



Republic of Croatia

Croatian Energy Regulatory Agency

ANNUAL REPORT

2016

Zagreb, June 2017

**CROATIAN ENERGY REGULATORY AGENCY
ANNUAL REPORT 2016**

Table of Contents

1	INTRODUCTION	3
2	OVERVIEW OF THE ENERGY SECTOR	5
2.1	Electricity	5
2.2	Natural gas	14
2.3	Oil, oil derivatives, and biofuels	17
2.4	Thermal energy	18
3	HERA'S ORGANIZATIONAL STRUCTURE, AUTHORITY AND ACTIVITIES	20
3.1	Organisation.....	20
3.2	Legal framework.....	21
3.3	Activities	22
3.4	HERA's activities and operations in 2013 in general	24
3.4.1	Consumer protection	24
3.4.2	Electricity	25
3.4.3	Natural gas.....	28
3.4.4	Oil and oil derivatives	29
3.4.5	Biofuels.....	29
3.4.6	Thermal energy.....	29
3.4.7	International cooperation.....	30
3.4.8	REMIT.....	31
3.4.9	Council of Regulatory Affairs and Consumer Protection	34
4	ELECTRICITY	35
4.1	Significant events on the electricity market	35
4.2	Regulated network activities in the electricity sector	39
4.2.1	Transmission and distribution system	39
4.2.2	Losses in the transmission and the distribution network.....	40
4.2.3	Development plans for the transmission and distribution networks	45
4.2.4	Tariffs for using the transmission and distribution network and connection fees	49
4.2.5	Unbundling of activities	52
4.3	Wholesale electricity market	57
4.3.1	Development of the wholesale electricity market	57
4.3.2	Allocation of cross-border transmission capacities and congestion management	62
4.3.3	Electric power system balancing and ancillary services	68
4.4	Retail electricity market.....	74
4.4.1	Basic features of electricity consumption.....	74
4.4.2	Development of the retail electricity market	77
4.4.3	Electricity prices for end consumers.....	80
4.4.4	Quality of the electricity supply.....	84
4.4.5	Protection of end consumers	88
4.4.6	Guarantee of origin system	93
4.5	Security of electricity supply	96
4.6	Incentives for generating electricity from renewable sources and cogeneration	103
4.7	Energy efficiency in the electricity sector.....	110

5	NATURAL GAS	112
5.1	Regulation of the legislative framework for natural gas	112
5.2	Regulated activities in the natural gas sector	118
5.2.1	Natural gas transport.....	118
5.2.2	Natural gas storage.....	125
5.2.3	Gas distribution	129
5.2.4	Unbundling of activities	132
5.3	Gas market	134
5.3.1	Natural gas balance	134
5.3.2	Natural gas supply and final consumption	136
5.3.3	Gas supply quality.....	139
5.3.4	Prices of natural gas.....	140
5.3.5	Consumer protection	151
5.4	Security of natural gas supply	153
5.5	Public service obligation in the gas sector	154
6	OIL AND OIL DERIVATIVES	158
6.1	Regulation of the legislative framework for oil and oil derivatives	158
6.2	Regulation of oil transportation through pipelines	158
6.3	Development of the oil and oil derivatives market	160
6.3.1	Storage of oil and oil derivatives.....	160
6.3.2	Production of crude oil and oil derivatives; trade in oil derivatives	161
6.4	Security of supply of oil and oil derivatives	164
7	BIOFUELS	166
7.1	Regulation of the legislative framework for biofuels	166
7.2	Development of the biofuels market	166
8	THERMAL ENERGY	168
8.1	Regulation of the Legal Framework for Thermal Energy	168
8.2	Thermal Energy Sector Organization, Activities, and Indicators	168
8.2.1	Thermal Energy Sector Organization	168
8.2.2	Thermal energy sector activities.....	172
8.2.3	Thermal Energy Prices	172
8.2.4	Consumer protection	175
9	LIST OF TABLES AND FIGURES	177
9.1	List of tables	177
9.2	List of figures	178
10	ABBREVIATIONS	181
11	APPENDIX – LICENCES TO PERFORM ENERGY-RELATED ACTIVITIES	184

1 INTRODUCTION

Dear Readers,

It is my great pleasure to present to you the *Annual Report on the Activities of the Croatian Energy Regulatory Agency for 2016*, which, along with the *Croatian Energy Regulatory Agency's Budget Execution Report*, is submitted annually to Croatian Parliament pursuant to the provisions of the Regulation of Energy Activities Act.

Let us remind you that the Croatian Energy Regulatory Agency (HERA) is an independent regulatory body acting under a public mandate, and its core tasks concern the regulation of energy activities in Croatia in conformity with obligations defined in the relevant national legal framework. HERA is also one of 28 national energy regulators of the member states of the European Union, whose rights and obligations (both in the national and European context) are based on the principles and general acts of European energy legislation.

The fundamental principle of operation for all national energy regulators in the EU is the autonomy of activities and decision-making guaranteed by law, both in relation to the executive government and the interests of economic operators in the energy sector, which does not in any way prejudice close cooperation with other relevant national bodies or the government defining general policy guidelines. Naturally, in addition to the guaranteed independence of regulators, the other aspect facilitating delivery of the energy regulation mission is represented by the accountability and transparency of operations as required by law.

The requirement to submit reports on activities to national parliaments constitutes one of the backbones of the system of regulator accountability.

HERA's annual report is a combination of overviews displaying the regulatory body's execution of obligations as required by law and the operational results and statistical indicators of regulated entities in the Croatian energy sector, as well as assessments, observations, and regulatory recommendations related to the development of Croatia's energy markets and their coupling and organisation in accordance with the rules of the European Single Market.

The structure of this report is compatible with the latest recommendations of the Council of European Energy Regulators (CEER) to the fullest possible extent, and every attempt has been made to align its contents and design with good practice in reporting as used by the EU and ACER.

The information and statistical data presented in this report mostly refer to the 2016 calendar year. Notwithstanding, common sense dictated some comment on trends and events that either continued or took place in early 2017.

The core tasks of energy regulation as implemented by HERA consist of the regulation of natural monopolies (primarily through establishing fees for the performance of regulated energy activities, i.e. tariffs), the monitoring and promotion of the development of energy markets and market mechanisms, and the gradual implementation of EU implementation regulations in the energy sector.

When evaluating the results of the Croatian energy sector in 2016 in the most general terms – naturally taking into consideration the components and elements comprising either the relevance or the monitoring obligation on the part of the energy regulator – it can be concluded that national energy systems functioned stably and reliably. Energy infrastructure largely corresponds to static planned demand, and thus indicators of

system security and reliability, security of supply, and quality of energy services show stable and reliable trends.

Energy prices in the electricity and natural gas segments (i.e. components functioning pursuant to the rules of the European Single Market) in 2016 were also either stable or showed slight downward trends, whereas the prices (tariffs) of infrastructure components as a component of the price of energy were, in principle, regulated in a satisfactory manner, indicating the positive effects of long-term cost control. Market-dictated price components still do not show the genuine effects of market competition, due on the one hand to the fact that prices have not yet been fully deregulated, and to systemic resistance to the complete liberalisation of the market on the part of some participants on the other. There is room for improved competition, primarily at the retail level, both through institutional/legal solutions and strengthened market surveillance.

The most challenging implementation issue in the Croatian electricity market probably lies in the establishment of a long-term, sustainable funding system for renewable sources and high-efficiency cogeneration. Although the role of HERA in this segment is a minor administrative one, the effects of market distortion engendered by undefined relations can be felt in a number of elements also related to regulation.

In early 2016, the demanding process of electricity transmission system operator certification was completed successfully, marking the Croatian transmission system operator's full compliance with EU regulations. The gas transport system operator, Plinacro, is yet to complete this same process. The certification process serves as a good illustration of the status of the Croatian energy industry in terms of operational compliance with a series of EU implementation regulations. Even though the energy system and its fundamental legal framework complies with the requirements of the so-called Third European Package of energy regulations at the macro level, many tasks and requisite corrections (in organisation and legislation) are yet to come at the level of implementation .

The EU energy sector framework is extremely dynamic and demanding where implementation is concerned – so much so that it is a continuous challenge to all stakeholders in the Croatian energy industry. HERA is no exception to the imperative of permanent adaptation to a new energy paradigm that is becoming increasingly complex. The concept of the Energy Union of 2015 was extended in late 2016 with an extensive new package of draft regulations under the motto “Clean Energy for All”.

Like the entire national energy sector, HERA must also continuously accommodate, adapt, and improve. One unchanging aspect is the unique role of the energy regulator, whose independent position is an essential, vital precondition for the implementation of the market energy concept, which Croatia has opted for in its energy reforms, energy strategy, and accession to the European Union. Though we witnessed occasional opposition to this position in 2016 and early 2017, HERA is positive that it will continue to operate in the coming period as a neutral and professional body whose activities will have to increasingly serve as a guarantee of stability for energy market participants and investors, to the ultimate benefit of energy users – our customers.

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

2 OVERVIEW OF THE ENERGY SECTOR

2.1 Electricity

The most significant changes in the electricity sector in 2016 were the deregulation of prices for electricity supply as a part of universal service (households), the launch of the organised Croatian day-ahead electricity market under the Croatian electric power exchange (CROPEX), and the issuing of a certified decision to the Croatian transmission system operator, Hrvatski operator prijenosnog sustava d.o.o. (HOPS), confirming that the operator meets the defined requirements for independent transmission operators. Although the concentration of the retail electricity market is still quite high, a slight decline in electricity prices was recorded on the retail market in comparison with 2015. A slight decline in electricity prices was also observed on the wholesale market in 2016 as compared to 2015. Tariff items for electricity transmission and distribution, as well as fees for connection to transmission and distribution networks, remained unchanged in relation to 2015. In 2016, the electricity sector saw an increase in total installed production facility capacity in Croatia (mostly from plants using renewable sources of energy and cogeneration plants); consequently, there was an increase in electricity generated by renewable sources and high-efficiency cogeneration as a share of total generated electricity. The status of electricity supply security is satisfactory, whereas electricity consumption increased by a modest 0.2% as compared to 2015.

During 2016, significant activities were undertaken in the preparation of by-laws regulating the wholesale electricity market, network connection, and electricity supply quality.

In late 2016, a sudden modification of the legal framework defining renewable sources and high-efficiency cogeneration also took place, resulting in a negative impact on the wholesale electricity market in early 2017.

Croatia's borders with Slovenia and Hungary were included in the Core capacity calculation region, the largest cross-border transmission capacity calculation region in the EU.

In late 2016, a new company was established – HEP Elektra d.o.o. – incorporated for electricity supply activities as a public service.

The peak load of the Croatian electric power system in 2016 was recorded on 12 July – 2,869MW – whereas the minimum load was observed on 22 May – 1,022MW. This was the second year in a row in which the peak load of the Croatian electric power system was recorded during the summer months.

The connection capacity of all power plants in Croatia at the end of 2016 was 4,794MW, an increase of 228MW compared to 2015. Capacity displayed a trend of continuous growth, primarily due to the connection of new facilities, under construction with the support of the renewable source and cogeneration electricity generation incentive system. Hydroelectric power plants account for the largest share of installed plant capacity at 45.37%, followed by thermal power plants (42.10%), wind power plants (10.05%), biomass power plants (1.32%) and solar power plants (1.16%). In 2016, the ratio between the installed capacity of power plants in Croatia and the peak load of the Croatian electric power system was 1.67, which is a relatively good indicator of the capabilities of national production to “cover” the load.

The total electricity consumption of the Croatian electric power system in 2016 was 17.7TWh, a modest increase of 0.2% as compared to 2015. The bulk of total electricity consumption was covered by production within Croatia (64.1%), while the rest was covered by physical net imports (35.9%), of which 2.7TWh was met with electricity imports from Krško Nuclear Power Plant in Slovenia, which is 50% owned by Hrvatska

elektroprivreda joint-stock company (Hrvatska elektroprivreda – dioničko društvo; hereinafter: HEP d.d.). Hydroelectric power plants accounted for the largest share in electricity generation in Croatia in 2016 (6.3TWh, 55.16%), followed by thermal power plants (3.6TWh, 31.99%), wind power plants (1TWh, 8.85%), and other renewable sources (0.5TWh, 4.01%). While 2016 can be considered average in terms of electricity generation by hydroelectric power plants, there was a reduction in the share of electricity generated by fossil fuel power plants due to the increased share of electricity generated by wind and other renewable sources of energy.

According to reports submitted by the transmission system operator and distribution system operator concerning security monitoring of the electricity supply in 2016, it can be inferred that electricity supply security in the Croatian electric power system is satisfactory.

Electricity transmission and electricity distribution are regulated energy-related activities performed as public services. There is one transmission system operator in Croatia – Hrvatski operator prijenosnog sustava d.o.o. (hereinafter: HOPS), as well as one distribution system operator – HEP-Operator distribucijskog sustava d.o.o. (hereinafter: HEP-ODS).

Losses of electricity in the distribution network amounted to 1,235GWh, or 7.6% of electricity procurement, a decrease as compared to 2015 both in absolute and relative terms. The average realised price of electricity to cover losses in the distribution network is HRK 343/MWh. The estimated amount of non-technical losses as a share of total losses is around 50%. Therefore, HERA wants HEP-ODS to intensify its implementation of measures to contribute to reducing losses, such as control of connection points and meters, as well as other measures aimed at reducing unauthorised electricity consumption, which is an important component of non-technical losses. Even though HEP-ODS procures significantly larger quantities of electricity to cover losses than those quantities related to HOPS, both the planned energy price and the average realised price are higher. The difference in average realised prices between HOPS and HEP-ODS in 2016 was as great as HRK 45/MWh. Consequently, HERA warned HEP-ODS to devise a new method of electricity procurement to cover losses by using a number of various products, if possible, in order to reduce the costs of energy procurement to cover losses.

With respect to preparation of development plans for the transmission and distribution networks, HOPS and HEP-ODS continued the positive practice of harmonising plans regarding construction progress and the funding of common structures (TS 110/x kV).

The transmission system operator and the distribution system operator deliver their information to HERA, which serves as the basis for the assessment of the impact of planned investments on tariff items for transmission and distribution in the three-year period. Based on the information submitted in 2016, HERA considers the planned total revenues of HOPS and HEP-ODS sufficient to cover the planned level of investment.

In February 2017, the European Commission approved co-financing for the Croatian and Slovenian transmission and distribution system operators for the SINCRO.GRID project under the CEF (Connecting Europe Facility) fund in the amount of EUR 40.5 million, representing 51% of the total planned project value.

Tariff items for electricity transmission and distribution are determined based on the *Methodology for Establishing Tariff Items for Electricity Transmission* and the *Methodology for Establishing Tariff Items for Electricity Distribution*. Pursuant to the above methodologies, HERA adopted an official *Decision on Tariff Item Amounts for Electricity Transmission* and a *Decision on Tariff Item Amounts for Electricity Distribution*. These decisions entered into force as of 1 January 2016. Notwithstanding, they did not affect the tariff items for 2016 as compared to 2015, which remained unchanged. Thus, the average realised prices of network usage in 2016 for all consumer categories were HRK 0.085/kWh for transmission and HRK 0.224/kWh for electricity distribution.

The fee for connection to the transmission and distribution networks is determined based on the provisions of the *Ordinance on Fees for Connection to the Electric Power Network and for Increasing Connection Capacity* and the *Decision on the Fee for Connection to the Electric Power Network and for Increasing Connection Capacity*. The base fee for connecting to the electric power network and for increasing connection capacity for end consumers, excluding VAT, is HRK 1,350/kW, except for within the City of Zagreb, where the price amounts to HRK 1,700/kW. However, in cases where actual connection costs are more than 20% higher than the result of multiplying the fee with the connection power, consumers bear the actual connection costs. Electricity producers always cover actual connection costs.

From 25 July to 8 September 2016, HERA held public consultations with concerned members of the public on the new *Proposed Methodology for Establishing Fees for Connection to the Electric Power Network for New Network Users and for Increasing the Connection Capacity of Existing Network Users*, which was adopted in 2017. This methodology is part of a package of related by-laws defining connection to the electric power network pursuant to the **Energy Act** and the **Electricity Market Act**. The package comprises a regulation determining the conditions and procedures for connection to the electric power network as issued by the ministry responsible for energy, according to which the following is to be harmonised: the methodology for establishing fees for connection to the electric power network for new network users and for increasing the connection capacity of existing network users as adopted by HERA; rules for connection to the transmission network as adopted by the transmission system operator, and; rules on connection to the distribution network as adopted by the distribution system operator. The ministry responsible for energy only held a public consultation on the *Proposed Regulation on Establishing the Conditions and Procedures for Connection to the Electric Power Network* in April 2017, whereas the transmission system operator and the distribution system operator are waiting for the final version of this regulation in order to be able to complete their rules for connection to the transmission and distribution networks. After waiting for the regulation to be adopted for some time, HERA finally issued the *Methodology for Establishing Fees for Connection to the Electric Power Network for New Network Users and for Increasing the Connection Capacity of Existing Network Users*.

Other by-laws that are also important for the connection of consumers and producers to the electric power network 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. In May 2016, the transmission system operator held a consultation with concerned members of the public on the *Proposed Network Code for the Transmission System*. Following HERA's prior approval, the transmission system operator will issue the *Network Code for the Transmission System* in 2017. The distribution system operator presented the *Proposed Network Code for the Distribution System* for consultation with concerned members of the public in May 2017. In April 2017, HERA issued the *Criteria for the Grant of Authorisations for the Construction and Commissioning of Direct Lines*, supplementing a package of by-laws related to connection to the transmission network.

As previously noted, on 10 February 2016, the Croatian Electric Power Exchange (Hrvatska burza električne energije d.o.o.; hereinafter: CROPEX) successfully initiated the organised Croatian day-ahead electricity market with eight registered members.

HEP-Proizvodnja d.o.o. had the largest share in production capacities and electricity generated from power plants in Croatia in 2016 – 81% of production capacities and 73% of generated energy.

The total amount of electricity sales as reported through the agreed schedules of energy entities from the HEP Group was 32.2TWh, i.e. 69% of total sales on the wholesale market.

In May 2016, HERA gave prior approval to the Croatian Energy Market Operator (Hrvatski operator tržišta energije; hereinafter: HROTE) for the *Amendments to the Rules on the Organisation of the Electricity Market*, as well as to HOPS for the *Rules on Electric Power System Balancing (HOPS, 5/2016 and 3/2017)*. In July 2016, HERA gave prior approval to HOPS for the *Methodology for Establishing Prices for the Provision of Ancillary Services (HOPS, 7/2016)*. In December 2016, HERA gave prior approval to HEP-ODS for the *Rules on the Application of Standard Load Profiles (HEP-ODS, 12/2016)*. Furthermore, in July 2016, HERA issued the *Methodology for Establishing Balancing Energy Prices*, whereas the *Methodology for Establishing Prices for Providing Balancing Services* was already adopted in 2015.

By giving prior approval for by-laws and developing by-laws within its area of competence, HERA ensured the full implementation of the legal framework, both in terms of the introduction of balance groups and of organising the electricity and ancillary services markets as stipulated in the **Electricity Market Act**.

The **Renewable Sources and High-Efficiency Cogeneration Act** makes HROTE and, indirectly, eligible electricity producers responsible for imbalances under the incentives system. As of 1 January 2017, the EKO balance group was supposed to begin its operations. All by-laws defining the wholesale market were issued under the assumption that the EKO balance group would commence its work on 1 January 2017, which would have finally included all wholesale market participants equally under the system of imbalance settlements. HERA deems it necessary to ensure the allocation of pertinent system balancing costs to all participants causing imbalances in order to motivate them to reduce them.

Public consultations were held with regard to the by-laws regulating the establishment and function of the EKO balance group in greater detail, during which the opinions of HERA and system operators were provided. However, in 2016, the ministry responsible for energy failed to issue the *Ordinance on Renewable Energy Sources and High-Efficiency Cogeneration* pursuant to the deadlines defined in the **Renewable Energy Sources and High-Efficiency Cogeneration Act**. The ministry also failed to provide approval to HROTE for the *Proposed Electricity Selling Rules* and the *Proposed Rules for Managing the EKO Balance Group*, which had previously been delivered to it.

At the proposal of the ministry responsible for energy, the Croatian government adopted the **Regulation on Amendments to the Renewable Energy Sources and High-efficiency Cogeneration Act** on 29 December 2016, which entered into force two days later. The **Regulation** postponed the introduction of the EKO balance group and retained the obligation of energy suppliers to receive electricity from HROTE at the stipulated price of HRK 0.42/kWh.

