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Croatian Energy Regulatory Agency

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CROATIAN ENERGY REGULATORY AGENCY
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1 INTRODUCTION

Dear readers,

In line with our legal obligation from the Act on the Regulation of Energy Activities, as well as the tradition of presenting the annual overview of the national energy sector, it is my pleasure to present on behalf of the Croatian energy regulator the *Annual Report on the Activities of the Croatian Energy Regulatory Agency for 2017*, which is submitted annually to the Croatian Parliament together with the *Report on the Execution of the Budget of the Croatian Energy Regulatory Agency*.

The Croatian Energy Regulatory Agency (HERA) is an independent regulatory body acting under a public mandate. Its core task is the regulation of energy activities in the Republic of Croatia in conformity with obligations defined in the relevant national legislative framework. HERA is also one of the 28 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, at the same time recognizing the need for close cooperation with other relevant national authorities and the government, who are in charge of establishing general energy policy guidelines. In addition to guaranteeing its independence, the law also obliges the regulator to comply with its legal obligations and ensure accountability and transparency in the regulation of the energy sector. The requirement to submit reports on its activities to the national parliament is one of the backbones of the regulator's accountability system.

HERA's annual report presents an overview of the legal obligations fulfilled by the regulator, the results and statistical indicators concerning the activities of regulated entities in the Croatian energy sector, and assessments, observations, and regulatory recommendations related to the development of Croatia's energy markets, their coupling and organisation in accordance with the rules of the European internal energy market.

The structure of the report is compliant with the latest recommendations of the Council of European Energy Regulators (CEER), and its content and design have been developed in line with good regulatory reporting practice used by the EU and the Agency for the Cooperation of Energy Regulators (ACER).

The principal regulatory tasks performed by HERA include regulating natural monopolies (primarily by establishing tariffs and fees for the performance of regulated energy activities), monitoring and promoting the development of energy markets and market mechanisms, and implementing applicable EU regulations.

As regards the state of the Croatian energy sector in 2017, we can be moderately satisfied, primarily in the segments within the competence of the energy regulator. In 2017, the regulated Croatian energy systems were in essence stable and reliable, the security of supply was satisfactory, and the quality of energy services was acceptable.

However, stakeholders and participants in the Croatian energy market are still faced with numerous challenges.

Some are related to "remnants of the past", and some to the remaining phases of the implementation of market mechanisms in practice, not only in theory.

For example, the Croatian wholesale energy markets are on the right path, as they are well equipped with mechanisms and platforms increasingly integrated in the European practice. However, the development of the retail electricity and gas markets is stagnating and there is an internal resistance which could slow down or delay the transfer of benefits that an open market can offer to its end consumers.

Furthermore, numerous challenges arise from the emergence of a "new age" in the European energy sector characterised by environmentally sound energy options and active users (producer-consumers), facilitated by the revolutionary new technologies.

Across the EU, 2017 was marked by a demanding process of developing and harmonising EU legislation to create the Clean Energy Package, which introduces many changes and novelties in the European energy sector.

The development of numerous new technologies, which were until recently considered exotic, raises a series of new issues in EU energy practices. The introduction of smart metering devices, e-mobility and new models for integrating renewable sources are just some of the issues that the Croatian energy sector needs to address on time and in a reasonable manner. In addition, in the near future it will also be faced with issues such as self-generation and producer-consumers (*prosumers*), the complete decarbonisation of the energy sector, peer-to-peer energy exchange, micro-networks independent of the main systems, etc.

In line with the position of European energy regulators, the Croatian energy regulator promotes a rational approach to new concepts, which calls for a completion of the current processes required for the full implementation of functional and connected (national) markets, the creation of all necessary prerequisites for the introduction of "smart" technologies and the selection of the most cost-efficient solutions.

By their very nature, energy regulators should remain neutral in terms of choosing among available energy technologies. However, as part of their consumer/user protection role, regulators should warn about the potential emergence of a "two-speed energy sector", in which less active consumers and market participants could be placed in an objectively (and even materially) less favourable position. In such situations, a gradual and analytical approach is recommended and preferred over quick and seemingly attractive solutions. The regulator is also tasked with ensuring that the costs of regulated energy systems are covered in a fair, equitable and transparent manner.

As far as the regulation of energy activities is concerned, the upcoming years will certainly be no less challenging. HERA strongly believes that, in cooperation with all stakeholders on the Croatian energy market, it is equipped with the necessary capacities to successfully deal with any changes which may occur in the sector.

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

2 OVERVIEW OF THE ENERGY SECTOR

2.1 Electricity

The most important changes in the electricity sector in 2017 are the spin-off of the electricity supply activity from the distribution system operator, introduction of a single invoice for electricity for all end consumers connected to the low voltage network, reduced value added tax applicable to electricity, and increased charges for renewable energy sources and high-efficiency cogeneration. The Croatian electricity market is becoming increasingly dynamic following the launching of the intraday market by the Croatian Electric Power Exchange (Hrvatska burza električne energije d.o.o.; hereinafter: CROPEX). In 2017, a large part of HERA's activities in the electricity sector consisted of drafting and adopting by-laws regulating the retail and wholesale electricity markets, the connection to the electricity network and the quality of electricity supply.

From 1 January 2017, electricity supply provided as a public service (universal and guaranteed service) was separated from HEP-Operator distribucijskog sustava d.o.o. (hereinafter: HEP ODS). Public electricity supply service is provided across the entire territory of Croatia under publicly available prices and in line with the special conditions set out in the ***Electricity Market Act***. This activity is now provided by a new company, HEP Elektra d.o.o., established in late 2016. Pursuant to the ***Electricity Market Act***, public service is not considered a market activity, and therefore HEP Elektra d.o.o. has additional obligations compared to market suppliers.

For all low voltage consumers who had previously been issued two invoices (one for electricity from the supplier and another for the network fee from the distribution system operator), a single invoice was introduced as of 1 January 2017.

The concentration on the retail supply market for household end consumers has increased slightly but has decreased for industrial end consumers. There has been a further decrease in electricity prices on the electricity market compared to 2016. Electricity prices in Croatia are determined on a market basis, including the price of electricity under the universal service to which household consumers are entitled, with the exception of guaranteed supply, where HERA is responsible for calculating tariffs in line with the *Methodology for setting tariffs for guaranteed electricity supply*.

Tariffs for electricity transmission and distribution, as well as transmission and distribution connection charges, remained unchanged in relation to 2016. On 1 January 2017, value added tax applicable to electricity was reduced from 25% to 13%. However, with increased charges for renewable energy sources and high-efficiency cogeneration as of 1 September 2017, the overall effect of reduced electricity price resulting from lower value added tax has been cancelled out to a certain extent.

In 2017, the electricity sector saw an increase in total installed capacity of Croatian production facilities, mostly related to plants using renewable energy sources and cogeneration plants. Consequently, there has been an increase in the share of electricity generated from renewable sources and high-efficiency cogeneration in total generated electricity, which amounted to 12.6% at the end of 2017.

According to the reports on monitoring the security of supply prepared by the transmission system operator and the distribution system operator, the state of electricity supply security was satisfactory in 2017.

The annual peak load of 3 079 MW in the Croatian electricity system was recorded on 4 August 2017, whereas the minimum load of 1 305 MW was recorded on 18 September 2017. This was the third year in a row in which the peak load of the Croatian electricity system was recorded during the summer months. In previous years, peak loads would usually appear in winter months.

The connection capacity of all power plants in Croatia at the end of 2017 was 4 911 MW, which is an increase of 111 MW compared to 2016. Capacity displayed a trend of continuous growth, primarily due to the connection of new facilities, from which the energy produced will be purchased within the incentives system for the generation of electricity from renewable energy sources and high-efficiency cogeneration (hereinafter: incentives system). Hydroelectric power plants account for the largest share of connected plant capacity (44.33%), followed by thermal power plants (41.12%), wind power plants (11.71%), biomass power plants (1.62%) and solar power plants (1.22%).

In 2017, the total consumption of electricity in the Croatian electricity system (including losses) amounted to 18.2 TWh, which is an increase by 2.96% compared to 2016 and the highest recorded consumption level since the beginning of measurements in 2000. Severe drought throughout the year significantly reduced generation in hydro power plants, and many thermal power plants were unavailable due to lengthy maintenance and unit upgrade periods (obligatory as per environmental regulations), which meant that significant quantities of electricity had to be imported.

The majority of total electricity consumption in Croatia was covered by electricity produced in Croatian power plants (59%), and the rest was covered by physical net imports (41%). Around 3 TWh were imported from Krško Nuclear Power Plant in Slovenia, 50% of which is owned by Hrvatska elektroprivreda d.d. (hereinafter: HEP d.d.), and the remaining 4.4 TWh were net imports. Hydro power plants accounted for the largest share in electricity generation in Croatia in 2017 (46.44%), followed by thermal power plants (37.48%), wind power plants (11.13%), and other renewable sources (4.95%).

Transmission and distribution of electricity are regulated energy activities performed as public services. Croatia has one transmission system operator – Hrvatski operator prijenosnog sustava d.o.o. (hereinafter: HOPS), and one distribution system operator – HEP-Operator distribucijskog sustava d.o.o. (HEP ODS).

Power losses in the distribution network in 2017 amounted to 1 343 GWh, which is 8.0% of the power procurement in that network and higher compared to 2016 in both absolute and relative terms.

The average realised price of electricity to cover losses in the distribution network is HRK 325/MWh, which includes the costs of positive and negative imbalances. It is estimated that non-technical losses make up around 50% of all losses in the network. Therefore, HERA has requested that HEP ODS intensify the implementation of measures which could contribute to loss reduction, such as connection point and meter control, and other measures aimed at reducing unauthorised electricity consumption, which is an important component of non-technical losses.

Electricity losses in the transmission network amounted to 417 GWh, which is 1.9% of total electricity transmitted. The absolute and relative values of power losses in the transmission network in 2017 were the lowest in the last eight years. In 2017, the planned purchase price of electricity to cover losses in the transmission network was HRK 325.03/MWh, while the unit cost, including the cost of market purchases and cost of imbalance settlements, amounted to HRK 314.90/MWh.

With respect to the transmission and distribution network development plans, HOPS and HEP ODS continued the good practice and harmonised their plans in terms of construction dynamic and financing of interfacing facilities (TS 110/x kV). In 2017, HOPS invested HRK 443.3 million, while HEP ODS' investments amounted to HRK 923.5 million.

HERA uses information submitted by HOPS and HEP ODS to assess the impact that the investments planned for the three-year period may have on transmission and distribution tariffs. Based on information submitted in 2017, HERA believes that the total planned income of HOPS and HEP ODS will be sufficient to cover the planned investments.

In February 2017, the European Commission approved a grant under the Connecting Europe Facility fund for the SINCRO.GRID project developed by the Croatian and Slovenian transmission and distribution system operators in the amount of EUR 40.5 million, i.e. 51% of the total planned value.

Tariffs for electricity transmission and distribution are determined based on the *Methodology for setting tariffs for electricity transmission* and the *Methodology for setting tariffs for electricity distribution*.

The 2017 tariffs did not change in comparison to 2016. Thus, the realised average prices of network usage in 2017 for all consumer categories were HRK 0.084/kWh for electricity transmission and HRK 0.224/kWh for electricity distribution.

HERA adopted the new *Methodology for setting electricity grid connection charges for new users and for increasing the connection capacity for existing users*, which was published on 31 May 2017 and entered into force on 1 January 2018. The Croatian Government adopted the *Regulation on issuing energy approvals and establishing the conditions and deadlines for connecting to the electricity network*, which entered into force on 1 April 2018. Given that the *Methodology* and *Regulation* had to be harmonised, HERA adopted *Amendments to the Methodology for setting electricity grid connection charges for new users and for increasing the connection capacity for existing users*, which entered into force on 9 April 2018. HERA also approved HOPS's *Rules on connection to the transmission network* and HEP ODS's *Rules on connection to the distribution network*, which also entered into force on 9 April 2018. These by-laws are part of a package regulating the connection to the electricity network in line with to the ***Energy Act*** and the ***Electricity Market Act***.

Other by-laws concerning the connection of consumers and producers to the electricity network that also require some adjustments are the network code for the transmission system, issued by the transmission system operator, and the network code for the distribution system, issued by the distribution system operator. Following HERA's prior approval, HOPS adopted the *Network code for the transmission system*, which entered into force in July 2017. In late July 2017, HERA received the proposal of the network code for the distribution system from HEP ODS. Having assessed the submitted proposal, in September 2017 HERA informed HEP ODS that the proposal did not meet the requirements for prior approval and requested a new proposal of the network code for the distribution system which

would take into consideration its comments. HERA received the new proposal in early March 2018.

In April 2017, HERA adopted the *Criteria for granting authorisations for the construction and commissioning of direct lines*, supplementing a package of by-laws related to transmission network connection.

In 2017, there were 12 registered members on the CROPEX day-ahead market, who traded a total of 138.9 GWh of electricity. As of 26 April 2017, market participants are also able to trade in electricity on CROPEX intraday market, in a safe, anonymous, continuous and transparent manner. Its six participants traded a total of 51.3 GWh of electricity in 2017. The intraday market trade enables market participants to reduce imbalances in relation to contractual schedules at times when they have more reliable production and consumption forecasts, and therefore reduce their balancing energy costs.

In 2017, HEP d.d. had the largest share in production capacities and electricity generated from power plants in Croatia – 83% of production capacities and 79% of generated energy.

In 2017, the total volume of sales by energy entities from HEP d.d. was 37.3 TWh, which is 71% of the total volume of sales on Croatia's wholesale electricity market.

The *Methodology for establishing balancing energy prices* was used to calculate imbalances in 2017, whereas the *Rules on electric power system balancing and the Rules on the implementation of standard load profiles* were used to calculate realised values.

As the establishment of the EKO balance group was postponed from 1 January 2017 to 1 January 2018, the deviations from contractual schedules and the realisation of eligible producers in the incentives system which occurred before April 2017 were not included in the settlement of imbalances before March 2017, when the transmission system operator adopted its *Amendments to the Rules on electric power system balancing*.

Based on the *Rules on the implementation of standard load profiles*, the new procedure was first applied in 2017 to distribute the realised consumption at billing metering points and losses in the distribution network, which cannot be measured separately due to technical limitations.

The only provider of electricity system balancing and auxiliary services in 2017 was HEP-Proizvodnja d.o.o. HOPS paid HRK 57 million for electricity system balancing services, and HRK 310 million for auxiliary services.

For all months of 2017, HOPS calculated the hourly settlement of imbalances and charged the balance group responsible parties a total of HRK 155 million in imbalance expenses.

In July 2017, HERA held a workshop with the energy entities on the availability and quality of billing and metering data.

The *Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing* was published in the Official Journal of the European Union on 28 November 2017 and entered into force on 18 December 2017.

At the end of 2017, the number of billing metering points for electricity was around 2.39 million. Total electricity sold to end consumers amounted to 16.16 TWh. Electricity sales (excluding power losses) in 2017 were 3.8% higher compared to 2016. The increase in total consumption is due to an increase in consumption across all categories of end consumers.

In 2017, the share of households in total electricity sold to end consumers was 38.8%, while the share of electricity sold to industrial end consumers was 61.2%, which is a slight increase compared to 2016.

In 2017 the retail market was supplied by ten active market suppliers in addition to HEP Elektra d.o.o., eight of which supplied household end consumers.

The total number of supplier switches in 2017 was 89 038, which is a switching rate of 3.64%. From the total number of electricity supplier switches, 31 066 were in the industrial category and 57 972 were in the household category.

The proportion of electricity sold to households outside the universal service in 2017 remained roughly the same as in 2016 (about 11%), while the proportion of electricity sold by suppliers outside HEP d.d. decreased (14% vs. 16% in 2016).

With regard to the concentration of the retail electricity market expressed in electricity sold, in December 2017 three suppliers had a total market share of 97.6% of end consumer supply in the household category, with the dominant supplier holding 88.99%. As for the supply of industrial end consumers, three suppliers had a total market share of 83.1%. Thus, the concentration of retail supply to household end consumers slightly increased compared to 2016 (97.5% in 2016), while market concentration in the supply of industrial end consumers slightly decreased (84.7% in 2016).

In 2017, all electricity suppliers were obliged to buy the total generated electricity under the incentives system, in proportion to their share in the total energy delivered to end consumers, at the regulated price of HRK 0.42/kWh. The annual average price of electricity on the day-ahead market on the Hungarian and Slovenian electricity exchanges in 2017 was HRK 0.38/kWh. The difference between the buy-off price and the market price is an additional cost for electricity suppliers. However, the situation has now improved compared to 2016, when the average price on exchanges was HRK 0.26/kWh, and the additional cost for the suppliers was consequently higher.

HEP ODS, which was the public service supplier in 2016, separated its electricity supply as a public service in late 2016 through a spin-off. Since 1 January 2017, electricity supply performed as a public service has been provided by HEP Elektra d.o.o. In addition, as of 1 January 2017, all suppliers started issuing a single invoice for electricity and network use to consumers whose billing metering points are connected to the low voltage network.

The average electricity price for end consumers under universal supply (households) was HRK 0.45/kWh in 2017.

In 2017, for household end consumers whose typical consumption is around 3 500 kWh per year, the proportion of taxes and charges in the total price of electricity amounted to 22%, the proportion of electricity price with supply costs was 45%, and the proportion of network charges was 33%.

As of 1 January 2017, VAT for electricity decreased to 13%, whereas on 1 September 2017, the fee for promoting electricity generation from renewable energy sources and high-efficiency cogeneration was increased to HRK 0.105/kWh, which led to a change in the composition of the overall electricity price.

In order to facilitate the selection of electricity supplier for end consumers, HERA prepared a new version of its tariff calculator, which shows parallel tariff models and prices of electricity offered by different electricity suppliers to consumers from the household category. The tariff calculator provides a better overview of individual suppliers' basic tariff models, indicative prices, and additional

information on the pricing, price composition and other information. The calculation serves purely for informational purposes and does not include any possible additional discounts. The new version was made available at the beginning of 2017.

The quality of electricity supply is defined and monitored in terms of continuity of supply, voltage quality and service quality. The *Requirements for the quality of electricity supply*, as the fundamental document in the field of quality of electricity supply, were adopted pursuant to the ***Electricity Market Act*** in March 2017. In this document, HERA determined the 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 Requirements also prescribe the content of annual reports prepared by HOPS and HEP ODS on the quality of electricity supply, and the content of suppliers' annual reports on the quality of services. The *Requirements for the quality of electricity supply* stipulate a gradual introduction of general, minimum and guaranteed standards of quality of electricity supply and a gradual introduction of financial compensation to consumers following the introduction of guaranteed quality standards for electricity supply.

Total electricity generated in power plants included in the incentives system for generation of electricity from renewable energy sources and highly efficient cogeneration in 2017 amounted to 2.3 TWh, or 12.6% of total electricity consumption in Croatia (18.2 TWh). Around HRK 1.9 billion of incentives were paid for electricity generated within the system. The weighted average price of electricity paid in 2017 to eligible producers taking part in the incentives system (HRK 0.84/kWh) was more than double of the annual average electricity price on the day-ahead market on the Hungarian and Slovenian electricity exchanges (HRK 0.38/kWh).

Hrvatski operator tržišta energije d.o.o. (hereinafter: HROTE) buys off electricity from eligible producers in the incentives system using funds partly collected from the fee for promoting electricity production from renewable sources and cogeneration paid by all end consumers of electricity, whereas the rest of the funds are collected from suppliers obliged to buy off electricity generated in the incentives system, in the amount proportional to their share in total electricity delivered to end consumers.

The ***Regulation on amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act*** was adopted in late December 2017, postponing the obligation of selling electricity from the incentives system on the electricity market from 1 January 2018 to no later than 1 January 2019, thus extending the mandatory takeover of electricity from the incentives system by the suppliers by another year and moving the deadline for the initiation of the EKO balance group's operations from 1 January 2018 to 1 January 2019.

The start of operations of the EKO balance group should have also ended the obligation of electricity suppliers to buy off electricity bought by HROTE from eligible electricity producers and started the sale of electricity provided by the EKO balance group on the electricity market, for which HROTE has completed all preparations. The deadline for the EKO balance group to become operational was initially set for 1 January 2017. However, at the last minute, the ***Regulation on amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act***, which was adopted on 29 December 2016 and entered into force on 31 December 2016, extended the deadline for the full functionality of the EKO

balance group to 1 January 2018, as well as the deadline for the sale of electricity from the EKO balance group on the electricity market. The deadline was postponed for the second time with the ***Regulation on amendments to the Act***, which was adopted on 28 December 2017 and entered into force on 31 December 2017, setting a new deadline for the full functionality of the EKO balance group to 1 January 2019, and with it the deadline for the start of sale of electricity from the EKO balance group on the electricity market.

Pursuant to the ***Renewable Energy Sources and High-Efficiency Cogeneration Act***, following a proposal submitted by the Ministry, the Croatian Government is due to adopt a regulation on the quotas for the period from 2016 to 2020 determining the total connection capacity in kilowatts (kW) of generation facilities and units eligible to conclude contracts on market premiums and contracts on electricity buy-off at a guaranteed price. These quotas will be used in tenders to select projects for electricity generation incentives. That regulation has not been adopted yet.

In its *Decision on charges for renewable energy sources and high-efficiency cogeneration* adopted on 31 August 2017, the Croatian Government increased the fees for renewable energy sources and high-efficiency cogeneration from HRK 0.035/kWh to HRK 0.105/kWh, and from HRK 0.005/kWh to HRK0.007/kWh for consumers obliged to obtain greenhouse gas emission permits starting with 1 September 2017.

In 2016, HERA ensured the financing of a study entitled *Supporting analyses for a cost-benefit analysis of smart meters and smart meter roll-out systems*, which was completed in late 2016. Its findings show that the financial and economic cost-benefit analysis of the plan provides positive results. The study considers the scenario of replacing old metering devices whose calibration lifetime has expired with smart meters, over a period of 11 years. HERA has acquired expert opinions on the study from the Faculty of Electrical Engineering and Computing in Zagreb, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture in Split, Faculty of Electrical Engineering in Osijek and Faculty of Engineering in Rijeka. HERA also held consultations with consumer protection bodies and obtained positive opinions of two bodies. Having obtained the opinions and pursuant to the findings of the study, on 21 July 2017 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 for further processing in line with the ***Energy Act***. Based on the Analysis, the minister sets out a plan of measures for the installation of smart meters for end consumers.

Croatian borders with Slovenia and Hungary are included in coordinated auctions held within the JAO capacity allocation office. This office is responsible for holding coordinated yearly, monthly and daily auctions for the allocation of capacities in both directions on all borders. Additionally, on the border with Slovenia, the Slovenian transmission system operator maintains the bilateral allocation of total intraday capacities in both directions. On the border with Bosnia and Herzegovina, the Coordinated Auction Office in South East Europe (SEE CAO) holds coordinated auctions in the SEE region for capacities on yearly, monthly and daily levels. On this border, HOPS maintains the bilateral allocation of total intraday capacities in both directions. On the border with Serbia, joint bilateral auctions continued for the allocation of capacities by HOPS performing yearly and monthly auctions and the Serbian transmission operator performing daily and intraday auctions in both directions for the total transmission capacity.

Total net income from auctions for the allocation of cross-zonal capacities[1] in 2017 was around HRK 60 million. As compared to 2016, there was a significant increase in income primarily associated with income from daily auctions, where the border between Croatia and Slovenia stands out in terms of imports.

In June 2017, in accordance with *Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management* (hereinafter: *CACM Regulation*) HERA approved the plan for the common establishment and performance of the functions of market coupling operators, developed by all nominated electricity market operators (NEMOs).

In addition to day-ahead market coupling, the *CACM Regulation* also stipulates the coupling of intraday markets using a continuous allocation process. This process should be realised through the cross-border intraday project (XBID). CROPEX and HOPS are currently participating in the accession stream procedure together with other participants from Central and Eastern Europe, with the main goal of transferring knowledge between existing and new project members. As the implementation of the harmonised intraday allocation of capacities at the regional level for the calculation of capacities in accordance with the *CACM Regulation* will be time consuming, EU has initiated activities regarding the implementation of projects on a smaller geographic scale (Local Implementation Project – LIP). Croatian borders with Slovenia and Hungary are included in LIP 15, and market coupling is expected to be realised in 2019.

Slovenian and Croatian transmission system operators and electricity exchanges have cooperated on the coupling of the Croatian and Slovenian day-ahead markets using the net transfer capacity (NTC) calculation of cross-zonal capacities. This initiative is a provisional solution for the coupling of the Croatian and Slovenian markets until the establishment of a single market as foreseen by the *CACM Regulation*. In March 2017, CROPEX and HOPS officially became members of the Italian Borders Working Table (IBWT) regional project, which resulted in the coupling of the Croatian electricity market with the Slovenian and implicitly the European market within the Multi-Regional Coupling (MRC) project, which currently includes 19 countries, accounting for 85% of Europe's electricity consumption. The Croatian and Slovenian day-ahead markets were successfully coupled in June 2018.

2.2 Natural gas

The natural gas sector in 2017 was characterized by continued market opening and further improvement of existing by-laws. In 2017 and early 2018, the gas market was characterised by the following:

- continued increase in gas consumption that began in 2015, following a three-year decline in consumption and a record low consumption in 2014, and a 15.4% increase in gas consumption in 2017, as compared to 2016,
- further development of both wholesale and retail gas markets in terms of marketisation and growing competition which began in late 2012,
- reduced prices on the wholesale market, modifications to business models in order to cater for consumers using gas supply as a public service,

1 *The term "cross-zonal capacity" has replaced the previously used term "cross-border transmission capacity".*

- reduced prices on the retail market and prices of gas supply as a public service, rising retail market competitiveness indicators, and the continuing liberalisation of the market for household consumers, which started in 2016,
- increased number of complaints related to the practical implementation of supplier switching procedures, due to which HERA undertook a number of coordinated measures including enhancing HROTE's supplier switch IT system in collaboration with HROTE, informing market participants of their rights and obligations through opinions or binding interpretations, etc.,
- fulfilment of important preconditions for the realisation of the strategic project of the construction of a terminal for the reception and dispatch of liquefied natural gas, i.e. the adoption of a new *Methodology for setting tariffs for the reception and dispatch of liquefied natural gas*, adoption of indicative tariffs for the reception and dispatch of liquefied natural gas for LNG HRVATSKA d.o.o. and indicative tariffs for gas transmission at the gas transmission system entry point from the liquefied natural gas terminal in Omišalj and at the gas transmission system exit point at the interconnection Dravaszerdahely to PLINACRO d.o.o., related to the implementation of the formal capacity lease procedure (hereinafter: open season procedure) for the liquefied natural gas terminal on the island of Krk (hereinafter: LNG terminal),
- implementation of the provisions of the *Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas*,
- implementation of the provisions of the *Commission Regulation (EU) 2017/459 of 16 March 2017 establishing a network code on capacity allocation mechanisms in gas transmission systems and repealing Regulation (EU) No 984/2013*.

In 2017, the total gas quantity which entered the transmission system amounted to 32 348 million kWh, which was 17% more than in 2016. Of the total quantity, 11 193 million kWh or 34.6% of natural gas came from domestic production, which is 3.1% more than in 2016; 17 956 million kWh or 55.5% of the total transported quantity of natural gas entered the transmission system from imports, which is 39.9% more than in 2016; and 3 199 million kWh of natural gas, or 9.9% of the total transported quantity, entered the transmission system from the Okoli underground gas storage facility (hereinafter: UGSF Okoli), which is 20% less than in 2016.

Also, the total gas quantity that exited the transmission system in 2017 amounted to 32 340 million kWh, which is 17% more than in 2016. End consumers directly connected to the transmission system received 16 955 million kWh or 52.4% of the total quantity of natural gas, which is 25.2% more than in the previous year; 11 173 million kWh or 34.5% of natural gas were delivered to consumers connected to the distribution system, which is 3.1% more than in 2016. A total of 4 212 million kWh of natural gas were delivered to UGSF Okoli, i.e. 13% of the total amount, which is 28.9% more than in 2016.

In 2016, INA d.d. held the largest share of the wholesale market (30%), followed by Prvo plinarsko društvo d.o.o. with 25%, whereas the remaining 45% were distributed among 12 gas suppliers. In 2017 the share of INA d.d. remained the same (30%) and Prvo plinarsko društvo d.o.o. increased its share to 30%. The remaining 40% of the wholesale market were distributed among 11 gas suppliers in 2017.

In 2017, there were 13 active balance responsible parties which traded a total of 16 414 421 MWh of gas at the virtual trading point (12% more than in 2016).

Further development of the gas wholesale market was also reflected in the decreased market prices of gas, which were lower by 11% on average as compared to 2016.

Gas market participants trading on unorganised wholesale markets were obliged to register with the Centralised European Register of Energy Market Participants (CEREMP) by April 2016 (hereinafter: CEREMP), which also includes the national register of participants on the Croatian market. In 2017, HERA performed activities concerning the registration of gas traders, gas suppliers, transmission system operators, gas storage system operators, gas producers and LNG terminal operators.

The liberalisation of the retail gas market continued to increase. In 2017, 13 619 end customers connected to the distribution system successfully switched their gas suppliers, which is a 168% increase compared to 2016. The proportion of gas distributed to consumers who switched their gas supplier in 2017 was 6.1% (671 million kWh) of the total gas delivered (10 839 million kWh). The retail gas market was marked by continued liberalisation for household consumers as some gas suppliers started offering market-based (unregulated) gas supply contracts to households. However, the process of retail market liberalisation also included a high number of complaints concerning the behaviour of market participants and terminated supplier switching procedures due to insufficient experience of gas market participants in the implementation of the procedure.

In order to eliminate obstacles to the development of the retail market, HERA implemented a number of measures. The most important were enhancing HROTE's supplier switch IT system in collaboration with HROTE, informing market participants of their rights and obligations through HERA's opinions or binding interpretations, optimisation of by-laws regulating the supplier switching procedure, collecting opinions and recommendations from participants in the supplier switching procedure and from consumers by means of surveys, etc. In 2017, 54 energy entities were licensed to supply gas, 46 of which performed this activity in practice.

The effects of retail market development are reflected in the prices for end consumers, which were 2.4% lower than the EU average for industrial consumers in Croatia in the period from July to December 2017, whereas in the same period of 2016 the prices for industrial consumer were 1% higher than the EU average. However, for end consumers using the public service, i.e. households and common boiler rooms, the regulated gas price in the period from July to December 2017 was lower by an average of 36.9% than the EU average. In 2016, this difference was 36.8%.

In 2017, the business model used for gas procurement by suppliers in the public gas supply service for household end consumers was, as in the previous years, based on the regulated establishment of all components in the price structure, and the central role of suppliers on the wholesale market. As a result of the amendments to the ***Gas Market Act***, from 1 April 2017 the wholesale market supplier (HEP d.d.) procures gas in line with market principles, and not under regulated conditions. Also, public service suppliers (34 local gas suppliers) autonomously decide whether they will procure gas for consumers using the public service from the supplier on the wholesale gas market under regulated conditions or from other suppliers or traders under market conditions. Natural gas producers

are no longer obliged to sell gas to the supplier on the wholesale market, and the quantity and price are no longer determined by the Croatian Government. However, the Government still determines the price at which the wholesale gas market supplier sells gas to public service suppliers.

HERA issued decisions on final prices of gas for households: in December 2016 for the period from 1 January to 31 March 2017 and in March 2017 for the period from 1 April to 31 December 2017. According to these decisions, the average final price of gas for households amounted to HRK 0.2446/kWh in 2017, which is 11% lower than in 2016. Pursuant to a Government decision, the wholesale (procurement) component of gas price (which makes up 72% of the final price) was increased by 4% as of 1 April 2017. However, since the average annual unit gas supply cost was reduced by 20% and the average annual distribution charge (variable and fixed component) was reduced by 14% (which makes up 22% of the final price), the average final price of gas for households in 2017 was 11% lower than in 2016. In line with these legislative changes, in February 2017 the Croatian Government adopted a *Decision on the gas price at which the wholesale market gas supplier (HEP d.d.) is obliged to sell gas to public service gas suppliers for household consumers (Official Gazette No. 18/17)* for the period from 1 April 2017 to 31 March 2018, setting the price at HRK 0.1809/kWh. Before 31 March 2017, this price was HRK 0.1734/kWh, which means that there was an increase of HRK 0.0075/kWh, or 4.3%. Because of that, and on the basis of conducted analyses and a public consultation, HERA issued a new *Methodology for setting tariffs for public service gas supply and guaranteed supply*, which reduced the total unit cost of gas supply for all 34 public service suppliers to an average of HRK 0.0112/kWh, decreasing the average total unit cost of gas supply by HRK 0.0052/kWh, or 31.7%. Following the change in input components of the final gas price, the reduction in the average cost of gas distribution by HRK 0.0027/kWh from 1 January 2017, and the *Decision on gas distribution tariff amounts* issued by HERA in December 2016, the final gas price for consumers using the public service increased by an average of 0.9% for all public service suppliers as of 1 April 2017.

As for the transmission system use, the 2016/2017 gas year saw the first quarterly-based capacity booking at interconnections and on the national market. Until a long-term and comprehensive operational solution for securing gas transmission capacities from Croatia to Hungary can be achieved, i.e. the construction of a compression station in Croatia, the capacity use service on the Croatian-Hungarian interconnection from Croatia to Hungary has been improved by introducing a new non-standard service for interruptible capacity provided by the transmission system operator.

The *Commission Regulation (EU) No. 984/2013 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems* harmonised the common commercial and technical capacity management rules on the gas market. The transmission system operator performs capacity booking via the PRISMA information platform for the Rogatec interconnection and the RBP information platform for the Dravaszerdahely interconnection.

Transmission system balancing was harmonised with the provisions of *Commission Regulation (EU) No. 312/2014 establishing a Network Code on Gas Balancing of Transmission Networks*. In 2016, HERA adopted a new *Methodology for establishing the price of balancing energy in the gas system*, and the gas market operator developed a trading platform for balancing products. In addition, following HERA's approval, the gas market operator, the transmission system

operator and the gas storage system operator adopted by-laws incorporating new rules on balancing, which entered into force on 1 April 2017.

For the first time from 1 April 2014 to 31 March 2017, the storage service was used by multiple users (4 gas suppliers and the transmission system operator), and from 1 April 2017, the gas storage service is used by 9 users (8 gas suppliers and the transmission system operator). In the period from 1 April 2014 to 31 March 2017, the gas storage system operator was obliged to allocate a part of gas storage system capacities, i.e. 70% of the standard bundled units, to the wholesale market supplier, and from 1 April 2017 this proportion was reduced to 60% in line with the provisions of the *Amendments to the* ***Gas Market Act*** from February 2017. 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.

The possibility to allocate storage capacities is a practical tool ensuring seasonal (summer – winter) and daily flexibility of gas suppliers, both in wholesale gas trading and in gas supply for retail end consumers.

In terms of monitoring the quality of supply, in October 2014 HERA started collecting data on supply quality indicators for guaranteed supply quality standards. Also, gas system operators and suppliers were obliged for the first time to submit to HERA annual reports on the quality of gas supply in 2014 by 1 March 2015. This requirement was partly fulfilled. Collecting such data was the basis for determining incentives and compensation for inadequate service quality. The adoption of new *General terms and conditions for gas supply* in 2018 introduced a compensation for inadequate service quality applicable to guaranteed standards. 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.

All of the above shows that the Croatian gas market is facing new changes leading to further market development and competitive gas prices, protection of end gas consumers, improved service quality, and enhanced gas supply security.

2.3 Oil, petroleum products, and biofuels

In 2017, the oil, petroleum products, and biofuel sector was marked by a slight increase in the production of petroleum products, a continued increase in petroleum product imports, and a continued growth in transported quantities of crude oil via the oil pipeline system.

The total demand for crude oil in 2017 was 3.470 million tonnes, which is a relative increase of 7.96% compared to 2016, when the total demand for crude oil was 3.214 million tonnes. The volume of imported crude oil in 2017 was 2.803 million tonnes, which is a relative increase of 10.81% compared to 2016, when 2.530 million tonnes of crude oil were imported. Domestic production of crude oil amounted to 667 000 tonnes in 2017, which is a relative decrease of 2.55% compared to 2016, when the domestic production of crude oil was 684 000 tonnes.

The production of petroleum products in 2017 amounted to 3.60 million tonnes, which is a relative increase of 5.88% compared to 2016, when 3.40 million tonnes of petroleum products were produced. The total production of liquefied petroleum gas in 2017 amounted to 242 000 tonnes, which is an increase of 14.69% compared to 2016, when it amounted to 211 000 tonnes.

The production of biofuels in 2017 amounted to only 367 tonnes, which is a sharp decrease of 93.9% as compared to the 6 0331 tonnes produced in 2016. This is a reflection of the continued negative trend in production, which amounted to 65.49% in 2016 as compared to 2015. The decrease in biofuel production is probably due to adverse market trends, initiated by the termination of incentives for the production of biofuels for transport paid to biofuel producers.

2.4 Thermal energy

There were no significant changes in the thermal energy sector in 2017 compared to the previous period. The adoption of the ***Thermal Energy Market Act*** did not lead to increased competition in thermal energy supply and thermal energy consumer activities on the thermal energy market, as had been expected. In 2017, two licences for thermal energy supply were extended, there were no new licences issued, and two thermal energy suppliers discontinued their engagement in this energy-related activity. At the end of 2017, there were 21 thermal energy suppliers in Croatia. On 31 December 2017, the register of thermal energy consumers, which is hosted by HERA on its website, contained 35 thermal energy consumers, 22 of which were active. The thermal energy consumer activity for most end consumer is still performed by thermal energy suppliers. In addition, activities related to the installation of heat exchangers, heat cost allocators (dividers), and thermal energy meters (calorimeter thermometers) almost completely ceased. This is due to several factors, including the upcoming amendments to the ***Thermal Energy Market Act*** announced by the ministry competent for energy.

In accordance with their legal obligation, all thermal energy consumers provided HERA with data it requires to maintain the records of thermal energy consumers, that is the data on thermal energy consumption and other technical data for all structures and billing metering points where they perform their thermal energy consumer activities.

In 2017, there were changes in the prices of primary energy sources used in thermal energy production, more specifically in the prices of natural gas used for the public service of gas and fuel oil supply. The *Methodology for setting tariffs for thermal energy production* provides for a procedure for modifying the tariffs in case of changes in the price of fuel used for thermal energy production. In 2017, in centralised heating systems where natural gas is used as an energy source for thermal energy production, there were no changes in tariff amounts for energy supplied to households, but the tariff was reduced by an average of 10.7% for business consumers in Karlovac and Vukovar compared to 2016. The tariff amount for energy in the centralised heating system Vojak (Rijeka), where fuel oil is used for thermal energy production, changed three times in 2017 (in February, May and December), which is a 13.2% increase compared to 2016. The total price of thermal energy in cities where HEP-Toplinarstvo d.o.o. provides thermal energy services remained the same in 2017 (Zagreb, Osijek, Sisak, Velika Gorica, Samobor, and Zaprešić).

In 2017, HERA received 93 various inquiries and submissions from end consumers, authorised representatives of co-owners, thermal energy consumers, energy entities, and institutions, to which it provided interpretations and opinions or issued corresponding decisions. In addition, within its jurisdiction and in its replies to inquiries, submissions and complaints, HERA issued guidelines and informed end consumers, authorised representatives of co-owners, thermal energy consumers

and energy entities about their rights and obligations set out by laws and regulations applicable in the thermal energy sector.

3 HERA'S ORGANISATIONAL STRUCTURE, POWERS AND ACTIVITIES

HERA is an independent, autonomous, non-profit legal entity which acts as a public authority competent for the regulation of energy-related activities. It 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

HERA's structure is defined by the **Act on the Regulation of Energy Activities (Official Gazette No. 120/12)** and the HERA's Statutes of 16 October 2013.

HERA consists of a Board of Commissioners, Office of the President of the Board of Commissioners, 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, 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 Croatian Government on the fees charged for the regulation of energy-related activities (Official Gazette Nos. 155/08, 50/09, 103/09 and 21/12), HERA's operations are funded from the following sources:

- a fee calculated as 0.05% of the total annual revenue generated in the previous year by energy entities from the sale of goods and/or services resulting from their energy-related activities for which they hold valid licences, and
- fees charged for granting licences for energy-related activities, fees charged for approving the eligible producer status, and fees charged for the settling of claims, complaints and requests.

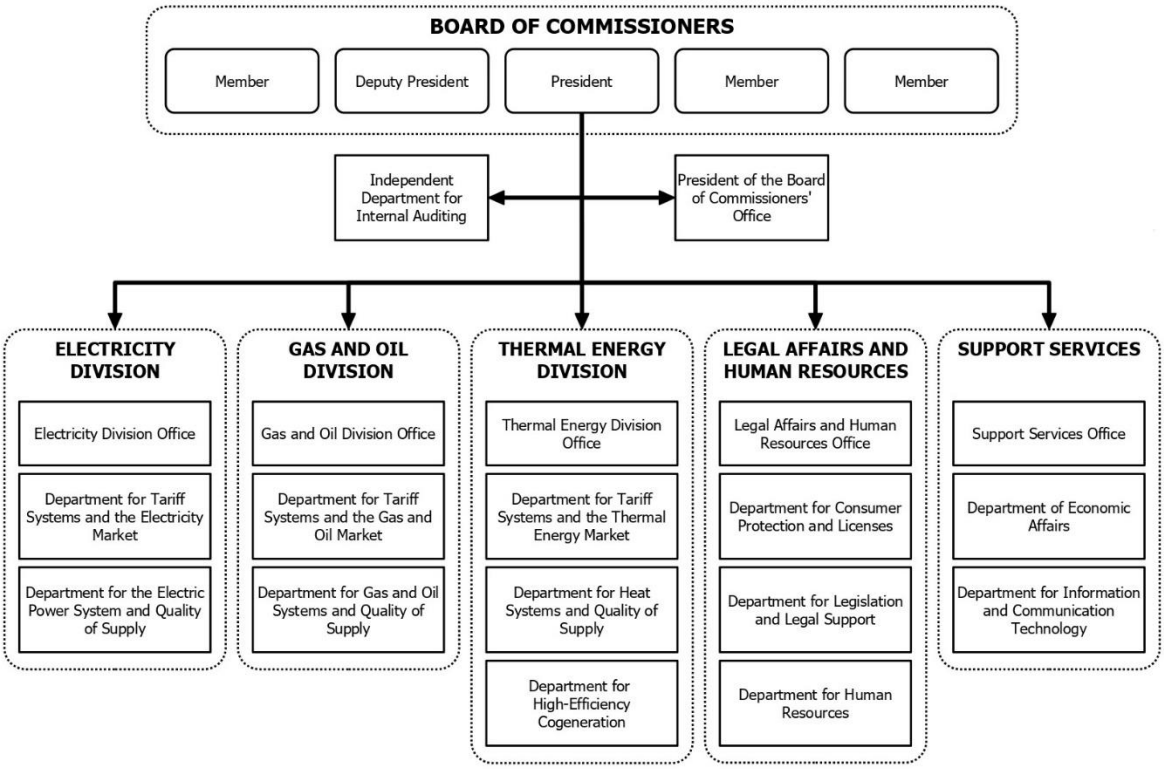


Figure 3.1.1 HERA organisational chart

Pursuant to the provisions of Article 8 of the **Act on the Regulation of Energy Activities**, HERA is accountable to Croatian Parliament for its operations.

The legality of HERA's operations, its general and individual acts is supervised by the ministry.

HERA's financial operations are supervised by a central state administration body, i.e. a legal entity vested with official authority for that purpose.

3.2 Legal 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),***
- ***Energy Act (Official Gazette Nos. 120/12, 14/14 and 102/15),***
- ***Electricity Market Act (Official Gazette Nos. 22/13 and 102/15),***
- ***Gas Market Act (Official Gazette Nos. 28/13, 14/14 and 16/17),***

- ***Thermal Energy Market Act (Official Gazette Nos. 80/13 and 14/14),***
- ***Oil and Petroleum Products Market Act (Official Gazette Nos. 19/14 and 73/17),***
- ***Act on Biofuels for Transportation (Official Gazette Nos. 65/09, 145/10, 26/11, 144/12 and 14/14),***
- ***Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette Nos. 100/15 and 131/17),***
- ***Energy Efficiency Act (Official Gazette No. 127/14),***
- ***Act on Alternative Fuel Infrastructure Deployment (Official Gazette No. 120/16),***
- ***Act on the Ratification of the Energy Community Treaty (Official Gazette – International Agreements Nos. 6/06 and 9/06),***
- ***General Administrative Procedure Act (Official Gazette No. 47/09),***
- *Ordinance on Licences for Performing Energy-Related Activities and Maintaining Registers of Granted and Revoked Licences for the Performance of Energy-Related Activities (Official Gazette Nos. 88/15 and 114/15),*
- *Decision on the Fees Charged for the Regulation of Energy-Related Activities (Official Gazette Nos. 155/08, 50/09, 103/09 and 21/12),* and
- Other by-laws adopted pursuant to the ***Energy Act*** and other legislation defining particular energy markets.

*The **Gas Market Act (Official Gazette No. 18/18)** has been in force since 3 March 2018 and was therefore not part of the legislative framework regulating the operations within HERA's area of competence in 2017.*

*The **Regulation on Amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette No. 131/17)** entered into force on 29 December 2017.*

3.3 Activities

HERA's activities are listed in the **Act on the Regulation of Energy Activities** (hereinafter: the **Act**), and include the following:

- granting, renewing, and transferring licences for the performance of energy-related activities, and revoking and suspending of licences,
- supervision of energy entities in their performance of energy-related 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-related 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-related 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,
- adoption of methodologies and tariff systems in accordance with this **Act**, the act governing the energy sector and other laws governing specific energy markets,
- setting or approving prices, tariffs and fees in accordance with the methodologies and tariff systems under Article 11, paragraph 1, item 9 of the **Act**,
- 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 transmission system and transport system operators with ENTSO-E and ENTSO- G development plans,
- supervision of transmission, transport, and distribution system operators (system owners), other energy entities or system users with respect to their compliance with the obligations laid down in the **Act**, the law governing the energy sector, and other laws governing specific energy markets, as well as with *Regulation (EC) No 714/2009 of the European Parliament and of the Council on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003 (hereinafter: Regulation No 714/2009)* and *Regulation (EC) No 715/2009 of the European Parliament and of the Council 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, and 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,
- submission of annual reports to the Croatian Parliament containing information on activities undertaken and results achieved in relation to the scope of activities under Article 11, Paragraph 1, Items 1 to 8 of the **Act**,
- reporting to other competent national authorities, ACER, the European Commission, and other bodies of the European Union, including the submission of annual reports to ACER and the European Commission containing information on activities undertaken and results achieved in relation to the scope of activities under Article 11, Paragraph 1, Items 1 to 8 of the **Act**,
- laying down the requirements for the quality of energy supply in accordance with applicable regulations governing specific energy-related activities,

- laying down general requirements for energy supply,
- specifying and supervising the methodology for setting network/system connection fees for new customers 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 advanced 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 transmission, transport, 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 transmission and transport 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.

In 2017, the Board of Commissioners held 32 meetings with a total of 349 agenda items discussed.

All decisions of the Board of Commissioners are published on HERA's website.

3.4 A general overview of HERA's activities and operations in 2017

3.4.1 Consumer protection

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

- By supervising energy entities and the quality of their services, and by collecting and processing data related to energy entities' activities in the field of consumer protection pursuant to the provisions of the **Energy Act** and the laws governing the performance of specific energy-related activities, as well as by cooperating with ministries and relevant inspectorates pursuant to the provisions of relevant laws, and
- By resolving individual consumer claims and complaints by virtue of its official authority pursuant to the **Act on the Regulation of Energy-Related Activities** and other laws and regulations governing specific energy markets.

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

In 2017, HERA received a total of 370 submissions from energy consumers, which included both energy consumer inquiries (120) and energy consumer claims and complaints (250). A total of 29 court proceedings were initiated against HERA's actions in 2017 before the competent administrative court.

HERA was also actively involved in the work of the National Consumer Protection Council and participated in the first round of trainings for consumer associations held on 23 November 2017. The aim of this exercise was to familiarize consumers in the energy sector with their rights and obligations and to introduce HERA as an authority that can be contacted in case any of their rights, which are guaranteed by regulations governing the energy sectors, have been violated.

In order to protect consumer rights concerning the transparency of the implementation of gas supply contracts by gas suppliers, on 7 November 2017 HERA carried out an inspection at MEĐIMURJE-PLIN d.o.o. za opskrbu plinom, Čakovec. Further details are available on HERA's website https://www.hera.hr/hr/docs/2018/Odluka_2018-03-16_06.pdf.

3.4.2 Electricity

In 2017, 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 tariff amounts 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 the rules for management and allocation of interconnection capacities and of compliance of the capacity allocation regime with *Regulation No 714/2009,*
- regular monitoring of balancing energy settlements and imbalance settlements in order to improve the regulations concerning balancing energy settlements and imbalance settlements,
- 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 the 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),
- granting 17 licences for the performance of energy-related activities (seven licences for electricity generation, one licence for electricity supply, and nine licences for electricity trade),
- extending 8 licences for the performance of energy-related activities (three licences for electricity generation, one licence for electricity trade, and four licences for electricity supply),
- issuing decisions related to eligible electricity producer status: one decision altering a preliminary decision, nine decisions to change the project operator in a preliminary decision, 14 decisions extending a preliminary decision, two decisions renewing the procedure for the extension of preliminary decisions, and one decision suspending the procedure for the extension of a preliminary decision; denied applications: six applications for the extension of a preliminary decision, two applications for the extension of a preliminary decision and two applications to change the project operator, five applications for extending a preliminary decision; 24 decisions granting eligible electricity producer status were issued and eight decisions to change the project operator in the decision; one request for a decision was rejected, and
- 185 claims and complaints from end consumers were resolved.

After consultation with the concerned stakeholders, HERA adopted the following by-laws in 2017:

- *Rules on Amendments to the Rules for Electricity Supplier Switching (Official Gazette No. 33/17)*,
- *Operating Rules in Cases of Exceeded Load on the Part of an Eligible Electricity Producer (Official Gazette No. 2/17)*,
- *Requirements for the Quality of Electricity Supply (Official Gazette Nos. 37/17 and 47/17),*
- *Criteria for Granting Authorisations for the Construction and Commissioning of Direct Lines (Official Gazette No. 43/17)*,

- *Methodology for Setting Fees for the Connection to the Electric Power Network for New Network Users and for Increasing the Connection Capacity for Existing Network Users (Official Gazette No. 51/17)*.

HERA issued the following decisions on tariff amounts:

- *Decision on Tariffs for Guaranteed Electricity Supply (Official Gazette No. 51/17)* (for the period from 1 July to 31 December 2017), and *Decision on Tariffs for Guaranteed Electricity Supply (Official Gazette No. 114/17)* (for the period from 1 January to 30 June 2018).

HERA adopted the following opinions and approvals:

- opinion on the *Proposal for a regulation determining the requirements and procedures for grid connection*,
- opinion on the *Proposal for a regulation on amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act*,
- approval of the *Annual energy procurement plan to cover losses in the distribution network for 2017* of HEP - Operator distribucijskog sustava d.o.o.,
- approval of the proposal of an *Agreement on cross-border redispatching between Hrvatski operator prijenosnog sustava d.o.o. and HEP-Proizvodnja d.o.o. for the period from 1 September 2017 to 31 December 2018*,
- approval of the *Proposal of amendments to the compliance programme of the independent transmission operator Hrvatski operator prijenosnog sustava d.o.o.*,
- approval of the proposal of an *Electricity Supply Agreement for a period of one year* of Hrvatski operator prijenosnog sustava d.o.o.,
- approval of the *Annual Energy Procurement Plan to cover losses in the transmission network for 2018* of Hrvatski operator prijenosnog sustava d.o.o.,
- approval of the proposals for an *Electricity delivery agreement to cover losses in the transmission network in 2018 and to cover part of the losses in 2019* of Hrvatski operator prijenosnog sustava d.o.o.,
- approval of the *Annual energy procurement plan to cover losses in the distribution network for 2018* of HEP - Operator distribucijskog sustava d.o.o.,
- approval of the proposals for contracts for the procurement of ancillary services for 2018 of Hrvatski operator prijenosnog sustava d.o.o.,
- approval of the proposal for *Annex 6 to the Agreement on the calculation and collection of the transmission network usage fee for electricity consumers connected to the distribution network* of Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval of the proposal for an *Amendment to the Rules on electricity system balancing* of Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval of the *Annual report on the security of supply of the Croatian electricity system for 2016* of Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval of the *Annual report on the security of supply in the distribution system for 2016* of HEP - Operator distribucijskog sustava d.o.o.,
- prior approval of the *Proposal for a network code for the transmission system* of Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval of the *Specific Annex for the Bidding Zone borders serviced by SEE CAO to the Harmonised Allocation Rules* and *Rules for explicit daily capacity*

allocation on bidding zone borders serviced by SEE CAO of Hrvatski operator prijenosnog sustava d.o.o.,

- prior approval of the *Rules for explicit daily capacity allocation for long-term and intraday trade on Bidding Zone border Croatia-Serbia* of Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval of the *Proposal for Rules on the application of standard load profiles* of HEP-Operator distribucijskog sustava d.o.o.,
- prior approval of the *Rules for daily explicit capacity allocation on Bidding Zone borders AT-CZ, AT-HU, HR-HU, HR-SI, CZ-DE, CZ-PL, PL-SK and PL-DE* of Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval of the *Rules for intraday capacity allocation between the Bidding Zones of Hrvatski operator prijenosnog sustava d.o.o. and Elektromreža Srbije d.d.* and *Nomination rules for the Bidding Zone border Croatia-Serbia* of Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval of the proposal for a *Decision on the appointment of a compliance manager* of Hrvatski operator prijenosnog sustava d.o.o.,
- prior approval of the *Proposal for a ten-year (2018–2027) development plan for the HEP ODS distribution network with a detailed elaboration of the initial three- and one-year periods* of HEP-Operator distribucijskog sustava d.o.o.,

and the following decisions:

- decision adopting the *Criteria for approving derogations in accordance with Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators*,
- decision rejecting the request for approval of the proposed *Contract on reserve capacity for tertiary regulation and supply of electricity in 2017* of Hrvatski operator prijenosnog sustava d.o.o.,
- decision adopting *Operating rules in cases of exceeded load on the part of eligible electricity producers*,
- decision adopting the *Criteria for granting authorisations for the construction and commissioning of direct lines*,
- decision adopting the *Criteria for approving derogations in accordance with Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a network code on demand connection*,
- decision approving the *Proposal for a common grid model methodology of all transmission system operators*,
- decision adopting the *Criteria for approving derogations in accordance with Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules*,
- decision approving the *Proposal of all transmission system operators for a day-ahead firmness deadline in accordance with Article 69 of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management*,
- decision approving the *proposal for the Plan for joint establishment and operation of market coupling operator functions*,
- decision on the *Proposal of a costs-benefit analysis for introducing advanced metering devices and relevant networking systems*,

- decision on the adoption of HERA's *Costs-benefit analysis for introducing advanced metering devices and relevant networking systems*,
- decision approving the *Core CCR TSO's proposal for the regional design of long-term transmission rights in accordance with Article 31 of Commission Regulation (EU) 2016/1719* of Hrvatski operator prijenosnog sustava d.o.o.,
- decision approving the *Regional specific annex for the CCR Core to the Harmonised Allocation Rules for long-term transmission rights 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.,
- decision approving the *All TSOs' Proposal for Amendment in accordance with Article 9(13) of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management on the determination of capacity calculation regions* of Hrvatski operator prijenosnog sustava d.o.o.,
- decision on the adoption of the *Report on the use of the revenues of Hrvatski operator prijenosnog sustava d.o.o. from the allocation of cross-border transmission capacities from July 2016 to June 2017*,
- decision on the performed supervision over Hrvatski operator prijenosnog sustava d.o.o.,
- decision approving the *All transmission system operators' proposal for a generation and load data provision methodology*,
- decision approving the of *All TSOs´ proposal for the establishment of a Single Allocation Platform (SAP) and for the cost sharing methodology*,
- decision approving the *Proposal for a ten-year transmission network development plan 2018 – 2027, with a detailed elaboration of the initial three- and one-year periods* of Hrvatski operator prijenosnog sustava d.o.o., and
- decision denying the approval of the planned pricing for energy procurement to cover losses in the transmission network for 2018 of Hrvatski operator prijenosnog sustava d.o.o.

3.4.3 Natural gas

In 2017, HERA carried out the following activities related to the gas sector:

- drafted and adopted *Amendments to the General terms and conditions of gas supply (Official Gazette No. 74/17)*,
- drafted and published the *Binding interpretation of General terms and conditions for gas supply regarding the section on switching suppliers*,
- drafted and published developing and issuing guidelines on titled Switching gas suppliers – additional instructions on procedures and clarifications,
- drafted and adopted *Amendments to the network codes for the gas distribution system (Official Gazette No. 43/17)*,
- drafted and adopted the *Methodology for setting tariffs for the reception and dispatch of liquefied natural gas (Official Gazette No. 110/17)*,
- adopted the *Decision on indicative tariff amounts for the reception and dispatch of liquefied natural gas (Official Gazette No. 127/17)*,

- drafted and adopted amendments to the *Methodology for setting the price of non-standard services for gas transport, distribution, storage, and public service gas supply (Official Gazette No.* 132/17),
- adopted the *Decision on the tariff amounts for gas transport for the period from 1 April 2017 to 31 December 2021 (Official Gazette No. 26/17)*,
- adopted the *Decision on tariff amounts for gas transport for the period from 1 January 2018 to 31 December 2021 (Official Gazette No. 127/17)*,
- adopted the *Decision on indicative tariff amounts for gas transport (Official Gazette No. 132/17)*,
- adopted the *Decision on determining the entity responsible for publishing information before the annual yearly capacity auction of the gas transmission system and before the tariff period in the Republic of Croatia*,
- adopted the *Decision on determining the entity responsible for holding periodic consultations regarding the methodology for setting the reference price of the capacity product for annual firm capacity, which is applicable at entry and exit points of the gas transmission system in the Republic of Croatia*,
- adopted the *Decision approving the Auction Premium Allocation Agreement* between Croatian transport system operator PLINACRO d.o.o. and Hungarian transport system operator FGSZ Ltd. concerning the interconnection point Dravszerdahely,
- drafted and adopted the *Methodology for setting tariffs for gas supply and guaranteed supply as public services (Official Gazette No. 26/17)*,
- adopted the *Decision on gas distribution tariffs amounts for energy entities for the second regulation period 2018–2021 (Official Gazette No. 127/17)*,
- adopted the *Decision on tariffs for gas supply as a public service for the period from 1 January to 31 March 2018 for 34 public service gas suppliers (Official Gazette No. 127/17)*,
- granted approvals to:
  - the transmission system operator with regard to the *Network rules for the gas transport system (PLINACRO 3/2017, 12/2017)*,
  - the gas market operator with regard to the *Rules on gas market organisation (HROTE 3/2017)*,
  - a gas storage system operator with regard to the *Rules for gas storage system use (UGSF Okoli 3/2017)*,
- adopted the *Criteria for grant authorisations for the construction and commissioning of direct gas pipelines (Official Gazette No. 78/17)*,
- issued three licences for gas trade activities,
- extended one licence for liquefied natural gas terminal management, and
- extended nineteen licences for gas supply activities.

