1,000,000,000
			I6	> 1,000,000,001	

In 2019, the average gas sale price in Croatia for non-household end consumers connected to the distribution system[66] was HRK 0.2704/kWh (net of VAT), or 10.7% more than in 2018; the lowest and the highest prices were recorded in Q3 (HRK 0.2632/kWh) and Q1 (HRK 0.2789/kWh), respectively.

In 2019, the average gas sale price in Croatia for non-household end consumers connected to the transmission system[67] was HRK 0.1756/kWh (net of VAT), or 17.9% less than in 2018; the lowest and the highest prices were recorded in Q3 (HRK 0.1394/kWh) and Q1 (HRK 0.2149/kWh), respectively.

Table 5.3.2. shows average gas sale prices excluding VAT in Croatia in 2019 for non-household end consumers by HERA's categorisation, separately for end consumers connected to the transmission system and end consumers connected to the distribution

66 *The weighted average by delivered gas quantity for end consumers on the market connected to the distribution system, for each gas supplier.*

67 *The weighted average by delivered gas quantity for end consumers on the market connected to the transmission system, for each gas supplier.*

system, as well as the total average sale prices of gas for all end consumers on the market in Croatia.

Table 5.3.2. Average gas sale price for non-household end consumers on the market in Croatia in 2019, net of VAT

Band (by annual consumption in kWh)		End consumers connected to the TRANSMISSION system (HRK/kWh)	End consumers connected to the DISTRIBUTION system (HRK/kWh)	TOTAL (HRK/kWh)
I1-1	≤ 100,000	*	0.3300	0.3300
I1-2	100,001–250,000	*	0.2977	0.2977
I2	250,001–2,500,000	*	0.2669	0.2664
I3-1	2,500,001–10,000,000	0.2127	0.2590	0.2573
I3-2	10,000,001 - 25,000,000	*	0.2177	0.2205
I4-1	25,000,001 - 50,000,000	*	0.2359	0.2299
I4-2	50,000,001 – 250,000,000	0.2142	0.2509	0.2213
I5	250,000,001 - 1,000,000,000	*	-	0.1605
I6	> 1,000,000,001	0.1733	-	0.1733
TOTAL		**0.1756**	**0.2704**	**0.2003**

** HERA does not publish the average price for this category for reasons of confidentiality, as there were less than three end consumers in this category in 2019.*

HERA also analyses the structure of the final gas price for non-household consumers. In 2019, the cost of goods, which includes the cost of gas purchase and the supply margin, accounted for 83% of the total average gas price for all end consumer categories on the market (net of VAT). The cost of gas transmission and distribution accounted for 5% and 12%, respectively. Figure 5.3.10. shows the structure of the final gas price in 2019 for non-household end consumers in Croatia according to EUROSTAT's categorisation.

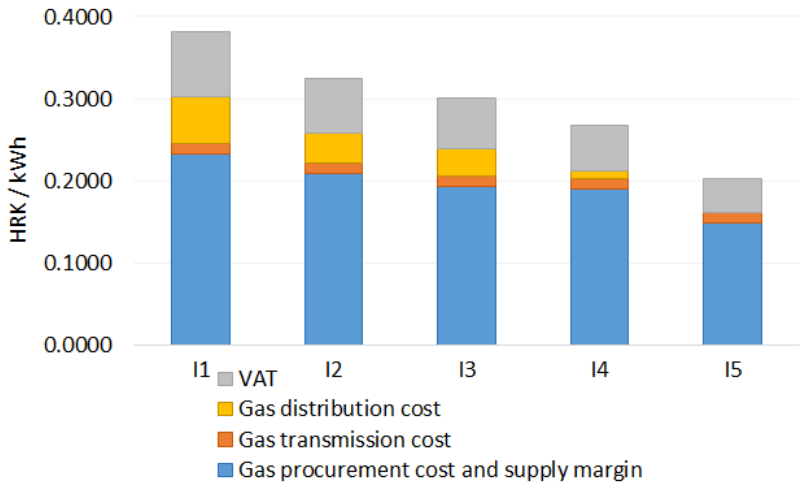


Figure 5.3.10. The structure of the final gas price for non-household consumers in Croatia in 2019 – consumer categories I1–I6 (according to EUROSTAT).

Quarterly trends in average retail gas prices in 2019 for end consumers on the market by HERA's categorisation are shown in Figure 5.3.11. For all categories, the total average retail price of gas was HRK 0.2003/kWh (net of VAT) in 2019. This represents a decrease of 10.1% as compared to 2018.

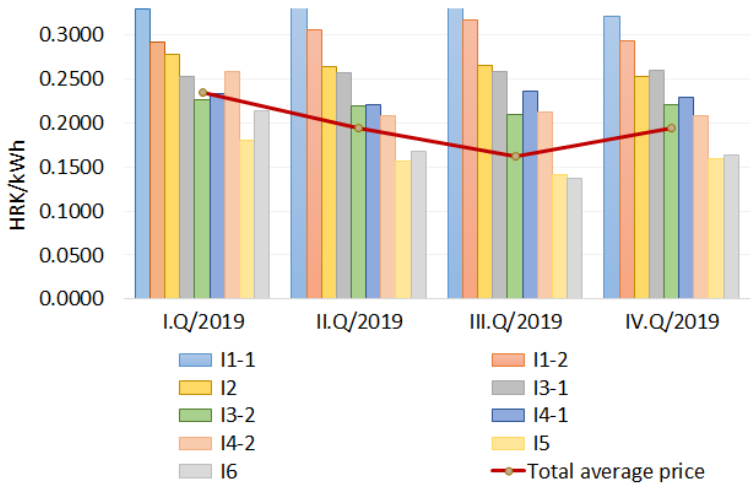


Figure 5.3.11. Average retail market gas prices (net of VAT) for end consumer categories on the market (non-household end consumer) in Croatia in 2019 by quarter

HERA's end consumer categorisation complies with *Directive 2012/27/EC*, *Commission Regulation (EU) 2016/1952*[68], and EUROSTAT's Methodology, as well as with its previous categorisation (three bands) to enable continuous monitoring of prices and comparing of past gas prices.

Figure 5.3.12. shows average retail market gas prices in Croatia for three gas consumption categories by quarter from 2012 to 2019.

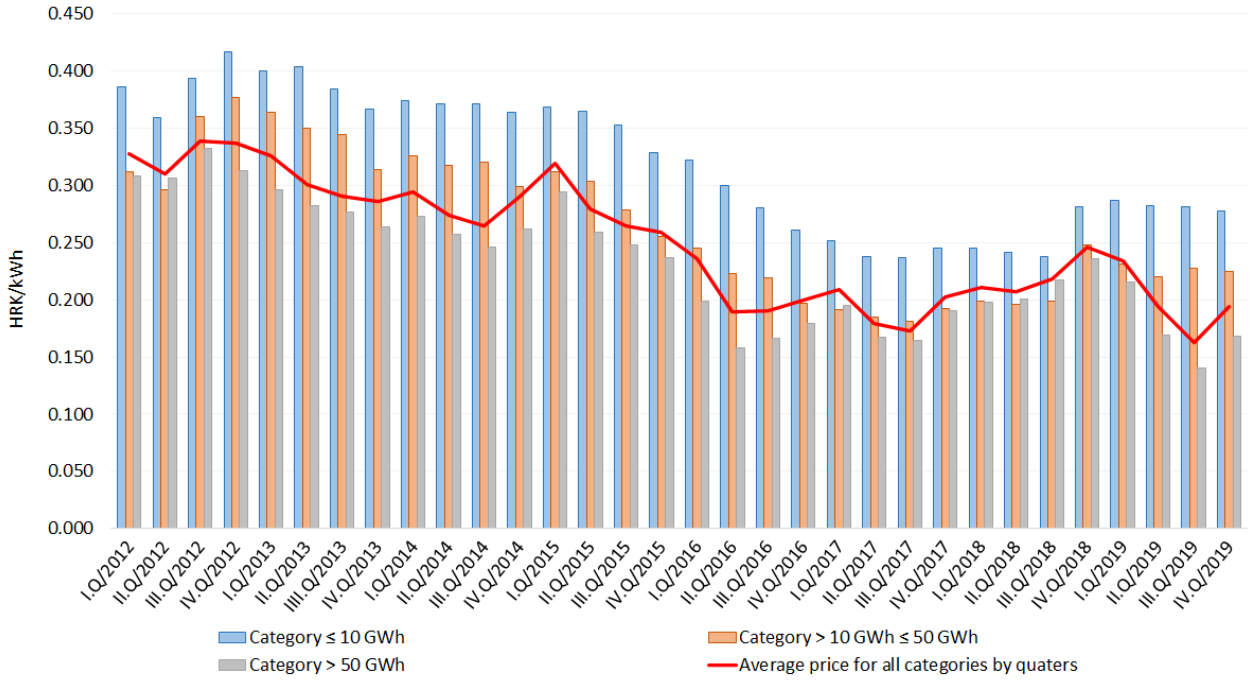


Figure 5.3.12. Average retail market gas prices (net of VAT) for non-household end consumer bands on the market in Croatia from 2012-2019, by quarter

A comparison of annual retail and wholesale market prices of gas in 2019 shows that the average retail price was 17.5% higher than the average wholesale price of gas. Trends in average gas prices on the retail market compared with the average wholesale price of gas on the market, as well as trends in the regulated wholesale price (wholesale market

[68] *Regulation (EU) 2016/1952 of the European Parliament and of the Council of 26 October 2016 on European statistics on natural gas and electricity prices and repealing Directive 2008/92/EC.*

supplier–public service supplier) excluding VAT from 2012 to 2019 are shown in Figure 5.3.13.

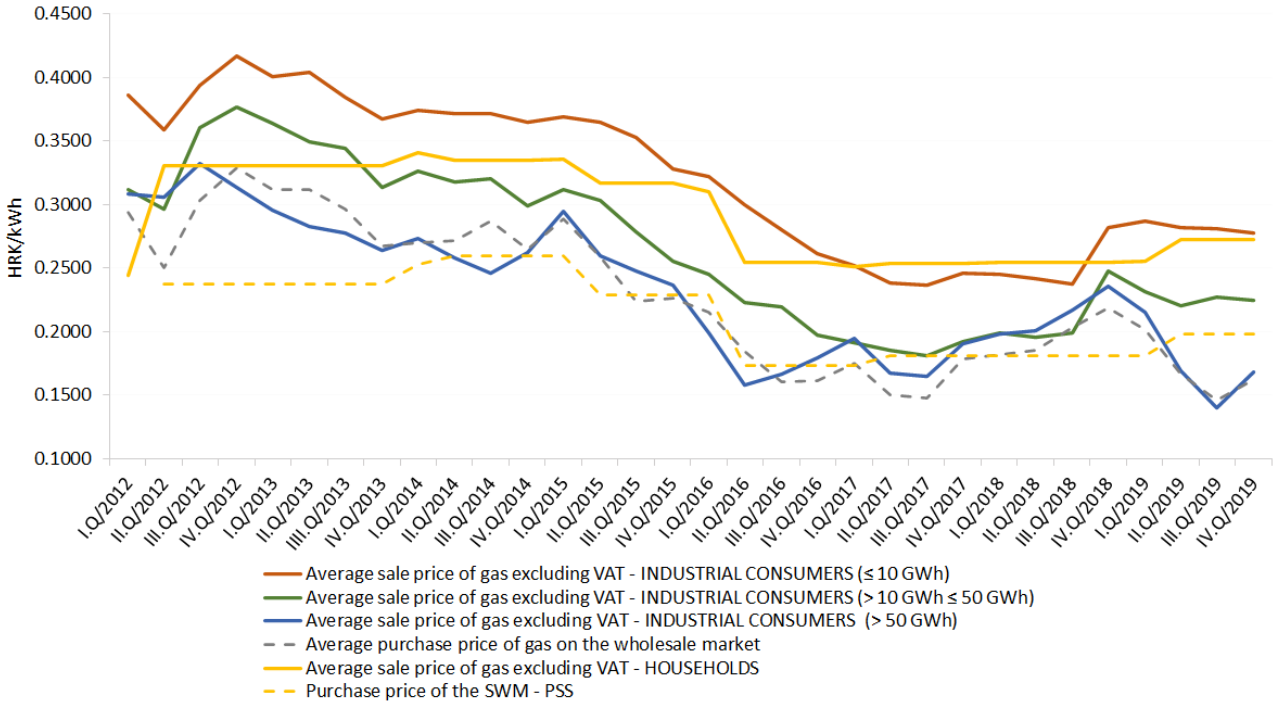


Figure 5.3.13. Trends in average retail gas prices for end consumer categories on the market as compared to the average wholesale price of gas on the market and the regulated wholesale gas price for the period 2012-2019

Natural gas prices for end consumers in European countries – households

According to EUROSTAT, the prices of natural gas (excluding taxes) for household end consumers in the European Union increased on average by 3.7% in 2019 as compared to 2018. Despite these changes, the price of natural gas excluding taxes for households in Croatia was still 34.7% below the European average in 2019.

Figure 5.3.14 shows how natural gas retail prices in some European countries changed for households in the D_2 consumption category, whose annual natural gas consumption ranges from 20 to 200 GJ, which approximately corresponds to natural gas consumption of 600 to 6,000 m^3/year, from 2002 to 2019.[69]

In 2019, the natural gas sale price including taxes for households in the D_2 band was the highest in Sweden (EUR 32.64/GJ), followed by the Netherlands (EUR 26.19/GJ) and Spain (EUR 24.40/GJ); it was lowest in Romania (EUR 9.43/GJ), Hungary (EUR 9.45/GJ), and Croatia (EUR 10.85/GJ). The price of natural gas in Croatia in 2019 was 42.2% lower than the European average.

The share of taxes in the total price of natural gas for this consumer category varied greatly. It was highest in Denmark (58.2%), the Netherlands (54.9%), Sweden (43.0%), and Italy (34.4%); it was lowest in the UK (9.9%), Luxembourg (10.1%), and Greece (10.4%). In Croatia, the share of taxes in the total gas price for this category of consumers amounted to 20.0%.

69 *Prices are calculated as average retail prices from the relevant years.*

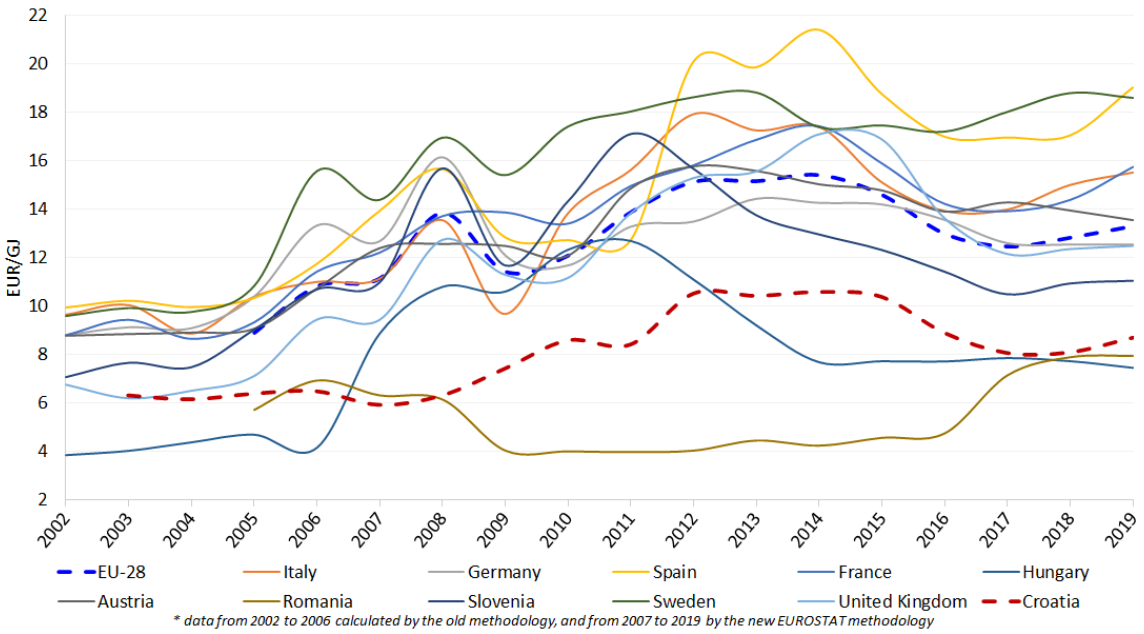


Figure 5.3.14. Trends in the retail price of natural gas for households in the D_2 band in particular European countries from 2002 to 2019 (excluding taxes)

Figure 5.3.15. shows average natural gas prices for households in the D_2 consumer band in 2019, both including and excluding taxes.