In its opinion on the proposed regulation, HERA indicated that the postponement of the defined model of electricity sale under the incentive system as stipulated by the law could adversely impact the development of the electricity market. This particularly regards the development of the day-ahead market and the intraday market, as the volume of electricity generated under the incentives system, which is already significant, will not be traded on CROPEX. Instead of a defined change of direction towards the development of the electricity market and the balancing model, a situation remained in which production planning and the development of realistic, defined schedules for eligible producers under the incentives system were not adequately resolved. All of this resulted in pronounced negative consequences for the balancing system and for the addition of more renewable energy power plants to the electric power system. Additional costs incurred from this situation will be covered by other market participants through the settlement of imbalances as the EKO balance group is not included in this process. In addition, a significant increase in electricity generated by wind power plants caused additional costs to the transmission system operator in the form of the procurement of ancillary services and balancing energy. The aforementioned opinion also noted that it would be necessary

to consider the risk of stagnation in the electricity retail market and/or of some suppliers possibly exiting the Croatian electricity market due to the postponed establishment of the new electricity sales framework for energy from renewable sources and cogeneration.

The *Rules on Electric Power System Balancing* define the market mechanisms for the procurement of ancillary services and for the acquisition of balancing energy, which allows ancillary services to be provided to all network users with adequate technical capabilities. These rules introduced the second (annual) settlement of imbalances, which is to be implemented for the first time in 2017.

The *Methodology for Establishing Prices for the Provision of Ancillary Services* determines the manner by which unit prices of ancillary services are calculated – this specifically applies to automatic secondary frequency restoration reserve, reserve capacity for tertiary regulation for system balancing, reserve capacity for tertiary regulation for system security, compensation operation for the purpose of voltage and reactive power control, start-up availability for production units without external power supply, start-up of production units without external power supply, availability of production units for operation in island mode, and for energy delivered under island mode. The *Methodology for Establishing Prices for the Provision of Ancillary Services* was applied for the first time in 2016. HOPS made relevant agreements with HEP-Proizvodnja d.o.o. for 2017 on the basis of this methodology.

The *Rules on the Application of Standard Load Profiles* define the manner in which the amount of realised end consumer electricity consumption in the distribution system that cannot be measured and allocated to balance groups on hourly levels due to technical constraints is calculated. This realised element includes billing metering points with no hourly measurements, as well as HEP-ODS's losses. The *Rules on the Application of Standard Load Profiles* also define the method by which imbalances are calculated under the second (annual) settlement of imbalances.

The sole balancing service provider in 2016 was HEP-Proizvodnja d.o.o.

HOPS's total costs for the electric power system balancing service in 2016 were HRK 59 million. The total costs of providing ancillary services were HRK 341 million, of which 83% was related to balancing reserve capacity.

Croatia's borders with Slovenia and Hungary were included in coordinated auctions held under the Joint Allocation Office (JAO), which is responsible for holding annual, monthly, and daily auctions for allocations in both directions at said borders. Furthermore, at the border with Slovenia, the Slovenian transmission system operator maintains a bilateral allocation of total intraday capacities in both directions. At the border with Bosnia and Herzegovina, the South East Europe Coordinated Auction Office (SEE-CAO) holds coordinated auctions in the SEE (South East Europe) region for capacities on annual, monthly, and daily bases. At this border, HOPS implements a bilateral allocation of total intraday capacities in both directions. At the border with Serbia, joint bilateral capacity allocation auctions continued, wherein HOPS implements annual and monthly auctions and the transmission system operator from Serbia implements daily auctions and intraday allocations in both directions for total transmission capacity.

At the end of 2016, the number of billing metering points for electricity end consumers was around 2.4 million. The total electricity sold to end consumers was 15.57TWh. The sale of electricity increased by 0.5% in 2016 as compared to 2015. The increase in total consumption occurred mainly because of an increase in consumption on the part of commercial consumers at medium and high voltages (red model). As for consumers using high voltage, there was a significant decrease in consumption, while consumers from the household category accounted for a moderate drop in consumption.

The proportion of energy sold to end consumers in the household category amounts to is 39.4% of total energy sold, while the share of energy sold to end consumers in the

commercial category is 60.6%. There was thus a marginal increase in the share of electricity sold to end consumers in the commercial category as compared to 2015.

The last ten-year period saw a very moderate rise in electricity sold to end consumers, although the sustainable development scenario from the October 2009 Energy Development Strategy of the Republic of Croatia optimistically predicted an average increase in electricity sold at an annual rate of 3.7% between 2006 and 2020. Were the above prediction realised, the electricity sold in 2016 would have amounted to 21,655GWh, which is 39% more than the actual amount sold.

The total number of supplier switches made in 2016 was 85,915, amounting to a switching rate of 3.57%. Consumers from the commercial category accounted for 33,817 of these switches, while household consumers accounted for 52,098 switches.

The share of electricity sales to households outside the universal service in 2016 grew marginally as compared to 2015 (from 10% to 11%), while the share of electricity sales by suppliers other than HEP d.d. remained at the same level as in 2015 (16%).

In terms of the retail electricity market concentration as expressed in electricity sold, as of December 2016, the three largest suppliers' total market share was 97.5% of end consumer supply in the household category, while the three largest suppliers' total market share amounted to 84.7% of supply to end consumers in the commercial category. This implies that, as compared to 2015, the concentration in the retail market for supply to consumers from the household category increased marginally (97% in 2015), while it decreased somewhat in supply to end consumers in the commercial category (86% in 2015).

In 2016, all electricity suppliers were obliged to purchase all electricity produced under the incentive system in proportion to their share in total energy supplied to end consumers at the regulated price of HRK 0.42/kWh. Annual electricity prices on the Hungarian and Slovenian electricity exchanges averaged HRK 0.26/kWh in 2016. This obvious difference represents a cost to electricity suppliers, which was indirectly transferred to their customers through electricity prices.

Amendments to the **Electricity Market Act** introduced changes in the electricity retail market. One significant modification was the termination of electricity price regulation under universal supply as of 1 January 2016 in accordance with the recommendations of the European Commission and practice in most European Union member states. HEP-ODS, which was a consumer supplier under universal service in 2016, separated electricity supply as a public service through a status change in the division of the company by separation. As of 1 January 2017, electricity supply as a public service is performed by HEP-Elektra d.o.o. Additionally, as of 1 January 2017, each supplier began issuing a single invoice for electricity and network usage to customers whose billing metering points are connected to the low voltage network.

A further slight drop in electricity prices was observed in the Croatian electricity market in 2016 as compared to 2015, as a result of the positive effects of competition in electricity supply.

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

In 2016, for end consumers in the household category with an average consumption amounting to 3,500 kWh *per annum*, the average proportion of taxes and fees amounted to 24% of the total price of electricity, the average share of electricity with supply costs was 44%, and the average share of network usage fees was 32%. An increase in the fee for renewable energy sources is expected in 2017, which will impact the total price of electricity. Considering that VAT has been reduced to 13% for electricity, the share of taxes and fees in the total price of electricity will also change in 2017.

To facilitate end consumers' selection of suppliers, HERA developed and published a new version of the tariff calculator, which provides comparisons of tariff models and prices of

various electricity suppliers for consumers from the household category. The tariff calculator allows an overview of suppliers' basic tariff models, prices for informational purposes, and additional information on pricing methods, price structures, etc. The calculations are strictly for informational purposes and do not include potential additional discounts offered by suppliers.

Due to the large number of end consumer complaints about suppliers' misleading business practices, an inspection of suppliers offering electricity supply to end consumers in the household category was carried out with respect to the implementation of the *General Terms and Conditions for Using the Network and Electricity Supply* in 2016. As a part of this inspection, each electricity supplier was instructed to align their terms and conditions for consumers in the household category with the provisions of the **Electricity Market Act**, the **Consumer Protection Act**, and the *General Terms and Conditions for Using the Network and Electricity Supply*. Misdemeanour proceedings were initiated against one supplier for charging "contract termination costs" for electricity supply contracts terminated early, which is contrary to the provisions of the *General Terms and Conditions for Using the Network and Electricity Supply*.

HERA focuses strongly on the issue of access to the electricity grid, as this has been one of the greatest challenges observed in past years, judging by the number of complaints. Through professional and persistent actions directed toward the transmission system operator and the distribution system operator, HERA has managed to ensure uniform practical procedures throughout Croatia. To this end, HEP-ODS established a Complaint Committee, which analyses complaints in the first instance and standardises methods of complaint resolution in all distribution areas. Through the systematic resolution of complaints about network access, HERA established uniform analytical criteria used in verifying network parameters and analysing the technical capabilities of connections in order to prevent the unfounded rejection of applications for connection to the electricity grid.

The total electricity generated by power plants under the incentive system in Croatia in 2016 was 1.7TWh, or 9.7% of total electricity consumption, which amounted to 17.7TWh. Around HRK 1.5 billion of incentives was paid for electricity generated in this way, which yielded an average price of around HRK 0.90/kWh for electricity generated in plants under the incentive system, which is approximately 3.5 times higher than the annual average price of electricity on the Croatian, Hungarian, and Slovenian electricity exchanges.

HROTE buys in electricity from producers under the incentive system with funds partly collected from incentives for generating electricity from renewable sources and cogeneration in the amount of HRK 0.035/kWh, or HRK 0.005/kWh for consumers obliged to obtain greenhouse gas emission permits. The rest of the funds are collected from suppliers obliged to buy in electricity generated under the incentive system at the regulated price of HRK 0.42/kWh in proportion to their share in total energy delivered to end consumers.

Pursuant to the **Renewable Energy Sources and High-efficiency Cogeneration Act**, the level of the fee for renewable energy sources and cogeneration is defined by the Croatian government in a decision adopted on 31 October of the current year for the following year, at the proposal of the ministry responsible for energy. The level of the fee for renewable energy sources and cogeneration must be sufficient to cover the costs for the year it is defined for, as well as for any claims from the previous year, taking into consideration the expected revenue from electricity sales and corresponding guarantees of the origin of electrical energy. The level of the fee for 2017 was not defined within the legally defined period, and thus the amounts from the previous period continued to apply in 2017. It was only in March 2017 that the ministry responsible for energy referred a proposed decision for public consultation, on the basis of which the fee would be increased to HRK 0.075/kWh for electricity end consumers and to HRK 0.007/kWh for consumers obliged to obtain greenhouse gas emission permits.

The **Renewable Energy Sources and High-Efficiency Cogeneration Act** also stipulated the introduction of the incentive system with market premiums and a guaranteed buy-in price, with contract awards based on tendering in both systems. However, the regulation as defined in this act, according to which the Croatian government was supposed to define additional quotas to be used for tendering in the period from 2016 to 2020 at the proposal of the ministry responsible for energy, has not yet been adopted. Furthermore, in addition to the introduction of the EKO balance group, this act eliminates suppliers' obligation to buy in electricity under the incentive system at a regulated price, and introduces the sale of this electricity on the electricity market as of 1 January 2017.

It should be noted that an increase in the amount of energy generated under the incentive system and the elimination of suppliers' obligation to buy in electricity under the incentive system at a regulated price might result in the need to further increase the fee for renewable sources of energy and cogeneration, which is paid by all end consumers of electrical energy.

As for the inspection of eligible producers, in 2016 HERA verified applications for the extension of prior approvals because of suspicions concerning notarised declarations on 50% of funds used for construction of plants, based upon which these prior approvals had been extended. Additionally, for the supervision of plants whose loads exceeded the values approved in decisions awarding them the status of eligible producers, HERA prepared the *Operating Rules in the Case of Exceeded Load on the Part of an Eligible Electricity Producer*, which it published on its website. The purpose of these rules is to unify procedures and ensure transparency in determining irregularities in the fulfilment of conditions for the use of production plants and/or production units on the basis of which eligible producer status has been awarded.

In 2016, HERA ensured the development of a study entitled "Assessment of the potential to increase the energy efficiency of the electricity infrastructure", which met its obligation in the electricity sector as defined in the **Energy Efficiency Act**. This study analysed measures affecting technical losses (decreases and increases) included in ten-year development plans for transmission and distribution systems from 2016 to 2025, also including a detailed elaboration of the initial three- and one-year periods.

Furthermore, during 2016, HERA ensured the development of a study entitled "Groundwork for preparing costs-benefit analyses for introducing advanced metering devices and relevant networking systems for electricity end consumers", which met its obligation in the electricity sector as defined in the **Energy Act**. The study was completed in late 2016. Financial and economic cost-benefit analyses yielded a positive result. The study considered a scenario in which advanced metering devices are introduced across a period of 11 years, based on the concept of installing these advanced metering devices for consumers when replacing existing meters whose calibration periods have expired. During 2017, HERA will carry out further activities necessary to supply the minister responsible for energy with all documents required to adopt a plan and programme of measures to introduce advanced metering devices for end consumers.

As the significant increase in cross-border trade at the intraday level has shown that there is a need for intraday trading, an intraday allocation of cross-border transmission capacities at the border with Hungary must be organised as well. In late 2016, HOPS and the Hungarian transmission system operator agreed on an activity roadmap, based upon which joint allocation of intraday capacities in both directions is expected to begin in mid-2017.

Total revenue from auctions for the allocation of cross-border transmission capacities in 2016 amounted to ca. HRK 35 million. The bulk of revenue from capacity allocations at annual auctions was realised in import directions. The largest revenues at monthly auctions were realised at the borders with Hungary and Slovenia.

Pursuant to Commission Regulation (EU) 2015/1222, dated 24 July 2015, which established a guideline on capacity allocation and congestion management (hereinafter: CACM), each transmission system operator from the EU furnished its national regulator with a harmonised proposal regarding the determination of capacity calculation regions in November 2015. As the national regulators failed to reach unanimous agreement on the proposal, in November 2016, ACER issued Decision No. 6-2016 defining the capacity calculation regions in the EU. The Croatian borders with Slovenia and Hungary were included in the CORE region, the largest cross-border transmission capacity calculation region in the EU.

In December 2016, HERA approved HOPS's first act pursuant to CACM in collaboration with other transmission system operators, which was related to generation and load data provision methodology. This act, together with the common grid model methodology currently being adopted, is intended to define the data required to establish a unified network model at the level of the EU.

The regulators, transmission system operators, and exchanges of Slovenia and Croatia began cooperating to couple the Croatian and Slovenian day-ahead markets using the net transfer capacity method (NTC). This initiative is a transitional solution for coupling the Croatian and Slovenian markets until they are coupled to a regional market, as defined in CACM. In March 2017, CROPEX and HOPS became official members of the regional Italian Borders Working Table project (IBWT), which made it possible to couple the Croatian electricity market to the European market under the MRC project (Multi-Regional Coupling MRC), which currently includes 19 countries and covers 85% of European electricity consumption.

Under the early implementation of Regulation (EU) 2016/1719, which established a guideline on forward capacity allocation (hereinafter: FCA), transmission system operators within ENTSO-E (European Network Transmission System Operators for Electricity) prepared the Harmonised Allocation Rules (hereinafter: HAR). In September 2016, HERA gave its prior approval for the rules, which has begun to be implemented for the allocation of long-term rights to cross-border capacities in 2017 (for annual and monthly periods) at the Croatian borders with Slovenia and Hungary.

CACM, in addition to day-ahead market coupling, also stipulates the coupling of intraday markets using a continuous process throughout the day. This process should be realised through the XBID project (Cross Border Intraday), which began even before CACM and its relevant adopted acts came into force. CROPEX and HOPS are thus currently involved in the Accession Stream project together with other participants from Central and Eastern Europe. The primary goal of this project is knowledge transfer between current and new project members.

2.2 Natural gas

The basic features of the natural gas sector are the continued trend of true market liberalisation and further improvements to existing by-laws. In 2016 and early 2017, the gas market was characterised by the following:

- a continued trend of recovery marked by growth in gas consumption as compared to 2015 after a three-year period of decline in consumption,
- the beginning of registration of participants in the gas wholesale market (gas traders, gas suppliers, transport system operators, gas storage system operators, gas producers, LNG terminal operators) in the Centralised European Register of Energy Market Participants (CEREMP), which also includes a national register of participants on the Croatian market,
- reduced prices on the wholesale market and rising wholesale market competitiveness indicators, with the introduction of modifications to the business model for ensuring gas to consumers who use gas supply as a public service obligation,
- reduced prices on the retail market, as well as for gas supply as a public service obligation; rising retail market competitiveness indicators, with the start of the practical liberalisation of the market for household consumers,
- an increase in the number of complaints related to the practical implementation of supplier switching procedures, due to which HERA undertook a number of adequate measures including resolving complaints, enhancing the supplier switch IT system in collaboration with HROTE, informing market participants of their rights and obligations through opinions or binding interpretations,
- the reservation of transport system capacities was made possible on a quarterly basis for the first time, and a new non-standard service provided by the transport system operator was introduced for the use of interruptible capacity with reduced interruptibility at the Dravaszerdehely interconnection from Croatia into Hungary,
- a continued upward trend in the number of gas storage system users, with a decrease in the number of standard storage capacity packages for priority allocation to the supplier on the wholesale market, from 70% to 60% of the total available number of standard packages, as well as the enabling of greater flexibility in the use of gas storage capacities,
- the realisation of preconditions necessary to implement a strategic development project for a liquefied natural gas Reception and delivery terminal, in the section of issuing a licence for liquefied natural gas terminal management issued by HERA to LNG HRVATSKA d.o.o., as well as HERA's issuing of the *Methodology for Establishing Tariff Items for The Reception and Dispatch of Liquefied Natural Gas*,
- balancing rules for the gas system fully harmonised with EU rules, and EU rules on establishing interoperability and data exchange entered into force.

2016 was also marked by further development and liberalisation of the gas market both in the wholesale and retail sectors, continuing the trend of introducing market relations and developing competition which began in late 2012.

A common measure used to determine market power concentration is the Herfindahl-Hirschman Index (hereinafter: HHI), which generally amounts to less than 2,000 points in competitive markets with no dominant players. The HHI in the wholesale gas market in the Republic of Croatia was 2,294 in 2016, as compared to 2,494 in 2015. It is important to note that this concentration indicator relates to the wholesale market, which also includes transactions in the sale of gas for public service requirements under regulated conditions.

The most significant gas supplier on the wholesale market in 2015 had a market share of 32%, the next largest supplier accounted for a market share of 23%, while the remaining

45% was distributed among 14 gas suppliers operating on the wholesale market. In 2016, the market share of the most significant gas supplier fell to 30%, whereas the market share of the next largest gas supplier rose to 25%. The remaining 45% of the wholesale market was distributed among 12 gas suppliers in 2016 (two less than in 2015).

In 2016, there were 13 balance responsible parties (one more than in 2015), who traded a total of 14,714,689MWh of gas at the virtual trading point (15% more than in 2015).

Further development of the gas wholesale market was also apparent in a decrease in market prices of gas, which were lower by an average of 29% at the wholesale level as compared to 2015.

Gas market participants trading on wholesale markets not considered organised markets (in the sense of REMIT) were obliged to register with CEREMP, which also includes the national register of market participants on the Croatian market, no later than April 2016. In 2016, HERA took steps to register gas traders, gas suppliers, transport system operators, gas storage system operators, gas producers, and LNG terminal operators.

In the retail segment of the market, the gas market shows significant continued liberalisation in the form of a significant rise in supplier switching, which increased by 61% in terms of the number of customers (5,076 switches) as compared to 2015, and by 21% in terms of delivered gas quantities (702,760MWh). Market liberalisation for consumers from the household category on the retail gas market (essentially) began in the form of particular gas suppliers offering market-based (unregulated) contracts for gas supply to households. However, this retail market liberalisation process was also marked with a significant number of cancelled supplier switching procedures, as well as complaints over the behaviour of market participants. HERA undertook the following measures with the intent of eliminating obstacles to the development of the retail market: resolving complaints, enhancing the supplier switch IT system in collaboration with HROTE, informing market participants of their rights and obligations through opinions or binding interpretations, optimising by-laws outlining the supplier switching procedure, collecting opinions and recommendations from both participants in the supplier switch procedure and consumers through surveys, etc. In 2016, 55 businesses held licences to carry out gas supply activities, of which 46 were active in gas supply.

According to data collected by HERA on a quarterly basis from all gas suppliers, the HHI on the Croatian retail gas market amounted to 1,280 in 2015 and 1,291 in 2016. This data regards the retail market, which includes all consumer categories, including households – consumers who use supply as a public service under regulated conditions. The aforementioned HHI, in addition to data on the growing number of gas suppliers and completed gas supplier switches, is an indicator of the maintenance of low concentration levels and significant retail market development.