3.4.4 Oil and petroleum products

In 2017, HERA's carried out the following activities in the oil and petroleum products sector:

- issued 10 licences for energy-related activities (8 licences for the wholesale trade in petroleum products, 1 licence for the wholesale trade in liquefied petroleum gas, and 1 licence for the storage of liquefied petroleum gas),

- extended 12 licences for energy-related activities (6 licences for the wholesale trade in petroleum products, 4 licences for the wholesale trade in liquefied petroleum gas, and two licences for the storage of oil and petroleum products), and
- transferred 2 licences (1 licence for the storage of oil and petroleum products and 1 licence for the wholesale trade in liquefied petroleum gas).

3.4.5 Biofuels

In 2017, HERA extended one licence in the biofuel sector for the wholesale trade in biofuels.

3.4.6 Thermal energy

In 2017, HERA carried out the following activities in the thermal energy sector:

- issued 2 licences for thermal energy production,
- ended 5 licences (2 licences for thermal energy production, 2 licences for thermal energy supply, and 1 licence for thermal energy distribution), and
- adopted 2 decisions on the expiry of licences (1 licence for thermal energy production and 1 licence for thermal energy supply).

In 2017, licences expired for one thermal energy supply company and one thermal energy production company.

In addition to these, HERA provided a number of interpretations and opinions, adopted relevant decisions and responded to various inquiries and submissions from end consumers, thermal energy consumers, authorised representatives of co-owners, energy entities, and institutions.

Pursuant to the ***Thermal Energy Market Act***, HERA hosts and regularly updates and maintains the register of thermal energy consumers on its website. On 31 December 2017, 35 businesses were recorded in the register (legal and natural persons).

HERA also maintains records on thermal energy consumers, for which data has been provided by all active thermal energy consumers, as provided by the ***Thermal Energy Market Act***.

In 2017, HERA carried out inspections of GTG VINKOVCI d.o.o., Vinkovci and GRADSKA TOPLANA d.o.o., Karlovac, in accordance with the *Network codes for thermal energy distribution* and *General requirements for thermal energy supply*, following complaints and failure to act upon requests submitted by end consumers, in particular regarding a decrease in connection capacity and conditions for thermal energy supply. Based on inspection results, requests made by end consumers were granted.

3.4.7 International cooperation

A significant portion of HERA's operations, pursuant to the **Act on the Regulation of Energy-Related Activities** and relevant EU legislation, concerns cooperation with national energy regulatory authorities in EU Member States and ACER as an official body of the European Union. Furthermore, HERA also cooperates with regulatory authorities from the neighbouring countries that are not EU member states, as well as with bodies within the Energy Community. HERA adequately

provides information about its operations to ACER, the Commission, and other bodies when necessary.

In addition to taking part in working groups and task forces within ACER, HERA actively collaborates with European national regulators under CEER, which is a trade association of European regulatory authorities both from EU Member States and non-EU countries. The President of HERA's Board of Commissioners was one of the vice presidents of CEER's Board of Directors in the previous period.

At the level of the European Union, HERA participates in the activities of working groups established by the European Commission, which are tasked with improving physical connections and organisation of the internal energy market. HERA also participates in the activities of regional initiatives, such as the European Commission's CESEC (*Central and South Eastern Europe Gas Connectivity*), whose initial aim was to improve and accelerate the development and integration of gas systems in this part of Europe. In 2017, the initiative was extended to cover electrical energy, renewable energy and energy efficiency sectors. Another initiative within ACER, the Gas Regional Initiative South South East (GRI SSE), aims for swifter implementation of network codes and market integration.

At the regional level, HERA is a member of the Mediterranean Energy Regulators (MEDREG), the Energy Regulatory Regional Association (ERRA), and the working bodies of the Energy Community.

In 2015, the European Commission published "A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy", which represents the European Union's new energy strategy. Mr Jean-Claude Juncker, president of the European Commission, has emphasised that the creation of the Energy Union is one of the European Union's political priorities.

The aim in creating the Energy Union is to significantly decrease European dependence on fossil fuels by removing barriers to the free flow of energy in a fully integrated energy system at the level of the entire European Union. In order to have a fully integrated energy market, it is necessary to continue with the cross-border coupling of electric power and gas systems, to implement and upgrade the management model of the internal energy market, to improve regional cooperation in a common European Union framework, and to provide new benefits and consumer protection, particularly with respect to vulnerable groups.

In order to achieve the outlined goals, on 30 November 2016 the Commission presented draft amendments to existing legislative framework concerning electricity, renewable energy sources, energy efficiency, eco-design, consumer protection, and Energy Union governance, jointly referred to as "Clean Energy for All Europeans". The ordinary legislative procedure to adopt these proposals is underway in the EU Council and European Parliament and is expected to be completed by February 2019. The Commission also announced amendments to the legislative framework for the gas sector. However, this will be a task for the new Commission assuming office in 2019.

Together with other regulators in ACER and CEER working groups, HERA is involved in the process of drafting amendment proposals to documents prepared by the Commission, and thus plays an active role in the process of adopting new legislation at the EU level.

In addition to consumer protection, national energy regulatory authorities play an important role in the creation of an integrated common internal energy market through the implementation and monitoring of a common network code, both in the electrical energy and gas sectors. HERA cooperates with ACER and other

national regulatory authorities in the implementation of a European network code and the organisation of a single European energy market in order to develop efficient competition and improve the security of supply, free of discrimination among suppliers from various Member States of the European Union and the Energy Community.

Energy is traded at regional and inter-regional energy exchanges. HERA primarily cooperates with ACER in order to ensure the harmonisation of regulatory frameworks among regions with the goal of establishing a competitive electricity and natural gas market.

Among significant set of obligations under European legislation relates to the REMIT Regulation, which tasks national regulatory authorities with the monitoring of transparency and the functioning of the European energy market.

3.4.8 REMIT

On 25 October 2011, the European Parliament and the Council of the European Union adopted REMIT (Regulation (EU) No 1227/2011 on wholesale energy market integrity and transparency), introducing a harmonised framework for monitoring the wholesale electricity and natural gas markets in the European Union. Based on REMIT, the 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 is any person (natural or legal), including transmission and transport system operators, who enters into transactions, including the placing of orders to trade, in one or more wholesale energy markets.

The common European framework for wholesale electricity and natural gas markets is such that REMIT:

- defines market abuse in the form of market manipulation, attempted market manipulation, and insider trading,
- introduces a clear prohibition of market abuse,
- provides that market participants are obliged to publish inside information which directly or indirectly applies to wholesale energy market products and which could significantly impact the formation of wholesale market prices,
- establishes that ACER monitors wholesale markets at the level of the European Union, and
- governs data collection at the level of the European Union.

HERA has the following tasks in the process of implementing REMIT in Croatia:

- providing information to relevant market participants and facilitating their timely registration in order to establish a national register,
- ensuring the implementation of REMIT in accordance with the powers conferred,
- providing adequate protection of received market-sensitive information, and
- cooperating with other institutions in order to help establish an integrated and transparent market.

REMIT provides for the inclusion into the national legislative framework of provisions conferring HERA with the investigatory and enforcement powers required for the above tasks.

Before submitting data on transactions and orders to trade in wholesale markets, all wholesale market participants must register in the Centralised European Register of Energy Market Participants (CEREMP). National regulatory authorities have been tasked with establishing national registers of market participants. CEREMP consists of national registers of all EU Member States.

This requires all market participants established in Croatia and market participants established outside the European Union which are active on the wholesale market in Croatia to register with HERA, unless they are already registered with a regulatory authority of another EU member state where they are also active.

Pursuant to REMIT, market participants trading on organised wholesale markets in the European Union were required to register by 7 October 2015. The only organised electricity market in Croatia is CROPEX, which has been forwarding all trading information to ACER since it began holding auctions. All other market participants trading on other wholesale markets as defined by REMIT were obliged to register with CEREMP by 7 April 2016.

HERA made the registration of market participants with CEREMP possible in early 2015, and roughly 100 participants in the electricity and/or natural gas markets were registered by the end of 2017. After April 2016, a number of market participants already registered with CEREMP supplemented their registration with HERA by identifying related undertakings as defined by REMIT.

After the registration process described above, market participants should:

- publicly disclose inside information,
- report to ACER and the national regulatory authority information related to transactions entered into by electricity and natural gas producers, operators of natural gas storage facilities or operators of liquefied natural gas import facilities the sole purpose of which is to cover the immediate physical loss resulting from unplanned outages where not to do so would result in the market participant not being able to meet existing contractual obligations or where such action is undertaken in agreement with the transmission system operator(s) concerned in order to ensure safe and secure operation of the system, and
- report to ACER the relevant information on wholesale energy market transactions, including orders to trade.

ACER plays a central role in the implementation of REMIT, as it collects information related to network status and allocations of cross-zonal capacities from transmission and transport 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 such information 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 possible sanctioning of market participants.

Even though REMIT does not explicitly provide that each EU Member State should monitor its own national market, systematic and ongoing monitoring and analysis of the behaviour of wholesale market participants is necessary, primarily in order

to identify typical, extraordinary and unusual market trends, which can serve as an incentive to HERA for further activities in terms of market supervision.

When HERA acquires sufficient experience in wholesale market supervision, it will decide on the possibility of receiving all market-sensitive information from ACER, which will be supported by adequate IT systems and business intelligence solutions.

In order to provide timely information to relevant market participants, in 2017 HERA published its "REMIT HERA newsletter", which serves to inform market participants by electronic means.

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

In late 2016, HERA hired consultants to prepare documentation for an information security management system in order to satisfy the information security requirements for the use of a tool designed by ACER to securely exchange information related to investigations of potential breaches of REMIT provisions.

HERA continuously cooperates with the regulatory authorities in Austria, Slovenia, Hungary, and the Czech Republic, primarily in terms of the exchange of experiences in the implementation of REMIT. This has resulted in the signing of a memorandum of understanding by these regulatory bodies in early 2017.

In March 2017, HERA and the regulatory authorities in Slovenia and Hungary were informed via the notification platform of a potential violation of REMIT provisions in the natural gas sector. ACER coordinates this process, which has not yet been completed due to its complexity and involvement of several countries.

3.4.9 Council for Regulatory Affairs and Consumer Protection

Pursuant to HERA's Statutes and the *Rules of operation of HERA's Council for Regulatory Affairs and Consumer Protection,* HERA has a Council for Regulatory Affairs and Consumer Protection (hereinafter: the Council), with the following responsibilities:

- 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.

In 2017, the Council held three meetings to discuss the following topics:

- proposal for a Methodology for setting tariffs for public service gas supply and guaranteed supply, also addressing the wider context of issues related to gas prices,
- Proposal for a cost-benefit analysis regarding advanced metering devices and network systems (HERA will submit this analysis to the minister responsible for energy, who in turn issues a decision determining the plan of measures for introducing advanced metering devices for end consumers), and

- measures outlined in the European Commission package “Clean Energy for All Europeans”, covering energy efficiency, energy from renewable sources, design of the electricity market, security of electricity supply and a governance system for the Energy Union.

4 ELECTRICITY

4.1 Significant events on the electricity market

Events in Croatia

The EKO balance group was intended to begin operating in 2017, however this was delayed due to the ***Regulation on Amendments to the Renewable Energy Sources and High-efficiency Cogeneration Act***, adopted on 29 December 2016, which entered into force on 31 December 2016.

As of 1 January 2017, electricity supply provided as a public service (universal and guaranteed service) was separated from HEP ODS into a newly incorporated company – HEP Elektra d.o.o. This significantly increased the transparency of the electricity market because the supply activity was separated from the network activity.

As of 1 January 2017, each supplier issued a single invoice for electricity and network to its consumers whose billing metering points are connected to the low voltage network.

In February 2017, HERA adopted the *Operating rules in cases of exceeded load on the part of eligible electricity producers*, establishing the criteria and the procedure in the case of exceeded load from the decision granting eligible electricity producer status.

In March 2017, HERA adopted the *Requirements for the quality of electricity supply* which, among other things, stipulate quality indicators of electricity supply, the manner of measuring, collecting and publishing indicators for the quality of electricity supply, the method, frequency and scope of reporting and submission of data on the quality of electricity supply to HERA, as well as a gradual introduction of general, minimum and guaranteed quality standards for electricity supply and gradual introduction of financial compensation to consumers following the introduction of guaranteed standards of electricity supply.

In March 2017, HERA adopted the *Rules on amendments to the Rules for electricity supplier switching,* which took into account the previous experiences and eliminated issues observed in the enforcement of the previously applicable *Rules*. The deadlines for the submission of applications for data harmonisation were changed, only one supplier switch was made possible with the same date of initiation of the supply contract enforcement during a calendar month, and the obligation of refunding the amounts paid in excess following the final calculation.

In March 2017, HERA provided HOPS with a prior approval for the *Amendments to the Rules on electric power system balancing* defining that until the establishment of the EKO balance group imbalances will be calculated that occur as the difference between the achievement of eligible producers in the incentives system and agreed schedules of suppliers pertaining to the obligatory electricity buy-off, and that the financial liability incurred based on this calculation shall be the liability of HOPS.

As of 26 April 2017, market participants in CROPEX are able to trade with electricity in the intraday market safely, anonymously, continuously and transparently.

In April 2017, HERA adopted the *Criteria for granting authorisations for the construction and commissioning of direct lines,* supplementing a package of by-laws related to transmission network connection.

In May 2017, HERA adopted the *Methodology for setting electricity grid connection charges for new users and for increasing the connection capacity for existing users,* stipulating the method for calculating the charges for connecting new users' buildings to the transmission and/or distribution network, as well as for increasing the connection capacity of existing network users.

In June 2017, HERA provided HOPS with a prior approval for the *Annual report on the security of supply in the transmission system for 2016*, and HEP ODS with a prior approval for the *Annual report on the security of supply in the distribution system for 2016*. Pursuant to these reports, the ministry competent for energy prepares its own annual report on the state of security of electricity supply and expected electricity demands in Croatia.

In late June 2017, HERA provided HOPS with a prior approval for the *Network code for the transmission system* which, among other things, regulates technical and other requirements for connecting users to the transmission network and the technical requirements for access to the transmission network and its use.

In June 2017, HERA adopted the *Decision on setting tariffs for guaranteed electricity supply for the period from 1 July to 31 December 2017.*

In July 2017, 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 for further processing and based on which the minister develops a plan of measures to introduce advanced metering devices for end consumers.

In late August 2017, the Croatian Government adopted the *Decision on charges for renewable energy sources and high-efficiency cogeneration*, increasing the charges for renewable energy sources and high-efficiency cogeneration from HRK 0.035/kWh to HRK 0.105/kWh, and from HRK 0.005/kWh to HRK 0.007/kWh for consumers obliged to obtain greenhouse gas emission permits.

In November 2017, HERA adopted the *Decision on setting tariffs for guaranteed electricity supply for the period from 1 January to 30 June 2018.*

In December 2017, HERA provided HEP ODS with a prior approval for the *Rules on the implementation of standard load profiles*, introducing multiple monthly loss coefficients as opposed to the single monthly loss coefficient, thereby compensating for the consequences of the difference in electricity charged via equal advance payments and the households' actual consumption.

In December 2017, HERA provided HEP ODS with a prior approval for the *Ten-year (2018–2027) development plan for the HEP ODS distribution network with a detailed elaboration of the initial three- and one-year periods,* and HOPS for the *Ten-year development plan for the transmission network from 2018 to 2027 with a detailed elaboration of the initial three- and one-year periods*.

The ***Regulation on amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act*** was adopted in late December 2017, postponing the obligation of selling electricity from the incentives system in the electricity market from 1 January 2018 to no later than 1 January 2019, thus extending the mandatory takeover of electricity by the suppliers by another year and moving the deadline for the initiation of the EKO balance group's operations from 1 January 2018 to 1 January 2019.

International events

In 2017, the European Commission continued working on the package of documents on Clean Energy For All Europeans (CEP), among which special mention should be made of the *Directive on common rules for the internal market in*

electricity (recast), *Regulation on conditions for access to the network for cross-border exchanges in electricity (recast), Regulation establishing a European Union Agency for the Cooperation of Energy Regulators (recast), Regulation on risk-preparedness in the electricity sector (recast),* and repeal of the *Directive on security of supply,* as well as the *Directive on the promotion of the use of energy from renewable sources (recast).*

In 2017, the following regulations related to the establishment of EU network rules entered into force:

- *Commission Regulation (EU) 2017/1486 of 2 August 2017 establishing a guideline on electricity transmission system operation,*
- *Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing,*
- *Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration.*

Entry into force of these regulations completes the work on the adoption of network rules as provided by *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*.

In March 2017, CROPEX and HOPS officially became members of the Italian Borders Working Table (IBWT) regional project, which in 2018 resulted in connecting the Croatian electricity market with the Slovenian market and implicitly the European market within the MRC project, which currently includes 19 countries accounting for 85% of Europe's electricity consumption.

Additionally, in accordance with the *Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators*, in November 2016 HERA made it possible for the generators of type A power-generating modules to submit applications via HERA's website to have their power-generating module classified as an emerging technology, whereby such facilities would be exempt from the application of the provisions of the said *Regulation*. HERA received several applications during this time, and in May 2017 decided on which power-generating modules to classify as an emerging technology.

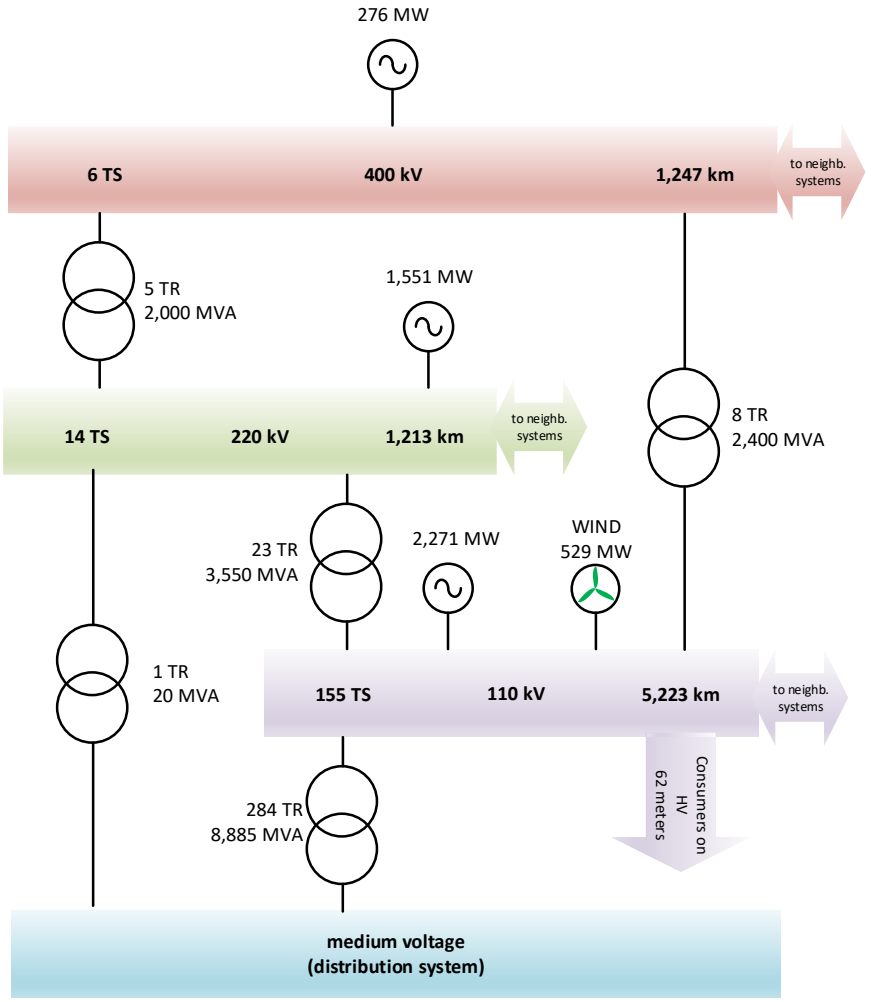
4.2 Regulated network activities in the electricity sector

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 the 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.

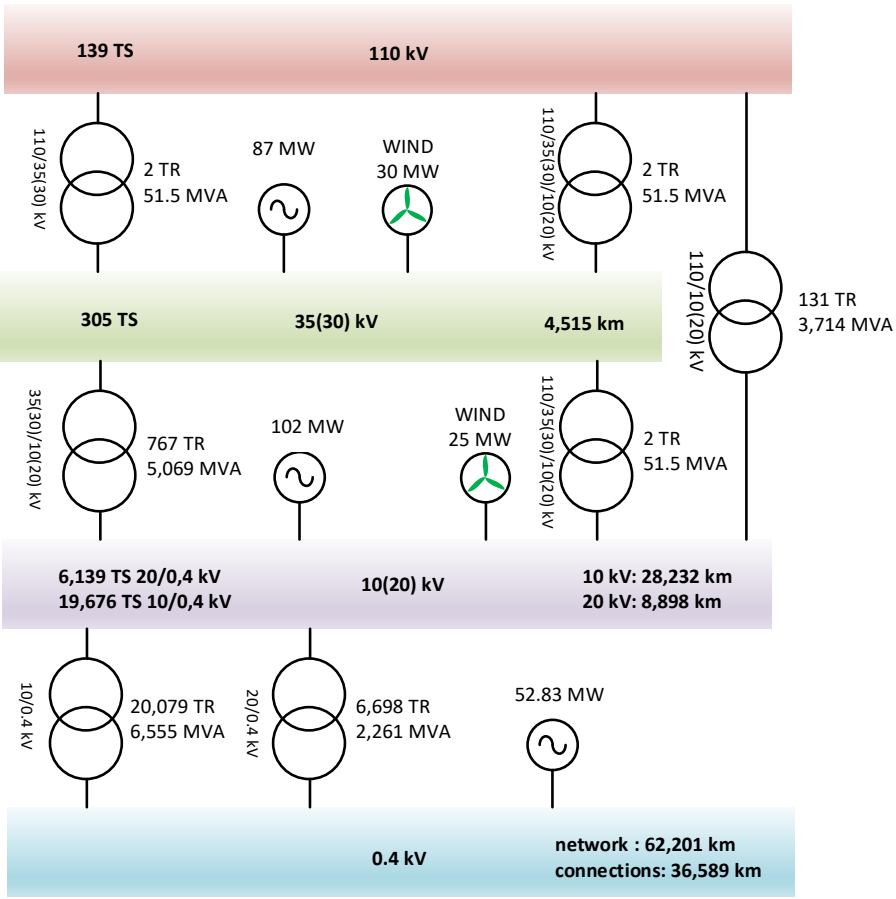


Source: HOPS

Figure 4.2.1 Basic information about the transmission system as of 31 December 2017

In Croatia, HEP ODS provides the public service of electricity distribution, and is responsible for the operation, management, maintenance, development and construction of the distribution network, as well as for ensuring the long-term capability 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

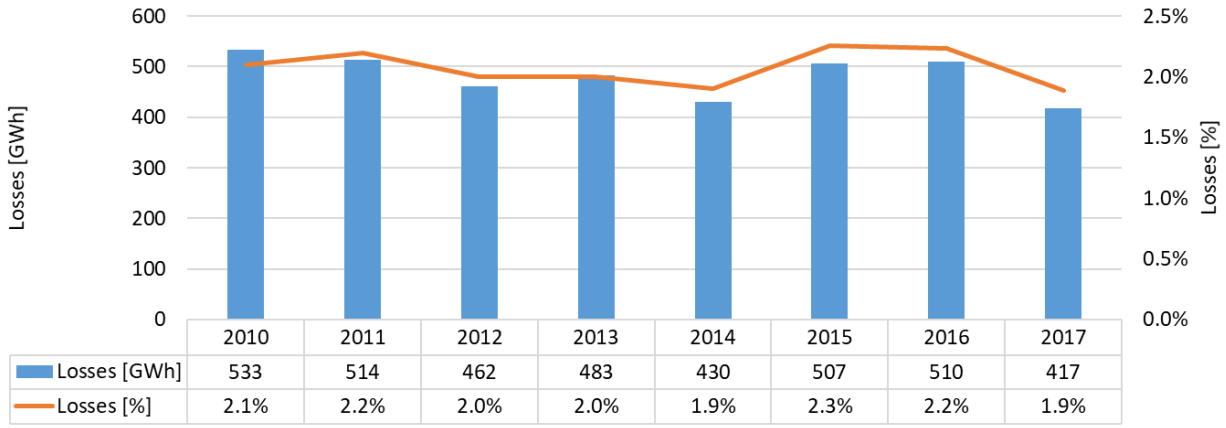
Figure 4.2.2 Basic information about the distribution system as of 31 December 2017

4.2.2 Losses in the transmission and distribution network

Losses in the transmission network in 2017

Power losses in the transmission network in 2017 amounted to 417 GWh, or 1.9% of total transmitted electricity.

Figure 4.2.3 shows the amounts and percentage of losses in the transmission network from 2010 to 2017.



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

Source: HOPS

Figure 4.2.3 Power losses in the transmission network from 2010 to 2017

The electricity to cover the losses for the year 2017 was purchased on market principles in the following ways (products[2]):

- Long-term (annual) products by a public tender with given quantities and the lowest price criterion, where HEP d.d. was selected as the lowest bidder – 74% of electricity,
- Purchase in CROPEX - 26% of electricity.

The total cost of market purchases of electricity to cover the losses in 2017 was HRK 116.8 million (total expenditure – income from the sale of surpluses in CROPEX) for the 416 GWh of purchased electricity (the difference between realisation and purchase on an hourly basis was covered in the settlement of imbalances).

The cost of imbalance settlement, arising from the difference between HOPS's market position, i.e. electricity purchased to cover the losses in the transmission network, and the losses incurred, amounted to HRK 14.2 million. The largest differences were observed in winter months, especially January.

Taking into account the costs of market purchases and the cost of imbalance settlement (HRK 131 million), the unit cost of electricity to cover losses was HRK 314.90/MWh.

In 2017, HERA approved the 2018 procurement plan for losses, which anticipates losses in the amount of 500 GWh. The plan provides for the procurement of approximately 70% of planned energy at the annual level (basic) by public tenders, while the remaining 30% would be procured through short-term (day-ahead or intraday) purchases on CROPEX. HOPS is also planning to divide the long-term basic procurement into two products: 35 MWh/h for 2018 and 5 MWh/h for 2018 and 2019.

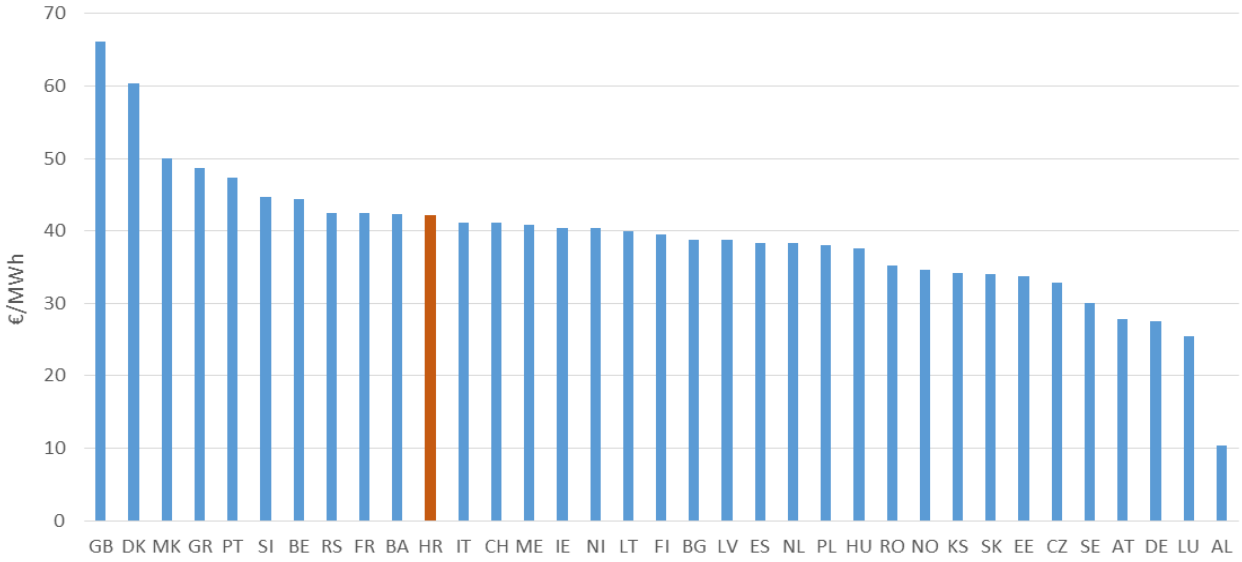
ITC agreement

The ITC agreement, i.e. compensation mechanism for European operators of transmission systems, to which HOPS is also a signatory, obliges all transmission system operators operating in the ITC mechanism to provide the European Network of Transmission System Operators for Electricity (ENTSO-E) with the planned price of electricity to cover the losses for the following year. The price

2 *Product means the quantity of electricity during a specific time frame and is generally designated as MWh/h.*

should be approved by the regulatory authorities 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*. HERA approved the electricity price of HRK 359.93/MWh to HOPS for the coverage of power losses in the transmission network for 2018.

Figure 4.2.4 provides a 2017 price comparison for the ITC agreement for individual countries.



Source: HOPS

Figure 4.2.4 Unit prices for the coverage of losses for 2017 for the needs of the ITC mechanism

Observations on losses in the transmission network for 2017

The absolute and relative values of power losses in the transmission network in 2017 was the lowest in the observed period of the last eight years.

Planned losses in the transmission network for 2017 were 490 GWh, while actual incurred losses were 417 GWh. This represents a planning error of almost 15%. As the plan is based on average incurred losses in the transmission network from the previous years, not taking into account numerous other factors that influence the load and, consequently, power losses, more significant imbalances compared to actual losses are possible. For these reasons, HOPS should improve its planning methodology by including expected weather conditions, expected system loads and other factors that influence losses.

The planned purchase price of electricity to cover losses in the transmission network for 2017 was HRK 325.03/MWh, while the average unit cost of electricity to cover losses in 2017 was HRK 314.90/MWh.

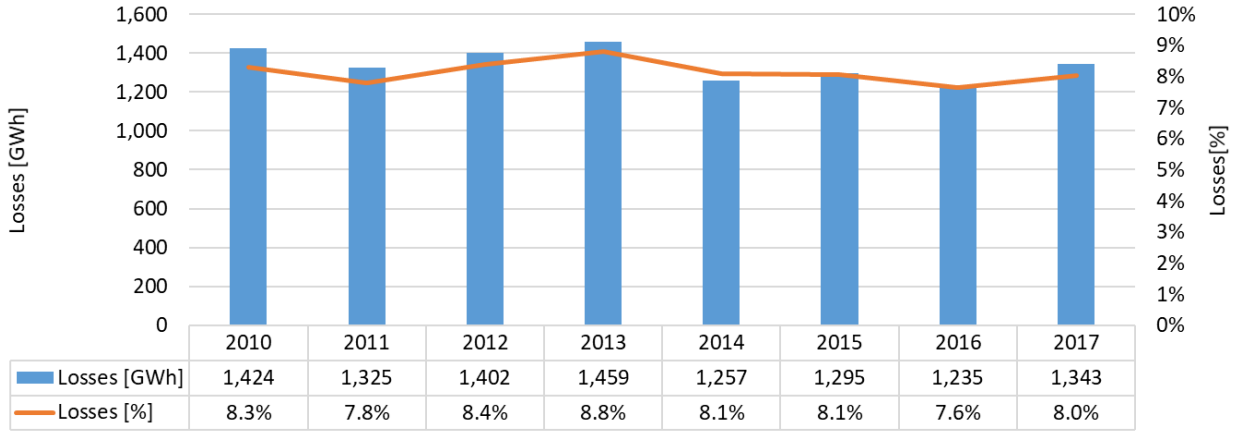
The time of procurement of electricity in the market with varying prices represents a risk and can translate into higher or lower costs of electricity procurement. Since HOPS purchases the electricity to cover losses in the market, the time of implementation of long-term procurement of electricity to cover losses can have a positive or negative effect on the price of losses. Thus, in the fourth quarter of 2017, the prices increased significantly relative to the summer prices that HOPS had used to calculate the planned price of procurement for loss coverage for 2018.

Since the tender was carried out in October 2017, the achieved price for long-term procurement was higher than expected.

Losses in the distribution network in 2017

Power losses in the distribution network in 2017 amounted to 1,343 GWh, i.e. 8.0% of the procurement of electricity in the network, which is in both absolute and relative terms higher compared to the corresponding indicators in 2016, when they amounted to 1,235 GWh, i.e. 7.6%.

Figure 4.2.5 shows the amounts and percentage of losses in the transmission network from 2010 to 2017.



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

Source: HEP ODS

Figure 4.2.5 Power losses in the distribution network from 2010 to 2017

Losses vary significantly by individual distribution areas due to the technical characteristics of the distribution network, consumption density, climate conditions and external temperature, as well as the extent of unauthorised consumption. Losses are also affected by electricity generation in production facilities connected to the distribution network (distributed generation), which have significantly increased in number over the past several years. Losses generally decrease if consumption at the location of distributed generation is concurrent with generation (reduced flows through the network) and increase if distributed generation at the location is not concurrent with consumption or there is no consumption whatsoever (increased flows through the network).

Losses in the distribution network are primarily classified as technical and non-technical losses. Technical losses are a consequence of the state of the distribution network infrastructure and the technical characteristics of network elements, while non-technical losses are caused by electricity theft, and deficiencies and errors in the measurement/readout/calculation of consumption. As the ratio of technical and non-technical power losses in total power losses is impossible to calculate precisely, they are usually approximated. The study on "Professional and scientific support in the development of a methodology for planning power losses and a methodology for calculating realised losses and estimating technical losses and electricity theft", which was commissioned by HEP ODS and carried out in late 2016, found a 51:49 ratio between technical and non-technical losses in the distribution network.

The required quantities of electricity to cover losses in 2017 were calculated based on the planned losses for 2017, which were prepared using standard load profiles and applying an appropriate loss coefficient. The loss coefficient for 2017 was

calculated as the average annual realised quantity of electricity to cover losses in the distribution system relative to the average procurement of electricity, for the four preceding years, pursuant to the then applicable *Rules on the implementation of standard load profiles*. Thus calculated loss coefficient is expressed as a percentage of total planned electricity procurement for the distribution system and remains the same for the entire year (principle of linear dependence between losses and system load).

The procurement of necessary quantities was carried out in the form of a long-term product (total quantity for the entire 2017) by a public tender, at the unit price of HRK 325/MWh. This is also the unit cost of electricity to cover losses in 2017, including costs of positive and negative imbalances, given that, pursuant to the executed contract, the electricity supplier bears the costs of imbalances. The total cost of electricity procurement to cover losses in the distribution network for 2017 was HRK 436.3 million.

In 2017, HERA approved the electricity procurement plan for the coverage of losses for 2018, which anticipates losses in the amount of 1,343 GWh, at the price of HRK 388/MWh. Unlike the previous years, when losses were calculated using the coefficient of losses for the entire year, in 2018 monthly loss coefficients are used in accordance with the new *Rules on the implementation of standard load profiles*.

Observations on losses in the distribution network for 2017

HEP ODS defines power losses in the distribution network as the difference between electricity taken up by the distribution network and electricity sold to end consumers. However, the currently used methodology introduces a significant error in determining losses, which is a result of several factors. First, electricity consumption is estimated on the basis of a large number of billing metering points which do not meter consumption on a monthly basis or are not equipped with meters that record load profiles. Further, the error is also introduced by the system of advance electricity payment for households, whereby the monthly electricity consumption for individual household consumers is estimated based on average monthly consumption in the corresponding previous six-month period, without taking into account seasonal differences or other possible factors that may influence consumption. Consequently, it is evident that a more precise determination of losses in the distribution network requires an improved estimate of input data that will take into account several factors instead of solely historical data and gradually introduce monthly meter reading.

Based on the study "Professional and scientific support in the development of a methodology for planning power losses and a methodology to calculate realised losses and estimate technical losses and electricity theft", carried out in late 2016, the proportion of non-technical losses in the distribution network is estimated at 49% of total losses, and exceeds 55% in some distribution areas. As non-technical losses are almost equal to, and in some cases greater than technical losses, HEP ODS should undertake additional measures to reduce non-technical losses.

Although HEP ODS procures considerably larger quantities of electricity to cover losses than the quantities procured by HOPS, the planned electricity price and the realised average price are higher. The difference in realised average price between HOPS and HEP ODS for 2017 amounted to HRK 10/MWh. The fact is that HEP ODS procures electricity for the coverage of losses via one product, which in practice reduces the number of market participants willing to assume the obligation of procuring such large quantities of electricity. However, one should also take into account that given the nature of the agreement between HEP ODS and HEP d.d.

for losses in 2017, HEP d.d. also assumes the whole risk of imbalances and most likely also incorporates this risk in the final price offered in public procurement, whereas HOPS bears that risk on its own. Accordingly, HEP ODS should improve its model and method of procuring electricity for the coverage of losses.

CEER Report on Power Losses

The drafting of the CEER Report on Power Losses began in 2016[3], the report is developed by the CEER Electricity Quality of Supply Task Force (EQS TF), including representatives of HERA as its active members. Two questionnaires were prepared for the purpose of data collection: one for regulators and one for interested parties. Data was received from regulators in 27 countries and from 21 interest groups. The report was published on CEER's website on 18 October 2017.

This report provides an overview of the definitions of losses and determination of losses, shows the level of losses in individual countries, and describes the methods of electricity procurement to cover power losses and the manner in which these costs are considered (regulatory framework). The report also considers smart meters and distributed generation, and their impact on losses. Finally, it provides observations and recommended good practices.

4.2.3 Development plans for transmission and distribution networks

Ten-year development plan for the transmission network (2018 – 2027)

In September 2017, HOPS submitted for HERA's approval the *Ten-year (2018-2027) development plan for the transmission network with a detailed elaboration of the initial three- and one-year periods*. Following public consultation and the submission of the document revised by HOPS based on HERA's comments, in December 2017 HERA approved the *Plan*, which was functionally harmonised with the 2016 ten-year development plan for the EU transmission network (hereinafter: TYNDP 2016).

The total planned financial investment in the development of the transmission network for the ten-year period (2018 - 2027) amounts to approximately HRK 6 billion. Of this, investments conditional on connecting new users to the network and increasing the connection capacity of existing users amount to approximately HRK 170 million.

Table 4.2.1 shows the realised annual investments in the HOPS network from 2013 to 2017.

Table 4.2.1 Realised annual investments in the transmission network from 2013 to 2017 in million HRK

Type of investment	2013	2014	2015	2016	2017
Investment preparation	6.6	7.9	8.4	12.6	8.9
Replacements and reconstruction	125.4	201.2	189.2	166.2	159.6
Revitalisations	30.8	49.9	61.5	59.0	72.5
New facilities	130.7	85.8	90.3	71.1	85.9
Other investments	46.2	35.1	37.9	34.9	55.3
Electric power grid conditions and connections	76.6	43.8	64.2	33.7	61.1
Total	**416.3**	**423.7**	**451.5**	**377.5**	**443.3**

Source: HOPS

3 *CEER Report on Power Losses, 18 October 2017, https://www.ceer.eu/documents/104400/-/-/09ecee88-e877-3305-6767-e75404637087*

Ten-year development plan for the distribution network (2018 - 2027)

In October 2017, HEP ODS submitted for HERA's prior approval the *Ten-year (2018 – 2027) development plan for the HEP ODS distribution network with a detailed elaboration for the initial three- and one-year periods*. HERA granted its prior approval for the *Plan* in December 2017.

Total planned financial investments in the development of the distribution network for the ten-year period (2018 - 2027) amount to approximately HRK 10 billion. Of this, investments conditional on connecting new users to the network and increasing the connection capacity of existing users amount to approximately HRK 3.5 billion.

Table 4.2.2 shows the realised annual investments in the HEP ODS network from 2013 to 2017.

Table 4.2.2 Realised annual investments in the distribution network from 2013 to 2017 in million HRK

Type of investment	2013	2014	2015	2016	2017
Investment preparation	14.4	17.8	10.7	20.0	27.9
Replacements and reconstruction	206.9	276.8	268.6	268.9	228.0
Revitalisations	5.7	19.3	16.8	21.9	19.2
Repairs and renovations	2.6	1.5	0.8	0.4	0.1
New facilities	187.8	210.4	146.6	153.2	126.9
Other investments and development	100.8	133.8	225.2	191.3	208.2
Electric power grid conditions and connections	361.8	219.5	250.0	301.1	313.3
Total	**879.9**	**879.1**	**918.7**	**956.8**	**923.5**

Source: HEP ODS

Observations on the development plans for transmission and distribution networks

Compared to previous development plans, HOPS has achieved the most significant progress in describing the implementation of energy efficiency measures in the transmission network, where it estimated potential savings in reducing transmission network losses during the ten-year period.

HEP ODS also focused on measures to reduce losses in the distribution electricity grid as part of its efforts to increase energy efficiency. The goal of HEP ODS is to reduce total power losses (technical and non-technical) down to 7.75% (± 0.25%) of realised procured electricity in the distribution network in the given year by the end of 2019.

The year 2017 saw the completion of the restructuring of HEP ODS's business operations. Implementation of the SAP application will also contribute to more systematic work procedures and improve work organisation. The development and provision of IT support to business processes related to the functioning of the electricity market continued, as well as the development of an advanced measurements system and communications system. The methodology and selection of the criteria for investment programs aimed at renewing parts of the distribution network were harmonised to optimise investments. The implementation of measures to increase energy efficiency also continued, as well as the implementation of technological solutions important for the development of an advanced electric power network. All of these processes should have a positive impact on the general efficiency of operations by improving the organisation of fieldwork, enhancing business processes and providing for more rational asset management.

During the preparation of the transmission and distribution network development plans, positive practices from the previous years continued. HOPS and HEP ODS harmonised their plans in terms of construction dynamics and financing of interfacing facilities (TS 110/x kV), to which they added an analysis of the impact of the three-year investment plan on the transmission and distribution charge, and all projects specified in TYNDP 2016 were considered in the same way all other HOPS investments.

In order to improve future development plans, HERA made the approval of HOPS's next ten-year plan conditional upon the fulfilment of the following requirements:

- Description of capital investments, so called investment card, which HERA receives in the reporting documents accompanying the relevant ten-year plan and which are not publicly available, should be filled out by HOPS in an appropriate data processing application (e.g. Excel), with a pre-defined structure of the cells and possible input of data as agreed with HERA,
- HOPS should update the unit prices of construction or revitalisation of individual elements of the transmission network, and
- All images showing the configuration of the 400 kV, 220 kV and 110 kV networks should be edited to enable clear identification of those transformer substations, and in particular transmission lines, that are in the process of construction or revitalisation.

With regard to the construction of new cross-zonal lines, HERA is of the opinion that the existing cross-zonal capacities are sufficient, given that the sum of average NTCs on all borders is 4,000 MW for both the incoming and outgoing directions.

Investments in the transmission and distribution network were similar to previous years.

Taking into account the general indicators of continuity of supply in the distribution network, the System Average Interruption Frequency Index (SAIFI) and the System Average Interruption Duration Index (SAIDI), according to which the distribution network in Croatia is among the weaker ones in the European Union, the investment plans should provide for measures that would improve those indicators.

In order to improve monitoring of the implementation of plans from the previous years, at HERA's request and in addition to the *Ten-year (2018 - 2027) development plan for the HEP ODS distribution network with a detailed elaboration for the initial three- and one-year periods,* HEP ODS additionally described the realisation of capital investments in the period from 2012 to 2016 and submitted updated information on unit prices of equipment for SF_6 insulated transformer substations and air-isolated switchgear.

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.

In terms of the significance and sources of investment, the SINCRO.GRID project stands out. The goal of the project is to improve voltage quality in the electric power system and utilise dynamic determination of the transmission capacity of lines through the use of advanced technical systems and algorithms. In February 2017, the European Commission approved a grant for this project in the amount of 40.5 million EUR, which represents 51% of the planned total value.

4.2.4 Tariffs for transmission and distribution network usage and connection charges

Average network charges

Table 4.2.3 shows average transmission network charges, while Table 4.2.4 shows average distribution network charges the period 2013–2017 for different end consumer categories.

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 4.2.3 Average transmission charges for the period 2013–2017

End consumer category	2013 [lp/kWh]	2014 [lp/kWh]	2015 [lp/kWh]	2016 [lp/kWh]	2017 [lp/kWh]
Industrial – high-voltage	7.0	7.0	7.1	6.6	6.7
Industrial – medium voltage	7.9	7.9	7.8	7.7	7.6
Industrial – low-voltage	8.9	8.9	8.9	8.9	8.9
Households	8.9	8.9	8.9	8.9	8.9
Average for all categories	**8.6**	**8.5**	**8.5**	**8.5**	**8.4**

Table 4.2.4 Average distribution charges for the period 2013–2017

End consumer category	2013 [lp/kWh]	2014 [lp/kWh]	2015 [lp/kWh]	2016 [lp/kWh]	2017 [lp/kWh]
Industrial – high-voltage	-	-	-	-	-
Industrial – medium voltage	14.0	14.0	13.9	13.7	13.7
Industrial – low-voltage	26.3	26.3	26.3	26.5	26.7
Households	24.3	24.6	24.4	24.5	24.5
Average for all categories	**22.4**	**22.5**	**22.3**	**22.4**	**22.2**

Transmission and distribution network connection charges

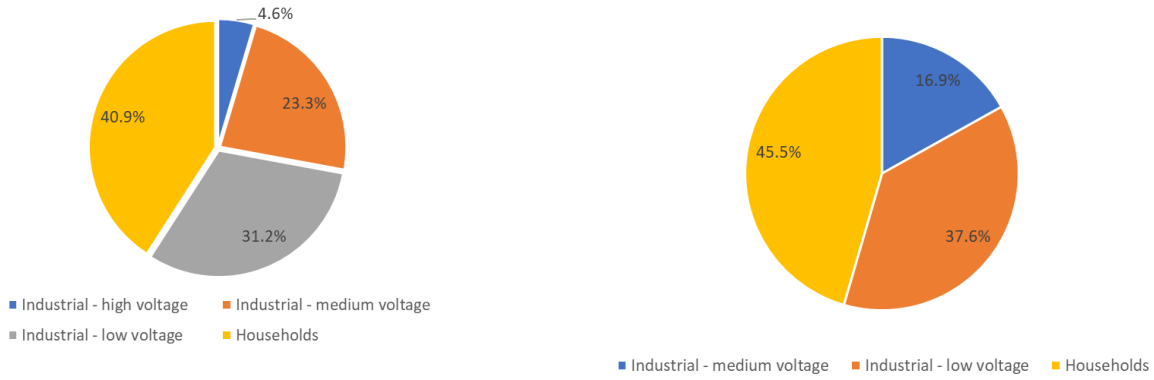
Consumers connecting to the transmission or distribution network or increasing connection capacity pay a connection charge. The purpose of the connection charge is to finance new connections, creation of technical conditions in the network and network development.

The consumer connection charge and the charge for increasing connection capacity without is HRK 1 350/kW excluding VAT, except in the city of Zagreb, where it is HRK 1 700/kW. However, in case planned connection costs exceed the funds collected from the charges by 20% or more, the consumer pays the actual costs of the connection.

Electricity producers always pay the actual connection costs.

Observations on transmission and distribution charges and connection charges

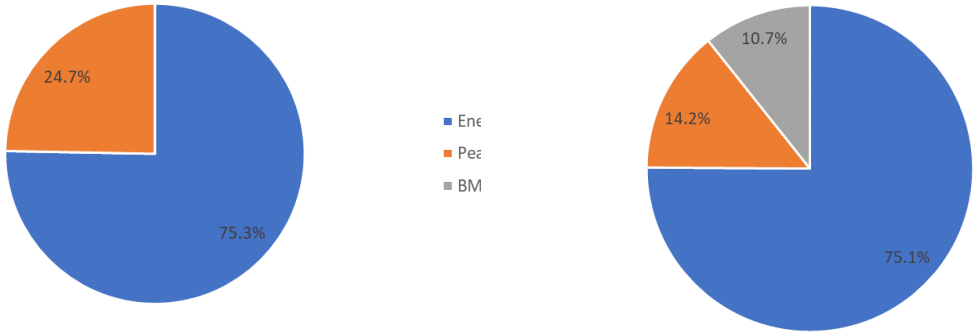
In terms of the breakdown of revenues from transmission network charges and distribution network charges in 2017, the proportions of individual categories are shown in Figure 4.2.6.



a) Transmission network b) Distribution network

Figure 4.2.6 Breakdown of revenues from transmission network and distribution network charges in 2017

The proportions of tariff components are shown in Figure 4.2.7.



a) Transmission network b) Distribution network

Figure 4.2.7 Proportions of tariff components in 2017

HERA adopted a new *Methodology for setting electricity grid connection charges for new users and for increasing the connection capacity for existing users* (*"Official Gazette", No. 51/17)*, which was published on 31 May 2017 and entered into force on 1 January 2018. The Croatian Government adopted the *Regulation on issuing energy approvals and establishing the conditions and deadlines for connecting to the electricity network ("Official Gazette", No. 7/18)*, which entered into force on 1 April 2018. Given that the *Methodology* and *Regulation* had to be harmonised, HERA adopted *Amendments to the Methodology for setting electricity grid connection charges for new users and for increasing the connection capacity for existing users*, which entered into force on 9 April 2018.

4.2.5 Unbundling of activities

Transmission system operator

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

Pursuant to Art. 19(3) of the ***Electricity Market Act***, the commercial and financial relations between the vertically integrated subject and HOPS must comply with market conditions. Pursuant to Art. 19(4) of the ***Electricity Market Act***, HOPS is obliged to submit for approval all commercial and financial contracts with the vertically integrated subject. HERA is obliged to verify whether the contracts are market-oriented under impartial conditions.

The description of measures taken for the purpose of harmonisation with the requirements and intermediate dates determined in the decision on the certificate issued to HOPS as an independent transmission operator

Requirements fulfilled by the independent transmission operator pursuant to HERA's decision on the certificate issued to HOPS in 2017:

- *Ancillary services and balancing energy* (undertaking of appropriate measures related to ancillary services procurement and balancing energy procurement agreements - item 2 of the operative part of HERA's Decision on the certificate issued to HOPS) – on 27 January 2017 HOPS submitted to HERA a template of the Balancing Energy Services Agreement published on HOPS's website on 17 January 2017 (ancillary services agreements for 2017 were concluded on 28 December 2016 pursuant to HERA's approval dated 16 December 2016, and submitted with a memo dated 16 January 2017);
- *Network usage agreements* (item 3 of the operative part of HERA's Decision on the certificate issued to HOPS) - entered into by HOPS and HEP-Telekomunikacije d.o.o. and submitted in 2016;
- *Telecommunications* (item 4 of the operative part of HERA's Decision on the certificate issued to HOPS) – on 16 January 2017 HOPS submitted the "Independent report on the implementation of separation of the telecommunication system of the company Croatian Transmission System Operator" (service agreements between HOPS and HEP-TELEKOMUNIKACIJE d.o.o. submitted in late December 2016, and the documentation related to the implementation of the LAN/WAN network at HOPS' locations);
- *Termination of the lease agreement concluded by HOPS as the lessee and other companies within the vertically integrated entity as the lessors* (item 5 of the operative part of HERA's Decision on the certificate issued to HOPS - on 5 May 2017, HOPS submitted to HERA the Agreement on the termination of the lease agreement for business premises at Cara Hadrijana 3, Osijek.

In 2017, HOPS as an independent transmission operator submitted commercial and financial agreements with the vertically integrated entity to HERA for approval.

Pursuant to Article 22 of the ***Electricity Market Act***, on 30 August 2017 HERA adopted a decision on approving the Proposal for Amendments to the Compliance programme of the independent transmission system operator.

HERA withheld the approval for the draft Business premises lease agreement between HOPS as lessor and HEP d.d. as lessee in a part of the "NDC" commercial building and parts of the "Prijenos" commercial building.

Distribution system operator

After incorporation of HEP Elektra d.o.o. za opskrbu električnom energijom, HEP ODS continued to perform electricity distribution activities. In addition to this activity, which is performed under regulated terms, HEP ODS also performs an ancillary activity (mainly services like public lighting maintenance, network user facility maintenance, etc.) following market principles. Separate accounts are kept for electricity distribution activities and the ancillary activity. HEP ODS is obliged to

comply with the *Decision on the manner and procedure for keeping separate accounts of energy entities ("Official Gazette", No. 86/14)* and consequently to generate separate financial reports for electricity distribution and for the ancillary activity.

Pursuant to the ***Electricity Market Act***, HEP ODS is particularly 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 obligated to publish annual reports in accordance with HERA's prior approval.

On 30 March 2018, HERA received a report from HEP ODS for 2017 on compliance with the principles of transparency, objectivity and impartiality, according to the adopted compliance programme of HEP ODS.

To ensure the principles of transparency, objectivity and impartiality, HEP ODS published the following acts and documents on its website www.hep.hr/ods:

- Compliance programme,
- 2017 Report on compliance with the principles of transparency, objectivity and impartiality, according to the adopted Compliance programme,
- Ten-year development plan for the HEP ODS distribution network (2017–2027),
- HEP ODS's annual reports,
- Annual report on monitoring electricity losses,
- Regulations related to electricity distribution activities,
- Forms and documents.

In 2017, HEP ODS was reorganised. Supporting functions (human resources, legal affairs, procurement, economic affairs, IT) were reorganised according to the functional model – centrally at HEP ODS headquarters, while technical functions were partially reorganised according to the functional model - a combination of the geographic and functional model.

The reorganisation process established new units in the consumer relations segment – consumer relations departments at distribution area levels, and a consumer relations service at HEP ODS headquarters. The Consumer Relations Service is functionally superior over the departments and is in charge of the organisation and coordination of operations related to consumer relations (monitoring and improvement of service quality) and public relations. The end of 2017 saw the initiation of the first stage of establishing a single contact centre of HEP ODS, with the aim of integrating all business processes associated with consumer relations in a single functional unit for the purpose of harmonising business practices, and improving the availability and quality of services of the entire HEP ODS.

HEP ODS is a subsidiary company, which is part of HEP d.d. Relations between HEP d.d. and HEP ODS are defined by the Agreement on mutual relations between HEP d.d. and HEP ODS.

HEP d.d., as the parent company, performs a range of tasks for HEP ODS in accordance with the provisions of the Agreement, including the application of the Methodology for calculating prices of services/tasks. The method of calculating prices of services/tasks determined in the Methodology is compliant with the rules for calculating transfer prices.

The services/tasks which HEP d.d. performs for HEP ODS pursuant to the Agreement are**:**

- Defining the general principles and guidelines for the preparation of operating plans,
- Determining the financial policy and the organisation of a centralised treasury,
- Establishing a general risk management policy,
- Internal audits,
- Establishing accounting policies and performing a part of accounting tasks,
- Determining the human resource management strategy and performing a part of those tasks,
- Performing a part of the legal tasks,
- Corporate communications,
- Support in monitoring and participation in the process of preparing and adopting regulations,
- Support in monitoring and participation in EU projects,
- Developing a corporate security strategy and performing a part of the respective tasks,
- Performing a part of the tasks related to ICT, and
- Developing a procurement strategy and performing a part of the respective tasks.

In 2017, in accordance with the *Agreement on mutual relations between HEP Elektra and HEP ODS*, HEP ODS provided services related to information systems, and in late 2017 IT systems of HEP Elektra d.o.o and HEP ODS were completely separated.

As of 1 January 2017, pursuant to Art. 32(2) of the *Rules on electricity market organisation*, HEP ODS is the sole member of the distribution system operator balance group and is also the balance responsible party. Given that electricity supply as a public service has been unbundled from HEP ODS since 1 January 2017, its balance group relates only to the procurement of energy to cover losses in the distribution network.

Provided by the same decision, HEP ODS procures and reports contractual schedules and pays for its deviations from contractual schedules. However, pursuant to the electricity procurement agreement for the coverage of losses, HEP ODS transfers (invoices) assumed costs of imbalances to the electricity supplier HEP d.d., as well as the task of creating the market position, i.e. transfers the entire risk of imbalances to HEP d.d.

HEP ODS still uses the visual identity of HEP d.d., which is not in compliance with Art. 36(3) of the ***Electricity Market Act.*** As this can lead to a confusion regarding the separate identity of energy supply entities which are also part of HEP d.d., HERA has requested HEP ODS to separate its visual identity from that of HEP d.d.

Observations on the unbundling of activities in 2017

HERA continually monitors the implementation of certification requirements.

HOPS is obliged to submit all commercial and financial contracts with the vertically integrated entity (HEP d.d.) to HERA for approval. HERA reviews the market orientation and impartiality of the contractual terms, and approves or withholds approval for these contracts.

As of 1 January 2017, electricity supply as a public service has been unbundled from HEP ODS into a separate company – HEP Elektra d.o.o. This has significantly increased the transparency of the electricity market.

Other aspects of unbundling need to be addressed as well, such as the use of ownership rights to the facilities in the distribution network, which are for the time being held by HEP d.d., and the fact that HEP d.d. performs a range of services/tasks for HEP ODS. Special consideration will be given to the issue of competence over metering data currently kept in HEP d.d.'s information system, which is problematic from the point of view of *Regulation (EU) 2016/679 of the European Parliament and of the Council on the protection of natural persons with regard to the processing of personal data and on the free movement of such data*, which enters into force on 25 May 2018.

According to the submitted financial statements, HOPS and HEP ODS are generating profit from their business operations. The majority of revenues are derived from transmission and distribution charges, based on approved tariffs. Bearing in mind the need for investments and modernisation of the network in view of the challenges posed by the European Commission (e.g. advanced networks and advanced meters), HERA is of the opinion that the companies' profits should be primarily reinvested to improve the operations of HOPS and HEP ODS.

4.3 Wholesale electricity market

4.3.1 Development of the wholesale electricity market

Electricity balance in Croatia

According to Table 4.3.1, the majority of total electricity consumption in Croatia, which amounted to 18,197 GWh in 2017, is covered by electricity that enters the network from Croatian power plants amounting to 10,818 GWh (59.5%), while the rest is covered by physical net imports, which amounted to 7,379 GWh (40.6%).