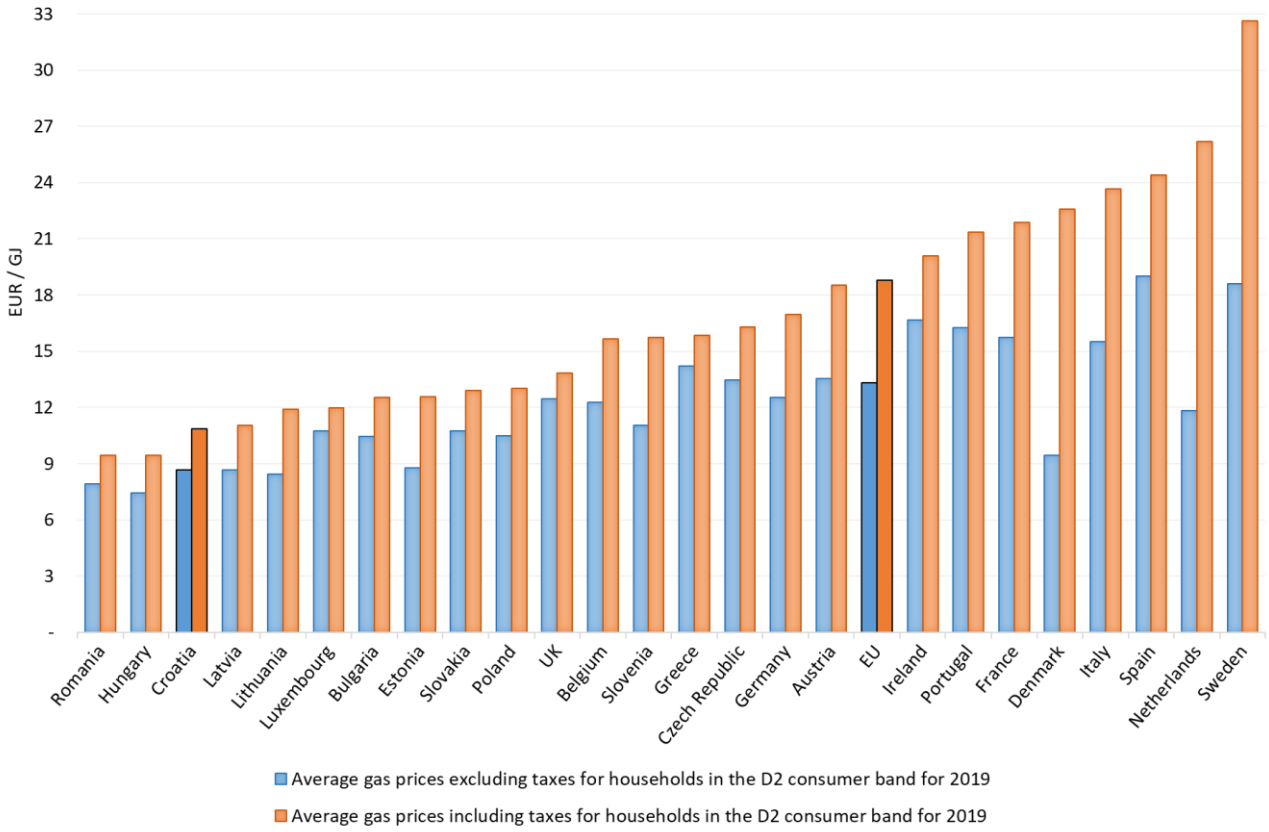


Figure 5.3.15. Average natural gas prices for households in the D_2 consumer band in 2019 (including and excluding taxes)

Furthermore, if the price of natural gas for households in the D_2 consumer band is expressed using the international PPS/GJ[70] unit in order to eliminate differences in the prices of goods/services across countries, in 2019, the price was the highest in Sweden (27.44 PPS/GJ) and the lowest in Luxembourg (9.72 PPS/GJ). Considering the purchasing power standard expressed in PPS, the final price of gas including taxes for households in the D_2 consumer band in Croatia in 2019 was 16.79 PPS/GJ, which is 11.6% lower than the European average. Figure 5.3.16. shows a comparison of European natural gas retail prices including taxes for households in the D_2 consumer band for 2018 and 2019, expressed in PPS/GJ.

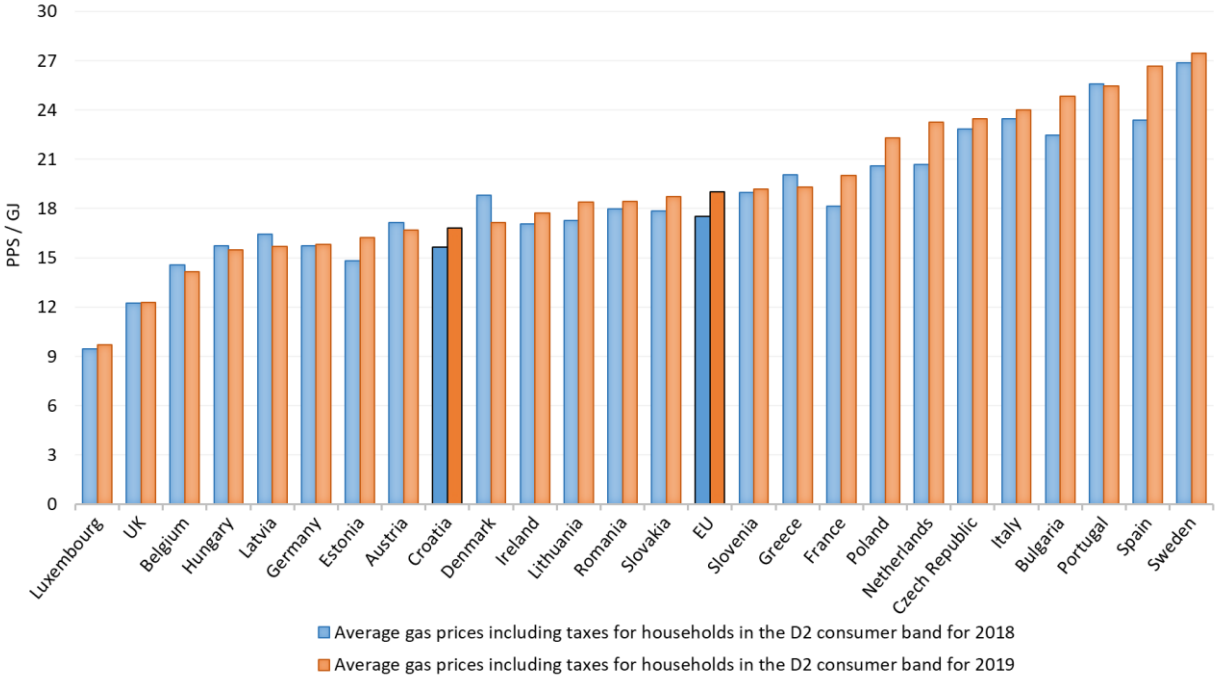


Figure 5.3.16. Natural gas prices for households in the D_2 consumer band in relation to the price of goods/services in European countries (including taxes) for 2018 and 2019

Natural gas prices for end consumers in European countries – non-households

According to EUROSTAT's data, as compared to 2018, natural gas prices in 2019 excluding taxes in the EU increased by 5.1% for I_3 non-household consumers with an annual natural gas consumption between 10,000 and 100,000 GJ, which approximately corresponds to a natural gas consumption of 300,000 to 3,000,000 m^3/yr. Figure 5.3.17. shows average natural gas prices for non-household end consumers in the I_3 consumer band in 2019, both including and excluding taxes.

70 *PPS (purchasing power standard) is a unit that equalises the purchasing power of different countries.*

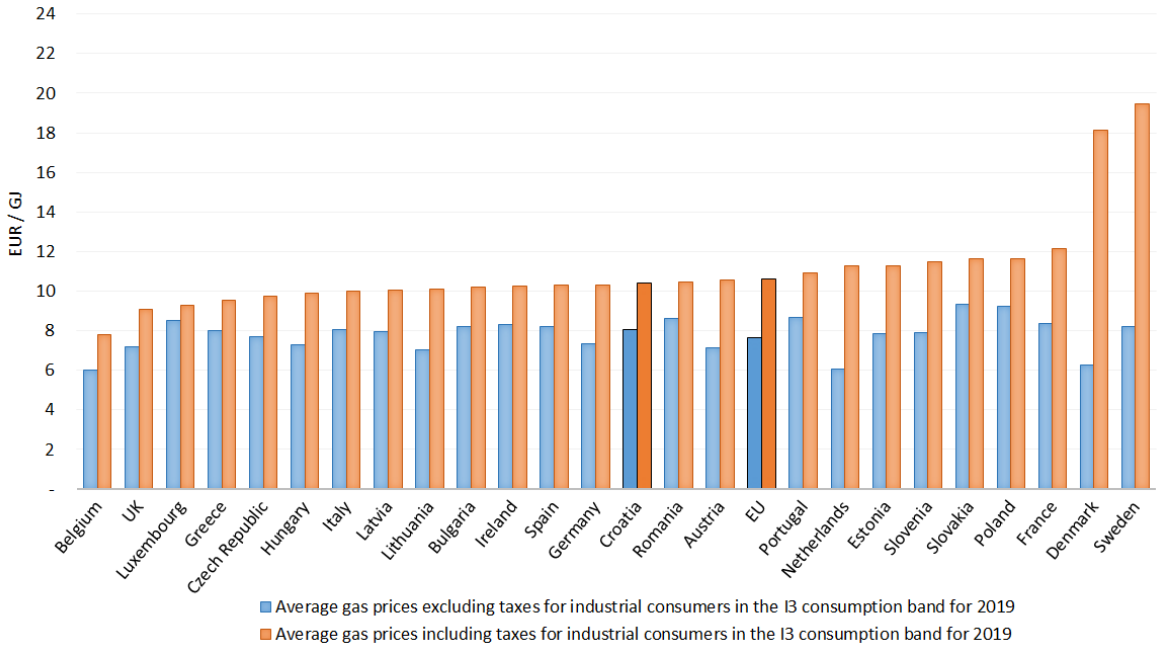


Figure 5.3.17. Average natural gas prices for non-household consumers in the I_3 consumer band for 2019 (including and excluding taxes)

In 2019. the natural gas sale price including taxes for non-household consumers in the I_3 consumer band was highest in Sweden (EUR 19.48/GJ) and Denmark (EUR 18.13/GJ); it was lowest in Belgium (EUR 7.82/GJ), the UK (EUR 9.09/GJ), and Luxembourg (EUR 9.28/GJ). In Croatia, the average natural gas sale price including taxes for non-household consumers in the I_3 consumer band in 2019 was EUR 10.39/GJ, which is 2.0% less than the European average.

The share of taxes in the total price of natural gas for this consumer band varied greatly – it was highest in Denmark (65.5%), Sweden (57.8%), and the Netherlands (46.4%) and lowest in Luxembourg (8.5%), Greece (16.2%), and Romania (17.7%). In Croatia, the share of taxes in the total price for this consumer band in 2019 was 22.4%.

If the price of natural gas for non-household consumers in the I_3 band is expressed in PPS/GJ, in 2019, Romania had the highest price of gas (20.43 PPS/GJ), while the price was lowest in Belgium (7.07 PPS/GJ). Considering purchasing power standard expressed with in PPS, in 2019, the final price of gas including taxes for non-household consumers in the I_3 consumer band in Croatia was 16.09 PPS/GJ, which is 43.4% higher than the European average. Figure 5.3.18. shows a comparison of European natural gas retail prices with taxes for non-household consumers in the I_3 consumer band for 2018 and 2019, expressed in PPS/GJ.

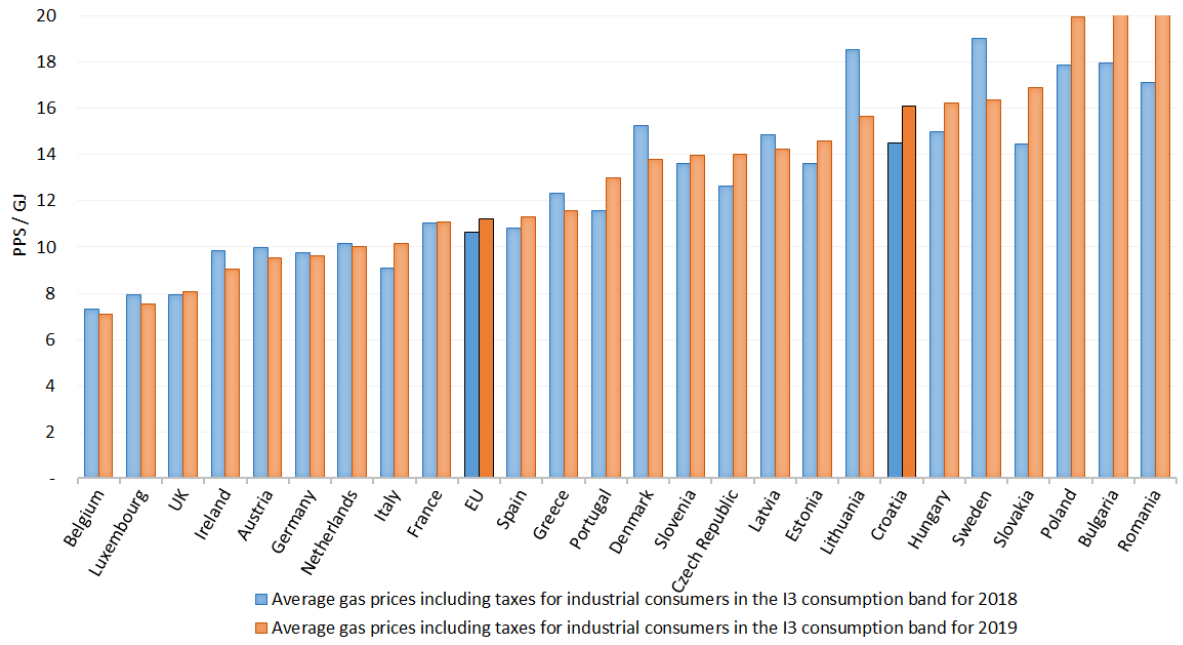


Figure 5.3.18. European natural gas prices with taxes for non-household consumers in the I_3 consumer band for 2018 and 2019, expressed in PPS/GJ.

Assessment of retail gas market function

The main indicators of the functioning of the retail market are supplier switching rate, HHI, and the impact of regulation on the market as a whole.

After an increase in the amount of supplier switches from 2014 to 2016 and significant growth in 2017, 2018 showed stagnation, which resulted in a lower number of completed supplier switches. However, the number of supplier switches increased in 2019 (according to the number of BMPs) by 9.0% as compared to 2018, which indicates the gradual stabilisation of the market with an upward trend in switches. The same can be concluded from the analysis of the HHI indicator, which was assessed as a relevant reflection of market concentration for the non-household category; it reached the target level of below 2,000 with a score of 1,809. This is certainly an indicator of positive changes on the retail market in 2019. Although the three largest participants still dominate, changes in their market shares have resulted in a significant decrease in the HHI indicator in 2019 as compared to 2018, when it amounted to 2,608. The share of the predominant participant reduced somewhat and was redistributed to the second- and third-most dominant participants; this had the greatest impact on lowering HHI to below 2,000. Additionally, changes in market share among smaller market participants were also noted; this also had an impact on the HHI value in 2019, albeit a small one. This change in HHI cannot lead us to conclude that the market is fully competitive, however it is a good indicator that the proportional distribution of market share among the three largest market participants is having a positive impact on market concentration.

The fact is that the majority of Croatian households still purchase gas under regulated conditions because household end consumers who use the public gas supply service are protected from significant fluctuations in prices on the gas market, which represents a certain type of security.

The establishment of a gas price comparison tool will also contribute to the further development of the retail gas market; this tool will be of key importance to end consumers as it will allow them compare verified offers at the market level of all gas suppliers in one place, thus facilitating their choice of a gas supplier. HERA plans to launch this gas price comparison tool in 2020.

5.3.4 Public service in the gas sector

Performance of energy activities as a public service is regulated by the **Energy Act**. A public service is defined as a service available at all times to end consumers and energy entities at a regulated price and/or under regulated conditions for access to and use of the energy service, which has to be available, sufficient, and sustainable, taking into account the safety, regularity, and quality of service, environmental protection, efficiency of energy utilisation, and climate protection, and which is performed according to the principles of transparency and impartiality and supervised by competent authorities.

Regulated energy services in the gas sector performed as public services are:

- gas transmission, gas distribution, gas storage, LNG terminal management,
- wholesale market supplier activity,
- public service gas supply, supply of last resort, and
- gas market organisation.

The public supply service represents a protective measure for household end consumers by regulating gas supply conditions. Suppliers in the public service are required to charge for delivered gas according to valid tariff amounts for the public gas supply service as adopted by HERA in accordance with the *Methodology for setting tariffs for public service gas supply and supply of last resort* (also adopted by HERA), as well as ensure the quality of gas and quality of service in accordance with the *General terms and conditions of gas supply*.

The public service supplier has at its disposal mechanisms for ensuring the availability of gas for the needs of consumers using the public supply service. The gas supply chain for public service consumers is regulated in the following manner:

- the supplier on the wholesale gas market sells gas to public service suppliers of household consumers (under regulated conditions), or
- public service suppliers of household consumers purchase gas under market conditions (an option introduced as of 1 April 2017).

Additionally, the **Gas Market Act** also provides for a protective measure applicable to all end consumers related to the right to supply of last resort. The role of a guaranteed supplier is to provide public gas supply service to end consumers left without a supplier under specific conditions, over a limited period and under regulated circumstances. The period during which this service is to be provided and the relevant conditions of supply of last resort are stipulated in the *Methodology for setting tariffs for public service gas supply and supply of last resort*. The tariffs for supply of last resort are established as follows:

a) for end consumers purchasing gas under market conditions:
   - for the first month from the start date of supply of last resort – in an amount equal to the tariffs for public gas supply service pursuant to the provisions of the *Methodology* issued by HERA for the public service gas supplier in a given distribution area,
   - for the subsequent two months (up to a total of three months from the start date of supply of last resort) – in an amount 10% higher than the tariffs for public gas supply service pursuant to the provisions of the *Methodology* issued by HERA for the public service gas supplier in a given distribution area, and
   - upon the expiry of three months from the start date of supply of last resort – in an amount 30% higher than the tariffs for public gas supply service pursuant to the provisions of the *Methodology* issued by HERA for the public service gas supplier in a given distribution area.

b) forend consumers using the public gas supply service:

- in an amount equal to the tariffs for public gas supply service set by the Agency for the public service gas supplier in a given distribution area, which are applied until a new public service supplier is selected for a given distribution area.

Having applied the criteria from the tender documentation for the period from 1 October 2018 to 30 September 2021, HERA appointed the energy entity GRADSKA PLINARA ZAGREB - OPSKRBA d.o.o. as the guaranteed supplier in Croatia.

5.3.5 Quality of 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 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*. In this regard, the quality of service 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 end consumers. The reliability of delivery implies the continuity of gas delivery from the transmission or distribution system in a period of timeand is expressed in the number of delivery interruptions and their duration. Gas quality implies that the parameters of gas delivered into the gas system are in line with standard gas quality as described in the *General terms and conditions of gas supply*. Gas producers, suppliers, and traders are obliged to ensure the standard quality of the gas that they deliver into the transmission or distribution systems.

Further, the system operator and the gas supplier are also obliged to establish a system of data collection concerning the quality of gas supply and to publish digitised annual reports on the quality of gas supply. In this way, data on the fulfilment of 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 obliged to provide to individual system users, end consumers, or the gas market operator. *Amendments to the General terms and conditions of gas supply (Official Gazette no. 39/20)* which entered into force on 1 April 2020, prescribe that the system operators or gas supplier 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, 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*.