The impact of retail market development is apparent in the level of final gas prices, which were higher by 1% on average in the second part of 2016 as compared to the average level in European Union countries, whereas this difference amounted to 11% in 2015. However, the regulated final gas price for end consumers using the public service – for households and shared boiler rooms – was an average of 36.8% lower than the average level in European Union countries. This difference amounted to 32.4% in 2015.

In 2016, the business model for gas procurement for suppliers in the public gas supply service (for consumers in the household category) was based on the regulated establishment of all components in the price structure, as well as the central role of suppliers on the wholesale market. As of 1 April 2017, as a result of amendments to the **Gas Market Act**, the wholesale market supplier (HEP d.d.) procures gas according to market principles, and not under regulated conditions. Furthermore, public service suppliers (34 local gas suppliers) autonomously decide whether they will procure gas for consumers using the public service under regulated conditions from the supplier on the wholesale gas market or from other suppliers or traders under market conditions. Also,

the Croatian government no longer considers it the obligation of natural gas producers to sell gas to suppliers on the wholesale market. The Croatian government still determines the price at which the wholesale gas market supplier sells gas to public service suppliers.

In March 2016, HERA issued a new *Decision on the Final Price of Gas for Households for the Period from 1 April to 31 December 2016*, on the basis of which the average final price of gas for households was reduced by 15% as compared to the previous year, amounting to HRK 0.2737/kWh for 2016. The changes in the final gas price occurred because of a change in the wholesale (purchase) component of the gas price, which accounts for approximately 71% of the total final price of gas for households, and which was reduced pursuant to a decision by the Croatian government, resulting in a 24% reduction compared to the previous decision. In addition, as of 1 January 2016, the average price of gas distribution was reduced by 9% compared to 2015, whereas in 2016 the distribution component accounted for an average of 23% of the total final price of gas for households.

Pursuant to the aforementioned statutory amendments, in February 2017, the Croatian government adopted a *Decision on the Price of Gas at Which the Wholesale Supplier* (HEP d.d.) is obliged to sell gas to suppliers in the household gas supply public service for the period from 1 April 2017 to 31 March 2018, in the amount of HRK 0.1809/kWh. This price was HRK 0.1734/kWh until 31 March 2017, which represents an increase of HRK 0.0075/kWh, or 4.3%. Due to this, following the completion of analyses and a public consultation, HERA issued a new *Methodology for Establishing Tariff Items for Public Service Gas Supply and Guaranteed Supply*, according to which the total unit cost of gas supply at the level of all 34 public service suppliers was reduced to an average of HRK 0.0112/kWh, representing a decrease in the average total unit cost of gas supply of HRK 0.0052/kWh, or 31.7%. Regarding the change in input components in the final gas price calculation, as well as the reduction in the average cost of gas distribution by HRK 0.0027/kWh as of 1 January 2017, pursuant to the *Decision on Gas Distribution Tariff Items* that HERA issued in December 2016, the final gas price for consumers using the public service as of 1 April 2017 increased by an average of 0.9% for all public service suppliers.

As for transport system usage, the 2016/2017 gas year saw the first quarterly-based capacity booking at interconnections and on the national market. Furthermore, Croatia's outbound capacity use service was enhanced at the Croatia-Hungary interconnection through the introduction of a new non-standard service provided by the transport system operator for interruptible capacity with reduced interruptibility. This non-standard service will be available for use until a permanent, comprehensive operational solution for ensuring capacities in gas transport from Croatia to Hungary is provided through the construction of a compressor station in Croatia.

Commercial and technical capacity management rules in the gas market were harmonised with Commission Regulation (EU) No. 984/2013 establishing a Network Code on Capacity Allocation Mechanisms in Gas Transmission Systems, while the transport system operator implements capacity booking on interconnections via the PRISMA information platform for the Rogatec interconnection and the RBP information platform for the Dravazerdehelyi interconnection.

Transport system balancing were harmonised with the provisions of Commission Regulation (EU) No. 312/2014 establishing a Network Code on Gas Balancing of Transmission Networks. In 2016, HERA issued a new *Methodology for Establishing the Price of Balancing Energy in the Gas System* and the gas market operator developed a trading facility for balancing product transactions. The new *Rules on balancing*, which took effect on 1 April 2017, were implemented through by-laws adopted by the gas market operator, the transport system operator, and the gas storage system operator with HERA's approval.

Between 1 April 2014 to 31 March 2017, storage services were used by multiple users for the first time (four gas suppliers and the transport system operator), whereas after 1 April

2017, the gas storage service was used by up to nine users (eight gas suppliers and the transport system operator). The gas storage system operator was obliged, pursuant to the provisions of amendments to the **Gas Market Act**, to reserve a percentage of standard gas storage system capacity packages for priority allocation to the supplier on the wholesale market – 70% between 1 April 2014 and 31 March 2017, and 60% after 1 April 2017. To adapt to market demands and new balancing rules, the gas storage system operator provided gas storage system users with a number of renominations for the use of storage over the gas day, changed direction of nominations, and changes in storage work cycles.

The use of storage capacities represents a substantial tool for gas supplier flexibility, both in wholesale gas trading and in gas supply for end consumers at the retail level on the seasonal (summer – winter) and daily levels.

In 2016, HERA issued a liquefied natural gas terminal management licence to LNG HRVATSKA d.o.o., representing its first issuance of such a licence to an energy entity. In addition, a *Methodology for Establishing Tariff Items for the Reception and Dispatch of Liquefied Natural Gas (LNG)* was issued for the first time. This methodology defines all elements for the LNG terminal management regulation model, as well as a calculation of the fee for LNG use for LNG terminal users. The first regulation period begins on the date the *Decision on Tariff Items for the Reception and Delivery of LNG* enters into force (as per the LNG terminal operator's request), and ends on 31 December 2021.

With regard to supply quality monitoring, as of October 2014, HERA began collecting data on realised supply quality indicators for guaranteed supply quality standards. For the first time, gas system operators and suppliers were obliged to submit an annual report to HERA on the quality of gas for 2014 by 1 March 2015. Data collection is the basis for establishing incentives and compensation for inadequate quality of service, the launch of which is foreseen in 2017. HERA is currently verifying and collecting additional data in order to establish incentives and compensation for inadequate quality of service in the period to come.

The bodies of EU energy regulators – the Agency for the Cooperation of Energy Regulators (hereinafter: ACER) and the Council of European Energy Regulators (hereinafter: CEER) – are continuously researching adequate applicable concepts of the European Union gas market development model.

All of the above indicates that the Croatian gas market is facing further changes aimed at market development and achieving competitive gas pricing, protection of final gas consumers, improved service quality, and enhanced gas supply security.

2.3 Oil, oil derivatives, and biofuels

The status of the oil, oil derivative, and biofuel sectors in 2016 was marked by a slight increase in oil derivative production, a continued increase in oil derivative imports, and continued growth in transported quantities of crude oil via the oil pipeline system. The biofuel sector was marked by a continued decline in biofuel generation.

Total demand for crude oil in 2016 was 3.214 million tonnes, which represents a relative increase of 12.7% compared to 2015, when the total demand for crude oil was 2.851 million tonnes. Crude oil import volume in 2016 was 2.53 million tonnes, which represents a relative increase of 14.4% as compared to 2015, when 2.2 million tonnes of crude oil was imported. National crude oil production in 2016 amounted to 684,000 tonnes, which represents a relative increase of 7% as compared to 2015, when the national production of crude oil was 639,000 tonnes.

Oil derivative production in 2016 amounted to 3.4 million tonnes, which represents a relative increase of 10.8% compared to 2015, when 3.1 million tonnes of oil derivatives

were produced. The total production of liquefied petroleum gas in 2016 amounted to 211,000 tonnes, which represents an increase of 0.5% as compared to 2015.

Biofuel production in 2016 amounted to 6.031 tonnes, a decrease of 65.4% as compared to 2015, when 17.441 tonnes were produced. This represents a continued decline in consumption, which amounted to 50.6% in 2015 as compared to 2014. The presumed cause of the decrease in biofuel production lies in adverse market trends caused by the termination of subsidies to biofuel producers for the production of biofuel for transport.

2.4 Thermal energy

In 2016, the thermal energy sector was marked by stagnation in the implementation of the **Thermal Energy Market Act**.

The prices of primary energy source materials used in thermal energy generation – natural gas for public service supply and fuel oil – fluctuated throughout 2016. The *Methodology for Establishing Tariff Items for Thermal Energy Generation* defines the procedure for changing energy tariff item amounts in the case of a change in the price of fuel used for thermal energy generation. Thus, during 2016, the tariff item for energy produced by centralised heating systems using natural gas to generate thermal energy was reduced by 21% on average as compared to 2015 (by 20% in Karlovac, by 21% in Slavonski Brod, by 27% in Vukovar, and by 17% in Rijeka). The tariff item for energy in the Vojak (Rijeka) centralised heating system, which uses fuel oil to generate thermal energy, changed five times throughout 2016 (in January, March, April, July, and November), and rose by 14.6% as compared to 2015. The total price of thermal energy in towns where thermal energy services were provided by HEP-Toplinarstvo d.o.o. did not change in 2016 (Zagreb, Osijek, Sisak, Velika Gorica, Samobor, Zaprešić).

The Ministry of Economy, Entrepreneurship and Crafts began preparing a study on the efficiency of individual thermal energy metering in district heating systems in 2016. The study was performed by the Hrvoje Požar Energy Institute; it was published under the title “An Analysis of the Implementation of the Energy Efficiency Directive in Metering in District Heating Systems”.

Regardless of the obligation and deadlines stipulated in the **Thermal Energy Market Act**, activities regarding the installation of heat exchangers, heat cost allocators (dividers), and thermal energy meters (calorimeter thermometers) largely ceased in 2016. Due to the frequent mention and implication of HERA’s responsibility in this matter, we would like to take this opportunity to stress the fact that HERA does not perform and is not responsible for supervising the installation of such devices.

With respect to all the changes introduced by the **Thermal Energy Market Act**, which represent significant modifications compared to the prior status, HERA provided guidelines and instructions to end consumers, authorised representatives of co-owners, thermal energy consumers, and energy entities as to their rights and obligations defined by law and by-laws in the thermal energy sector by responding to queries, complaints, and petitions within the framework of its responsibility. In addition, while resolving technical and legal issues between participants in the thermal energy sector, HERA also provided instructions on technical solutions, statutory provisions, and regulations in the fields of construction, common housing, energy efficiency, and consumer rights protection.

As on 31 December 2016, 31 thermal energy consumers, 19 of whom were active, were listed in the Register of Thermal Energy Consumers maintained by HERA on its website. Thermal energy purchasing activities are still performed by thermal energy suppliers for most end consumers, and no competition or significant growth has developed in this segment of the thermal energy market.

In accordance with their legal obligation and within the set deadline, all thermal energy purchasers provided HERA with information for records of thermal energy purchasers, which relate to thermal energy consumption and other technical data for all structures (billing metering points) where they perform thermal energy purchasing activities.

During 2016, HERA issued two thermal energy supply licences (TI-SAN d.o.o., and POSLOVNI PARK VIROVITICA d.o.o.). Two licences for thermal energy supply were renewed (TOP-TERME d.o.o., and KOMUNALAC POŽEGA d.o.o.). At the request of IVAKOP d.o.o. from Ivanić Grad, HERA issued decisions on the expiry of its thermal energy generation, distribution, and supply licences.

During 2016, HERA received 149 various queries and petitions from end consumers, authorised representatives of co-owners, thermal energy consumers, energy entities, and institutions, to whom it provided statements or opinions and issued adequate decisions.

3 HERA'S ORGANIZATIONAL STRUCTURE, AUTHORITY AND ACTIVITIES

HERA is an independent, autonomous, non-profit legal person with public authority over the regulation of energy-related activities. It was established in 2004 pursuant to the **Energy-Related Activities Regulatory Act (Official Gazette No. 177/04)**.

HERA's activities are in the interest of Croatia, and are carried out in accordance with HERA's public authority.

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

3.1 Organisation

HERA's structure is defined by the **Energy-Related Activities Regulatory Act (Official Gazette No. 120/12)** and the HERA's statute, dated 16 October 2013.

HERA has a board of commissioners, an office of the president of the board of commissioners, and specialist services.

HERA is managed by its Board of Commissioners, which is responsible for the professional work of HERA.

The president of the Board of Commissioners manages the board's work, represents HERA, represents HERA in all proceedings before the courts, administrative authorities, and other state authorities, as well as before legal entities vested with public 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 responsible for the legality of HERA's work. The president of the Board of Commissioners has a deputy. The specialist services perform the professional, administrative, and technical duties of HERA.

The main organisational units of the professional services are as follows:

- the Electricity Sector,
- the Gas and Oil Sector,
- the Thermal Energy Sector,
- the Legal and Personnel Office, and
- the Support Services Office.

The organisational chart of HERA is shown in Figure 3.1.1.

The professional services are managed by directors who are appointed by the president of the Board of Commissioners in accordance with public tenders for vacancies. The directors are appointed to a term of four years with the possibility of re-selection.

The directors of professional services manage the professional operations of the sectors, and are accountable to the president of the Board of Commissioners for their operations.

Pursuant to the *Decision of the Croatian Government on the Amount of Fees for Performing 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 amounting to 0.05% of the total annual revenue from the sale of goods and/or services generated in the previous year by energy entities involved in energy-related activities conducted based on licences for performing such energy-related activities, and
- fees for issuing licences for performing energy-related activities, fees for acquiring eligible producer status, and fees for the settling of claims, complaints, and requests.

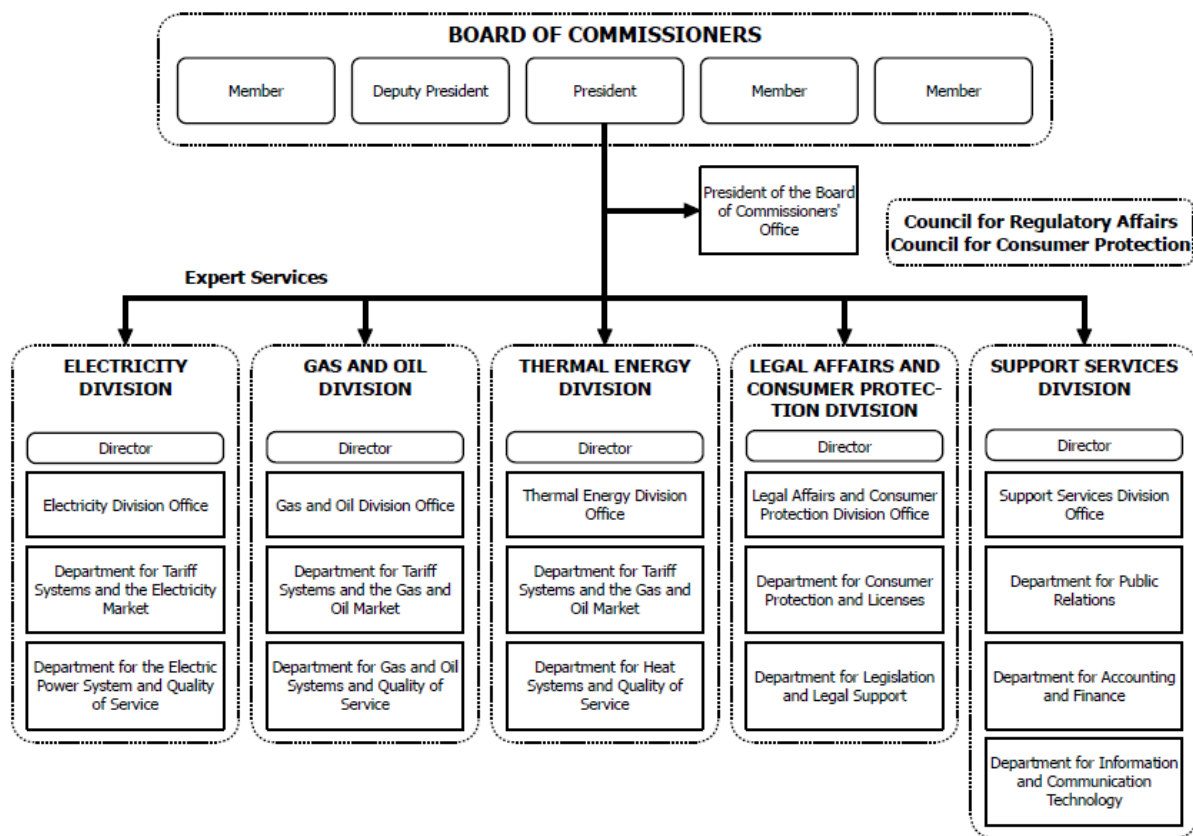


Figure 3.1.1. Organisational chart of HERA

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

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

HERA's financial management is supervised by the central public administration vested with public authority for this purpose.

3.2 Legal framework

The legal framework for the performance of the activities within HERA's jurisdiction in 2016 was stipulated by the following regulations:

- **Energy-Related Activities Regulatory Act (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 Oil Derivatives Market Act (Official Gazette No. 19/14),**
- **Biofuels for Transportation Act (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 123/16),**
- **Energy Efficiency Act (Official Gazette No. 127/14),**
- **Alternative Fuel Infrastructure Deployment Act (Official Gazette No. 120/16),**

- **Energy Community Treaty Ratification Act (Official Gazette – International Agreements Nos. 6/06 and 9/06),**
- **General Administrative Procedures Act (Official Gazette No. 47/09),**
- *Regulation on Licences for Performing Energy-Related Activities and Maintaining Registers of Issued and Revoked Licences for the Performance of Energy-Related Activities (Official Gazette Nos. 88/15 and 114/15),*
- *Decision on the Amounts of Fees 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 **Act on Amendments to the Gas Market Act (Official Gazette No. 16/17)** has been in force since 23 February 2017, and was therefore not part of the legislative framework defining the operations within HERA's jurisdiction in 2016.*

*The **Regulation on Amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act (Official Gazette No. 123/16)** entered into force on 31 December 2016.*

3.3 Activities

HERA's activities are defined in the **Energy-Related Activities Regulatory Act** (hereinafter: the **Act**), and include the following tasks:

- issuing, renewing, and transferring licences for the performance of energy-related activities, and temporarily and permanently revoking of licences,
- supervising energy entities in their performance of energy-related activities,
- supervising the implementation of provisions for separating activities pursuant to the law governing the energy sector and the laws governing the performance of particular energy-related activities,
- supervising the maintenance of separate accounting records, as defined in the law governing the energy sector and other laws governing particular energy markets,
- supervising compliance with the prohibition of the mutual subsidising of energy-related activities pursuant to laws governing particular energy markets,
- supervising compliance with the principles of transparency, objectivity, and impartiality in the work of energy market operators,
- providing approval for general acts that organise the electricity market and general acts that organise the natural gas market,
- issuing decisions on the acquisition of eligible producer status and the temporary and permanent revocation of eligible producer status,
- providing methodologies and tariff systems in accordance with the **Act**, the law governing the energy sector, and other laws governing particular energy markets,
- setting or approving prices, amounts of tariff items, and fees in accordance with the methodologies and tariff systems under Article 11, paragraph 1, item 9 of the **Act**,
- approving investment, development and construction plans for systems pursuant to the laws governing particular energy markets,
- supervising the compliance of the investment, development, and construction plans of the transmission system and transport system operators with ENTSO-E and ENTSO-G development plans,

- supervising the transmission, transport, and distribution system operators (system owners) and other energy entities or system users with respect to their compliance with the obligations defined in the Act, the law governing the energy sector, and other laws governing particular 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 the repeal of 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 the repeal of Regulation (EC) No 1775/2005 (*hereinafter: Regulation No. 715/2009*),
- cooperating with the regulatory bodies of European Union member states and neighbouring countries, as well as with ACER,
- cooperating with regulatory bodies and other bodies within the Energy Community pursuant to the **Ratification of the Energy Community Treaty Act**,
- implementing the legally binding decisions of ACER and the European Commission,
- submitting annual reports to Croatian Parliament containing information on activities undertaken and results achieved in relation to the scope of activities under Article 11, Paragraph 1, Items 1 through 8 of the **Act**,
- reporting to other competent national authorities, ACER, the European Commission, and other European Union bodies, involving 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**,
- issuing conditions for energy supply quality pursuant to applicable regulations governing particular energy-related activities,
- issuing general requirements for energy supply,
- issuing and supervising the methodology for establishing network/system connection fees for new customers and for increasing the connected load/capacity for energy businesses and end consumers,
- making cost-benefit analyses and obtaining opinions from representatives of consumer protection bodies with respect to introducing advanced metering devices for end consumers,
- supervising energy supply quality pursuant to applicable regulations governing particular energy markets,
- supervising the transparency of energy market function,
- supervising the level of openness, competition, and misconduct on the energy market and in consumer supply,
- supervising restrictive covenants, especially contracts restricting the number of suppliers, and informing the national competition regulators when required,
- supervising free contracting in terms of supply contracts with the possibility of termination and long-term contracts, under the condition they comply with EU legislation and policies,
- supervising the time required by transmission, transport, and distribution system operators for connection and repair works,
- providing assistance, together with other relevant authorities, in ensuring the implementation of efficient and prescribed consumer protection measures,

- issuing recommendations related to prices for energy supply performed as public service at least once per year,
- providing consumers with the right to access information on their energy consumption, i.e. creating a format for presenting consumers with consumption data that is easy to understand and standardised at the national level, and establishing the procedures by which consumers and suppliers may exercise their right to access consumption data such that consumers can allow registered suppliers access to data on their consumption, whereas entities responsible for managing data on their own consumption shall provide suppliers with such data, all of which services shall be free of charge to consumers,
- supervising the confidentiality of consumer energy consumption data,
- monitoring investments into 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,
- supervising the implementation of stipulated criteria for establishing access to the gas storage system,
- monitoring the execution 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 2016, the Board of Commissioners held 29 sessions at which a total of 350 agenda items were discussed.