Table 4.3.1 Croatia's electricity balance in 2016 and 2017 in GWh

No.	Electricity balance	2016	2017
1	Total production	11,331	10,818
2	Imports to Croatia	12,397	12,157
3	**Total supply (1+2)**	**23,728**	**2, 975**
4	Exports from Croatia	6,054	4,778
5	**Physical net imports (2-4)**	**6,343**	**7,379**
6	**Total consumption (3-4)**	**17,674**	**18,197**
7	Direct supply in the distribution network	900	877
8	Losses in the transmission network	510	417
9	**Transmission consumption (6-7-8)**	**16,264**	**16,903**
10	Delivery to end consumers in the transmission network	645	801
11	Pumping work of the Velebit Pump Storage Power Plant and other own consumption	290	284
12	**Delivery to the distribution network from the transmission network (9-10-11)**	**15,329**	**15,818**
13	**Transit (min (2, 4))**	**6,054**	**4,778**

Source: HOPS, HEP ODS

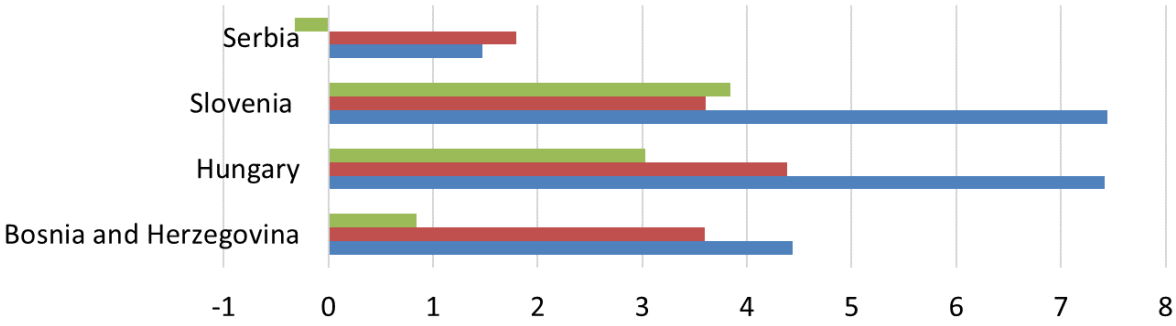
Trade at Croatian borders

Figure 4.3.1 shows the volumes of cross-zonal trading (imports, exports and net exchange) at Croatian borders with the neighbouring countries in 2017 according

to volumes from the contractual schedules of energy entities. Net imports exist at all borders except the border with Serbia.

Imports from Slovenia include electricity from NPP Krško (3.0 TWh) for HEP d.d. The total (trade) net imports, including electricity from NPP Krško, amounted to 7.4 TWh.

In terms of intraday trading, imports to Croatia at cross-zonal transmission capacities amounted to 782 GWh, while exports amounted to 902 GWh, from which it is evident that market participants on the intraday level undertake balancing activities for contractual schedules with expected realisations of production and consumption.



	Bosnia and Herzegovina	Hungary	Slovenia	Serbia
Net exchange	0.8 TWh	3.0 TWh	3.8 TWh	-0.3 TWh
Exports	3.6 TWh	4.4 TWh	3.6 TWh	1.8 TWh
Imports	4.4 TWh	7.4 TWh	7.4 TWh	1.5 TWh

Source: HROTE

Figure 4.3.1 Cross-zonal trade on borders between Croatia and the neighbouring countries in 2017 by volumes from contractual schedules of energy entities

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

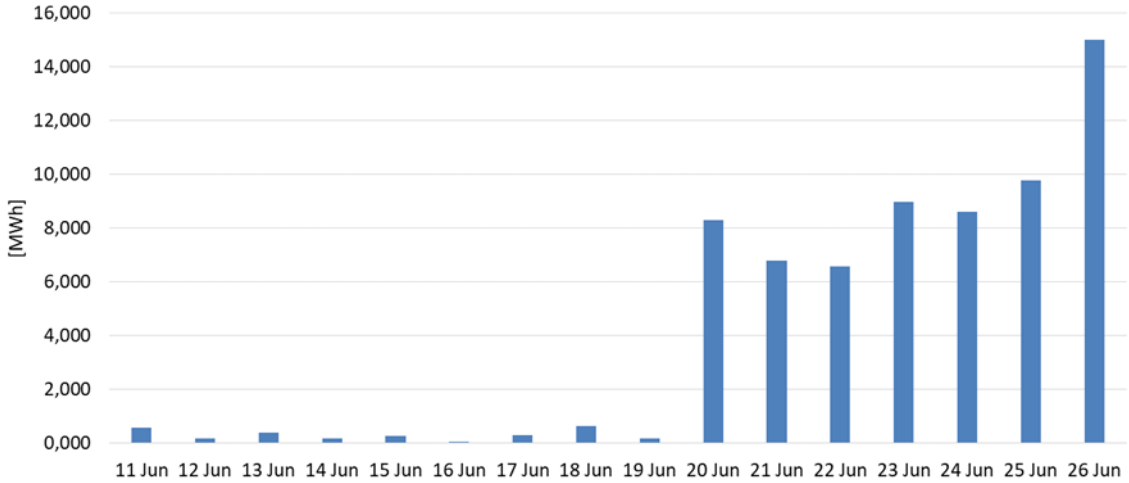
In 2017, there were twelve registered members on CROPEX at the day-ahead market, and the total electricity purchased from CROPEX at the day-ahead market amounted to 138.9 GWh. The intraday market had six market participants. The total electricity purchased at the intraday level on CROPEX amounted to 51.3 GWh, though it should be noted that the intraday electricity market on CROPEX was opened on 26 April 2017. The intraday market on CROPEX provides for continuous trading 30 minutes before the physical delivery of electricity.

The data for 2017 shows that the market participant who sold most electricity has a share of 27.6% of the total electricity sold through CROPEX, while the market participant who purchased the most electricity has a share of 61.7% of the total electricity purchased through CROPEX.

In January 2017 prices on the CROPEX day-ahead market increased to an average of 85 €/MWh, which was similar to the average prices on the day-ahead markets on the Slovenian and Hungarian electricity markets. Extremely low temperatures causing increased demand for electricity were a contributing factor.

In March 2017, CROPEX and HOPS joined the cross-zonal IBWT project and became its full members, thereby formally initiating the procedure of connecting the Croatian day-ahead market with the MRC coupled market. In 2017, the approximate date of coupling the Croatian electricity market with the MRC market was determined and approved by the IBWT Management Board, expected to take

place in the second quarter of 2018. February 2018 saw the initiation of joint tests of involved system operators and electricity markets within the regional IBWT project, with the aim of establishing a coupled market within the set period. This pertains to the border with Slovenia, and CROPEX and HOPS were also involved in activities related to coupling the market with Hungary and Bosnia and Herzegovina, and indirectly with other markets of South East Europe. The Croatian and Slovenian day-ahead markets were successfully coupled on 19 June 2018 (delivery date 20 June 2018). Figure 4.3.2 shows a multifold increase in the total trading volume during several days after the coupling.



Source: CROPEX

Figure 4.3.2 Daily trading volumes in the CROPEX day-ahead market

Electricity market concentration indicators

Figure 4.3.3 shows the shares of energy entities in production capacities and electricity generated by power plants in Croatia in 2017. HEP d.d. has the largest share, amounting to 83% of production capacities and 79% of generated electricity.

a) Production capacities b) Generated electricity

Source: HOPS, HEP ODS, HROTE

Figure 4.3.3 Shares of energy entities in production capacities and electricity generated by power plants in Croatia in 2017

As of 31 December 2017, there were 46 valid licences for electricity generation, 17 licences for electricity supply, 33 licences for trading in electricity, and one license for trading, mediation, and representation on the electricity market.

In 2017, the total volume of sales from the contractual schedules of energy entities from HEP d.d. was 37.3 TWh, i.e. 71% of the total volume of sales on Croatia's wholesale electricity market.

Observations on the development of the wholesale market

The EKO balance group was intended to begin operating in 2017, however this was delayed due to the ***Regulation on Amendments to the Renewable Energy Sources and High-efficiency Cogeneration Act***, adopted on 29 December 2016, which entered into force on 31 December 2016. Furthermore, on 28 December 2017 the start of operations of the EKO balance group was postponed from 1 January 2018 to 1 January 2019. This has resulted in unfavourable effects on the wholesale electricity market for the following reasons:

- Suppliers have to take over an increasing amount of electricity (currently 12.5% of total consumption) in a regulated manner under stipulated prices,
- The ***Regulation*** significantly changed the operating conditions of the market participants, and
- The delay in setting up the EKO balance group slowed down the development of organised electricity trading on CROPEX in terms of volume.

In the future, when such regulations are adopted, ample time should be left prior to their entry into force to allow market participants to prepare for the consequences.

In 2017, electricity generated by plants under the incentives system with guaranteed buy-off accounted for 21.0% of the total generated electricity, i.e. 12.5% of the total electricity consumption in Croatia. If all incentive agreements which HROTE executed within the incentives system are taken into account, the amount of such electricity that reached the market under guaranteed and regulated conditions may lead to market disruption, as under present circumstances suppliers are obliged to buy off such electricity at prices significantly higher than the market ones.

The year 2017 saw an increase in the forward electricity prices for 2018 at HUPEX - Hungarian power exchange (physical futures market, PhF): from the starting 38 €/MWh at the beginning of the year, the prices gradually increased from mid-May to reach around 47 €/MWh at the end of the year.

As of 26 April 2017, market participants on CROPEX can trade with electricity in the intraday market safely, anonymously, continuously and transparently.

Bearing in mind the trade volume, bids for purchases and sales, the number and share of market participants in purchases and sales, and the prices that corresponded with the prices in the neighbouring exchanges, a modest progress can be observed on CROPEX in terms of competition development.

In addition to the future coupling of the Croatian trading zone with the trading zones in Hungary and Slovenia, with which there are most cross-zonal capacities, in the future the Croatian trading zone will also be coupled with trading zones in South East Europe, thereby increasing the liquidity of CROPEX and the level of market competition. In that regard, in 2015 six signatory states to the Energy Community Treaty, Bosnia and Herzegovina, Montenegro, Serbia, Macedonia, Albania and Kosovo, undertook to commence activities to couple their electricity markets[4].

[4] *https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/WB6*

In 2017, CROPEX worked on establishing the intraday electricity market, which would reinforce the implementation of CACM in the part which refers to organised electricity markets, thereby enabling a reduction in the imbalances of balance groups and enabling the determination of the wholesale price of electricity closer to real time. CROPEX also became a full member of IBWT, and together with HOPS, it should take timely action in order to connect with neighbouring exchanges.

Given the fact that it is evident from the significant amount in cross-zonal trading at the intraday level that there is a need for intraday trading, it is safe to say that it will be additionally enhanced by the establishment of the intraday allocation of cross-zonal capacities at the border with Hungary which was set up in 2018.

As regards the promotion of market competition, transparency in data publication is necessary. In that regard, it is necessary to provide for the implementation of *Commission Regulation (EU) No 543/2013 of 14 June 2013 on submission and publication of data in electricity markets and amending Annex I to Regulation (EC) No 714/2009 of the European Parliament and of the Council* in order to increase the transparency of the electricity wholesale market, and thus also improve the operations of the market, by publishing all the necessary data on the central platform for information transparency. Use of the platform by all countries in the region would contribute to the consistency of data exchange procedures for the most important market processes. Additionally, as regards the promotion of market competition, HERA publishes news on market development, together with the quantitative and qualitative analyses, in its annual report. Furthermore, market competition and the organised electricity market were promoted in the media (Internet, press) and in professional conferences during 2017.

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

4.3.2 Allocation of cross-zonal capacities and congestion management

Cross-zonal capacity allocation regimes in 2017

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 rules on the management and allocation 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 4.3.2 shows the allocation of cross-zonal capacities on Croatian borders in 2017.

Table 4.3.2 Cross-zonal capacity allocation regimes on borders between Croatia and the neighbouring countries in 2017

Border	Yearly auction	Monthly auctions	Daily auctions	Intraday allocations
Slovenia	+	+	+	+
Hungary	+	+	+	-
Serbia	+	+	+	+
Bosnia and Herzegovina	+	+	+	+

Legend:
Coordinated (JAO)
Coordinated (SEE CAO)
Bilateral (ELES-HOPS, EMS-HOPS, NOS BIH-HOPS)
No allocation

Croatian borders with Slovenia and Hungary are included in coordinated auctions held within the JAO capacity allocation office. This office is responsible for holding coordinated yearly, monthly and daily auctions for the allocation of capacities in both directions on all borders. Additionally, on the border with Slovenia, the Slovenian transmission system operator maintains the bilateral allocation of total intraday capacities in both directions.

On the border with Bosnia and Herzegovina, the Coordinated Auction Office in South East Europe (SEE CAO) holds coordinated auctions in the SEE region for capacities on yearly, monthly and daily levels. On this border, HOPS maintains the bilateral allocation of total intraday capacities in both directions.

On the border with Serbia, joint bilateral auctions continued for the allocation of capacities by HOPS performing yearly and monthly auctions and the Serbian transmission operator performing daily and intraday auctions in both directions for the total transmission capacity.

Table 4.3.3 shows cross-zonal transmission capacities allocated in the yearly auction for 2017 (period from 1 January 2017 to 31 December 2017).

Table 4.3.3 Cross-zonal capacities offered and allocated in yearly auctions per border for 2017

Direction[5]			Offered capacity [MW]	Number of participants	Number of participants with accepted offers	Allocated [MW]	HOPS income [HRK]
BA	→	HR	400	12	5	400	6,013,096
HR	→	BA	400	10	6	400	392,158
SI	→	HR	800	22	7	799	5,482,379
HR	→	SI	800	23	15	800	1,568,354
RS	→	HR	150	10	7	150	545,414
HR	→	RS	150	10	5	150	304,080
HU	→	HR	700	23	7	698	5,701,621
HR	→	HU	600	22	11	599	2,544,328
							22,551,430

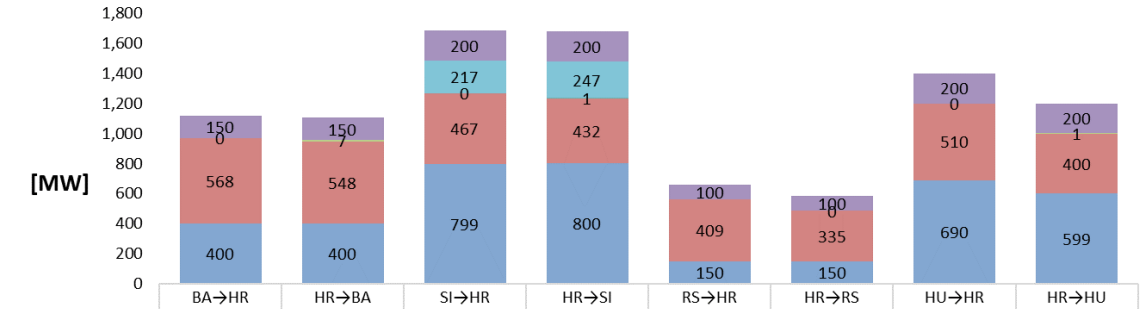
Source: HOPS

The majority of income from allocations of cross-zonal capacities at yearly auctions was generated through imports. Total income collected by HOPS from yearly auctions is approximately HRK 22.6 million, which is HRK 3.2 million more compared to 2016.

The most significant increase in income from yearly auctions relative to 2016 was reported for imports on the border between Croatia and Bosnia and Herzegovina.

Figure 4.3.4 shows average cross-zonal capacities per border in 2017. NTC values for monthly auctions are calculated on a monthly basis. This figure shows the already allocated capacities (AAC) on a yearly basis, capacities allocated on a monthly basis ("Allocated"), capacities specifically intended for allocation on a daily basis ("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.

[5] *The tables use two-letter ISO codes for countries: HR (Republic of Croatia), SI (Republic of Slovenia), HU (Republic of Hungary), BA (Bosnia and Herzegovina) and RS (Republic of 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	217	247	0	0	0	0
Unallocated	0	7	0	1	0	0	0	1
Allocated	568	548	467	432	409	335	510	400
AAC	400	400	799	800	150	150	690	599

Source: HOPS

Figure 4.3.4 Average monthly cross-zonal capacities per border in 2017

Table 4.3.4 shows average winter and summer NTC values for 2016 and 2017. Winter values refer to January, February, March, October, November and December, while summer values refer to April, May, June, July, August and September.

Table 4.3.4 Average winter and summer NTC values per border for 2016 and 2017

Winter values [MW]						Summer values [MW]					
Direction			2016	2017	Change	Direction			2016	2017	Change
BA	→	HR	999	965	-3%	BA	→	HR	851	970	14%
HR	→	BA	814	945	16%	HR	→	BA	786	966	23%
SI	→	HR	1,483	1,483	0%	SI	→	HR	1,500	1,483	-1%
HR	→	SI	1,433	1,483	3%	HR	→	SI	1,457	1,478	1%
RS	→	HR	528	583	10%	RS	→	HR	438	512	17%
HR	→	RS	583	540	-7%	HR	→	RS	546	407	-25%
HU	→	HR	1,200	1,200	0%	HU	→	HR	1,200	1,200	0%
HR	→	HU	1,000	1,000	0%	HR	→	HU	1, 000	1,000	0%
Imports			**4,210**	**4,231**	**0%**	**Imports**			**3,989**	**4,165**	**4%**
Exports			**3,830**	**3,968**	**4%**	**Exports**			**3,789**	**3,851**	**2%**

Source: HOPS

It is evident from the previous table that there is more cross-zonal capacity on offer in the winter period than in the summer period.

As compared to 2016, NTC values increased significantly on the border with Bosnia and Herzegovina, especially in exports.

Given the offered capacities on the border with Serbia, as compared to 2016, a significant increase in import NTCs can be observed, with a concurrent significant decrease in export NTCs.

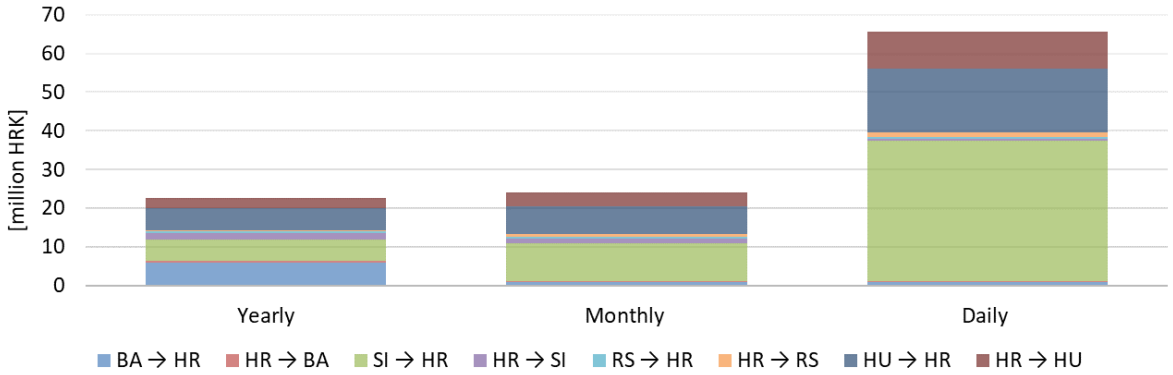
On the border with Slovenia, in both directions, after additional calculations TSOs allocated to the market participants additional capacities offered at daily auctions for all months in 2017.

The majority of capacity was allocated at the borders with Hungary and Slovenia, which is also where HOPS raised the highest revenues.

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 fee in the day of delivery on the borders with Serbia, Slovenia, and Bosnia and Herzegovina, in the order in which requests were received.

Figure 4.3.5 shows the breakdown of income collected by HOPS from yearly, monthly and daily auctions per direction for cross-zonal transmission capacities in 2017.



Source: HOPS

Figure 4.3.5 Breakdown of income collected by HOPS from yearly, monthly and daily auctions per direction for cross-zonal transmission capacities in 2017

As compared to 2016, there was a significant increase in income primarily associated with income from daily auctions, where the border between Croatia and Slovenia stands out in terms of imports.

In terms of the secondary market of cross-zonal capacities, on all borders it is possible to transfer allocated capacity to a new market participant, and on the borders with Slovenia, Hungary and Bosnia and Herzegovina it is additionally possible to resell capacities allocated on a yearly and monthly auction to the competent auction office, which then offers those capacities in subsequent auctions, i.e. on the secondary market, with market participants entitled to financial compensation for resold capacity. In 2017, HOPS's costs for this purpose amounted to HRK 50.37 million, which shows that market participants did not fully use the capacity allocated at the yearly and monthly auctions.

In addition to income, HOPS also incurred costs related to the allocation of cross-zonal capacities: fees to JAO and SEE-CAO and the cost of the resale of capacities in the secondary market.

Table 4.3.5 shows the breakdown HOPS income and costs from auctions for the allocation of cross-zonal capacities in 2017.

Table 4.3.5 Breakdown of HOPS income and costs from auctions for the allocation of cross-zonal capacities in 2017

Income/cost	Amount [million HRK]
Yearly auctions	22.55
Monthly auctions	24.00
Daily auctions	65.65
Resale of capacities	-50.37
JAO and SEE CAO costs	-2.14
Total	**59.69**

In 2017, HOPS's net income doubled as compared to 2016, amounting to almost HRK 60 million. Increased income was reported for all three income categories, based on the allocation of capacities at yearly, monthly and daily auctions.

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

The capacities offered at yearly auctions by border in 2017 were the same as those offered in the previous year.

The largest number of participants compete for the allocation of capacities in yearly auctions at the borders with Slovenia and Hungary, which is also where the largest quantities of capacities are offered.

In 2017, market participants were offered more capacities in monthly auctions than in 2016.

NTC values vary significantly on the border with Bosnia and Herzegovina, with winter NTC values are in general higher than the summer ones, particularly for imports.

In February 2017, on the border with Hungary in the import direction not all capacity allocated at the yearly auction was reported for use and these 95 MW were resold, i.e. the operators offered this capacity at monthly auction. Therefore, the average value of AAC in Figure 4.3.3 is 690 MW instead of the usual 698 MW which were reported for use in all other months.

On the border with Serbia, due to the works on the Sremska Mitrovica 2 – Ernestinovo 400 kV transmission line it was not possible to transmit electricity in certain hours in the periods from 19 to 30 June and from 1 to 7 July 2017.

On the border with Hungary, intraday allocation of capacities was not yet established in 2017. Due to intensive cooperation between system operators, and subsequently between national regulators, the joint allocation of intraday capacities in both directions started taking place in late March 2018.

Figure 4.3.3 demonstrates that an average of about 7 MW of capacities remained unallocated at monthly auctions for the direction from Croatia to Bosnia and Herzegovina every month, i.e. there was no congestion in that direction.

The same figure demonstrates that in the directions from Croatia to Slovenia and from Croatia to Hungary there was an average of 1 MW remaining unallocated in monthly auctions. This is due to the algorithm of capacity allocation which, in the case of several market participants offering the same marginal price that was achieved at the auction, partly accepts those offers so as not to exceed the total offered capacity in the auction.

The majority of income from allocations at yearly auctions was realised in the incoming direction. At monthly auctions, the majority of income was realised on the borders with Hungary and Slovenia.

Before allocating capacities for 2017 and their use, HERA issued prior approvals for the relevant rules for the allocation and use of cross-zonal capacities. In order to monitor the process of allocation and use of cross-zonal capacities more easily, in line with the practice of EU transmission system operators, at the end of 2016 HERA granted a prior approval for special rules regulating exclusive use of capacities, which will apply until revocation.

The *Rules on the allocation and use of cross-border transmission capacities* stipulate that the use of transmission capacity allocated at yearly, monthly and daily auctions and intraday allocations are to be reported to HOPS in the manner and according to the deadlines published on HOPS's website.

In addition to the above, at the end of 2017, HERA granted prior approvals for all individual rules for the allocation of capacities for 2018 at individual borders, without any significant changes to the capacity allocation process as compared to 2017.

In 2017, HERA published a report on the use of HOPS's income from the allocation of cross-zonal capacities for the period from July 2016 to June 2017, in which it was confirmed that HOPS generated a net income from the allocation of cross-zonal capacities in the amount of HRK 43.68 million during the said period. In the same period, HOPS invested HRK 38.77 million to reconstruct the existing facilities of the transmission network so as to provide for the maintenance or increase of cross-zonal capacities, with the largest part of the investment pertaining to TS Melin and the upgrade of the second busbar system, replacement of HV and secondary equipment of the 400 kV plant and procurement and instalment of a 220 kV switch and other equipment. The realised difference between net income and financed investments in the period from July 2016 to June 2017 was deposited by HOPS to a special internal account, and will be invested in the subsequent period in the transmission network for the purpose of maintaining or increasing cross-zonal capacities in accordance with *Regulation (EC) No 714/2009.*

The *CACM Regulation* stipulates that implicit methods allocating energy and capacity together should be used for the daily and intraday allocation of capacities in power exchanges. In the case of day-ahead market coupling, implicit allocations should be used, while continuous implicit allocations should be used for intraday market coupling. To calculate cross-border capacities, the Regulation stipulates the flow-based method as first choice, and only in special cases does it allow for the use of the coordinated NTC method.

With market coupling, capacity is allocated implicitly on the day-ahead and intra-day markets as part of a transaction at the power exchange on both sides of the border between bidding zones. The main precondition for market coupling is the existence of a power exchange. Market coupling via exchanges enables simultaneous consideration of all purchase and sale orders received in two or more bidding zones in a single optimization procedure.

The Croatian borders with Slovenia and Hungary are included in the CORE region, the largest capacity calculation region in the EU.

At these borders, the application of day-ahead market coupling is anticipated using the flow-based method. However, due to the complexity of the project and harmonisation on the regional level, this method of market coupling is not expected until 2019.

As Serbia and Bosnia and Herzegovina have not yet transposed the *CACM Regulation* into their legislation, the relevant Croatian borders are not specifically listed in ACER's *Decision 06/2016*. Once these preconditions are fulfilled, they will be an integral part of the region for South East Europe.

Also, the *CACM Regulation* obliges the national regulators to approve unanimously a series of regulations and conditions or methodologies prepared by all nominated electricity market operators (NEMOs) or transmission system operators for the calculation of capacities both at the EU and regional levels. As certain acts are directly or indirectly interdependent, a delay in the adoption of a single act may jeopardise the adoption of other acts, particularly bearing in mind the fact that national regulators should approve all acts via a consensus. When the regulators cannot agree, as in the case of determining capacity calculation regions, ACER must take the final decision.

In December 2016, HERA approved the first act prepared by HOPS pursuant to the *CACM Regulation* in cooperation with other EU system operators regarding the methodology of providing generation and load data. This act, together with the common grid model methodology, which HERA approved in May 2017, should define the data for the establishment of a unified network model at the EU level.

In June 2017, in accordance with the *CACM Regulation* HERA approved the plan to define the common establishment and performance of the functions of market coupling operators, developed by all NEMOs. The plan is very important as it regulates the performance of the functions of market coupling operators encompassing the development and maintenance of algorithms, systems and procedures for unified day-ahead and intraday coupling, processing of input data on the capacity between bidding zones and restrictions in allocation provided by the operators of coordinated capacity calculation, implementation of algorithms for price coupling of the market and matching of continuous trading and confirmation and submission of the results of single day-ahead and intraday coupling to NEMOs.

In addition, the plan identifies the PCR (Price Coupling of Regions) project as a project with EU relevance for the coupling of the day-ahead market, whereas the XBID project is of EU relevance for the coupling of intraday markets.

ACER's *Decision No 07/2017* of 14 December 2017, pursuant to the *CACM Regulation*, established the system operator's congestion income distribution methodology, after national regulatory agencies had failed to unanimously harmonise further activities in view of the proposed act by all system operators.

Regarding the determination of harmonised maximum and minimum prices at the single day-ahead and intraday market, in accordance with the *CACM Regulation*, and since the national regulators failed to reach an agreement, ACER was tasked with setting those prices.

Therefore, in its *Decision No 04/2017* of 14 November 2017, ACER determined the maximum price of EUR +3 000/MWh and a minimum price of EUR -500/MWh in the single day-ahead market, while in the *Decision No 05/2017* of 14 November 2017, it determined the maximum price of EUR +9 999/MWh and a minimum price of EUR -9 999/MWh in the single intraday market.

In January 2018, together with other national regulators HERA approved two acts generated by all NEMOs related to the identification of products that can be taken into consideration in the procedure of single day-ahead and intraday coupling.

Single day-ahead and intraday coupling should use as needed the existing NEMOs and already applied solutions, not preventing their competition for the purpose of efficiency and with the aim of applying single day-ahead and intraday coupling as soon as possible. Therefore, the approved products are based on already existing products being traded in any national electricity market in EU Member States, within the existing EUPHEMIA algorithm for day-ahead markets, or the XBID algorithm under development for intraday markets.

In January 2018, HERA and other national regulators also approved the all NEMOs' proposal for a methodology of back-up procedures to be used in situations in which the price coupling process cannot yield results and it is necessary to establish alternative solutions to provide for the allocation of capacity, with a detailed description and characteristics of back-up procedures for the coupling of day-ahead and intraday markets.

In the meantime, regulators, transmission system operators and Slovenian and Croatian exchanges began cooperating on the Croatian and Slovenian day-ahead market coupling using the NTC calculation of cross-zonal capacities. This initiative is a provisional solution for the coupling of the Croatian and Slovenian markets until the establishment of a single market as foreseen by the *CACM Regulation*.

In March 2017, CROPEX and HOPS officially became members of the Italian Borders Working Table (IBWT) regional project, which resulted in coupling the Croatian electricity market with the Slovenian and implicitly the European market within the MRC project, which currently includes 19 countries accounting for 85% of Europe's electricity consumption.

The Croatian and Slovenian day-ahead markets were successfully coupled in June 2018.

In addition to the MRC project, Europe also has the 4MMC (Four Markets Market Coupling) project, encompassing the common coupled day-ahead market between Hungary, Slovakia, Czech Republic and Romania, and using the capacities calculated based on the NTC method. During 2017, consideration was given to the possibilities of coupling the Croatian and Hungarian day-ahead markets, which would indirectly result in the coupling of the MRC and 4MMC markets, but no specific steps were agreed.

Both mentioned projects used the same EUPHEMIA algorithm, which was developed as part of the PCR project. CROPEX also uses that algorithm exclusively to calculate hourly prices on the Croatian electricity market, as it is not yet coupled with the neighbouring markets.

In addition to day-ahead market coupling, the *CACM Regulation* also stipulates the coupling of intraday markets using a continuous allocation process. This process should be realised through the XBID project. CROPEX and HOPS are currently participating in the accession stream project together with other participants from Central and Eastern Europe, with the main goal of transferring knowledge between existing and new project members.

As the implementation of the harmonised intraday allocation of capacities at the regional level for the calculation of capacities in accordance with the *CACM Regulation* will be time consuming, EU has initiated activities regarding the implementation of projects on a smaller geographic scale (Local Implementation Project – LIP). Croatian borders with Slovenia and Hungary are included in LIP 15, and market coupling is expected to be realised in 2019.

Regulation (EU) 2016/1719 establishing a guideline on forward capacity allocation (FCA) was adopted in September 2016, stipulating detailed rules for capacity allocation between bidding zones on long-term markets, for establishing a common methodology for determining long-term capacity, and for establishing a single allocation platform at the European level on which long-term transmission rights are offered at yearly and monthly auctions.

One of the first tasks stipulated by *FCA* is the adoption of harmonised rules for the allocation of long-term transmission rights. The proposal of the rules should be submitted by each transmission system operator to the relevant national regulator within six months after the entry into force of the *FCA Regulation*. As part of the early implementation of the *FCA Regulation*, transmission system operators within ENTSO-E developed Harmonised Allocation Rules (HAR), for which HERA gave its prior approval in September 2016, and whose application for the allocation of long-term rights to cross-zonal capacities started in 2017 (for yearly and monthly periods) at Croatia's borders with Slovenia and Hungary.

As national regulators failed to agree on the approval of harmonised rules, stipulated by the *FCA Regulation*, in its *Decision No 03/2017* ACER established harmonised rules for the allocation of long-term transmission rights to be applied to long-term capacities in 2018.

Subsequent to ACER's *Decision*, in mid-October 2017 HERA, together with other national regulators from the Core region, approved the *Regional specific annex for CCR Core to Harmonised allocation rules for long-term transmission rights* providing for all cross-zonal borders where capacities will be allocated in accordance with HAR, including Croatian borders with Slovenia and Hungary, that system operators are to define a cap on total compensation to be paid to all holders of curtailed long-term transmission rights to ensure operation remains within operational security limits prior to the day-ahead firmness deadline in the relevant calendar year.

In December 2017, together with other national regulators HERA approved the proposal of all system operators for the establishment of a single allocation platform and a methodology for cost sharing. It presents the functional requirements needed by market participants in order to be able to trade in long-term capacities on the JAO auction office, which will exercise the role of a single platform for the allocation of long-term capacities at EU level.

JAO is a joint company owned and managed by transmission system operators. The single allocation platform will be governed by the SAP Council, which will make decisions on operating procedures and carry out all tasks of the single platform.

4.3.3 Electric power system balancing and ancillary services

Settlement of imbalances for imbalance responsible parties

The methodology used to calculate the prices of imbalances in the settlement of imbalances in 2017 was the *Methodology for establishing balancing energy prices ("Official Gazette", Nos. 71/16 and 112/16)*. To calculate values needed for the first settlement of imbalances in 2017, *Rules on electric power system balancing (HOPS, 5/2016 and 3/2017)* and the *Rules on the implementation of standard load profiles (HEP ODS, 12/2016)* were used.

With the ***Regulation on amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act ("Official Gazette", No. 23/2016)*** of 29 December 2016, Croatian Government postponed the establishment of the EKO balance group from 1 January 2017 to 1 January 2018. This was not anticipated when the regulations on the settlement of imbalances were adopted, which assumed the establishment of the EKO balance group as provided by the ***Act***.

Imbalances caused by the difference between contractual schedules that pertain to eligible producers in the incentives system and the actual values were not included in the first settlement of imbalances by April 2017.

In the *Amendments to the Rules on electric power system balancing (HOPS, 3/2017)*, HOPS stipulated that until the EKO balance group is established, the financial obligations arising from the difference in actual values by eligible producers in the incentives system and suppliers' contractual schedules, which pertain to mandatory reception of electricity, are assigned to the transmission system operator

Based on the *Rules on the implementation of standard load profiles (HEP ODS, 12/2016)*, a new procedure was first applied in 2017 to distribute the consumption

realisation on billing metering points and losses in the distribution network, which cannot be measured separately due to technical limitations.

In 2018, HROTE carried out the second settlement of imbalances for 2017. Prior to 2017 there was no need for a second settlement due to the application of the appropriate correction factor *k*. In order to reduce the imbalances in the second annual settlement of imbalances, in 2017 HEP ODS adopted the *Rules on the implementation of standard load profiles (HEP ODS, 12/2017)*, which provide for the application of monthly coefficients from 2018, instead of a single annual coefficient for losses which was used in the previous rules. These amendments also changed the deadline for the second annual settlement of imbalances and introduced a monthly submission of informative imbalance amounts for the second annual settlement of imbalances.

A comparison of the hourly prices of imbalances on an average day in Croatia and its surroundings (Figure 4.3.6) reveals that in 2017 the prices for positive imbalances in Hungary were lower than those in Croatia and Slovenia, while the prices for negative imbalances in Slovenia and Croatia were lower than those in Hungary. The prices for positive and negative imbalances in Croatia were on par with those in Slovenia. This means that in 2017 the settlement of imbalances for participants on the Croatian market was more favourable than in Hungary, and on par with that in Slovenia with regard to prices within tolerance thresholds.

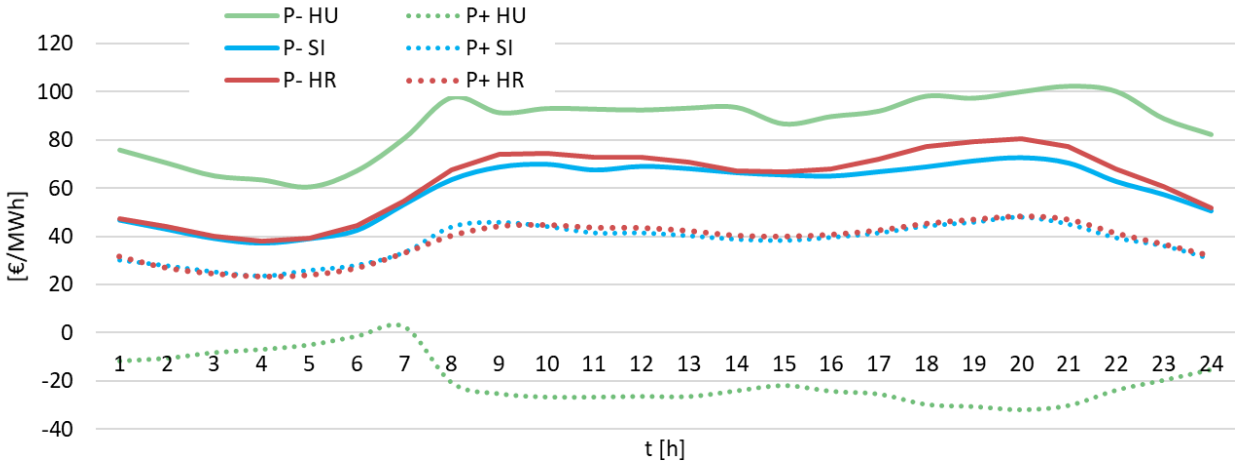


Figure 4.3.6 Hourly prices of imbalances on an average day in 2017 in Croatia, Hungary and Slovenia

Figure 4.3.7 shows the average monthly prices of positive and negative imbalances. The highest average weighted monthly price for negative imbalances P_n was achieved in January (EUR 165/MWh), while the highest average weighted monthly price for positive imbalances P_p was achieved in November (EUR 37/MWh).

January 2017 was marked by high consumption of electricity due to low temperatures, and consequently by high prices on the electricity exchange, with an average of approximately EUR 85/MWh. Moreover, the imbalances of entities responsible for imbalances were also exceptionally high both in relative and in absolute terms.

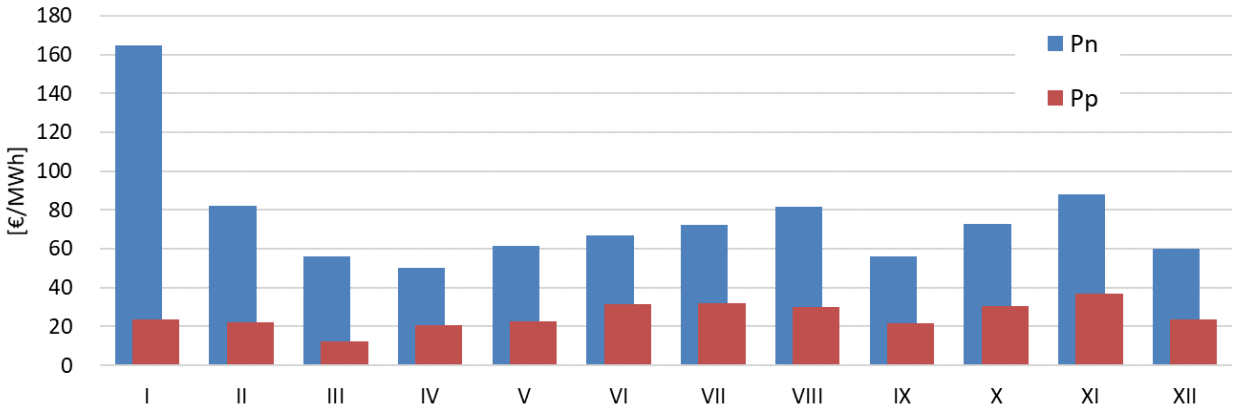


Figure 4.3.7 Average monthly prices of positive and negative imbalances in 2017

Figure 4.3.8 shows a monthly breakdown of imbalance amounts invoiced by HOPS in 2017 (A_{tot} – total amount, A_n – amount of negative imbalances, A_p – amount of positive imbalances). For all months of 2017, the total amount of settled imbalances calculated by HOPS was HRK 155 million, of which 45.2 million pertains to contractual schedules and imbalances of eligible producers in the incentives system, while HRK 14.2 million pertains to HOPS for losses in the transmission network.

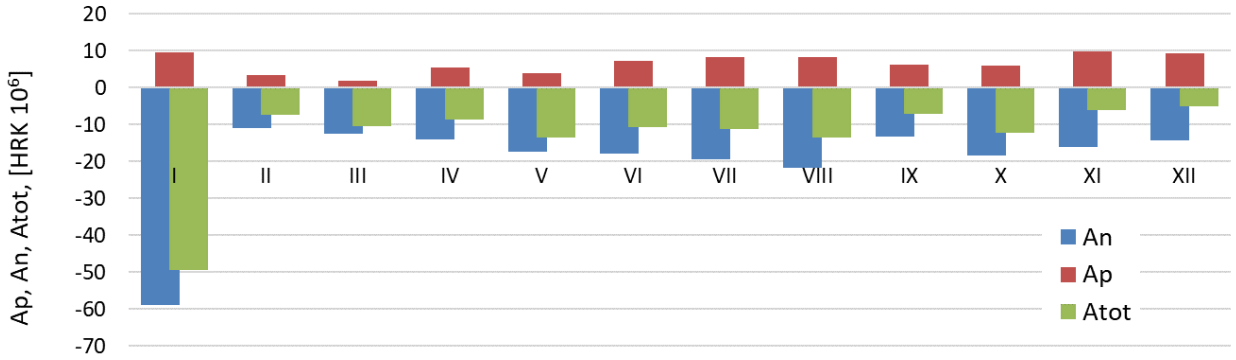


Figure 4.3.8 Invoiced imbalance amounts in 2017

Provision of balancing services

In 2017, the price of electricity for the purpose of electricity system balancing was calculated according to the *Methodology for establishing prices for the provision of balancing services* ("*Official Gazette*", *No. 85/15*).

Currently, the sole balancing service provider is HEP-Proizvodnja d.o.o., which, upon HOPS's request, activated a total amount of 189 GWh in balancing energy for increases and 172 GWh for decreases. Also, in the imbalance netting cooperation, 62 GWh were exchanged for increases and 62 GWh for decreases.

HOPS's total costs for the balancing service in 2017 were HRK 57 million. This does not include compensation costs for unintentional imbalances of the Croatian regulation zone from the exchange programme with neighbouring regulation zones, which amounted to HRK 3 million, nor does it include the amount for the imbalance netting process, which is negligible.

Ancillary services

HOPS and HEP Proizvodnja d.o.o. have entered into agreements for the provision of ancillary services based on the *Methodology for establishing prices for the provision of ancillary services (HOPS, 7/2016)*.

The ancillary services used for electricity system balancing include power reserves of automatic secondary frequency control and power exchange, power reserves of tertiary control for system balancing, and power reserves of tertiary control for system security.

In 2017, the average needs for ancillary services related to balancing for power reserves of automatic secondary frequency control and power exchange amounted to ±56.83 MW per hour. The needs for power reserves of tertiary control for system balancing amounted to ±120 MW, and the needs for tertiary control for system security were +150 MW per hour. HOPS determined the needs for these services and agreed their provision with HEP Proizvodnja d.o.o.

Ancillary services and balancing energy were paid for based on unit prices and realised quantities. The total costs of providing ancillary services were HRK 310 million, of which 83% were related to power reserves for system balancing.

On 4 July 2017, HOPS adopted the *Network Code for the Transmission System ("Official Gazette", No. 67/17)* which, among other things, regulates the conditions for the provision of ancillary services.

Observations on electricity system balancing

The establishment of the EKO balance group as stipulated by the ***Renewable Energy Sources and High-efficiency Cogeneration Act*** would have positive effects on the balancing mechanism, as it would lead to minimising the imbalances of eligible producers under the incentives system, for which HROTE must report the contracted schedules, which would subsequently lead to reduced reserve capacity demands and increased possibility of integrating renewable energy sources and developing the intraday electricity market. A public consultation was conducted related to by-laws that regulate the functioning of the EKO balance group, and the opinions of HERA and the system operators were obtained. What remains is to adopt an ordinance on renewable energy sources and high-efficiency cogeneration, electricity selling rules, and the rules for managing the EKO balance group. Enabling the operation of the EKO balance group and trading on the intraday market would result in reduced imbalances and thus reduced overall costs of electricity system balancing.

In view of the above, the EKO balance group should be established as soon as possible to fully include its imbalances in the settlement and billing of imbalances.

In order to plan consumption and production, HEP ODS and HOPS must establish an efficient mechanism for submitting historical data for billing metering points as quickly as possible (e.g. day by day). This would reduce the imbalances and expenses of balance groups, reserve capacity demands would decrease, and the ability to accept renewable energy sources would increase. On 18 July 2017, HERA held a workshop with energy entities on the availability and quality of billing and

metering data, where the users of metering data had an opportunity to propose the necessary amendments and improvements.

In 2017, as in the previous years, settlement of imbalances was frequently recalculated due to errors in the calculation of realisations in the distribution network and frequent suppliers' complaints regarding the calculations of realisations, and consequently settlement of imbalances. On the other hand, errors in the calculation of rates also occur due to the use of monthly readings when determining the hourly rates for billing metering points without measurements of hourly load profiles.

The sudden postponement of the establishment of the EKO balance group at the end of 2016 with implementation in 2017 gave rise to emergency amendments to by-laws regulating electricity system balancing and created uncertain operating circumstances for electricity market participants.

Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing entered into force on 18 December 2017. The implementation of the guideline will result in opening the market of power reserves and balancing energy on joint platforms in the European Union, implementation of the imbalance netting cooperation, harmonised determination of the prices of balancing energy, imbalances and power reserves. It will establish standard balancing products, but individual system operators will be able to request the use of specific balancing products. Previous compensation in kind for unintended imbalances will be replaced by financial compensation.

With regard to pilot projects of cross-zonal balancing, HOPS participated as an observer in the PICASSO (Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation) and MARI (Manually Activated Reserves Initiative) projects, and expressed interest in the TERRE (Trans European Replacement Reserves Exchange) project. Among other pilot projects, also active is IGCC (International Grid Control Cooperation).

In 2017, *Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation* was adopted, containing provisions on load-frequency-control aimed at regulating the requirements for system operators, distribution system operators, and providers of products in the transmission and distribution networks. This regulation also provides for minimum requirements in terms of the quality of the common system frequency, and in terms of reserve dimensioning.

4.4 Retail electricity market

4.4.1 Basic features of electricity consumption

Sale of electricity in 2017

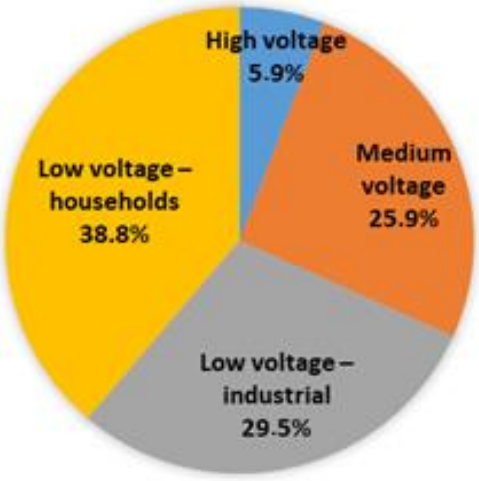
Table 4.4.1 shows data on the number of billing metering points (BMP), sale, and average sale of electricity by billing metering point, and the share of individual consumption categories in total electricity sales.

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 2017

Consumption category	Number of BMPs	Sale [MWh]	Sale per BMP [kWh]	Share in total sale [%]	Change in sale 2017/2016 [%]
High voltage-110 kV[6]	52	948 932	18,248,687	5.9	20.9
Medium voltage	2,218	4,182,173	1,885,560	25.9	6.0
Total high and medium voltage	**2,270**	**5,131,104**		**31.8**	**8.4**
Low voltage - industrial users (blue)	42,383	223,593	5,275	1.4	-5.1
Low voltage - industrial users (white)	123,794	1,189,797	9, 611	7.4	-4.3
Low voltage - industrial users (red)	23,896	2,940,519	123,055	18.2	4.8
Low voltage - public lighting (yellow)	21,152	405,798	19,185	2.5	-4.8
Total low voltage - industrial	**211,225**	**4,759,706**		**29,5**	**1,1**
Low voltage - households (blue)	722,827	1,486,523	2,057	9.2	-0.2
Low voltage - households (white)	1,450,345	4,756,156	3,279	29.4	2.9
Low voltage - households (black)	2,987	7,019	2,350	0.04	-3.9
Low voltage - households (red)	685	17,420	25,431	0.11	115.1
Total low voltage - households	**2,176,843**	**6,267,118**	**2879**	38.8	**2.3**
Total low voltage	**2,388,069**	**11,026,824**		**68.2**	**1.7**
Overall total	**2,390,339**	**16,157,929**		**100.0**	**3.8**

Source: HEP ODS, HOPS

Figure 4.4.1 shows a breakdown of electricity sales by end consumer category.



Source: HEP ODS, HOPS

Figure 4.4.1 Proportion of individual end consumer categories in total electricity sales in Croatia in 2017

Table 4.4.2 shows the sale of electricity to end consumers from 2008 to 2017

Table 4.4.2 Sale of electricity to end consumers in the period from 2008 to 2017

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017

6 *There are 12 end consumers connected to high voltage, from industry and transport (Croatian railways electro-traction) and 40 power plants which are in this case end consumers (own consumption), with 140 BMPs in total.*

Consumption [GWh]	15,907	15,514	15,721	15,602	15,353	15,187	14,932	15,485	15,570	16,158

Distribution by EUROSTAT consumption bands

Since 2007, the European statistical office EUROSTAT has monitored average electricity prices using consumption bands for household and non-household (industrial) end consumer categories.

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

Table 4.4.3 Consumption and billing metering points for household end consumers in Croatia per EUROSTAT consumption band

Consumption band	Minimum consumption [kWh/year]	Maximum consumption [kWh/year]	Consumption [%]	Number [%]
Da – very small households	1	< 1,000	3.6	30.2
Db – small households	1,000	< 2,500	16.1	26.3
Dc – medium households	2,500	< 5,000	35.3	27.5
Dd – large households	5,000	< 15,000	40.6	15.5
De – very large households	≥ 15,000		4.4	0.6

Source: EUROSTAT and HEP ODS

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 Dc (medium households) and Da (very small households). Table 4.4.4 shows electricity consumption bands and indicative peak loads for industrial end consumers according to EUROSTAT, and Table 4.4.5 a breakdown of consumption and billing metering points for low, medium and high voltage industrial end consumers by EUROSTAT consumption band.

Table 4.4.4 Electricity consumption bands and indicative peak loads for industrial end consumers according to EUROSTAT

Consumption band	Minimum consumption [MWh/year]	Maximum 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 industrial end consumers in Croatia by EUROSTAT consumption band in 2017

Consumption band	Low voltage industrial consumers		Medium voltage industrial consumers		High voltage industrial consumers		Total industrial consumers	
	Consumption [%]	Number [%]	Consumption [%]	Consumers [%]	Consumption [%]	Consumers [%]	Consumption [%]	Consumers [%]
Ia	8.7	78.2	0.0	0.0	0.0	0.0	8.7	78.3
Ib	27.9	20.2	0.2	0.2	0.0	0.0	28.2	20.4
Ic	9.6	0.5	1.6	0.3	0.1	0.0	11.3	0.7
Id	1.9	0.0	18.7	0.5	0.3	0.0	21.0	0.5
Ie	0.0	0.0	17.0	0.1	2.8	0.0	19.8	0.1
If	0.0	0.0	4.7	0.0	6.3	0.0	11.1	0.0
> 150 000 MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All bands	**48.1**	**98.9**	**42.3**	**1.0**	**9.6**	**0.0**	**100.0**	**100.0**

Source: HEP ODS and HOPS

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

In the medium voltage category of industrial end consumers, the most electricity was sold in the Id consumption band, 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.

Observations on the main characteristics of electricity sales in 2017

Electricity sales in 2017 were 3.8% higher compared to 2016. The increase in total consumption was particularly influenced by industrial consumers.

The share of households in total electricity sold to end consumers was 38.8%, while the share of electricity sold to industrial end consumers was 61.2%, which is a slight increase compared to 2016.

Table 4.4.2 shows that the past ten-year period has seen a moderate increase in electricity sales to end consumers. Data on electricity sales during this ten-year period were compared to forecast electricity sales in the sustainable development scenario from the Energy Development Strategy of the Republic of Croatia (October 2009). This document forecast a 3.7% average annual increase in electricity sales from 2006 to 2020. Had the sales increased at that rate in the past ten-year period, electricity sales in 2017 would have reached 22 063 GWh, or 36.5% more than the actual sales.

4.4.2 Development of the retail electricity market

Electricity supply for the market and electricity supply provided as a public service

Electricity supply is the sale of electricity to end consumers on the retail market. The end consumers are classified into two categories: households and industrial consumers.

Electricity supply to household end consumers may be provided as market supply or as part of the universal service, which is a public electricity supply service across the entire territory of Croatia under published prices.

An end consumer from the household category who is left without a supplier for any reason whatsoever, will automatically be transferred to electricity supply

under the universal service. Household end consumers supplied by a market supplier may request to switch to the universal service supply.

In relation to the single information point principle and pursuant to the ***Electricity Market Act***, suppliers of the universal service are required to:

- Establish customer centres for providing information, solving user inquiries, requests and complaints, whether in person, by phone or electronically,
- Establish a complaints committee for electricity supply pursuant to the provisions of the act governing consumer protection regarding universal service suppliers, to which complaints may be filed related to a decision issued by a branch office,
- Adjust office hours of customer centres to user needs, with at least one day in the week when the customer centre is open until 8 p.m.; users should be enabled to schedule meetings by phone or electronically, and
- Intercede with the transmission system operator or distribution system operator regarding complaints and information related to aspects regulated by the contract on the use of the transmission and distribution network.

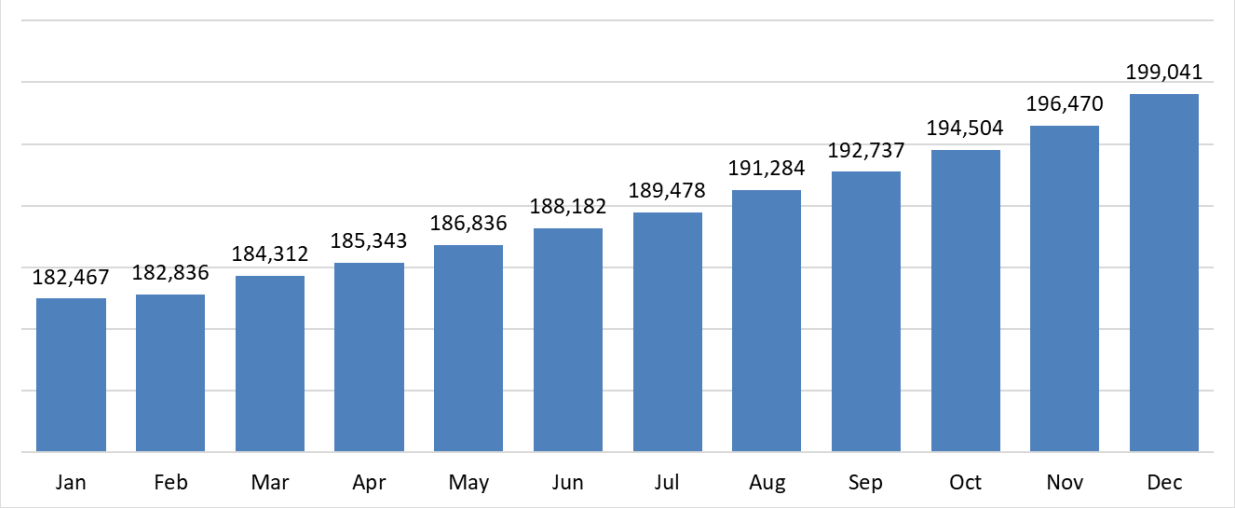
Household end consumers are offered market supply by several individual suppliers, while supply as part of the universal service was in 2017 provided as a public service by HEP Elektra d.o.o.

Industrial end consumers should select a market supplier, otherwise they will be provided with a guaranteed supplier whose prices are higher than average market prices in order to motivate end consumers to select a market supplier. In 2017, the public service of guaranteed supply was provided by HEP Elektra d.o.o.

Amendments to the ***Electricity Market Act*** deregulated electricity pricing within universal supply as of 1 January 2016, which is in line with the recommendations of the European Commission and the practice in most EU Member States. As of 1 January 2017, each supplier issued a single invoice for electricity and network to its consumers whose billing metering points are connected to the low voltage network.

Retail market in 2017

Figure 4.4.2 shows the number of billing metering points for household end consumers who were supplied outside the universal service in 2017.



Source: HEP ODS and HOPS

Figure 4.4.2 Number of billing metering points for household end consumers outside the universal service in 2017

In December 2017, the proportion of electricity sold to households outside the universal service was 11%, whereas the proportion of electricity sold to industrial consumers outside the guaranteed supply was about 91% (Figure 4.4.3). In December 2017, the share of HEP d.d. (HEP-Opskrba d.o.o. and HEP Elektra d.o.o.) in the supply of all consumers was 86%.

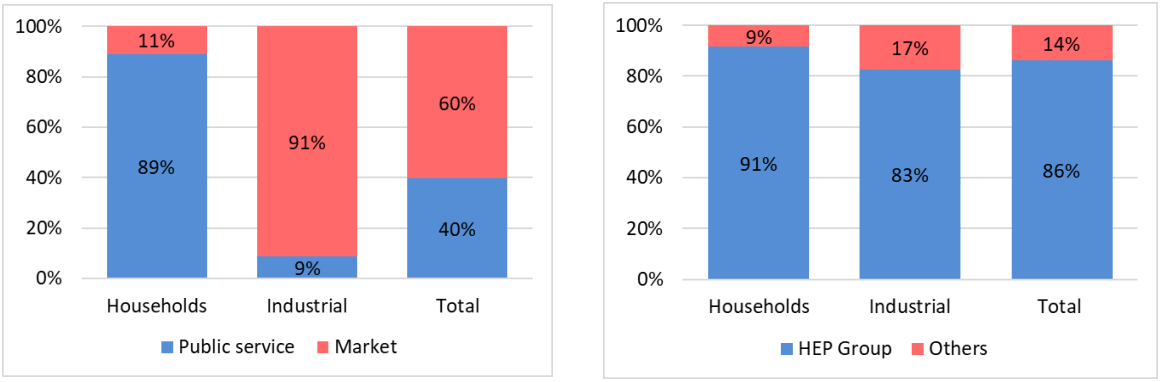


Figure 4.4.3 Supply shares according to energy in December 2017

Vulnerable consumers

Croatian Government adopted the *Regulation on criteria for acquiring the status of a vulnerable consumer of electricity from networked systems ("Official Gazette", No. 95/15)*, which entered into force on 1 October 2015, based on which suppliers of end consumers from the household category charge a solidarity fee of HRK 0.03/kWh. The funds collected from the solidarity fee are remitted by the supplier to the state budget once a month and recorded as earmarked funds of the ministry competent for social welfare.

Observations on the development of the retail market in 2017

In 2017, the retail electricity market in 2017 had 11 suppliers, and the number of innovative offers (buy-off of surpluses from own production and other benefits) and the number of consumers with own production increased. The number of consumers who switched suppliers also increased.

The share of electricity sold to households outside the universal service in 2017 remained roughly the same as in 2016 (about 11%), while the share of electricity sold by suppliers outside HEP d.d. decreased (14% vs. 16% in 2016).