System operators and gas suppliers are obliged to provide 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 obliged to provide HERA with annual reports on the quality of 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, HERA collects data on the quality of gas supply in order to monitor:

- general standards of supply quality: reliability of delivery (monitoring delivery interruptions, system leak tests, odourisation of gas, 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 delivery 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 billing metering point register).

With respect to gas suppliers, HERA collects data on the quality of gas supply in order to monitor:

- general standards of supply quality: quality of service (resolution of complaints and inquiries from end consumers, correction of gas supply invoices), and
- guaranteed standards of supply quality: quality of service (correction of gas supply invoices, orders to resume gas supply after settlement of obligations, entry and updating of data in the billing metering point register).

As of June 2018, charges for three services rendered beyond the guaranteed standard apply to the following services: submission of readings to the supplier and suspension of gas supply on the order of the supplier (the distribution system operator is obliged to enforce both standards, and the gas supplier is entitled to compensation), and the correction of gas supply invoices (the gas supplier is obliged to enforce the standard, while the end consumer is entitled to compensation).

Amendments to the General terms and conditions of gas supply, which entered into force on 1 April 2020, prescribe a charge for services offered outside the guaranteed standard, specifically for the entry and updating of data in the BMPR (standard binding upon the distribution system operator, closed distribution system organiser, and gas supplier; the gas market operator has a right to this charge). Incentives and reimbursements for services rendered beyond the guaranteed standard are planned for the upcoming periods; by that time, 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.

In 2019, the transmission system operator recorded 22 planned interruptions in gas delivery in the gas transmission system. The total duration of all delivery interruptions in 2019 was 545 hours.

In 2019, distribution system operators recorded an average of 17 planned gas delivery interruptions with an average duration of 458 hours, as well as 16 unplanned delivery interruptions with an average duration of 36 hours.

5.3.6 Consumer protection

In 2019, HERA received a total of 153 applications from natural and legal persons within its area of competence in the gas sector, as shown in Table 5.3.3.

Table 5.3.3. Consumer submissions by type in 2019

Type of case	Number	Proportion [%]
Appeals	0	0
Complaints and other consumer applications	84	55
Inquiries	69	45
Total	**153**	**100**

Of the 84 complaints and other consumer applications, 41 were submitted by citizens (natural persons). Table 5.3.4. shows the most common reasons for complaints from natural persons.

Table 5.3.4. Complaints received from natural persons in 2018

Complaints from natural persons	Number	Proportion [%]
Calculation of gas consumption	14	34
Unauthorised gas consumption	9	22
Supplier switches	8	19
Delivery interruption	4	10
Other	6	15
Total	**41**	**100%**

The end consumer 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 I. "*Consumer protection measures*". 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 26 September 2015),
- **Gas Market Act** (in force as of 3 March 2018),
- **Act on the Regulation of Energy Activities** (in force as of 8 November 2012),
- **Consumer Protection Act** (in force as of 21 October 2015),
- *General terms and conditions of gas supply* (in force as of 9 June 2018).

The measure protecting gas consumers and gas system users against actions of gas system operators and suppliers, pursuant to Article 88 of the **Gas Market Act**, stipulates that an end consumer 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 actions of the gas supplier, pursuant to Article 24 of the *General terms and conditions of gas supply*, stipulates that end consumers 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 end consumers 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 end consumers about the termination of the concluded gas supply contract,
- the content of an invoice issued for delivered gas,
- non-fulfilment of the provisions of the public service gas supply contract,
- failure to re-establish gas delivery within the defined time frames, upon 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, HERA may take the following measures:

- reach a binding decision on how to handle the complaint,
- provide instructions on how to handle the complaint, or
- issue an opinion on a complaint.

5.4 Security of natural gas supply

The basic framework on the security of 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 gas supply and repealing Regulation (EU) No 994/2010*, which entered into force on 1 November 2017. The objective of *Regulation 2017/1938* is to boost solidarity and trust between the Member States and put in place measures needed to achieve these aims.

In addition, pursuant to the provisions of the **Gas Market Act**, market participants are responsible for the security of gas supply within the scope of their activities. The competent authority in charge of implementing measures under *Regulation 2017/1938* is the ministry competent for energy. Together with regional self-government units, it is responsible for implementing measures ensuring the security of supply.

In order to establish a preventive action plan containing measures needed to mitigate identified risks in accordance with the risk assessment undertaken pursuant to Article 9 of *Regulation (EU) 994/2010 of the European Parliament and of the Council of 20 October 2010* concerning *measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC* and to establish an emergency plan containing measures to be taken to eliminate or mitigate the impact of gas supply disruptions pursuant to Article 10 of *Regulation (EU) 994/2010*, the Croatian government adopted the *Emergency plan concerning measures to safeguard the security of gas supply in Croatia (Official Gazette no. 78/14)* in June 2014.

In order to establish criteria for acquiring the status of a protected consumer and measures to safeguard reliable supply of protected consumers, in June 2015, the Croatian Government adopted the *Regulation on the criteria for acquiring the status of a protected consumer in gas supply crisis situations (Official Gazette no. 65/15*).

The preventive action plans and the emergency plans drawn up pursuant to *Regulation (EU) No. 994/2010* will remain in force until new preventive action plans and emergency plans drawn up pursuant to *Regulation 2017/1938* are first adopted.

5.5 Energy efficiency in the natural gas sector

Energy efficiency in gas infrastructure

Gas infrastructure is specific in that it is a large and expensive infrastructure that has been developed over decades; its construction, maintenance, and improvement require significant financial resources. For these reasons, increasing the energy efficiency of gas infrastructure is a complex economic and environmental issue.

The energy efficiency of gas infrastructure predominantly relates to losses of natural gas from the system and to the system's own energy consumption (gas and electricity consumption). Gas losses occur in almost all components of the gas system (transmission, distribution, compressor stations, metering and regulating stations [MRS], storage system); these are divided into ventilation losses (during reconstruction and maintenance), fugitive emissions (leakage), and losses due to incidents (accidents). The issue of system gas losses has recently become especially important, not only due to direct energy losses but also due to the exceptional environmental issues caused by methane (CH_4) emissions. Methane, one of the basic components of natural gas, is of particular importance because the greenhouse gas potential of methane is 25 times higher than that of the same mass of carbon dioxide (CO_2).

Energy efficiency in Croatia is regulated by the **Energy Efficiency Act**. With the adoption of this **Act**, EU acquis in the field of energy efficiency has been fully transposed into Croatian legislation.

In the context of assessing potential and proposing measures to increase the energy efficiency of gas infrastructure, Article 16.1. of this **Act**, in accordance with the transposed EU acquis, provides that 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 gas infrastructure and abolish those that are harmful to the infrastructure's efficiency.

In its *Methodology for setting tariffs for gas distribution*, 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. Furthermore, in the *Methodology for setting tariffs for gas transmission*, 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 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 through tariffs by requiring them to develop, maintain, and operate a system that takes energy savings into account.

In accordance with Article 5 of the **Act**, energy efficiency improvement policies are determined by energy efficiency plans.

In order to implement these tasks, in 2017, HERA commissioned a study entitled *An Assessment of the Potential for Increasing the Energy Efficiency of the Gas Infrastructure.* The aim of the study was to determine the potential for increasing the energy efficiency of gas infrastructure. Gas infrastructure losses are based on the *net-balancing methodology*.

The goal is to increase the energy efficiency of gas infrastructure; this study analyses financially acceptable measures that can be implemented to reduce losses in gas infrastructure. These measures are contained in the ten-year development plans for the Croatian gas transmission system 2017-2026, the distribution systems development plan, and the development plans and reports regarding realised investments in the gas storage system with a detailed elaboration of realised planned investments into system improvements on an annual and multi-annual basis.

The deadlines for the introduction of these measures are defined in ten-year development plans for the gas transmission system, development plans and reports on realised investments in the gas storage system, and distribution system development plans, with a detailed elaboration of the initial three- and one-year periods, which HERA approves with a view to cost-efficient improvements to gas infrastructure.

Applicable and cost-effective measures to increase the energy efficiency of gas infrastructure stem from the need to reduce gas losses. Measures for the transmission system 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, and the replacement of gas preheating boilers at MRSs.

The analysis of distribution system development plans shows that the potential for increased energy efficiency is fairly high in the distribution system, especially as concerns the replacement of existing steel piping with PE piping and the evaluation and possible replacement of overpressure values.

As concerns the gas storage system, activities directed towards increasing energy efficiency involve improvements to the energy efficiency of compressors, dehydration and hydration units, and preheating systems at reducing stations.

The energy obligation system in the gas sector – public service suppliers

In accordance with Article 13.3 of the **Energy Efficiency Act**, the bond parties to the obligation system in 2019 were energy suppliers and all related persons who are energy suppliers, if they supplied a total of more than 300 GWh of energy in 2017 to end consumers or distribution stations that sell energy to end consumers.

The Ministry of Environmental Protection and Energy defines savings obligations for bond parties in the obligation system through an *ex officio* decision determining the required savings in kWh for the following calendar year, which it is obliged to issue by 30 June of the current year; this decision is based on data on energy provided by the parties to end consumers or distribution stations that sold the energy in the year before last. Exceptionally, for 2019, the Ministry issued these decisions in December 2019.

The Ministry's decision determines the initial base obligation of bond parties in the amount of 1.5% of their annual energy sales to end consumers in the year before last. The Ministry subtracts the following from the base obligation:

- the share of the target achieved through alternative measures in the observed year, beginning in 2017,
- the share of biofuels that entities (which are also bond parties) that sell diesel fuel or petrol for motor vehicles were required to include in their fuel in accordance with a special regulation governing the use of biofuels for transport,
- share of energy supplied by the energy supplier to consumers who are producers, distributors, or suppliers of thermal energy, and
- share of energy supplied by the energy supplier to an industry that is bound by legislation regulating greenhouse gas emissions trading.

Legislation also stipulates that the Ministry will increase the obligations of bond parties in the following year by the amount of unrealised savings in the previous year, when unrealised savings do not exceed 10% of total obligations in the previous year. If unfulfilled obligations from the previous year exceed 10%, the Ministry will determine the amount that the bond party is obliged to pay in a lump sum into the Environmental Protection and Energy Efficiency Fund in a decision issued by 31 May of the current year on the basis of the value of investments of the Environmental Protection and Energy Efficiency Fund into alternative measures in the previous year; bond parties are required to pay this amount into the fund within 30 days of having received the decision. This amount is determined by multiplying unrealised obligations from the previous year exceeding 10% in kWh by half of the amount of the Fund's investment into alternative measures in the calendar year preceding the year in which the liability was determined, expressed in HRK/kWh.

Introduction of smart meters

In accordance with the **Energy Act**, distribution system operator sets out the technical requirements and determines the costs of introducing smart meters and mass roll-out of smart metering systems, and communicates these requirements to HERA. 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 end consumers.

HERA has begun drafting a project task to create a study entitled "*The basis for determining the technical requirements and costs of introducing smart meters and smart meter networking systems for end consumers of natural gas*", the implementation of which is planned for 2020.

Bearing in mind that there are 35 distribution system operators in Croatia, and that HERA has not yet received a proposal from any of them regarding the technical requirements and costs of introducing smart meters and smart meter networking systems, as well as that no minimum functionality of smart meters has yet been attested in Croatia, this study will have to encompass an analysis of necessary and acceptable device functionality and suggest minimum functional requirements for smart meters.

An overview of 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 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, considering the acceptable functionality and the optimal technology that enables this functionality.

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)**, as well as by-laws adopted on the basis of these acts.

In addition, the framework for determining and monitoring liquid petroleum fuel quality is laid down in the *Regulation on Liquid Petroleum Fuel Quality, Monitoring and Reporting Methods, and Calculation Methods for Greenhouse Gas Emissions in the Life Cycle of Supplied Fuel and Energy (Official Gazette no. 57/17)*, based on the **Air Protection Act (Official Gazette no. 130/11 and 47/14).** The new **Air Protection Act (Official Gazette no. 127/19)** entered into force on 1 January 2020; it stipulates that the existing *Regulation on the quality of liquid petroleum fuels and monitoring and reporting methods and the methodology for calculating greenhouse gas emissions in the lifetime of delivered fuels and energy* shall remain in force until the enactment of a new regulation.

The Liquid petroleum fuel quality monitoring programme for 2019 (Official Gazette no. 13/19) prescribes sampling methods for liquid petroleum fuels, especially for petrol stations and warehouses, sampling quantity and frequency, sampling locations depending on the quantity of liquid petroleum fuel the supplier has placed on the domestic market, laboratory analysis methods for samples of liquid petroleum fuel, and reporting on performed analyses.

The requirements for wholesale and foreign trade in petroleum products in 2019 were governed by the *Regulation on requirements for wholesale trade and trade with third countries in certain goods (Official Gazette no. 47/14 and 62/15*), which expired as of 12 October 2019 with the entry into force of the *Regulation on the expiry of the Regulation on requirements for wholesale trade and trade with third countries in certain goods (Official Gazette no. 95/19)*.

Since the **Oil and Petroleum Products Market Act** entered into force in 2014, the price of oil and petroleum products are not regulated on the Croatian market; instead, they are defined according to market principles.

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 obliged 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 also be used for oil imports by land.

Figure 6.2.1. The JANAF d.d. oil pipeline system

In 2018, a total of 6.5 million tonnes of crude oil was transported through the oil pipeline system, which represents a decrease of 24.4% compared to the previous year. Oil quantities transported from 2005 to 2019 and planned quantities for 2020 are shown in Figure 6.2.2.

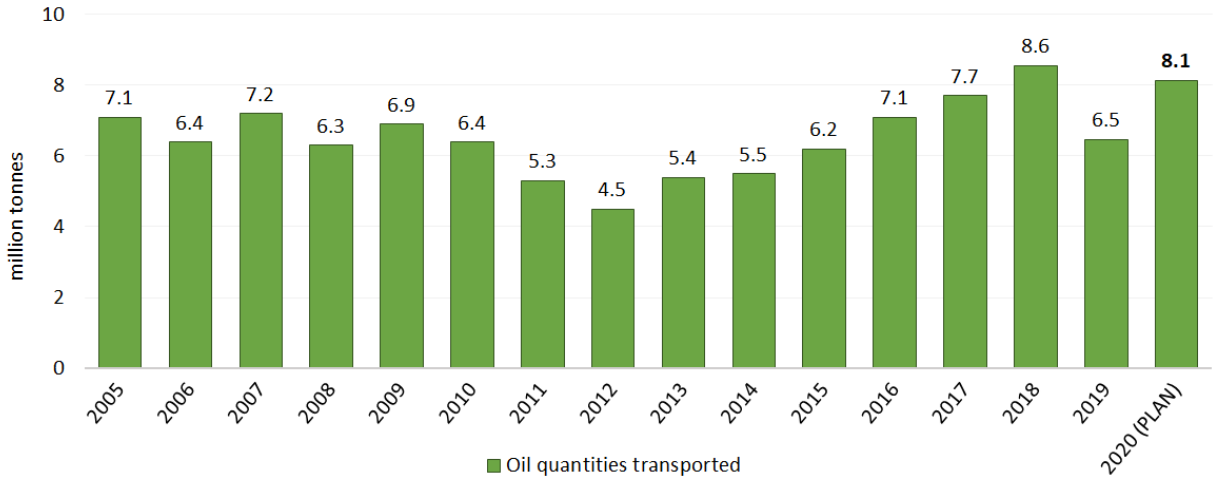


Figure 6.2.2. JANAF's oil pipeline system – transported quantities in [millions of tonnes]

Particularly important activities undertaken by JANAF in 2019 included investments in the pipeline system, investments in storage space, investments in safety and environmental protection systems, investments in the electricity system, investments in the modernisation of other facilities, investments in business IT systems and software, etc.

6.3 Development of the oil and petroleum products market

6.3.1 Storage of oil and petroleum products

In 2019, oil and petroleum products were stored by 20 energy entities, while liquefied petroleum gas was stored by five energy entities. The storage of oil and petroleum products involves storage in special facilities for own needs (producers, consumers, and transport companies), and storage for the purpose of supply security and/or for the purpose of trade. According to data furnished by the energy entities, total available storage capacities in 2019 amounted to 2.97[71] million m^3, as compared to a total of 2.91 million m^3 of available capacity in 2018 (excluding storage capacities within INA's refineries). The increase in storage capacities is attributed to the newly built storage capacities for crude oil and petroleum products at the Ploče Terminal. The geographical locations of the most important oil and petroleum products storage facilities in Croatia, according to the type of goods stored, are shown in Figure 6.3.1.

[71] *The above data on 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: NAUTICA VUKOVAR d.o.o., Priljevo 14, 32000 Vukovar; NAFTA CENTAR d.o.o. za trgovinu i usluge, Mirka Kleščića 7, 10430 Samobor; EURO GAS d.o.o., Alojzija Stepinca 36, 35400 Nova Gradiška; BDM d.o.o. za trgovinu i usluge, Ante Starčevića 54, 35000 Slavonski Brod; i BRALA d.o.o. za trgovinu i usluge, Ulica braće Dežmalj 26, 23242 Posedarje.*

Figure 6.3.1. Geographical locations of oil and petroleum products storage facilities according to the type of goods stored, and total storage capacities in 2019

6.3.2 Production of crude oil and petroleum products; trade in petroleum products

Production of crude oil

Even though it is not considered an energy activity, 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. Domestic production of crude oil amounted to 554,000 tonnes in 2019, which is 56,000 tonnes less (9.2%) than in 2018; this represents a continued negative trend in domestic crude oil production. In addition to domestic production, Croatia also covers its demand for crude oil with imports, primarily from Azerbaijan, Iraq, Libya, the Russian Federation, and Saudi Arabia. Domestic production of crude oil amounted to 2.03 million tonnes in 2019, which is a decrease of 31.6% as compared to 2018. A comparison of imported and domestic crude oil quantities from 2006 to 2019 is shown in Figure 6.3.2.