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

3.4 HERA's activities and operations in 2013 in general

3.4.1 Consumer protection

Within the area of its jurisdiction, 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 particular energy-related activities, as well as by cooperating with ministries and relevant inspectorates pursuant to the provisions of relevant laws, and
- by resolving particular consumer complaints by virtue of the public authority vested in HERA pursuant to the **Energy-Related Activities Regulatory Act** and other laws and regulations governing particular energy markets.

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

During 2016, HERA received a total of 721 petitions from energy consumers, which included both energy consumer queries (350) and energy consumer complaints (371). A

total of four court proceedings were initiated against the behaviour of HERA in 2016 through bringing claims to the administrative court with jurisdiction in such matters – one of these claims involved a decision taken by HERA in 2015, while the other three were related to HERA's decisions from 2016.

3.4.2 Electricity

In 2016, HERA's activities in the electricity sector mainly involved the following:

- developing and issuing by-laws governing the electricity market,
- implementing European Union regulations,
- issuing decisions on the amounts of tariff items based on methodologies applicable to the energy entities performing electricity-related activities under the public service,
- approving and monitoring the implementation of ten-year development plans for the transmission and distribution networks,
- monitoring electricity losses in the transmission and distribution networks, and taking part in the production of reports by CEER (the Council of European Energy Regulators) concerning electricity 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 calculations and settlement of imbalances in order to improve the regulations concerning balancing energy calculations and settlement of imbalances, including the implementation of standard load profiles,
- collection and processing data on electricity supply quality and taking part in the production of CEER reports on electricity supply quality,
- implementing REMIT, which, in cooperation with ACER, prevents insider trading and market manipulation,
- monitoring the unbundling of energy-related activities and the organisation of separate accounting in businesses performing electricity-related activities as a public service (HEP-ODS),
- final activities related to the issuing of certificates to the transmission system operator were completed, and the decision was taken to issue a certificate to Hrvatski operator prijenosnog sustava d.o.o.,
- supervising energy entities providing electricity supply services and harmonising supplier conditions for the household category with both legislation and the provisions of the *General Terms and Conditions for Using the Network and Electricity Supply (Official Gazette No. 85/15)*; all suppliers implemented the required harmonisation except for 220V d.o.o., which led to the initiation of misdemeanour proceedings against this electricity supplier,
- issuing 17 licences for the performance of energy-related activities (six licences for electricity generation and 11 licences for electricity trade),
- renewing 12 licences for the performance of energy-related activities (four licences for electricity generation, six licences for electricity supply, and two licences for electricity trade),
- issuing decisions related to eligible electricity producer status, involving the issuance of seven preliminary decisions, three decisions altering a preliminary decision, six decisions changing the project operator in a preliminary decision, 34 decisions extending a preliminary decision, eight decisions rejecting the request for the extension of a preliminary decision, 24 decisions and four decisions changing the

project operator in a decision, while 16 applications for the issuance of a preliminary decision and two applications for extending a preliminary decision were rejected, and

- resolving 469 administrative and non-administrative cases, of which 254 were complaints from end consumers.

After consultation with concerned members of the public, HERA issued the following by-laws in 2016:

- *Modification of the Methodology for Establishing Tariff Items for Electricity Transmission (Official Gazette No. 84/16)*, and
- *Methodology for Establishing Balancing Energy Prices (Official Gazette Nos. 71/16 and 112/16)*.

HERA issued the following decisions on the amounts of tariff items:

- *Decision on Tariff Items for Guaranteed Electricity Supply (Official Gazette No. 55/16)* (for the period from 1 July to 31 December 2016), and *Decision on Tariff Items for Guaranteed Electricity Supply (Official Gazette No. 109/16)* (for the period from 1 January to 30 June 2017).

HERA issued the following opinions and approvals:

- opinion on the *Draft Ordinance on Renewable Energy Sources and High-Efficiency Cogeneration*,
- opinion on the draft *Electricity Selling Rules*,
- opinion on the **Draft Regulation on Amendments to the Renewable Energy Sources and High-Efficiency Cogeneration Act**,
- approval for Hrvatski operator prijenosnog sustava d.o.o.'s Annual Energy Procurement Plan to cover losses in the transmission network in 2016,
- approval for Hrvatski operator prijenosnog sustava d.o.o.'s price of electricity losses in the transmission network in 2016,
- approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft Agreement on Commitments Based on Issued Bonds No. 02/2016 and the draft Annex III to the Agreement on Commitments Based on Issued Bonds No. 07/2013 ,
- approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft Annex No. 3 to the Agreement on the Calculation and Collection of Fees for Transmission Network Usage, included in the calculations for electricity consumers connected to the distribution network,
- approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft Electricity Supply Agreement for a period of one year,
- approval for Hrvatski operator prijenosnog sustava d.o.o.'s Annual Energy Procurement Plan to cover losses in the transmission network for 2017,
- approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft Electricity Delivery Agreement to cover losses in the transmission network for the period of January – December 2017,
- approval for Hrvatski operator prijenosnog sustava d.o.o.'s agreements on the provision of ancillary services:
 - Agreement on the Provision of Reserve Capacity and Regulation Electricity from Automatic Secondary Frequency Restoration Reserves,
 - Agreement on the Provision of Reserve Operating Capacity and Regulation Electricity from Tertiary Regulation for System Balancing,
 - Agreement on the Provision of Reserve Operating Capacity and Regulation Electricity from Tertiary Regulation for System Security,
 - Agreement on the Provision of Compensation Operation Services for the Purpose of Voltage and Reactive Power Control,

- Agreement on Island Operation Services, and
- Agreement on the Provision of Black Start Services,
- prior approval for HEP-operator distribucijskog sustava d.o.o.'s draft Ten-Year (2016 – 2025) Development Plan for the HEP-ODS distribution network with a detailed elaboration of the initial three- and one-year periods,
- prior approval for Hrvatski operator tržišta energije d.o.o.'s draft amendments to the *Rules on the Organisation of the Electricity Market*,
- prior approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft *Rules on Electric Power System Balancing*,
- prior approval for Hrvatski operator prijenosnog sustava d.o.o.'s Annual Report on Security of Supply of the Croatian Electrical Energy System for 2015,
- prior approval for HEP-operator distribucijskog sustava d.o.o.'s Annual Report on Security of Supply in the Distribution System for 2015,
- prior approval for HEP-operator distribucijskog sustava d.o.o.'s draft *Rules on Non-Standard Distribution System Operator Services* with the annexed *Rates of Non-Standard Distribution System Operator Services*,
- prior approval for HEP-operator distribucijskog sustava d.o.o.'s report for 2015 on ensuring the principles of transparency, objectivity, and impartiality pursuant to HEP-Operator distribucijskog sustava d.o.o.'s issued Compliance Programme,
- prior approval for HEP-Operator distribucijskog sustava d.o.o.'s *Rules for Delimiting Consumption and Meter Reading under the Supplier Switch Procedure*,
- prior approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft *Methodology for Establishing Prices for the Provision of Ancillary Services*,
- prior approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft *Rules for Auctions for the Allocation of Cross-Border Transmission Capacities* at the South East Europe Coordinated Auction Office (SEE CAO), v. 1.4., August 2016,
- prior approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft *Rules on Forward Capacity Allocation*,
- prior approval for Hrvatski operator tržišta energije d.o.o.'s draft amendments to the *Rules for Using the Register of Guarantees of the Origin of Electricity*,
- prior approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft *Rules on the Use of Cross-Border Transmission Capacities*,
- prior approval for Hrvatski operator prijenosnog sustava d.o.o.'s draft *Rules for Daily Auctions for the Allocation of Cross-Border Transmission Capacities at the Borders of the CEE Region and at the Croatian-Hungarian and Croatian-Slovenian Borders*,
- prior approval for:
 - *the draft Rules for Annual and Monthly Auctions for Capacity Allocation between the Bidding Zones of Hrvatski operator prijenosnog sustava d.o.o. ("HOPS") and JP EMS BEOGRAD ("EMS") for 2017*,
 - *the draft Rules for Daily Auctions for Capacity Allocation between the Bidding Zones of JP EMS BEOGRAD ("EMS") and Hrvatski operator prijenosnog sustava d.o.o. ("HOPS") for 2017*,
 - *the draft Rules for Intraday Capacity Allocation between the Bidding Zones of Hrvatski operator prijenosnog sustava d.o.o. ("HOPS") and JP EMS BEOGRAD ("EMS") for 2017*,
- prior approval for HEP-Operator distribucijskog sustava d.o.o.'s draft *Rules on the Implementation of Standard Load Profiles*,
- prior approval for:

- the draft *Rules for Daily Auctions for Capacity Allocation between the Bidding Zones of EMS AD Beograd and Hrvatski operator prijenosnog sustava d.o.o. for 2017*, and the draft *Rules for Intraday Capacity Allocation between the Bidding Zones of Hrvatski operator prijenosnog sustava d.o.o. and EMS AD Beograd for 2017*,
- prior approval for the draft *Rules for the Intraday Allocation of Cross-Border Transmission Capacities between the Regulation Areas of Hrvatski operator prijenosnog sustava d.o.o. and Nezavisni operator sistema u Bosni i Hercegovini*, and
- prior approval for the draft *Ten-Year (2017 – 2026) Development Plan for the HEP-ODS distribution network with a detailed elaboration for the initial three- and one-year periods, of HEP-Operator distribucijskog sustava d.o.o.*,

as well as the following decisions:

- *Decision on the Provision of Approval for Hrvatski operator prijenosnog sustava d.o.o.'s Draft Ten-Year Development Plan for the Transmission Network for the 2016 – 2025 Period, with a Detailed Elaboration of the Initial Three- and One-Year Periods*,
- *Decision on the Adoption of the Assessment of Potential for Increasing the Energy Efficiency of the Electricity Infrastructure*,
- *Decision Establishing the Proposed Conditions for Electricity Supply Quality*,
- *Decision Establishing the Proposed Methodology for Establishing Fees for Connection to the Electric Power Network for New Network Users and for Increasing the Connection Capacity of Existing Network Users*,
- *Decision on the Provision of a Statement on the Draft Ordinance on the Use of Renewable Energy Sources and High-Efficiency Cogeneration*,
- *Decision on the Adoption of the Report on the Use of the Revenues of Hrvatski operator prijenosnog sustava d.o.o. following the allocation of cross-border transmission capacities from July 2015 to June 2016*,
- *Decision Establishing the Draft Rules on Amendments to the Rules for Electricity Supplier Switching*, and
- *Decision on Approval for the Proposed Methodology of All Transmission System Operators on the Provision of Information on Generation and Loads*.

3.4.3 Natural gas

In 2016, HERA's activities in the gas sector were as follows:

- developing and issuing the *Methodology for Establishing Tariff Items for the Reception and Dispatch of Liquefied Natural Gas*,
- developing and issuing the *Methodology for Establishing the Price of Balancing Energy in the Gas System*,
- developing and issuing the amendment to the *Methodology for Establishing the Price of Non-Standard Services for Gas Transport, Distribution, Storage and Public Service Gas Supply*,
- developing and issuing an amendment to the *Methodology for Establishing the Price of Non-Standard Services for Gas Transport, Distribution, Storage and Public Service Gas Supply*,
- developing and issuing an amendment to the *Methodology for Establishing Tariff Items for Public Service Gas Supply and Guaranteed Supply*,
- issuing a *Decision on the Amounts of Tariff Items for Gas Distribution for 35 Distribution System Operators*,
- issuing a *Decision on the Amounts of Tariff Items for Gas Storage*,
- issuing a *Decision on Fees for Connection to the Gas Distribution or Transport System and for Increases in Connection Capacity for the 2017 – 2021 Regulation Period*,

- issuing a *Decision on Average Hourly Rates for Providers of Non-Standard Services in the Gas Sector for the Second 2017 – 2021 Regulation Period*,
- issuing a *Decision on the Amounts of Tariff Items for Public Gas Supply Services for 2016 for 34 Public Service Gas Suppliers*,
- issuing a *Decision on the Amounts of Tariff Items for Public Gas Supply Services for 2017 for 34 Public Service Gas Suppliers*,
- issuing a *Decision on Fees for Gas Market Organisation*,
- issuing a *Decision on the Manner and Procedure for Separate Accounting Practices for Energy Entities*,
- issuing approvals to:
 - a transmission system operator with regard to the *Network Rules for the Transport System*,
 - an energy market operator with regard to the *Rules on Gas Market Organisation*,
 - a gas storage system operator with regard to the *Rules for Use of the Gas Storage System*,
- issuing opinions on:
 - the *Decision on the Gas Price that the Natural Gas Producer Shall Use to Sell Natural Gas Produced in the Republic of Croatia to Suppliers in the Wholesale Gas Market*,
 - the *Decision on the Gas Price that Suppliers on the Wholesale Gas Market Shall use to Sell Gas to Public Service Gas Suppliers for Household Consumers*,
 - the **Deployment of Alternative Fuel Infrastructure Act**,
- issuing one licence for liquefied natural gas terminal management,
- issuing of five licences for gas trade activities, and
- renewing six licences for energy-related activities, of which one was a licence for gas distribution and five were licences for gas supply.

3.4.4 Oil and oil derivatives

In 2016, HERA's activities in the oil and oil derivatives sector were as follows:

- issuing 12 licences for energy-related activities, of which nine licences were for the wholesale trade of oil derivatives, one was a licence for the wholesale trade of liquefied petroleum gas, and two were licences for the storage of oil and oil derivatives,
- renewing 12 licences for energy-related activities, of which nine licences were for the wholesale trade of oil derivatives, one was a licence for the wholesale trade of liquefied petroleum gas, and two were licences for the storage of oil and oil derivatives.

3.4.5 Biofuels

During 2016, HERA issued three licences in the biofuel sector for energy-related activities, of which one licence was for biofuel production, one was for the wholesale trade of biofuels, and one was for biofuel storage. HERA renewed one licence for the wholesale trade of biofuels.

3.4.6 Thermal energy

In 2016, HERA's activities in the thermal energy sector were as follows:

- issuing licences for thermal energy supply activities:

- TI-SAN d.o.o.,
- POSLOVNI PARK VIROVITICA d.o.o.,
- renewing licences for thermal energy supply activities:
 - TOP-TERME d.o.o.,
 - KOMUNALAC POŽEGA d.o.o.,
- the expiration of licences for thermal energy generation, distribution, and supply:
 - IVAKOP d.o.o.,
- issuing the *Methodology for Establishing Fees for Connection to the Thermal Distribution Network and for Increasing Connection Capacity (Official Gazette No. 42/16)*.

In addition to the aforementioned activities in the thermal energy sector, in 2016, HERA issued a number of comments and opinions, issued relevant decisions, and responded to various inquiries and petitions from end consumers, thermal energy consumers, authorised representatives of co-owners, energy businesses, and institutions. A consultation with concerned members of the public was held during the procedure of issuing the *Methodology for Establishing Fees for Connection to the Thermal Distribution Network and for Increasing Connection Capacity*.

Pursuant to the **Thermal Energy Market Act**, HERA established and regularly maintains a register of thermal energy consumers. As of 31 December 2016, 31 businesses were recorded in the register (legal and natural persons).

HERA additionally maintains records on thermal energy consumers, therefore all active thermal energy consumers furnished their information for the thermal energy consumer records as defined in the provisions of the **Thermal Energy Market Act**.

As of 31 December 2016, the status with regard to licences in the thermal energy sector was as follows:

- thermal energy generation – 25,
- thermal energy distribution – 10, and
- thermal energy supply – 23.

3.4.7 International cooperation

A significant section of HERA's operations, pursuant to the **Energy-Related Activities Regulatory Act** and the legal framework at the level of the European Union, concerns cooperation with the energy regulatory agencies of European Union member states and ACER as an official body of the European Union. Furthermore, HERA also cooperates with regulatory agencies from neighbouring countries that are not European Union member states, as well as with bodies within the Energy Community. HERA adequately provides information of 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 agencies both from European Union member states and countries that are not members of the European Union. The president of HERA's Board of Commissioners is currently one of the vice-presidents of CEER's Board of Directors.

HERA also participates in the activities of regional initiatives, such as the European Commission's CESEC (*Central and South Eastern Europe Gas Connectivity*), the aim of which is to develop and integrate gas systems better and more quickly in this part of Europe. Another initiative within ACER, *Gas Regional Initiative South South East (GRI SSE)*, aims for swifter implementation of network codes and market integration.

In addition to cooperation at the European level, and with respect to regional cooperation, HERA is a member of and participant in the activities 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 communique on 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 commission, has emphasised the creation of the Energy Union as 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. To achieve this fully integrated energy market, it is necessary to continue 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 attain 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 regular procedure adopting these proposals is underway in the EU Council and European Parliament, and is expected to be completed by the beginning of 2018. The commission also announced modifications to the legislative framework for the gas sector. Presumably, all new acts should enter into force by 2020, however this will depend on harmonising positions among European institutions.

Together with the other regulators within ACER and CEER's working groups, HERA is involved in the process of developing draft amendments to draft documents prepared by the Commission, and thus plays an active role in the process of adopting new legislative framework at the EU level.

In addition to consumer protection, national energy regulatory agencies 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 is cooperating with ACER and other national regulatory agencies in the implementation of a European network code and the organisation of a single European energy market, all 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 or inter-regional energy exchanges. HERA primarily cooperates with ACER in order to ensure the harmonisation of regulatory frameworks among the regions with the goal of establishing a competitive electricity and natural gas market.

Among other significant obligations under European legislation, REMIT must also be emphasised, which allocated additional tasks to national regulatory agencies with regard to 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 single 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 single European framework in the electricity and natural gas wholesale markets was introduced, 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 publicly disclose inside information that applies to wholesale energy market products directly or indirectly, and which could significantly impact the formation of wholesale market prices,
- ACER monitors the 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,
- safeguarding the implementation of REMIT in accordance with the powers conferred,
- providing adequate protection of market-sensitive information received, and
- cooperation with other institutions, which will contribute to the establishment of an integral and transparent market.

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

Before information on transactions and transaction orders in wholesale markets begins being delivered, participants in the wholesale electricity market must register in the Centralised European Register of Energy Market Participants (CEREMP). National regulatory agencies have been charged with the task of establishing national registers of market participants. CEREMP consists of the national registers of all countries of the European Union.

Therefore, both market participants established in Croatia as well as market participants established outside of the European Union, must register with HERA while active in the wholesale market within Croatia if they have not already registered with a regulatory agency in another EU member state where they are also active.

Pursuant to REMIT, market participants trading on organised wholesale markets in the European Union were supposed 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 unorganised wholesale markets as defined by REMIT were obliged to register with CEREMP by 7 April 2016.