As regards the concentration of the retail electricity market expressed in electricity sold, in December 2017 three suppliers had a total market share of 97.6% of end consumer supply in the household category, while three suppliers had a total market share of 83.1% in the supply of industrial end consumers. Thus, the concentration of retail supply to household end consumers slightly increased compared to 2016 (97.5% in 2016), while the supply to industrial end consumers slightly decreased (84.7% in 2016).

In 2017 the retail market was supplied by 10 active market suppliers in addition to HEP Elektra d.o.o., eight of which supplied household end consumers.

In 2017, all electricity suppliers were obliged to buy the total generated electricity under the incentives system, in proportion to their share in the total energy delivered to end consumers, at the regulated price of HRK 0.42/kWh. The annual

average price of electricity on the day-ahead market on the Hungarian and Slovenian electricity exchanges in 2017 was HRK 0.38/kWh. This difference between the buy-off price and the market price represents an additional expense for electricity suppliers, and was smaller in 2017 compared to 2016, when the average price on exchanges was HRK 0.26/kWh. The ***Renewable Energy Sources and High-Efficiency Cogeneration Act*** stipulates that the regulated obligatory buy-off should be repealed as of 1 January 2017, and the energy generated in plants under the incentives system should be purchased and sold on the electricity market by HROTE. The ***Regulation on amendments to this Act*** extended the obligation for suppliers to buy-off electricity from the incentives system until 31 December 2018. Implementation of that ***Regulation*** will lead to increased supplier costs in purchasing electricity, it will affect their revenues and could consequently cause an increase in the price of electricity for end consumers.

As of late 2015, a new interface for the implementation of the process of supplier switch has been in place, in accordance with the *Rules on electricity supplier switching* ("*Official Gazette*", *Nos*. *56/15 and 33/17).* The number of supplier switches is monitored at consumer billing metering points.

The recorded number of supplier switches at billing metering points of existing consumers connected to the distribution network is taken as an indicator of supplier switches. The total number of supplier switches in 2017 was 89 038, which represents an increase compared to 2016, when this number was 85 915. This yields a supplier switching rate of 3.64% for 2017, which is more than in the year before, when the rate was 3.57%. From the total number switches, 31 066 were in the industrial category and 57 972 were in the household category.

4.4.3 Electricity prices for end consumers

Electricity prices in Croatia in 2017

The average total selling prices for end consumers[7] by tariff category and voltage from 2012 to 2017 are shown in Table 4.4.6. The prices are determined based on tariffs items from the tariff systems for regulated energy activities from 2012 to 2017 and according to supplier data (for the first half of 2017). Table 4.4.7 shows average electricity prices (excluding the network usage charge, other charges and taxes) for end consumers on the electricity market (industrial consumers) and for end consumers within the universal supply (households) from 2012 to 2017.

Table 4.4.6 Average total selling prices of electricity for end consumers from 2012 to 2017 [HRK/kWh]

End consumer category	2012	2013	2014	2015	2016	2017
Medium voltage consumers	**0.61**	**0.60**	**0.58**	**0.57**	**0.55**	**0.52**
Low voltage consumers – industrial	0.79	0.78	0.75	0.74	0.73	0.68
Low voltage consumers – households	0.78	0.82	0.79	0.79	0.78	0.78
Low voltage consumers	**0.79**	**0.80**	**0.78**	**0.77**	**0.76**	**0.76**

Source: HEP ODS, market suppliers

[7] *Total selling price includes the transmission and distribution network charges and the price of energy.*

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 2012 to 2017 [HRK/kWh]

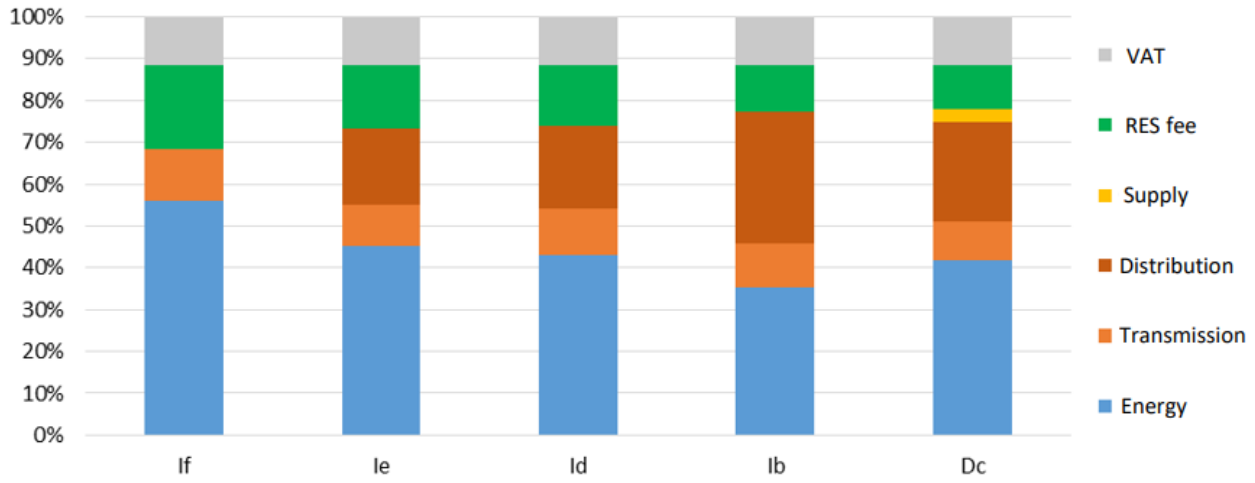
Type of supply	2012	2013	2014	2015	2016	2017
Market (high and medium voltage)	0.37	0.37	0.36	0.34	0.33	0.31
Market (low voltage, industrial)	0.42	0.42	0.40	0.38	0.37	0.34
Universal service (households)	0.47	0.49	0.46	0.45	0.45	0.45

Source: Suppliers on the market (suppliers who are not under the public service obligation)

Table 4.4.8 shows the characteristics of typical end consumers in Croatia by EUROSTAT consumption band in 2017, while Figure 4.4.4 shows a breakdown of the total electricity price for end consumers, including all charges and taxes, for different consumption bands according to EUROSTAT.

Table 4.4.8 Characteristics of typical electricity end consumers in Croatia in 2017

End consumer type	Band	Consumption [MWh/year]	Peak load [MW]	Consumption ratio day/night	Tariff system category
Very large industrial	If	100,000	15.00	60/40	Industrial consumers - high voltage (HV)
Large industrial	Ie	24,000	4.00	60/40	Industrial consumers - medium voltage - MV (35 kV)
Medium industrial	Id	2,000	0.50	65/35	Industrial consumers - medium voltage - MV (10 kV)
Small industrial	Ib	150	0.05	70/30	Industrial consumers - low voltage - LV (red)
Medium households	Dc	3.5		70/30	Households (white)



Source: HEP ODS, market suppliers

Figure 4.4.4 Breakdown of the total electricity price for end consumers in Croatia according to EUROSTAT consumption bands in 2017

Electricity prices in European countries in 2017

Figures 4.4.5 and 4.4.6 show the total prices of electricity for Dc and Ic bands in EU Member States, Norway, Iceland, and Turkey in the second half of 2017.

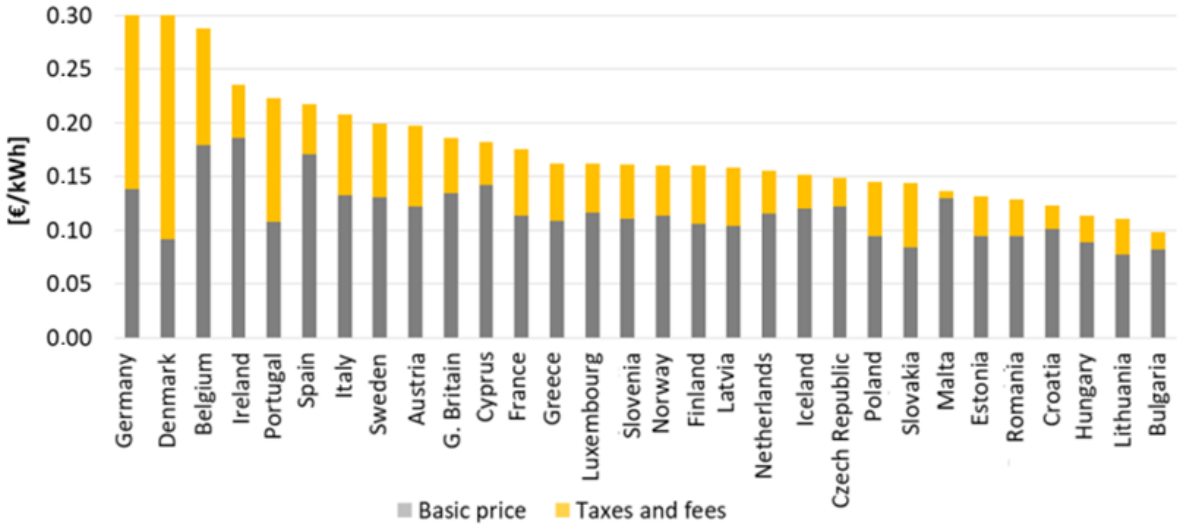


Figure 4.4.5 Total electricity prices for household consumers in the Dc consumption band, including charges and taxes, in the second half of 2017

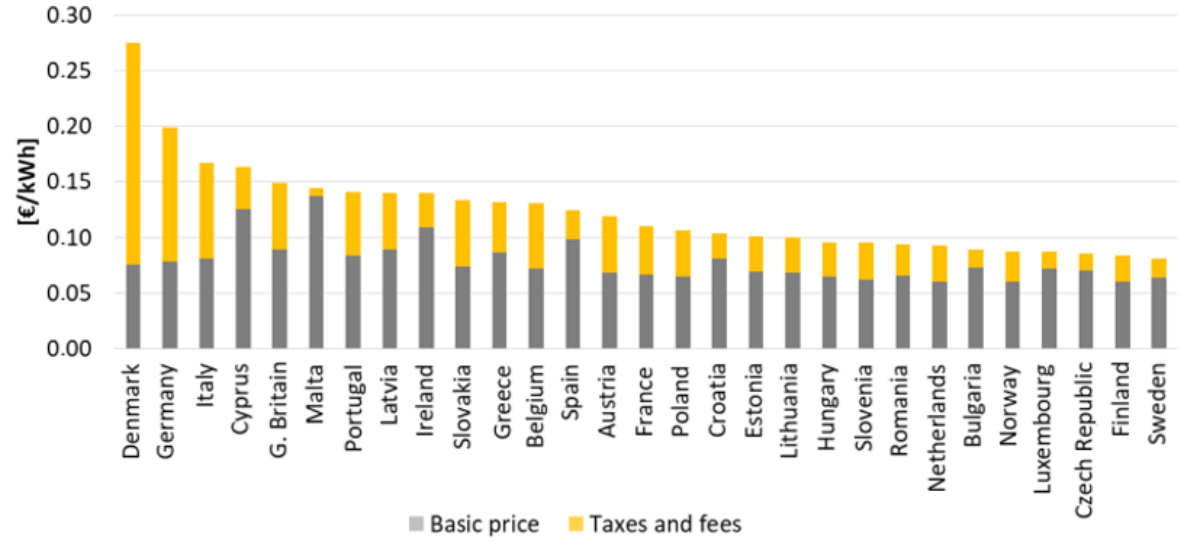


Figure 4.4.6 Total electricity prices for industrial consumers in the Ic consumption band, including charges and taxes, in the second half of 2017

Observations on electricity prices for end consumers in 2017

A further decrease in electricity prices on the Croatian electricity market was observed in 2017 compared to 2016. Notably, electricity prices in Croatia have been fully deregulated – this includes the price of electricity under the universal service to which household consumers are entitled, except for guaranteed supply.

For end consumers in Croatia from EUROSTAT's Dc band (medium households), the share of electricity price with supply costs amounts to 42% of the total price of electricity, while the rest pertains to transmission and distribution charges, the supply fee, the fee for promoting electricity generation from renewable sources and cogeneration, and value added tax (VAT).

In 2017, for household end consumers in the Dc band, the average proportion of taxes and charges in the total price of electricity in Croatia amounted to 22%, the

average proportion of electricity price with supply costs was 45%, and the average proportion of network charges was 33%.

As of 1 September 2017, the fee for promoting electricity generation from renewable energy sources and high-efficiency cogeneration was increased to HRK 0.105/kWh, whereas on 1 January 2017, VAT for electricity was decreased to 13%, which led to a change in the composition of the overall electricity price.

In order to facilitate the selection of electricity supplier for end consumers, HERA prepared a new version of its tariff calculator, which shows parallel tariff models and prices of electricity offered by different electricity suppliers to consumers from the household category. The tariff calculator provides a better overview of individual suppliers' basic tariff models, indicative prices, and additional information on the pricing, price composition and other information. The calculation serves purely for informational purposes and does not include possible additional discounts. The new version was made available at the start of 2017.

4.4.4 Quality of electricity supply

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

The Requirements for the quality of electricity supply, as the fundamental document in the field of quality of electricity supply, were adopted pursuant to the ***Electricity Market Act*** in March 2017.

In this document, HERA determined, among other things, 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 Requirements also prescribe the content of annual reports of transmission system operators and distribution system operators on the quality of electricity supply, and the content of suppliers' annual reports on the quality of services. The Requirements for the quality of electricity supply stipulate a gradual introduction of general, minimum and guaranteed standards of quality of electricity supply and a gradual introduction of financial compensation to consumers following the introduction of guaranteed quality standards for electricity supply.

A group of regulations, adopted in 2017 and 2018, including the network code for the transmission system, network code for the distribution system (pending), 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.

Continuity of supply in 2017

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. An interruption occurs in a situation where the voltage at an electricity reception and/or delivery point is less than 5% of nominal voltage. Supply interruptions are classified according to their duration as short-term (up to three minutes) and long-term (more than three minutes). A supply interruption is considered a planned supply interruption if it is announced in the manner and within the time frame defined in the *General terms and conditions for network use and electricity supply*; otherwise it is considered an

unplanned supply interruption. For the time being, HOPS and HEP ODS monitor only long-term supply interruptions.

The continuity of supply in the transmission network is measured by the number and duration of supply interruptions and by estimated undelivered electricity due to supply interruptions, Table 4.4.9.

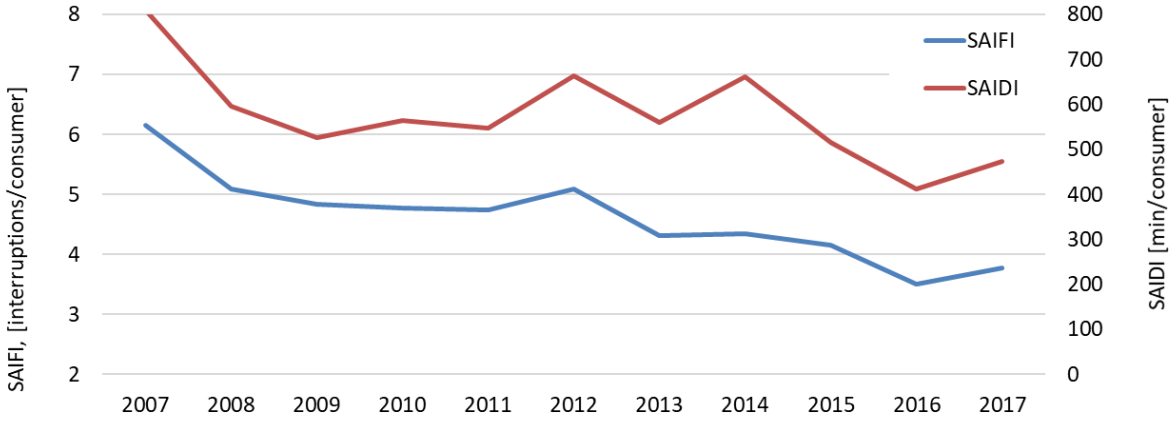
Table 4.4.9 Supply interruptions in the HOPS network from 2008 to 2017

Year	Number of supply interruptions	Duration of supply interruptions [min]	Estimated undelivered electricity [MWh]
2008	131	4,844	666
2009	144	7,676	1,840
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

Source: HOPS

Supply continuity indicators, which are systematically monitored in the distribution network, show the average annual number of interruptions per consumer (SAIFI), and the average total annual duration of interruption per consumer (SAIDI).

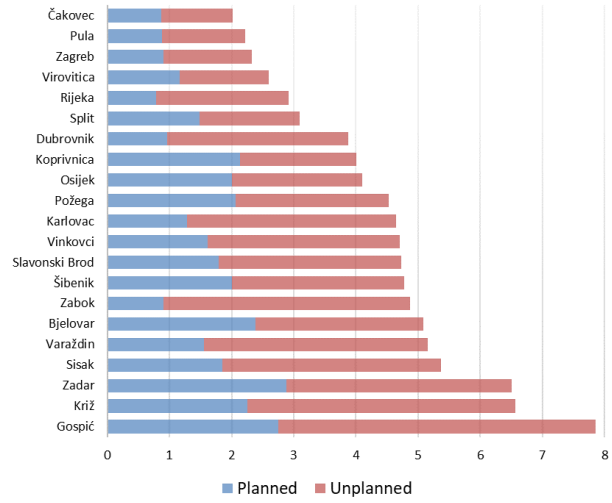
In 2017, SAIFI was 3.77 supply interruptions per consumer in the HEP ODS network, of which 38% were planned interruptions. SAIDI was 473 minutes per consumer, of which 45% were planned interruptions. SAIFI and SAIDI indices show that the continuity of supply in HEP ODS's network has improved over the years (Figure 4.4.7).



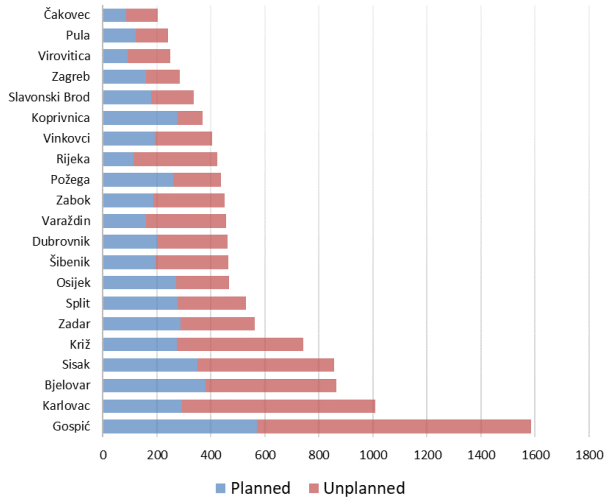
Source: HEP ODS

Figure 4.4.7 Indicators of continuity of supply in HEP ODS network from 2007 to 2017

As far as distribution areas are concerned, DP Elektra Čakovec had the best SAIFI and SAIDI scores in 2017, while the worst scores were attained by DP Elektrolika Gospić, as shown in Figure 4.4.8, because this is a distribution area with extreme weather conditions and specific network characteristics (long overhead lines).



Average annual number of interruptions per consumer – SAIFI



Average annual duration of interruption in minutes per consumer – SAIDI

Source: HEP ODS

Figure 4.4.8 Indicators of continuity of supply in HEP ODS network by distribution area in 2017

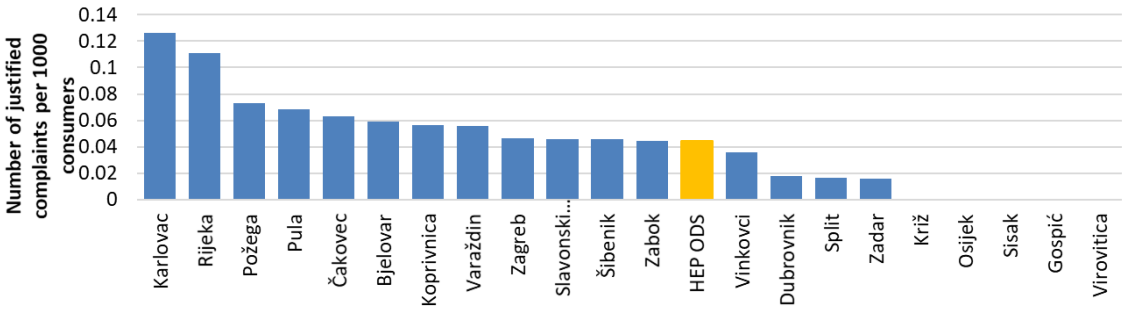
Voltage quality in 2017

As per the *General terms and conditions for network use 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.

A total of 205 complaints concerning voltage quality in the distribution network were filed, of which 108 were justified and resolved in favour of the complainant. Figure 4.4.9 shows the number of justified complaints concerning voltage quality per 1 000 consumers in HEP ODS distribution network by distribution area in 2017.



Source: HEP ODS

Figure 4.4.9 Number of justified complaints concerning voltage quality per 1,000 consumers in HEP ODS's distribution network by distribution area in 2017

Quality of service in 2017

Quality of service is measured as the time between the receipt of a request for service and the rendering of the service. The shorter the time before the service is rendered, the higher the quality of service.

Table 4.4.10 shows the data on provisional grid connection authorisations (PEES) and grid connection authorisations (EES) issued to end consumers in the HEP ODS network in 2017, and Table 4.4.11 shows the data on PEESes and EESes issued to producers in HEP ODS network in 2017.

Table 4.4.10 PEESes and EESes issued to end consumers connected to the HEP ODS network in 2017

Consumer category	PEES		Number of issued EESes			
	Number issued	Days of issuing	Total[8]	New consumers	Construction site connection	Temporary connection
MV[9]	176	17	155	55	12	0
LV[10] – industrial	7,199	15	7,904	3,094	1,207	564
LV– households	20,183	21	36,632	27,387	496	0
LV– public lighting	419	16	333	215	0	0
TOTAL	**27,976**		**45,024**	**30,751**	**1,715**	**564**

Source: HEP ODS

Table 4.4.11 EPAs and EAs issued to producers and end consumers with own production in HEP ODS network in 2017

Voltage level	PEES		EES
	Number issued	Days of issuing	Number issued
MV	60	22	20
LV	236	23	89
TOTAL	**296**		**109**

Source: HEP ODS

The *Requirements for the quality of electricity supply* define the guaranteed standard of service quality in terms of the time required to build the connection and connect the building to the low voltage network when it is not necessary to build a medium voltage line or a 10(20)/0,4 kV substation, which is 30 days.

Observations on the quality of electricity supply in 2017

In 2017, estimated undelivered electricity in the transmission network was reduced compared to 2016. However, a significant increase in the number and duration of supply interruptions was recorded.

In the distribution network, the SAIDI index was worse compared to 2016.

The worst supply continuity score for HEP ODS was recorded at DP Elektrolika Gospić, where SAIDI was twice as high as the HEP ODS average. Such poor supply continuity scores at DP Elektrolika Gospić were greatly influenced by harsh weather conditions.

8 *Including capacity increase for existing consumers.*

9 *Medium voltage – connection to 10, 20 and 35(30) kV network.*

10 *Low voltage – connection to 0.4 kV network.*

In the first quarter, extremely cold weather with heavy precipitation and strong winds, and salting, caused an increased number of unplanned supply interruptions across almost all of Croatia.

Days of thunderstorms with heavy rainfall, thundering and strong winds, which marked the second quarter, caused an increased number of unplanned supply interruptions across almost all of Croatia.

During the third quarter, due to a series of fires that affected the areas of Omiš, Split, Starigrad, Promina and Biograd, preventive disconnections of the transmission line were necessary.

In the fourth quarter, a strong wind and thunderstorm caused an increased number of supply interruptions in the territories of Elektra Bjelovar, Elektra Čakovec, Elektrolika Gospić, Elektra Koprivnica, Elektra Križ, Elektroslavonija Osijek, Elektra Požega, Elektra Sisak, Elektrodalmacija Split, Elektra Šibenik and Elektra Zagreb.

According to CEER's report on the quality of electricity and gas supply published in September 2016 (6th Benchmarking Report on the Quality of Electricity and Gas Supply), and based on the data for 2014, of Croatia is among the countries with the highest recorded number of minutes of undelivered electricity per consumer, both in terms of planned and unplanned supply interruptions.

Given the above, as well as the fact that SAIDI and SAIFI did not improve significantly, HEP ODS should enhance the existing monitoring system for supply interruptions and undertake additional measures to improve the continuity of supply.

The largest number of justified complaints regarding voltage quality was recorded in DP Elektra Zagreb (26 justified complaints per 555 017 end consumers). The largest number of justified complaints regarding voltage quality relative to the number of end consumers was recorded in DP Elektra Karlovac (11 justified complaints per 87 233 end consumers).

In 2017, there was a further decrease in the number of issued PEESes and EESes to producers and end consumers with own production in the HEP ODS network compared to 2015 and 2016, which is largely because the quota for promoting solar power plants was met.

4.4.5 Consumer protection

Applications in the electricity sector in 2017

Table 4.4.12 shows the classification of cases in the electricity sector received in 2017, and Table 4.4.13 shows the data on appeals and complaints filed in the electricity sector. Related to consumer protection in 2017, HERA received 185 appeals and complaints and 273 other applications – inquiries and requests for opinion or interpretation of regulations.

Table 4.4.12 Classification of applications in the electricity sector received by HERA in 2017

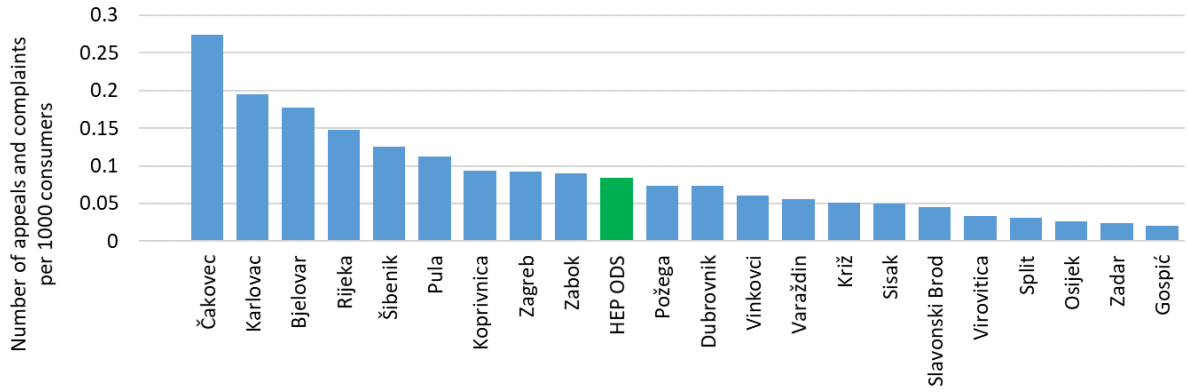
Description	Number	Proportion [%]
Appeals and complaints	185	31%
Request for approval	56	9%
Request for opinion/interpretation/instruction	273	45%
Decisions	33	5%
New licenses and extensions	26	4%
Decisions and preliminary decisions	31	5%
TOTAL	**604**	**100%**

Table 4.4.13 Appeals and complaints in the electricity sector received by HERA in 2017

No.	Description	Number	Proportion [%]
1	**Complaints related to the calculation and use of electricity**		**26%**
1.1	Complaints regarding the calculation of electricity consumption	43	
1.2	Complaints regarding the calculation of balancing energy	1	
1.3	Complaints regarding unauthorised use of electricity	5	
2	**Complaints regarding the quality of electricity supply**		**4%**
2.1	Complaints regarding continuity of supply	2	
2.2	Complaints regarding voltage quality	5	
2.3	Complaints regarding service quality	0	
3	**Appeals regarding connection**		**12%**
3.1	Appeals regarding denied requests for PEES in the process of obtaining a location permit	1	
3.2	Appeals regarding denied requests for PEES	3	
3.3	Appeals regarding the conditions in issued PEES	1	
3.4	Appeals regarding denied requests for EES	1	
3.5	Appeals regarding the conditions in issued EES	0	
3.6	Appeals regarding the connection contract fee	3	
3.7	Appeals regarding failure to fulfil the provisions of the network connection contract - failure to connect	0	
3.8	Appeals regarding network access - other reasons	13	
4	**Appeals and complaints regarding disconnection**		**19%**
4.1	Appeals regarding disconnection from the power network	26	
4.2	Complaints regarding suspension of electricity supply	10	
5	**Complaints against suppliers**	13	**7%**
6	**Complaints against system operators**	15	**8%**
7	**Other**	43	**23%**
	TOTAL	**185**	**100%**

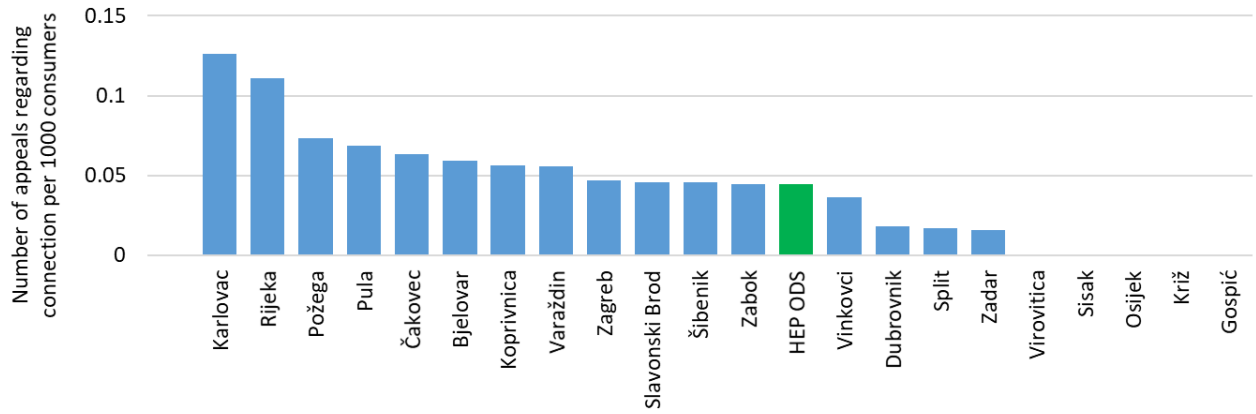
Most appeals and complaints received by HERA in 2017 pertained to the calculation of electricity consumption, loss of consumer status and connection to the power network.

Figures 4.4.10 and 4.4.11 are related to the work of the HEP ODS Complaints Committee. Figure 4.4.10 shows the number of appeals and complaints per 1 000 consumers per distribution area, and Figure 4.4.11 shows the number of appeals regarding connection per 1 000 consumers per HEP ODS distribution area in 2017.



Source: HEP ODS

Figure 4.4.10 Number of appeals and complaints per 1 000 consumers per HEP ODS distribution area in 2017



Source: HEP ODS

Figure 4.4.11 Number of appeals regarding connection per 1,000 consumers per HEP ODS distribution area in 2017

Complaints against suppliers and misleading business practices

In 2017, HERA received fewer complaints against electricity suppliers compared to 2016. The complaints pertained to supplier switching and suppliers' misleading business practices.

HERA forwarded the received consumer complaints to the suppliers, after which the suppliers usually terminated the respective contracts. In its opinions issued to consumers, HERA highlighted the right to terminate a contract within 14 days of its conclusion in accordance with the ***Consumer Protection Act***. If the consumers suspected that there were misleading business practices, HERA instructed them to contact the authorities competent in such matters.

Performance of the Appeals Committee and HEP ODS appeal committees in 2017

The HEP ODS consumer appeals committees resolve complaints related to calculations of electricity consumption, meter malfunctions, connections/disconnections, voltage issues, etc. HEP ODS can receive and process queries and complaints via e-mail.

Appeals from network users regarding network access are resolved by the centralised Complaint Processing Committee of HEP ODS. This greatly standardises

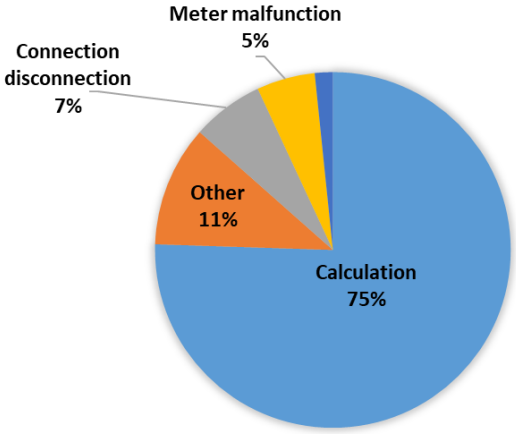
access to appeal resolution and the application of by-laws and regulations in all HEP ODS distribution areas.

Table 4.4.14 provides an overview of appeals processed by HEP ODS's Appeal Processing Committee, and Figure 4.4.12 shows data on the performance of consumer appeals committees for HEP ODS distribution areas in 2017.

Table 4.4.14 Overview of appeals processed by HEP ODS's Appeal Processing Committee in 2017

Type of appeal	Total	Approved	Denied
Denied request for PEES	2	2	0
Non-acceptance of conditions in PEES and/or connection fee	13	5	8
Other	15	6	9
TOTAL	**30**	**13**	**17**

Source: HEP ODS



Source: HEP ODS

Figure 4.4.12 Types of appeals processed by consumer appeals committees of HEP ODS distribution areas in 2017

Observations on end consumer protection in 2017

The protection of end consumers complies with the provisions of *Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009* and the measures set out in *Annex I, "Measures on Consumer Protection"*. Provisions of the *Directive* and *Annex* I were transposed into our legal system through the following acts and by-laws:

- ***Energy Act***, in force as of 26 September 2015,
- ***Electricity Market Act***, in force as of 3 October 2015,
- ***Energy Activities Regulation Act***, in force as of 8 November 2012,
- ***Consumer Protection Act***, in force as of 21 October 2015, and
- *General terms and conditions for network use and electricity supply*.

HERA continued to make its best efforts to address issues related to initial connection, which had been a dominant problem in the previous years and is also listed at the very beginning of *Annex I "Measures on Consumer Protection".* Through the analysis of appeals and their resolution, which required a great deal of expert work due to the lack of harmonisation between by-laws and laws and lack of established practices across Croatia, steps were taken towards a systematic solution of these problems. HEP ODS's Appeals Processing Committee was

established successfully and took over the function of the first instance appeal body regarding initial connections to the network. As a second instance body, HERA systematically resolved the filed appeals, and simultaneously worked on establishing uniform criteria throughout Croatia. These uniform criteria are now used in all distribution areas, as ensured by the HEP ODS Appeals Committee, and all parameters are more thoroughly reviewed in order to prevent ungrounded rejection of connection. This has resulted in a further decrease in the number of appeals in this sector in 2017, except for the "other reasons" category, which covers appeals related to works delays and similar reasons.

This problem was also addressed through the adoption of new regulations that will be clearer and easier to interpret and to present to new network users. In this regard, HERA adopted the *Methodology for setting electricity grid connection charges for new users and for increasing the connection capacity for existing users*, which was published on 31 May 2017, and entered into force on 1 January 2018. Further, HERA provided its opinion in the public consultation process on the *Proposal for a Regulation on issuing energy approvals and establishing the conditions and deadlines for electricity grid connections*, which entered into force on 1 April 2018. HERA also approved the *Rules on connection to the transmission network* and *Rules on connection to the distribution network*, adopted by HOPS and HEP ODS.

As a result of the implementation of the ***Act on Procedures Involving Illegally Built Buildings ("Official Gazette", Nos. 86/12, 143/13, 65/17)***, many buildings were legalised 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, the system operator cannot obtain permits to build its infrastructure and/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 infrastructure should be built. This results in a number of appeals filed by owners of legalised structures regarding the conditions of PEESes or refusals to issue PEESes. A large number of such appeals is also expected in the coming years, which is why the 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 package of energy laws and by-laws, household end consumers are also protected by the ***Consumer Protection Act***. Thus, the most sensitive category of consumers is relatively well-protected, and all their rights are respected in accordance with the *Directive* and *Annex I.* As an additional very important benefit for this end consumer category and with the aim of promoting and developing the retail market, HERA decided to make available on its website a tariff calculator for household electricity to enable a comparison between different electricity suppliers' offers based on annual consumption of households, in accordance with CEER's recommendations[11].

While industrial end consumers are not protected under the ***Consumer Protection Act***, they enjoy protection under all other above-mentioned regulations. The

11 *CEER Guidelines of Good Practice on Price Comparison Tools, 10 July 2012.*

relatively large number of supplier switches (14.55% annually) suggests that the retail market in this segment is relatively well-developed.

The majority of complaints and appeals filed with HERA pertain to the work of the system operators, mostly because of the loss of customer status. The next major group of complaints pertains to the suppliers, mostly to supplier switches and misleading business practices.

In resolving appeals related to connections, HERA first seeks the opinion of the relevant system operator and submits the appeals to the relevant system operator for proper action, during which a certain number of appeals are granted, while those that the operators reject are sent to HERA for further action. In 2017, HERA resolved six such appeals, four of which were approved and two of which were rejected.

As compared to the previous year, in 2017 HERA received fewer end consumers appeals and complaints, and the highest increase was recorded regarding to complaints against HEP ODS, mainly pertaining to the loss of customer status and connection capacity. A large number of appeals and complaints against suppliers pertains to misleading business practices of electricity suppliers in the retail market, especially false presentation of sales agents.

Of the total 245 complaints received by HEP ODS Consumer Protection Committees, 76% concerned the calculation of electricity consumption. HEP ODS Consumer Protection Committees accepted 23% of complaints, which represents a 38.5% increase compared to 2016.

4.4.6 Guarantee of origin

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. 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 establishing the origin of electricity ("Official Gazette", No. 133/14)* requires electricity suppliers to submit annual reports to end consumers describing the structure of the electricity supplied during the previous year once per year, between the 1st to 31st July of the current year. In 2017, all end consumers should have received a report elaborating the structure of the supplied electricity. Given that the *Methodology* does not provide for sanctions, in the second year the majority of suppliers failed to comply with this obligation, hence amendments to the methodology should be considered in order to introduce sanctions. Those suppliers who sent reports to their end consumers provided only a minor portion of the required data (basic data and basic structure of the 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 2017, 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.

The reporting obligation is based on Guarantees of Origin, electronic documents defined by *Directive 2009/28/EC on the promotion of the use of energy from renewable sources* and *Directive 2012/27/EC on energy efficiency*, and on the *Regulation on the Establishment of the Guarantees of Origin System ("Official Gazette", Nos. 84/13, 20/14 and 108/15)*. The framework set by EU directives enables international trade in guarantees of origin and the use of guarantees of origin from other countries in proving the structure of the electricity sold.

A guarantee of origin, among other things, contains data on the quantity of electricity (the basic unit is 1MWh), 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 the Guarantees of Origin system* and the *Rules for using the Register of Guarantees of Origin*.

The register has been fully operational since 2 February 2015, and six suppliers and two producers of electricity have created their user accounts by the end of 2017. The Register includes six facilities for which the issue of guarantees of origin is possible. Table 4.4.15 provides an overview of registrations.

Table 4.4.15 Registrations in the Register of Guarantees of Origin

Type of registration	New registrations in 2017	Total registrations
User account of the eligible electricity producer	1	2
User account of other Register users	1	6
Total user accounts	2	8
Total registered production plants	4	6

Source: HROTE

In 2017, five registered suppliers traded in guarantees of origin, while guarantees of origin were issued for six production plants (HE Lešće, HE Varaždin, HE Orlovac, HE Dubrava, HE Čakovec, Mala vjetroelektrana Ravna 1). An overview of transactions in guarantees of origin is provided in Table 4.4.16.

Table 4.4.16 Activities in the Register of Guarantees of Origin in 2017

Activity	Number (1 guarantee = 1 MWh)
Number of issued guarantees of origin for electricity generated in Croatia in 2016	1,713,678
Number of imported guarantees of origin	50,357
Number of exported guarantees of origin	176,952
Number of cancelled guarantees of origin for consumption in 2017	961,670
Number of expired guarantees of origin	0

Source: HROTE

In accordance with the *Decision on the fees for participation in the guarantees of origin system ("Official Gazette", No. 34/15)* adopted by HERA, HROTE collected HRK 614 427 in 2017. Simultaneously, the cost of operating the Register and other activities in the guarantees of origin system amounted to HRK 257 072 in 2017. The ratio between revenues and costs suggests that the guarantees of origin system has improved in terms of sustainability, as compared to the previous year.

Observations on the guarantees of origin system

In 2017 a significant increase in activity was recorded compared to 2016, both in Register registrations and in the number and volume of transactions. In addition to hydro power plants HE Lešće and HE Varaždin, for which HEP-Proizvodnja d.o.o. acquired the status of an eligible electricity producer in 2016, in 2017 HEP-Proizvodnja d.o.o. acquired the status of an eligible electricity producer for the constructed hydro power plants HE Orlovac, HE Dubrava and HE Čakovec, and registered them in the Register of Guarantees of Origin. In addition to these hydro power plants, the Register of Guarantees of Origin also includes the registration of Mala vjetroelektrana Ravna 1 by ADRIA WIND POWER d.o.o., the first production plant in Croatia which left the incentives system for generation of electricity from renewable energy sources and highly efficient cogeneration and moved to the guarantees of origin system.

There is still a need for improvements of the legal framework concerning the guarantee of origin system. More specifically, the ***Energy Act*** and the ***Electricity Market Act*** only stipulate the adoption of by-laws that regulate the guarantees of origin system, but do not 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.

Further registrations of users and production plants are expected in 2018, together with a livelier competition of suppliers using tariff models with a guaranteed structure of electricity. It can be assumed that HEP-Proizvodnja d.o.o., after organising the billing metering points and other necessary changes in the switching facilities of older power plants for the purpose of clear separation from HOPS and HEP ODS, will also register other hydro power plants in the Register of Guarantees of Origin and that the production plants who leave the incentives system for renewable energy sources will also be registered. Based on these expectations, a further improvement in sustainability across the whole system is expected through a larger number of transactions in the Register.

4.5 Security of electricity supply

Basic levels of supply security

Pursuant to the ***Electricity Market Act***, security of supply refers to securing the required quantities of electricity for end consumers and the capability of the transmission and distribution network to deliver this electricity to end consumers.

The security of electricity supply can be observed in the short, mid, and long term.

- **Short-term supply security** refers to the reliability of the distribution system and the operative security of the transmission system, and is observed in a time period from a few minutes to several days at most.
- **Mid-term supply security** is related to the adequacy of the electricity system in a typical investment cycle of three to five years. The electricity system is considered adequate when it is sufficiently developed to meet the electricity consumption in terms of the nominal load values of system elements and voltage limits, and taking into consideration planned and unplanned outages.
- **Long-term supply security** refers to a longer period considering market and investment risks caused by the regulatory framework and the market model, and the diversity of electricity generating facilities in terms of primary energy sources.

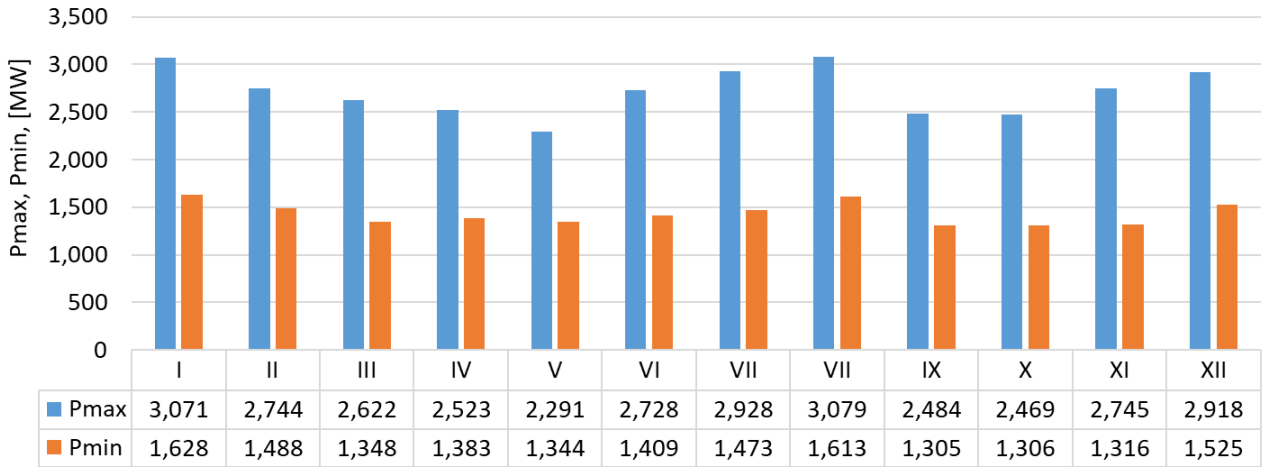
System load characteristics

Mid-term supply security considers whether the amount of electricity generated in Croatia, imported electricity, and the capacity of the Croatian transmission network are adequate to meet the total electricity consumption in Croatia. This chapter provides an overview of mid-term supply security regarding the adequacy of production and imports. Table 4.5.1 shows the maximum and minimum loads (P_{max} and P_{min}) of the Croatian electricity system, the times when they occur, and the corresponding electricity imports and exports.

Table 4.5.1 Maximum and minimum loads of the Croatian electricity system

Year	Maximum load				Minimum load			
	P_{max} [MW]	Time	Imports at P_{max} [MW]	Exports at P_{max} [MW]	P_{min} [MW]	Time	Imports at P_{min} [MW]	Exports at P_{min} [MW]
2008	3,009	31 Dec 18:00	1,903	892	1,182	25 May 06:00	1,207	672
2009	3,120	21 Dec 18:00	1,448	548	1,151	13 Apr 05:00	687	440
2010	3,121	16 Dec 18:00	1,589	955	1,113	23 May 06:00	1,253	1,060
2011	2,970	25 Jan 19:00	1,493	721	1,185	25 Apr 04:00	1,368	687
2012	3,193	06 Feb 19:00	2,340	881	1,132	27 May 06:00	1,314	609
2013	2,813	11 Feb 20:00	1,626	878	1,105	31 Mar 04:00	661	1,347
2014	2,974	31 Dec 18:00	1,462	674	1,166	11 May 06:00	1,181	1,070
2015	3,009	22 Jul 13:00	2,296	474	1,188	22 Jun 06:00	1,339	600
2016	2,869	12 Jul 14:00	2,142	441	1,155	22 May 06:00	1,022	641
2017	3,079	04 Aug 14:00	1,657	270	1,305	18 Sep 04:00	906	543

Figure 4.5.1 shows the maximum and minimum loads in the Croatian electricity system in 2017.



Source: HOPS

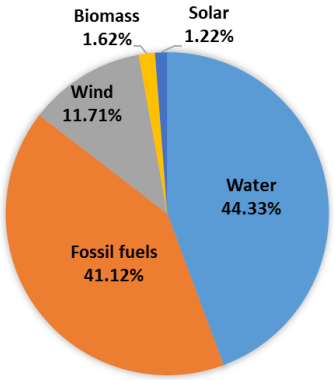
Figure 4.5.1 Maximum and minimum loads of the Croatian electricity system in 2017

In the last three years the maximum (peak) loads of the electricity system occurred in the summer. According to HOPS, this is due to milder winters than usual and high temperatures during the summer combined with a busy tourist season.

Adequacy of production and imports

The total capacity of all power plants in Croatia amounted to 4 911 MW at the end of 2017. In addition, HEP d.d. is a co-owner of the Krško Nuclear Power Plant located in Slovenia, and has at its disposal 50% of its capacity, i.e. 348 MW.

Figure 4.5.2 shows a breakdown of all primary power sources in the total capacity of Croatian power plants at the end of 2017.



Source: HOPS and HEP ODS

Figure 4.5.2 Breakdown of the total capacity of Croatian power plants by primary power sources at the end of 2017

Figure 4.5.3 shows the capacities of Croatian power plants and the maximum system loads from 2008 to 2017. The ratio between the total capacity of power plants in Croatia and the maximum load of the Croatian electricity system in 2017 was 1.60.

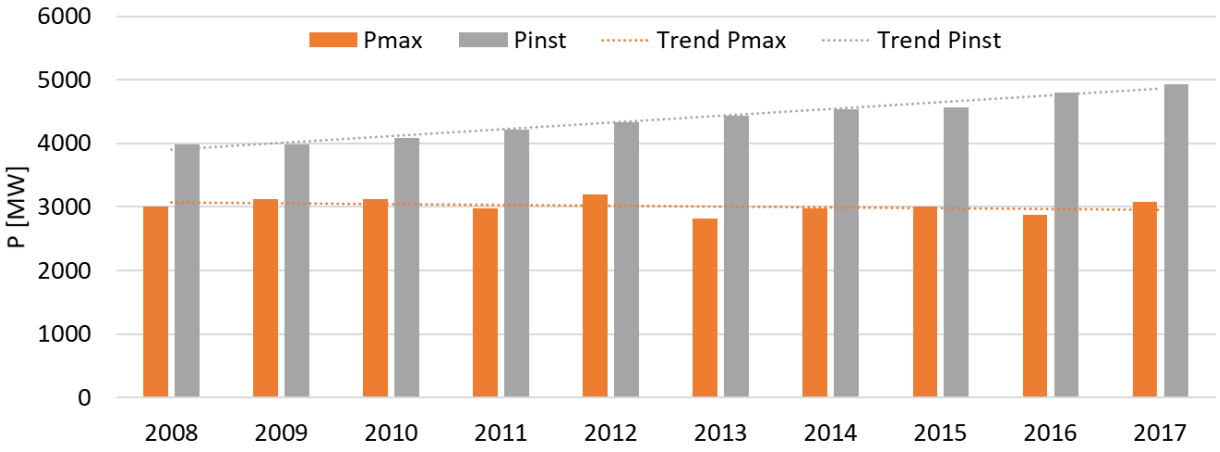
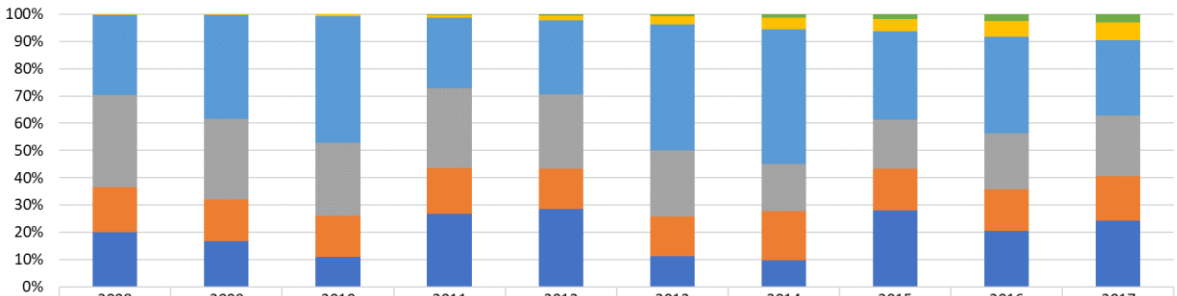


Figure 4.5.3 Maximum loads of the Croatian electricity system (P_{max}) and capacities of Croatian power plants (P_{inst}) from 2008 to 2017

The electricity required by the Croatian electricity system is provided by the generation in Croatian power plants and by imports via cross-zonal lines. Figure 4.5.4 shows the proportions of all electricity sources procured for the requirements of the Croatian electricity system. The amount produced by the Krško Nuclear Power Plant for HEP d.d. (50% of its total capacity) is presented separately from net imports.



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Other RES	-	5	16	33	85	132	194	298	454	535
Wind	40	45	138	201	329	517	730	794	1,002	1,204
Water	5,277	6,765	8,305	4,578	4,772	8,054	8,356	5,715	6,250	5,025
Fossil fuels	6,101	5,207	4,825	5,184	4,791	4,228	2,912	3,192	3,625	4,054
Krško Nuclear PP	2,986	2,730	2,690	2,953	2,622	2,518	3,030	2,685	2,715	2,984
Net imports (excl. KNPP)	3,591	2,952	1,986	4,752	5,002	1,973	1,642	4,948	3,628	4,395

Figure 4.5.4 Proportions of electricity sources procured for the requirements of the Croatian electricity system from 2008 to 2017

These data lead to the following conclusions:

- Croatia is highly dependent on hydrology (due to a large proportion of electricity produced from hydro power plants) and electricity imports,
- the proportion of production from fossil fuels is gradually decreasing,
- the proportion of production from wind and other renewable sources is gradually rising, and
- the proportion of production from Krško Nuclear Power Plant is relatively constant.

From 2010 to 2014 there was a steady decline in consumption due to negative economic trends. However, in 2015 an upward trend in consumption began, which also continued in 2016 and 2017. In 2017 the consumption of electricity increased by 2.96% compared to 2016 and marked the highest consumption level recorded by HERA (measured since 2000).

However, the high consumption was combined by severe drought for the most part of the year, which significantly reduced production from hydro power plants. Considering the reduced availability of thermal power plants due to lengthy maintenance and unit upgrade periods, environmental regulations and their low competitiveness on the electricity market, significant quantities of electricity had to be imported.

Figure 4.5.5 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 2017 amounted to 41% of the total consumption of the Croatian electricity system.

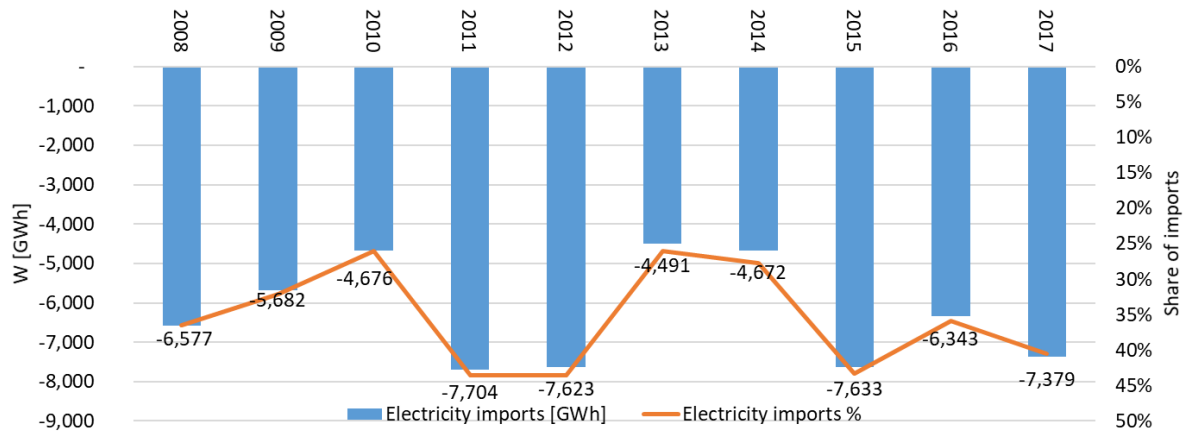
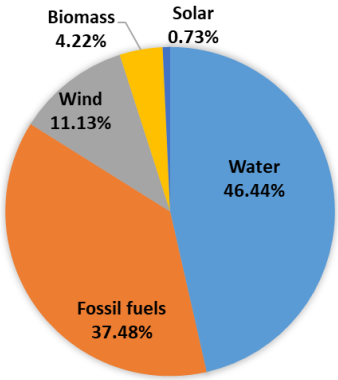


Figure 4.5.5 Net electricity imports required for domestic consumption and share of imports in the total consumption in Croatia

Figure 4.5.6 shows the breakdown of electricity produced in Croatian power plants and delivered to the electricity system by primary source of energy. A significant share of renewable energy sources is evident.



Source: HOPS and HEP ODS

Figure 4.5.6 Electricity produced in Croatian power plants delivered to the electricity system in 2017 by primary source

Measures for maintaining the security of supply and development plans

In 2010, HOPS prepared and adopted its *Plan for the defence of the electricity system from major disruptions*. The main purpose of the Plan is to provide protective procedures to prevent the disruption of the stable and secure operation of the electricity system. The measures introduced by the Plan are binding for all users of the transmission system. In accordance with the Defence Plan, HEP ODS prepares independent plans for each distribution area for urgent load shedding and under-frequency load shedding at the request of HOPS.

HOPS and HEP ODS are obliged to prepare ten-year development plans for the transmission and distribution network, which are submitted to HERA for approval on an annual basis. The ten-year development plans also define the measures that would guarantee network adequacy and security of supply.

The ***Electricity Market Act*** stipulates that the transmission system operator and the distribution system operator are obliged to monitor the security of electricity supply, and publish annual reports on supply security in the transmission and

distribution systems for the previous year, by 30 April of the current year and with HERA's prior approval,. Based on these reports, the Ministry prepares its own annual report on the security of electricity supply and expected electricity demands in Croatia. In cooperation with the Ministry and based on these reports, HERA may request from the distribution system operator, the transmission system operator, and other electricity system entities to implement certain measures in order to improve the security of electricity supply. In 2017, HERA granted its prior approval for reports on the security of supply prepared by HOPS and HEP ODS for 2016 and the future (mid-term) period. HERA has no information whether the Ministry prepared its corresponding annual report.

Furthermore, based on the data received from HOPS and other transmission system operators, ENTSO-E prepares and publishes reports on mid-term and long-term security of supply (i.e. Summer Outlook, Winter Outlook and Mid-Term Adequacy Forecast). The most recent report published on long-term security of supply, the *Mid-term Adequacy Forecast 2017 Edition*[12], confirms HOPS's estimates that Croatia is highly dependent on electricity imports, especially during the winter months. However, when the conditions in the neighbouring countries are favourable, the existing cross-zonal capacities are sufficient to meet system requirements at all times. This situation is expected to improve with the construction of new production facilities.

In 2015, HOPS also joined a pilot project on short- and mid-term security of supply (Short- and Medium-Term Adequacy, SMTA) launched by ENTSO-E. As a result of the pilot project, transmission system operators will have access to indicators of possible difficulties regarding the adequacy of supply in the short and mid term. This project is also supported by TSC (Transmission System Operator Security Cooperation). TSC is an initiative launched by 13 transmission system operators from 10 countries in continental Europe, including HOPS, with the aim to increase system security by developing procedures for eliminating bottlenecks in the transmission network.

In assessing the security of electricity supply several factors must be considered, especially the expected increase in electricity consumption, plans for the construction of new production facilities, and the decommissioning of outdated generation units.

The basic guidelines for further development of the Croatian electricity system by 2020 are laid down in the ***Energy Development Strategy of the Republic of Croatia***.

Figure 4.5.7 shows peak loads achieved from 2001 to 2017 as compared to the forecasts from the Master Plan (*Necessary construction of new electric power facilities and plants in Croatia from 2001 until 2020*, EIHP, 2001) and the ***Energy Development Strategy of the Republic of Croatia***. According to the Strategy, the decommissioning of thermal power plants of the total power of 1 100 MW is expected by 2020. However, the Strategy also forecast an increase in electricity consumption, which was not realised.