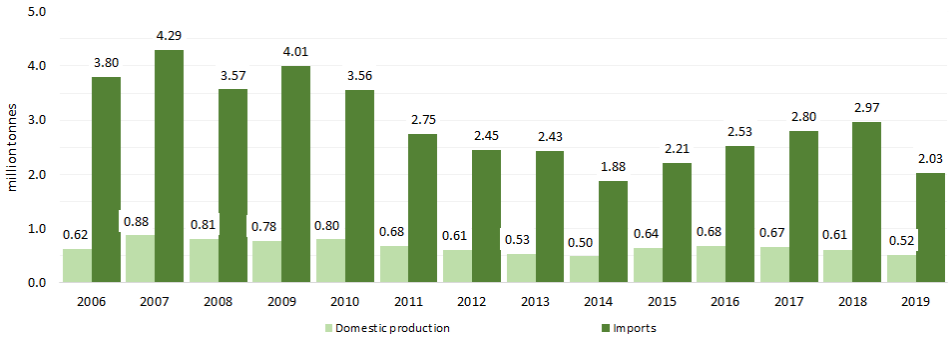


Figure 6.3.2. Crude oil quantities from domestic production and imports from 2006 to 2019 in [millions of tonnes]

Production of petroleum products

In Croatia, petroleum products are produced by INA d.d. The petroleum products produced at the oil refinery in Rijeka and the Etan ethanol facility in Ivanić Grad include motor fuel and industry and household fuels. 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 2019 are shown in Figure 6.3.3.

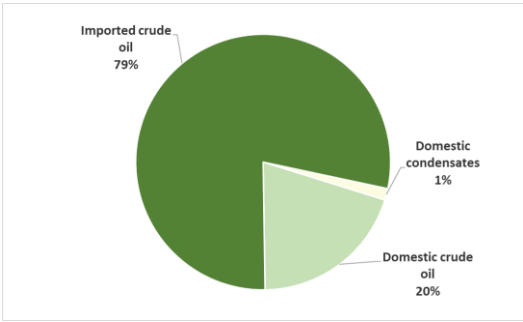


Figure 6.3.3. Shares of raw materials used for refinery processing in 2019

Domestic production of petroleum products amounted to 2.8 million tonnes in 2019, which is 1.0 million tonnes less (26.3%) than in 2018; this represents a continued negative trend and an increasing dependence on petroleum product imports as a result of reduced domestic refinery processing capacity. The total quantities of petroleum products produced from 2006 to 2019 are shown in Figure 6.3.4.

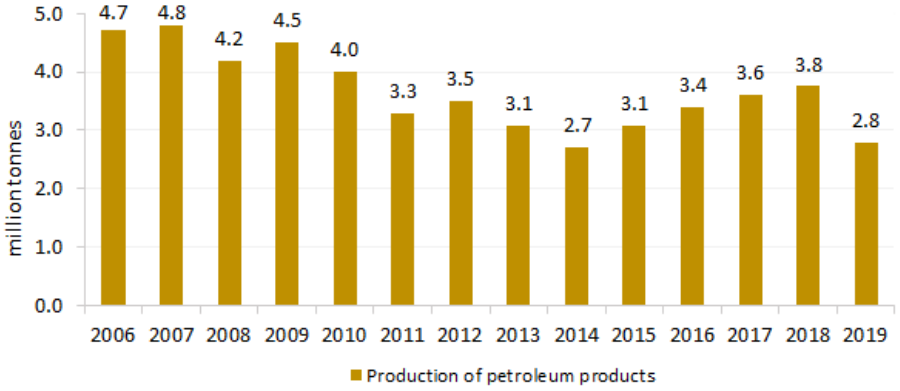


Figure 6.3.4. Quantities of petroleum products produced from 2006 to 2019 in [millions of tonnes]

The total production of liquefied petroleum gas in 2019 amounted to 197,000 tonnes, which is an increase of 57,000 tonnes (22.4%) as compared to 2018. The quantities of liquefied petroleum gas (LPG) produced from 2006 to 2019 are shown in Figure 6.3.5.

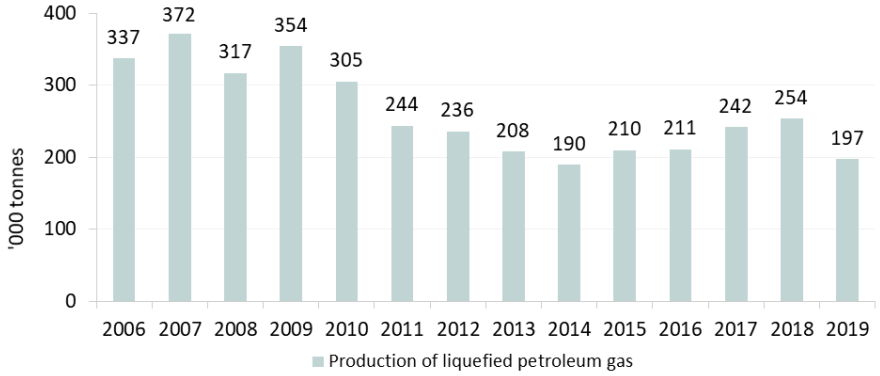


Figure 6.3.5. Quantities of LPG produced from 2006 to 2019 in [thousands of tonnes]

Trade in petroleum products

Petroleum products trading covers the following energy activities:

- wholesale trade in petroleum products,
- retail trade in petroleum products,
- wholesale trade in LPG, and
- retail trade in LPG.

Wholesale trade in petroleum products and LPG are subject to licensing by HERA. The approval of the ministry was formerly required for these activities pursuant to the *Regulation on Requirements for Wholesale Trade and Trade with Third Countries in Certain Goods*. The requirement for ministry approval ceased with the entry into force of the *Regulation on the expiry of the Regulation on requirements for wholesale trade and trade with third countries in certain goods*.

In 2019, wholesale trade in petroleum products was carried out by 45 energy entities, while wholesale trade in liquefied petroleum gas (LPG) was carried out by 13 energy entities.

Total sales of petroleum products in 2019 amounted to 2.62 million tons, which represents an increase of 127,363 tonnes or 5.2% as compared to 2018, when it amounted to 2.49 million tonnes.

In addition to petroleum products from domestic production, imported petroleum products account for a significant share on the Croatian market. According to data supplied to HERA by the energy entities, a total of 1.92[72] million tonnes of petroleum products were imported in 2019, which represents an increase in imports of 428,231 tonnes (28.8%) as compared to 2018; Figure 6.3.6. portrays imported quantities of petroleum products from 2006-2019.

[72] *The above data on total quantities of imported petroleum products is incomplete because the requested data required for the preparation of this Annual Report was not submitted by the following energy entities: TEHNOPETROL d.o.o. za prijevoz, trgovinu i usluge, Gornja Trebinja 5, 47000 Karlovac; LE-ENERGIJA d.o.o., Dužice 17, 10000 Zagreb; TRI BARTOLA za trgovinu i usluge d.o.o., Hrvatskog sabora 25G, 23000 Zadar; DP OIL ENERGY d.o.o. Osječka 73, 51000 Rijeka; GRŽINČIĆ usluge transporta i trgovine d.o.o., Podstrmac 6, 51217 Klana; UNIJA-TRADE d.o.o., Pavičini 604, 52208 Krnica; BDM d.o.o., Ante Starčevića 54, 35000 Slavonski Brod; ORA-FORM ZAGREB d.o.o., Oporovečki vinogradi 12 C, 10000 Zagreb; BRALA d.o.o., Ulica braće Dežmalj 26, 23242 Posedarje; DRAGO BENZ j.d.o.o. za trgovinu i usluge, Greda 17, 10340 Vrbovec; D.M. INVENTUM d.o.o., Lisičina 51, 10000 Zagreb; i EZIS d.o.o. za trgovinu i usluge, Meksička 3, 10000 Zagreb.*

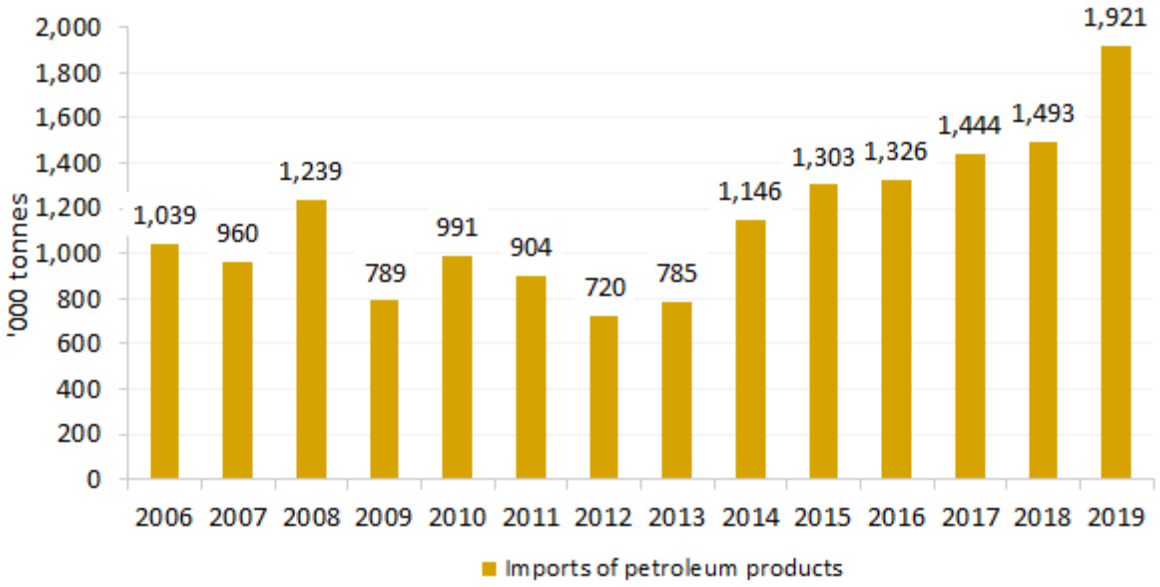


Figure 6.3.6. Imports of petroleum products from 2006 to 2019 in [thousands of tonnes]

6.4 Secure 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 the *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. 73/17)*** and the **Act on Amendments to the Oil and Petroleum Products Market Act (Official Gazette no. 73/17)**, the Croatian Compulsory Oil and Petroleum Product Stocks Agency (HANDA) was merged with the Croatian Hydrocarbon Agency (CHA) on 1 September 2017. CHA is therefore 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 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. The expert committee for monitoring the regular market supply of oil and petroleum products did not meet in 2019.

CHA is obliged to determine compulsory oil and petroleum product stocks equal to 90-day average consumption. Pursuant to the provisions of the **Oil and Petroleum Products Market Act**, CHA issues a decision determining the quantity and shares of compulsory

stocks for each year. CHA issued no decision regarding the quantity and shares of compulsory oil and petroleum product stocks for 2019.

7 BIOFUELS

7.1 Legal framework for biofuels

The biofuels market and corresponding 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, and 94/18), and by-laws adopted on the basis of 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 segment of biofuels comprises the following energy activities:

- production of biofuels,
- storage of biofuels,
- wholesale trade in biofuels, and
- retail trade in biofuels.

These energy activities are subject to a licence issued by HERA, except in the case of biofuel produced 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. In addition to HERA's licence, approval of the ministry is also required for the wholesale trade in biodiesel pursuant to the *Regulation on Requirements for Wholesale Trade and Trade with Third Countries in Certain Goods*. The requirement for ministry approval ceased with the entry into force of the *Regulation on the expiry of the Regulation on requirements for wholesale trade and trade with third countries in certain goods*.

Permits were obtained by four energy entities to perform these energy activities; in 2019, they produced a total of 264 t of biodiesel, which represents a decrease in production of 36.4% as compared to 2018.The production of biofuels in 2019 represents only a small percentage of peak production from 2012, when it amounted to 39,476 tonnes. The quantities of biofuel produced from 2009 to 2019 are shown in Figure 7.2.1.

The assumed cause of the decrease in biofuel production are adverse market trends, which started in the second half of 2014 with the termination of cash incentives for the production of biofuels for transport paid to biofuel producers by the Croatian Energy Market Operator (HROTE), which consequently reflected on insufficient investment into modernising biofuel production systems.

Energy entities have a total of 1,800 m^3 of storage capacity. In 2019, the total capacity of biofuel production was 184 tonnes per day, with waste edible oil being the only raw material used to produce biofuel.

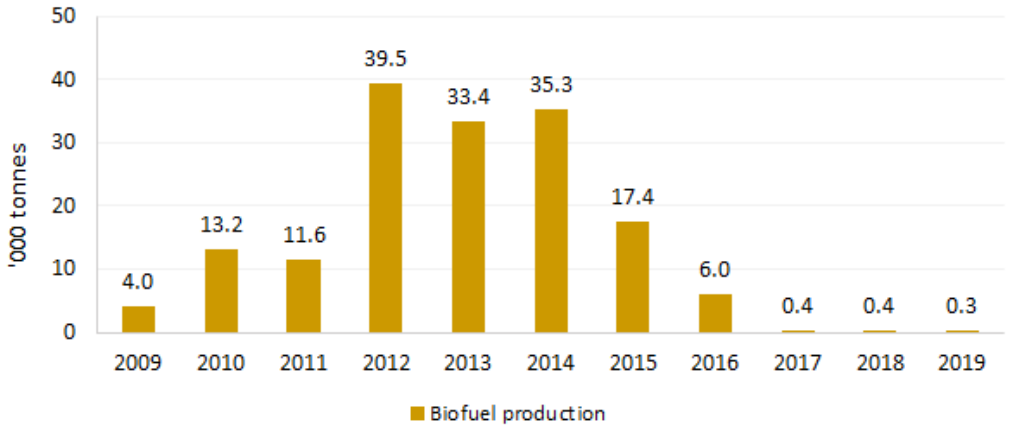


Figure 7.2.1. Quantities of biofuels produced from 2009 to 2019 in [thousands of tonnes]

Biofuels as a supplement or substitute for diesel or petrol for transport 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 out 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 for 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 European Union acquis.

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 (Official Gazette no. 80/13, 14/14, 102/14, 95/15, 76/18, and 86/19)**, and by-laws adopted pursuant to these acts.

The key by-laws governing specific activities in detail adopted by HERA are: 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 *Ordinance on the Method of Allocating and Calculating the Costs of Supplied Thermal Energy (Official Gazette no. 99/14, 27/15, and 124/15*), adopted by the ministry competent for energy, is especially important to end consumers of thermal energy. The majority of received inquiries and complaints pertain to this *Ordinance*.

The manner and conditions of performing energy activities related to district heating (the production, distribution, and supply of thermal energy) depend on the type of district heating system that supplies end consumers of thermal energy. The **Thermal Energy Market Act** differentiates between central, closed, and independent district heating systems. Central district heating systems 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 2,000 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 district heating system is smaller than a central district heating system; it encompasses multiple non-household and/or business/residential buildings/structures (less than 500 independent users in total) connected by internal installations (branch pipelines from the hot water, warm water, and/or steam network shorter than 2,000m). Closed district heating systems do not perform the energy activity of thermal energy distribution. Independent district heating systems are systems for one building/structure with its own boiler and multiple independent users.

Aside from the aforementioned energy activities related to district heating, there also exist thermal energy buyers. Thermal energy buyers are defined by the **Thermal Energy Market Act**, however the purchasing of thermal energy 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 professional management, handling, maintenance of internal installations, delivery of thermal energy for thermal energy billing, and issuing invoices to end consumers 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.

Pursuant to the **Thermal Energy Market Act**, in independent and closed district heating systems, the prices of thermal energy delivered to thermal energy buyers and end consumers are formed freely in accordance with market conditions.

HERA adopts tariff items for regulated activities, specifically, for the production and distribution of thermal energy; these tariffs must be applied by the energy entity performing these activities as a public service in the central district heating system. Charges for thermal energy supply and the purchasing thermal energy are market activities which are freely contracted. In cases where the end consumer uses thermal energy mostly for commercial purposes, the prices of all energy activities in central district heating systems are determined according to market principles, or 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)*. Furthermore, HERA has also adopted the *Methodology for Calculating the Charge for Connection to the Thermal Distribution Network and for Increase in the Connection Capacity (Official Gazette no. 42/16)*.

Changes to the legal framework in 2019

The Croatian government's *Legislative Activities Plan for 2018* includes the creation of a new **Thermal Energy Market Act**. Consequently, in July 2018, HERA received a **Draft Proposal of the Act on Amendments to the Thermal Energy Market Act** from the Ministry of Environment and Energy and subsequently provided an opinion on this proposal. However, these amendments were not adopted in 2018 or 2019. The Croatian government's *Legislative Activities Plan for 2020* also foresees the adoption of an **Act on Amendments to the Thermal Energy Market Act**.

As the provision of the **Gas Market Act** prescribing that the price of gas used to produce thermal energy for household end consumers is the same as the price of gas for household end consumers does not exist in the **Thermal Energy Market Act**, in line with the powers set out in the **Act on the Authority of the Croatian Government to Regulate Particular Issues under the Jurisdiction of Croatian Parliament through the Issuance of Regulations**, in August 2018, the Croatian government adopted the **Regulation on amendments to the Thermal Energy Market Act (Official Gazette no. 76/18)** before the Croatian Parliament continued with its regular sessions. In short, this **Regulation** ensured that thermal energy producers considered small or medium enterprises that are connected to the gas distribution system who purchase gas to produce thermal energy intended for household end consumers have the right to procure gas under regulated conditions until the gas market has been fully liberalised, i.e. until 31 March 2021. This ensured household thermal energy end consumers the same treatment as household gas end consumers.

As the **Act on Amendments to the Thermal Energy Market Act** was not adopted in 2019, the Croatian government reissued its **Regulation on amendments to the Thermal Energy Market Act (Official Gazette no. 86/19),** which represents a continuation of the previous **Regulation on amendments to the Thermal Energy Market Act (Official Gazette no. 76/18)**.

Regarding by-laws related to the district heating sector, the *Ordinance on the preparation of cost-benefit analyses* was adopted; this ordinance determines the detailed content of cost-benefit analyses within the framework of estimation national potential for heating and cooling on the state level. It also determines methodologies, assumptions, and principles that must be respected when making cost-benefit analyses for the use of a particular electricity and/or thermal energy production facility. *The Ordinance on criteria for issuing energy approvals for power plants* prescribes that those production facilities under the obligation to provide cost-benefit analyses as defined in the *Thermal Energy Market Act* must provide (inter alia) a cost-benefit analysis created according to the aforementioned **Ordinance** for an energy approval to be issued. Specifically, cost-benefit analyses must be created 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 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 industrial facilities.