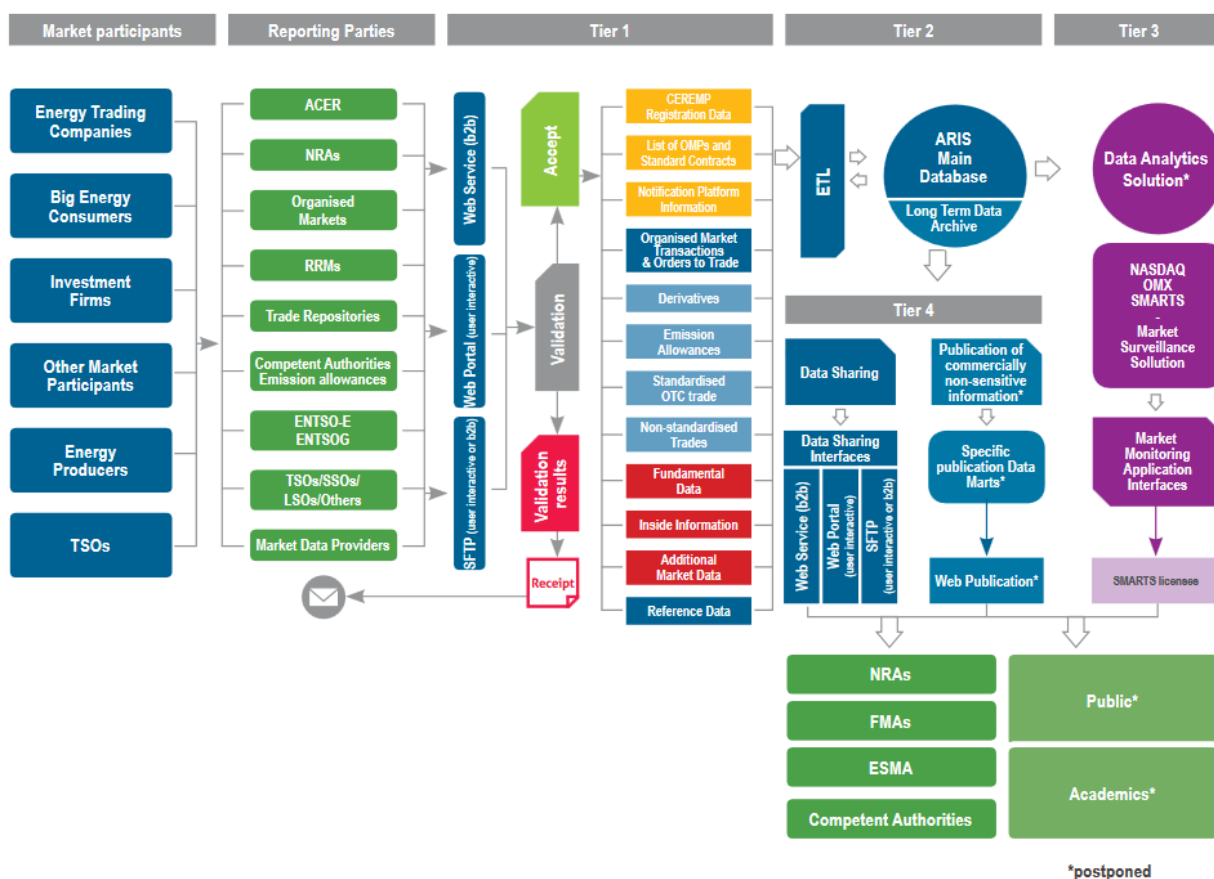
HERA made the registration of market participants with CEREMP possible in early 2015, and roughly 100 participants in the electricity and/or natural gas markets had registered by the end of 2016. After April 2016, a number of market participants already registered with CEREMP supplemented their registration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

After the registration process described above, market participants must:

- publicly disclose inside information,
- furnish ACER and the national regulatory body with information related to transactions made by electricity and natural gas producers, natural gas system operators, or liquefied natural gas terminal operators, with the exclusive purpose of covering

- furnish ACER with records on wholesale energy market transactions, including trade orders.

ACER plays a central role in the implementation of REMIT, as it collects information related to network status and allocations of cross-border capacities from transmission and transport system operators, as well as information on transactions and transaction orders from market participants themselves or directly from organised markets as defined by REMIT. Based on such data relating to the territory of the entire European Union, ACER performs analyses and discovers potential misconduct on the energy market within the European Union, which it forwards to national regulatory agencies, which are responsible for further investigation and the possible sanctioning of market participants. Figure 3.4.1 below shows a basic overview of all levels of ACER's ARIS platform, which receives and processes data from various sources, creates reports, and forwards elementary or aggregate data to other relevant stakeholders.



Source: ACER's annual report on REMIT for 2015

Figure 3.4.1. Scheme of ACER's ARIS platform

Even though REMIT does not explicitly define that each member state of the EU should monitor its own national market, systematic and ongoing monitoring and analysis of the behaviour of participants on wholesale markets is necessary, primarily in order to define typical market trends, and thus extraordinary or unusual trends as well, 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, HERA will decide on the possibility of receiving all market-sensitive information from ACER, which will be supported by adequate IT systems and BI (business intelligence) solutions.

In order to provide timely information to relevant market participants, HERA began publishing relevant information in 2016 via 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 establishing an information security management system in order to satisfy the information security conditions essential for the use of a tool designed by ACER to securely exchange information related to the handling of cases of breaches of REMIT provisions.

HERA continued its cooperation with regulatory agencies from Austria, Slovenia, Hungary, and the Czech Republic, primarily in terms of the exchange of experiences in the implementation of REMIT. This resulted in the signing of a memorandum of understanding among these regulatory bodies in early 2017.

3.4.9 Council of Regulatory Affairs and Consumer Protection

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

- providing opinions pm regulations and methodologies adopted by HERA,
- taking part in providing opinions to HERA on draft regulations 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 the tasks and authority of HERA.

At a session held on 29 June 2016, HERA's Board of Commissioners adopted a *Decision on the Selection of New Council Members* based on a public tender for prospective council candidates published by HERA in mass media.

In December 2016, the first constitutive session of newly-elected council members was held, at which the chairman and vice-chairman of the council were elected.

4 ELECTRICITY

4.1 Significant events on the electricity market

Events in Croatia

The **Renewable Energy Sources and High-efficiency Cogeneration Act** entered into force as of 1 January 2016. It repealed the previous tariff system for electricity generation from renewable energy sources and cogeneration, as well as repealing the existing incentive system (except for those who had already signed buy-off contracts with HROTE).

As of 1 January 2016, the price of electricity under the universal service is no longer regulated, which is in line with both European Commission recommendations and practice in most European Union member states.

In January 2016, HERA provided its opinion of the *Draft Ordinance on Renewable Energy Sources and High-Efficiency Cogeneration* to the ministry responsible for energy. The adoption of this act is foreseen by the **Renewable Energy Sources and High-efficiency Cogeneration Act**.

In February 2016, HERA adopted a decision on the issuing of a certificate to HOPS under the Independent Transmission Operator (ITO) model. In accordance with stipulated procedure, HERA also notified the European Commission of the issuing of this certificate. HERA issued the certificate with four stipulated conditions; it also defined a final compliance deadline for each of them, which is a procedural option as stipulated in the **Electricity Market Act**.

On 10 February 2016, CROPEX successfully began the organised Croatian day-ahead electricity market with eight registered members.

In March 2016, HERA provided prior approval to HOPS for the proposal of a ten-year development plan for the transmission network for the period from 2016 – 2025 with a detailed elaboration of the initial three- and one-year periods. It also provided prior approval to HEP-ODS for the proposal of a ten-year (2016 – 2025) development plan for the HEP-ODS distribution network with a detailed elaboration of the initial three- and one-year periods.

In May 2016, after obtaining approval from HERA, HROTE adopted amendments to the *Rules on the Organisation of the Electricity Market ("Official Gazette", No. 48/16)*, which introduced a market model with balance groups.

In May 2016, HOPS conducted a public consultation with concerned members of the public regarding the *Network Rules for the Transmission System*.

After obtaining HERA's prior approval, HOPS adopted the *Rules on Electric Power System Balancing* in May 2016, which stipulate the market mechanisms for the procurement of ancillary services and balancing energy, and which also make it possible to provide ancillary services to all network users who possess adequate technical capabilities.

In May 2016, HERA provided prior approval to HOPS for the *Annual Report and Security of Supply of the Croatian Electric Power System for 2015*, and to HEP-ODS for the *Annual Report and Security of Supply in the Distribution System for 2015*. Pursuant to said reports, the ministry responsible for energy prepares an annual report on the state of security in electricity supply and expected electricity demands in Croatia.

In June 2016, HERA adopted a *Decision on Tariff Items for Guaranteed Electricity Supply*.

In June 2016, HERA provided an opinion to the Ministry of Maritime Affairs, Transport and Infrastructure regarding its proposed **Deployment of the Alternative Fuels Infrastructure Act**, which also regulates the area of electro mobility.

In July 2016, HERA adopted the *Methodology for Determining Balancing Energy Prices*, which defines the imbalance price calculation method while taking the new market model with balance groups into account.

In September 2016, HERA adopted a *Decision Adopting the Assessment of the Potential for Increasing the Energy Efficiency of the Electricity Infrastructure*, which observes the potential for reducing electricity losses as the difference between future losses without the implementation of measures and future losses with energy efficiency measures implemented.

In July 2016, HERA submitted the *Methodology for Establishing Fees for Connection to the Electric Power Network for New Network Users and for Increasing the Connection Capacity of Existing Network Users* and the *Draft Conditions for the Quality of Electricity Supply* for consultation with concerned members of the public.

In July 2016, after obtaining prior approval from HERA, HOPS adopted the *Methodology for Determining Prices for the Provision of Ancillary Services*, which regulates the prices of ancillary services in the absence of an ancillary services market: automatic secondary frequency restoration reserve, reserve capacity for tertiary regulation for balancing, reserve capacity for tertiary regulation for system security, compensation operation for the purpose of voltage and reactive power control, possibility of starting production units without external power supply, production units without external power supply, availability of generating units for insular operation, and delivered electricity in insular operation mode.

In July 2016, after prior approval from HERA, HEP-ODS adopted the *Rules on Non-Standard Distribution System Operator Services with Annexed Rates of Non-Standard Distribution System Operator Services*.

In July 2016, after prior approval from HERA, HEP-ODS adopted the *Rules for Delimiting Consumption and Meter Reading under the Supplier Switch Procedure*, which complement the *Rules on Changing Electricity Supplier*.

In September 2016, HERA adopted changes to the *Methodology for Determining Tariff Item Amounts for Electricity Transmission* ("Official Gazette", No. 84/16).

In September 2016, HERA provided another opinion regarding the new *Draft Ordinance on the Use of Renewable Energy Sources and High-Efficiency Cogeneration* to the ministry responsible for energy as part of the public consultation procedure.

In September, HERA adopted decisions on conducted supervision for suppliers 220V, RWE ENERGIJA, Hrvatski telekom, HEP-Opkrba, GEN-I, and HEP-Operator distribucijskog sustava concerning the harmonisation of suppliers' conditions for the household category with legal regulations and the provisions of the *General Terms and Conditions for Using the Network and Electricity Supply*.

In September 2016, HERA provided HROTE with a prior opinion on the proposed *Electricity Selling Rules* in accordance with the **Renewable Energy Sources and High-Efficiency Cogeneration Act**, pursuant to which HROTE is obliged to trade electricity on the electricity market in a transparent and impartial manner.

In September 2016, after obtaining prior approval from HERA, HOPS adopted the *Rules for Long-Term Capacity Allocation*, which were prepared pursuant to ENTSO-E's Harmonised Allocation Rules (HAR) as part of the early implementation of the Commission Regulation Guideline on Forward Capacity Allocation (FCA GL).

In November 2016, HERA adopted a *Decision on Tariff Items for Guaranteed Electricity Supply* ("Official Gazette", No. 109/06).

In December 2016, HERA provided an opinion on the proposed Regulation on Amendments to the **Renewable Energy Sources and High-efficiency Cogeneration Act**.

In December 2016, HERA provided approval to HOPS for a proposed contract securing the automatic secondary frequency restoration reserve, a contract on reserve capacity for

tertiary regulation for system balancing, a contract securing reserve capacity for tertiary regulation for system security, a contract on compensation operation services for the purpose of voltage and reactive power control, and a contract on insular operation services, all of which will be executed with the ancillary services provider.

Also, in December 2016, HERA provided prior approval to HOPS for a proposed ten-year development plan for the transmission network for the period from 2017 – 2026 with a detailed elaboration of the initial three- and one-year periods. It also provided prior approval to HEP-ODS for a proposed ten-year (2017 – 2026) development plan for the HEP-ODS distribution network with a detailed elaboration for the initial three- and one-year periods.

As of 1 January 2017, electricity supply as a public 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.

International events

On 30 November 2016, the European Commission published a document package called Clean Energy For All Europeans (CEP). This document package introduced a range of changes and amendments to existing and new directives and decrees, together with ancillary documents, in the aim of speeding the implementation of a unified internal electricity market as a key precondition determined by the Energy Union.

The package mainly includes measures intended to standardize electricity markets within the EU with the following goals:

- establishing a common (unified) electricity market within the EU, as well as securing the adequacy of electrical energy systems,
- promoting the better integration of electricity generated from renewable sources into electricity markets,
- improving energy efficiency, including new means of transport, e.g. electric vehicles, which can use energy originally generated from renewable sources, and
- establishing the Energy Union's management mechanisms.

Within CEP, the Commission has introduced the following legislation proposals:

- modify the directive on joint rules for the internal electricity market,
- modify the regulation on conditions for access to the grid for the cross-border exchange of electricity,
- modify the regulation on the establishment of the Agency for the Cooperation of Energy Regulators,
- a regulation on risk preparedness in the electricity sector, and the repeal of the directive on security of supply,
- modify the directive on the promotion of the use of energy from renewable sources,
- change the Energy Efficiency Directive,
- change the Buildings Energy Efficiency Directive, and
- a decree on Energy Union governance.

As regards the provision of opinions on CEP documents and the proposal of amendments to individual provisions from the legislative framework, HERA participates in the ACER and CEER working groups, which formulate the views of all EU regulators.

During 2016, intensive activities continued in the European Union regarding the preparation of network codes, i.e. guidelines, which are regulations by nature, and which are prepared for the commission by ENTSO-E in accordance with the framework determined by ACER. The adoption and application of network codes is regulated by Regulation No. 714/2009. Progress in the preparation of certain codes may be followed on the ENTSO-E web site.

All network codes entered into force or were adopted by March 2017, as follows:

- Commission Regulation (EU) 2015/1222, dated 24 July 2015, establishing a guideline on capacity allocation and congestion management, entered into force as of August 2015,
- Commission Regulation (EU) 2016/631, dated 14 April 2016, establishing a network code on requirements for generator grid connection, entered into force as of May 2016 (hereinafter: RFG Regulation),
- Commission Regulation (EU) 2016/1719, dated 26 September 2016, establishing a guideline on forward capacity allocation, entered into force as of October 2016,
- Commission Regulation (EU) 2016/1388, dated 17 August 2016, establishing a network code on demand connection, entered into force as of September 2016 (hereinafter: DCC Regulation),
- Commission Regulation (EU) 2016/1447, dated 26 August 2016, establishing a network code on requirements for high voltage direct current system and direct current-connected power park module grid connections, entered into force as of September 2016 (hereinafter: HVDC Regulation),
- A commission regulation (EU) establishing a guideline on the operation of systems for electricity transmission was adopted in May 2016, and is under consideration by European Parliament and the Council,
- A commission regulation (EU) establishing network codes on emergencies and electricity transmission was adopted in May 2016, and is under consideration by European Parliament and the Council,
- A commission regulation (EU) establishing guidelines for balancing was adopted in March 2017, and is under consideration by European Parliament and the Council.

Similar to the day-ahead market, certain markets have initiated the XBID project even before the activation of the CACM Regulation, which is intended to achieve a uniform algorithm, thus enabling the connection of within-day markets across the entire EU. As part of the approval process of the suggested operating plan of the market coupling operator, HERA confirmed the Price Coupling of Regions (PCR) project and the XBID project as projects of common interest for all EU countries together with other EU regulators in February 2017.

In accordance with the CACM Regulation, each TSO from the EU submitted a harmonised proposal regarding the determination of capacity calculation regions to its according national regulator in November 2015. Since the national regulators have not reached a consensus regarding the acceptance of the proposal, in November 2016 ACER adopted Decision No. 6/2016, whereby it defined capacity calculation regions in the EU.

Pursuant to obligations arising from the CACM Regulation, in December 2016, HERA approved the *Methodology for the Provision of Data on Generation and Loads*, which HOPS prepared together with the other EU transmission system operators.

In accordance with the *Network Codes for Connection to the Electric Power Network*, which include the RFG Regulation, DCC Regulation and HVDC Regulation, at the beginning of 2017, HERA conducted a public consultation for the adoption of criteria for approving imbalances for all 3 network codes, pursuant to which it adopted and published the criteria.

Additionally, in accordance with the RFG Regulation, in November 2016, HERA enabled the submission of requests via its web site for manufacturers of type A production modules for the classification of their production module technology as an emerging technology, whereby such plants would be exempt from the application of the provisions of the RFG Regulation. HERA received several requests during this time, and in May 2017, it decided on which production modules to classify as emerging technologies.

In accordance with REMIT, market participants trading on organised wholesale markets in the European Union as defined by REMIT were to register by 7 October 2015, while all other participants (those active only on the bilateral markets) were to register by April 2016. By the end of 2016, HERA registered approximately 100 participants from Croatia and surrounding Energy Community countries in the Centralised European Register of Energy Market Participants (CEREMP), who are active on the electricity market or gas market within the Republic of Croatia.

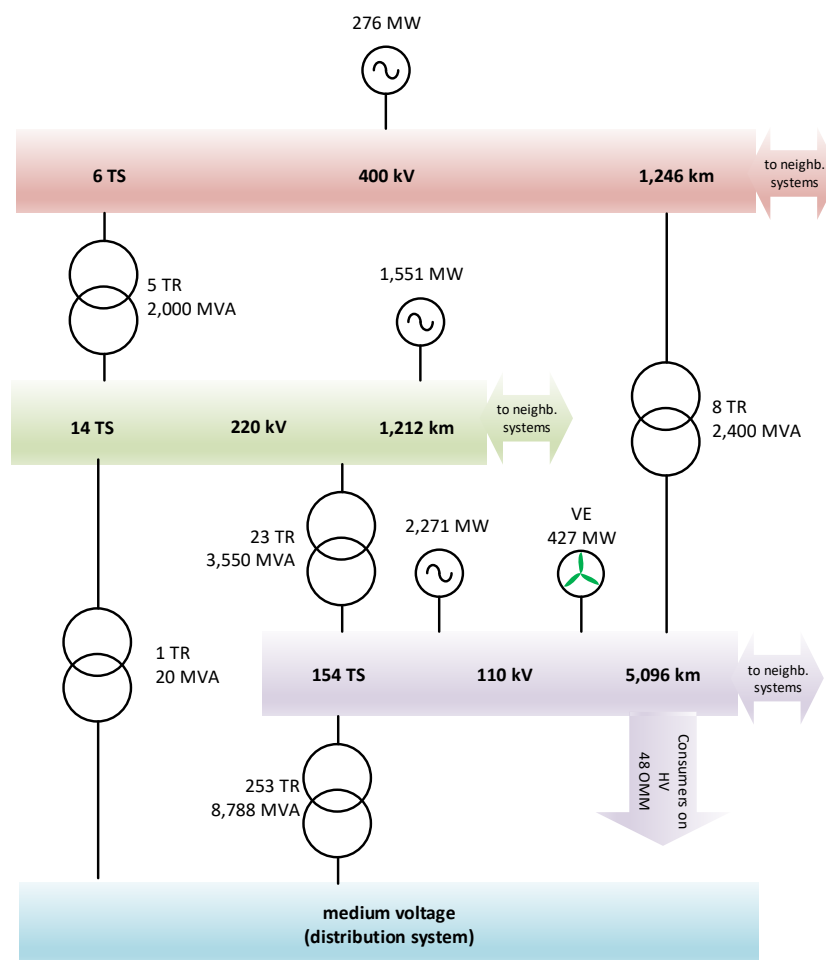
4.2 Regulated network activities in the electricity sector

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-border transmission lines, as well as for ensuring the long-term capability of the network to satisfy reasonable requirements for the transmission of electricity.

Figure 4.2.1. shows basic information on the number of transformer substations (TS) and the power of the transformer fleet (TR), length of lines, power of connected power plants, and the number of billing metering points (BMP) in the transmission system.