12 *ENTSO-E Mid-term Adequacy Forecast 2017 Edition, https://www.entsoe.eu/outlooks/midterm/*

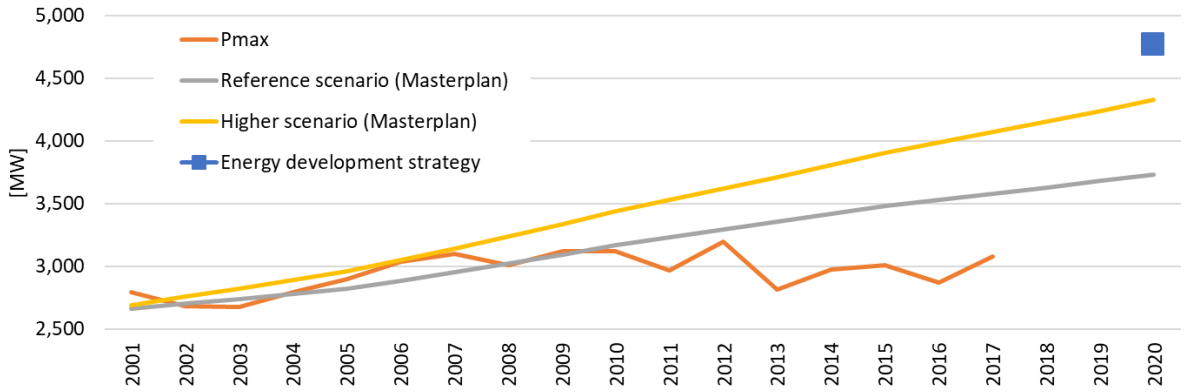
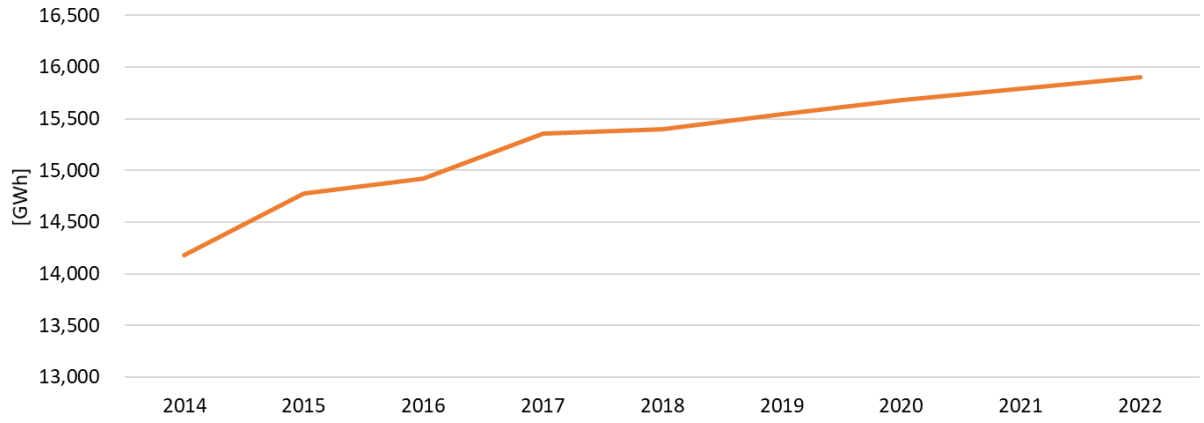


Figure 4.5.7 Peak loads (P_{max}) achieved from 2001 to 2017 compared to forecasts from the Master Plan and the Energy Development Strategy of the Republic of Croatia

Figure 4.5.8 shows the realised electricity consumption in the last four years and the expected increase in consumption by end consumers in the distribution network in the next five years, as specified in HEP ODS plans. As of 2017, the consumption is expected to increase by an average of 0.7% per year.



Source: HEP ODS

Figure 4.5.8 Electricity consumption by end consumers in the distribution network in the last four years and expected consumption by 2022

According to the *Ten-year development plan for the transmission network (2018-2027)*, the integration of wind power plants of up to 800 MW in total capacity would not require any major interventions in the transmission network in terms of construction of new lines and transformer substations. It would, however, significantly increase the requirements concerning the provision of ancillary services. The total costs of secondary and tertiary control for any additional integrations of wind power plants primarily depend on the installed power of wind power plants and average error in electricity production plans, developed by HROTE from 1 January 2017.

Furthermore, according to data from HEP d.d., the decommissioning of 1 124 MW of thermal power plants is expected by 2023, and depending on their reconstruction or investments, this amount may be reduced to 909 MW of installed power. Several production facilities with a total of 255 MW of installed power may be decommissioned as early as 2018, which amounts to approximately 5% of the current production capacities in Croatia. Considering the outputs from

these production facilities in the past two years, the electricity system will not be affected significantly (except for TE Plomin 1), and the decommissioning will primarily affect the system's control capabilities. However, in the next 10 years HEP d.d. plans to construct or reconstruct production facilities in the total capacity of up to 1 300 MW.

In accordance with the provisions of the ***Energy Act***, the responsibility for stable and secure energy supply lies with the Ministry. The Croatian government, upon the proposal of the Ministry (which obtains an opinion from HERA), issues a yearly report on the state of the security of electricity supply and expected energy demands.

Observations on the security of electricity supply

In early 2018, HERA received requests for the prior approval of reports on monitoring the security of supply in 2017 prepared by HOPS and HEP ODS, and granted its prior approval for both reports. 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, provided that there are sufficient electricity imports.

In 2017 HOPS completed a *Study on the adequacy of generation capacities in the Croatian energy system* for the following five-year period based on an analysis of data on power plants available to the Croatian electricity system. The Study presents the following conclusions:

- production capacities are not sufficient to respond to Croatian electricity demands,
- as far as the system as a whole is concerned, the capacities are satisfactory primarily thanks to a very good connection of the Croatian transmission system with the systems in the region.

In other words, taking into account the adequacy of generation capacities and the stochastic nature of electricity generation from hydro power plants and other renewable energy sources, as well as the low competitiveness of thermal power plants, it is evident that some of the electricity required to meet consumption demands must be imported. However, the transmission network is sufficiently developed to enable significant exchanges (primarily imports) with the neighbouring electricity systems. Significant quantities of energy are imported from Slovenia, Bosnia and Herzegovina, and Hungary.

The *Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration* entered into force in December 2017. The purpose of this Regulation is to maintain operational security, prevent the propagation or deterioration of incidents to avoid a widespread disturbance and the blackout state as well to allow for the efficient and rapid restoration of the electricity system from the emergency or blackout states. By 18 December 2018, HOPS must design a system defence plan and a system restoration plan in consultation with HERA, HEP ODS, significant grid users, neighbouring transmission system operators and other transmission system operators in its synchronous area. HOPS has started with preliminary activities in order to comply with these obligations within the set deadline.

With the aim of preventing and managing possible crisis situations regarding the supply of electricity on the European level, the *Clean Energy Package* presented by the European Commission in 2016 includes a proposal for a Regulation on risk-preparedness in the electricity sector and repealing *Directive 2005/89/EC*. The

previous *Directive 2005/89/EC* is considered inadequate as it only sets general objectives for the security of supply, leaving member states with too much flexibility in achieving these objectives. Because the European systems are interconnected, a crisis situation that occurs in one member state often has consequences in neighbouring states (and possibly even larger areas), or a certain scenario, such as extreme weather conditions, may affect several countries at the same time.

4.6 Incentives for electricity production from renewable sources and cogeneration

Eligible electricity producers

In accordance with the by-laws in force by the end of 2015, HERA issued preliminary decisions on eligible producer status to legal and natural persons (project operators), for planned power plants (hereinafter: preliminary decision). In 2016, HERA ceased issuing preliminary decisions, as the ***Renewable Energy Sources and High-efficiency Cogeneration Act*** (hereinafter: the ***Act***) does not set a legal basis for the issuance of such preliminary decisions.

When a facility is constructed, HERA issues a decision granting 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 operators are not required to obtain a decision. Instead, pursuant to the ***Act***, they are granted eligible producer status based on evidence 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.

Table 4.6.1 shows the number of decisions on eligible electricity producer status granted by HERA in 2017.

Table 4.6.1 Decisions on eligible electricity producer status granted by HERA in 2017.

Type of facility / primary energy source	No. of decisions issued[13]	Plant capacity [MW]
Solar power plants	3	2 020
Hydro power plants	6	399,385
Wind power plants	3	104,700
Biomass power plants	6	10,494
Geothermal power plants	0	0,000
Power plants fuelled by biogas	6	6,027
Cogeneration	0	0,000
Other plants using renewable sources	0	0,000
Total	**24**	**522,626**

In 2017, HERA also issued one decision on altering a preliminary decision, nine decisions to change the project operator in a preliminary decision, 14 decisions extending a preliminary decision, five decisions denying applications for extending a preliminary decision, two decisions renewing the procedure for extending

13 *Including decisions on guarantee of origin.*

preliminary decisions, one decision suspending the procedure for extending a preliminary decision, and eight decisions to change the project operator in a decision. HERA also rejected six applications for issuing a preliminary decision as these are no longer issued, two applications for extending a preliminary decision and two applications to change the project operator in a preliminary decision, and denied one application for a decision. Table 4.6.2 gives an overview of the decisions granting eligible electricity producer status issued by HERA from 2007 to 2017[14].

Table 4.6.2 Decisions granting eligible electricity producer status issued by HERA from 2007 to 2017

Type of facility / primary energy source	No. of facilities	Total capacity [MW]
Solar power plants	226	22,491
Hydro power plants	21	540,675
Wind power plants	24	528,600
Biomass power plants	18	36,449
Power plants fuelled by biogas	33	39,462
Power plants fuelled by landfill gas and gas from wastewater treatment plants	1	2,500
Cogeneration	6	112,943
Total	**329**	**1,283,120**

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 ***Act***. However, the eligible producer status does not imply the right to incentivised prices for delivered electricity but is only one of the conditions to qualify for incentives.

If eligible electricity producers cannot meet the conditions to qualify for incentives, they may participate in the guarantee of origin system pursuant to the *Regulation on the Establishment of the Guarantees of Origin System*. Power plants cannot participate in the incentives system and simultaneously sell guarantees of origin of electricity.

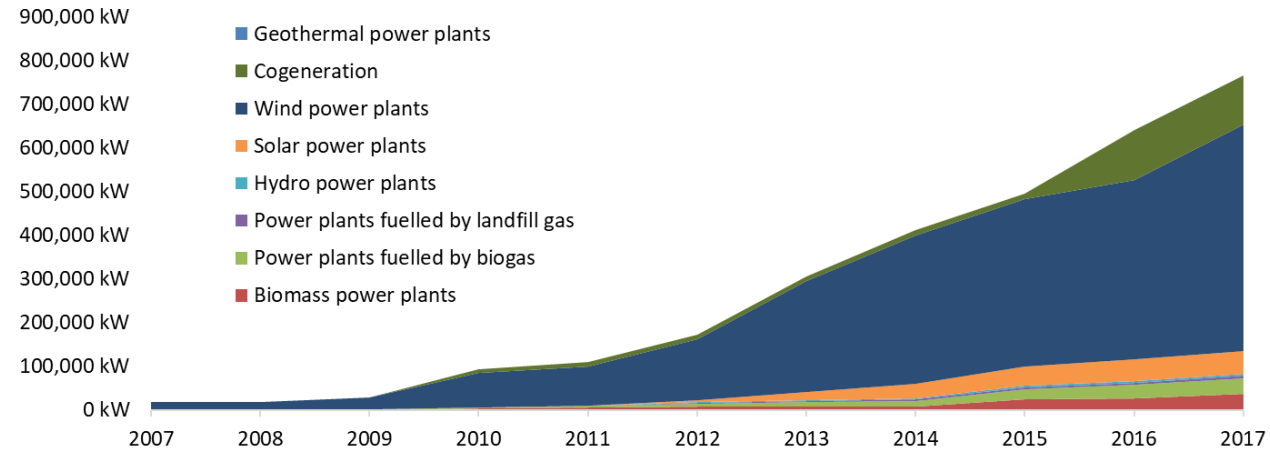
Incentives for the production of electricity from renewable energy sources and cogeneration

Since the by-laws foreseen in the ***Act*** (regulation on quotas for promoting electricity production from renewable sources and cogeneration, ordinance on the use of renewable energy sources and high-efficiency cogeneration and state aid programme) were not adopted in 2016 and 2017 as planned, HROTE was not able to conclude any new contracts on electricity buy-off from renewable sources and cogeneration.

In 2017, 21 electricity buy-off contracts were activated, i.e. 21 facilities with a total connection capacity of 125,951 MW became operational and were included in the incentives system. Contracts with 9 facilities were terminated due to the expiry of their preliminary decisions.

Figure 4.6.1 shows the gradual entry of generation facilities into the incentives system since its introduction in 2007, and Table 4.6.3 shows the basic indicators related to the incentives system.

14 *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.).*



Source: HROTE

Figure 4.6.1 Installed capacity of facilities in the incentives system from 2007 to 2017 by type of facility

Table 4.6.3 Generation and paid incentives to eligible producers in 2017 by type of facility

Type of facility / primary energy source	Number of facilities	Installed capacity [MW]	Electricity generation [MWh]	Share in generation [%]	Paid incentives (VAT excluded) [in mil. HRK]	Share in disbursements [%]
Solar power plants	1,223	51.49	73,996	3.25%	142.88	7.47%
Hydro power plants	12	4.48	15,867	0.70%	15.30	0.80%
Wind power plants	21	519.00	1,178,211	51.74%	874.21	45.70%
Biomass power plants	17	35.95	186,011	8.17%	234.48	12.26%
Geothermal power plants	0	0.00	0	0.00%	0.00	0.00%
Power plants fuelled by biogas	32	36.73	278,661	12.24%	356.52	18.64%
Power plants fuelled by landfill gas and gas from wastewater treatment plants	2	5.50	78	0.00%	0.03	0.00%
Cogeneration	6	113.29	544,497	23.91%	289.36	15.13%
Total	**1,313**	**766.45**	**2 277 321**	**-**	**1,912,78**	**-**

Source: HROTE

In 2017, the share of energy generated in plants which participate in the incentives system corresponded to 12.6% of total electricity consumption in Croatia (18.2 TWh).

Figure 4.6.2 shows average incentivised 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 the Hungarian and Slovenian electricity exchanges in 2017 (HRK 0.38/kWh). Although it is important to compare incentivised prices with the actual electricity market price is important from the point of view of market efficiency, it should be noted that incentivised prices reflect the levelized cost of electricity (LCOE), which includes the cost of building technologies which are not yet competitive, costs connected with project financing, etc.

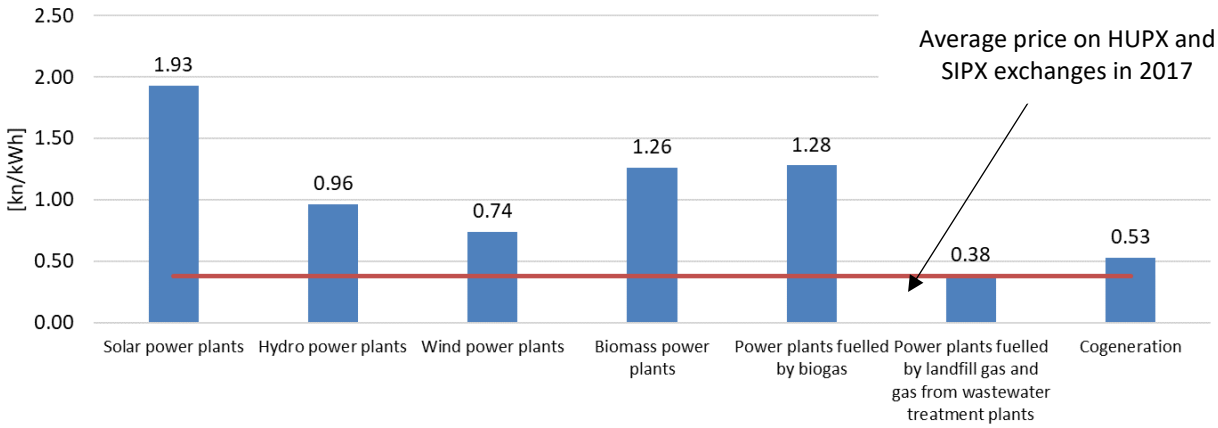


Figure 4.6.2 Weighted average buy-off price of electricity in the incentives system by facility type in 2017

HROTE buys off electricity from eligible producers in the incentives system using funds collected on a twofold basis:

- before 31 August 2017, all end consumers of electricity in Croatia paid a fee of HRK 0.035/kWh for promoting the generation of electricity from renewable sources and cogeneration (hereinafter: RES&C fee) in their electricity bills. The fee was HRK 0.005/kWh for consumers required to obtain greenhouse gas emission permits. From 1 September 2017, consumers pay a fee for promoting renewable energy sources and cogeneration in the amount of HRK 0.105/kWh for all consumers and HRK 0.007/kWh for consumers required to obtain greenhouse gas emission permits, and
- all suppliers must buy off electricity generated in the incentives system at the regulated price of HRK 0.42/kWh in the 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 (exceptionally)
  - by allocating planned day-ahead values for HEP Elektra and HEP-Opskrba.

Table 4.6.4 shows a negative cash flow due to an increase in HROTE's expenses in 2017, resulting from new generation plants being added to the incentives system. HROTE has settled a part of its liabilities using unallocated funds from previous periods and using funds collected from the increased fee for promoting electricity production from renewable sources and cogeneration introduced on 1 September 2017. Therefore, the imbalance is less pronounced than in 2016. Cash flow will continue to be monitored in 2018, and interventions will be made if necessary to make the incentives system sustainable.

Table 4.6.4 Cash flows in the incentives system [HRK mil.]

Income/expenses	2015	2016	2017
Incentives system income			
Income from end consumers of electricity (from RES&C fees)	524.92	514.70	890.73
Income from the sale of electricity from the incentives system to suppliers	579.78	724.89	956.47
Incentives system expenses			
Cost of electricity bought from eligible producers	1,038,74	1,546,55	1,912,79
Costs of financing HROTE's activities in the RES&C incentives system	6.00	9.00	12.45
Balancing energy costs	-	-	-
Cost of special supplier fees	-	-	-
Annual difference	**59.96**	**-315.96**	**-78.02**

Regulation on amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act

The ***Regulation on amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act***, adopted on 28 December 2017,

- extends the deadline for the obligation to sell electricity from the incentives system on the electricity market from 1 January 2018 to 1 January 2019 at the latest, and extends obligatory supplier buy-off for another year, and
- extends the deadline for the start of operations of the EKO balance group from 1 January 2018 to 1 January 2019.

The EKO balance group, which includes producers under the incentives system, was due to become operational in January 2017. In terms of the volume of electricity, the operation of the EKO balance group may influence both the retail and the wholesale electricity markets, as well as aspects connected with electricity system balancing. For the EKO balance group to become fully functional in accordance with the ***Act***:

- HROTE needs to adopt rules for the sale of electricity from the incentives system on the electricity market, for which HERA issued its opinion in 2016, but the ministry competent for energy has not yet given its prior approval,
- after receiving the opinions from HOPS and HEP ODS, and with the approval of the Ministry, HROTE needs to adopt rules for managing the EKO balance group and regulating various aspects of its operations, and
- in accordance with the ***Act*** and the opinion of HERA, the ministry competent for energy needs to adopt an Ordinance on the use of renewable energy sources and high-efficiency cogeneration, which should define a monthly fee for members of the EKO balance group to cover the costs of their imbalance.

Observations on incentives for electricity production from renewable sources and cogeneration

The weighted average price of electricity paid in 2017 to eligible producers taking part in the incentives system (HRK 0.84/kWh) is more than double of the annual average electricity price on the day-ahead market on the Hungarian and Slovenian electricity exchanges (HRK 0.38/kWh).

In its Decision on charges for renewable energy sources and high-efficiency cogeneration adopted on 31 August 2017, the **Croatian Government** increased the fees for renewable energy sources and high-efficiency cogeneration from HRK 0.035/kWh to HRK 0.105/kWh, and from HRK 0.005/kWh to HRK 0.007/kWh for consumers obliged to obtain greenhouse gas emission permits starting with 1 September 2017. This has markedly increased the price of electricity paid by end consumers. At the same time, due to changes in financing the incentives system,

the share of funds collected from electricity suppliers for the incentives system decreased from 58% to 52%.

The start of operations of the EKO balance group should have also ended the obligation of electricity suppliers to buy off electricity bought by HROTE from eligible electricity producers and started the sale of electricity provided by the EKO balance group on the electricity market, for which HROTE has completed all preparations. The deadline for the EKO balance group to become operational was initially set for 1 January 2017. However, at the last minute, the ***Regulation on amendments to the Act***, which was adopted on 29 December 2016 and entered into force on 31 December 2016, extended the deadline for the full functionality of the EKO balance group to 1 January 2018, including the deadline for the sale of electricity from the EKO balance group on the electricity market. The deadline was extended for the second time with the new ***Regulation on amendments to the Act***, which was adopted on 28 December 2017 and entered into force on 31 December 2017, setting the new deadline for the full functionality of the EKO balance group to 1 January 2019, including the deadline for the start of sale of electricity from the EKO balance group on the electricity market.

Pursuant to the ***Renewable Energy Sources and High-Efficiency Cogeneration Act***, following a proposal submitted by the Ministry, the Croatian Government is due to adopt a regulation on quotas for the period from 2016 to 2020 determining the total connection capacity in kilowatts (kW) of generation facilities and units eligible to conclude contracts on market premiums and contracts on electricity buy-off at a guaranteed price. These quotas will be used in tenders to select projects for electricity generation incentives. That regulation has not been adopted yet.

In 2017, several new facilities became operational, and the most notable in terms of installed capacities are Glunča Wind Power Plant (23 MW), Katuni Wind Power Plant (39 MW) and extension to the ZD6 Wind Power Plant (one part) of around 45 MW. The Lukovac Wind Power Plant (48 MW) was tested in 2017. Because ***Amendments to the Electricity Market Act*** and the ***Act*** stipulate that HOPS is obliged to provide connection to all wind power plants that have concluded a buy-off contract with HROTE, the total capacity of wind power plants in the incentive system with guaranteed buy-off is expected to amount to 738 MW. Following the construction of the remaining wind power plants that have signed contracts with HROTE and their entry into the incentives system (Krš Pađene, Pađene, Kom-Orjak-Greda and Jasenice wind power plants), there will be a further increase in the quantity of electricity generated by wind power plants, and a resulting increase in disbursed incentives.

Due to cash flow imbalances in the incentives system (recorded negative cash flows in the previous two years), the expected increase in the amount of energy generated within the incentives system may lead to a further increase of the fee for promoting electricity production from renewable sources and cogeneration paid by all end consumers of electricity. In addition, once the purchase of electricity from the incentives system by the suppliers at a regulated price, as currently stipulated in the ***Act***, is no longer obligatory, supplier procurement costs will be reduced and fees for promoting electricity production from renewable sources and cogeneration will be increased, provided that market prices remain lower than regulated prices. The increase will depend on successful sales and the price that HROTE will be able to set for energy from the incentives system.

In line with the regulations governing the incentives system, HERA issued 14 decisions extending preliminary decisions in 2017, thereby extending the deadline

for the construction of facilities in which generated electricity will be bought off at an incentivised price for additional two years. Since the key document for the extension is a notarised statement that 50% of the funds have been spent on the construction of the facility, HERA carried out checks to verify the statements during the extension granting procedure.

In line with the regulations governing the incentives system, the right of the facilities generating electricity from biomass or biogas to incentivised prices for delivered electricity is conditioned upon achieving a minimum total annual facility efficiency. For the high-efficiency cogeneration facilities, the right to incentivised prices for delivered electricity is linked to primary energy savings. In 2017, HERA issued 14 decisions on total annual efficiency of such facilities, and 5 decisions on required primary energy savings. To determine the total annual efficiency and the required amount of primary energy savings applicable to a generation facility, inspections were conducted in 15 facilities in 2017.

For facilities using biomass, the incentivised price for the current year is adjusted against the total annual efficiency achieved in the previous year. Out of six biomass facilities which were issued decisions determining the total annual efficiency in 2016, the annual efficiency of five facilities led to an increase in incentivised price by 20% in 2017, whereas the annual efficiency of one facility resulted in the reduction of the incentivised price by 10%. Since the latter facility had not achieved the required minimum annual efficiency, this requirement was set for 2017 as per HERA's decision. The concerned eligible electricity producer made additional investments into the construction of a wood drying facility and, by increasing its thermal energy consumption, reached the required minimum total annual efficiency for 2017, as confirmed by HERA in its decision in early 2018.

In practice, in some cases eligible producers deliver electricity exceeding the capacity approved in the decision granting them eligible electricity producer status. This is considered an irregularity in the use of the production facility and, pursuant to the ***Renewable Energy Sources and High-Efficiency Cogeneration Act***, HERA shall issue a decision determining the deadline for the eligible electricity producer to correct any such irregularities. In order to apply a clear and uniform procedure for correcting irregularities in connection with exceeded capacity, on 24 February 2017 HERA adopted the *Operating rules in cases of exceeded load on the part of eligible electricity producers*, which are available on its website. In line with the new rules, in early 2018 HERA issued decisions requesting the correction of irregularities for three facilities that exceeded the approved capacities in December 2017.

4.7 Energy efficiency in the electricity sector

Energy efficiency in the electricity infrastructure

Pursuant to the ***Energy Efficiency Act***, in performing its regulatory activities in line with legislation governing electricity and gas markets, HERA must consider energy efficiency when adopting decisions on the operation of electricity and gas infrastructure.

Pursuant to the ***Energy Efficiency Act***, HERA must:

- ensure that the potential for increasing energy efficiency of gas and electricity infrastructure is assessed, particularly related to transmission/transport, 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 complete 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 for the initial three- and one-year periods. Such measures are also necessary for increasing the safety of operation and compliance with technical regulations; otherwise, the investments would be too high to be justified solely by 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, considering cost-effective improvements to the network infrastructure.

Once preconditions are met for the introduction of advanced technologies, such as load management technologies, HERA will revise the assessed potential for increases in energy efficiency of the electricity infrastructure and set target deployment dates for the introduction of advanced measures.

The approved *Ten-year development plan for the transmission network from 2018 to 2027 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 units which would lead to fewer losses, revitalisation of old overhead lines and conductor replacement, use of high-temperature low-sag (HTLS) conductors with a larger aluminium clad cross-section for fewer losses, replacement of deteriorated submarine cables, construction of new lines, installation of reactive power compensation devices, replacement of overhead lines with cables. It also proposes measures for electricity system management.

The approved Plan also sets other measures for investments in the network, such as reconstruction of network portions with small conductor cross-section and long line sections, upgrade of voltage level for some portions of the network from 10 kV to 20 kV, replacement of old power transformers with new units which would lead to fewer losses, further implementation of reactive power compensation. In

addition, it proposes measures for electricity system management, for example optimisation of network reconnect status, automatic voltage regulation, etc.

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.

In 2016, HERA commissioned a study entitled *Supporting analyses for a cost-benefit analysis of smart meters and smart meter roll-out systems*.

The study was completed in late 2016. Its findings show that the financial and economic cost-benefit analysis gives positive results. The study considers the scenario of replacing old metering devices whose calibration lifetime has expired with smart meters, over a period of 11 years.

High- and medium-voltage industrial consumers and low-voltage industrial consumers (red model) have already been equipped with smart meters.

HERA has acquired expert opinions on the study from the Faculty of Electrical Engineering and Computing in Zagreb, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture in Split, Faculty of Electrical Engineering in Osijek and Faculty of Engineering in Rijeka. HERA also held consultations with consumer protection bodies, and obtained opinions of two bodies, which were both positive.

Having obtained the opinions and pursuant to the results of the study, in July 2017 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 for further processing in line with the ***Energy Act***. Based on the Analysis, the minister sets out a plan of measures for the installation of smart meters for end consumers.

Observations on energy efficiency in electricity consumption

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.

In terms of consumption management, appropriate activities should be put in place to enable end consumers easy access to data on their electricity consumption in sufficiently short time intervals, based on which they can manage their consumption and save energy or earn additional income by taking on a more active role on the electricity market.

In addition, 2017 has seen continued implementation of the provisions from the *General terms and conditions for network use and electricity supply*, which classify end consumers, including households with connection capacity above 20 kW, into tariff models for network use which consider 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 be careful when and how they use their devices and how they use major energy consuming devices. Increased loads by end consumers require a stronger electricity network, and leads to more losses.

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***, ***Gas Market Act***, ***Act on the Regulation of Energy Activities***, and by-laws adopted pursuant to these laws.

In February 2018, the Croatian Parliament, pursuant to Article 89 of the Constitution of the Republic of Croatia, adopted the new ***Gas Market Act (Official Gazette No. 18/18)***. The new ***Gas Market Act*** stipulates, inter alia, HERA's obligation to select a wholesale gas market supplier through a public call for tenders for the period from 1 August 2018 to 31 March 2021, after which the function of the wholesale gas market supplier will be abolished. In the transitional period of three gas years, the wholesale gas market supplier will be allowed to sell gas under regulated conditions to public service suppliers who decide to buy gas for public service household supply from the wholesale gas market supplier. After the end of the transitional period of three gas years, HERA will select public service gas suppliers based on public tenders, with the amount of the margin they will charge to households as one of the main criteria for selection, which can be lower than or equal to the margin determined by HERA pursuant to the methodology. This has enabled the public service gas suppliers to survive even after the transitional period of three gas years in order to protect consumers in the household category and to enable household supply under regulated conditions, which include the setting of the highest possible price at which gas can be sold to households. Further, the new ***Gas Market Act*** stipulates the procedure for selecting a guaranteed supplier on the market who is required to deliver gas to end consumers connected to the distribution system who are left without a supplier under certain conditions. In addition, during the transitional period of three gas years, the possibility of a priority storage lease for the part which refers to the public service – directly or indirectly through the wholesale gas market supplier, was left open in order to ensure the security of supply in such a way as to allocate a part of the storage system capacity proportionally to the share of consumption of public service households.

In 2017, HERA adopted the following by-laws:

- *Methodology for setting tariffs for gas supply and guaranteed supply as public services (Official Gazette No. 26/17),*
- *Methodology for setting tariffs for the reception and dispatch of liquefied natural gas (Official Gazette No. 110/17),*
- *Amendments to the Methodology for setting the price of non-standard services for gas transmission, distribution, storage, and public service gas supply (Official Gazette No. 132/17)*.

In addition, HERA also adopted the following decisions:

- *Corrigendum to the Decision on gas distribution tariffs (Official Gazette No. 14/17),*
- *Decision on tariffs for gas transmission for the period from 1 April 2017 to 31 December 2021 (Official Gazette No. 26/17),*
- *Decision on tariffs for gas transmission for the period from 01 January 2018 to 31 December 2021 (Official Gazette No. 127/17),*

- *Decision on indicative tariffs for gas transmission (Official Gazette No. 132/17),*
- *Decision on indicative tariffs for the reception and dispatch of liquefied natural gas (Official Gazette No. 127/17),*
- *Decision on gas distribution tariffs for energy entities for the second regulation period 2018–2021 (Official Gazette No. 127/17),*
- *Decision on tariffs for gas supply as a public service for the period from 1 January to 31 March 2018 for 34 public service gas suppliers (Official Gazette No. 127/17),*
- *Decision on determining the entity responsible for publishing information before the annual yearly capacity auction of the gas transmission system and before the tariff period in the Republic of Croatia (HERA 11/2017),*
- *Decision on determining the entity responsible for holding periodic consultations regarding the methodology for setting the reference price of the capacity product for annual firm capacity, which is applicable at entry and exit points of the gas transmission system in the Republic of Croatia (HERA 11/2017), and*
- *Decision approving the Auction Premium Allocation Agreement* for the Dravszerdahely interconnection between PLINACRO d.o.o., the Croatian transmission system operator, and FGSZ d.o.o., the Hungarian transmission system operator (HERA 3/2018).

Based on the provisions of the new ***Gas Market Act*** and after consultations in April and May 2018, HERA issued the following:

- *General terms and conditions of gas supply (Official Gazette No. 50/18),*
  - *Binding interpretation of General terms and conditions of gas supply regarding supplier switching,*
  - *Switching gas suppliers – additional instructions on procedures and clarifications,*
- *Network Code for the gas distribution system (Official Gazette No. 50/18),*
- *Methodology for setting tariffs for gas supply and guaranteed supply as public services (Official Gazette No. 48/18),*
- *Methodology for setting tariffs for gas transmission (Official Gazette No. 48/18),*
- *Methodology for setting tariffs for gas distribution (Official Gazette No. 48/18),*
- *Methodology for setting tariffs for gas storage (Official Gazette No. 48/18),*
- *Methodology for setting tariffs for the reception and dispatch of liquefied natural gas (Official Gazette No. 48/18),*
- *Methodology for calculating the fee for connection to the gas distribution or transmission system and for the connection capacity increase (Official Gazette No. 48/18), and*
- *Methodology for setting the price of non-standard services for gas transmission, distribution and storage, the reception and dispatch of liquefied natural gas, and public service gas supply (Official Gazette No. 48/18).*

Further, pursuant to the provisions of the new ***Gas Market Act*** and after public consultations, HERA gave its consent to the following by-laws:

- *Network Code for the transmission system (PLINACRO d.o.o., 5/18),*
- *Gas Market Code (HROTE d.o.o., 5/18),*
- *Storage Code (PSP d.o.o., 5/18), and*

- *Rules of operation of the liquefied natural gas terminal (LNG HRVATSKA d.o.o., 3/18).*

In March 2017, HERA granted PLINACRO d.o.o. approval for the *Network Code for the transmission system (PLINACRO d.o.o., 3/17)*, in December 2017, it approved the *Amendments to the Network Code for the transmission system (PLINACRO d.o.o., 12/17)*, and in March 2018, it approved the *Amendments to the Network Code for the transmission system (PLINACRO d.o.o., 3/18)*.

In February 2017, HERA granted Hrvatski operator tržišta plina d.o.o. from Zagreb approval for the *Amendments to the Gas Market Code (HROTE d.o.o., 2/17)*, and in March 2017, it approved the *Gas Market Code (HROTE d.o.o., 3/17)*.

In December 2016, HERA granted Podzemno skladište plina d.o.o. from Zagreb approval for the *Storage Code (PSP d.o.o., 12/16)*, in January and February it approved the *Amendments to the Storage Code (PSP d.o.o., 1/17, 1-2/17 and 2/17)*, and in March 2017, it approved the *Storage Code (PSP d.o.o., 3/17)*.

In March 2018, HERA granted LNG HRVATSKA d.o.o. from Zagreb approval for the *Rules of operation of the liquefied natural gas terminal* (LNG HRVATSKA d.o.o., 34/18).

In April 2017, HERA drafted and issued Amendments to the *Network Code for the gas distribution system,* harmonising the rules for gas energy allocations received at the distribution system entry point with the ***Act on Amendments to the Gas Market Act,*** which enables public service suppliers to procure gas under market conditions.

In February 2017, the Croatian Parliament adopted the ***Act on Amendments to the Gas Market Act (Official Gazette No. 16/17)***.

In March 2016, the Croatian Government, pursuant to Article 5.a of the ***Act on Amendments to the Gas Market Act (Official Gazette No. 14/14)***, adopted the following decisions:

- *Decision on the gas price at which natural gas producers are obliged to sell natural gas produced in the Republic of Croatia to the wholesale gas market supplier from 1 April 2016 to 31 March 2017 (Official Gazette No. 27/16), and*
- *Decision on the gas price at which the wholesale gas market supplier is obliged to sell gas to public service gas suppliers for household consumers for the period from 1 April 2016 to 31 March 2017 (Official Gazette No. 27/16).*

In February 2017, the Croatian Government, pursuant to Article 31, paragraph 4 of the ***Act on Amendments to the Gas Market Act***, also adopted the following decision, repealing the relevant prior decision:

- *Decision on the gas price at which the wholesale market supplier is obliged to sell gas to public service gas suppliers for household customers (Official Gazette No. 18/17)*.

HERA provided opinions on these decisions pursuant to the provisions of the ***Act on the Regulation of Energy Activities, the Energy Act, and the Gas Market Act***.

Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette No. 26/17)

On 16 March 2017, HERA adopted a new *Methodology for setting tariffs for public service gas supply and guaranteed supply*. The Methodology applicable before that date defined, inter alia, the structure and method by which tariff amounts for public service gas supply are determined, as well as the method, elements, and criteria by which particular components are calculated in the structure of the final

gas price. The new *Methodology* retains both the final gas price structure and the same method of determining gas distribution and supply costs.

The ***Act on Amendments to the Gas Market Act***, adopted in February 2017, created the conditions for the adoption of the new *Methodology for setting tariffs for public service gas supply and guaranteed supply*. This ***Act*** extends the transitional period during which the wholesale gas market supplier supplies public service gas suppliers with gas. Furthermore, this ***Act*** foresees that the wholesale gas market supplier shall be appointed by the Croatian Government based on the results of a public tender organised by the Ministry in cooperation with HERA and the gas market operator. Until the appointment of the wholesale gas market supplier via public tender, HEP d.d. was appointed as the wholesale gas market supplier. ***The Act*** also enables public service suppliers to procure gas under market conditions.

In addition, on 28 February 2017, the Croatian Government adopted the *Decision on the gas price at which the wholesale gas market supplier (HEP d.d.) is obliged to sell gas to public service gas suppliers* for household consumers; this price of gas was set at HRK 0.1809/kWh for the period from 1 April 2017 to 31 March 2018. Until 31 March 2017, the price was HRK 0.1734/kWh.

For these reasons and based on analyses and consultations, HERA adopted a new *Methodology for setting tariffs for public service gas supply and guaranteed supply*, which set the variable amount of the gas supply fee at HRK 0.0097/kWh (excluding VAT), while the fixed monthly gas supply fee for each tariff model was left unchanged. Establishing a new variable gas supply fee and retaining the same fixed monthly gas supply fee resulted in an average total unit gas supply cost of HRK 0.0112/kWh for all 34 public service suppliers.

Methodology for setting tariffs for public service gas supply and guaranteed supply (Official Gazette No. 34/18)

Pursuant to the provisions of the new ***Gas Market Act*** (Official Gazette No. 18/18), on 6 April 2018 HERA issued a new *Methodology for setting tariffs for public service gas supply and guaranteed supply*.

For the purpose of harmonisation with the provisions of the new ***Gas Market Act***, the new *Methodology* provides a method of determining the final gas supply price over two periods – in the transitional period from 1 August 2018 to 31 March 2021 (transitional provisions) and in the period after 31 March 2021 (regular provisions). For the transitional period from 1 August 2018 to 31 March 2021, HERA shall hold a public tender and, by 1 July 2018 at the latest, select the wholesale market supplier who will sell gas to public service gas suppliers for household end consumers under regulated conditions. Further, for the period after 1 April 2021, HERA shall hold a public tender and select public service suppliers for household end consumers. The role of the wholesale market supplier will be abolished, and the public service suppliers will procure gas under market conditions.

The new *Methodology* determines the formula and the method for setting the reference price, where the reference price is the highest price at which the wholesale market gas supplier can sell gas to public service suppliers for household end consumers in the transitional period. Until HERA appoints the wholesale market supplier, or by 1 August 2018, HEP d.d. acts as the selected wholesale market gas supplier. In the period from 1 April to 1 August 2018 HEP d.d. applies the price of HRK 0.1809/kWh, determined in the *Decision on the gas price at which the wholesale market gas supplier is obliged to sell gas to public service gas suppliers for household customers*, which was adopted by the Croatian

Government on 28 February 2017. Accordingly, HERA adopted the *Decision on tariffs for gas supply as a public service for the period from 1 April to 31 July 2018*, pursuant to which the final price for household consumers remains the same as in the period from 1 January to 31 March 2018, unless a public service supplier reaches a decision on tariffs for public service gas supply independently, provided that the tariffs from that decision are not higher than tariffs adopted by HERA.

Given that one of the basic aims of the new *Methodology* is to move towards full market-based pricing of gas supply, in accordance with the provisions of the new ***Gas Market Act***, the method for determining components of the final price of gas supply has been amended. In the transitional period from 1 August 2018 to 31 March 2021, the same final price structure will be retained as in the current period, and the reference price of gas shall be introduced. The reference price of gas for the transitional period from 1 August 2018 to 31 March 2021 is determined as the sum of the purchase price of gas reflecting the unit cost of gas procurement on the reference spot market, and it is calculated based on the prices of futures on the Dutch spot market Title Transfer Facility (hereinafter: TTF) and of the premium as the fixed part of the reference price of gas, which is intended for covering the operating costs of the wholesale market supplier. The criterion for the selection of the wholesale market supplier by HERA is the lowest premium, which remains fixed for the period from 1 August 2018 to 31 March 2021, in which the wholesale market supplier will be selected via public tender.

For the period after 31 March 2021, the final price of gas supply will be composed of the cost of gas procurement and the cost of gas distribution. The method of determining the cost of gas distribution remains unchanged, while the cost of gas procurement is intended to cover all justified operating costs of the public service gas supplier, including costs of gas procurement, costs of use of the transmission system and of the gas storage system, costs of gas market organisation and costs based on the calculations stipulated by the provisions of the *Gas Market Code*, and the remaining operating costs of the public service gas supplier. As opposed to the transitional period in which the cost of gas procurement is set by the new *Methodology*, in the period after 31 March 2021, the criterion for the selection of the public service gas supplier via public tender organised by HERA will be the lowest cost of gas procurement. In addition, an important change in the new *Methodology* is the repeal of the fixed monthly gas supply fee as a component of the fixed monthly fee for individual tariff models. Thus, the fixed monthly gas supply fee no longer exists as a separate component but will become a part of the total cost of gas supply in the period after 31 March 2021. An important element of the new Methodology is the mechanism of ensuring end customer protection regarding greater fluctuations of the final price, which could be caused by the anomalies in the wholesale gas market.

Methodology for setting tariffs for the reception and dispatch of liquefied natural gas (Official Gazette No. 110/17)

On 22 July 2016, HERA issued the *Methodology for setting tariffs for the reception and dispatch of liquefied natural gas*. A project known as the LNG terminal, consisting of the construction of a reception terminal for liquefied natural gas on the island of Krk, was declared a strategic investment project of significance to Croatia at the session of the Croatian Government held on 16 July 2015. The proposed project includes the construction and management of infrastructure required for the reception, storage, and regasification of liquefied natural gas.

The project aims to cover energy demand and is an important factor in both the diversification of natural gas supply and in increased natural gas supply security for South-Eastern Europe. The European Commission included this project in its list of key energy infrastructure projects and projects of common interest (hereinafter: PCIs), as it will facilitate Europe's energy and climate objectives and strengthen the Energy Community by integrating Europe's energy markets. Also, in February 2016, the European Commission published the "Strategy for liquefied natural gas and gas storage", which focuses on diversifying supply routes, ensuring gas supply security, and the role of liquefied natural gas in this respect. In that document, the LNG terminal is a significant project that will ensure supply security and diversification for the countries of South-Eastern Europe, which are the most vulnerable in this respect and mostly depend on a single route.

Considering the strategic significance of the LNG terminal, on 10 November 2017 HERA adopted the improved *Methodology for setting tariffs for the reception and dispatch of liquefied natural gas (Official Gazette No. 110/17)*.

Also, in December 2017, to carry out the binding phase of the Open Season procedure, HERA adopted the *Decision on indicative tariffs for the reception and dispatch of liquefied natural gas for LNG HRVATSKA d.o.o.*, and the *Decision on indicative tariffs for gas transmission at the gas transmission system entry point from the liquefied natural gas terminal in Omišalj and at the gas transmission system exit point at the interconnection Dravaszerdahely to PLINACRO d.o.o.*

Methodology for setting tariffs for the reception and dispatch of liquefied natural gas (Official Gazette No. 48/18)

With respect to the modifications in the legal framework through the entry into force of the new ***Gas Market Act***, on 22 May 2018 HERA adopted the new *Methodology for setting tariffs for the reception and dispatch of liquefied natural gas*. Certain elements of the *Methodology* were additionally improved or harmonised with regard to the provisions on the same elements in other tariff methodologies that were adopted in different intervals. The following elements were modified and improved in the *Methodology*:

- cost categories considered unjustified by HERA,
- the method of setting the initial and revised values of regulated assets as a justified value of tangible and intangible fixed assets in use,
- revalorisation of tangible and intangible fixed assets or of new assets which the operator acquired through changes in operator status,
- minimum useful life for the category of ships, as recognized by regulations,
- definition of the premium for additional investment risk, i.e. of the premium for the development of energy operations of LNG terminal management,
- possibility of offering a discount on tariffs to individual customers,
- method of calculating fees for the use of the LNG terminal,
- prerequisites for the establishment of a regulatory account, and
- deadline for the submission of annual data and requests for setting or changing tariffs for the reception and dispatch of liquefied natural gas.

Methodology for setting tariffs for gas transmission (Official Gazette No. 48/18)

With respect to the modifications in the legal framework through the entry into force of the new ***Gas Market Act***, on 22 May 2018 HERA adopted the new *Methodology for setting tariffs for gas transmission*. Certain elements of the *Methodology* were additionally improved or harmonised regarding the provisions on the same elements in other tariff methodologies that were adopted in different

intervals. The following elements were modified and improved in the *Methodology*:

- regular audits of allowed revenues,
- determination of the reference interest rate,
- cost categories considered unjustified by HERA,
- the method of setting the initial and revised values of regulated assets as a justified value of tangible and intangible fixed assets in use,
- revalorisation of tangible and intangible fixed assets or of new assets which the operator acquired through changes in operator status,
- the method of setting a risk-free rate of return and the variability coefficient of return on operator´s shares in relation to the average variability of return on market portfolio,
- coefficients for the use of the firm capacity of the transmission system on quarterly, monthly, daily and intraday levels,
- setting indicative amounts of tariffs, and
- the deadline for submission of annual data and of requests to determine or change tariff amounts for gas transmission.

Methodology for setting tariffs for gas distribution (Official Gazette No. 48/18)

With respect to the modifications in the legal framework through the entry into force of the new ***Gas Market Act***, on 22 May 2018 HERA adopted the new *Methodology for setting tariffs for gas distribution*. Certain elements of the *Methodology* were additionally improved or harmonised regarding the provisions on the same elements in other tariff methodologies that were adopted in different intervals. The following elements were modified and improved in the *Methodology*:

- regular audits of allowed revenues,
- determination of the reference interest rate,
- cost categories considered unjustified by HERA,
- the method of setting the initial and revised values of regulated assets as a justified value of tangible and intangible fixed assets in use,
- revalorisation of tangible and intangible fixed assets or of new assets which the operator acquired through changes in operator status,
- the method of setting a risk-free rate of return and the variability coefficient of return on operator´s shares in relation to the average variability of return on market portfolio,
- prerequisites for the establishment of a regulatory account and the method of setting the initial tariff, and
- the deadline for submission of annual data and of requests to determine or change tariff amounts for gas distribution.

Methodology for setting tariffs for gas storage (Official Gazette No. 48/18)

With respect to the modifications in the legal framework through the entry into force of the new **Gas Market Act**, on 22 May 2018 HERA adopted the new *Methodology for setting tariffs for gas storage*. Certain elements of the *Methodology* were additionally improved or harmonised with regard to the provisions on the same elements in other tariff methodologies that were adopted in different intervals. The following elements were modified and improved in the *Methodology*:

- regular audits of allowed revenues,
- determination of the reference interest rate,
- cost categories considered unjustified by HERA,

- the method of setting the initial and revised values of regulated assets as a justified value of tangible and intangible fixed assets in use,
- revalorisation of tangible and intangible fixed assets or of new assets which the operator acquired through changes in operator status,
- the method of setting a risk-free rate of return and the variability coefficient of return on operator´s shares in relation to the average variability of return on market portfolio,
- duration of the regulatory account,
- the deadline for submission of annual data and of requests to determine or change tariff amounts for gas storage.

Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the reception and dispatch of liquefied natural gas, and public service gas supply (Official Gazette No. 48/18)

With respect to the modifications in the legal framework through the entry into force of the new ***Gas Market Act***, on 22 May 2018 HERA adopted the new *Methodology for setting the price of non-standard services for gas transmission, distribution, storage, the reception and dispatch of liquefied natural gas, and public service gas supply*. As the *Methodology* is now binding for the operator of the liquefied natural gas terminal, the title of the methodology has been changed, the method and formula for setting average hourly rates have been established, as well as the method for setting the rates of non-standard services for operators of liquefied natural gas terminals in the first regulation period. Further, the Methodology sets out the formula for unique determination of costs of securing working conditions, and it improves the provisions related to the method of adopting, publishing and applying the rates of non-standard services. In addition, the rates of non-standard services for individual operators have been further improved and modified, taking into account Croatian gas-related regulations, especially the network code and the comments and suggestions received during the public consultation procedure.

Methodology for calculating the fee for connection to the gas distribution or transmission system and for the connection capacity increase (Official Gazette No. 48/18)

With respect to the modifications in the legal framework through the entry into force of the new ***Gas Market Act***, on 22 May 2018 HERA adopted the new *Methodology for calculating the fee for connection to the gas distribution or transmission system and for the connection capacity increase*. Some elements of the *Methodology* were further improved or harmonised with respect to the provisions on identical elements in other methodologies, but there were no significant changes.

Rules of operation of the liquefied natural gas terminal (Official Gazette No. 34/18)

On 29 March 2018, LNG HRVATSKA d.o.o., with HERA's approval, issued the *Rules of operation of the liquefied natural gas terminal*, which regulate the procedure and terms of use of the LNG terminal, requests regarding persons intending to use the LNG terminal, their rights, obligations and responsibilities, as well as special requests which refer to LNG terminal management, its use for shipping by LNG carriers, trans-shipment of LNG to the LNG terminal and its regasification.

The *Rules* regulate the description of the LNG terminal, the development, construction and maintenance of the LNG terminal, LNG terminal management, contractual relationships and general terms and conditions of use of the LNG terminal, booking and use of LNG terminal capacities, metering code and rules of

allocation, data disclosure and information exchange, indemnification of damages, rules for the sale of liquefied natural gas or natural gas to LNG terminal users in the Open Season Procedure, the general terms and conditions of use of the LNG terminal and the accounting policy for natural gas.

Amendments to the Storage Code (1/17)

On 12 January 2017, PODZEMNO SKLADIŠTE PLINA d.o.o., upon HERA's approval, issued amendments to the *Storage Code*, shifting the deadline for the receipt of applications for booking standard bundled units from 15 January to 31 January of the current storage year.

Amendments to the Storage Code (1-2/17)

On 30 January 2017, PODZEMNO SKLADIŠTE PLINA d.o.o., upon HERA's approval, issued amendments to the *Storage Code*, allowing applications for booking standard bundled units to be received in two rounds per year.

Amendments to the Storage Code (2/17)

On 28 February 2017, PODZEMNO SKLADIŠTE PLINA d.o.o., upon HERA's approval, issued amendments to the *Storage Code* at the request of the Ministry of Environment and Energy, in order to extend the deadline for applications for booking standard bundled units on the yearly level from 28 February 2017 to 24 March 2017.

Storage Code (3/17)

On 31 March 2017, PODZEMNO SKLADIŠTE PLINA d.o.o., upon HERA's approval, issued the *Storage Code* in order to comply with the provisions of *Commission Regulation (EU) No. 312/2014 of 26 March 2014 establishing a Network Code on Gas Balancing of Transmission Networks*, which entitles storage system users to submit a total of five re-nominations on a gas day, to reverse nominations, and to change storage work cycles.

Storage Code (50/18)

On 29 May 2018, PODZEMNO SKLADIŠTE PLINA d.o.o., upon HERA's approval, issued the *Storage Code* for the purpose of harmonisation with the new ***Gas Market Act (Official Gazette No. 18/18)***. The *Code* redefined the concepts of interim re-nomination, description of the technical storage capacity and operative procedures related to the possibility of interim changes in storage work cycles. Also, the deadline for confirmation of information on the interruption of storage services due to planned works on the gas storage system was extended. The list of non-standard services was harmonised with the *Methodology for setting the price of non-standard services for gas transmission, distribution, storage, and public service gas supply*, the deadlines were changed for booking and contracting lease services for standard bundled units (hereinafter: SBUs) (which ends on 1 July of the current year), and for contracting short-term, i.e. individual continued services for the upcoming storage year (which ends at the end of October of the current year). A cash deposit was introduced as a possible payment guarantee instrument and the part referring to the necessary instruments serving as bid guarantee was revised. Offering SBUs or continued individual services outside the set deadlines was enabled in case of exceptional circumstances or situations in which the Operator has on his disposal unallocated or uncontracted SBUs or continued individual services. In the period from 22:00 to 03:00 hours, several exceptional re-nominations were enabled under the requirements for exceptional re-nomination. A partial assignment of the storage contract was enabled, as well as its assignment

to another User or a third party and for a period shorter than the duration of the contract. The reference gas price as the initial lowest per-unit price of gas in the first round of the procedure of sale of non-withdrawn gas upon the expiry or termination of the Contract was replaced by the average applicable price of gas published for the previous month.

Amendments to the Network Code for the transmission system (2/17)

On 24 February 2017, PLINACRO d.o.o., upon HERA's approval, issued amendments to the *Network Code for the transmission system* for the purpose of harmonisation with the provisions of *Commission Regulation (EU) No. 312/2014 of 26 March 2014 establishing a Network Code on Gas Balancing of Transmission Networks*, regarding the obligation of the transmission system operator to publish a call for tender to select a balancing service provider.

Network Code for the transmission system (03/17)

On 31 March 2017, PLINACRO d.o.o., upon HERA's approval, issued the new *Network Code for the transmission system* for the purpose of complete harmonisation with the provisions of *Commission Regulation (EU) No. 312/2014 (BAL Regulation)*, and to introduce changes related to the definition of balancing zones, balancing responsibilities, provision of information on balancing, actions of the transmission system operator, balancing actions, order in which offers are accepted, transactions on the gas market operator platform, and the establishment of gas quantities for daily, intraday, and monthly reports.

Network Code for the transmission system (3/18)

On 1 March 2018, PLINACRO d.o.o., upon HERA's approval, issued new amendments to the *Network Code for the transmission system* to make additions or changes to the format of requests for capacity booking on the quarterly level.

Network Code for the transmission system (50/18)

On 30 May, PLINACRO d.o.o., upon HERA's approval of 29 May 2018, adopted the new *Network Code for the transmission system* for the purpose of harmonisation with the new ***Gas Market Act***. The Network Code introduced modifications to regulate the description of the transmission system, development of the transmission system, connection to the transmission system, connection of the transmission system to other parts of the gas system, supervision and management of the transmission system, rules for transmission system balancing, maintenance of the transmission system, services and products of the transmission system operator, procedure for contracting capacities at interconnections and at all gas transmission system entry and exit points in Croatia, trade with contracted capacities, use of transmission system capacities, the metering code and the rules on gas allocation, data disclosure and information exchange, restriction and suspension of gas delivery, unauthorised consumption, procedures for managing congestions at interconnections, procedure for amending the Network Code for the transmission system and the general terms and conditions of use of the gas transmission service.

Amendments to the Gas Market Code (2/17)

On 24 February 2017, HROTE d.o.o., upon HERA's approval, adopted the amendments to the *Gas Market Code* for the purpose of harmonisation with *Commission Regulation (EU) No. 312/2014 establishing a Network Code on Gas Balancing of Transmission Networks (BAL Regulation)*, regarding the implementation of the balancing service and adjusting the calculation of remaining

imbalances of the balance group and calculations in the event that the balance group ceases to function.

Gas Market Code (03/17)

On 31 March 2017, HROTE d.o.o., upon HERA's approval, issued the *Gas Market Code* for the purpose of complete harmonisation with the provisions of *Commission Regulation (EU) No. 312/2014 of 26 March 2014 establishing a Network Code on Gas Balancing of Transmission Networks*, as well as with the ***Act on Amendments to the Gas Market Act***, which concerns the following: organisation and management of trading platforms; the role of trading platform operators; providing access to trading platforms for balance responsible parties; overview of trading on a trading platform; balancing actions taken by the transmission system operator; calculation of the fee for daily imbalances; implementation of the principle of financial neutrality.

Gas Market Code (50/18)

On 30 May 2018, HROTE d.o.o., upon HERA's approval of 29 May 2018, issued the new *Gas Market Code* for the purpose of harmonisation with the new ***Gas Market Act***. The new *Code* regulates the procedures, principles and standards for gas market organisation and operations in compliance with the balance group model, organisation of balance groups, their responsibilities and the register of balance group responsible parties and their direct members, contractual relationships between the gas market operator and the balance responsible party, balancing service provider and the transmission system operator, transactions at the virtual trading point, trading at trading platforms, calculation of the fee for daily imbalances for each balance group, calculation of balancing actions, i.e. of trading at trading platforms and activated balancing energy for the balancing service, calculation of the neutrality fee, and other rules necessary for the organisation and functioning of the gas market.

Act on Amendments to the Gas Market Act (Official Gazette No. 16/17)

The amendments to the ***Gas Market Act*** eliminated the obligation of natural gas producers to offer the entire volume of produced gas primarily to Croatia's wholesale market supplier and guaranteed supplier. Additionally, the Act provides for changes to the gas procurement business model for public service supply by stipulating that a public service supplier may procure gas for households, as has been the case to date, under regulated conditions from the wholesale market supplier, or, should it decide to do so, directly on the market according to market conditions. Furthermore, the role of the wholesale gas market supplier is defined as a public service under regulated conditions. Until the appointment of the wholesale gas market supplier via a public call, HEP d.d. has been appointed the wholesale gas market supplier starting from 1 April 2017. The gas storage system operator is obliged to allocate 60% of total available SBUs to the wholesale gas market supplier. Furthermore, some provisions related to gas system balancing were amended and adjusted with respect to the trading platform, balancing services, calculation of fees and costs, and financial neutrality. Finally, to ensure the implementation of Regulation (EU) No. 1227/2011 on wholesale energy market integrity and transparency (hereinafter: REMIT), penalty provisions are set out for violations committed by gas market participants who do not submit wholesale market transaction records to ACER in the prescribed manner, or who fail to register in the national register maintained by HERA pursuant to REMIT.

Decision on determining the entity responsible for publishing information before the annual yearly capacity auction of the gas transmission system and before the tariff period in the Republic of Croatia (HERA 11/2017)

On 3 November 2017, pursuant to Articles 29 and 30 of the *Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas (Text with EEA relevance) (OJ L 72, 17.3.2017)*, HERA adopted the *Decision on determining the entity responsible for publishing information before the annual yearly capacity auction of the gas transmission system and before the tariff period in the Republic of Croatia*.

Considering that the information which must be published before the annual yearly capacity auction pursuant to Article 29 of the *Regulation 2017/460* and the information which must be published before the tariff period pursuant to Article 30 of the *Regulation 2017/460* is published on the web site of the transmission system operator, and pursuant to Article 1 paragraph 1 of the *Regulation 2017/460* with a hyperlink to the web site of the appropriate entity on the platform of the European Network of Transmission System Operators for Gas (ENTSOG), HERA appointed the energy entity PLINACRO d.o.o., which is the gas transmission system operator and a member of ENTSOG, as the most suitable party in Croatia to publish such information.

Decision on determining the entity responsible for holding periodic consultations regarding the methodology for setting the reference price of the capacity product for annual firm capacity, which is applicable at entry and exit points of the gas transmission system in the Republic of Croatia (HERA 11/2017)

On 3 November 2017, pursuant to Articles 26 and 27 of the *Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas (Text with EEA relevance) (OJ L 72, 17.3.2017)*, HERA adopted the *Decision on determining the entity responsible for holding periodic consultations regarding the methodology for setting the reference price of the capacity product for annual firm capacity, which is applicable at entry and exit points of the gas transmission system in the Republic of Croatia*.