Exemptions from obligatory cost-benefit analyses are identified in Article 15.13. and 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 HERA in 2013.

The Ordinance on the preparation of cost-benefit analyses was drafted in accordance with the provisions of *Directive 2012/27/EU, Directive 2018/2002/EU,* and *Commission Delegated Regulation 2019/826/EU.*

The Ordinance on criteria for issuing energy approvals for power plants adopted in early 2020 regulates the issuance of energy approvals for all production facilities that produce electricity or thermal energy (power plants, cogeneration facilities, boiler rooms). Said ordinance was adopted on the basis of the **Thermal Energy Market Act**, which prescribes that the same ordinance be used for the issuance of energy approvals for the construction of thermal energy production facilities.

In late 2018, the **Act on Amendments to the Energy Efficiency Act** entered into force; this act made significant changes to the energy savings obligation system, considering that the system had not been implemented since the adoption of the **Energy Efficiency Act** in 2014. The implementation of the energy efficiency obligation system thus began in 2019; it will be gradually implemented from 2019 to 2021 such that the number of bond parties in the system increases every year. Specifically, in 2019, the bond parties were energy suppliers and related persons who supplied a total of more than 300 GWh of energy in 2017; this limit has been reduced to 100 GWh in 2020, and will be finally lowered to the limit of 50 GWh in 2021.

Although the implementation of the energy efficiency obligation system was foreseen in *Directive 2012/27/EU*, which relates to energy efficiency, the outset of implementation in Croatia was marked with numerous difficulties and ambiguities. Firstly, the *Ordinance on the energy efficiency obligation system*, which provides a detailed elaboration of the energy savings obligation system, was only adopted in early May 2019. Due to the closure of the Centre for Monitoring Business Activities in the Energy Sector and Investments in 2018, the role of the National Coordinating Body for Energy Efficiency was taken over by a new, separate internal unit at the ministry competent for energy; this transition resulted in difficulties in implementing the System for Monitoring, Measuring, and Verification of Energy Savings (SMIV). Also, some energy suppliers were unprepared for this obligation, which represented a significant burden on their business. However, the key difficulty for energy suppliers was in the issuance of decisions in which the ministry competent for energy determines the obligations of a particular bond party. The transitional and final

provisions of the **Act on Amendments to the Energy Efficiency Act** prescribed that the decisions for obligations in 2019 should have been issued by 31 December 2018, however they were issued only at the very end of 2019.

The aforementioned difficulties, uncertainties in the issuance of decisions defining energy efficiency savings obligations for particular bond parties, and doubts as to the applicability of particular energy efficiency measures to prove savings resulted in the need for changes to the legal framework. In order to eliminate these difficulties, the **Act on Amendments to the Energy Efficiency Act (Official Gazette no. 25/20)** and the *Ordinance on the system for monitoring, measuring, and verifying energy savings* were adopted in early 2020.

8.2 Thermal Energy Sector: Organisation, Activities, and Indicators

8.2.1 Thermal system characteristics

Energy entities for thermal energy generation, distribution, and supply in Croatia provide the services of space heating and preparation of sanitary hot water for 157,000 end consumers, 95% of whom fall under the household category.

Thermal energy used for space heating and the preparation of sanitary hot water is produced in co-generation thermal power plants, as well as in local heating plants, i.e. separate boiler rooms.

In 2019, energy entities supplied more than 1,949 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 426 kilometres.

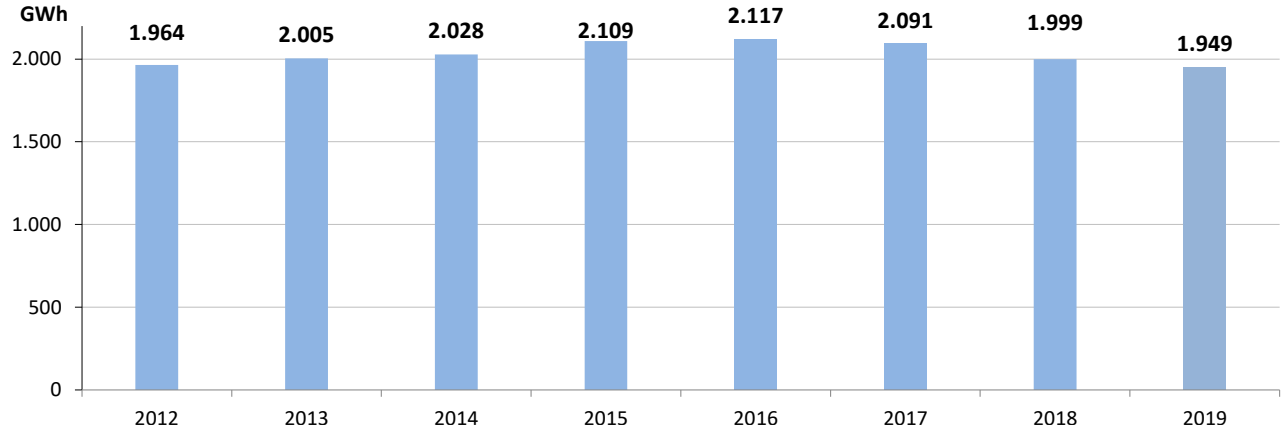


Figure 8.2.1. Supplied thermal energy in Croatia from 2012 to 2019

Table 8.2.1. contains data about 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 end consumers, the installed capacity of the thermal energy production facility, and contracted capacity in 2019.However, Table 8.2.1 does not include data pertaining to energy entities supplying thermal energy exclusively to non-household and commercial consumers, nor the data for energy entities who were not involved in this activity in 2019.

Average losses in thermal energy production and distribution for thermal systems, i.e. the energy entities from Table 8.2.1., amounted to 21.6% in 2019.

Average losses in the distribution networks in 2019 amounted to 19.4%; average losses in 2018 amounted to 18.8%.

Table 8.2.1. Data concerning energy entities in the thermal energy sector in 2019

Energy entity	Number of end consumers	Network length	Total installed capacity	Thermal energy production	Supplied thermal energy	Surface area	Fuel*
		km	MWt	GWh/y	GWh/y	m^2	
HEP-Proizvodnja d.o.o.			1,438.00	2,092.19			NG, FO
Zagreb			1,113.70	1,766.12			NG, FO
Osijek			213.30	233.02			NG, FO, biomass
Sisak			111.00	93.05			NG, biomass
HEP-Toplinarstvo d.o.o.	128,363	385.38	313.02	131.35	1,782.56	10,043,531	NG, FOEL, LFO
Zagreb	102,765	282.52	63.80	48.40	1,419.35	8,117,431	NG, FOEL
Osijek	11,793	56.89	140.50	4.31	216.12	1,108,331	NG, FOEL, LFO
Sisak	4,149	30.03	0.00	0.00	75.40	295,018	NG
Velika Gorica	5,902	10.22	69.61	50.36	46.30	334,891	NG, FOEL, LFO
Samobor	1,382	3.35	18.75	12.49	11.21	79,078	NG, FOEL
Zaprešić	2,372	2.37	20.36	15.78	14.20	108,782	NG, FOEL
Energo d.o.o., Rijeka	9,571	15.08	102.16	61.97	51.52	563,702	NG, FOEL, FO
Gradska toplana d.o.o., Karlovac	7,848	21.20	88.63	62.17	49.89	501,748	FO
Brod-plin d.o.o., Slavonski Brod	3,723	7.05	33.91	32.66	29.98	195,915	NG
Tehnostan d.o.o., Vukovar	3,708	7.22	37.99	19.04	16.02	205,937	NG, FO
Vartop d.o.o., Varaždin	928	1.57	25.13	5.75	5.64	48,250	NG
GTG Vinkovci d.o.o., Vinkovci	1,626	1.60	17.83	7.52	7.30	88,317	NG, FO
Poslovni park Virovitica d.o.o., Virovitica	444	0.90	4.08	2.99	2.99	28,311	NG
Komunalac d.o.o., Požega	417	0.61	4.00	2.17	1.89	19,839	NG
SKG d.o.o., Ogulin	90	0.58	4.40	0.86	0.86	6,483	LFO
TOTAL	**156,718**	**441.19**	**2,069.14**	**2,418.66**	**1,948.65**	**11,702,034**	

** NG – natural gas, FO – fuel oil, FOEL – fuel oil extra light, LFO – light fuel oil*

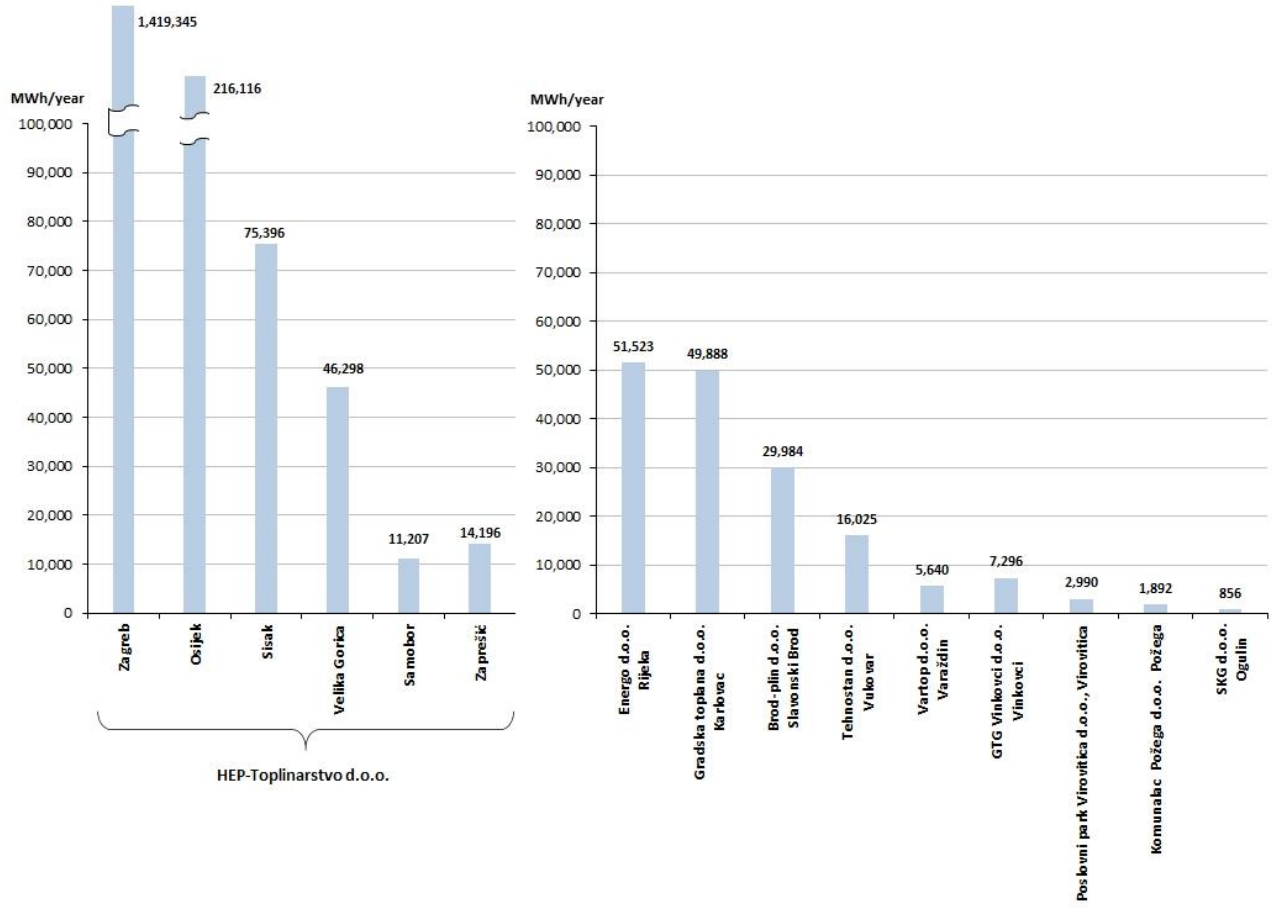


Figure 8.2.2. Supplied thermal energy in 2019

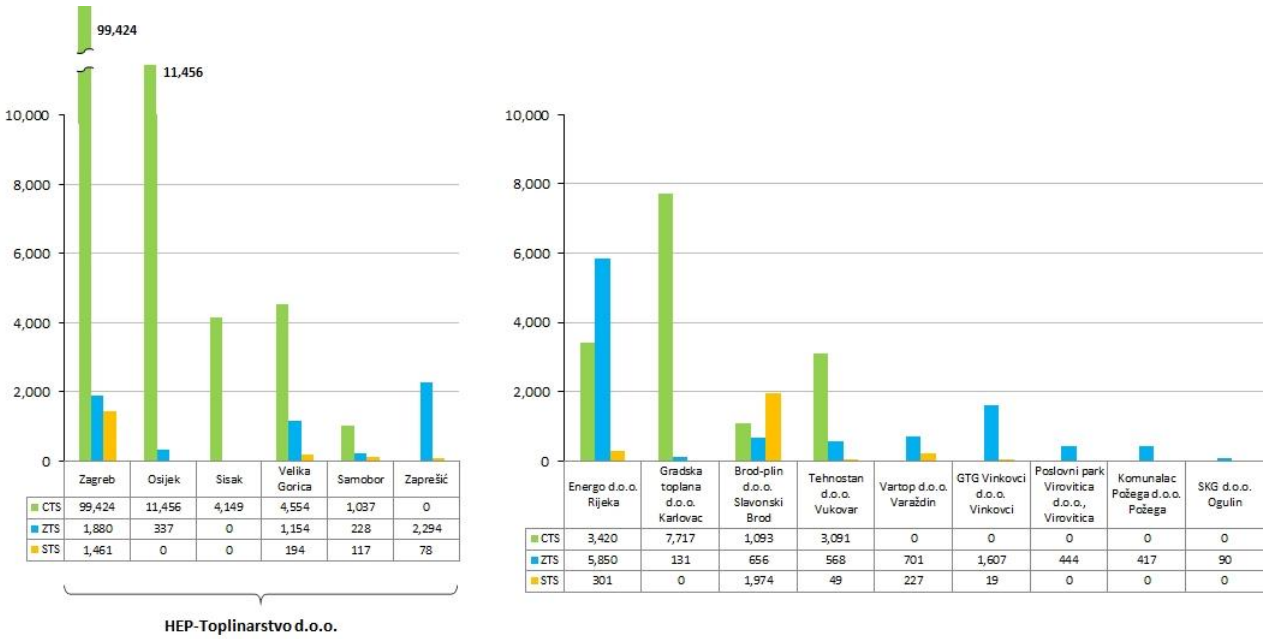


Figure 8.2.3. Number of end consumers in 2019

Most 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, it generates only a small portion of 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 2019, HEP-Proizvodnja d.o.o. delivered 2,092.19 GWh of thermal energy to HEP-Toplinarstvo d.o.o.

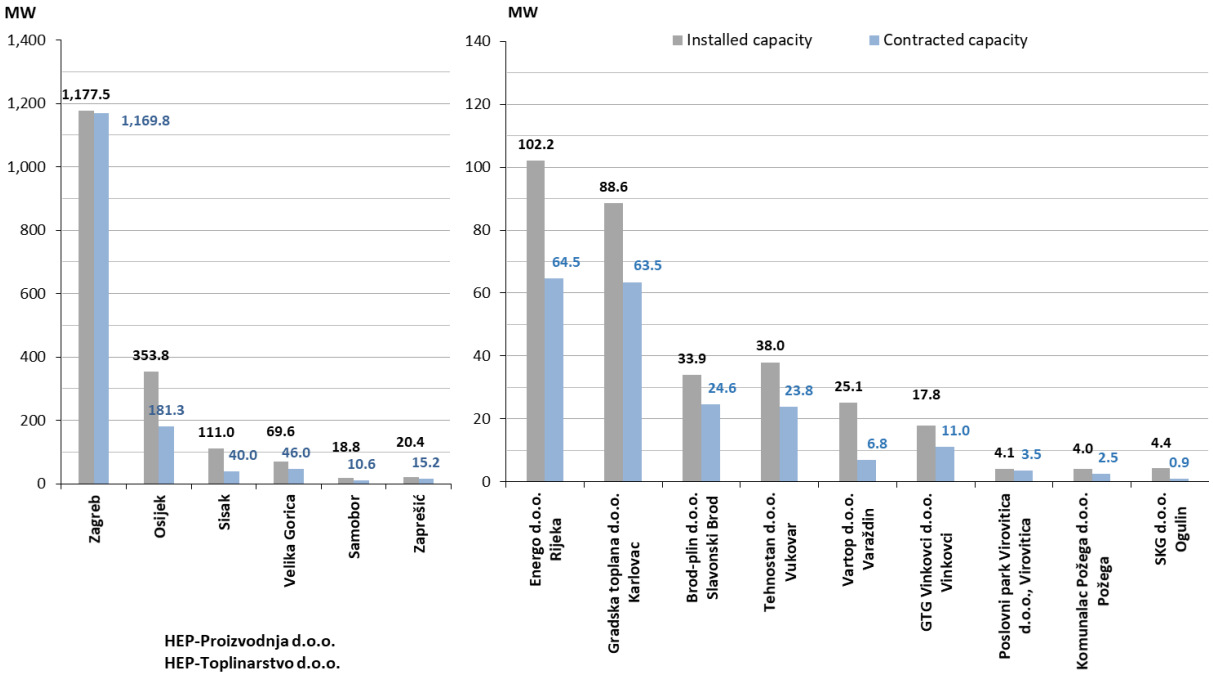


Figure 8.2.4. Installed capacity of thermal energy production facilities and contracted capacity in 2019

The majority of energy entities engaged in thermal energy production, distribution, and supply are mostly owned by units of local government or the state, while a smaller portion of 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, centralised district heating systems in Zagreb, Osijek, Sisak, Samobor, Velika Gorica, Rijeka, Karlovac, Slavonski Brod and Vukovar account for almost 87% of end consumer connections, 90% of surface area, and 93% of supplied thermal energy, as shown in Figure 8.2.5.