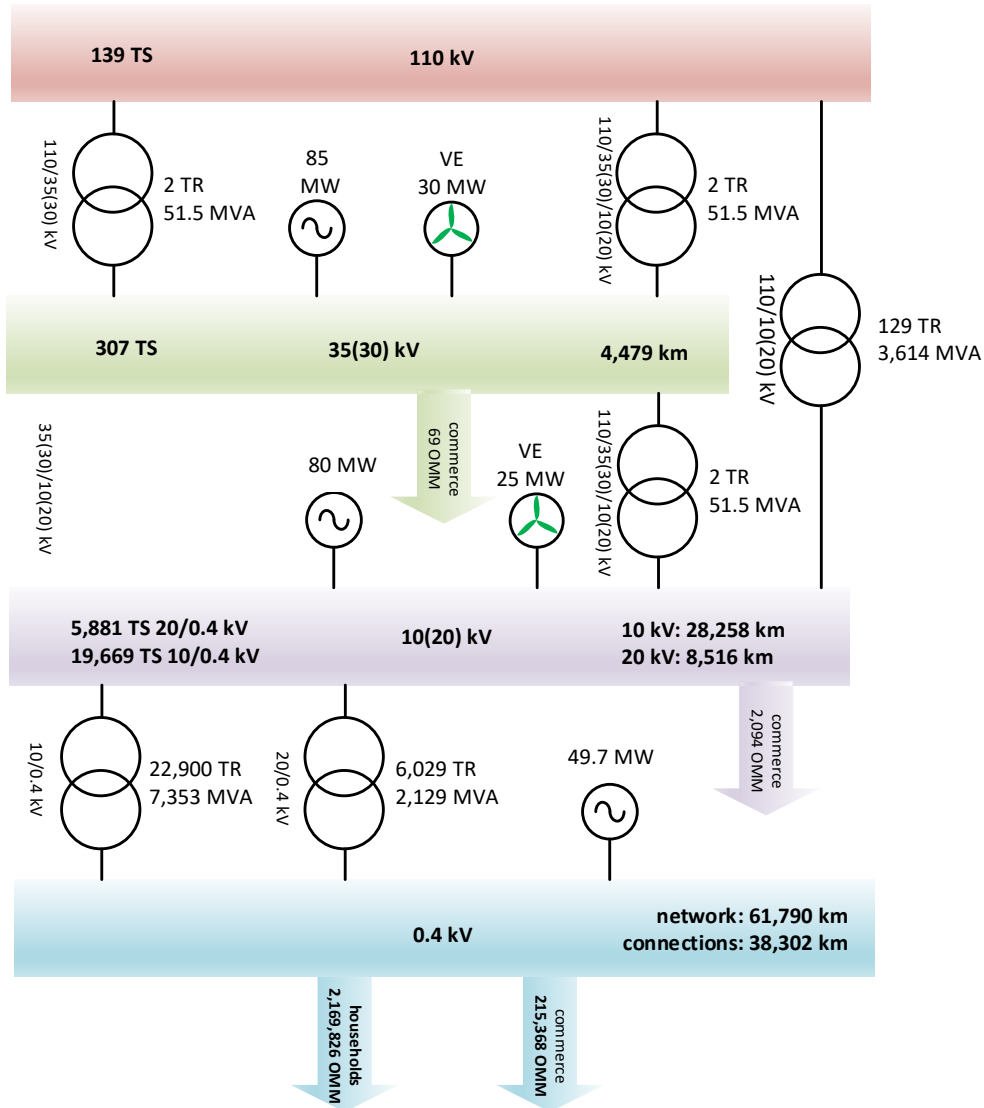


Source: HOPS

Figure 4.2.1. Basic information about the transmission system as of 31 December 2016

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 the power of the transformer fleet (TR), length of lines, power of connected power plants, and the number of billing metering points (BMP) in the distribution system.



Source: HEP-ODS

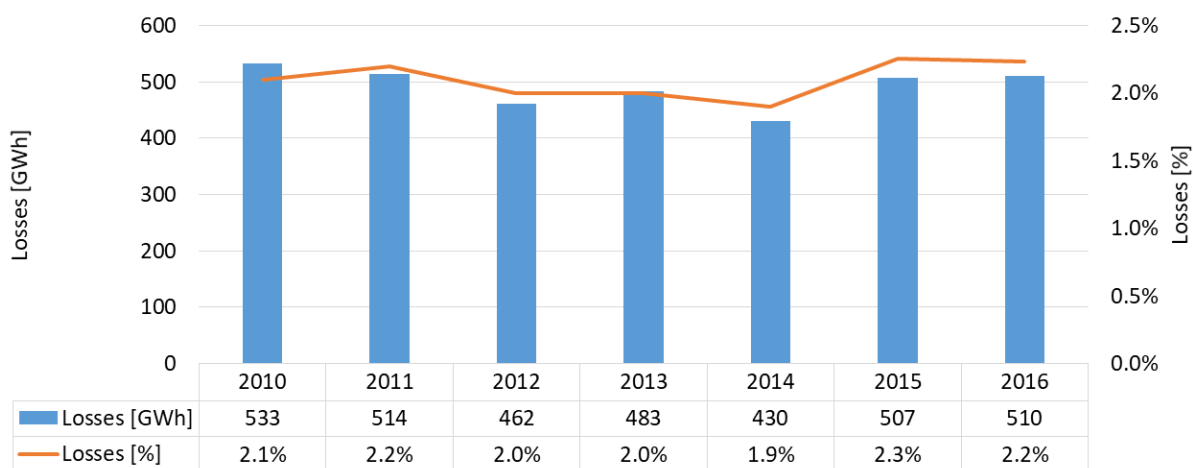
Figure 4.2.2. Basic information about the distribution system as of 31 December 2016

4.2.2 Losses in the transmission and the distribution network

Losses in the transmission network in 2016

Losses of electricity in the transmission network in 2016 amounted 510GWh, or 2.2% of total transmitted electricity.

Figure 4.2.3. shows the amounts and percentage of losses in the transmission network from 2010 to 2016.



Source: HOPS

Figure 4.2.3. Losses of electricity in the transmission network from 2010 to 2016

The electricity to cover the losses for the year 2016 was purchased on market principles in the following ways (products¹):

- long-term (annual) products through a public tender with given quantities and lowest price criteria, wherein HEP d.d. was selected as the lowest bidder – 86% of electricity,
- short-term (day-ahead) products through a public tender with a given framework for the sale and purchase of electricity and lowest mark-up criteria as compared to the reference price, wherein GEN-I Zagreb d.o.o. was selected as the lowest bidder, and
- purchase on the Croatian Electric Power Exchange (Hrvatska burza električne energije d.o.o. - CROPEX) – 14% of electricity.

The total cost of market purchases to cover of losses in 2016 was HRK 137 million (total expenditure – income from sale under the framework contract and on CROPEX) for the total purchased 461GWh of electricity (the remainder was covered through the settlement of imbalances). The average achieved electricity price for the coverage of losses was HRK 297.74/MWh.

In 2016, HERA approved the procurement plan to cover losses for the year 2017, which anticipates losses in the amount of 490GWh. In said plan, HOPS anticipates the purchase of approx. 70% planned energy at the annual level (basic) through public tenders, while the remaining 30% would be obtained through short-term (day-ahead or within-day) purchases on CROPEX.

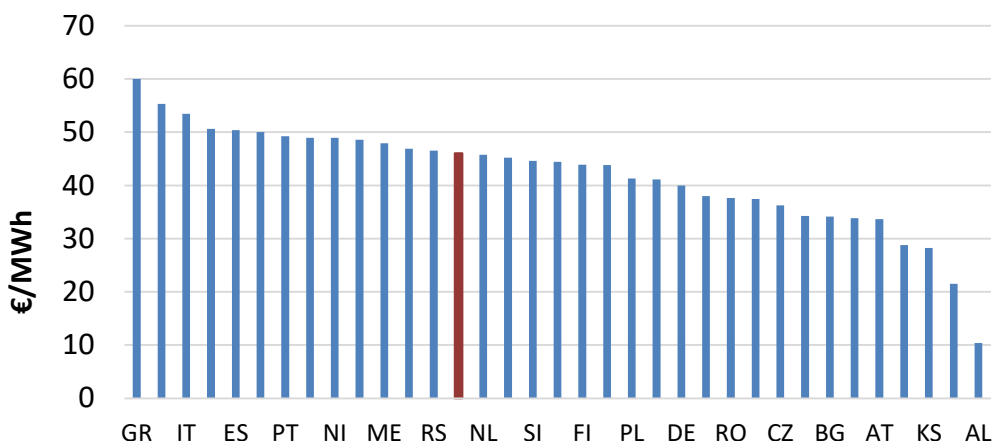
To reduce losses in the transmission network, HOPS proposes optimising voltage in the network.

ITC agreement

The ITC agreement, i.e. the compensating mechanism for European operators of transmission systems, of which HOPS is also a signee, orders all transmission system operators who operate in the ITC mechanism to provide ENTSO-E with the price of electricity losses for the following year. Said price should be approved by the national regulatory agencies in accordance with EU Regulation 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 confirmed the electricity price of HRK 325.03/MWh to HOPS for coverage of losses in the transmission network for 2017, and this price will also be used for the ITC agreement.

¹ A product is a quantity of electricity during a certain timeframe and is generally designated as MWh/h.

Figure 4.2.4. provides a price comparison for the ITC agreement for 2016 for individual countries.



Source: HOPS

Figure 4.2.4. Unit rates for coverage of losses for the year 2016 – ITC

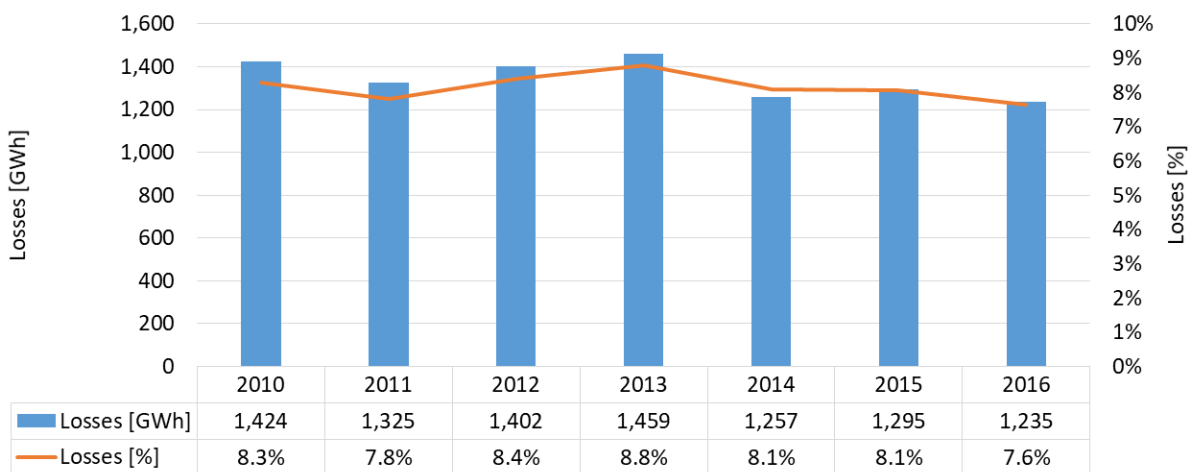
Observations on losses in the transmission network for 2016

Planned losses in the transmission network for 2016 were 476GWh, while actual incurred losses were 510GWh. This represents a planning error of approx. 7%. Since the plan is based on average annual losses in the transmission network from previous years, greater deviations are possible when compared to actual incurred values. For the aforementioned reasons, HOPS should improve its planning methodology to include 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 2016 was HRK 354.74 /MWh, while the average achieved price in 2016 was HRK 297.74/MWh. Similar to the planning of losses, HOPS should improve its methodology for determining planned prices.

Losses in the distribution network in 2016

The losses of electricity in the distribution network in 2016 were 1.235GWh, i.e. 7.6% of the procurement of energy, which is less than in 2015 in both absolute and relative terms. Figure 4.2.5. shows the amounts and percentage of losses in the distribution network from 2010 to 2016.



Source: HEP-ODS

Figure 4.2.5. Losses of electricity in the distribution network from 2010 to 2016

Losses differ significantly by individual distribution areas due to the technical characteristics of the distribution networks, consumption density, and the extent of unauthorised consumption. Losses are also affected by electricity generation in production facilities connected to the distribution network (distributed generation), the number of which has significantly increased in 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 (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 the technical characteristics of network elements, while non-technical losses are caused by electricity theft, errors in the measurement/readout/calculation of consumption, and technical faults. The share of technical and non-technical losses of electricity in the amount of total losses is almost impossible to define precisely, so it is usually approximated. At the level of the distribution network, HEP-ODS has previously estimated this ratio to be 70:30. However, a recent study "Professional and Scientific Support in the Development of a Methodology for Planning Electricity Losses and a Methodology for Calculating Realized Losses and Estimating Technical Losses and Electricity Theft", which was commissioned by HEP-ODS, has shown that the ratio between technical and non-technical losses at distribution level is 51:49.

The required quantities of electricity to cover losses in 2016 were calculated pursuant to planned losses for 2016, which were prepared through the use of standard load profiles and the application of the appropriate loss coefficients. The required quantities (total of 1,390GWh) were purchased as follows:

- as long-term products by public tender for the period from 1 January until 31 May 2016, at the price of HRK 345/MWh,
- as long-term products by public tender for the period from 1 June until 31 December 2016, at the price of HRK 340/MWh, and
- bilaterally, through contracts for the sale and purchase of electricity for the coverage of positive and negative deviations of losses compared to planned quantities.

The average achieved electricity price for the coverage of losses, including the cost of positive and negative deviations, amounted to HRK 343/MWh in 2016.

In 2016, HERA received for approval a procurement plan for the coverage of losses for 2017, which anticipates losses in the amount of 1,335GWh, at the price of HRK340/MWh. In said plan, HEP-ODS anticipates purchase by public tender according to minimal cost criteria for the total quantity (per single product).

Measures for reducing losses in the distribution network

In 2016, HEP-ODS implemented the following operational measures, which do not require major investment activities and which can contribute to reduction of losses: the inspection of connection points and meters and other measures for reducing electricity theft, the implementation of technical inspections of measured data in the remote reading system, the inspection of measurement accuracy, the optimisation of network reconnect status, the disconnection of network elements when idle, etc.

Together with the aforementioned operational measures, investment measures were also implemented, of which the replacement and reconstruction of existing facilities and the construction of new ones are notably important for the reduction of losses.

It is particularly important to note the control of theft, which comprises a significant part of the non-technical losses. Approximately 145,000 regular inspections of connection points and billing metering points were performed in 2016, during which 218 cases of electricity theft were discovered. The control of theft based on reports and snap inspections uncovered 634 cases of electricity theft.

Observations on losses in the distribution network for 2016

HEP-ODS defines the loss of electricity 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 significant error in determining losses, which is the result of several factors. Since electricity consumption is evaluated 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, it is difficult to determine losses precisely. This is also tied to the system of advance electricity payment for households, whereby monthly electricity consumption for individual household consumers is estimated based on the average monthly consumption in the previous six-month period, without taking into account seasonal differences or other possible factors that may influence consumption. In accordance with the above, HEP-ODS should urgently develop a new procedure to more precisely identify electricity losses in the distribution network.

Based on a study entitled "Professional and Scientific Support in the Development of a Methodology for Planning Electricity Losses and a Methodology to Calculate Realized Losses and Estimate Technical Losses and Electricity Theft", commissioned by HEP-ODS, the share of non-technical losses in the distribution network is estimated at 49% of total losses, which exceeds 55% in some distribution areas. What is alarming is that these non-technical losses are almost the same as, and in some cases even larger than technical losses, which are the result of the infrastructure. The completed study "Assessment of the Potential for Increasing the Efficiency of the Electricity Infrastructure" states that the ratio of technical losses to non-technical losses is closer to 50:50, and not 70:30 as previously claimed by HEP-ODS. HERA noted this difference in its decision dated 5 January 2017 on the issuing of approval for the procurement plan for the coverage of losses for 2017. It also asked HEP-ODS to improve the method of calculating technical losses in order to separate technical from non-technical losses as accurately as possible.

In accordance with the above, it is necessary to urgently focus on reducing non-technical losses. In this regard, HEP-ODS should implement measures within its powers and duties and propose possible additional measures to counteract theft and inspect billing metering points, which can be implemented and/or included in the legal framework. Within its authority, HERA will take the appropriate regulatory measures and will act accordingly.

Although HEP-ODS procures significantly larger quantities of energy to cover losses than the quantities procured by HOPS, the planned electricity price and the average realised price are higher. The difference in average realised prices between HOPS and HEP-ODS for 2016 is as much as HRK 45/MWh. Accordingly, HEP-ODS should envisage a new mode of procurement, possibly through the use of multiple products, in order to reduce the cost of procurement for loss coverage.

Other relevant information

Pursuant to the **Energy Efficiency Act**, in implementing regulatory tasks in accordance with provisions regulating the electricity and gas markets, HERA must consider energy efficiency when adopting decisions on the operation of the electricity and gas infrastructure. The term "energy efficiency of the electricity infrastructure" refers to the reduction of technical losses in the transmission and distribution network. With the aim of implementing the tasks set out, HERA ordered the preparation of a study entitled "An Assessment of the Potential for Increasing the Energy Efficiency of the Electricity Infrastructure" (hereinafter: the Study).

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. The above measures follow the need to increase the safety of operation and comply with technical regulations; these investments are too high to be

justified solely through savings from loss reduction. Based on the Study, HERA adopted a decision stating the following:

- HERA estimated the potential for increasing the energy efficiency of the electricity infrastructure, which amounts to 51GWh annually on average for the transmission network and 25GWh annually for the distribution network for the period from 2016 to 2025, and
- HERA determined that, in order to achieve these savings, measures, investments, and timeframes should follow the ten-year development plans of the transmission and distribution networks for the period from 2016 to 2025, with a detailed elaboration of the initial three- and one-year periods.

The preparation of the CEER report on electricity losses entitled "Report on Power Losses" began in 2016. A CEER Task Force called Electricity Quality of Supply (EQS), in which HERA representatives take active part, is tasked with preparing this report. For the purpose of data collection, two questionnaires have been prepared: one for regulators one for interested parties. At the time this report was prepared, all the data was collected, and said report is being prepared, with a publication date expected in the second half of 2017.

4.2.3 Development plans for the transmission and distribution networks

Ten-year development plan for the transmission network (2017 - 2026)

In October 2016, HOPS delivered a "Ten-year development plan for the transmission network from 2017 to 2026, with a detailed elaboration of the initial three- and one-year periods" to HERA for approval. After a conducted public consultation, HERA approved this plan, which has been functionally harmonised with the ten-year development plan for the European transmission network as of 2016 (hereinafter: TYNDP 2016), in December 2016.

Table 4.2.1. shows the estimated total investment in the development of the transmission network for the ten-year period (2017 – 2026), while Table 4.2.2. shows realised annual investments in the HOPS network from 2012 to 2016.

Table 4.2.1. Estimate of total investment in the development of transmission network for the ten-year period (2017 – 2026)

Investments	Amount [Thousands HRK]
Own investments in the transmission network	5,944,490
Investments for the connection of end consumer buildings	154,477
Investments for the connection of new conventional power plants	416,191
Investments for connection of wind power plants	105,000
Investments for European Union projects of common interest ²	99,825
Total	6,719,983

Source: HOPS

² Pursuant to EU Regulation No. 347/2013 of the European Parliament and the Council, a list of projects of common EU interests (PCI) for the energy infrastructure has been defined.

Table 4.2.2. Realised annual investments in the transmission network from 2012 to 2016 in millions of HRK

Type of investment	2012	2013	2014	2015	2016
Investment preparation	6.1	6.6	7.9	8.4	12.6
Replacements and reconstruction	147.9	125.4	201.2	189.2	166.2
Revitalisations	30.8	30.8	49.9	61.5	59.0]
New facilities	218.4	130.7	85.8	90.3	71.1
Other investments	8.5	46.2	35.1	37.9	34.9
Electric power conditions and connections	78.1	76.6	43.8	64.2	33.7
Total	489.8	416.3	423.7	451.5	377.5

Source: HOPS

Ten-year development plan for the distribution network (2017 - 2026)

In September 2016, HOPS delivered a "Ten-Year Development Plan for the HEP-ODS Distribution Network from 2017 to 2026, with a Detailed Elaboration of the Initial Three- and One-Year Periods" to HERA for prior approval. After conducting public consultation, in HERA provided prior approval for said plan in December 2016.