Taking into consideration that, in accordance with the ***Act on the Regulation of Energy Activities***, HERA holds the required public consultations on methodologies for setting tariffs, and considering that, pursuant to Article 27 paragraph 4 of *Regulation 2017/460*, HERA shall take a motivated decision on all items of the methodology for setting the reference price based on the final consultation held in accordance with Article 26 of *Regulation 2017/460*, HERA was recognised as the most suitable party to hold periodic consultations, which at least include a final consultation, pursuant to Article 26 of the *Regulation 2017/460*. In addition, pursuant to Article 28 of *Regulation 2017/460*, HERA, as the national regulatory authority, shall conduct a consultation on discounts, multipliers and seasonal factors with the national regulatory authorities of all directly connected Member States and the relevant stakeholders at the same time as the final consultation, pursuant to Article 26 of *Regulation 2017/460*.

Decision approving the Auction Premium Allocation Agreement (HERA 3/2018)

On 16 March 2018, pursuant to Article 21 paragraph 3 of the *Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas (Text with EEA relevance) (OJ L 72, 17.3.2017)*, HERA adopted the *Decision approving the Auction Premium Allocation Agreement* at the interconnection point Dravszerdahely between

PLINACRO d.o.o., the Croatian transmission system operator, and FGSZ d.o.o., the Hungarian transmission system operator.

On 15 March 2018, pursuant to Article 21 paragraph 3 of the *Commission Regulation (EU) 2017/460 of 16 March 2017 establishing a network code on harmonised transmission tariff structures for gas (Text with EEA relevance) (OJ L 72, 17.3.2017)*, HERA received from PLINACRO d.o.o. a Request for Approval of the Auction Premium Allocation Agreement at the interconnection point Dravszerdahely between PLINACRO d.o.o., the Croatian transmission system operator, and FGSZ d.o.o., the Hungarian transmission system operator. Taking into consideration that on 26 January 2018 PLINACRO d.o.o., the Croatian transmission system operator, and FGSZ d.o.o., the Hungarian transmission system operator concluded the Auction Premium Allocation Agreement, which stipulates that PLINACRO d.o.o. and FGSZ d.o.o. shall mutually allocate auction premiums from the sale of bundled capacity products proportionally to the reserved prices ratio at the interconnection point Dravszerdahely, HERA granted its approval to the Auction Premium Allocation Agreement.

Decision adopting the National policy framework for the establishment of infrastructure and market development of alternative fuels for transport (Official Gazette No. 34/2017)

At a session held on 6 April 2017, the Croatian government adopted the *Decision adopting the National policy framework for the establishment of infrastructure and market development of alternative fuels for transport* (hereinafter: NPF). The purpose of the NPF is to define and elaborate goals and measures to establish the infrastructure and develop the market of alternative fuels for transport. On the gas market, compressed natural gas and liquefied natural gas are considered as alternative fuels for transport.

5.2 Regulated activities in the natural gas sector

5.2.1 Natural gas transmission

Natural 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 network of main and regional gas pipelines which transmit natural gas produced in Croatia (the northern part of continental Croatia and the Northern Adriatic) or imported via interconnections with Slovenia (Rogatec-Zabok) and Hungary (Donji Miholjac–Dravaszerdahely) to exit measuring-reduction stations where the gas is delivered to gas distribution systems and to end (industrial) consumers directly connected to the transmission system. The Croatian gas transmission system is shown in Figure 5.2.1.

Figure 5.2.1 Croatian gas transmission system

The operation of the transmission system, directly connected to the Panona and Northern Adriatic production fields, the Okoli underground gas storage facility, 35 distribution systems and 20 end consumers, is continuously controlled and managed from the national dispatch centre in Zagreb, which is equipped with a modern Supervisory Control and Data Acquisition System (SCADA). The operational management and maintenance of the system are organised in five gas transmission regions: Eastern Croatia with the head office in Donji Miholjac, Central Croatia with the head office in Popovača, Northern Croatia with the head office in Zabok, Western Croatia with the head office in Rijeka, and Southern Croatia with the head office in Benkovac.

The total length of the Croatian gas transmission system at the end of 2017 was 2 693 km, of which 952 km were gas pipelines with an operating pressure of 75 bar, and 1 741 km were gas pipelines with an operating pressure of 50 bar.

Gas is received into the transmission system from ten connection points at entry measuring stations, six of which are used to receive gas from production fields in Croatia (Legrad connection point was not active in 2017), 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 195 connection points (157 exit pressure reducing metering stations), 36 of which are used to deliver gas to industrial consumers connected to the transmission system, 158 connection points are used to deliver gas to distribution systems operated by 35 distribution system operators, and one connection point is used to inject gas into the Okoli underground gas storage facility.

With regard to investments realised in 2017, the transmission system operator PLINACRO d.o.o. actively worked 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 2017, PLINACRO continued its preparatory activities, such as exploration works, development of surveying plans, preliminary and final project design, settlement of property rights issues, acquisition of site permits and construction permits, and specification and procurement of equipment, in order to meet the requirements for the construction of the Omišalj – Zlobin gas pipeline, LNG evacuation pipelines and the compression station in Velika Ludina.

Also, in 2017 PLINACRO d.o.o. completed the project of extension and reconstruction of the gas quality measuring system (phase II), which encompassed the design, procurement, installation and implementation of the sulphur and dew point analyser, which will be used to monitor all gas quality parameters together with the previously installed process gas chromatographs.

Further, the technical protection system was continuously upgraded in 2017 with the aim of raising the level of security at the transmission system facilities.

In 2017, 49 gas suppliers organised in 13 balance groups used the gas transmission service[15].

In 2017, the transmission system operator PLINACRO d.o.o. carried out capacity and congestion management in accordance with the provisions of the *Network Code for the transmission system*, which was harmonised with the *Commission Regulation (EU) No. 984/2013 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems*. This *Regulation* establishes standardised capacity allocation mechanisms in gas transmission systems, methods of cooperation between adjacent transmission system operators to facilitate the sale of capacity, the booking of transmission system interconnection capacity using IT capacity booking platforms, standard capacity types, and capacity coupling on both sides of particular interconnections.

In 2017, a total of 1 449 applications for yearly, quarterly, monthly, daily, and intraday capacity bookings were received via the capacity management system (SUKAP) and auctions on online platforms for capacity lease and trade (PRISMA and RBP). The applications were received from 13 balance groups and concerned 49 transmission system users and 1 184 "balance group – transmission system user – connection" combinations.

The interest in capacity booking on a yearly and monthly basis at transmission system exit points declined for the 2017/2018 gas year, while the interest in capacity booking on a quarterly and daily levels was significant. Furthermore, capacity booked on quarterly and daily levels increased as compared to the 2016/2017 gas year.

Transmission system balancing was managed in accordance with the *Gas Market Code (HROTE, 3/2017)*. Capacity booking, allocation, and contracting procedures are identical for all connections, regardless of the location and direction of gas flow (entry/exit). All bookings of all capacities by a single user within the same balance group submitted in a single booking application form part of a single gas transmission contract. Further activities were carried out related to the implementation of the *Commission Regulation (EU) No. 312/2014 establishing a Network Code on Gas Balancing of Transmission Networks* on balancing rules. The

15 *The number of balance groups on 31 December 2017*

new rules for gas balancing in the transmission system entered into force on 1 April 2017 (upon HERA's approval) with the adoption of the new *Gas Market Code* by the gas market operator, adoption of the new *Network Code for the transmission system* by the transmission system operator, and adoption of the new *Storage Code* by the storage system operator.

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 2017, regular activities related to transmission system capacity management were conducted within the following business processes:

- gas transmission service contracting for monthly and annual periods,
- daily processing of nominations,
- collection and processing of data on measured and allocated gas quantities,
- daily and monthly reporting and publishing of data, and
- monitoring and publishing of gas quality data.

In 2017, the number of transmission system users by category was as follows:

- 12 users using entries to the transmission system at interconnections,
- 1 user using an entry to the transmission system from an upstream pipeline network,
- 45 users using exits from the transmission system to distribution systems, and
- 10 users using exits from the transmission system to end consumers.

According to data submitted by the energy entity PLINACRO d.o.o., the total quantity of gas transported in Croatia in 2017 was 32 340 008 547 kWh, which represents a 17% increase as compared to the total transported quantity in 2016. Total losses and imbalances in gas metering in 2017 were 0.28%. The largest quantity of gas transported in a single day for end consumption[16] was 157 805 080 kWh/day. The total technical capacity of all entries to the transmission system on 31 December 2017 was 11 216 850 kWh/h. According to data submitted by PLINACRO d.o.o., technical capacities were determined for ten entries to the transmission system, the largest being the following: Dravaszerdahely – 2 880 000 kWh/h; Pula Terminal – 2 592 996 kWh/h; UGSF Okoli – 2 273 923 kWh/h; and Rogatec – 2 016 000 kWh/h. In 2017, the maximum hourly used capacity at all transmission system entries amounted to 6 792 617 kWh/h, whereas the maximum used capacity at a single transmission system entry point was recorded at the underground gas storage facility Okoli and amounted to 2 085 529 kWh/h. The quantities of transported gas by transmission system entry groups per month in 2017 are shown in Figure 5.2.2.

16 *Exits to distribution systems and exits to consumers directly connected to the transmission system*

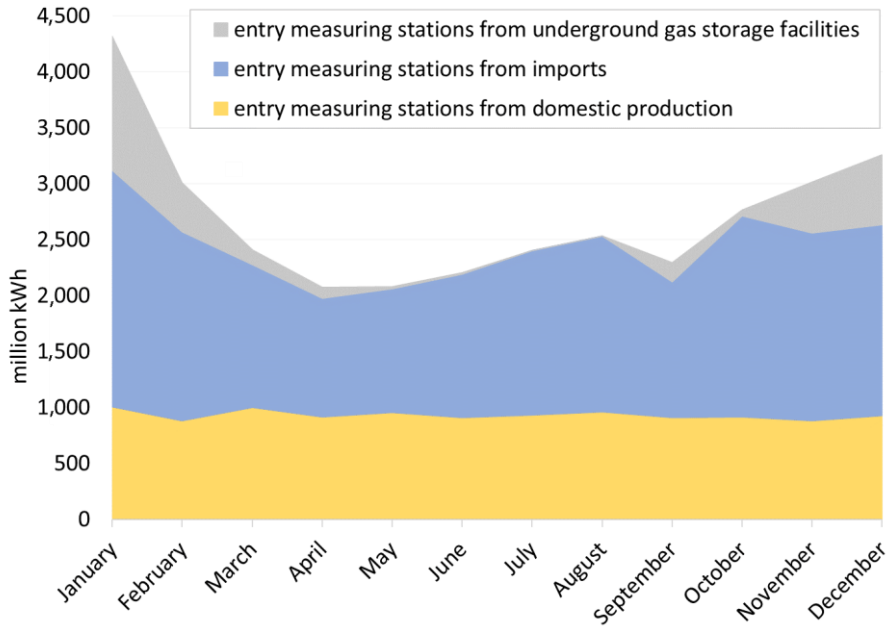


Figure 5.2.2 Quantities of transported gas by transmission system entry groups per month in 2017

The total technical capacity of exits from the transmission system on 31 December 2017 was 19 537 170 kWh/h. Of that amount, the total technical capacity of exits to distribution systems amounted to 11 751 409 kWh/h, the total technical capacity of exits to end consumers directly connected to the transmission system was 6 080 321 kWh/h, and the technical capacity of the exit to UGSF Okoli was 1 705 440 kWh/h. The maximum hourly used capacity at all transmission system exits in 2017 amounted to 6 575 212 kWh/h, whereas the maximum used capacity by type of transmission system exit point was recorded at the exit to distribution systems in the amount of 3 874 773 kWh/h. Quantities of transported gas by transmission system exit groups per month in 2017

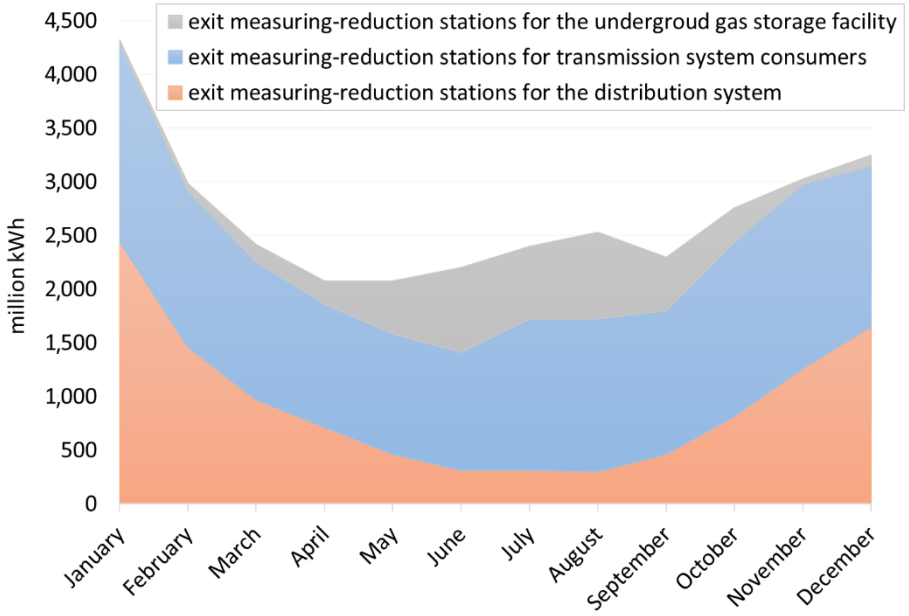


Figure 5.2.3 Quantities of transported gas by transmission system exit groups per month in 2017

The mild increase in gas consumption that began in 2015 continued in 2017, following a three-year decline in consumption and a record low consumption in 2014. A 15.4% increase in gas consumption was recorded in 2017, as compared to 2016. The total annual quantities of transported gas per consumer group are shown in Figure 5.2.4.

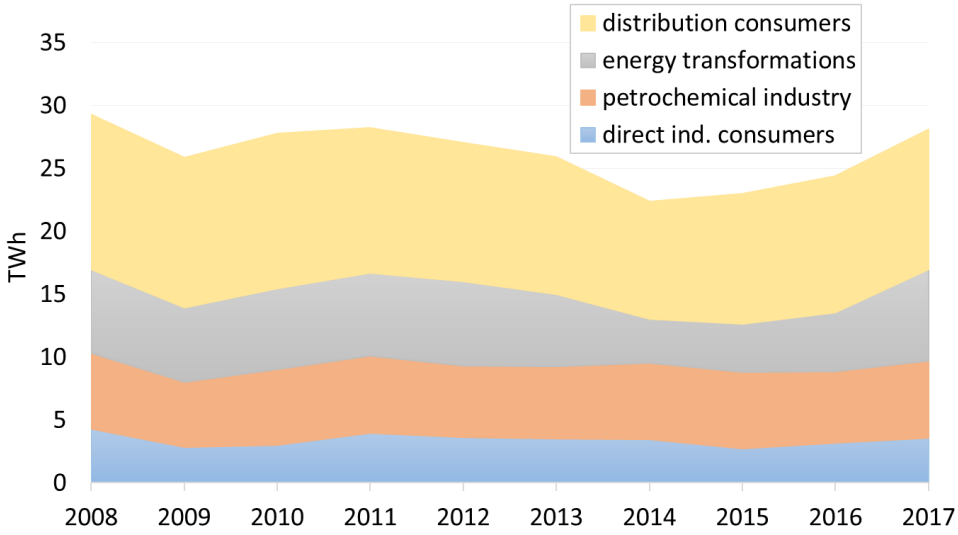


Figure 5.2.4 Total annual quantities of transported gas per consumer group

In 2017, the price of natural gas transmission was established based on the *Methodology for setting tariffs for gas transmission* (hereinafter: the *Methodology*). The *Methodology* is based on the principle of maximum allowed transmission system operator revenue, also known as the "building blocks" approach. Allowed operating costs are determined by applying incentive mechanisms (efficiency coefficients and allocation of 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 regulatory asset value for a five-year regulation period is projected by an *ex-ante* approach as part of approving investment plans, as well as by an *ex-post* review of realised investments. Upon the expiry of a regulation period, allowed revenues are revised, including operating and capital costs, and the realised revenues are compared based on tariffs for gas transmission with the revised allowed revenues. Possible imbalances are transferred to the calculation of allowed revenues in the following regulation period. These methodological principles are also applied in other tariff methodologies for gas infrastructure activities, such as gas storage, liquefied natural gas terminal management, and gas distribution.

The *Methodology* provides for eight tariff items, categorized in 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, one tariff item for gas quantities at exits from the transmission system, and one tariff item for the entry from the liquefied natural gas terminal.

The amounts of gas transmission tariffs are established by HERA, and they are the same for all users of the transmission system. Table 5.2.1. shows tariff amounts excluding VAT[17] for gas transmission, which were applicable from 1 January to

17 *All tariff items and prices mentioned in this chapter are net of VAT*

31 March 2017, and in accordance with the new *Decision on tariff amounts for gas transmission* adopted by HERA in March 2017, the tariff amounts from 1 April to 31 December 2017, as well as for the remaining years of the second regulatory period ending in 2021.

Table 5.2.1 Tariff amounts for gas transmission for the period 2017–2021

Tariff type	*Tariff item ID*	*Tariff item*	*Tariffs for regulatory period years (excluding VAT)*						*Unit*
			2017 (01/01-31/03)	*2017 (01/04-31/12)*	*2018*	*2019*	*2020*	*2021*	
Tariffs for annual contracted firm capacity for entries into the transmission system	$T_{EN,IN}$	Tariff for entry at interconnection	3.4147	2.7432	2.7476	2.6778	2.5404	2.4112	HRK/kWh /day
	$T_{EN,PR}$	Tariff for entry from production	3.0732	2.4689	2.4728	2.4100	2.2864	2.1701	HRK/kWh /day
	$T_{EN,ST}$	Tariff for entry from the gas storage system	0.3415	0.2743	0.2748	0.2678	0.2540	0.2411	HRK/kWh /day
	$T_{EN,LNG}$	Tariff for entry from LNG terminal	-	-	-	-	-	-	HRK/kWh /day
Tariffs for annual contracted firm capacity for exits from the transmission system	$T_{EX,IN}$	Tariff for exit at interconnection	8.6399	6.9710	7.0118	6.6107	5.6222	5.6789	HRK/kWh /day
	$T_{EX,CR}$	Tariff for exit in Croatia	1.2960	1.0457	1.0518	0.9916	0.8433	0.8518	HRK/kWh /day
	$T_{EX,SZ}$	Tariff for exit in separate zone	-	-	-	-	-	-	HRK/kWh /day
Tariff for gas quantity at exits from the transmission system	T_Q	Tariff for gas quantity	0.0022	0.0018	0.0018	0.0018	0.0018	0.0018	HRK/kWh

In December 2017, pursuant to the *Methodology*, HERA performed a regular revision of tariffs for gas transmission and issued the *Decision on tariff amounts for gas transmission* setting the tariff amounts for gas transmission in the second regulation period 2018–2021. The tariff amounts for gas transmission from 1 January 2018 to 31 December 2021 pursuant to the *Decision* are shown in Table 5.2.2.

Table 5.2.2 Tariff amounts for gas transmission from 1 January 2018 to 31 December 2021

Tariff type	*Tariff item ID*	*Tariff item*	*Tariffs for regulatory period years (excluding VAT)*				*Unit*
			2018	*2019*	*2020*	*2021*	
Tariffs for annual contracted firm capacity for entries into the transmission system	$T_{EN,IN}$	Tariff for entry at interconnection	2.6860	2.6044	2.4581	2.3211	HRK/kWh/ day
	$T_{EN,PR}$	Tariff for entry from production	2.4174	2.3440	2.2123	2.0890	HRK/kWh/ day
	$T_{EN,ST}$	Tariff for entry from the gas storage system	0.2686	0.2604	0.2458	0.2321	HRK/kWh/ day
	$T_{EN,LNG}$	Tariff for entry from LNG terminal	-	-	-	-	HRK/kWh/ day
Tariffs for annual contracted firm capacity for exits from the transmission system	$T_{EX,IN}$	Tariff for exit at interconnection	6.8546	6.4295	5.4401	5.4668	HRK/kWh/ day
	$T_{EX,CR}$	Tariff for exit in Croatia	1.0282	0.9644	0.8160	0.8200	HRK/kWh/ day
	$T_{EX,SZ}$	Tariff for exit in separate zone	-	-	-	-	HRK/kWh/ day
Tariff for gas quantity at exits from the transmission system	T_{Q}	Tariff for gas quantity	0.0018	0.0018	0.0018	0.0017	HRK/kWh

The price of gas transmission for transmission system users, i.e. the fee for the use of the gas pipeline transmission system, is established pursuant to the *Methodology*, according to the previously leased use and actual use of transmission system capacities for a particular user in one year. Transmission system entry or exit capacities are contracted independently, on a yearly, quarterly, monthly, daily, or intraday basis.

The total average price of gas transmission in 2017 for all transmission system users amounted to HRK 0.0194 HRK/kWh, which was an increase of 6.46% as compared to the total average gas transmission price in 2016.

5.2.2 Natural gas storage

Natural gas storage is a regulated energy activity performed as a public service. The energy entity PODZEMNO SKLADIŠTE PLINA d.o.o. has been the Croatian gas storage system operator since 2009. It uses the UGSF Okoli for natural gas storage. The geographical position of the facility is shown in Figures 5.2.1 and 5.2.8.

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.

The technical capacities of the gas storage system[18] are defined by the Supplemental mining project for the Okoli exploitation field – Underground gas storage of 25 November 2005. The technical capacity of the operating 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 2017, a total of 3 717 366 MWh of natural gas were injected into UGSF Okoli and 2 734 558 MWh of natural gas were withdrawn. There were operating cycles in UGSF Okoli in 2017: six periods of gas withdrawal, two stand-by periods, and four 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 21 March 2017, when the operating volume was 1 384 165 MWh. The final gas withdrawal cycle started on 1 November 2017, when the operating volume was 4 768 569 MWh, which was also the highest operating volume of UGSF Okoli. The operating volumes of natural gas at UGSF Okoli on specific dates in 2017 are shown in Figure 5.2.5. The largest gas withdrawal capacity achieved in 2017 was 2 071 MWh/h, while the largest gas injection capacity achieved was 1 705 MWh/h.

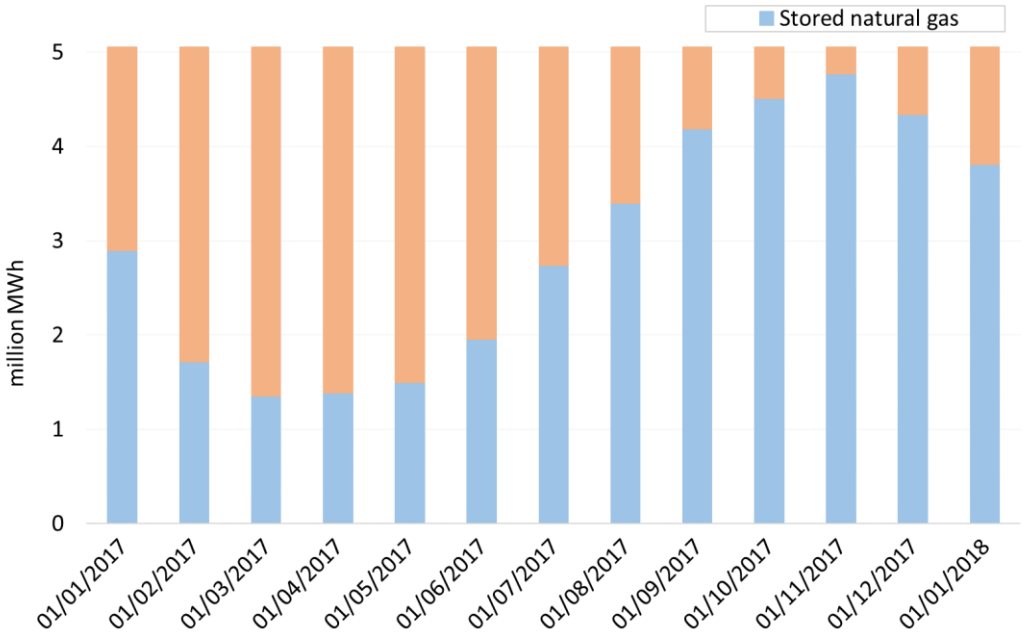


Figure 5.2.5 Natural gas stocks at UGSF Okoli on specific days in 2017

After the new electrically driven compressor unit (MK 5N) and the relative infrastructure had been successfully installed before the beginning of the injection season in 2017, two existing gas units were replaced with new ones, whereby the final configuration of the motor-compressor unit was completed, composed of two new gas units with the injection capacity of 50 000 m³/hour each and of a new electrical unit with the injection capacity of 80 000 m³/hour. The two old gas units with the total capacity of 90 000 m³/hour were left in reserve.

The construction of the connection gas pipelines of two new operating wells was completed at UGSF Okoli (Ok-62 and Ok-63), and a permit for the use of the new

18 *Technical capacity is the total capacity of the gas storage system which the gas storage system operator can offer to system users, taking into account the integrity and technical capabilities of the gas storage system*

facilities was obtained. The construction of the gas pipelines of the old wells Ok-20, Ok-26 and Ok-1D, converted into operating wells, was completed, also for the purpose of gas withdrawal and injection from/into UGSF Okoli. A permit for test exploitation of the wells was obtained, and the use permit is expected in 2018.

Also started is the replacement of the entry/exit separator at UGSF Okoli, which separates the liquid phase potentially present in natural gas. The old separator had a flow capacity of 160 000 m^3/h, while the capacity of the new separator will be 240 000 m^3/h of gas. The necessary technical documentation has been drawn up, and execution of works is planned for 2018.

The development of an integrated computer model for UGSF Okoli was completed. The purpose of the model was to realistically evaluate all the operating parameters of UGSF Okoli and to optimise the storage as a whole in order to inform decision-making regarding further investment in the UGSF Okoli.

In 2017, additional exploration works continued at the location of the "Grubišno polje" hydrocarbon production field to establish the possibility of gas storage in geological formations. Evaluation of the environmental impact of the project resulted in the Decision of the competent Ministry of Environment and Energy regarding acceptability of the project's environmental impact.

In December 2016, pursuant to the *Methodology for setting tariffs for gas storage*, HERA issued the *Decision on tariff amounts for gas storage (Official Gazette No. 122/16)*, which set out tariffs for gas storage in the second regulatory period 2017–2021. The tariff amounts for gas storage pursuant to that *Decision* are shown in Table 5.2.3.

Table 5.2.3 Tariff amounts for gas storage for the second regulatory period 2017–2021

Tariff type	*Tariff item ID*	*Tariff item*	*Tariffs – HERA adjustment (excluding VAT)*					*Unit*
			2017	*2018*	*2019*	*2020*	*2021*	
Tariff for contracted standard bundled unit, annual	T_{SBU}	Tariff for standard bundled unit	1,339,094	1,324,608	1,310,279	1,296,105	1,282,084	HRK/SBU
Tariffs for contracted individual firm services, annual	$T_{F,INJ}$	Tariff for firm injection capacity	1.2243	1.2110	1.1979	1.1850	1.1721	HRK/kWh day
	$T_{F,WIT}$	Tariff for firm withdrawal capacity	0.9794	0.9688	0.9583	0.9480	0.9377	HRK/kWh day
	$T_{F,OV}$	Tariff item for firm operating volume	0.0205	0.0203	0.0201	0.0199	0.0196	HRK/kWh
Tariffs for individual contracted interruptible services, daily	$T_{I,INJ}$	Tariff for interruptible non-nominated injection capacity	0.0100	0.0099	0.0098	0.0097	0.0096	HRK/kWh day
	$T_{I,WIT}$	Tariff for interruptible non-nominated withdrawal capacity	0.0080	0.0079	0.0078	0.0077	0.0077	

The market role and the significance of gas storage are directly related to other gas market components, particularly in the context of market liberalisation. In this sense, the operations of the gas storage system operator were marked by several phases – up to 31 March 2014, when the storage system was used by only one user; from 1 April 2014 to 31 March 2017, when the storage system was used by a number of users for the first time (four gas suppliers and the transmission system operator); and a further increase in the number of users after 1 April 2017, when the gas storage service is used by up to 10 users (nine gas suppliers and the transmission system operator). The gas storage system operator was obliged[19] to reserve a portion of gas storage system capacity, i.e. SBU-s, for priority allocation to the supplier on the wholesale market. 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 after 1 April 2017. The gas storage system operator conducted a capacity booking procedure for the five-year period which began on 1 April 2017, in which 18 users expressed their interest to lease and after which some users exercised their right to participate in the secondary market of gas storage system capacities. The allocation of standard bundled units (SBUs) during those periods is shown in Figure 5.2.6. 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.

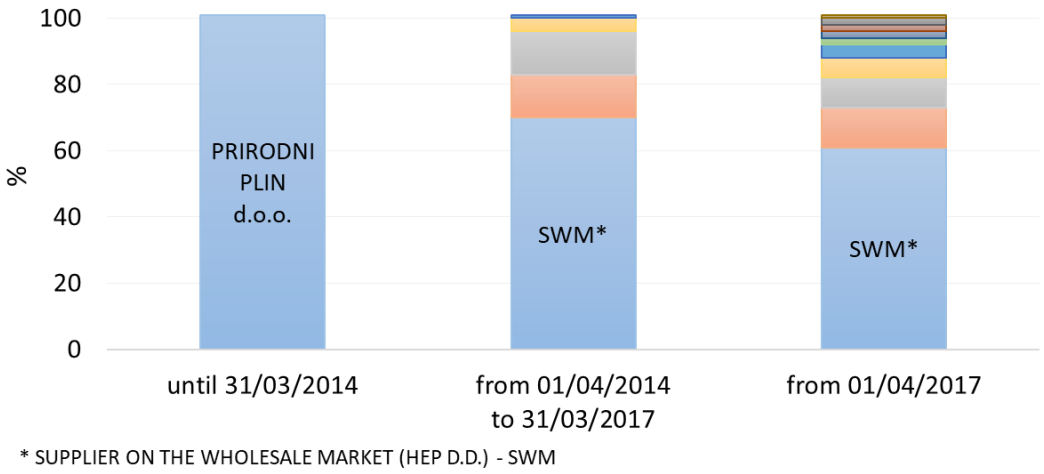


Figure 5.2.6 Allocation of UGSF Okoli gas storage capacities (standard bundled units)

5.2.3 Gas distribution

Gas distribution is a regulated energy activity performed as a public service. In 2017, gas distribution in Croatia was performed by 35 energy entities.

According to data collected by HERA from 35 distribution system operators, the total quantity of gas distributed [20]in Croatia in 2017 amounted to 11 173 million kWh, which was a 3.1% increase in comparison to the total distributed quantity in

19 *Decision of the Republic of Croatia on determining priorities in implementing the procedure for gas storage system capacity allocation for suppliers participating in the wholesale gas market (OG 29/14 and Article 31 paragraph 2 of the Act on Amendments to the Gas Market Act (OG 16/17),*

20 *Natural gas and associated gas*

2016. The largest quantities were distributed to TM2 (4 096 million kWh), TM5 (1 365 million kWh), and TM3 (1 239 million kWh) tariff model users.

The total number of billing metering points for end consumers connected to the distribution system amounted to 665 283 in 2017, which was an increase of 0.8% as compared to the total number of billing metering points in 2016. Out of that number, 659 358 billing metering points were under TM1-TM4 tariff models (with annual consumption up to 100 000 kWh), and 5 925 were under TM5-TM12 tariff models (with annual consumption exceeding 100 000 kWh).

The total length of all gas distribution systems in Croatia was 19 091 km at the end of 2017, which represents a 0.32% decrease compared to 2016, according to data collected from distribution system operators. In the total length of distribution systems, low-pressure gas pipelines accounted for 28.6%, medium-pressure gas pipelines accounted for 64.7%, and high-pressure gas pipelines accounted for 6.8%. In terms of material type, 27.6% of the total distribution system at the end of 2017 was made of steel pipes, 72% was made of polyethylene pipes, and 0.3% was made of other materials. There were 118 odourisation stations in all distribution systems at the end of 2017. A comparison of the length of distribution systems, total technical capacity of entries into distribution systems, and gas losses by distribution system operators in Croatia in 2017 is shown in Figure 5.2.7. The geographical layout of the distribution system operators' distribution areas in 2017 is shown in Figure 5.2.8.

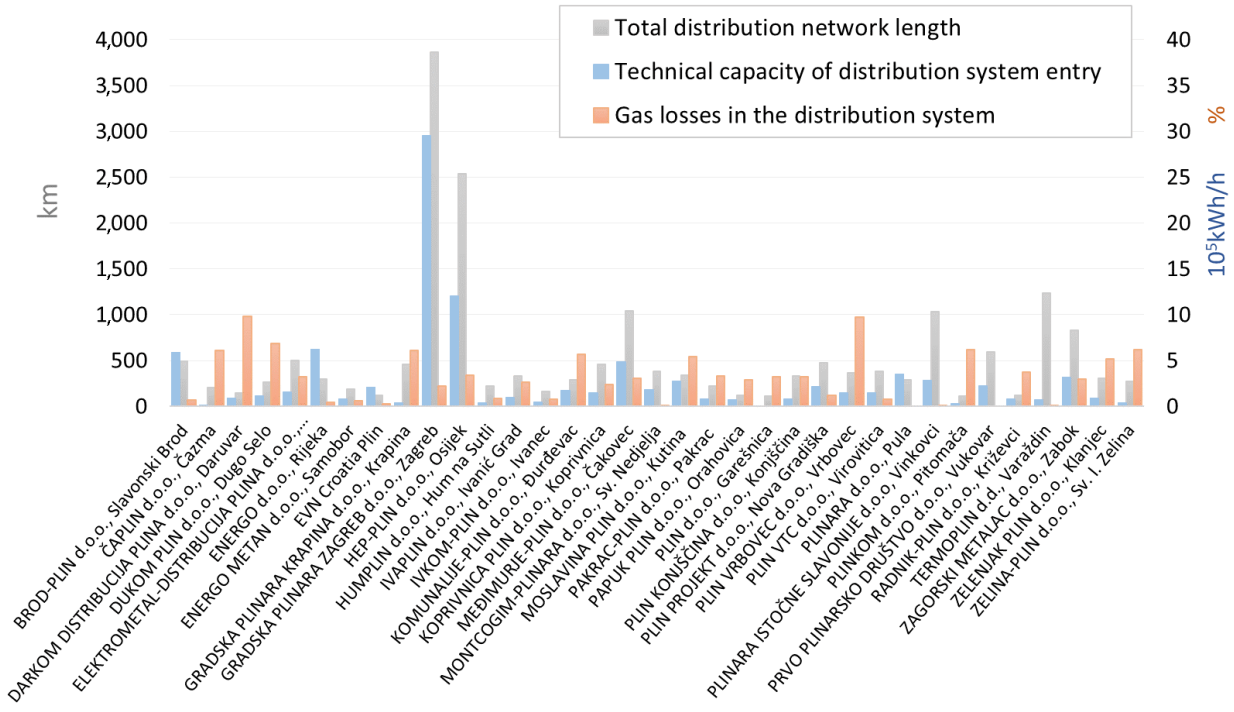


Figure 5.2.7 Comparison of the length of distribution systems, total technical capacity of entries into distribution systems, and gas losses by distribution system operators in Croatia in 2017

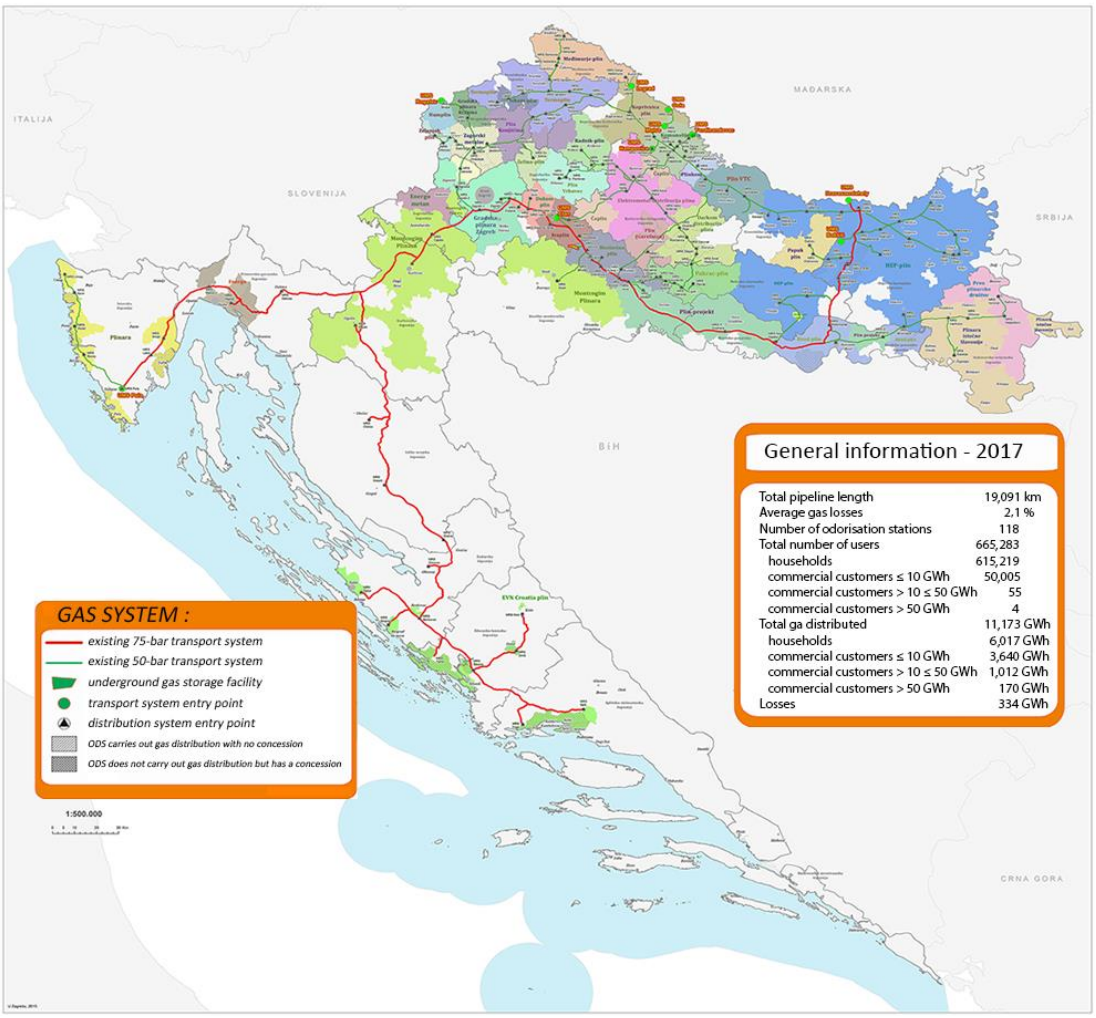


Figure 5.2.8 Distribution system operators' distribution areas and basic information on gas distribution activities in Croatia in 2017

Under the ***Energy Act***, the price of gas distribution is regulated. In 2017 it was determined in accordance with the *Methodology for setting tariffs for gas distribution*. The *Methodology* classifies billing metering points into 12 tariff models according to annual gas consumption. 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 fee that is equal for all operators for a particular tariff model. The gas distribution tariffs for the period from 1 January to 31 December 2017 were established in the *Decision on gas distribution tariff amounts*.

The average gas distribution price of particular distribution system operators can be expressed as a ratio of annual revenue from gas distribution, based on tariff items Ts1 and Ts2, and the total annual distributed gas quantities. The total average weighted price of gas distribution in the period from 1 January to 31 December 2017 of all distribution system operators in Croatia was HRK 0.0475 kWh, which represents a decrease of 5.5% compared to the total average weighted price of gas distribution in 2016. Average gas distribution tariffs in 2017 as compared to 2016 per distribution system operator are shown in Figure 5.2.9.

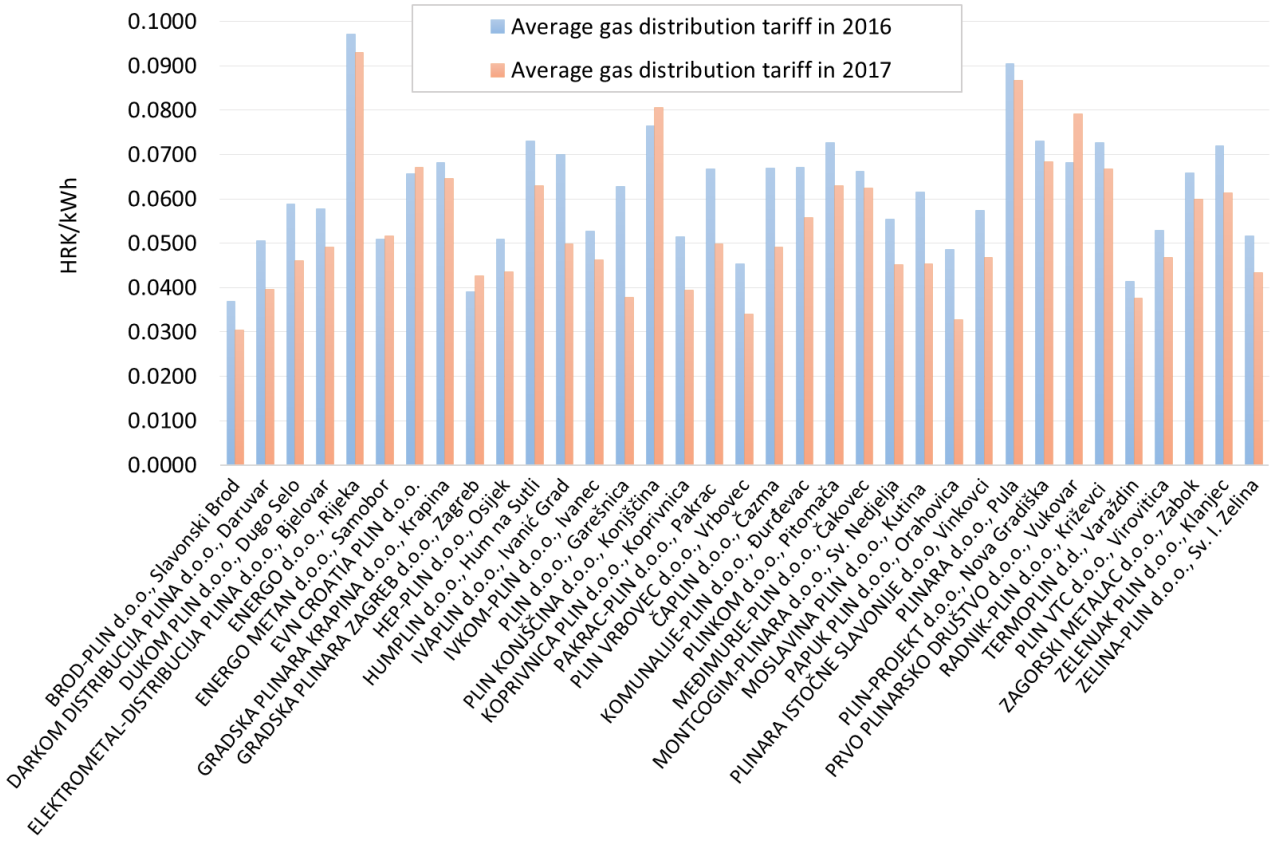


Figure 5.2.9 Average gas distribution tariffs in 2016 and 2017 per distribution system operator in Croatia

In 2017, pursuant to the *Methodology*, HERA conducted a regular revision of allowed revenues for distribution system operators in Croatia. In this process, HERA identified a difference between revised allowed revenues and realised revenues generated from gas distribution activities in the years of the first regulatory period 2014–2016. Further, the identified differences (positive or negative) were divided in four equal parts and a quarter was added to planned allowed revenues for the remaining years of the second regulatory period 2018–2021. HERA used the obtained correction element to correct planned revenues and adjusted allowed revenues, and the amounts of tariffs for the remaining years of the second regulatory period 2018–2021. After the regular revision, the total average weighted price of gas distribution of all distribution system operators in Croatia for 2018 is HRK 0.0485/kWh, which is a decrease of 1.3% as compared to the total average weighted price of gas distribution in 2018 calculated before the regular revision.

5.2.4 Unbundling of activities

The unbundling of energy activities pursuant to the provisions of the ***Gas Market Act*** implies that the activities of the transmission system operator, distribution system operators, gas storage system operator, and LNG system operator, including operators that are part of a vertically integrated energy entity, must be organised into independent legal entities independently of other activities in the gas sector.

The unbundling requirements were met by all market participants by 2010.

In 2017, gas was transported by the energy entity PLINACRO d.o.o., while gas storage was handled by the energy entity PODZEMNO SKLADIŠTE PLINA d.o.o.

In 2017, gas was distributed by 35 energy entities and actively supplied by 46 out of 54 licensed energy entities. 12 distribution system operators were organised as independent legal engaged only in gas distribution, whereas 23 energy entities were organised as vertically integrated legal entities with fewer than 100 000 customers and were active both in gas distribution and gas supply. The structure of energy entities in the gas sector on 1 May 2018, with respect to their energy activities and unbundling requirements, is shown in Figure 5.2.10.

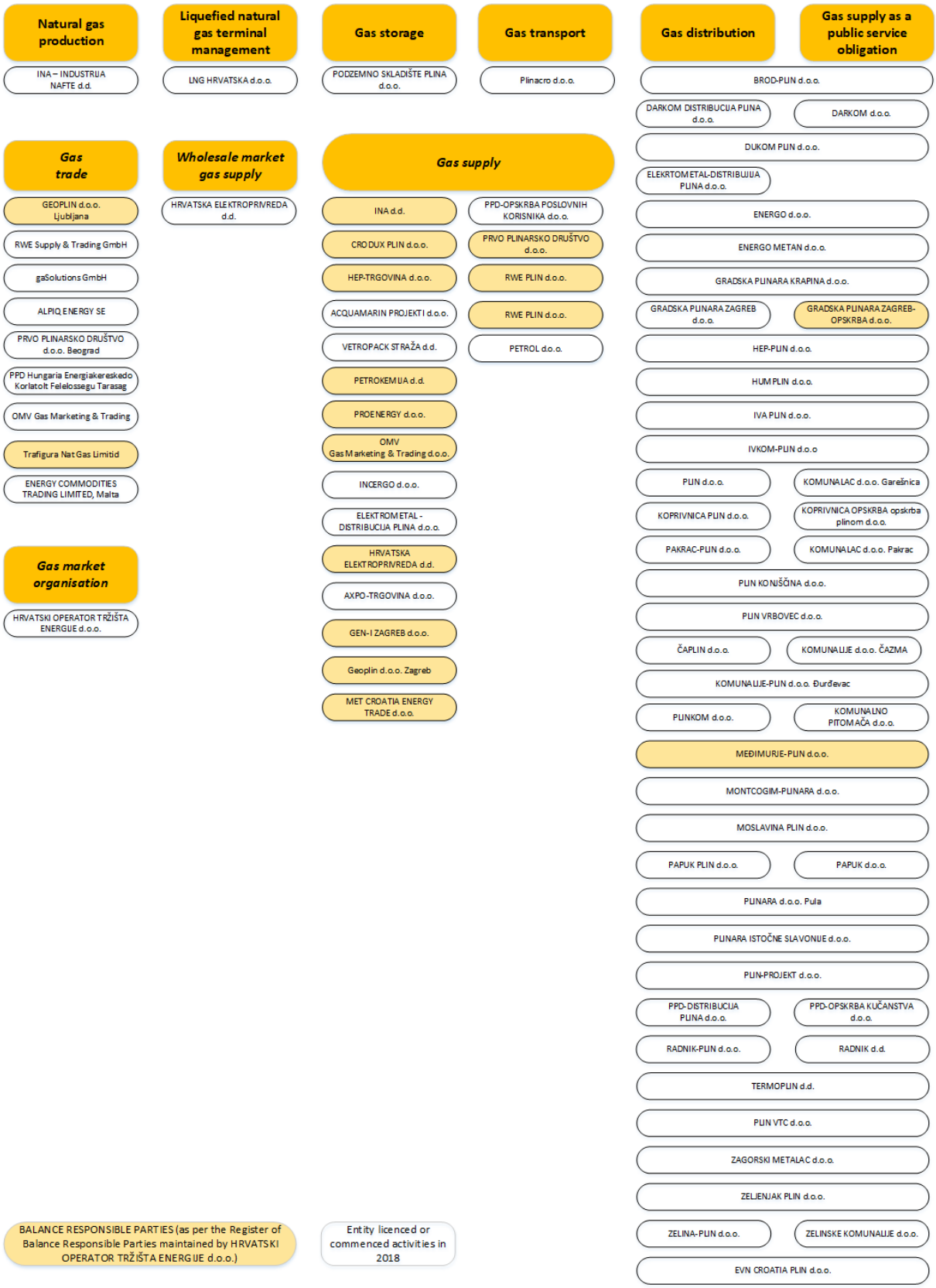


Figure 5.2.10 Structure of energy entities by their role in the Croatian gas market

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 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 PLINACRO d.o.o. and some entities engaged in the production, trade, and supply of electricity, 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 Gas market

5.3.1 Natural gas balance

In 2017, the total gas quantity which entered the transmission system amounted to 32 348 million kWh, which was 17% more than in 2016. Of the total quantity, 11 193 million kWh or 34.6% of natural gas came from domestic production, which is 3.1% more than in the previous year; 17 956 million kWh or 55.5% of the total transported quantity of natural gas entered the transmission system from imports, which is 39.9% more than in 2016; and 3 199 million kWh of natural gas entered the transmission system from UGSF Okoli, which is 20% less than in 2016 (Figure 5.3.1.).

Also, the total gas quantity that exited the transmission system in 2017 amounted to 32 340 million kWh, which is 17% more than in 2016. Out of these quantities, end consumers directly connected to the transmission system received 16 955 million kWh or 52.4% of the total quantity of natural gas, which is 25.2% more than in the previous year; 11 173 million kWh or 34.5% of natural gas were delivered to consumers connected to the distribution system, which is 3.1% more than in 2016; and 4 212 million kWh of natural gas were delivered to UGSF Okoli, which is 13.0% of the total quantity, or 28.9% more than in 2016.

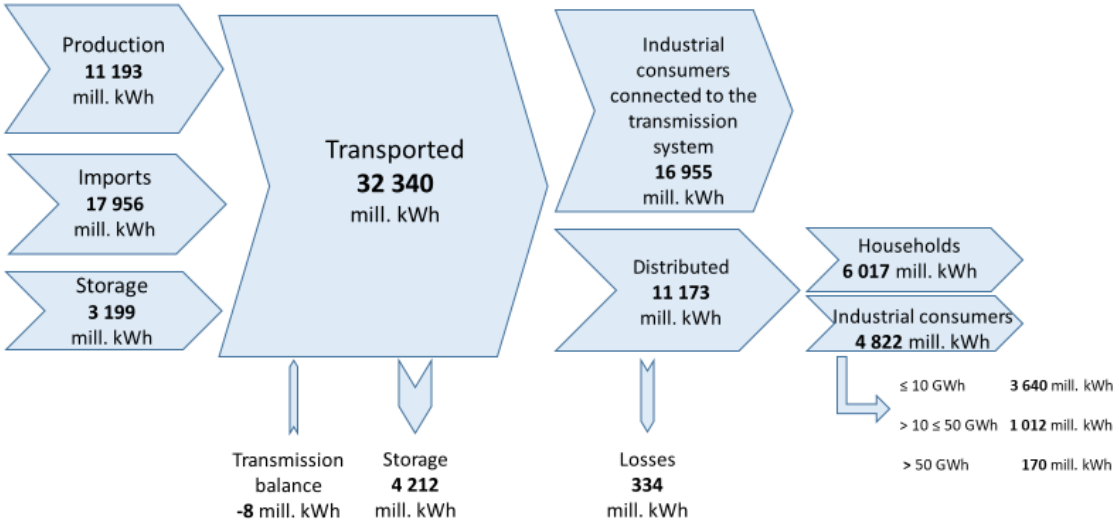


Figure 5.3.1 Natural gas balance in Croatia in 2017

According to the data from gas suppliers, a total of 10 839 million kWh of gas was delivered to end consumers in 2017 from the distribution systems, of which 6 017 million kWh (56%) were delivered to households and 4 822 million kWh (44%) were delivered to industrial consumers.

In 2017, 49 gas suppliers associated in 13 balance groups used the gas transmission service. According to the shares of individual balance groups in the quantity of gas transported by transmission system exit groups, the balance responsible party INA d.d. took over 26.5% of gas from the transmission system, balance responsible party Prvo plinarsko društvo d.o.o. took over 23.9% of gas, balance responsible party HEP d.d. took over 17.7%, and balance responsible party HEP-Trgovina plina took over 19.4% of gas, while the remaining nine balance groups took over 12.5%. The shares of respective balance groups in 2017 are shown in Figure 5.3.2.

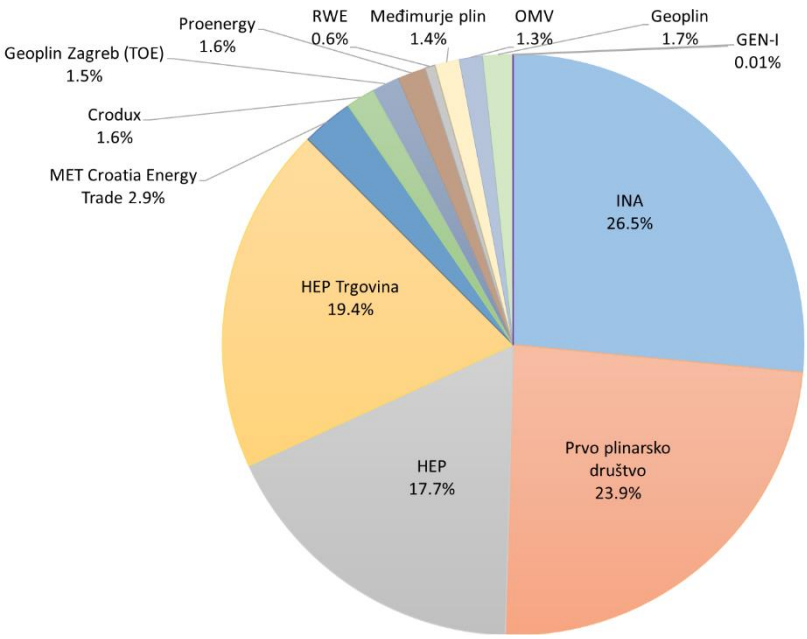


Figure 5.3.2 Shares of balance groups in total natural gas quantities delivered by the transmission system in 2017

A significant component of Croatia's wholesale gas market is gas trade carried out at the virtual trading point (VTP). VTP is a virtual point in the gas system (the transmission system and the gas storage system) where balance responsible parties can trade in gas. Transactions are agreed bilaterally and confirmed and carried out via a system provided by the gas market operator – HROTE d.o.o. In addition, transactions are related to the time of the gas day and can be agreed and registered either for the following or the current gas day. In 2017, there were 13 active balance responsible parties which traded a total of 16 414 421 MWh of gas (12% more than in 2016).

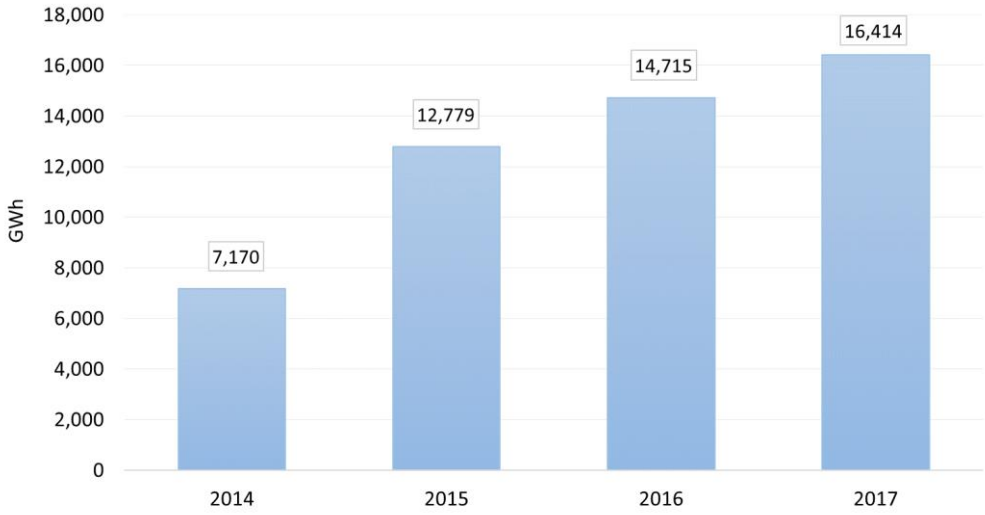


Figure 5.3.3 Gas quantities traded at the virtual trading point (VTP) in 2014, 2015, 2016 and 2017

In accordance with the REMIT Regulation, gas market participants trading on organised and unorganised wholesale markets are obliged to register with CEREMP. CEREMP unifies the national registers of all EU countries, and HERA, as

Croatia's national regulatory agency, is obliged to establish a national register of participants on the Croatian market. Gas market participants trading on unorganised wholesale markets were obliged to register with CEREMP by the beginning of April 2016, and HERA took actions during 2016 and 2017 concerning the registration of gas traders, gas suppliers, transmission system operators, and gas storage system operators.

5.3.2 Natural gas supply and end consumption

In 2017, natural gas in Croatia was supplied by 46 energy entities, even though 54 energy entities were licensed to supply gas. As per the data that HERA collects from gas suppliers on a quarterly basis, the gas supply structure in 2017 was as follows:

- 6 017 million kWh were delivered to end consumers connected to the distribution system, using the gas supply public service[21] *(hereinafter: end consumers using the public service)*, i.e. 22% of the total gas quantity delivered,
- 4 822 million kWh were delivered to end consumers connected to the distribution system and supplied under market conditions *(hereinafter: end consumers connected to the distribution system)*, i.e. 17% of the total gas quantity delivered, and
- 16 955 million kWh were delivered to end consumers in the gas market directly connected to the transmission system *(hereinafter: end consumers connected to the transmission system)*, i.e. 61% of the total gas quantity delivered.

The delivery structure in 2017 is shown in Figure 5.3.4.