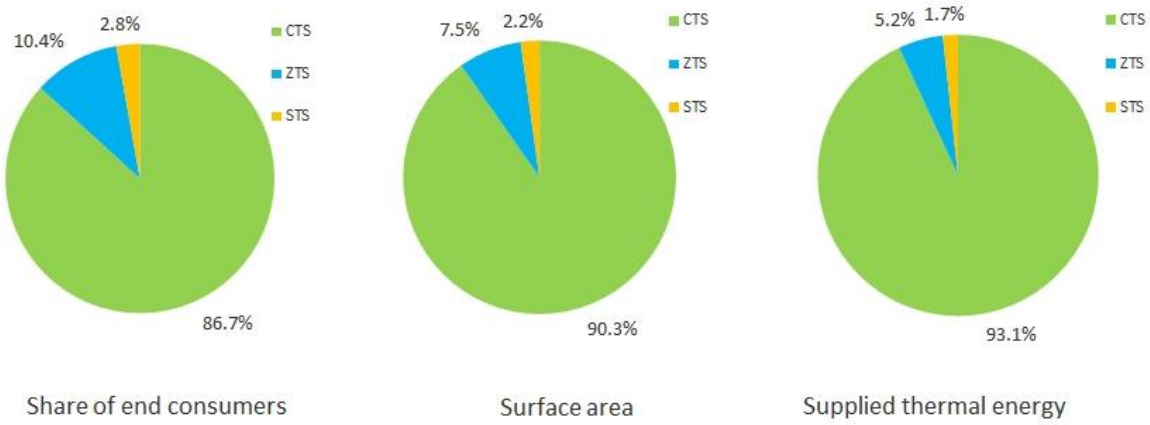


Figure 8.2.5. Share of end consumers, surface area, and supplied thermal energy per district heating system

8.2.2 Energy activities in the thermal energy sector

In 2019, 13 licences were issued for the performance of energy activities:

- six licenses for thermal energy production (BIO ENERGANA BJELOVAR d.o.o., Bjelovar; Elektrana Grubišno Polje d.o.o., Grubišno Polje; BIOMASS TO ENERGY ŽUPANJA d.o.o., Županja; Međunarodna zračna luka Zagreb d.d., Velika Gorica; Energija Gradec d.o.o., Zagreb; A&A BIOENERGY VIRO d.o.o., Darda),
- seven licenses for thermal energy supply (BIO ENERGANA BJELOVAR d.o.o., Bjelovar; Toplota Slatina d.o.o., Slatina; Elektrana Grubišno Polje d.o.o., Grubišno Polje; Međunarodna zračna luka Zagreb d.d., Velika Gorica; Energija Gradec d.o.o., Zagreb; ENNA Biomasa Vukovar d.o.o., Vukovar; A&A BIOENERGY VIRO d.o.o., Darda).

In 2019, 10 licences for the performance of energy activities were extended:

- five licenses for thermal energy production (PETROKEMIJA d.d., Kutina; GTG VINKOVCI d.o.o. Vinkovci; Brod-plin d.o.o., Slavonski Brod; VARTOP d.o.o., Varaždin; UNIVERZAL d.o.o., Varaždin),
- one license for thermal energy distribution (Brod-plin d.o.o., Slavonski Brod), and
- four licenses for thermal energy supply (Tehnostan d.o.o., Vukovar; INAS-INVEST d.o.o., Zagreb; POSLOVNI PARK VIROVITICA d.o.o., Virovitica; TI-SAN d.o.o., Sveta Nedelja).

In 2019, 7 licences for the performance of energy activities expired:

- two licences for thermal energy production (PLIN VTC d.o.o., Virovitica; GKP ČAKOM d.o.o., Čakovec),
- two licences for thermal energy distribution (PLIN VTC d.o.o., Virovitica; GKP ČAKOM d.o.o., Čakovec), and
- three licenses for thermal energy supply (ZRAČNA LUKA ZAGREB d.o.o., Velika Gorica; PLIN VTC d.o.o., Virovitica, GKP ČAKOM d.o.o., Čakovec).

As of 31 December 2019, the number of licences in the thermal energy sector was as follows:

- 32 licenses for thermal energy production,
- 7 licenses for thermal energy distribution, and
- 26 licenses for thermal energy supply.

New licenses for thermal energy production and thermal energy supply, aside from Međunarodna zračna luka Zagreb d.d., 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 HERA has issued decisions on eligible electricity producer status.

Pursuant to the **Thermal Energy Market Act**, HERA manages a register of thermal energy buyers, which is accessible on its website. Four new businesses were recorded in the Register of Thermal Energy Buyers in 2019, while one business was deleted from the register. As of 31 December 2019, 42 businesses were recorded in the register (legal and natural persons). In addition to this register, 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.

In addition, in line with the regulations governing the renewable energy and cogeneration incentives system, 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 2019, HERA issued 33 decisions affirming the total annual efficiency of such facilities, as well as six decisions affirming primary energy savings for 2018.

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*, 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 centralised heating systems did not submit any requests to determine tariff amounts for thermal energy production and thermal energy distribution in 2019. However, the *Methodology for setting tariffs for thermal energy production* provides for a simplified procedure for changing tariffs in case of changes in the price of fuel used for thermal energy production. In 2019. HERA received a total of six such requests for changes in energy tariff items submitted by four energy entities (one request each from BROD-PLIN d.o.o., Slavonski Brod and GRADSKA TOPLANA d.o.o, Karlovac, as well as two requests each from TEHNOSTAN d.o.o., Vukovar, and ENERGO d.o.o., Rijeka). These requests resulted in two increases in tariff items in 2019 (an increase of 7.35% for households in Slavonski Brod and an increase of 6.29% for households in Karlovac), as well as two increases in 2020 (an increase of 6.82% for households and an increase of 6.82% for non-household and business consumers in the Gornja Vežica centralised heating system in Rijeka). In the case of the two requests from TEHNOSTAN d.o.o., no increases in tariff items resulted for the two centralised heating systems in Vukovar.

Table 8.2.2. shows tariff amounts for thermal energy production and thermal energy distribution for centralised heating systems as of 31 December 2019. 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 centralised 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 which are contracted freely.

Table 8.2.2. Amounts of tariff items for thermal energy generation and thermal energy distribution for centralised heating systems as of 31 December 2019 (net of VAT)

Energy entity	Centralised heating system	Tariff groups (Tg)*	Tariff models (TM)**	Tariff amounts as of 31 December 2019					
				Production		Distribution		Prod. + dist.	
				Energy [HRK/kWh] *[HRK/t]*	Capacity [HRK/kW] *[HRK/t/h]*	Energy [HRK/kWh] *[HRK/t]*	Capacity [HRK/kW] *[HRK/t/h]*	Energy [HRK/kWh] *[HRK/t]*	Capacity [HRK/kW] *[HRK/t/h]*
Energo d.o.o., Rijeka	GORNJA VEŽICA	Tg1	TM1	0.2772	9.50	0.0500	4.00	0.3272	13.50
		Tg2	TM2	0.2772	9.50	0.0500	4.00	0.3272	13.50
	VOJAK	Tg1	TM1	0.2912	11.00	0.0500	5.50	0.3412	16.50
		Tg2	TM2	0.2912	11.00	0.0500	5.50	0.3412	16.50
Gradska toplana d.o.o., Karlovac	TINA UJEVIĆA	Tg1	TM1	0.2619	11.60	0.0400	4.40	0.3019	16.00
		Tg2	TM2	0.3669	12.60	0.0400	4.40	0.4069	17.00
Brod-plin d.o.o., Slavonski Brod	SLAVONIA	Tg1	TM1	0.2526	11.60	0.0500	5.20	0.3026	16.80
		Tg2	TM2	0.3096	11.60	0.0500	5.20	0.3596	16.80
Tehnostan d.o.o., Vukovar	BOROVO NASELJE	Tg1	TM1	0.2686	9.50	0.0470	5.00	0.3156	14.50
		Tg2	TM2	0.3921	9.50	0.0470	5.00	0.4391	14.50
	OLAJNICA	Tg1	TM1	0.2696	9.50	0.0470	5.00	0.3166	14.50
		Tg2	TM2	0.3929	9.50	0.0470	5.00	0.4399	14.50
HEP-Toplinarstvo d.o.o., Zagreb	SAMOBOR	Tg1	TM1	0.2605	7.24	0.0395	3.73	0.3000	10.97
		Tg2	TM2	0.2952	7.69	0.0448	3.97	0.3400	11.66
	VELIKA GORICA	Tg1	TM1	0.2760	7.88	0.0240	3.27	0.3000	11.15
		Tg2	TM2	0.3128	8.97	0.0272	3.73	0.3400	12.70
	DUBRAVA	Tg1	TM1	0.1569	3.96	0.0131	2.64	0.1700	6.60
		Tg2	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	Tg1	TM1	0.1525	2.30	0.0175	3.45	0.1700	5.75
		Tg2	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	Tg1	TM1	0.1492	4.32	0.0108	4.11	0.1600	8.43
		Tg2	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	Tg1	TM1	0.1089	3.44	0.0711	4.11	0.1800	7.55
		Tg2	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*

* Tariff groups are Tg1 - Households and Tg2 - Industry and business consumers

** Tariff models are: TM1 - Hot/warm water (in HRK/kWh), TM2 - Hot/warm water (in HRK/kWh), and TM3 - Technological steam (in HRK/t)

*** Tariff items for the production of thermal energy have been determined for HEP-Proizvodnja d.o.o., Zagreb, which delivers thermal energy from its cogeneration plants for the needs of the end consumers of HEP-Toplinarstvo d.o.o.

A chart showing the average shares of individual components in the total price of thermal energy for household end consumers for centralised heating systems in Croatia is given in Figure 8.2.6. Shares of different thermal energy price components were calculated based on the data on supplied thermal energy, connection capacity, surface area, and number of end consumers for each centralised heating system in 2019, tariffs for the production and distribution of thermal energy, charges for thermal energy supply, and charges for thermal energy buyers.

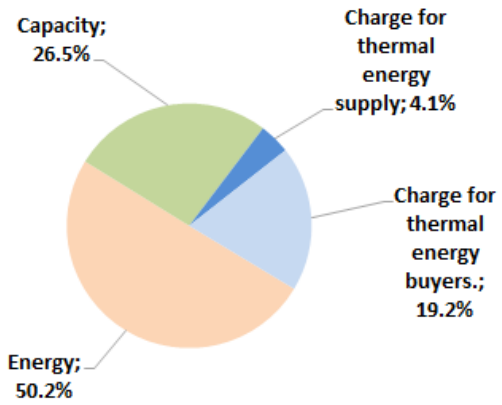
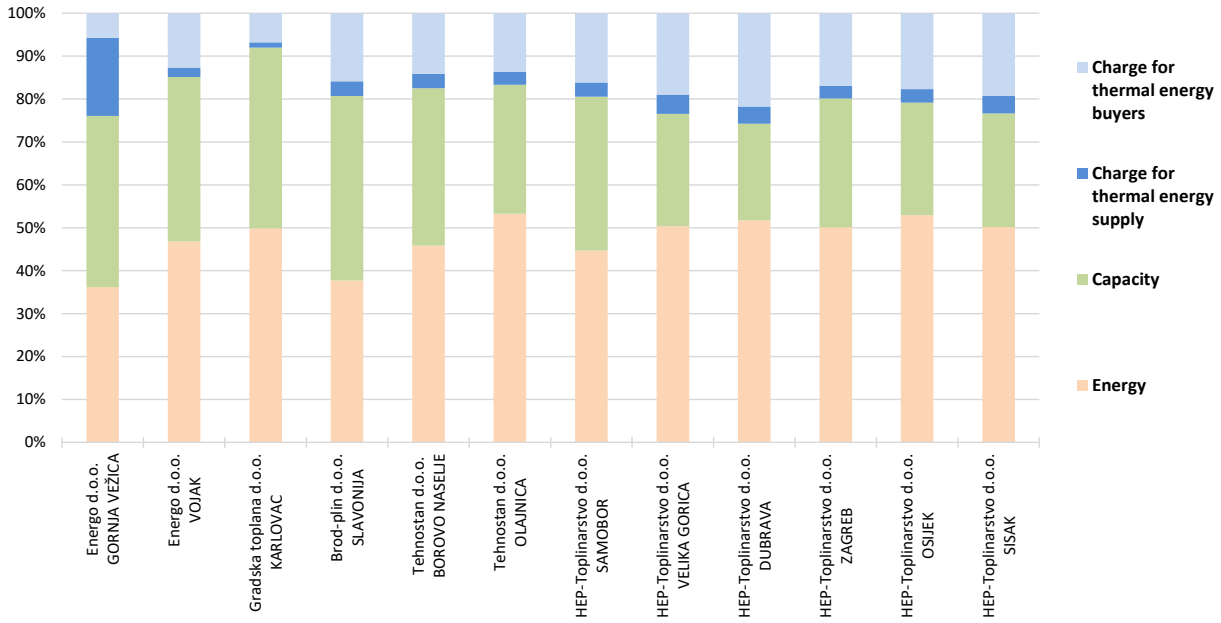


Figure 8.2.6. Average shares of individual components in the total price of thermal energy for household end consumers of centralised heating systems

Figure 8.2.6. shows that the average regulated portion of the thermal energy price for all centralised heating systems amounts to around 77%.

Figure 8.2.7. provides a more detailed breakdown of the total price of thermal energy and its different components for household end consumers across centralised heating systems in Croatia in 2019.



Charge for thermal energy buyers	5.7%	12.7%	6.8%	15.9%	14.2%	13.7%	16.2%	19.0%	21.8%	16.9%	17.7%	19.2%	Market share
Charge for thermal energy supply	18.2%	2.2%	1.3%	3.4%	3.3%	3.0%	3.3%	4.5%	4.0%	3.0%	3.2%	4.1%	
Capacity	39.8%	38.3%	42.1%	43.0%	36.7%	30.1%	35.9%	26.1%	22.5%	30.0%	26.2%	26.5%	Regulated share
Energy	36.2%	46.8%	49.8%	37.7%	45.8%	53.2%	44.7%	50.4%	51.7%	50.1%	52.9%	50.2%	

Figure 8.2.7. Shares of particular components in the total price of thermal energy for the end consumers in the household category for particular centralised heating systems in 2019

Pursuant to the **Thermal Energy Market Act**, in individual heating systems and closed heating systems, the prices of thermal energy delivered to thermal energy buyers and end consumers are formed freely in accordance with market conditions. Given that HERA does not define any of the components of thermal energy prices for closed and individual 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

In the thermal energy sector, HERA received 60 submissions in 2019, of which 53 submissions (two appeals, 25 complaints, 23 inquiries, and three other submissions) were related to district heating; seven inquiries were related to the acquisition of eligible electricity producer status for cogeneration plants. Submissions were submitted by thermal energy end consumers, authorised representatives of co-owners, energy entities, thermal energy buyers, institutions and other parties.

Table 8.2.3. divides among the 53 submissions related to district heating according to their content (regardless of the type of submission). Compared to the previous period, and especially 2015. and 2016. which were marked by requests of end consumers and other legal and natural persons for opinions and interpretations of the **Thermal Energy Market Act** and by-laws, the submissions received in 2019 (as in 2018) show a significant decline in the number of requests for interpretation of legislation and complaints in general. Instead, 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 centralised heating was 7% lower than in the previous year.

Table 8.2.3. Submissions (appeals, complaints, inquiries) regarding district heating received in 2019

Description	Number	Proportion
Billing complaints	12	23%
Complaints related to payment of the fixed part of the thermal energy price	5	9%
Complaints regarding disconnection from the district heating system	4	8%
Complaints related to the actions of thermal energy buyers	9	17%
Complaints related to heat cost allocator installation and reading	6	11%
Requests for HERA's opinion/interpretation/instruction	14	26%
Other	3	6%
Total	**53**	**100%**

In addition to the submissions shown above related to the district heating system and energy activities in the district heating sector, in 2019, HERA also received seven inquiries related to the acquisition of eligible electricity producer status for cogeneration plants.

In 2019, supervision of energy entity TEHNOSTAN d.o.o., Vukovar was completed; it had begun in 2018 due to a complaint from a thermal energy end consumer. More specifically, HERA had received complaints from a large number of end consumers who had been disconnected from the district heating system, as well as complaints from owners of independent heating units who were not clients of TEHNOSTAN d.o.o. as end consumers, but who had first received notifications from this energy entity in October 2017, which were followed by decisions in May 2018, and finally invoices for fixed costs and accompanying costs for energy from shared thermal energy consumption. Given that TEHNOSTAN d.o.o. did not act in accordance with HERA's opinion on the aforementioned notifications and decisions, HERA launched an inspection. Following supervision of TEHNOSTAN D.O.O, Vukovar, HERA enacted a Decision on the supervision of energy entity TEHNOSTAN d.o.o. on 8 April 2019. HERA established that energy entity TEHNOSTAN

d.o.o. in the aforementioned cases did not act in compliance with Article 45 of the **Thermal Energy Market Act** and Article 18 of the *General requirements for thermal energy supply (Official Gazette no. 35/14 and 129/15)*, and consequently issued a decision instructing TEHNOSTAN d.o.o. to re-examine its actions by determining the factual situation for each individual case and apply all relevant provisions, also taking HERA's opinion into consideration. The decision was published on HERA's website. Following the decision, HERA continued to monitor the implementation of the decision.

The supervision of TEHNOSTAN d.o.o., Vukovar was the first supervision undertaken in accordance with the **Act on Amendments to the Act on the Regulation of Energy Activities (Official Gazette no. 68/18)**, which introduced significant changes in the implementation of supervision.

Most complaints in 2019 related to allocating and calculating costs of supplied thermal energy, as well as obligations imposed on thermal energy buyers, authorised representatives of co-owners of independent heating units within a building/structure, and persons in charge of reading heat cost allocators did not fall within the framework of HERA's powers, jurisdiction, and responsibilities as prescribed by laws and by-laws governing the energy sector. However, the State Inspectorate began operating in 2019, which includes an energy inspection unit for district heating and the gas market. The tasks of the energy inspection unit for district heating and the gas market include, inter alia, inspection of the implementation of legislation that determine:

- 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 requirements for the security, reliability, consistency, and quality of thermal energy supply, as well as professional management, handling and maintenance of internal installations and all equipment located at the internal installation, and
- measures to protect end consumers of thermal energy, as well as the powers and responsibilities of co-owners and end consumers of thermal energy.