Table 4.2.3. shows the estimated total investment in the development of the distribution network for the ten-year period (2017 – 2026), while Table 4.2.4. shows realised annual investments in the HEP-ODS network from 2012 to 2016.

Table 4.2.3. Estimated investment in the development of the distribution network for the ten-year period (2017 – 2026)

Investment category	Amount [Thousands HRK]
Transformation 110/x kV and SN network 35 kV	1,712,884
Mid-voltage network 10(20) kV	2,031,811
Low-voltage network	797,700
SDV, automation of SN network, metering devices and new technologies	1,531,300
Business infrastructure	590,450
Electric power conditions and connections	3,500,000
Total	10,164,145

Source: HEP-ODS

Table 4.2.4. Achieved annual investments in the distribution network from 2012 to 2016 in HRK million

Type of investment	2012	2013	2014	2015	2016
Investment preparation	17.7	14.4	17.8	10.7	20.0
Replacements and reconstruction	287.9	206.9	276.8	268.6	268.9
Revitalisations	7.3	5.7	19.3	16.8	21.9
Repairs and renovations	4.2	2.6	1.5	0.8	0.4
New facilities	234.7	187.8	210.4	146.6	153.2
Other investments and development	127.1	100.8	133.8	225.2	191.3
Electric power conditions and connections	304.5	361.8	219.5	250.0	301.1
Total	983.4	879.9	879.1	918.7	956.8

Source: HEP-ODS

Observations on the development plans for the transmission and distribution networks

As compared to previous development plans, HOPS has made the most significant progress in describing the implementation of energy efficiency measures in the transmission network, since it estimated possible savings in reducing transmission network losses for the first time during the ten-year period.

HEP-ODS also emphasized measures for reducing losses in the distribution electricity grid as a part of measures for increasing energy efficiency. HEP-ODS's goal is to reduce total electricity losses (technical and non-technical) down to 7.75 % (± 0.25 %) of yearly realised procured electricity in the distribution network by the end of 2019.

As regards HEP-ODS's operation, progress was made in the following areas in 2016:

- the business process of connecting users was harmonised and improved,
- continued development and assurance of IT support for business processes connected with the function of the electricity market,
- further development of the advanced measurements system and the associated communications system (AMI),
- the analysis and improvement of general operating efficiency, working procedures, and organisation, including the process of implementing the SAP business IT system,
- continued implementation of measures to reduce electricity losses and increase energy efficiency,
- technical solutions for processing systems were harmonised and optimised,
- investments were harmonised and optimised through the methodology and selection of criteria for investment programmes to renovate distribution network elements, and
- technological solutions specific to advanced electricity grids were implemented.

During the preparation of the transmission and distribution network development plans, positive practices from previous years continued:

- HOPS and HEP-ODS harmonised their plans regarding the construction dynamics and financing of interfacing facilities (TS 110/x kV),
- HOPS and HEP-ODS' plans included an analysis of the impact of the three-year investment plan on the amount of transmission and distribution fees, and
- all projects listed in TYNDP 2016 were treated equally to other HOPS investments.

In order to improve future plans, HOPS should define criteria for the selection of facilities for renovation, which should be based on estimates of remaining operating life, network element reliability, effects on plant safety and availability, and the need for increasing power transmission capacity.

During the HOPS plan approval procedure, HERA requested HOPS to provide information on capital investments whose timeframe or financial frame significantly deviate from the last approved ten-year plan. HOPS delivered a justification for the postponement of certain investments, based upon which it can be concluded that certain investments are planned to be implemented more quickly in cases when a delay would impose an unjustified risk to system security, and in cases in which the faster construction of joint transformer substations TS 110/x kV is required during the process of harmonizing the construction of joint facilities.

Differences in the financial frameworks of certain capital projects, particularly those of projects that are to be completed near the end of the ten-year period, were justified with newer and more accurate data.

Activities concerning investment into the distribution network are satisfactory, in particular those concerning investment into capital facilities (e.g. TS 110/x kV), while future ten-year plans should additionally develop joint investment strategies for the 20(10)kV and 0.4kV networks, with the aim of improving the quality of supply through improvements in the continuity of supply and voltage quality, all in order to achieve equal

treatment for all network users, regardless of the degree of development of the area in which they are located.

The recommendation is to introduce the analysis of the harmonisation of business practices in all distribution areas regarding the quality of supply and services for network consumers in future ten-year plans.

Additionally, for the purpose of improved and more efficient monitoring of the implementation of plans from previous years, HEP-ODS should additionally describe:

- the realization of capital investments and other investments from the last approved plan,
- implementation as regards sources of financing,
- develop and submit a plan to shut down the 35kV network,
- describe identified problems and prepare an investment plan by area within the plan for restructuring the voltage situation,
- related to continuity of supply, provide an attachment with a list of terminals and outages and problem-solving procedures at terminals with explanations of significant deviations from averages,
- develop and submit a plan for the installation of remote read-enabled meters,
- in order to rationalise operations and asset management, prepare conversion plans and explain procedures for the disposal of old equipment (e.g. the disposal or relocation of high power transformers), and
- analyse the collective investment plan and provide a critical review.

As part of the plan approval process, system operators also provide HERA additional report documents that are not available to the public. These documents provide details of the technical characteristics of capital projects and their implementation. System operators also provide data used to estimate the impact of planned investments in the three-year period on the amounts of tariff items for the transmission and distribution of electricity.

Based on the available information, HERA is of the opinion that HOPS's expected total revenue, which is derived from the application of tariff items, the sale of balancing and imbalance energy, auctions for the allocation of cross-border transmission capacities, the ITC agreement, and fees for connection to the transmission network and increases in connection capacity, is adequate to cover annual investment levels, according to HOPS' investment plans.

HEP-ODS's income, which is derived from tariff items, non-standard services, and fees for connection to the distribution network and increases in connection capacity, is adequate to cover annual investment levels. The plan report on cash flow for the period from 2017 to 2019 shows a positive cash net flow for all years at the end of the period.

In the plan, HOPS states it will provide HRK 99.8 million of financing from its own assets for the SINCRO.GRID project, which is included in the PCI list. Said project is the result of cooperation between the Croatian and Slovenian transmission system operators, HOPS and ELES, and distribution system operators, HEP-ODS and SODO. The goal of the project is to improve voltage quality in the electric power system and utilise the dynamic transmission capacity of existing transmission lines through the use of advanced technical systems and algorithms. In February 2017, the European Commission approved co-financing for the SINCRO.GRID project through the CEF fund in the form of a grant in the amount of EUR 40.5 million, which represents 51% of the planned total value of the project.

In 2016, HOPS invested 377.5 million Kuna, while HEP-ODS' investments amounted to HRK 956.8 million.

According to preliminary data received from HOPS, HRK 33.7 million was invested in creating conditions for and connection to the electric power network transmission, while HRK 301.1 million was invested into the distribution network. Compared to 2015, HEP-ODS increased investment by 4.1%, so it can be said that the degree of implementation of all investment programs shows that the distribution system operator is in step with market requirements and network users through the use of modern technologies and improvements to business practices.

The average (planned) required financial resources for own investments in HEP-ODS's network are approximately HRK 660 million per annum. HEP-ODS anticipates an investment of HRK 350 million annually for the construction of new lines and plants to connecting future facilities of network users, which is expected to be covered from distribution network connection fees and fees for increasing connection capacity.

In 2017, HEP-ODS plans to reinvest profit to finance investments in the amount of HRK 49.6 million.

HEP-ODS anticipates approximately HRK 1 billion per annum to realise all investments for the ten-year period.

During the ten-year period, HOPS plans to invest 34% of total assets, including own financing, fees for connection to the electric power network, and grants from EU funds into capital structures of importance to the system. The same share is planned for the renovation of facilities. Investment in the amount of 13% of total assets is planned for replacements, reconstruction, and other investments.

During the relevant ten-year period, HEP-ODS plans to invest 68% of assets (which consist solely of own sources of funding) into energy facilities, 23% of assets into secondary systems, metering devices and development, and 9% into business infrastructure.

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

Average network usage fees

Table 4.2.5. shows the average transmission network usage fees, while Table 4.2.6. shows the average distribution network usage fees for the period from 2012 to 2016 sorted by end consumer category.

The amounts of the average fees for usage of transmission and distribution networks are determined according to the realised income by end consumer category, obtained by applying the appropriate tariff items from the tariff systems for electric power transmission and electric power distribution to the achieved sales of electricity.

Table 4.2.5. Average transmission network usage fees for the period from 2012 to 2016

End consumer category	2012 [lp/kWh]	2013 [lp/kWh]	2014 [lp/kWh]	2015 [lp/kWh]	2016 [lp/kWh]
Commercial - high voltage consumers	7.9	7.0	7.0	7.1	6.6
Commercial - medium voltage consumers	7.7	7.9	7.9	7.8	7.7
Commercial - low voltage consumers	8.4	8.9	8.9	8.9	8.9
Households	8.3	8.9	8.9	8.9	8.9
Average for all consumers	8.2	8.6	8.5	8.5	8.5

Table 4.2.6. Average distribution network usage fees for the period from 2012 to 2016

End consumer category	2012 [lp/kWh]	2013 [lp/kWh]	2014 [lp/kWh]	2015 [lp/kWh]	2016 [lp/kWh]
Commercial - high voltage consumers	-	-	-	-	-
Commercial - medium voltage consumers	14.4	14.0	14.0	13.9	13.7
Commercial - low voltage consumers	26.1	26.3	26.3	26.3	26.5
Households	23.0	24.3	24.6	24.4	24.5
Average for all consumers	21.7	22.4	22.5	22.3	22.4

Transmission and distribution network connection fees

Consumers connecting to the transmission or distribution network or increasing connection capacity pay a connection fee. Funds from these fees are used to finance the construction of the connection and a part of the technical conditions on the network necessary for connecting users.

The customer connection fee and the fee for increasing connection capacity is HRK 1,350/kW + VAT, except in the territory of the city of Zagreb, where it is HRK 1,700/kW + VAT. However, if the planned connection costs exceed the funds collected from said fee by 20% or more, the customer pays the costs of the connection in full.

Electricity producers always pay the actual connection costs.

Observations on connection fees and tariffs for the transmission and distribution of electricity

Tariff items for the transmission and distribution of electricity are determined pursuant to the *Methodology for Determining Tariff Items for Electricity Transmission* and the *Methodology for Determining Tariff Items for Electricity Distribution* (hereinafter: the Methodologies). The Methodologies were adopted by HERA, and they entered into force as of 1 October 2015.

Pursuant to the provisions of said Methodologies, HERA adopted a *Decision on the Amount of Tariff Items for Electricity Transmission* and the *Decision on the Amount of Tariff Items for Electricity Distribution* for the first time. These decisions entered into force as of 1 January 2016. The system operators did not submit any requests for changes to tariff items for the transmission and distribution of electricity during 2016. Tariff items for 2017 did not change as compared to 2016.

The Methodologies are based on the following principles and rules:

- total costs shall be justified, impartial, and transparent,
- tariff items for individual tariff models are the same across the entire territory of Croatia,
- the amounts of tariff items for individual tariff models are determined such that they reflect the total costs the operator of the transmission or distribution system bears for said tariff model to as great an extent as possible,
- electricity consumption and peak loads for transmission or distribution are calculated for each billing metering point,
- the tariff item for excessive reactive power is equal for all voltage levels,
- financing for the development of the transmission and distribution networks is provided from income and fees for connection to the transmission and distribution networks and fees for increasing connection capacity, which are paid by consumers and producers, which is
- the ratio of the higher daily tariff item (VT) and lower daily tariff item (NT) for the electricity taken, which is approximately 2:1 for the category of consumers with two-tariff meters.

In accordance with Art. 17 of the **Energy-Related Activity Regulatory Act**, HERA consults with concerned members of the public during the procedure of adopting methodologies. During the consultation process, interested parties may submit objections to the proposed methodologies to HERA.

Based on the provisions of Art. 29, Par. 7 of the **Energy Act**, energy entities (in this case HOPS or HEP-ODS) submits HERA with a request to determine change tariff items. Pursuant to Art. 29, Par. 10 of the **Energy Act**, HERA may also determine the amounts of tariff items independently.

Pursuant to Art. 30, Item 46 and Art. 40, Item 22 of the **Electricity Market Act**, HOPS and HEP-ODS are required to publicly announce the amounts of tariff items for the transmission and distribution of electricity at least 15 days prior to their application.

The regulation method applied in these methodologies is the method of approved expenses. This method determines the amounts of tariff items based on actually incurred costs from the previous regulatory year, incurred and estimated total costs for the present regulatory year, and planned total costs for the future regulatory year in question. Said method acknowledges a reasonable return on investment to the operator.

HERA audits individual costs within the total operating costs of the transmission and distribution operators through horizontal analysis, i.e. by monitoring cost trends over a long period and comparing the year under audit with the previous one. Simultaneously, a vertical analysis of individual costs is performed in order to track their share in total costs and keep them within acceptable limits.

According to the Methodologies, the postage stamp principle is used to determine the amount of tariff items, which means they are calculated equally for all voltage levels and all consumers on the transmission and distribution network, regardless of the length of the transmission or distribution route.

The amount of tariff items is different for consumers according to the category they belong to as regards the voltage levels (VN, SN i NN) and time of use (day/night). The tariffs are determined so as to avoid cross-subsidies of individual consumer categories. This takes network characteristics by voltage levels into account. This approach yields the following average ratios of usage fees for the transmission and distribution networks by voltage levels VN : SN : NN = 1 : 3.2 : 5.3.

The fee for network usage for low voltage consumers with the same characteristics (households and commercial consumers) are approximately the same.

Transmission and distribution network connection fees are determined based on the provisions of the *Ordinance on Fees for Connection to the Electric Power Network and for Increasing Connection Capacity*, which HERA adopted in 2006. Unit fees for connection to the electric power network and for increases in connection capacity are determined by the *Decision on Fee Amounts for Connection to the Electric Power Network and for Increasing Connection Capacity*, which the Croatian government adopted in 2006.

HERA adopted the new *Methodology for Establishing Fees for Connection to the Electric Power Network for New Network Users and for Increasing the Connection Capacity of Existing Network Users* ("Official Gazette", No. 51/17), which was published on 31 May 2017, and which shall enter into force on 1 January 2018. As said methodology should be harmonised with the regulation on determining the conditions and procedures for connection to the electric power network, which has yet to be passed by the Croatian government upon the proposal of the ministry responsible for energy, it is expected that HERA will have to adopt amendments to said methodology in order to harmonise it with the related regulation when it is passed.

The connection of legalised buildings, which are frequently built far from the existing distribution network, was noticed as a problem in 2016. Connection costs in such cases are usually well above the average.

4.2.5 Unbundling of activities

Transmission system operator

The certification of the electricity transmission system operator is a procedure which determines its compliance with the provisions of the **Electricity Market Act**, which stipulates the unbundling and independence of electricity transmission system operators. As a regulatory body, HERA is charged with the certification procedure of electricity transmission system operator HOPS, in accordance with the regulations of national energy laws, primarily the **Electricity Market Act**, which transposes the Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC (hereinafter: Directive 72/2009/EC).

During the procedure of certifying HOPS as an independent transmission operator, on 12 October 2015, HERA passed a *Decision Defining the Draft Decision to Issue a Certificate to HOPS as an Independent Transmission Operator* and submitted it for the opinion of the European Commission.

On 16 December 2015, the European Commission passed Opinion No. C(2015) 9559 which states, inter alia, that HERA's annual report should also contain a description of measures undertaken by HOPS and HERA for the purpose of harmonisation with different requirements and intermediate dates determined in the final decision on the issuance of the certificate and a self-assessment of progress in accordance with the Art. 37, Par. 1, Item e) of the Directive 72/2009/EC.

On 22 February 2016, after obtaining the opinion of the European Commission, HERA adopted a decision issuing a certificate to HOPS under the Independent Transmission Operator (ITO) model.

A detailed description of the fulfilment of obligations from the decision on the issuance of the certificate is provided in a separate chapter.

Pursuant to Art. 19, Par. 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, Par 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.

Attached to the *Certification Request*, HOPS also provided HERA with contracts through which certain companies that are part of a vertically integrated entity provide services to HOPS, including an agreement for covering losses in the transmission network, a framework agreement on the sale and purchase of electricity for covering losses, a framework agreement on the sale and purchase of electricity for the compensation program, and an agreement on electricity supply for the period of one year.

Attached to the *Certification Request*, HOPS provided HERA with contracts on the services it renders to companies that are part of a vertically integrated entity. It also submitted an explanation of deadlines for executing agreements on network usage with HEP-Proizvodnja d.o.o.

Pursuant to Art. 18, Par. 7 of the **Electricity Market Act**, HOPS may not share IT systems or equipment with any part of the vertically integrated entity, nor may it jointly use the services of the same consultants or subcontractors for IT systems.

During the certification procedure, HOPS completed the process of separating its information technology (systems and application) infrastructure from the information technology infrastructure of other companies that are part of the vertically integrated entity.

In terms of the ownership of the electric power structure, a document entitled "Agreement on Mutual Relations regarding Unbundling at the Interface of Generating Facilities of the Transmission and Distribution Network" (which includes the "Principles of the Unbundling of the Activities of Generation, Transmission, and Distribution of Electricity") determines the model of unbundling at the interface of the transmission and distribution network, generating facilities, and the transmission and distribution network. Pursuant to these documents, individual contracts on the joint use of the electric power infrastructure were executed between HOPS and the companies that are part of the vertically integrated entity.

Art. 22, Par. 1 of the **Electricity Market Act** stipulates that the transmission system operator must adopt a compliance programme stipulating measures to prevent the possibility of biased behaviour and the manner of monitoring compliance with this programme. HERA provided prior approval for the compliance programme. Compliance with the programme is independently monitored by the person in charge of compliance monitoring.

Through the compliance programme, HOPS management presented an overview of measures excluding the possibility of biased behaviour and the manner of monitoring compliance with the programme. HERA gave prior approval for the compliance programme. HERA also gave prior approval to HOPS for the appointment of a person responsible for compliance monitoring.

Description of measures taken for the purpose of harmonisation with various requirements and intermediate dates determined in the decision on issuing a certificate to HOPS as an independent transmission operator

In its decision issuing the certificate, HERA determined the obligations/terms HOPS must fulfil, including the provision of appropriate intermediate dates for the implementation of individual measures.

Thus, regarding the services rendered to HOPS by (other) companies that are part of the vertically integrated entity (contracts for the procurement of ancillary services and the acquisition of balancing energy, which must be harmonised with legal requirements regulating said area), HERA's decision issuing the certificate required HOPS to notify it (and provide evidence) of activities undertaken related to the execution of contracts for the procurement of ancillary services and the acquisition of balancing energy by intermediate dates, as follows:

- the adoption of the *Methodology for Determining Prices for the Provision of Ancillary Services* by the end of June 2016 (adopted by HOPS, with HERA's prior approval),
- the adoption of the *Rules on Electric Power System Balancing* by the end of June 2016 (adopted by HOPS, with the prior opinion of HROTE and the prior approval of HERA), and
- entry into force of the contract for the procurement of ancillary services and the acquisition of balancing energy by 1 January 2017, with the submission of the contract to HERA by 15 January 2017 at the latest.

In the period from mid-June of 2016 until mid-January of 2017, HERA received documentation in connection with the procurement of ancillary services, i.e. balancing energy, as requested in the decision on the issuance of certificates.

Additionally, regarding the services which HOPS renders to (other) companies that are part of the vertically integrated entity, in its decision issuing the certificate, HERA required HOPS to notify it (and provide evidence) of activities undertaken related to the execution of a network usage agreement with HEP-Proizvodnja d.o.o. (as a part of the vertically integrated entity) by intermediate dates as follows:

- execution of the network usage agreement for TE Sisak by 15 April 2016,

- execution of the network usage agreement for HE Varaždin, HE Dubrava, and HE Čakovec by 15 May 2016,
- execution of the network usage agreement for HE Đale, HE Vinodol, HE Gojak, HE Senj, HE Rijeka, HE Orlovac, HE Zakučac (G1, G2 and G3), HE Peruča, HE Dubrovnik, HE Sklope, RHE Velebit, TE-TO Osijek, KTE Jertovec, EL-TO Zagreb, TE Rijeka, and TE Plomin by 31 May 2016,
- execution of the network usage agreement for TE-TO Zagreb by 20 June 2016,
- execution of the network usage agreement for HE Kraljevac by 30 September 2016, and
- execution of the network usage agreement for HE Zakučac (G4) by 31 January 2017, with submission of said contract to HERA by 15 February 2017 at the latest.