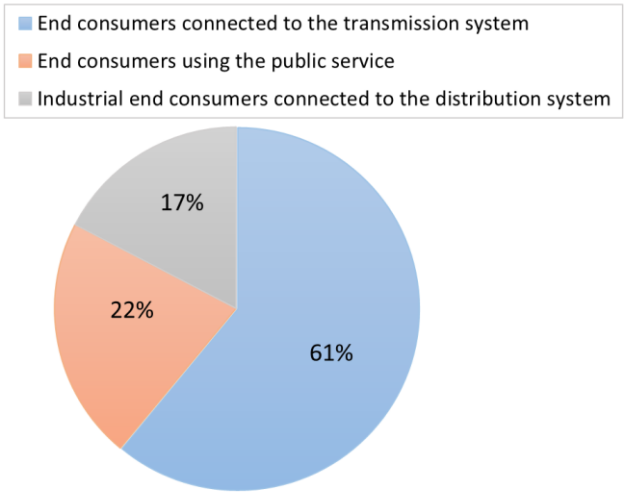


Figure 5.3.4 Structure of natural gas delivery from the transmission system in 2017 (gas quantities in million kWh))

In 2017, the total gas quantity which gas suppliers delivered to end consumers connected to the distribution system amounted to 10 839 million kWh, of which 6 017 million kWh of gas were delivered to end consumers using the public service, which is an increase of 2.5% as compared to 2016. A total of 4 822 million kWh of gas were delivered to industrial end consumers connected to the distribution

21 *Supply as part of the public service, pursuant to the **Gas Market Act**, is defined as gas supply carried out under regulated conditions for households, and gas supply for those energy entities, legal and natural persons which use such gas to generate thermal energy supplied to households pursuant to the **Thermal Energy Market Act**.*

system, which is an increase of 2.8% as compared to 2016. A total of 16 955 million kWh of gas were delivered to end consumers connected to the transmission system, which is an increase of 25.2% as compared to 2016.

The total number of end consumers on the gas market at the end of 2017 was 662 864, of which 615 576 were end consumers using the public service under market conditions for the household category, 47 269 were end consumers supplied under market conditions in the distribution system, and 19 were end consumers supplied under market conditions in the transmission system.

After the beginning of market liberalisation in the household category in the second half of 2016, 2017 was marked by the continued trend of competition development on the retail market, which resulted in many supplier switches. The proportion of gas distributed to consumers who switched gas suppliers in 2017 was 6.1% (671 million kWh) of the total delivered quantity of gas (10 839 million kWh), while the number of successful supplier switches (13 619) accounts for 2% of the total number of billing metering points (665 283) (Figure 5.3.5.).

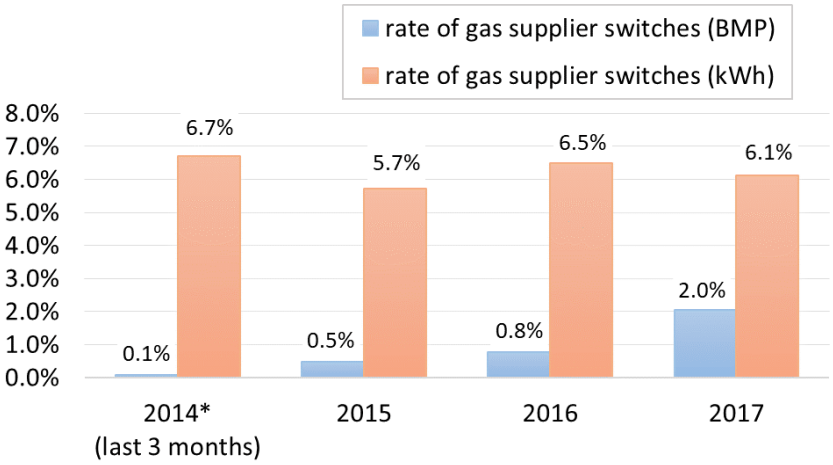


Figure 5.3.5 Rates of gas supplier switches with regard to the number of billing metering points (BMPs) and gas consumption (kWh) since the beginning of retail market liberalisation in Croatia

Further retail market liberalisation has been marked by a significant number of terminated supplier switching procedures, as well as complaints concerning the behaviour of market participants. In 2017, 8 435 supplier switching procedures were terminated. The reasons for termination of supplier switching procedures and for complaints concerning actions of energy entities were mostly related to outstanding bills owed to current suppliers, incorrect customer information, and withdrawals from supplier switching procedures. In order to eliminate obstacles to the development of the retail market, HERA has implemented a number of measures. The most important ones are enhancing HROTE's supplier switch IT system in collaboration with HROTE; informing market participants of their rights and obligations through HERA's opinions or binding interpretations; collecting opinions and recommendations from participants in the supplier switching procedure and from consumers by means of surveys, etc. In addition, HERA plans to modify the supplier switching rules and to supervise operations of energy entities within the framework of its authority in order to ensure an efficient retail market on which end consumers can take advantage of the best conditions for gas supply.

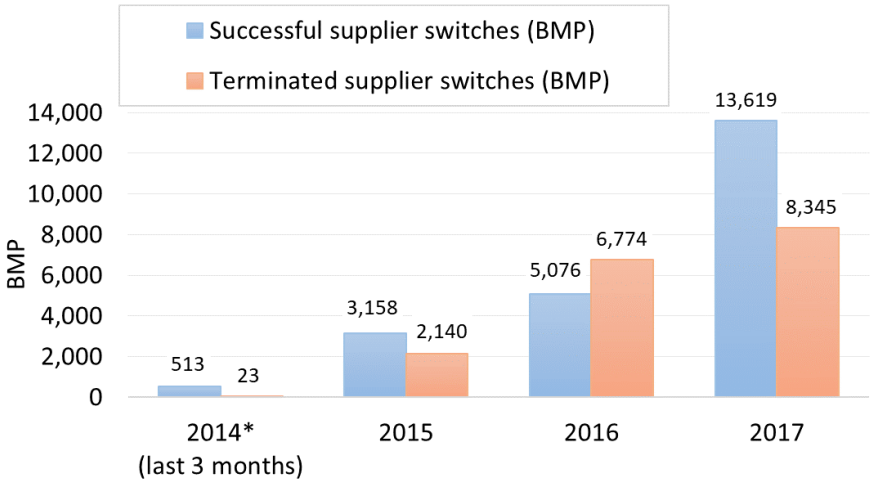


Figure 5.3.6 Number of completed and terminated gas supplier switches since the start of retail market liberalisation in Croatia

5.3.3 Quality of gas supply

The ***Gas Market Act*** sets out the obligations of gas producers and transmission, distribution, storage and LNG system operators, as well as the obligations of gas suppliers, regarding 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 transmission, distribution, and gas storage system operators, as well as by gas suppliers, is set out in the *General terms and conditions of gas supply*. Thus, the quality of service encompasses the commercial requirements of gas supply quality, which, when observed 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 time, and 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 Annex I to 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 transmission system operator, the distribution system operator, the gas storage 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 or end consumers.

Since October 2014, system operators and suppliers have been obliged to provide HERA with data on indicators of supply quality for guaranteed standards of supply

quality, no later than 30 days after the end of the relevant quarter. Further, 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.

In this way, HERA collects data on the indicators of gas supply quality for the transmission system operator in order to monitor:

- general standards of supply quality: reliability of delivery (monitoring delivery interruptions, transmission system leak tests) and quality of gas (gas quality control), and
- guaranteed standards of supply quality: reliability of delivery (planned delivery interruptions).

In addition, HERA collects data on gas supply quality indicators for distribution system operators in order to monitor:

- general standards of supply quality: reliability of delivery (monitoring delivery interruptions, distribution 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).

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 queries from end consumers, correction of gas supply invoices), and
- guaranteed standards of supply quality: quality of service (correction of gas supply invoices, restoration of gas supply upon the settlement of obligations).

Incentives and reimbursements for services rendered beyond the guaranteed standard are planned for 2018; by that time, values and criteria for the adjustment of general standards of gas supply quality must be established, including reimbursement amounts for respective guaranteed standards of gas supply quality.

In 2017, the transmission system operator recorded 22 planned interruptions in gas delivery in the gas transmission system. The total duration of all delivery interruptions in 2017 was 99 hours.

In 2017, distribution system operators recorded an average of ten planned gas delivery interruptions and 23 unplanned delivery interruptions. The average duration of all delivery interruptions in an individual distribution system in 2017 was 422 hours.

5.3.4 Prices of natural gas

Regulated gas prices

The regulated wholesale gas price from 1 January to 31 March 2017 was, as in 2016, established in the *Decision on gas price, obligating suppliers participating in the wholesale gas market to sell gas to public service gas suppliers for household consumers*, which was issued by the Croatian Government in March 2016 and entered into force on 1 April 2016. The gas price pursuant to this *Decision* was equal for all end consumers using the public service and set at HRK 0.1734/kWh.

Further, in March 2017, the Croatian Government issued a new *Decision on gas price, obligating suppliers participating in the wholesale gas market to sell gas to public service gas suppliers for household consumers for the period from 1 April 2017 to 31 March 2018*. The gas price from this *Decision on gas price* was set at HRK 0.1809/kWh.

The regulated retail gas price, which is applicable for end consumers using the public service, i.e. household end consumers, and end consumers using gas for thermal energy generation to supply households (boiler rooms) is established pursuant to the *Methodology for setting tariffs for public service gas supply and guaranteed supply*.

The tariffs for public service gas supply and guaranteed supply for the twelve tariff models for all public service gas suppliers in Croatia for the period from 1 January to 31 March 2017 were established in the *Decision on tariffs for gas supply as a public service for the period from 1 January to 31 March 2017*, and for the period from 1 April to 31 December 2017 they were established by the *Methodology for setting tariffs for public service gas supply and guaranteed supply*.

In 2017, the total average gas sale price for end consumers using the public service in Croatia varied from HRK 0.2108/kWh to HRK 0.3231/kWh (net of VAT). In 2017, the average gas sale price for end consumers using the public service[22] in Croatia was HRK 0.2446/kWh (net of VAT), which represents an 11% decrease in the total average price compared to 2016.

Table 5.3.1 shows quarterly trends of average gas prices excluding VAT for end consumers using the public service in Croatia in 2017, in total, by household end consumers, and by end consumers using gas for thermal energy generation to supply households (boiler rooms), is shown in Table 5.3.1.

Table 5.3.1 Average quarterly gas sale prices for end consumers using the public service in Croatia in 2017, net of VAT

	HOUSEHOLDS (HRK/kWh)	*BOILER ROOMS (HRK/kWh)*
Q1	0.2378	0.2201
Q2	0.2682	0.2193
Q3	0.3040	0.2106
Q4	0.2416	0.2209
TOTAL	**0.2465**	**0.2197**
TOTAL (PUBLIC SERVICE)	**0.2446**	

The structure of the regulated final gas price is set by the *Methodology for setting tariffs for public service gas supply and guaranteed supply*, pursuant to which the gas price for end consumers using the public service consists of the cost of gas procurement, gas distribution, and supply margin. The cost of gas procurement represents the gas price as defined in a decision of the Croatian Government according to which public service gas suppliers purchase gas from the supplier on the wholesale gas market (SWMs), and its share on average accounted for 72% of the total regulated final price of gas in 2017, excluding VAT. The share of distribution in the average final gas price in 2017 was 22%, excluding VAT, while

22 *The weighted average by delivered gas quantities for end consumers using the public service, for each respective gas supplier.*

the gross supply margin of public service suppliers (PSSes) was 6%. The structure of the regulated gas price in 2017 for end consumers using supply as a public service is shown in Figure 5.3.7.

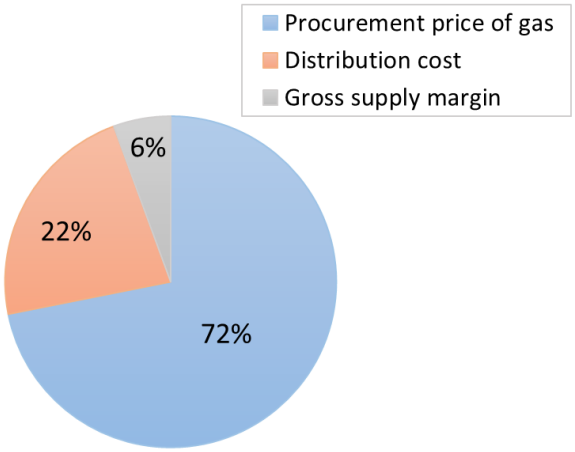


Figure 5.3.7 Structure of the regulated final price of gas in 2017, net of VAT

Market gas prices

In 2017, HERA used a questionnaire on gas supply and trade to collect quarterly data from gas suppliers and traders in Croatia. The purpose of the questionnaire was to gather data on gas procurement, such as the number of gas sellers, the quantity of procured gas, and the average purchase price of gas bought in Croatia under market conditions (under bilateral agreements, including the virtual trading point, excluding imports) and under regulated conditions, as well as the average purchase price of imported gas. In addition, the questionnaire included data on gas sales on the retail market by category of gas consumption for end consumers using the public service, for end consumers on the market, and for direct consumers. The questionnaire also included information on gas sales on the wholesale market.

The average sale price of gas for end consumers connected to the distribution system[23] in Croatia in 2017 amounted to HRK 0.2335 /kWh (net of VAT), which represents a decrease of 16% compared to 2016.

In 2017, the average gas sale price in Croatia for end consumers connected to the transmission system[24] was HRK 0.1805/kWh (net of VAT), or 1% more than in 2016. The lowest price was recorded in Q2 (HRK 0.1673/kWh), and the highest price was recorded in Q1 (HRK 0.1943/kWh).

Table 5.3.2 shows average gas sale prices without VAT in Croatia in 2017 per consumer band for end consumers on the market and for direct end consumers in Table 5.3.2, and the total average sale prices of gas for all consumers who are not using the public service in Croatia.

23 *The weighted average by delivered gas quantity for end consumers on the market connected to the distribution system, for each gas supplier.*

24 *The weighted average by delivered gas quantity for end consumers on the market connected to the transmission system, for each gas supplier.*

Table 5.3.2 Average gas sale price for end consumers on the market in Croatia in 2017, net of VAT

Band	*End consumers connected to the TRANSMISSION system (HRK/kWh)*	*End consumers connected to the DISTRIBUTION system (HRK/kWh)*	*TOTAL (HRK/kWh)*
I1-1	-	0.2860	0.2860
I1-2	-	0.2556	0.2556
I2	0.1588	0.2403	0.2401
I3-1	0.1731	0.2141	0.2127
I3-2	0.1680	0.1930	0.1883
I4-1	0.1763	0.1905	0.1871
I4-2	0.1728	0.1954	0.1793
I5	*	-	*
I6	0.1810	-	0.1810

** 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 2017*

The quarterly trends of average retail gas prices in 2017 for all end consumer bands are shown in Figure 5.3.8. The prices are categorised by annual gas consumption, starting with band I1-1, in which gas consumption is less than or equal to 100 000 kWh, while in the last consumer band (I6) gas consumption exceeds 1 000 000 000 kWh. In 2017, the total average retail price of gas for all consumer bands was HRK 0.1937/kWh, which is a 7% decrease compared to 2016.

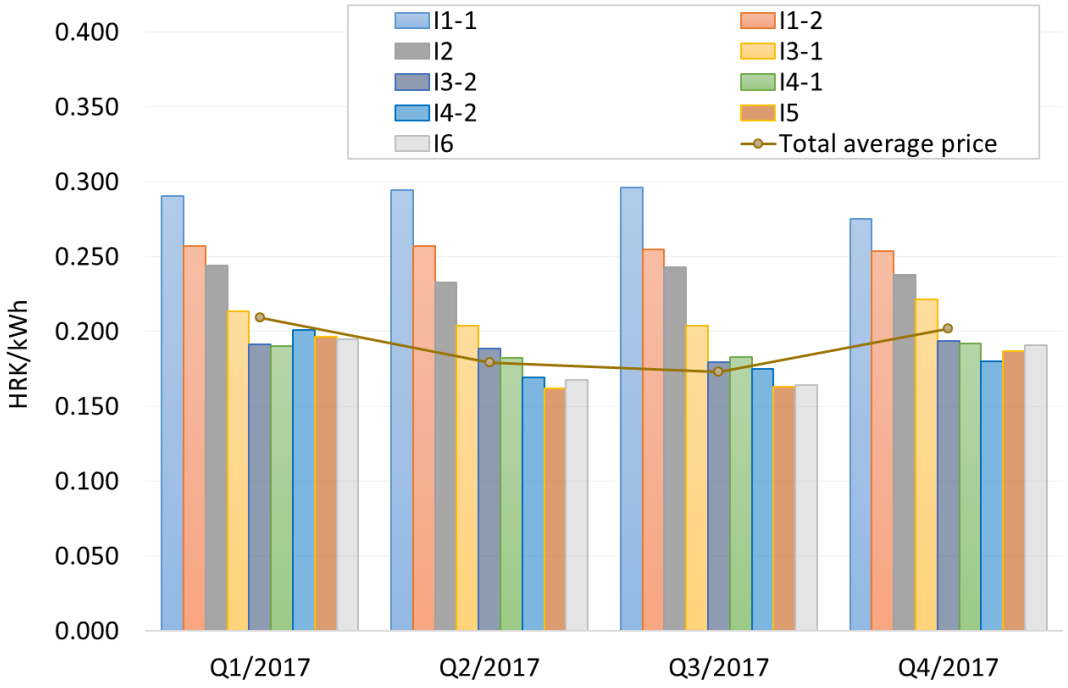


Figure 5.3.8 Average retail prices of gas by quarter for all end consumer bands in Croatia in 2017, net of VAT

HERA's end consumer categorisation complies with *Directive 2012/27/EC*, *Commission Regulation (EU) 2016/1952* and the Methodology of the European Statistical Office (EUROSTAT), as well as with the previous HERA categorisation. However, HERA established a total of nine end consumer bands, compared to the

six categories of industrial end consumers in EUROSTAT's methodology. The reason for this is to enable continuous monitoring of prices and comparing of past gas prices. Gas consumption was previously categorized in three groups – gas consumption less than or equal to 10 GWh, gas consumption exceeding 10 GWh but less than or equal to 50 GWh, and gas consumption exceeding 50 GWh.

Average retail market gas prices in Croatia for these three gas consumption groups by quarter from 2012 to 2017 are shown in Figure 5.3.9.

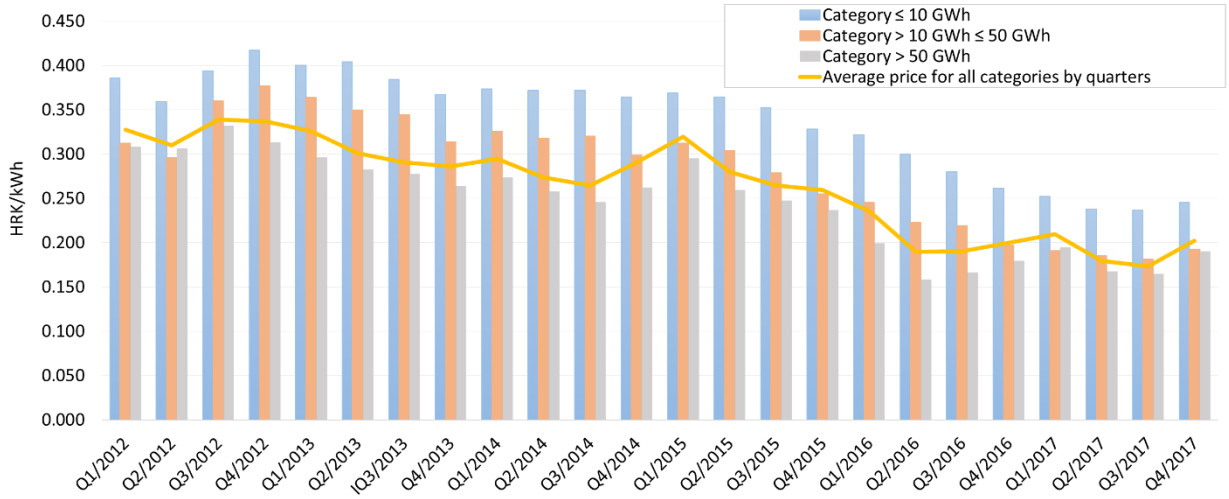


Figure 5.3.9 Average retail market gas prices excluding VAT from 2012 to 2017 for end consumer categories on the market in Croatia

The average gas sale price without VAT on the wholesale market in 2017 (sale under bilateral agreements, including the virtual trading point) was HRK 0.1662/kWh, which represents a decrease of 10% as compared to 2016, when it was HRK 0.1855/kWh. In 2017, a total of 12 suppliers sold gas on the wholesale market. The highest average wholesale gas price, including imports by individual gas suppliers in 2017, was HRK 0.2070/kWh, while the lowest price was HRK 0.1410/kWh.

The average gas purchase price without VAT on the market in 2017 (procurement under bilateral agreements, at the virtual trading point, and from imports) was HRK 0.1598/kWh, which represents a decrease of 2% as compared to 2016, when it was HRK 0.1624/kWh. The average purchase price of gas in 2017 was marked by a continued downward trend, which began in Q2 of 2015 and ended in Q3 of 2016, when a mild increase in price was recorded; mild increases were noted again in Q4 of 2016 and Q1 of 2017. In 2017, the average purchase price of gas on the market was the highest in Q4, when it was HRK 0.1710/kWh, and the lowest in Q3, when it was HRK 0.1412/kWh.

A comparison of annual retail and wholesale market prices of gas in 2017 shows that the average retail price was 21% higher than the average purchase price of gas on the market. Average gas prices on the retail market according to HERA's previous categorisation compared with the average purchase price of gas without VAT on the market from 2012 to 2017 are shown in Figure 5.3.10.

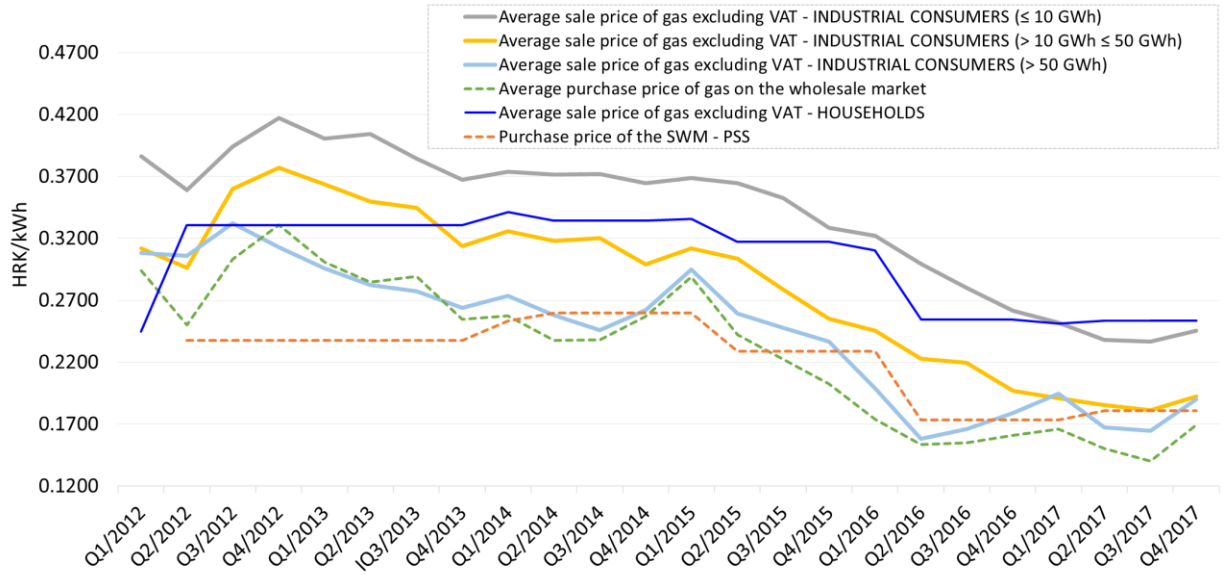


Figure 5.3.10 Average gas prices on the retail market compared with the average purchase price of gas on the gas market from 2012 to 2017 [HRK/kWh]

Since early 2014, HERA offers a calculator on its official website for household gas consumers using the public supply service, accessible at http://www.hera.hr/hrvatski/iplin/. The iPlin application enables consumers to select their gas supplier and enter their annual gas consumption in order to receive information on applicable tariff models and gas prices for a particular distribution area, as well as on approximate annual savings for individual consumers in any area of Croatia. A screenshot of the iPlin application is shown in Figure 5.3.11.

Figure 5.3.11 The iPlin application

In addition, iPlin enables users to convert gas consumption amounts from kWh into m^3, and from m^3 into kWh, which facilitates comparisons of the quantity of gas delivered as indicated on the invoice with the quantity of delivered gas as recorded at the metering point. Users should enter correct data on lower heat values, which can be obtained on the website of the corresponding distribution system operator.

Also, iPlin offers end consumers other useful information, such as price lists of non-standard services of the corresponding gas supplier and distribution system operator, as well as all relevant laws and by-laws, as shown in Figure 5.3.12.

Figure 5.3.12 A preview of the iPlin application from HERA's website

Natural gas prices for end consumers in European countries

Natural gas prices for household end consumers in most European countries were continuously on the rise from 2010 to 2012. The prices were steady in 2013, 2014 and 2015, but in 2016 and 2017 the price of natural gas for households decreased in most European countries. In 2017, some European countries, such as Slovenia, UK and Germany, recorded significant price drops over 5%, while in Austria, Italy and Romania gas prices for households increased. According to EUROSTAT's data, natural gas prices for household end consumers in Croatia followed average European gas price trends. Despite these changes, the price of natural gas for households in Croatia was still significantly below the European average in 2017.

Figure 5.3.13 shows the changes in natural gas retail prices in some European countries for households in the D_2, consumption band, 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 2017[25].

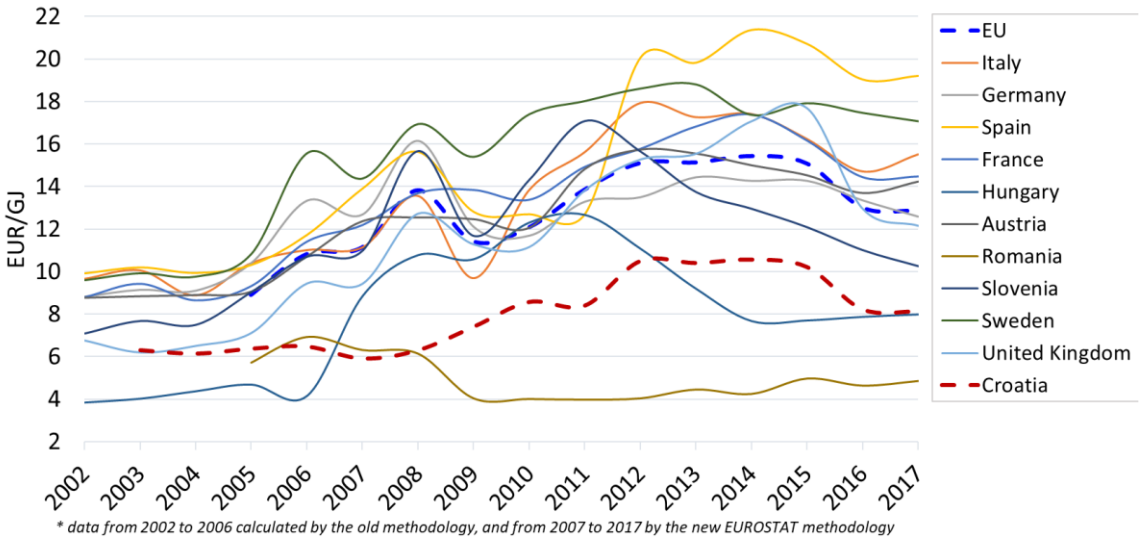


Figure 5.3.13 Changes in the retail prices of natural gas for households in the D_2 band in some European countries from 2002 to 2017 (excluding taxes) [EUR/GJ]

25 *The prices are calculated as average retail prices from July to December of the relevant years.*

According to EUROSTAT's data, in 2017 the prices of natural gas for households in the D_2 band in the European Union decreased by 1.1% as compared to 2016.

Figure 5.3.14. shows average natural gas prices for households in the D_2 consumer band from July to December 2017, including and excluding taxes.

The average natural gas sale price with taxes for households in the D_2 band in the second half of 2017 was the highest in Sweden (EUR 31.26/GJ), Denmark (EUR 24.30/GJ), and Italy (EUR 24.28/GJ), and the lowest in Romania (EUR 8.58/GJ), and Hungary (EUR 10.14/GJ). It is evident that the proportion of taxes in the total price of natural gas for this consumer category varied greatly and that it was the highest in Denmark (55.8%), the Netherlands (51.0%), Sweden (45.4%), and Romania (43.3%), and the lowest in the UK (8.7%), Luxembourg (10.3%), and Greece (16.0%).

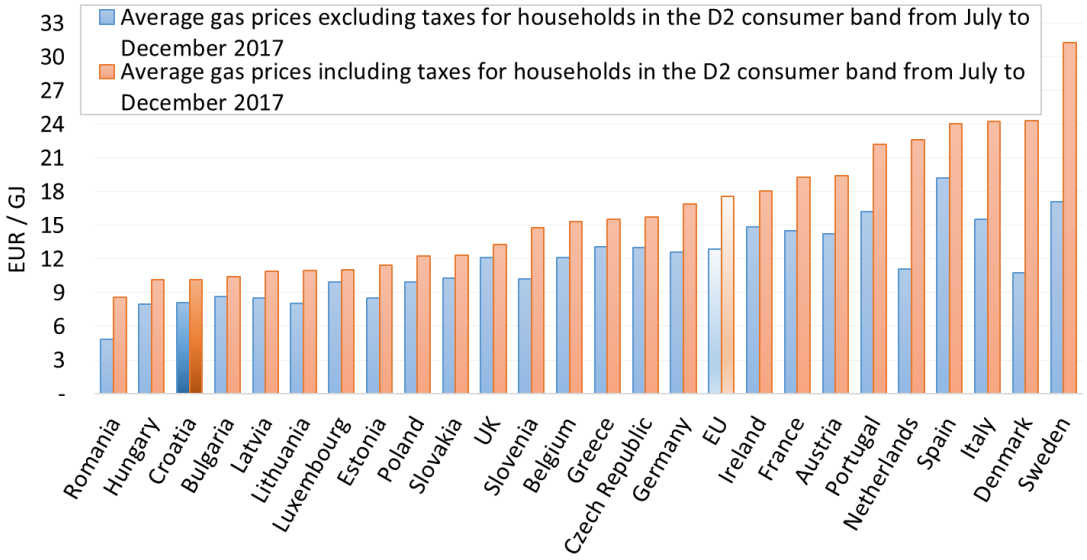


Figure 5.3.14 Average natural gas prices for households in the D_2 consumer band for the period from July to December 2017 (including and excluding taxes)

Figure 5.3.15. shows a comparison of European natural gas retail prices with taxes for households in the D_2 consumer band from July to December 2016 compared to 2017. The international unit of purchasing power standard (PPS)/GJ[26] was used as a price unit to eliminate differences in the prices of goods/services between countries.

26 *PPS (purchasing power standards) is a unit that equalises the purchasing power of different countries.*

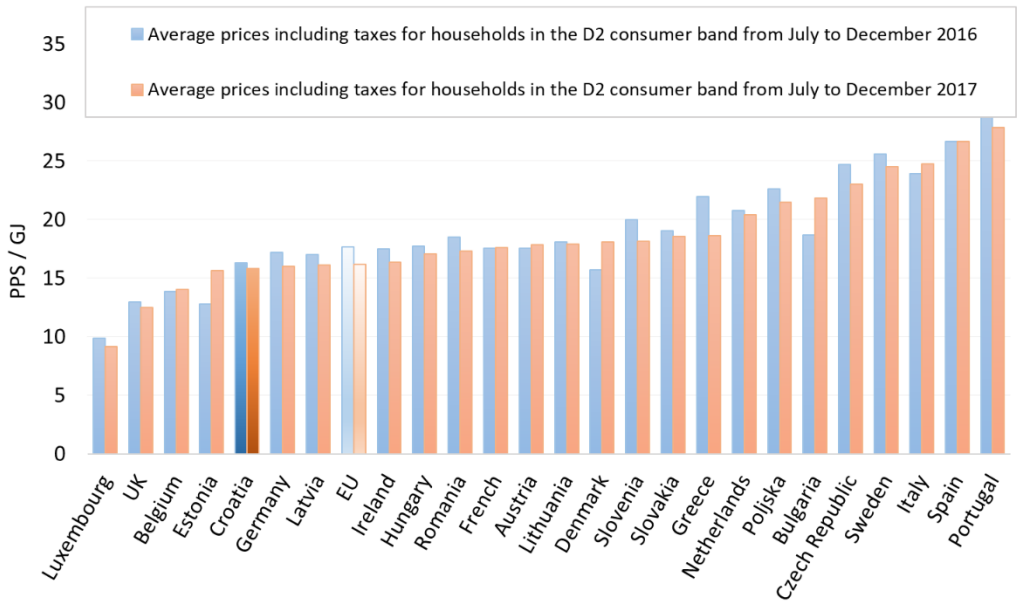


Figure 5.3.15 Comparison of average natural gas prices for households in the D_2 consumer band with the price of goods/services in European countries (including taxes) from July to December 2016, compared to 2017

According to EUROSTAT's data, in 2017 natural gas prices with taxes in the EU decreased by 5.5% for I_3 industrial consumers, with annual natural gas consumption between 10 000 and 100 000 GJ, which approximately corresponds to natural gas consumption of 300 000 to 3 000 000 m^3/year.

Figure 5.3.16. shows average natural gas prices for I_3 industrial consumers in European countries from July to December 2017, including and excluding taxes.

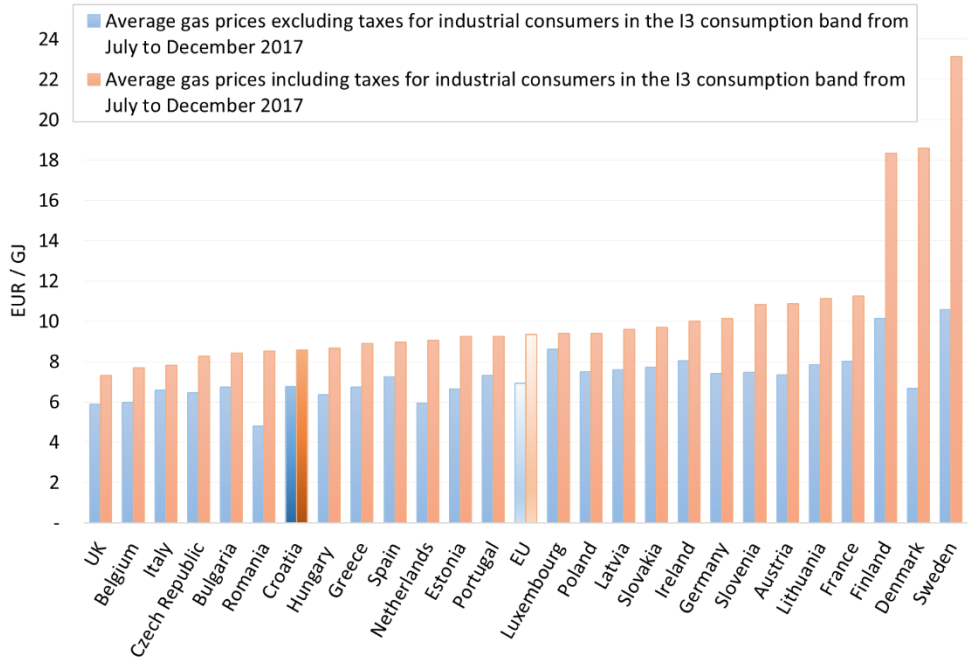


Figure 5.3.16 Average natural gas prices for industrial consumers in the I_3 consumption band from July to December 2017 (including and excluding taxes)

The average natural gas sale price with taxes for industrial consumers in the I_3 consumption band in the second half of 2017 was the highest in Sweden (EUR 23.12/GJ), Denmark (EUR 18.59/GJ) and Finland (EUR 18.34/GJ), and the lowest in the UK (EUR 7.31/GJ), Belgium (EUR 7.69/GJ), Italy (EUR 7.81/GJ) and the Czech Republic (EUR 8.24/GJ). It is evident that the proportion of taxes in the total price of natural gas for the this consumer category varied greatly and that it was the highest in Denmark (64.2%), Sweden (54.3%), and Finland (44.7%), and the lowest in Luxembourg (8.3%), Italy (15.7%), and Spain (19.0%).

Figure 5.3.17. shows a comparison of European average natural gas prices with taxes for industrial consumers in the I_3 consumption band from July to December 2016 and 2017, where the international unit PPS/GJ was used as a price unit to eliminate differences in the price of goods/services of different countries.

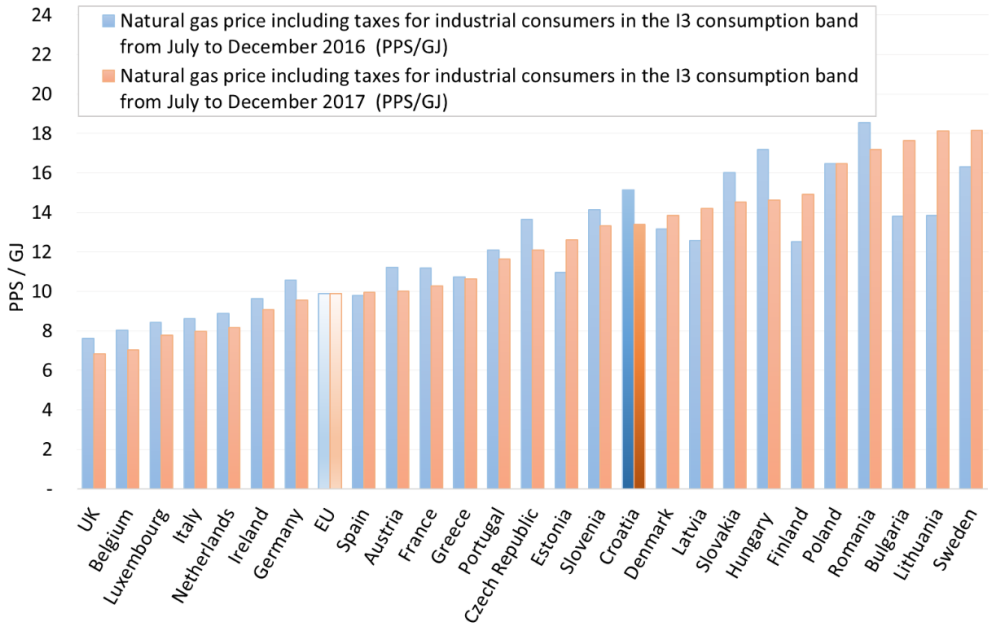


Figure 5.3.17 Natural gas prices for industrial consumers in the I_3 consumption band in relation to the price of goods/services in European countries (including taxes) from July to December 2016 and July to December 2017

5.3.5 Consumer protection

In 2017, HERA received and resolved 61 consumer applications regarding consumer protection in the gas sector, 59 of which were complaints and other applications by consumers. The remaining two were appeals submitted to HERA within its area of competence: one appeal regarding the energy conditions for connection and one regarding the conditions of access to the distribution system. Appeals, complaints and other consumer applications are shown in Table 5.3.3.

Table 5.3.3 Appeals, complaints and other consumer applications by type in 2017

Type of case	*Number*	*Proportion*
Appeals	2	3%
Complaints and other consumer applications	59	97 %
Total	**61**	**100%**

In addition to the appeals and complaints shown in Table 5.3.3, in 2017 HERA also received 273 other end consumer applications, inquiries, and requests for opinion or interpretation of regulations.

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*, and Annex I, Measures on Consumer Protection. Provisions of the Directive and Annex I were transposed into our 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 1 January 2014).

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 a party dissatisfied with an act or failure to act on the part of the transmission system operator, distribution system operator, gas storage operator, LNG terminal operator, gas market operator, or supplier, which affects the rights, obligations, or legal interests of the party and which is not resolved through an administrative procedure, or when judicial or other legal protection is mandated by law, may file a complaint regarding such action. The gas system operator or supplier must issue a decision concerning the complaint within 15 days of the date of the complaint; if, following the decision, the dissatisfied party should still regard its rights or legal interests are violated, it can, for the purpose of protection of its own rights, file a complaint to HERA, which is obliged to inform the dissatisfied party in writing of the measures it has taken with respect to the complaint without delay, and no later than 30 days after the date of the complaint. Should the party be dissatisfied with the measures taken, or if it receives no information on measures taken within the prescribed period, it can 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 23 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, which affects their rights, obligations, or legal interests, and which is not resolved through administrative procedure, or when judicial or other legal protection is mandated by law, may file a written complaint with the supplier, so long as the gas supplier's action or failure to act continues. Complaints may be filed in particular against the following:

- 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*.

The gas supplier must make a decision concerning the complaint within 15 days; if the end consumer should still regard its rights or legal interests as violated due to the gas suppliers' actions, it can, for the purpose of protection of its rights, submit

a complaint to HERA, which is obliged to inform the end consumer in writing without delay, and no later than 30 days from the date of the complaint, of the measures it has taken with respect to the complaint. Should the end consumer be dissatisfied with the measures taken, or if it receives no information on measures taken within the prescribed period, it can initiate an administrative dispute against the gas supplier. Based on the complaint, HERA may take the following measures:

- reach a binding decision on how to handle the complaint,
- make a non-binding proposal on how to handle the complaint, or
- issue a non-binding opinion on a complaint.

In 2017, HERA received 128 submissions from natural and legal persons concerning gas, 59 of which were complaints and 69 were inquiries. Of the 59 complaints, 29 were submitted by citizens (natural persons) with respect to gas supply as follows:

- 15 concerning the supplier switching procedure,
- 7 concerning suspended gas delivery,
- 4 concerning billing, and
- 3 concerning complaints against supply contracts.

In addition to resolving consumer complaints, HERA recognises effective competition in the retail market as the key measure of end gas consumer protection, as well as informing consumers of their rights and obligations.

HERA informs consumers by:

- publishing information on HERA's official website,
- supervising information published on energy entities' websites,
- responding to consumer inquiries, and
- via the tariff calculator (iPlin) for consumers who use public service supply.

Effective competition includes fast and simple gas supplier switching, and in this respect HERA:

- issues rules for supplier switching (*General terms and conditions of gas supply*) and opinions or binding interpretations of the 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
- supervises actions taken by energy entities when implementing supplier switches, upon receiving complaints, and when issuing decisions on handling complaints (binding decisions, non-binding proposals for action, opinions).

Another precondition for effective competition is 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 on past gas consumption in the previous year and on estimated gas consumption in the current year (by 1 March each year).

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 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010 (hereinafter: Regulation No 2017/1938)*, 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. Some of the major improvements with regard to the previous *Regulation 994/2010* are: introduction of the principle of solidarity – in case of a serious crisis situation, neighbouring Member States will aid in safeguarding supply of households and key public services; enhanced regional cooperation – by means of regional risk groups, as well as joint assessment of security risks and harmonised joint preventive and emergency measures; and greater transparency – introduction of the obligation to notify the competent authority of contracts between suppliers and buyers covering the equivalent of 28% or more of yearly gas consumption in the national market.

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 set by *Regulation 2017/1938* is the ministry competent for energy, responsible for:

- monitoring gas market supply and demand,
- preparing estimates of future consumption and available supply,
- planning the construction and development of additional gas system capacities, and
- proposing and implementing measures in case a crisis situation is declared.

Regional self-government units are responsible for:

- monitoring supply and demand on their territory,
- preparing estimates of future consumption and available supply,
- planning the construction of additional capacities and the development of distribution systems on their territory, and
- proposing and implementing measures within the area of their competence defined by law.

Furthermore, *Regulation (EU) No 2017/1938* sets the responsibilities of the relevant authorities to prepare:

- a preventive action plan containing measures needed to mitigate identified risks, and
- an emergency plan containing measures to be implemented to mitigate the impact of gas supply disruptions.

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) No. 994/2010*, and to establish an emergency plan containing measures to be taken to mitigate the impact of gas supply disruptions pursuant to Article 10 of *Regulation (EU) No 994/2010*, the Croatian Government adopted the *Emergency plan concerning measures to safeguard the security of gas supply in Croatia*.

In order to establish criteria for acquiring the status of a protected consumer and measures to safeguard reliable supply of protected consumers, the Croatian

Government adopted the *Regulation on the criteria for acquiring the status of a protected consumer in gas supply crisis situations*.

The preventive action plans and the emergency plans drawn up pursuant to *Regulation 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 Public service in the gas sector

Performance of energy-related 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.

Energy-related activities in the gas sector are carried out either as market activities or as regulated activities. The regulated activities performed as public services are:

- gas transmission, gas distribution, gas storage, LNG terminal management *(hereinafter: system operator)*,
- wholesale market supplier activity[27],
- public service gas supply, guaranteed supply, and
- gas market organisation.

The *system operator* is obliged to connect legal and natural persons to the gas system, except in some exceptional circumstances. Also, the system operator is obliged to provide users with objective, equal, and transparent conditions of access to the gas system while applying the tariffs pursuant to the methodology issued by HERA, as well as to ensure gas quality, quality of service, and reliability of delivery pursuant to the *General terms and conditions of gas supply*.

A public service supply represents a protective measure for a specific group of consumers by regulating gas supply conditions. The ***Gas Market Act*** lays down the measure for households and gas supply of those energy entities, legal and natural persons that use gas to generate thermal energy supplied to households pursuant to the law governing the thermal energy market. A public service supplier must charge the delivered gas pursuant to the applicable tariffs for public gas supply service set out in the methodology issued by HERA, and to ensure gas quality and quality of service pursuant to the *General terms and conditions of gas supply*.

In addition, the Act also provides for a protective measure applicable to all end consumers related to the right to guaranteed supply. 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 conditions. The period during which this service is to be provided and the relevant conditions of guaranteed supply are stipulated in the *Methodology for setting tariffs for public service gas supply and guaranteed supply*,. The tariffs for guaranteed supply in 2017 were established as follows:

a) for end consumers purchasing gas under market conditions:

27 *The **Act on Amendments to the Gas Market Act (Official Gazette No. 16/17)** amended the definition of gas wholesale market supplier – a gas supplier supplying a public service supplier with gas, as a public service under regulated conditions.*

- for the first month from the start date of guaranteed supply, in the amount equal to the last calculated price of gas that the end consumer paid to the existing gas supplier,
- for the subsequent two months (up to a total of three months from the start date of guaranteed supply), in an amount 10% higher than the last calculated gas price that the end consumer paid to the existing gas supplier, and
- upon the expiry of three months from the start date of guaranteed supply, in an amount 30% higher than the last calculated gas price that the end consumer paid to the existing supplier.

b) for end consumers using the public gas supply service:

- for the first three months from the start date of guaranteed supply – in an amount equal to the tariffs for public gas supply service pursuant to the provisions of the *Methodology* issued by the Agency for the public service gas supplier in a given distribution area,
- for the subsequent three months (up to a total of six months from the start date of guaranteed supply) – in an amount 10% higher than the tariffs for public gas supply service pursuant to the provisions of the *Methodology* issued by the Agency for the public service gas supplier in a given distribution area, and
- upon the expiry of six months from the start date of guaranteed supply – supply by the new public supplier supply under market conditions.

The methods for setting tariffs for guaranteed supply changed in April 2018 with the new *Methodology for setting tariffs for public service gas supply and guaranteed supply* as follows:

a) for end consumers purchasing gas under market conditions:

- for the first month from the start date of guaranteed supply – in an amount equal to the tariffs for public gas supply service pursuant to the provisions of the *Methodology* issued by the Agency 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 guaranteed supply) – in an amount 10% higher than the tariffs for public gas supply service pursuant to the provisions of the *Methodology* issued by the Agency for the public service gas supplier in a given distribution area, and
- upon the expiry of three months from the start date of guaranteed supply – in an amount 30% higher than the tariffs for public gas supply service pursuant to the provisions of the *Methodology* issued by the Agency for the public service gas supplier in a given distribution area.

b) for end 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.

Selection of a guaranteed supplier, pursuant to Article 60 of the ***Gas Market Act***, involves the following:

- a guaranteed supplier is selected for a period of three gas years; at least one guaranteed supplier is selected by HERA based on a public call for tenders.

The guaranteed supplier's obligation is related to gas supply for end consumers connected to the distribution system if:

1. the licence of the current supplier of the end consumer issued by HERA has expired,
2. HERA revoked the licence of the current supplier of the end consumer (temporarily or permanently), or
3. the gas market operator submitted a written notice concerning the current supplier of the end consumer, through which the supplier acquired the status of a supplier in difficulties.

The current circumstances on the gas market in Croatia important for the role of a guaranteed supplier are the following:

- within six months after the entry into force of the new ***Gas Market Act***, HERA shall hold a public call for tenders and select at least one guaranteed supplier for the needs of end consumers provided in Article 60, paragraph 1, pursuant to Articles 61 and 62 of the ***Gas Market Act***.

Selecting a public service supplier (pursuant to Article 59 of the ***Gas Market Act***) involves the following:

- a public service supplier supplies household consumers with gas under regulated conditions to ensure the security, regularity, quality and price of household supply,
- the requirements for the security of household supply are stipulated by special regulations governing the security of gas supply in Croatia,
- the requirements for the regularity and quality of household supply are provided by the document referred to in Article 95 of that ***Act***,
- tariffs paid by the consumers of the public gas supply service are set in the methodology referred to in Article 94, paragraph 1, item 5,
- a public service supplier is selected for a period of three gas years,
- depending on the distribution areas on the Croatian territory, a public service supplier is selected by HERA based on a public tender,
- HERA shall hold a public call for tenders pursuant to Articles 61 and 62, and apply the criterion of the lowest cost of gas supply of a public service supplier, which has to be lower or equal to the cost of gas supply of a public service supplier in accordance with Article 94, paragraph 1, item 5 (the *Methodology for setting tariffs for gas supply and guaranteed supply as public services*).

The public service supplier has at its disposal the mechanisms for ensuring the availability of gas for the needs of consumers using the public service supply. The chain of gas supply for public service consumers is regulated by the decisions of the Croatian Government concerning the procurement of gas for public service supply in the following manner:

- the supplier on the wholesale gas market sells gas to public service suppliers of household consumers (under regulated conditions), or
- the public service supplier of household consumers procures gas under market conditions (an option introduced as of 1 April 2017).

The gas storage system operator is obliged to provide priority allocation to the supplier on the wholesale gas market in the procedure of allocating gas

storage system capacities (70% of working volume prior to 1 April 2017, 60% of working volume as of 1 April 2017).

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***, and 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 Nos. 130/11 and 47/14)***.

The *Programme for Monitoring Liquid Petroleum Fuel Quality for 2017 (Official Gazette No. 120/16)* lays down the method of sampling liquid petroleum fuel (especially for service stations and storage facilities), the number and frequency of samples, sampling locations depending on the quantity of liquid petroleum fuel placed on the national market or used for personal needs by the supplier, and laboratory analyses of liquid petroleum fuel samples.

The requirements for wholesale and foreign trade in petroleum products are governed by the *Regulation on Requirements for Wholesale Trade and Trade with Third Countries in Certain Goods (Official Gazette Nos. 47/14 and 62/15)*.

6.2 Oil transportation through pipelines

In Croatia, oil transportation 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 transport 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 d.d.'s oil pipeline system to oil refineries in Rijeka and Sisak, as well as for the needs of refineries in Bosnia and Herzegovina, Serbia 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 JANAF d.d. oil pipeline system

In 2017, a total of 7.7 million tonnes of crude oil was transported through the oil pipeline system, which represents an increase of 8.45% compared to the previous year. The oil quantities transported from 2005 to 2017 and the quantities planned for 2018 are shown in Figure 6.2.2.

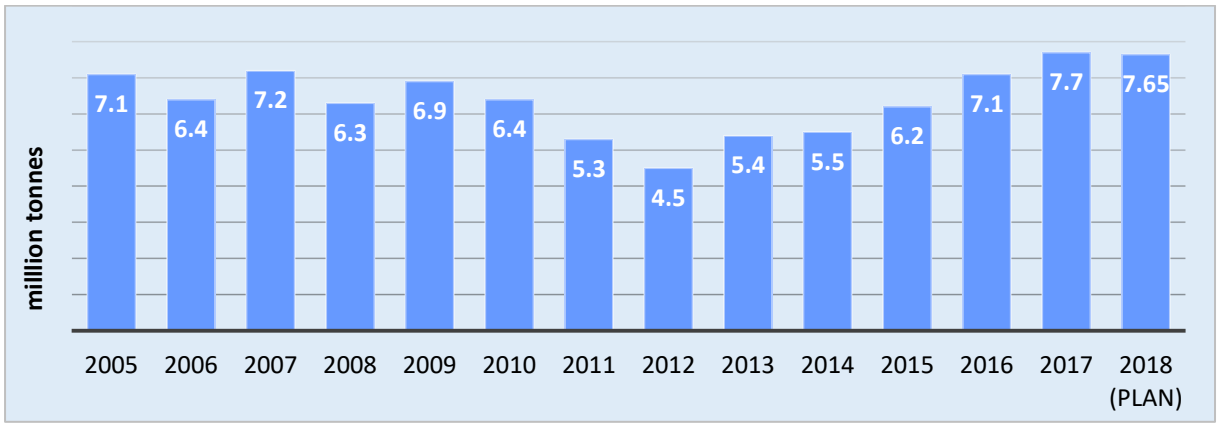


Figure 6.2.2 JANAF's oil pipeline system – transported quantities [in millions of tonnes]

Among other activities undertaken by JANAF d.d. concerning the development of the oil pipeline system in 2017, particularly important are investments in infrastructure upgrades – new pipeline routes with a total length of 9.5 km, expansion of an oil pumping station, investments in pipelines (refurbishment), investments in the technical security system, investments in structures, metering stations, and other infrastructure, and investments in IT systems and business solutions for JANAF's shared systems.

Ever since the ***Oil and Petroleum Products Market Act*** entered into force in February 2014, the price of oil transport is established by internal decisions on the price of oil transport through the oil pipeline system, which are adopted based on internal rules on the establishment of the price of oil transport through JANAF's oil pipeline system.

6.3 Development of the oil and petroleum products market

6.3.1 Storage of oil and petroleum products

In 2017, oil and petroleum products were stored by 21 energy entities, while the liquefied petroleum gas storage was carried out by two 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. As the price of storage of oil and petroleum products is not regulated, it is determined by market principles. According to data furnished by the energy entities, total available storage capacities amounted to 2.56 million m^3 in 2017, compared to total 2.45 million m^3 of available capacity in 2016 (excluding storage capacities within INA's refineries). The increase in storage capacities is attributed to the newly built storage capacities for crude oil at the Omišalj 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.

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 2017

6.3.2 Production of crude oil and petroleum products; trade in petroleum products

Production of crude oil

Even though it is not classified as 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 INA d.d. at hydrocarbon production fields in the continental part of Croatia. Domestic production of crude oil amounted to 667,000 tonnes in 2017, which is a decrease of 2.55% compared to 2016. In addition to domestic production, Croatia also covers its demand for crude oil with imports, primarily from Iraq, Azerbaijan, Russia and Kazakhstan, which amounted to 2.8 million tonnes in 2017, an increase of 10.8% compared to 2016. A comparison of imported and locally produced crude oil from 2006 to 2017 is shown in Figure 6.3.2.

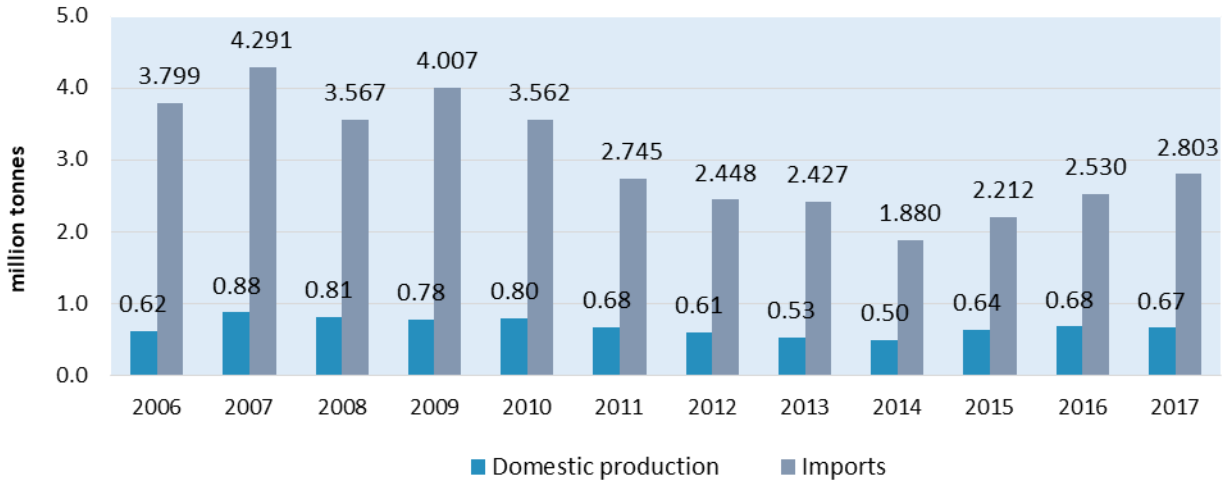


Figure 6.3.2 Crude oil quantities from domestic production and imports from 2006 to 2017 [in millions of tonnes]

Production of petroleum products

Petroleum Products are produced by INA d.d. The derivatives produced in the Rijeka and Sisak oil refineries, as well as in the Etan ethane facility in Ivanić Grad, include both engine fuels and industrial 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 2017 are shown in Figure 6.3.3.

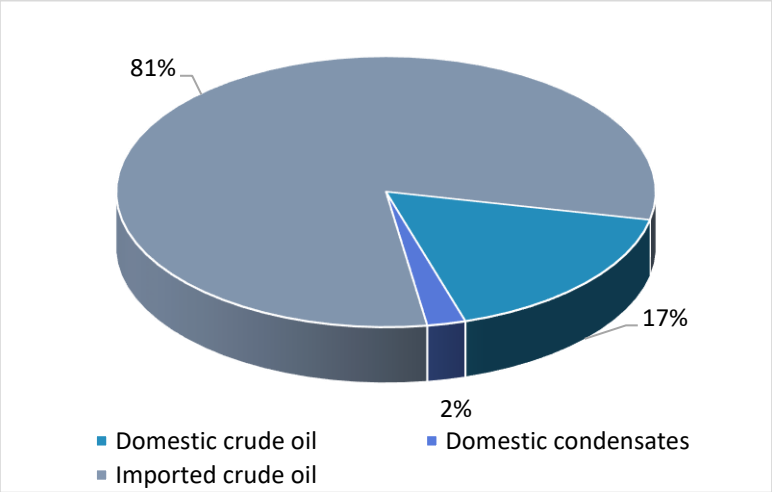


Figure 6.3.3 The shares of raw materials used for refinery processing in 2017

The total production of petroleum products in 2017 amounted to 3.60 million tonnes, which is a 5.88% increase compared to 2016. The total quantities of petroleum products produced from 2006 to 2017 are shown in Figure 6.3.4.