8.2.5 Energy efficiency in district heating systems

Energy efficiency in tariff systems

As explained in chapter 8.1., 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. Therefore, the final price of thermal energy in district heating systems is only partly regulated, as 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 individual decisions on the amount of tariffs for thermal energy production and thermal energy distribution for individual central district heating systems are available on 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. In principle, revenue from the energy tariff should cover variable energy costs, while revenue from the power tariff should cover fixed costs. The power 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*, 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, however up to a maximum of 18%. In exceptional cases, HERA may approve larger losses in the distribution network, considering the specific business conditions and characteristics of the distribution network, whereby the thermal energy distributor is required to provide an operative plan to reduce 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, HERA will confirm these losses. Based on an analysis of variable costs and calculated losses in thermal energy production, HERA can rule a part of the amount of variable costs as justifiable, considering the specificity of business conditions and the characteristics of production facilities.

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. Prior to the entry into force of the **Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette 100/15)** on 1 January 2016, a similar provision was included in the **Electricity Market Act (Official Gazette no. 22/13)**.

Until the adoption of the provisions of Article 25 of the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, eligible electricity producer status was regulated by the *Ordinance on attaining eligible electricity producer status (Official Gazette no. 132/13, 81/14, 93/14, 24/15, 99/15, and 110/15)*. Prior to this, eligible electricity producer status was regulated by the *Ordinance on attaining eligible electricity producer status (Official Gazette no. 88/12)* and the *Ordinance on attaining eligible electricity producer status (Official Gazette no. 67/07 and 35/11)*.

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 EU acquis related to high-efficiency cogeneration.

The current EU regulation framework for defining primary energy savings was defined in the aforementioned *Directive 2012/27/EU*, *Directive (EU) 2018/2002*, and the following acts:

- *Commission Delegated Regulation (EU) 2015/2402 of 12 October 2015 reviewing harmonised efficiency reference values for separate production of electricity and heat in 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/EC: 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).*

The aforementioned framework is derived from the prior framework for cogeneration as defined in *Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC*, which was replaced with *Directive 2012/27/EU* in 2012.

On the basis of the aforementioned ordinances on eligible electricity producer status, HERA has issued decisions on eligible electricity producer status for six natural gas cogeneration facilities (shown in Table 8.2.4.). For all six of these cogeneration facilities, corresponding electricity buy-off agreements have been concluded with HROTE (all six facilities are in the electricity production incentives system).

Table 8.2.4. Decisions awarding eligible electricity producer status for high-efficiency cogeneration facilities

Eligible producer	Name of facility	Power [MW] (electricity)	Power [MW] (thermal energy)	Date of decision
TERMOPLIN d.d.	TERMOPLIN cogeneration facility	0.033	Not indicated in decision	26 July 2010
Hrvatska industrija šećera d.d. (transferred from SLADORANA d.d.)	Sladorana d.d. cogeneration facility	10.000	Not indicated in decision	29 July 2010
ENERGO d.o.o., Rijeka	Energy facility next to Kantrida indoor swimming pool	0.460	0.720	28 March 2011
OSATINA GRUPA d.o.o., Semeljci	Greenhouse for hydroponic tomato production with ancillary facilities	0.650	1.208	29 May 2013
OSATINA GRUPA d.o.o., Semeljci	Tomašanci cogeneration facility 1 MW + 1 MW	1.800	2.416	12 June 2014
HEP-Proizvodnja d.o.o., Zagreb	Combined cogeneration Block L, 100 MWe/80 MWt at TETO Zagreb	100.000	80.000	26 July 2016

In accordance with the *Ordinance on attaining eligible electricity producer status*, HERA conducts yearly supervision of primary energy savings and issues decisions affirming the amount of primary energy savings for individual cogeneration facilities.

In 2019, HERA issued decisions affirming primary energy savings for 2018 for all six cogeneration facilities; all facilities attained primary energy savings higher than the minimum required amount. These decisions were published on HERA's website.

In accordance with the *Memorandum of understanding on mutual data exchange* concluded between HERA and the Croatian Bureau of Statistics on 12 June 2017, HERA delivered aggregate data on primary energy savings for the six 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*. As HERA does not determine primary energy savings for all cogeneration facilities, but rather only for cogeneration facilities that have been awarded eligible electricity producer status, the Bureau of Statistics obtains data on primary energy savings for the remaining facilities directly from producers.

According to the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, when electricity delivered from production facilities into the electricity grid must be limited, the transmission system operator or the distribution system operator are required to ensure that production facilities with eligible producer status have priority over other production facilities for delivery of electricity into the grid, unless such priority delivery significantly undermines the reliability and stability of the electricity. In other words, cogeneration facilities with eligible electricity producer status have priority in delivery. Similar provisions exist in the **Thermal Energy Market Act** and the **Electricity Market Act**.

Aside from this, HERA determines the total yearly energy efficiency for biomass and biogas cogeneration facilities that have concluded electricity buy-off agreements on the basis 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) 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).* Total yearly energy efficiency is defined on the yearly level as efficiency in converting primary fuel energy into electricity and useful heat.

Energy efficiency commitment system

The functioning and legislative framework for the energy efficiency obligation system was described in chapters 2.4., 4.6., 5.5., and 8.1.; as previously explained, implementation began in 2019.

As the energy efficiency obligation system is being gradually implemented, in 2019, bond parties were energy suppliers and related persons who supplied a total of more than 300 GWh of energy to end consumers in 2017. Due to these limits, the only entities in the thermal energy sector who were subject to this requirement in 2019 were HEP-Toplinarstvo d.o.o., Zagreb and Brod-plin d.o.o., Slavonski Brod.

It should be noted that Brod-plin d.o.o. was a bond party in 2019, as it was simultaneously a thermal energy supplier and a gas supplier; as a result, the total delivered gas and thermal energy to end consumers in 2017 (delivery according to which the obligation for 2019 was determined) was higher than the prescribed limit. In 2020, in addition to the aforementioned energy entities, ENERGO d.o.o. Rijeka will also become a bond party due to the lowered limit.

The final threshold of 50 GWh for bond parties that will be implemented in 2021 and beyond is a relatively high threshold for thermal energy suppliers, except for thermal energy suppliers in large cities. Thus, this obligation will only encompass a few energy entities in the thermal energy sector. Additionally, although it is unclear whether the definition of energy suppliers/bond parties in the **Energy Efficiency Act** also encompasses thermal energy buyers, if large energy entities that undertake thermal energy buyer activities in their district heating systems are excluded, the remaining thermal energy buyers are far below the aforementioned threshold.

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10 ABBREVIATIONS AND GLOSSARY

4M MC	and/or 4M MC Project – Four Markets Market Coupling Project (project entailing the coupling of day-ahead markets between Hungary, Slovakia, Czech Republic, and Romania)
10G	10-year plan
AAC	Already Allocated Capacity
ACER	Agency for the Cooperation of Energy Regulators
aFRR	Automatic Frequency Restoration Reserve
AGEN-RS	Slovenian national energy regulator
Aggregator	Legal person that brings together various technical units into a group with the aim of providing imbalance settlement on the reserve energy and balancing energy market
AIB	Association of Issuing Bodies
AIT	Average Interruption Time
ARIS	ACER's platform for data reception, data processing, and report creation
AZU	Croatian Hydrocarbon Agency
BI	Business Intelligence
Bidding zone	Bidding zone
BSP	Slovenian Electricity Exchange
CAPEX	Capital expenditures
CEER	Council of European Energy Regulators
CEF	Connecting Europe Facility (a key EU financing instrument that promotes growth, employment, and competition through targeted investments into infrastructure on the European level)
CEGHIX	Central European Gas Hub AG - CEGHIX®" price index
CEP	Clean Energy Package – The "Clean energy for all Europeans" package
CEREMP	Centralised European Register of Energy Market Participants
CESEC	Central and South Eastern Europe Connectivity
CHP	Cogeneration through combined heat and power
Core region	Region in the EU for the calculation of transmission capacities determined by borders and not by bidding zones, and which 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
Core FB MC	Core Flow-based Market Coupling
CROPEX	Hrvatska burza električne energije d.o.o. (Croatian electricity exchange)
CDHS	Centralised heating system
DA	Distribution area
EES	Electricity consent
EEA	European Economic Area
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
Energy	Energy Not Supplied

ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSOG	European Network of Transmission System Operators for Gas
EOTRP	Study on the optimal technical solution for network connection
EQS WS	CEER's Energy Quality of Supply Work Stream
ESO EAD	Bulgarian Electricity System Operator EAD
EU	European Union
EUPHEMIA	Algorithm for calculating prices on the electricity market
EUROSTAT	Statistical office of the European Union
Ex-ante	The term ex-ante is 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	The term ex-post is 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	System or incentive mechanism with a guaranteed purchase price
FGSZ Ltd.	Hungarian transmission system operator
Fund	Environmental Protection and Energy Efficiency Fund
FRR	Frequency Restoration Reserve
GCV	Gross calorific value of gas under normal conditions – heat freed during the complete combustion of natural gas in air, at a combustion temperature of 25°C and a natural gas temperature of 0°C
GRI SSE	Gas Regional Initiative South South East
HANDA	Hrvatska agencija za obvezne zalihe nafte i naftnih derivata (Croatian Agency for Required Stocks of Crude Oil and Petroleum Products)
HEPP	Hydroelectric power plant
HEP d.d.	Hrvatska elektroprivreda – dioničko društvo
HEP-ODS	HEP-Operator distribucijskog sustava d.o.o.
HERA	Croatian Energy Regulatory Agency
HHI	Herfindahl – Hirschman index
HOPS	Hrvatski operator prijenosnog sustava d.o.o.
HROTE	Hrvatski operator tržišta energije d.o.o.
HTLS	High-temperature Low-sag
HUDEX	Hungarian Derivative Energy Exchange
HUPEX	Hungarian electricity exchange
IBWT	Italian Borders Working Table
IGCC	International Grid Control Cooperation
IN	Imbalance Netting
INA d.d.	Industrija nafte d.d.
iPLIN	An application available on HERA's website – calculator for household gas consumers using gas supply as a public service
ISO codes	ISO state and 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
IT	Information Technology
ITC	and/or ITC agreement- Compensation mechanism between European transmission system operators
ITO	Independent Transmission Operator
JANAF	Jadranski naftovod d.d.
JAO	Joint Allocation Office
Commission	European Commission
LCOE	Levelised Cost of Electricity
LFC	Load Frequency Control
LIP	Local Implementation Project
MAIFI	Momentary Average Interruption Frequency Index
MARI	Manually Activated Reserves Initiative
MC	Market Coupling
MEDREG	Mediterranean Energy Regulators
mFRR	Manual Frequency Restoration Reserve
MRC	Multi-Regional Coupling
RMS	Reducing and metering station
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
NIS Directive	Directive (EU) 2016/1148 concerning measures for a high common level of security of network and information systems across the Union
LV	Low voltage level / low voltage network
NPF	National policy framework for establishing infrastructure and developing the alternative transport fuels market
LT	Lower daily tariff
NTC	Net Transfer Capacity
RSE	Renewable sources of energy
BMP	Billing metering point
Open Season	Call for subscription/participation in an allocation mechanism based on requirements that enable the transparent and non-discriminatory allocation of capacity for access to infrastructure and dimensioning of supply according to demand
OUJU	Public service suppliers
WMS	Wholesale gas market supplier
PCI	Projects of Common Interest
PCR	Price Coupling of Regions
PEEA	Preliminary electricity consent
PhF	Physical Futures Market
PICASSO	Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation

PPS	Purchasing Power Standards
PRISMA	Platforms for capacity interconnections gas transmission system
PSP Okoli	Okoli - Podzemno skladište plina d.o.o.
RBP	Platforms for capacity interconnections gas transmission system
RCC	Regional Coordinating Centre
RES	Renewable energy sources
RHE	Reversible hydroelectric power plant
RES&C Register	Register of renewable energy sources and cogeneration, and eligible producers
ROMM	Register of billing metering points
RSI	Residual Supply Index
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
Council	Regulatory Affairs and Consumer Protection Council
SCADA	Supervisory Control and Data Acquisition System
SBU	Standard bundled unit
SEE	South East Europe
SEE CAO	South East Europe Coordinated Auction Office
SHB	Regulatory block that includes Slovenia, Croatia, and Bosnia and Herzegovina.
SINCRO.GRID	A project financed by CEF. The goal of the project is to improve the voltage quality in the electric power system and use the dynamic transmission capacity of existing transmission lines by using advanced technical systems and algorithms.
Smart grid	Smart grid
SMTA	Short and Medium Term Adequacy (ENTSO-E pilot project to analyse short-term and mid-term supply security)
SMIV	System for measuring and verifying energy savings
MV	Medium voltage level / medium voltage network
SODO	Distribution System Operators Association
SOR	System Operation Region
Strategy	Energy Development Strategy of the Republic of Croatia until 2030 with a view to 2050 (Official Gazette, no. 25/20)
IHS	Individual heating system
SUKAP	Yearly, quarterly, monthly, daily and intraday capacity management system
TERRE	Trans European Replacement Reserves Exchange
TM	Tariff model
TR	Installed transformer power
TRM	Transmission Reliability Margin
TS	Transformer station
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)
TSCNET	Regional Security Coordinator (RSC) Service for the TSOs in Central and South Eastern Europe
TTF	Title Transfer Facility
TYNDP 2018	Ten-Year Network Development Plan for the European Union transmission network from 2018

PES	Primary Energy Savings
LPG	Liquefied petroleum gas
LNG	Liquefied Natural Gas
CACM Regulation	Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management
DCC Regulation	Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a network code on demand connection
EBGL Regulation	Commission Regulation (EU) 2017/2195 establishing a guideline on electricity balancing
ERNC Regulation	Commission Regulation (EU) 2017/2196 establishing a network code on electricity emergency and restoration
FCA Regulation	Commission Regulation (EU) 2016/1719 establishing a guideline on forward capacity allocation
HVDC Regulation	Commission Regulation (EU) on establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules
NC TAR Regulation	Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas
REMIT regulation	Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency
RFG Regulation	Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators
SOGL Regulation	Commission Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation
HV	High voltage level / high voltage network
HT	High daily tariff item
VTP	VTPVirtual 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 – LICENSES FOR THE PERFORMANCE OF ENERGY ACTIVITIES

List of licences issued from 01/01/2019 to 31/12/2019	No. of issued licences
Electricity production	**6**
GEOEN d.o.o. za energetiku i graditeljstvo Gajevat ulica 59 10000 Zagreb, Croatia	
ENERGOSTATIK društvo s ograničenom odgovornošću za proizvodnju, trgovinu i usluge Damir Tomljanovića Gavrana 17 10000 Zagreb, Croatia	
BIOMASS TO ENERGY ŽUPANJA društvo s ograničenom odgovornošću za proizvodnju energije Industrijska 7 32270 Županja, Croatia	
A&A BIOENERGY VIRO d.o.o. za proizvodnju energije Osječka 69 31326 Darda, Croatia	
C.E.M.P. d.o.o. za razvoj i izgradnju energetskih objekata i proizvodnju energije iz obnovljivih izvora Trgovačka ulica 3 10255 Donji Stupnik, Croatia	
VJETROPARK JASENICE d.o.o. za proizvodnju i distribuciju električne energije iz obnovljivih izvora Podudbina 15 53234 Udbina, Croatia	
Electricity trade	**5**
JAS Budapest Kereskedelmi és Szolgáltató Zrt. Mogyoródi út 168 1141 Budapest, Hungary	
ADRIA SOL d.o.o. za proizvodnju, trgovinu i usluge Industrijska zona bb 51223 Kukuljanovo, Croatia	
E D F TRADING LIMITED 80 Victoria Street, Cardinal Place, 3rd floor London SW1E 5JL, United Kingdom	
ELECTRADE S.P.A. Via Nonis 68/A 36063 Marostica (VI), Italy	
Petrol d.d., Ljubljana Dunajska cesta 50 1000 Ljubljana, Slovenia	
Gas trade	**2**
WIEE Hungary Kft. Váci út 37 1134 Budapest, Hungary	
ERDAL TRADING LTD 53, Office 2, Sir Adrian Dingli Street Silema SLM 1092, Malta	
Gas supply	**1**

List of licences issued from 01/01/2019 to 31/12/2019	No. of issued licences
BUTAN PLIN d.o.o. za trgovinu nafte i naftnim derivatima na veliko i malo Ulica rijeke Dragonje 23 52466 Novigrad, Croatia	
Thermal energy production	**6**
BIO ENERGANA BJELOVAR d.o.o. za proizvodnju električne i toplinske energije, distribuciju usluge i trgovinu Ulica hrvatskog proljeća 3, 43000 Bjelovar, Croatia	
ENERGOSTATIK društvo s ograničenom odgovornošću za proizvodnju, trgovinu i usluge Damir Tomljanovića Gavrana 17, 10000 Zagreb, Croatia *Napomena: Firm changed to Elektranu Grubišino polje d.o.o*.	
BIOMASS TO ENERGY ŽUPANJA društvo s ograničenom odgovornošću za proizvodnju energije Industrijska 7 32270 Županja, Croatia	
Zagreb International Airport Ulica Rudolfa Fizira 1 10410 Velika Gorica, Croatia	
Energija Gradec d.o.o. Trg Dražena Petrovića 3 10000 Zagreb, Croatia	
A&A BIOENERGY VIRO d.o.o. za proizvodnju energije Osječka 69 31326 Darda, Croatia	
Thermal energy supply	**7**
BIO ENERGANA BJELOVAR d.o.o. za proizvodnju električne i toplinske energije, distribuciju usluge i trgovinu Ulica hrvatskog proljeća 3 43000 Bjelovar, Croatia	
Toplota Slatina d.o.o. za proizvodnju, trgovinu i usluge Trg sv. Josipa 10 33520 Slatina, Croatia	
ENERGOSTATIK društvo s ograničenom odgovornošću za proizvodnju, trgovinu i usluge Damir Tomljanovića Gavrana 17, 10000 Zagreb, Croatia *Napomena: Firm changed to Elektranu Grubišino polje d.o.o*.	
Zagreb International Airport Ulica Rudolfa Fizira 1 10410 Velika Gorica, Croatia	
Energija Gradec d.o.o. Trg Dražena Petrovića 3 10000 Zagreb, Croatia	
ENNA Biomasa Vukovar d.o.o. za proizvodnju i usluge Gospodarska zona 13 32000 Vukovar, Croatia	
A&A BIOENERGY VIRO d.o.o. za proizvodnju energije Osječka 69 31326 Darda, Croatia	
Wholesale trade in biofuels	**1**
CRODUX DERIVATI DVA društvo s ograničenom odgovornošću za trgovinu naftnim derivatima i plinovima Savska Opatovina 36 10090 Zagreb, Croatia	

List of licences issued from 01/01/2019 to 31/12/2019	No. of issued licences
Storage of biofuels	**1**
TANKERKOMERC d.d. za trgovinu, turizam i usluge Obala Kneza Trpimira 2 23000 Zadar, Croatia	
Wholesale trade in petroleum products	**5**
PRVO PLINARSKO DRUŠTVO d.o.o. za uvoz, opskrbu i trgovinu plinom Gospodarska zona 13 32000 Vukovar, Croatia	
BENZINSKA PUMPA BREBRIĆ d.o.o. za trgovinu Zagrebačka 51/b 44322 Lipovljani, Croatia	
HUDEK-TRGOTRANS d.o.o. Biljevec 77 42243 Biljevec, Croatia	
TOMICA BENZ društvo s ograničenom odgovornošću za proizvodnju, trgovinu i usluge Kolodvorska 74 10452 Donja Zdenčina, Croatia	
NAVIS SUPPLEMENTUM d.o.o. za opskrbu brodova Kralja Zvonimira 119 21210 Solin, Croatia	
Storage of oil and petroleum products	**1**
PRVO PLINARSKO DRUŠTVO d.o.o. za uvoz, opskrbu i trgovinu plinom Gospodarska zona 13 32000 Vukovar, Croatia	
Wholesale trade in liquefied petroleum gas	**1**
G.S. PLIN d.o.o. za punjenje i distribuciju plina Bast 10 A 21320 Baška Voda, Croatia	
TOTAL	**36**

List of licences extended from 01/01/2019 to 31/12/2019	No. of licences extended
Electricity production	**3**
AMNIS ENERGIJA d.o.o. za usluge Karlovačka cesta 203/A 10000 Zagreb, Croatia	
RP GLOBAL DANILO d.o.o. za razvoj projekata za proizvodnju energije Bijenička 21 10000 Zagreb, Croatia	
EKO-ENERGIJA projektiranje, proizvodnja i trgovina d.o.o. Ante Starčevića 18 21241 Obrovac	
Electricity supply	**2**
RWE ENERGIJA d.o.o. Capraška ulica 6 10000 Zagreb, Croatia	

List of licences extended from 01/01/2019 to 31/12/2019	No. of licences extended
ENNA POWER d.o.o. Gospodarska zona 13 32000 Vukovar, Croatia	
Electricity trade	**10**
MVM Partner d.o.o. za trgovinu i usluge Ilica 1 10000 Zagreb, Croatia	
Interenergo d.o.o. Tivolska cesta 48 1000 Ljubljana, Slovenia	
ČEZ, a. s. Duhová 2/1444 140 53 Prague 4, Czech Republic	
DANSKE COMMODITIES A/S Varkmestergade 3 8000 Aarhus C, Denmark	
AYEN ENERGIJA, trgovanje z električno energijo, d.o.o. Zemljemerska ulica 12 1000 Ljubljana, Slovenia	
ENERGI DANMARK A/S Hedeager 5 8200 Aarhus N, Denmark	
EPS Trgovanje, Družba za trgovino z električno energijo, d.o.o. Tivolska cesta 48 1000 Ljubljana, Slovenia	
Centrica Energy Trading A/S Skelagervej 1 9000 Aalborg, Denmark	
ALPIQ ENERGY SE Jungmannova 26/15, Nové Město 110 00 Praha 1, Czech Republic	
ENERGY SUPPLY EOOD Ulica Grafa Ignatieva 2 1000 Sofia, Bulgaria	
Management of liquefied natural gas terminals	**1**
LNG HRVATSKA d.o.o. za poslovanje ukapljenim prirodnim plinom Radnička cesta 80 10000 Zagreb, Croatia	
Gas distribution	**16**
ENERGO d.o.o. Dolac 14 51000 Rijeka, Croatia	
MOSLAVINA PLIN d.o.o. za gradnju plinovoda i distribuciju plina Trg kralja Tomislava 6 44320 Kutina, Croatia	
GRADSKA PLINARA ZAGREB d.o.o. Radnička cesta 1 10000 Zagreb, Croatia	

List of licences extended from 01/01/2019 to 31/12/2019	No. of licences extended
KOPRIVNICA PLIN - distribucija plina, d.o.o. Mosna ulica 15 48000 Koprivnica, Croatia	
MEĐIMURJE-PLIN d.o.o. za opskrbu plinom Obrtnička 4 40000 Čakovec, Croatia	
DARKOM DISTRIBUCIJA PLINA d.o.o. za distribuciju plina Josipa Kozarca 19 43500 Daruvar, Croatia	
PLIN KONJŠČINA d.o.o. za distribuciju i opskrbu plinom Bistrička cesta 1 49282 Konjščina, Croatia	
PLIN VTC d.o.o. za distribuciju i opskrbu plinom Ote Horvata 15 33000 Virovitica, Croatia	
KOMUNALIJE-PLIN d.o.o. Radnička cesta 61 48350 Đurđevac, Croatia	
ZELENJAK PLIN d.o.o. za distribuciju i opskrbu plinom Trg Antuna Mihanovića 1 49290 Klanjec, Croatia	
ČAPLIN d.o.o. za distribuciju plina Sv. Andrije 14 43240 Čazma, Croatia	
PLIN VRBOVEC d.o.o. za distribuciju i opskrbu plinom Kolodvorska 29 10340 Vrbovec, Croatia	
PAPUK PLIN d.o.o. za obavljanje djelatnosti u sektoru plina Vladimira Nazora 14 33515 Orahovica, Croatia	
PLIN d.o.o. za distribuciju i opskrbu plina Mate Lovraka 30 43280 Garešnica, Croatia	
IVKOM-PLIN d.o.o. za distribuciju i opskrbu plinom Vladimira Nazora 96/b 42240 Ivanec, Croatia	
IVAPLIN d.o.o. za distribuciju i opskrbu plinom Ulica Krešimira IV 10 10310 Ivanić Grad, Croatia	
Gas market organisation	**1**
HRVATSKI OPERATOR TRŽIŠTA ENERGIJE d.o.o. za organiziranje tržišta električne energije i plina Ulica grada Vukovara 284 10000 Zagreb, Croatia	
Gas trade	**4**
GEOPLIN d.o.o. Ljubljana, Družba za trgovanje in transport zemeljskega plina Cesta Ljubljanske brigade 11 1000 Ljubljana, Slovenia	
RWE Supply & Trading GmbH Altenessener Strasse 27 45141 Essen, Germany	

List of licences extended from 01/01/2019 to 31/12/2019	No. of licences extended
gaSolutions GmbH Mariahilfer Straße 123/3 A-1060 Vienna, Austria	
ALPIQ ENERGY SE Jungmannova 26/15, Nové Město 110 00 Praha 1, Czech Republic	
Gas supply	**7**
IVAPLIN d.o.o. za distribuciju i opskrbu plinom Ulica Krešimira IV 10 10310 Ivanić Grad, Croatia	
INA - INDUSTRIJA NAFTE, d.d. Avenija V. Holjevca 10 10000 Zagreb, Croatia	
ZELENJAK PLIN d.o.o. za distribuciju i opskrbu plinom Trg Antuna Mihanovića 1 49290 Klanjec, Croatia	
PLIN VRBOVEC d.o.o. za distribuciju i opskrbu plinom Kolodvorska 29 10340 Vrbovec, Croatia	
Vetropack Straža tvornica stakla d.d. Hum na Sutli 203 49231 Hum na Sutli, Croatia	
EVN Croatia Plin d.o.o. za distribuciju plina Zagrebačka avenija 104 10000 Zagreb, Croatia	
GEN-I Hrvatska d.o.o. trgovina i prodaja električne energije Radnička cesta 54 10000 Zagreb, Croatia	
Thermal energy production	**5**
PETROKEMIJA d.d. tvornica gnojiva Aleja Vukovar 4 44320 Kutina, Croatia	
GTG VINKOVCI d.o.o. za upravljanje grobljem, tržnicama na malo i proizvodnju, distribuciju i opskrbu toplinskom energijom Kralja Zvonimira 1 32100 Vinkovci, Croatia	
Brod-plin d.o.o. za izgradnju i održavanje plinske mreže, distribuciju i opskrbu prirodnim plinom, proizvodnju, distribuciju i opskrbu toplinskom energijom Trg pobjede 5, 35000 Slavonski Brod, Croatia	
VARTOP d.o.o. za održavanje, upravljanje i toplinarstvo Stanka Vraza 6 42000 Varaždin, Croatia	
UNIVERZAL d.o.o. za proizvodnju, gospodarenje otpadom, trgovinu i hotelijerstvo Cehovska 10 42000 Varaždin, Croatia	
Thermal energy supply	**4**
TEHNOSTAN d.o.o. za proizvodnju, distribuciju i opskrbu toplinskom energijom Dr. Franje Tuđmana 23 32000 Vukovar, Croatia	

List of licences extended from 01/01/2019 to 31/12/2019	No. of licences extended
INAS-INVEST d.o.o. za usluge i trgovinu Slavonska avenija 22c 10000 Zagreb, Croatia	
POSLOVNI PARK VIROVITICA d.o.o. za obavljanje uslužnih djelatnosti Trg bana Josipa Jelačića 21/III 33000 Virovitica, Croatia	
TI-SAN d.o.o. za trgovinu, promet i usluge Industrijska 13 10431 Sveta Nedelja	
Thermal energy distribution	**1**
Brod-plin d.o.o. za izgradnju i održavanje plinske mreže, distribuciju i opskrbu prirodnim plinom, proizvodnju, distribuciju i opskrbu toplinskom energijom Trg pobjede 5, 35000 Slavonski Brod, Croatia	
Production of biofuels	**1**
BIODIZEL VUKOVAR d.o.o. za proizvodnju, trgovinu i usluge Težačka međa 2 32000 Vukovar, Croatia	
Wholesale trade in biofuels	**2**
ADRIA OIL d.o.o. za prodaju naftnih derivata Spinčići 38 51215 Kastav	
RIJEKA TRANS d.o.o. za trgovinu i poslovanje nekretninama Kukuljanovo 337 51227 Kukuljanovo, Croatia	
Storage of biofuels	**1**
BIODIZEL VUKOVAR d.o.o. za proizvodnju, trgovinu i usluge Težačka međa 2 32000 Vukovar, Croatia	
Wholesale trade in petroleum products	**12**
TIFON d.o.o. za trgovinu i usluge Zadarska ulica 80 10000 Zagreb, Croatia	
CRODUX DERIVATI DVA d.o.o. za trgovinu naftnim derivatima i plinovima Savska Opatovina 36 10000 Zagreb, Croatia	
NAUTICA VUKOVAR d.o.o. za lučku djelatnost Priljevo 14 32000 Vukovar, Croatia	
PETROL d.o.o. za trgovinu i prijevoz nafte i naftnih derivata Oreškovićeva 6/h, Otok 10010 Zagreb, Croatia	
Adriatic Tank Terminals d.o.o. za trgovinu i usluge Lučka cesta bb 20340 Ploče, Croatia	
SIROVINA BENZ TRANSPORT d.o.o. za prijevoz Trg Oluje 1 22300 Knin, Croatia	

List of licences extended from 01/01/2019 to 31/12/2019	No. of licences extended
GAS OIL d.o.o. za prodaju naftnih derivata Liburnijska 6 51414 Ičići, Croatia	
BENZIN PERIĆ, d.o.o. za trgovinu naftnim derivatima Trogirska cesta 1/a 21220 Trogir, Croatia	
TROMILJA BENZIN d.o.o. za trgovinu i usluge Tromilja 1/a 22221 Lozovac, Croatia	
RI-BENZ d.o.o. za trgovinu i prijevoz nafte i naftnih derivata Martinkovac 143/3 51000 Rijeka, Croatia	
DREZGA d.o.o. Obrtnička 2 10437 Rakitje, Croatia	
AUTOPRIJEVOZNIK KLJAJIĆ d.o.o. Ježdovečka 118 B 10250 Ježdovec, Croatia	
Storage of oil and petroleum products	**7**
TIFON d.o.o. za trgovinu i usluge Zadarska ulica 80 10000 Zagreb, Croatia	
NAFTNI TERMINALI FEDERACIJE d.o.o. za uskladištenje, špediciju, vanjski i unutrašnji promet Trg kralja Tomislava 2 20340 Ploče, Croatia	
INA MAZIVA d.o.o. za proizvodnju i trgovinu mazivima i srodnim proizvodima Radnička cesta 175 10000 Zagreb, Croatia	
NAUTICA VUKOVAR d.o.o. za lučku djelatnost Priljevo 14 32000 Vukovar, Croatia	
PETROL d.o.o. za trgovinu i prijevoz nafte i naftnih derivata Oreškovićeva 6/h, Otok 10010 Zagreb, Croatia	
LUKOIL Croatia d.o.o. za trgovinu naftom i naftnim derivatima Capraška ulica 6 10000 Zagreb, Croatia	
SIROVINA BENZ TRANSPORT d.o.o. za prijevoz Trg Oluje 1 22300 Knin, Croatia	
Wholesale trade in liquefied petroleum gas	**3**
ISTRABENZ PLINI proizvodnja i distribucija industrijskih plinova d.o.o. Pristanište Podbok 3, Bakar-dio 51222 Bakar, Croatia	
BRALA d.o.o. za trgovinu i usluge Ulica braće Dežmalj 26 23242 Posedarje, Croatia	
G.S. PLIN d.o.o. za punjenje i distribuciju plina Bast 10 A 21320 Baška Voda, Croatia	

List of licences extended from 01/01/2019 to 31/12/2019	No. of licences extended
TOTAL	80

Energy activity	Issued licences – as of 31/12/2019
Electricity production	60
Electricity transmission	1
Electricity distribution	1
Electricity market organisation	1
Electricity supply	12
Electricity trade	30
Natural gas production	1
Gas transmission	1
Gas storage	1
Management of liquefied natural gas terminals	1
Gas distribution	35
Gas market organisation	1
Gas trade	12
Gas supply	51
Management of liquefied natural gas and/or compressed natural gas supply points	0
Thermal energy production	32
Thermal energy supply	26
Thermal energy distribution	7
Production of biofuels	4
Wholesale trade in biofuels	7
Storage of biofuels	5
Production of petroleum products	1
Transmission of oil through pipelines	1
Transmission of petroleum products through product pipelines	0
Wholesale trade in petroleum products	45
Storage of oil and petroleum products	20
Storage of liquefied petroleum gas	5
Wholesale trade in liquefied petroleum gas	13
TOTAL:	374

As of 31 December 2019, the status with regard to licences in the Summary review of the Register of Licences for the Performance of Energy Activities kept by HERA was: 374 licenses.

Licences expired:

- *electricity production, due to the expiration of the licence:*
  - PLIN VTC d.o.o., Ote Horvata 15, 33000 Virovitica,
  - GKP ČAKOM d.o.o., Mihovljanska 10, 40000 Čakovec,
- *distribution of thermal energy, due to the expiration of the license:*
  - *PLIN VTC d.o.o., Ote Horvata 15, 33000 Virovitica,*
  - GKP ČAKOM d.o.o., Mihovljanska 10, 40000 Čakovec,
- *thermal energy supply, due to the expiration of the licence:*
  - ZRAČNA LUKA ZAGREB d.o.o. Ulica Rudolfa Fizira 1, 10410 Velika Gorica,
  - PLIN VTC d.o.o., Ote Horvata 15, 33000 Virovitica,
  - GKP ČAKOM d.o.o., Mihovljanska 10, 40000 Čakovec,
- *wholesale trade in petroleum products, due to expiration of the licence:*
  - ANTUNOVIĆ TA d.o.o., Zagrebačka avenija 100/A, 10000 Zagreb.
  - LE-ENERGIJA d.o.o., Dužice 17, 10000 Zagreb,
  - GRŽINČIĆ usluge transporta i trgovine d.o.o., Podstrmac 6, 51217 Klana,
  - MK Group d.o.o. za građenje i usluge, Riva 16, 51000 Rijeka,
  - DRAGO BENZ j.d.o.o. za trgovinu i usluge, Greda 17, 10340 Vrbovec,
  - D.M. INVENTUM d.o.o., Lisičina 51, 10000 Zagreb,
  - EZIS d.o.o. za trgovinu i usluge, Meksička 3, 10000 Zagreb,
  - IRA GRAD d.o.o. za trgovinu i ugostiteljstvo, Davora Zbiljskog 26, 10000 Zagreb,
- *electricity trade, at own request:*
  - EFT HRVATSKA d.o.o. za trgovinu i usluge, Trnjanska cesta 65, 10000 Zagreb,
- *gas supply, at own request:*
  - OMV Gas Marketing & Trading d.o.o. za opskrbu plinom u likvidaciji, Amruševa 8, 10000 Zagreb,
- *gas trade, at own request:*
  - PRVO PLINARSKO DRUŠTVO d.o.o. BEOGRAD, Trešnjinog cveta 1, Belgrade, Serbia,
- *storage of oil and petroleum products, at own request:*
  - EURO GAS d.o.o. za usluge i trgovinu, Alojzija Stepinca 36, 35400 Nova Gradiška,
- *wholesale trade in Liquefied Petroleum Gas, at own request:*
  - EURO GAS d.o.o. za usluge i trgovinu, Alojzija Stepinca 36, 35400 Nova Gradiška.

Information on licences to perform energy activities is available in the summary of the licence registry managed by HERA on HERA's website:
***https://www.hera.hr/hr/html/registar_dozvola.html*.**