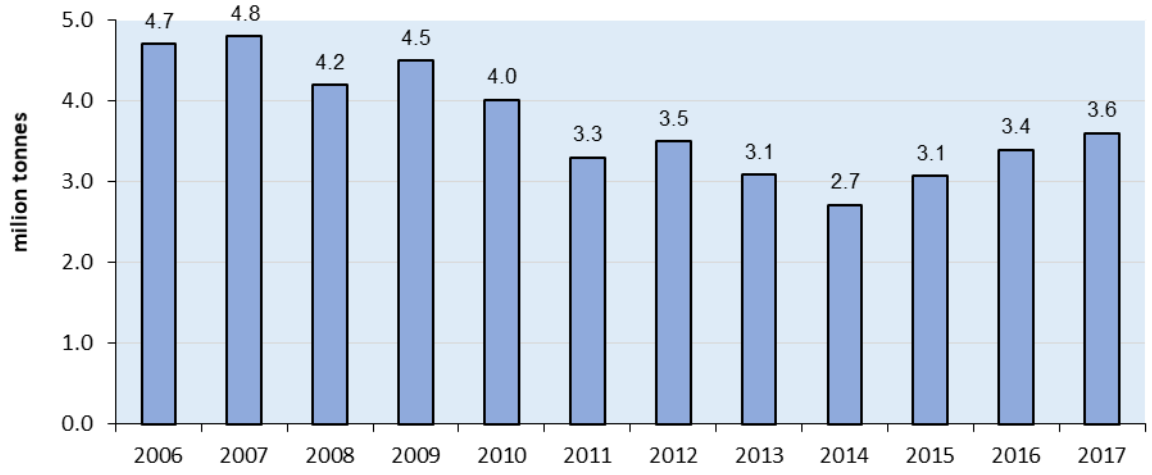


Figure 6.3.4 Quantities of petroleum products produced from 2006 to 2017 [in millions of tonnes]

In 2017, INA d.d. continued to produce high-quality petrol and diesel fuels pursuant to the *Regulation on Liquid Petroleum Fuel Quality*, which is harmonized with European directives and standards establishing quality requirements for liquid petroleum fuels.

The total production of liquefied petroleum gas in 2017 amounted to 242,000 tonnes, which is an increase of 14.69% compared to 2016. The quantities of liquefied petroleum gas (LPG) produced from 2006 to 2017 are shown in Figure 6.3.5.

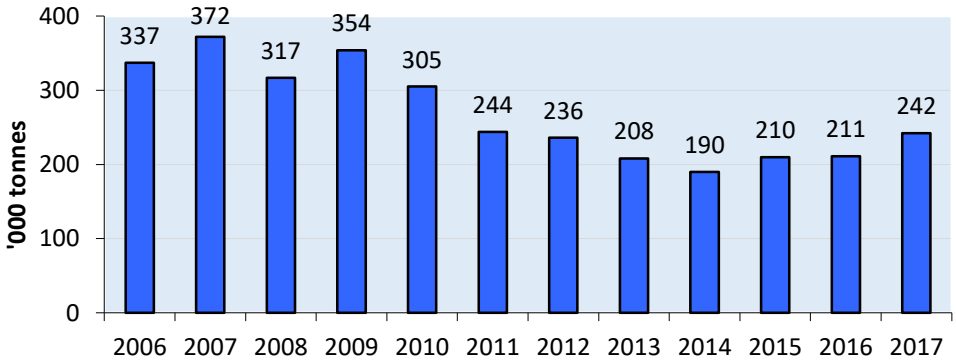


Figure 6.3.5 Quantities of LPG produced from 2006 to 2017 [in thousands of tonnes]

Trade in petroleum products

Oil derivative 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. In addition, approval of the ministry is also required for these activities pursuant to the *Regulation on Requirements for Wholesale Trade and Trade with Third Countries in Certain Goods*.

In 2017, wholesale trade in petroleum products was carried out by 59 energy entities, while wholesale trade in liquefied petroleum gas (LPG) was carried out by 12 energy entities.

As the price of petroleum products is not regulated, it is determined by market principles. 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 1.44 million tonnes of petroleum products were imported in 2017. The quantities of imported petroleum products from 2006 to 2017 are shown in Figure 6.3.6.

Having removed the price caps in the retail trade of petroleum products, the Ministry introduced reinforced monitoring of applied prices. Pursuant to the provisions of the *Ordinance on Amendments to the Ordinance on Data that Energy Entities are Obliged to Submit to the Ministry (Official Gazette No. 16/15)* and the *Ordinance on the Amendment to the Ordinance on the Manner in which Retail Prices and Unit Prices of Products and Goods are Published (Official Gazette No. 16/15)*, which entered into force on 15 February 2015, energy entities dealing in retail trade in petroleum products and liquefied petroleum gas are obliged to inform the Ministry about each change in the retail price of petroleum products and/or biofuels. The Ministry shall use the collected data to makes the information on retail prices publicly available.

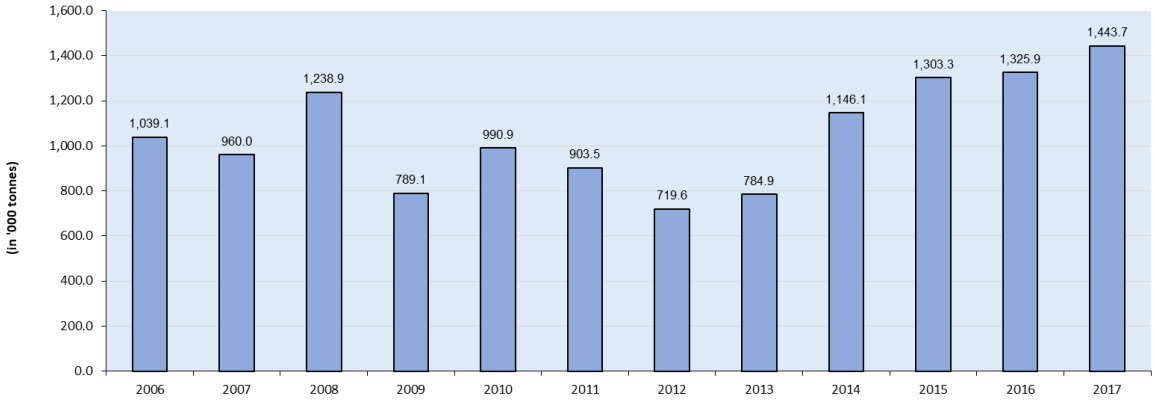


Figure 6.3.6 Imports of petroleum products from 2006 to 2017 [in thousands of tonnes]

6.4 Secure supply of oil and petroleum products

The requirements for a 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. In accordance with the ***Act on Modifications and Amendments to the Act on the establishment of the Croatian Hydrocarbon Agency (Official Gazette No. 73/17)*** and 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. Consequently, the Croatian Hydrocarbon Agency (CHA) is the central authority in Croatia for compulsory oil and petroleum product stocks, and it is a single authority authorised to form, maintain and sell compulsory stocks.

In this context, the competent Ministry establishes the necessary conditions and monitors the secure, regular, and quality supply of the oil and petroleum products market in Croatia, and is responsible for coordination and cooperation with the European Commission and the International Energy Agency, while expert assistance to the Ministry is provided by the CHA.

A representative of 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 2017.

The 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***, the CHA issues a decision determining the quantity and shares of compulsory stocks for each year. No decision has been issued by HANDA, i.e. the CHA, regarding the quantity and shares of compulsory oil and petroleum product stocks for 2017.

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 Transportation***, and by-laws adopted on the basis of these acts.

The ***Act on Biofuels for Transportation*** 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-related activities are subject to a licence issued by HERA, except in the case of biofuel produced exclusively for own needs or if less than 1TJ 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 biofuels pursuant to the *Regulation on Requirements for Wholesale Trade and Trade with Third Countries in Certain Goods*.

Licences for these energy activities have been obtained by four energy entities. In 2017, they produced and distributed a total of 367 tonnes of biodiesel, which represents a decrease of 93.9% compared to 2016. The quantities of biofuel produced from 2009 to 2017 are shown in Figure 7.2.1.

The assumed cause of the decrease in biofuel production are adverse market trends, initiated by the termination of cash incentives for the production of biofuels for transportation paid to biofuel producers by the Croatian Energy Market Operator (HROTE). HROTE's rights and obligations with respect to the payment of cash incentives are stipulated by the ***Act on Biofuels for Transportation*** and by-laws governing the system of biofuel incentives in Croatia. Pursuant to the ***Act on Biofuels for Transportation***, the system of incentives for the production and use of biofuels in transportation was funded, up to 31 December 2012, from a dedicated fee for promoting biofuel production, which HROTE collected from distributors and paid to biofuel producers as incentives. The amendments to the Act on Biofuels for Transportation adopted in 2012 stipulated that HROTE would cease collecting the fee for promoting biofuel production as of 1 January 2013. Instead, funds for incentive payments are obtained as a share in revenue from excise duties earmarked for the production of biofuels. The 2014 Annual Business Report, published on HROTE's website, clearly shows that incentive payments were regular until July 2014. The payment for August 2014 was partial, and then suspended, due to a lack of funds that were to be provided from the Croatian state budget. In its 2015 Annual Business Report, HROTE states that on 9 January 2015 it requested an opinion of the Ministry of Economy on HROTE's further role and activities regarding incentives for the production of biofuels in 2015, but no reply was received before the completion of this report.

The energy entities have a total of 1 800 m^3 of storage capacity. In 2017, the total capacity of biofuel production was 184 tonnes per day, with waste edible oil being the only raw material used to produce biofuel.

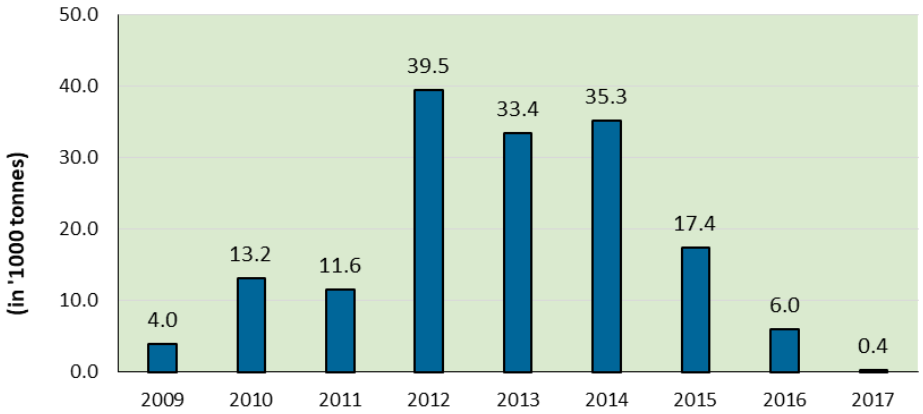


Figure 7.2.1 Quantities of biofuel produced from 2009 to 2017 [in thousands of tonnes]

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 Nos. 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 Transportation*** provides for incentives in 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.

The *Regulation on the Incentives for the Production of Biofuels for Transportation (Official Gazette No. 1/2014)* sets out how incentives are provided for the production of biofuels for transportation, the methodology used to calculate the highest selling price for biodiesel and bioethanol, methods used to calculate cash incentives and the share in revenue from excise duties earmarked for biofuel production, and the use of revenue from excise duties earmarked for biofuel production, as well as the powers, obligations, and responsibilities of the ministry in charge of energy issues, the ministry in charge of finances, and the Croatian Energy Market Operator with regard to the management of funds from the share in revenue from excise duties earmarked for biofuel production.

8 THERMAL ENERGY

8.1 Legal framework for thermal energy

Regulation for the thermal energy sector and thermal energy production, distribution, and supply activities in Croatia is based on the ***Energy Act***, ***Act on the Regulation of Energy Activities***, ***Thermal Energy Market Act***, and by-laws adopted pursuant to these acts.

The ***Thermal Energy Market Act*** imposes new frameworks for changes in the organisation of the thermal energy sector. In 2014, HERA adopted a number of by-laws providing a more detailed regulation of the rights, duties, obligations, responsibilities, and relations between participants on the thermal energy market – producers, distributors, suppliers, consumers and end consumers of thermal energy. The following by-laws were adopted: *Network Codes for Thermal Energy Distribution (Official Gazette No. 35/14)*, *General Requirements for Thermal Energy Supply (Official Gazette No. 35/14)*, *General Requirements for Thermal Energy Delivery (Official Gazette Nos.35/14 and 129/15)*, *Methodology for Setting Tariffs for Thermal Energy Production (Official Gazette No. 56/14), and Methodology for Setting Tariffs for Thermal Energy Distribution (Official Gazette No. 56/14)*. Furthermore, in 2016 HERA adopted the *Methodology for Calculating the Fee for Connection to the Thermal Distribution Network and for Increase in the Connection Capacity (Official Gazette No. 42/16)*.

In addition to these by-laws, also important for the thermal energy sector is the *Ordinance on the Method of Allocating and Calculating the Costs of Supplied Thermal Energy (Official Gazette Nos. 99/14, 27/15 and 124/15)* adopted by the Ministry of Economy.

8.2 Thermal energy sector: organisation, activities, and indicators

8.2.1 Thermal energy sector: organisation

Energy entities for the production, distribution, and supply of thermal energy in Croatia provide the services of space heating and preparation of sanitary hot water for 155,000 end consumers, of which 95% fall under the category of households.

Thermal energy used for space heating and the preparation of sanitary hot water is produced in co-generation thermal power plants in Zagreb and Osijek, as well as in local heating plants, i.e. separate boiler rooms.

In 2017, energy entities supplied more than 2.1TWh of thermal energy to households and industrial consumers (Figure 8.2.1). The total length of the distribution network and external installations is 435 kilometres. Average losses in the distribution network in 2017 were 14.3% (excluding indicators for Energo d.o.o., Rijeka, which did not submit the requested data).

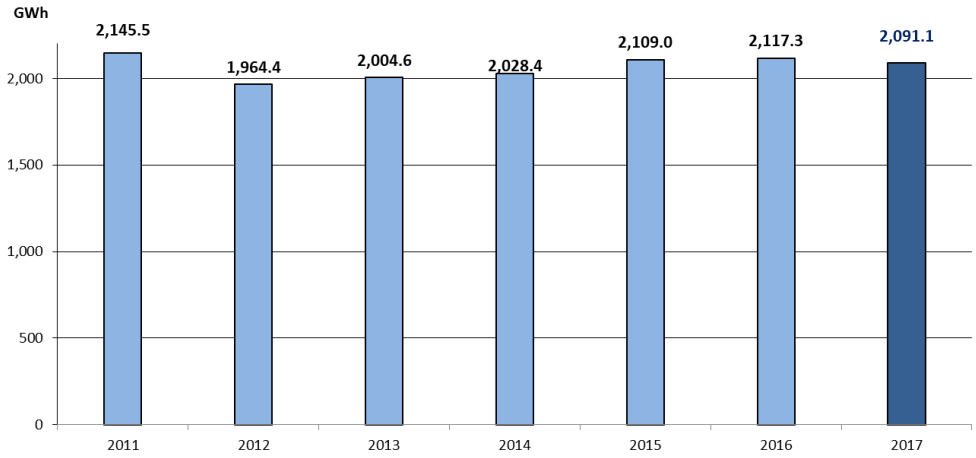


Figure 8.2.1 Supplied thermal energy in Croatia from 2011 to 2017

Table 8.2.1 contains data about the energy entities; Figures 8.2.2, 8.2.3, and 8.2.4 show supplied thermal energy, number of end consumers, installed capacity for thermal energy production, and connection capacity in 2017.

Table 8.2.1 Data related to energy entities in the thermal energy sector in 2017

ENERGY ENTITY	Number of end consumers	Network length	Total installed capacity	Generated thermal energy	Supplied thermal energy	Surface area	Fuel*
		Km	MWt	GWh	GWh	m2	
HEP-Proizvodnja d.o.o.			1,557.00	2,158.38	-**		NG, FO
Zagreb			1,277.00	1,786.20	-		NG, FO
Osijek			200.00	260.59	-		NG, FO, biomass
Sisak			80.00	111.60	-		NG, biomass
HEP-Toplinarstvo d.o.o.	126,715	378.75	321.46	143.22	1,913.55	9,994,495	NG, FOEL, LFO
Zagreb	101,175	276.90	72.23	50.40	1,526.37	8,062,006	NG, FOEL
Osijek	11,742	56.49	140.50	5.12	234.14	1,116,634	NG, FOEL, LFO
Sisak	4,145	29.95	0.00	0.00	73.20	293,208	NG
Velika Gorica	5,900	9.95	69.61	57.94	52.16	335,042	NG, LUEL, LFO
Samobor	1,380	3.08	18.75	13.05	11.98	78,817	NG, FOEL
Zaprešić	2,373	2.37	20.36	16.70	15.71	108,788	NG, FOEL
Energo d.o.o., Rijeka	9,858	15.77	102.16	-	52.29	563,702	NG, FOEL, FO
Gradska toplana d.o.o., Karlovac	7,834	21.20	117.63	64.55	53.47	503,849	NG
Brod-plin d.o.o., Slavonski Brod	3,748	7.05	34.24	37.20	33.57	197,142	NG
Tehnostan d.o.o., Vukovar	3,739	7.22	32.94	21.29	17.40	208,266	NG, FO
Vartop d.o.o., Varaždin	926	1.57	25.13	0.00	5.89	48,250	NG
GTG Vinkovci d.o.o., Vinkovci	1647	1.60	17,83	8.92	8.70	89,794	NG, FO
Poslovni park Virovitica d.o.o., VT	402	0.90	4.08	3.12	3.12	28,311	NG
Komunalac d.o.o., Požega	417	0.61	4.00	2.09	2.09	19,839	NG
SKG d.o.o., Ogulin	84	0.58	4.40	1.01	1.01	5,977	LFO
TOTAL	**155,370**	**435.25**	**2,220.86**	**2,439.78**	**2,091.10**	**11,659,626**	

** NG – natural gas, FO – fuel oil, FOEL – fuel oil extra light, LFO – light fuel oil*
*** HEP-Proizvodnja d.o.o. supplies generated thermal energy to HEP-Toplinarstvo d.o.o.*

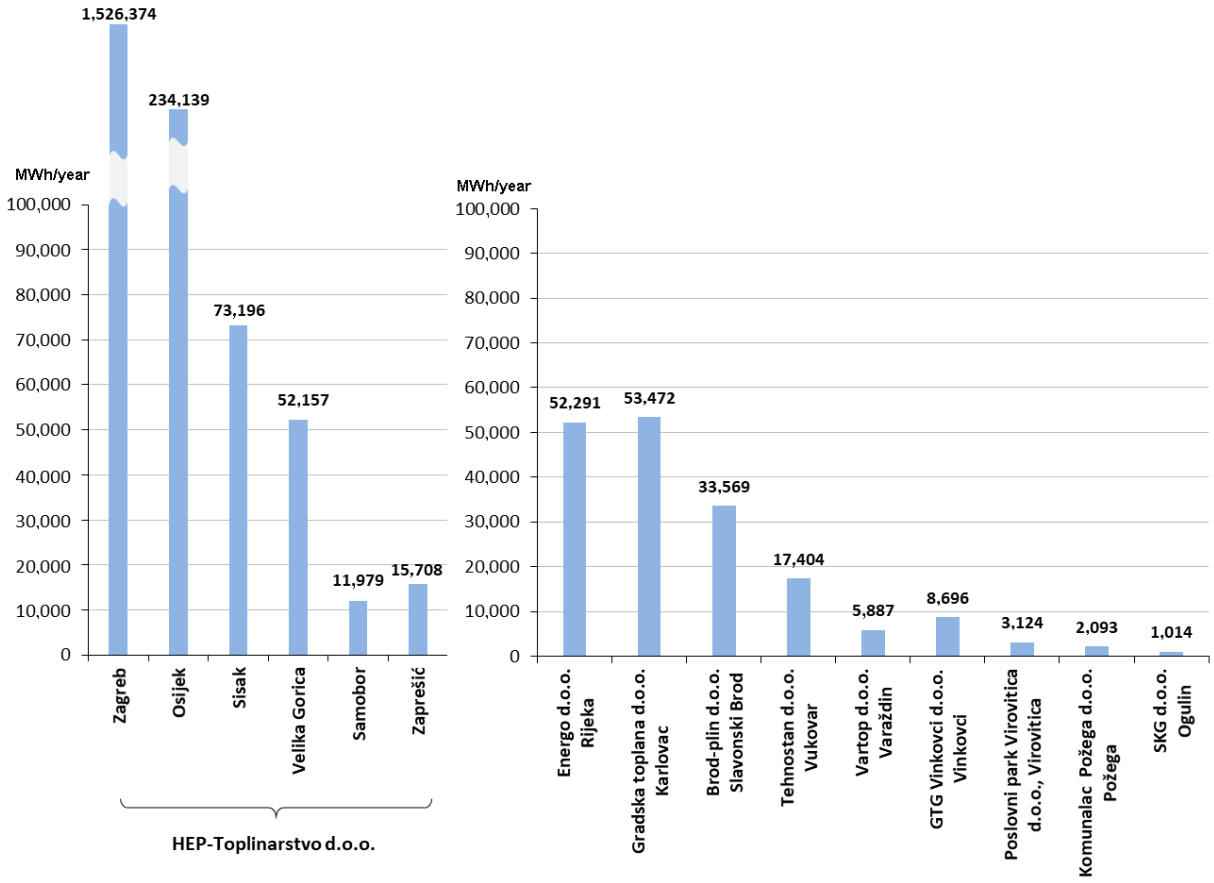


Figure 8.2.2 Supplied thermal energy in 2017

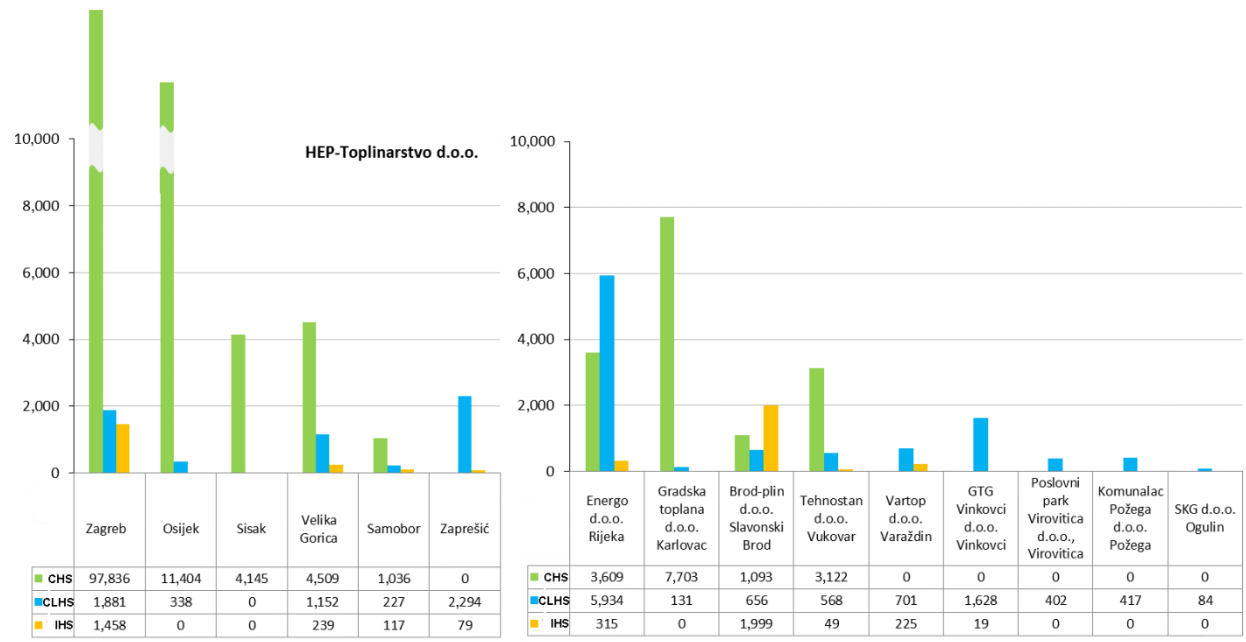


Figure 8.2.3 Number of end consumers in 2017

The majority of energy entities in the thermal energy sector have a considerable installed capacity reserve in relation to the connection capacity. Only a small

portion of supplied thermal energy is generated by HEP-Toplinarstvo d.o.o. in its own plants, and the remainder is purchased or taken over from HEP-Proizvodnja d.o.o., a producer of thermal energy. In 2017, HEP-Proizvodnja d.o.o. delivered 2,158.38 GWh of thermal energy to HEP-Toplinarstvo d.o.o.

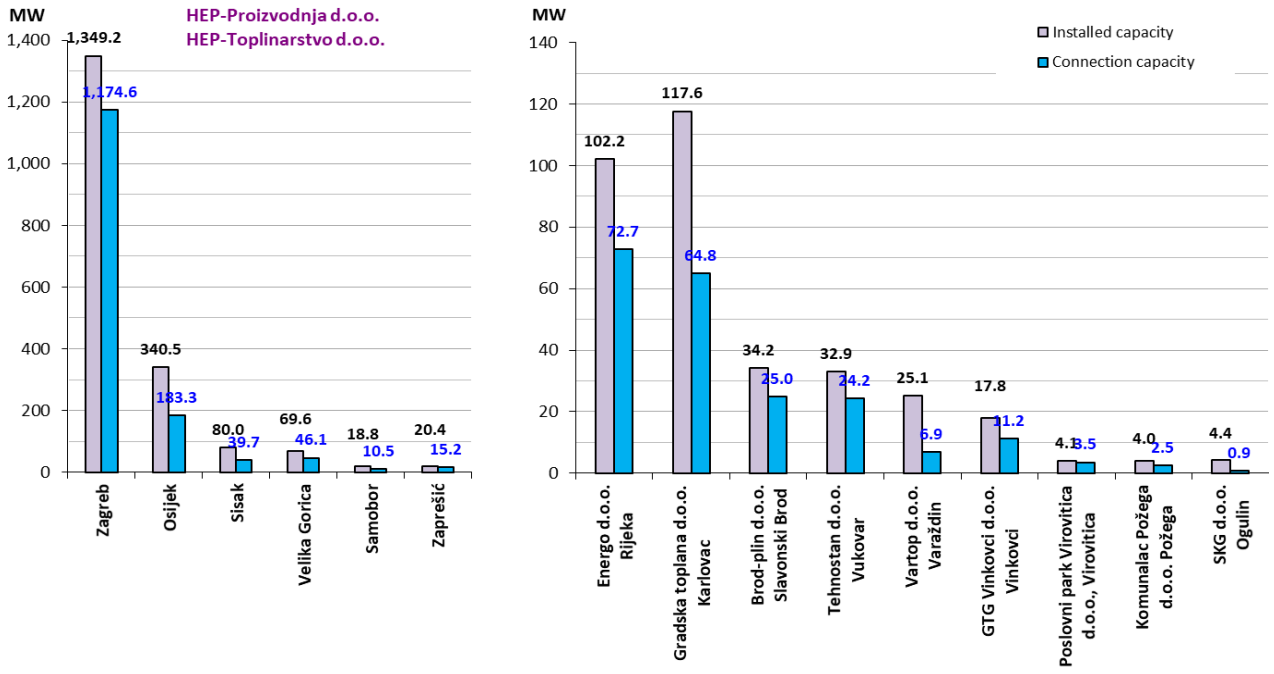


Figure 8.2.4 Installed capacity for thermal energy production, including connection capacity in 2017

The majority of energy entities engaged in thermal energy production, distribution, and supply are mostly owned by local government units 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.

Out of all heating systems listed in Table 8.2.1, centralised heating systems in Zagreb, Osijek, Sisak, Samobor, Velika Gorica, Rijeka, Karlovac, Slavonski Brod and Vukovar account for 86.6% of end-consumer connections, 88% of surface area and 93.1% of supplied thermal energy, as shown in Figure 8.2.5.

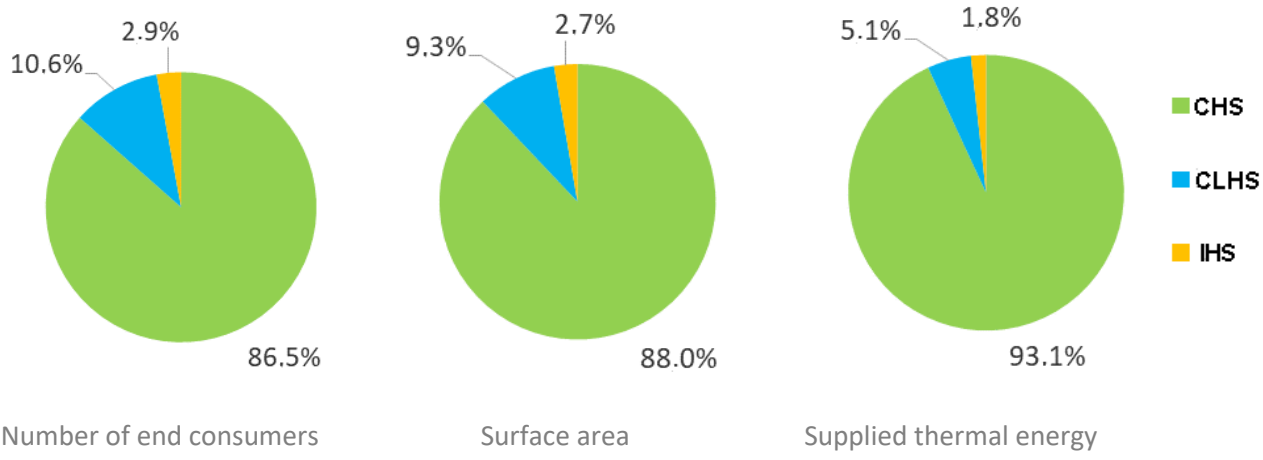


Figure 8.2.5 Share of end consumers, surface area, and supplied thermal energy per heating system

8.2.2 Thermal energy sector: activities

In 2017, HERA received and resolved 93 cases in the thermal energy sector, which are grouped in categories shown in Table 8.2.2.

Table 8.2.2 Cases related to thermal energy in 2017

Type of case	Number	Share
Inquiries, complaints, claims and submissions	78	84%
Changes in tariffs for energy from centralised heating systems	9	10%
Requests by energy entities and competent national authorities for opinions	6	6%
Total	**93**	**100%**

In 2017, HERA carried out the following activities regarding licences to perform energy-related activities:

- licences for thermal energy production issued to:
  - TI-SAN d.o.o., Sveta Nedelja,
  - SAVA d.o.o., Stara Gradiška,
- licences for thermal energy production extended for:
  - DI-ČAZMA d.o.o., Čazma,
  - GRADSKA TOPLANA d.o.o., Karlovac,
- licences for thermal energy supply extended for:
  - VARTOP d.o.o., Varaždin,
  - HRVATSKE ŠUME d.o.o., Zagreb,
- licence for thermal energy distribution extended for:
  - GRADSKA TOPLANA d.o.o., Karlovac,
- decision on the expiry of licence for thermal energy production issued regarding:
  - ENERGOREMONT d.d., Karlovac,
- decision on the expiry of licence for thermal energy supply issued regarding:
  - ENERGOREMONT d.d., Karlovac.

In 2017, licences of two energy entities expired: licence for thermal energy production held by SPLIT PARKING d.o.o., Split, and license for thermal energy supply held by UNIVERZAL d.o.o., Varaždin.

On 31 December 2017, the number of licences in the thermal energy sector was as follows:

- production of thermal energy 25,
- distribution of thermal energy 9, and
- supply of thermal energy 21.

Pursuant to the ***Thermal Energy Market Act***, HERA hosts and regularly updates and maintains the register of thermal energy consumers on its website. HERA also maintains records on thermal energy consumers, for which data has been submitted by all active thermal energy consumers, as provided by the ***Thermal Energy Market Act***.

8.2.3 Tariff items 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 *Methodology for Setting Tariffs for Thermal Energy Distribution*, HERA is responsible for calculating tariffs for thermal energy production and tariffs for thermal energy distribution only for centralised heating systems.

In 2017, there were changes in the prices of primary energy sources used in thermal energy production, more specifically natural gas used for the public service of gas and fuel oil supply. The *Methodology for Setting Tariffs for Thermal Energy Production* provides for a procedure for modifying the tariffs in case of changes in the price of fuel used for thermal energy production. In 2017, in centralised heating systems where natural gas is used as an energy source for thermal energy production, there were no changes in tariff amounts for energy supplied to households, but the tariff was reduced by an average of 10.7% for business consumers in Karlovac and Vukovar compared to 2016. The tariff amount for energy in the centralised heating system Vojak (Rijeka), where fuel oil is used for thermal energy production, changed three times in 2017 (in February, May and December), which is a 13.2% increase compared to 2016. The total price of thermal energy in cities where HEP-Toplinarstvo d.o.o. provides thermal energy services remained the same in 2017 (Zagreb, Osijek, Sisak, Velika Gorica, Samobor, and Zaprešić).

Table 8.2.3 shows tariff amounts for thermal energy production and thermal energy distribution for centralised heating systems on 31 December 2017. They represent the regulated portion of the thermal energy price, whereas the fees for thermal energy supply and fees for thermal energy consumer 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 the fees for thermal energy supply and for performing thermal energy consumer activities, which make up the market component of thermal energy prices and which are contracted freely.

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 2017, tariffs for the production and distribution of thermal energy, fees for thermal energy supply, and fees for thermal energy consumers on 31 December 2017.

Figure 8.2.6 shows that the average regulated portion of the thermal energy price for all centralised heating systems amounts to 80.8%.

Table 8.2.3 Tariff amounts for thermal energy production and thermal energy distribution for centralised heating systems on 31 December 2017. (VAT excluded)

ENERGY ENTITY	CENTRALISED HEATING SYSTEM	TARIFF GROUPS (Tg)*	TARIFF MODELS (TM)**	Tariff amounts - 31 December 2017					
				GENERATION		DISTRIBUTION		GEN + DISTRIB	
				Energy [kn/kWh] *[kn/t]*	Capacity [kn/kW] *[k/t/h]*	Energy [kn/kWh] *[kn/t]*	Capacity [kn/kW] *[k/t/h]*	Energy [kn/kWh] *[kn/t]*	Capacity [kn/kW] *[k/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	0.2464	11.60	0.0400	4.40	0.2864	16.00
		Tg2	TM2	0.2903	12.60	0.0400	4.40	0.3303	17.00
Brod-plin d.o.o. Slavonski Brod	SLAVONIJA	Tg1	TM1	0.2353	11.60	0.0500	5.20	0.2853	16.80
		Tg2	TM2	0.2828	11.60	0.0500	5.20	0.3328	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	0.3045	9.50	0.0470	5.00	0.3515	14.50
	OLAJNICA	Tg1	TM1	0.2696	9.50	0.0470	5.00	0.3166	14.50
		Tg2	TM2	0.3062	9.50	0.0470	5.00	0.3532	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*

(Tg)* Tg1 – Households; Tg2 – Industry and businesses
(TM)** TM1 – Hot/warm water; TM2 – Hot/warm water; *TM3 – Technological steam*

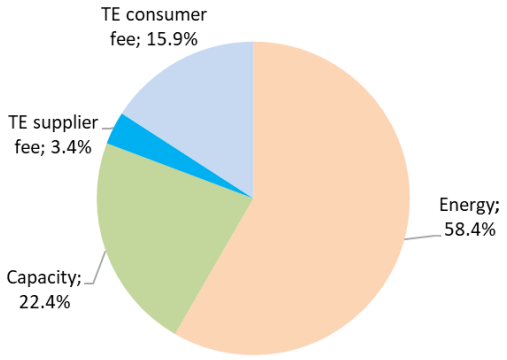
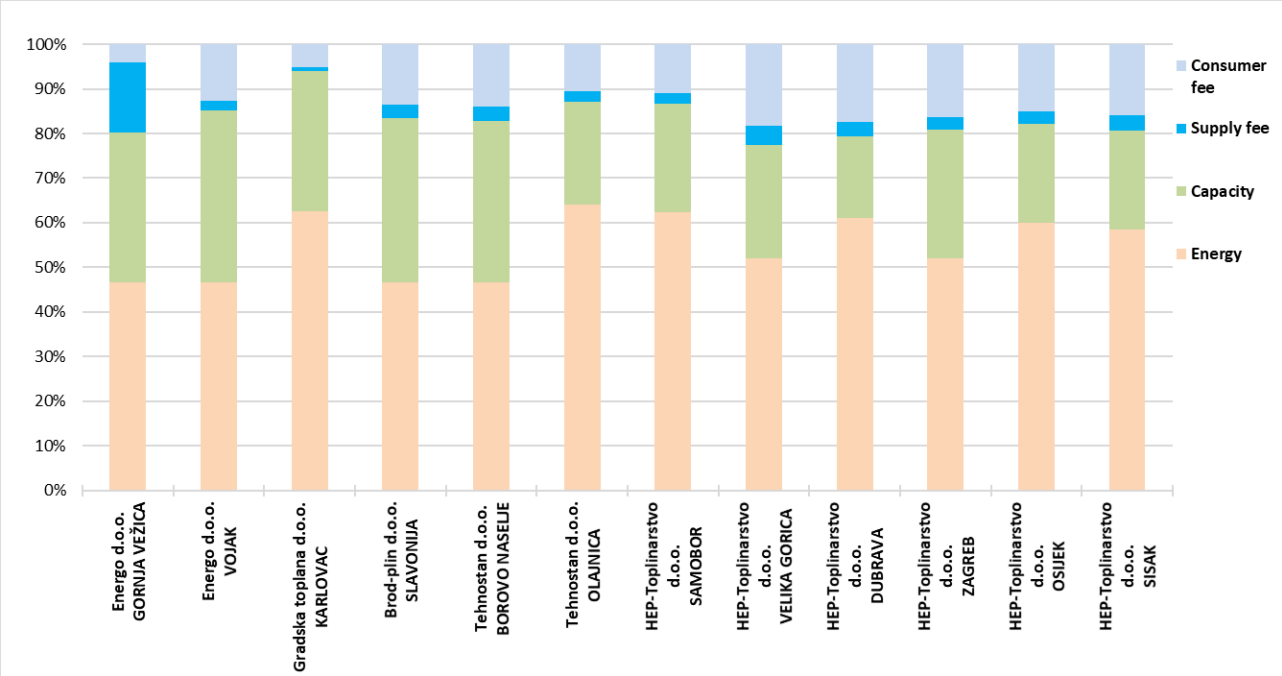


Figure 8.2.6 Average shares of individual components in the total price of thermal energy for household end consumers for all centralised heating systems

Figure 8.2.7 gives a more detailed breakdown of the total price of thermal energy for household end consumers across centralised heating systems in Croatia in 2017.



Consumer fee	4.1%	12.6%	5.1%	13.6%	13.9%	10.5%	11.0%	18.3%	17.4%	16.2%	15.0%	15.9%	Non-regulated components
Supply fee	15.7%	2.2%	0.9%	2.9%	3.3%	2.3%	2.2%	4.3%	3.2%	2.8%	2.7%	3.4%	
Capacity	33.5%	38.6%	31.4%	36.9%	36.2%	23.1%	24.4%	25.3%	18.2%	28.9%	22.3%	22.4%	Regulated components
Energy	46.7%	46.6%	62.6%	46.6%	46.6%	64.0%	62.3%	52.1%	61.1%	52.0%	60.0%	58.4%	

Figure 8.2.7 Breakdown of the total price of thermal energy for household end consumers across centralised heating systems in 2017

Closed heating systems are systems covering several industrial and/or residential-commercial buildings that share a common heating system, and where the thermal energy supplier provides management, operation, and maintenance. Prices of thermal energy delivered to thermal energy consumers in closed heating systems are defined freely in accordance with market conditions.

An independent heating system consists of a boiler-room, thermal energy meter, and internal installations. Independent heating systems are managed and maintained by thermal energy consumers. Prices of thermal energy delivered to end consumers are formed freely in accordance with market conditions.

The total price of thermal energy in closed and independent heating systems does not include regulated components, but it is formed freely in accordance with market conditions.

Given that none of the components of thermal energy prices for closed and independent heating systems are set by HERA, Table 8.2.3 does not show prices for those systems.

8.2.4 Consumer protection

In 2017, HERA received 78 inquires, complaints, claims and submissions in the thermal energy sector. Table 8.2.4 provides a classification of all cases.

Table 8.2.4 Inquiries, complaints, claims and submissions received in 2017

Case description	Number	Share
Disconnection from the thermal energy system	10	13%
Methodology and prices of thermal energy	2	3%
Quality of thermal energy, quality of service, transparency of invoices and calculating thermal energy consumption	20	26%
Ordinance on the Method of Allocating and Calculating the Costs of Supplied Thermal Energy and the Thermal Energy Market Act	5	6%
Installation and reading of heat cost allocators, heating quality after heat cost allocator installation	7	9%
End customers' requests for opinions and interpretation of the Thermal Energy Market Act and by-laws	15	19%
Requests by other legal persons for opinions and interpretation of the Thermal Energy Market Act and by-laws	19	24%
Total	**78**	**100%**

Compared to 2016, which was marked by inquiries and complaints made by end consumers with regard to requests made by end consumers and other legal persons for opinion and interpretation of the ***Thermal Energy Market Act*** and by-laws, the total number of inquiries and complaints in 2017 was reduced by 34%.

HERA provided interpretations and opinions or issued corresponding decisions to all inquiries, complaints, claims and submissions, within the realm its powers and responsibilities, and provided guidelines and appropriate assistance to end consumers, authorised representatives of the co-owners, thermal energy consumers, and energy entities.

9 LIST OF TABLES AND FIGURES

9.1 List of tables

9.2 List of figures

10 ABBREVIATIONS AND ACRONYMS

4MMC	and/or 4MMC Project - Four Markets Market Coupling Project
AAC	Already Allocated Capacity
ACER	Agency for the Cooperation of Energy Regulators
AIB	Association of Issuing Bodies
ARIS	ACER REMIT Information system
BMP	Billing metering point
CACM	Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management
CEER	Council of European Energy Regulators
CEF	Connecting Europe Facility
CEGHIX	Central European Gas Hub AG Spot Index
CEP	Clean Energy Package - Clean Energy for All
CEREMP	Centralised European Register of Energy Market Participants
CHA	Croatian Hydrocarbon Agency
CHP	Cogeneration through combined heat and power
CHS	Central heating system
CLHS	Closed heating system
Commission	European Commission
CORE	Core Capacity Calculation Region
CROPEX	Hrvatska burza električne energije d.o.o. (Croatian Electricity Exchange)
DCC	Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a Network Code on Demand Connection
EC	European Commission
EEA	European Economic Area
EES	Grid connection authorisation
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSOG	European Network of Transmission System Operators for
EQS TF	Electricity Quality of Supply Task Force
ERRA	Energy Regulatory Regional Association
EU	European Union
EUPHEMIA	Pan-European Hybrid Electricity Market Integration Algorithm for the calculation of day-ahead electricity prices across Europe
EUROSTAT	Statistical Office of the European Union
FCA GL	and/or FCA Regulation - Commission Regulation (EU) 2016/1719 of 26 September 2016 establishing a guideline on forward capacity allocation / FCA GL Guideline on Forward Capacity Allocation
FCA	Forward Capacity Allocation
FGSZ Ltd.	Hungarian transmission system operator
GRI SSE	Gas Regional Initiative South South East
HANDA	Croatian Compulsory Oil Stocks Agency
HAR	Harmonised Allocation Rules

HEP d.d.	Hrvatska elektroprivreda – joint stock company
HEP ODS	HEP-Operator distribucijskog sustava d.o.o. (Distribution system operator)
HERA	Croatian Energy Regulatory Agency
HOPS	Hrvatski operator prijenosnog sustava d.o.o. (Croatian transmission system operator)
HROTE	Hrvatski operator tržišta energije d.o.o. (Croatian energy market operator)
HTLS	High-temperature low-sag
HUPEX	Hungarian electricity exchange
HV	High voltage
HVDC	HVDC Regulation - Commission Regulation (EU) 2016/1447 of 26 August 2016 establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules
IBWT	Italian Borders Working Table
IGCC	International Grid Control Cooperation
INA d.d.	Industrija nafte d.d.
iPLIN	Application available on HERA's website – calculator for household gas consumers using gas supply as a public service
IT	Information Technology
ITC	Inter-TSO Compensation for transit
ITO	Independent Transmission Operator
IHS	Independent heating system
JANAF	Jadranski naftovod d.d.
JAO	Joint Allocation Office
LCOE	Levelized Cost of Electricity
LIP	Local Implementation Project
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
LV	Low voltage
MARI	Manually Activated Reserves Initiative
MEDREG	Mediterranean Energy
MRC	Multi-Regional Coupling
MV	Medium voltage
NEMO	Nominated Electricity Market Operator
NTC	Net Transfer Capacity
PCI	Projects of Common Interest
PCR	Price Coupling of Regions
PEES	Provisional grid connection authorisation
PhF	Physical Futures Market
PICASSO	Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation
PPS	Purchasing Power Standards
PRISMA	Joint capacity booking platform of major European transmission system operators
PSS	Public service supplier

RBP	Regional Booking platform
REMIT	Regulation (EU) No 1227/2011 of the European Parliament and of the Council of 25 October 2011 on wholesale energy market integrity and transparency
RES	Renewable energy sources
RFG	RFG Regulation – Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SBU	Standard bundled unit
SCADA	Supervisory Control and Data Acquisition
SEE	South East Europe
SEE-CAO	South East Europe Coordinated Auction Office
SINCRO.GRID	Project financed through CEF – The aim of the project is to improve voltage quality in the electricity system and increase the capacities of existing transmission lines through the use of advanced technical systems and algorithms
SMTA	Short and Medium Term Adequacy
SUKAP	Yearly, quarterly, monthly, daily and intraday capacity management system
TERRE	Trans European Replacement Reserves Exchange
TM	Tariff model
TR	Transformer rating
TRM	Transmission Reliability Margin
TS	Transformer substation
TSC	Transmission System Operator Security Cooperation
TTF	Title Transfer Facility
TYNDP 2016	Ten-Year Network Development 2016
UGSF Okoli	Underground storage facility Okoli
VTP	Virtual trading point
XBID	Cross Border Intraday

11 APPENDIX – LICENCES TO PERFORM ENERGY-RELATED ACTIVITIES

List of licences issued from 01/01/2017 to 31/12/2017	No. of issued licences
Electricity production	**7**
BIOINTEGRA d.o.o. – for manufacturing, trade and services Vladimira Nazora 179 33520 Slatina	
VJETROELEKTRANE GLUNČA d.o.o. – for trade and services Krapanjska 8 22000 Šibenik	
SAVA d.o.o. – for manufacturing, trade and services Trg hrvatskih branitelja 1 35435 Stara Gradiška	
VJETROELEKTRANA KATUNI d.o.o. – for electricity production Vukovarska 17 20000 Dubrovnik	
VRBOVSKO EKO ENERGIJA d.o.o. – for electricity and thermal energy production Tvornička 31 51326 Vrbovsko	
POŠTAK d.o.o. for services Jurišićeva 1/a 10000 Zagreb	
DRVNI CENTAR GLINA d.o.o. – for manufacturing, trade and services Žrtava Domovinskog rata 71 44400 Glina	
Electricity supply	**1**
DOMAĆA ENERGIJA d.o.o. – for services and trade Zagrebačka avenija 104 d 10000 Zagreb	
Electricity trade	**9**
JWM Energia Sp. z o.o. Kolejowa 57 40-602 Katowice Poland	
EDS International SK, s.r.o. Bajkalska 22 82109 Bratislava Slovakia	
INCERGO d.o.o. – for trade and services Hruševečka ulica 9 10000 Zagreb	
GAZPROM MARKETING & TRADING LIMITED 20 Triton Street London NW1 3BF United Kingdom	
DOMAĆA ENERGIJA d.o.o. – for services and trade Zagrebačka avenija 104 d 10000 Zagreb	

List of licences issued from 01/01/2017 to 31/12/2017	No. of issued licences
Green World Group OOD ul. Ivan Vazov 36 Varna 9000 Bulgaria	
ENEL TRADE S.P.A. Viale Regina Margherita 125 00198 Rome Italy	
Električni Finančni Tim Cesta v Mestni log 88 A 1000 Ljubljana Slovenia	
ENERGIE2 d.o.o. – for electricity trade Prilaz Gjure Deželića 74/II 10000 Zagreb	
Gas trade	**3**
PPD Hungária Energiakereskedő Korlátolt Felelősségű Társaság Montevideo utca 2/C 1037 Budapest Hungary	
OMV Gas Marketing & Trading GmbH Trabrennstraße 6-8 1020 Vienna Austria	
Trafigura Nat Gas Limited Leicester Court, Suite 2 Edgar Bernard Street Gzira GZR 1702 Malta	
Thermal energy production	**2**
TI-SAN d.o.o. – for trade, transport and services Industrijska 13 10431 Sveta Nedelja	
SAVA d.o.o. – for manufacturing, trade and services Trg hrvatskih branitelja 1 35435 Stara Gradiška	
Wholesale trade in petroleum products	**8**
GRAĐEVINARSTVO I PROIZVODNJA KRK d.d. Stjepana Radića 31 51500 Krk	
TG d.o.o. – for trade and services Kolodvorska 74 10452 Donja Zdenčina	
VELOX VENUM d.o.o. – for trade and services E. Vidovića 13 10360 Sesvete	
BRALA d.o.o. – for trade and services Ulica braće Dežmalj 26 23242 Posedarje	
INVEST SEDLIĆ d.o.o. – for manufacturing, trade and services I. V. Trnskog 9/E 43000 Bjelovar	

List of licences issued from 01/01/2017 to 31/12/2017	No. of issued licences
ALDO COMMERCE d.o.o. – for crafts and related services, internal and international trade Molindrio 11a 52440 Poreč	
SEDLIĆ d.o.o. – for manufacturing and services Berek 54 43232 Berek	
Croatian Hydrocarbon Agency Miramarska 24 10000 Zagreb	
Storage of liquefied petroleum gas	**1**
PETROL limited liability company for trade and services Otok, Oreškovićeva 6/h 10010 Zagreb	
Wholesale trade in liquefied petroleum gas	**1**
ADRIA OIL d.o.o. – for sale of petroleum products Spinčići 38 51215 Kastav	
TOTAL	**32**

List of licences extended from 01/01/2017 to 31/12/2017	No. of licences extended
Electricity production	**3**
EKO d.o.o. – for energy consulting Jurišićeva 1a 10000 Zagreb	
OSATINA GRUPA d.o.o. – for manufacturing, transport and services in agriculture Kralja Tomislava 91 31402 Semeljci	
ZAGREBAČKI HOLDING d.o.o. – for public transport, water supply, waste disposal, travel agency, sports, property management and real estate Ulica grada Vukovara 41 10000 Zagreb	
Electricity supply	**4**
MET Croatia Energy Trade d.o.o. – for trade and services Radnička cesta 80 10000 Zagreb	
220V d.o.o. – for electricity trade Budmanijeva 3 10000 Zagreb	
LUKA PLOČE ENERGIJA d.o.o. – for electricity production Trg kralja Tomislava 21 20340 Ploče	
CRODUX PLIN d.o.o. – for trade and services Savska Opatovina 36 10000 Zagreb	
Electricity trade	**1**
ENERGIE2 d.o.o. – for electricity trade Prilaz Gjure Deželića 74/II 10000 Zagreb	
Management of liquefied natural gas terminals	**1**
LNG HRVATSKA d.o.o. – for liquefied natural gas operations Radnička cesta 80 10000 Zagreb	
Gas supply	**19**
RADNIK građevinarstvo i građevinska industrija d.d. Ulica kralja Tomislava 45 48260 Križevci	
HUMPLIN d.o.o. – for gas distribution Lastine 1 49231 Hum na Sutli	
ZAGORSKI METALAC d.o.o. – for gas distribution and supply Celine 2 49210 Zabok	
PAPUK d.o.o. – for public utilities Vladimira Nazora 14 33515 Orahovica	
MOSLAVINA PLIN d.o.o. – for gas pipeline construction and gas distribution Trg kralja Tomislava 6 44320 Kutina	

List of licences extended from 01/01/2017 to 31/12/2017	No. of licences extended
MONTCOGIM - PLINARA d.o.o. – for the construction of distribution networks, gas distribution and maintenance Trg Ante Starčevića 3A 10431 Sveta Nedelja	
ZELINSKE KOMUNALIJE d.o.o. Katarine Krizmanić 1 10380 Sveti Ivan Zelina	
Gradska plinara Krapina d.o.o. – for gas distribution and supply Frana Galovića 7 B/II 49000 Krapina	
Brod-plin d.o.o. – for gas network construction and maintenance, natural gas distribution and supply, and thermal energy production, distribution and supply Tome Skalice 4 35000 Slavonski Brod	
PLIN-PROJEKT d.o.o. – for gas pipeline construction and gas distribution Alojzija Stepinca 36 35400 Nova Gradiška	
PLINARA d.o.o. – for gas supply Industrijska 17 52100 Pula	
KOMUNALAC d.o.o. – for public utility services Ulica križnog puta 18 34550 Pakrac	
PLINARA ISTOČNE SLAVONIJE d.o.o. – for gas supply Ohridska 17 32100 Vinkovci	
IVKOM-PLIN d.o.o. – for gas distribution and supply Vladimira Nazora 96/b 42240 Ivanec	
ACQUAMARIN PROJEKTI d.o.o. – for engineering, trade and production Trogirska 3 51000 Rijeka	
Geoplin d.o.o. (previously: TRGOVINA I OPSKRBA ENERGENTIMA d.o.o. for trade and services) Radnička cesta 39 10000 Zagreb	
PRVO PLINARSKO DRUŠTVO - OPSKRBA POSLOVNIH KORISNIKA d.o.o. K. A. Stepinca 27 32000 Vukovar	
PRVO PLINARSKO DRUŠTVO - OPSKRBA KUĆANSTAVA d.o.o. K. A. Stepinca 27 32000 Vukovar	
RWE Plin d.o.o. – for gas supply Capraška ulica 6 10000 Zagreb	
Thermal energy production	**2**
DI ČAZMA d.o.o. – for furniture production and wood processing A. Vulinca 28 43240 Čazma	
GRADSKA TOPLANA d.o.o. – for thermal energy production and distribution Tina Ujevića 7 47000 Karlovac	
Thermal energy supply	**2**

List of licences extended from 01/01/2017 to 31/12/2017	No. of licences extended
HRVATSKE ŠUME d.o.o. Ljudevita Farkaša Vukotinovića 2 10000 Zagreb	
VARTOP d.o.o. – for maintenance, management and thermal energy Stanka Vraza 6 42000 Varaždin	
Thermal energy distribution	**1**
GRADSKA TOPLANA d.o.o. – for thermal energy production and distribution Tina Ujevića 7 47000 Karlovac	
Wholesale trade in biofuels	**1**
BIODIZEL VUKOVAR d.o.o. – for manufacturing, trade and services Težačka međa 2 32000 Vukovar	
Wholesale trade in petroleum products	**6**
INCERGO d.o.o. – for construction, trade and services Rudolfa Matza 1 10360 Sesvete	
NAFTA CENTAR d.o.o. – for trade and services Mirka Kleščića 7 10430 Samobor	
TEHNOPETROL d.o.o. – for transport, trade and services Gornja Trebinja 5 47000 Karlovac	
TRI BARTOLA d.o.o. – for trade and services Hrvatskog sabora 25G 23000 Zadar	
BDM d.o.o. for trade and services Ante Starčevića 54 35000 Slavonski Brod	
ORA-FORM ZAGREB d.o.o. – for manufacturing, trade and services Oporovečki vinogradi 12 C 10000 Zagreb	
Storage of oil and petroleum products	**2**
ZAGREBAČKI PROMETNI ZAVOD d.o.o. Ljubljanska avenija 1 10000 Zagreb	
NAFTA CENTAR d.o.o. – for trade and services Mirka Kleščića 7 10430 Samobor	
Wholesale trade in liquefied petroleum gas	**4**
CRODUX PLIN d.o.o. – for trade and services Savska Opatovina 36 10000 Zagreb	
GAS OIL RIJEKA d.o.o. – for the sale of petroleum products Spinčići 38 51215 Kastav	
PROPAN-BUTAN d.o.o. – for services Put sv. Jurja 74 21217 Kaštel Novi	

List of licences extended from 01/01/2017 to 31/12/2017	No. of licences extended
ZAGREBAČKI PROMETNI ZAVOD d.o.o. Ljubljanska avenija 1 10000 Zagreb	
TOTAL	**46**

Energy-related activities	Issued licences – as at 31/12/2017
Electricity production	**46**
Electricity transmission	**1**
Electricity distribution	**1**
Electricity market organisation	**1**
Electricity supply	**17**
Electricity trade	**33**
Gas production	**0**
Natural gas production	**1**
Gas transport	**1**
Gas storage	**1**
Management of liquefied natural gas terminals	**1**
Gas distribution	**35**
Gas market organisation	**1**
Gas trade	**9**
Gas supply	**52**
Thermal energy production	**25**
Thermal energy supply	**21**
Thermal energy distribution	**9**
Production of biofuels	**4**
Wholesale trade in biofuels	**6**
Storage of biofuels	**4**
Production of petroleum products	**1**
Transportation of oil through pipelines	**0**
Transportation of petroleum products through product pipelines	**0**
Wholesale trade in petroleum products	**44**
Storage of oil and petroleum products	**21**
Storage of liquefied petroleum gas	**4**
Wholesale trade in liquefied petroleum gas	**12**
Licences to perform energy activities issued under the Energy Act (Official Gazette nos. 68/01, 177/04, 76/07, 152/08, 127/10):	

Transportation of oil through pipelines and other modes of transport not elsewhere specified, under Article 15 paragraph 1 item 22 of the Energy Act	**2**
Transportation of petroleum products through product pipelines and other means of transportation not elsewhere specified, under Article 15 paragraph 1 item 22 of the Energy Act	**1**
Transportation of oil, petroleum products and biofuels by road vehicles	**1**
Trade, intermediation, and representation on the energy market	**1**
Retail and wholesale trade in liquefied petroleum gas	**1**
TOTAL:	**357**

On 31 December 2017 there were a total of 357 licences issued by HERA.

Four licences were transferred:

- gas supply:
  - from KOMUNALAC d.o.o. city utility company, Koprivnica, to KOPRIVNICA OPSKRBA d.o.o., Koprivnica,
  - from PETROL PLIN d.o.o. for gas storage, refilling and trade, Zagreb, to PETROL d.o.o. for trade and transport of oil and petroleum products, Zagreb,
- storage of oil and petroleum products:
  - from TERMINAL DUNAV d.o.o. for transhipment and storage of petroleum products, Vukovar, to LUKOIL Croatia d.o.o. for trade in oil and petroleum products, Zagreb,
- wholesale trade in liquefied petroleum gas:
  - from PETROL PLIN d.o.o. for gas storage, refilling and trade, Zagreb, to PETROL d.o.o. for trade and transport of oil and petroleum products, Zagreb.

Four licences expired:

- thermal energy production, pursuant to a decision on the expiry of the licence:
  - ENERGOREMONT d.d., Karlovac,
- thermal energy supply, pursuant to a decision on the expiry of the licence:
  - ENERGOREMONT d.d., Karlovac,
- thermal energy production, due to expired period of the licence:
  - SPLIT PARKING d.o.o., Split,
- thermal energy supply, due to expired period of the licence:
  - UNIVERZAL d.o.o., Varaždin.

Information on licences granted to perform energy-related activities is available in the licence register hosted by HERA:
http://www.hera.hr/hrvatski/html/dozvole.html.