From mid-April of 2016 to the end of August of 2016, HERA received network usage agreements executed between HOPS and HEP-Proizvodnja d.o.o., as requested in the decision on the issuance of certificates.

Regarding the implementation of activities on unbundling HOPS's telecommunications system, in the decision issuing the certificate, HERA ordered HOPS to implement said activities (unbundling from the telecommunications system of HEP-TELEKOMUNIKACIJE d.o.o. for telecommunications services – hereinafter: HEP-TELEKOMUNIKACIJE) by intermediate dates as follows:

- preparation of the technical design of HOPS's LAN/WAN network (relating to 14 of HOPS' business locations) by 15 March 2016,
- preparation of transport services for the HOPS business network (relating to 14 of HOPS' business locations) by 15 June 2016,
- purchase of LAN/WAN equipment (relating to 14 of HOPS' business locations) by 15 June 2016,
- drafting and submitting new agreements to HERA for review according to the final telecommunications services model for the requirements of HOPS by 30 September 2016,
- implementation of a LAN/WAN network at HOPS' locations (relating to 14 of HOPS's business locations) by 31 December 2016,
- execution of new agreements (as per the final telecommunications services model for the needs of HOPS, between HOPS and HEP-TELEKOMUNIKACIJE) by 31 December 2016, and
- delivery to HERA of all documents, including a document prepared by an independent auditor evaluating the implementation of the model of the unbundling of HOPS' telecommunications system, by 15 January 2017.

Related to the above, from mid-March of 2016 to mid-January of 2017, HERA received documentation in connection with the implementation of the unbundling of HOPS' telecommunications system as requested in the decision on the issuance of certificates.

Subsequently, as regards the ownership and unbundling of business premises, in its decision issuing the certificate, HERA ordered HOPS to notify it (and provide evidence) of activities concerning HOPS' relocation into new offices at locations in Osijek and Opatija, as well as of the termination of existing lease contracts, by intermediate dates as follows:

- For Osijek:
 - selection of subcontractor and execution of contract by 29 April 2016,
 - selection of subcontractor and execution of contract by 24 January 2017,
 - completion of final works and elevator installation by 25 March 2017, and
 - relocation of HOPS by 30 June 2017, with evidence on the termination of the lease contract for the existing location by 15 July 2017 at the latest,

- For Opatija:
 - o completion of detailed design and bill of materials by 9 July 2016,
 - o selection of subcontractor and execution of contract by 22 September 2016,
 - o establishment of building site and excavation by 21 December 2016,
 - o completion of reinforced concrete structure by 20 April 2017,
 - o completion of final works by 16 December 2017, and
 - o relocation of HOPS by 1 May 2018, with evidence on the termination of the lease contract for the existing location by 15 May 2018 at the latest.

In accordance with the above, in 2016, HERA received the documentation requested in the decision on the issuance of certificates regarding HOPS's relocation to new business premises in Osijek.

As regards the relocation of HOPS from Opatija to a new location in Matulji in 2016, a delay was noticed due to the obligatory public procurement procedure – an appeal was filed, over which HOPS had no influence.

HERA is of the opinion that HOPS took the prescribed actions in the aforementioned areas within the stipulated deadlines, with minor and/or justified deviations in certain cases, and that HOPS has generally complied with the obligations arising from the decision issuing the certificate.

Distribution system operator

Art. 47, Par. 2. of the **Act on Amendments to the Electricity Market Act** stipulates that the electric power entity that supplies consumers under the universal service, HEP – Operator distribucijskog sustava d.o.o. (hereinafter: HEP-ODS), is obliged to unbundle electricity supply as a public service through a change in status of the division of the company by separation by 31 December 2016 at the latest. During 2016, HEP-ODS performed the activities required to comply with this obligation.

Pursuant to Art 550 of the **Companies Act**, HEP-ODS prepared a Demerger Plan, which consisted of the proposal of a statement on the incorporation of HEP Elektra d.o.o., the final balance sheet of HEP-ODS, the starting balance sheet of the HEP Elektra d.o.o., the demerger balance with an overview of the assets, liabilities, and legal relations retained by HEP-ODS and an overview of the assets, liabilities, and legal relations to be transferred to HEP Elektra d.o.o. as a new company, an auditor report on the incorporation of the new company, and a list of employees whose employment contracts are to be transferred to HEP Elektra d.o.o. The status change was performed through a demerger model, and the new company was incorporated as of 1 November 2016 and registered in the court register as of 31 October 2016.

HEP Elektra d.o.o. is registered for electricity supply activities as a public service. The incorporator of HEP Elektra d.o.o. is HEP d.d., with one business share in the amount of HRK 20,000.00 (share capital of the new company).

After incorporating 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 ancillary activities (mainly services like public lighting maintenance, network user facility maintenance, etc.) according to market principles. Activities in electricity distribution and ancillary activities are kept separately in accounting. In this regard, HEP-ODS is obliged to comply with the *Decision on the Manner and Procedure for Keeping Separate Accounting Records for Energy Entities ("Official Gazette", No. 86/14)*, and, accordingly, to prepare separate financial reports for the distribution of electricity and ancillary activities.

Pursuant to Art. 39, Item 14 of the **Electricity Market Act**, HEP-ODS is, in particular, responsible for monitoring the implementation of all of its obligations, particularly in

terms of the principles of transparency, objectivity, and impartiality, and it is obligated to issue annual reports in accordance with HERA's prior approval.

On 3 April 2017, HERA received a report for 2016 from HEP-ODS on 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 web site www.hep.hr/ods:

- Programme for ensuring and implementing the principles of transparency, objectivity, and impartiality in the operation of HEP-ODS
- HEP-ODS's compliance programme
- report for 2015 on the implementation of a programme ensuring and implementing the principles of transparency, objectivity, and impartiality in the company's operation,
- *Price List of HEP-ODS Non-Standard Services*,
- Rules for preventing unauthorised electricity consumption,
- Rules on measurement data,
- Format of supplier data delivery and other documents related to communications with suppliers,
- *Proposed Ten-Year Development Plan of the HEP-ODS Distribution Network for the Period 2017 – 2026*,
- Annual report on monitoring electricity losses, and
- List of members of the HEP-ODS compliance programme monitoring committee.

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 said agreement, including the application of *Methodology for Establishing the Price of Services/Tasks*. The manner of establishing the price 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 executed agreement are:

- determining general principles and guidelines for the preparation of operating plans,
- determining the financial policy and the organisation of a centralised treasury,
- establishing general risk management policy,
- internal audits,
- establishing accounting policies and performing some accounting tasks,
- determining the human resources management strategy and performing some of these tasks,
- performing some legal tasks,
- corporate communications,
- support in monitoring and participation in the process of preparing and adopting regulations,
- support in monitoring and participating in EU projects,
- determining the corporate security strategy and performing some of these tasks,
- performing some tasks related to ICT, and
- determining purchasing strategy and performing some of these tasks.

Pursuant to Art. 79, Par. 1 of the *Rules on Electricity Market Organisation*, the distribution system operator participated in the electricity market as a separate energy entity in the role of distribution system operator and a supplier within the public service until 31 December 2016, and was required to be a member of a market balance group. During said period, no limitations were imposed on HEP-ODS regarding its choice of market balance group, and was a member of the HEP d.d. balance group.

As of 1 January 2017, pursuant to Art. 32, Par. 2 of the *Rules on Electricity Market Organisation* the sole member of distribution system operator balance group is the distribution system operator, which also manages this balance group. Since electricity supply as a public service has been unbundled from HEP-ODS since 1 January 2017, its balance group refers only to the procurement of electricity to cover losses in the distribution network.

Within the framework of said decision, HEP-ODS purchases and reports contractual schedules and pays for its deviations from contractual schedules.

Observations on the unbundling of activities in 2016

HERA continually monitors the implementation of certification conditions.

HOPS is obliged to submit all commercial and financial contracts with the vertically integrated subject to HERA for approval. HERA reviews market conditions and the 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 significantly increased the transparency of the electricity market.

HEP-ODS continues to use the visual identity of HEP d.d., which is not in compliance with Art. 36, Par. 3 of the **Electricity Market Act**. As this can lead to confusion regarding the separate identity of the electric power entities for supply which are also part of HEP d.d., HERA will monitor this challenge more closely.

Other aspects of unbundling need to be addressed as well, such as the use of ownership rights to the electric power infrastructure structure of the distribution network, which are for the time being held by HEP d.d., or the fact that HEP d.d. performs a range of services/tasks for HEP-ODS.

According to the submitted financial reports, HOPS and HEP-ODS are making a profit from their business operations. The majority of profit is derived from fees for using the transmission and distribution networks, pursuant to approved tariff items. Bearing in mind the need for investment and modernisation of the network according to the challenges posed by the European Commission (e.g. advanced networks and advanced meters), HERA is of the opinion that the profit of the companies should be primarily used for investment into the network.

4.3 Wholesale electricity market

4.3.1 Development of the wholesale electricity market

Electric power balance sheet of the Republic of Croatia in 2016

According to Table 4.3.1., the majority of total electricity consumption in Croatia, which amounted to 17,674GWh in 2016, is covered by electricity that enters the network from power plants within the territory of Croatia amounting to 11,331GWh (64.1%), while the rest is covered by physical net imports, which amount to 6,343GWh (35.9%).

Table 4.3.1 Electric power balance sheet of the Republic of Croatia in 2015 and 2016 in GWh

No.	Electric power system balance sheet	2015	2016
1	Total production	9,999	11,331
2	Import into Croatia	13,165	12,397
3	Total procurement (1+2)	23,164	23,728
4	Export from Croatia	5,532	6,054
5	Physical net import (2-4)	7,633	6,343
6	Total consumption (3-4)	17,632	17,674
7	Direct procurement in the distribution network	715	900
8	Losses in the transmission network	507	510
9	Consumption of transmission (6-7-8)	16,410	16,264
10	Delivery to end consumers on the transmission network	702	645
11	Pumping work of Velebit Pump Storage Power Plant and other own consumption	236	290
12	Delivery into distribution network from the transmission network (9-10-11)	15,382	15,329
13	Transit (min(2, 4))	5,532	6,054

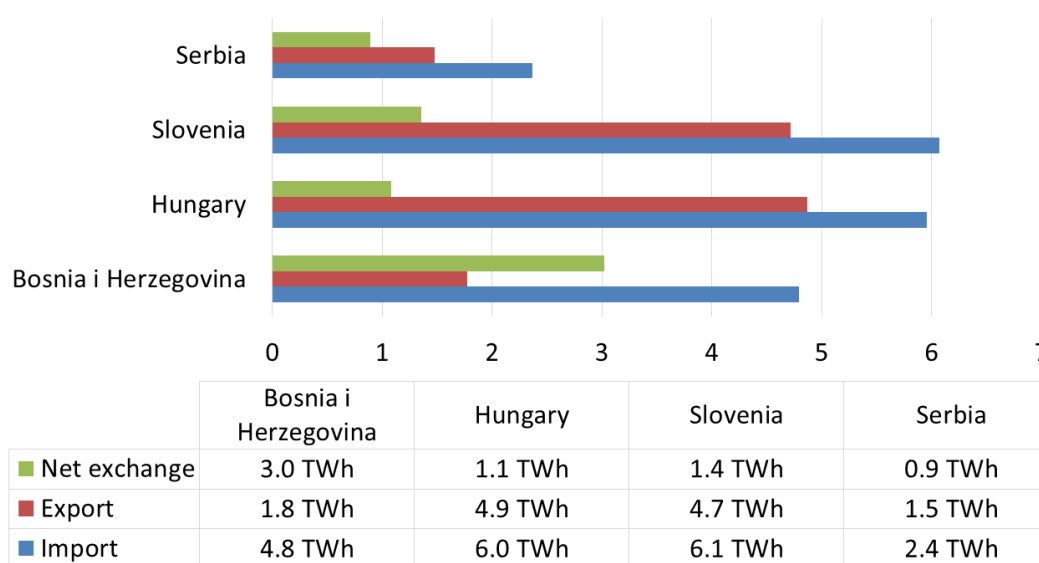
Source: HOPS, HEP-ODS

Trade at Croatia's borders

Figure 4.3.1. shows the amount of cross-border trading (import, export, and net exchange) at Croatia's borders with neighbouring countries in 2016 by amount from the agreed schedules of energy entities, where it is evident that the result at all borders is net import.

Imports from Slovenia include the takeover of electricity from NPP Krško (2.7TWh) for HEP d.d. The total (trade) net import, including electricity from NPP Krško, amounted to 6.4TWh.

In terms of intraday trading, imports into Croatia at cross-border transmission capacities amounted to 514GWh while exports amounted to 553GWh, from which it is evident that market participants on the intraday level adjust the agreed schedules through cross-border trade.



Source: HROTE

Figure 4.3.1. Cross-border trade by borders of Republic of Croatia with neighbouring countries in 2016 by amounts from agreed schedules of energy entities

Hrvatska burza električne energije d.o.o.

Hrvatska burza električne energije d.o.o. (hereinafter: CROPEX) successfully began the organised Croatian day-ahead electricity market with eight registered members on 10 February 2016.

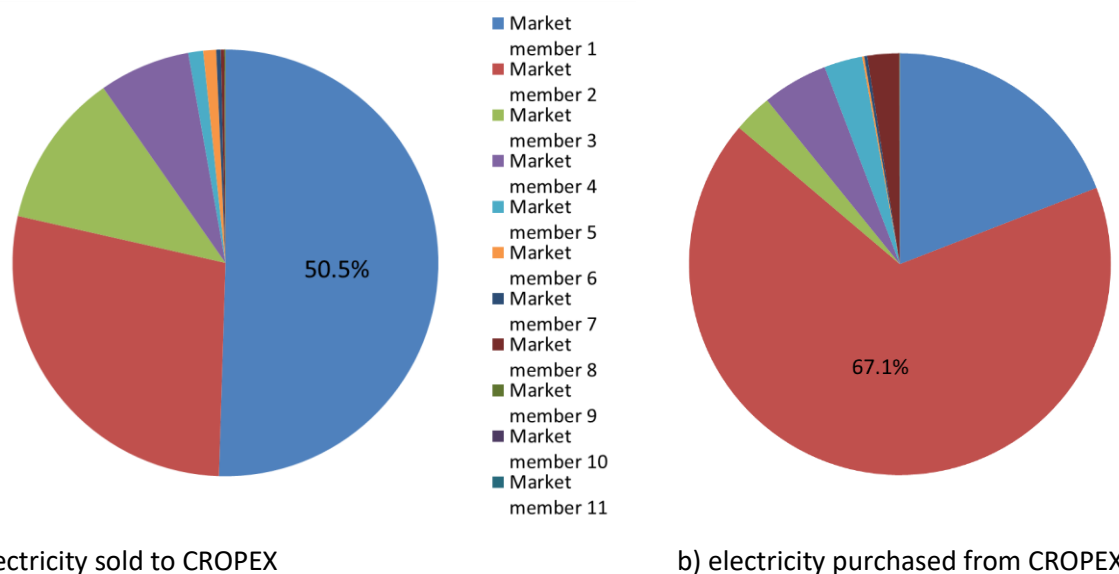
In November 2016, CROPEX executed agreements on the preparation of a trading platform and intraday market management with Nord Pool Spot AS, thereby fulfilling the precondition for setting up the organised intraday electricity market.

In 2016, three registered energy entities with head offices outside Croatia in a European Union member state registered with CROPEX.

At the end of 2016, CROPEX had 11 registered members, and the total amount of offers for purchase was 1.6TWh, the total amount of sale offers was 1.1TWh, and the total sold electricity amounted to 0.3TWh.

Figure 4.3.2. shows electricity purchased and sold via CROPEX. It is evident that the market participant who sold most electricity has a share of 50.5% of the total electricity sold through CROPEX, while the market participant who purchased the most electricity has a share of 67.1% of the total electricity purchased through CROPEX.

January 2017 on CROPEX was marked with high electricity prices, with an average price of €85/MWh, which was equivalent to the levels of the Slovenian and Hungarian exchanges. Extremely low temperatures causing increased demand for electricity were a contributing factor to this.



a) electricity sold to CROPEX

b) electricity purchased from CROPEX

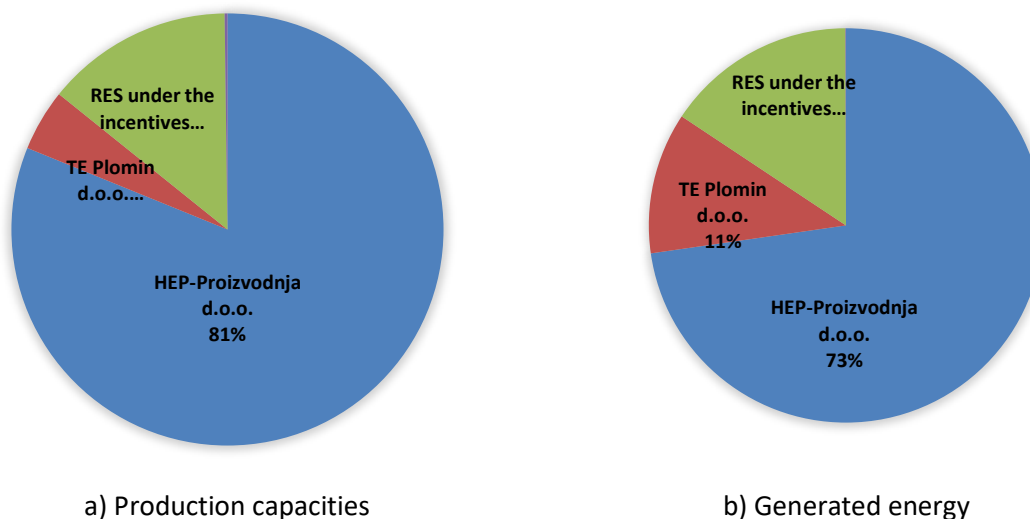
Source: CROPEX

Figure 4.3.2. Electricity purchased and sold to CROPEX by market participants in 2016

In September 2016, HOPS and CROPEX signed a document entitled the "IBWT Adherence Form" in order to acquire the status of a full member of IBWT (Italian Borders Working Table) and to comply with the formal condition for beginning the project of connecting the Croatian electricity market across the Slovenian border. When the Croatian participants join the IBWT bodies, the processes in the procedure of market coupling will be jointly defined.

Electricity market concentration indicators

Figure 4.3.3. shows the share in production capacities and electricity generated by power plants in Croatia by energy entity in 2016. HEP-Proizvodnja d.o.o. has by far the largest share, amounting to 81% of production capacities and 73% of generated electricity.



Source: HOPS, HEP-ODS, HROTE

Figure 4.3.3. Share of production capacities and electricity generated by power plants on the territory of the Republic of Croatia per energy operator in 2016

As of 31 December 2016, there were 42 valid licenses for generation of electricity, 18 licences for electricity supply, 24 licenses for trading in electricity, and one license for trading, mediation, and representation on the electricity market. In 2016, HERA issued 11 licenses for electricity trading under the simplified procedure to companies registered in EU member states.

On Croatia's wholesale electricity market in 2016, the total volume of sales from the agreed schedules of energy entities from HEP Grupa was 32.2TWh, i.e. 69% of the total volume of sales on the wholesale market.

Observations on the development of the wholesale market in 2016

The share of energy generated by plants under the incentives system with guaranteed buy-off in 2016 amounted to 16% of the total generated electricity, i.e. 10% of the total electricity consumption in Croatia. If all incentive agreements which HROTE executed within the incentives system are taken into account, the share of this electricity that reached the market under guaranteed and regulated conditions may lead to market disruption.

An electricity market model with balance groups began operating in September 2016, and 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. The above will lead to unfavourable effects on the wholesale electricity market for following reasons:

- suppliers have to take over an increasing amount of electricity (currently 10% of total consumption) in a regulated manner under non-market prices,
- said **Regulation** significantly changes 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 the future, when passing such regulations, ample time should be left prior to their entry into force so that market participants can prepare for the consequences. Also, such regulations should promote the development of the electricity market rather than disrupting it.

The beginning of 2016 saw a drop in the forward wholesale prices of electricity on HUPEX, the Hungarian power exchange, to a level of approx. €36/MWh, which is a significant drop compared to the previous two-year period, when these prices were around €40/MWh. During the rest of the year, prices fluctuated from €33-38/MWh.

As of 10 February 2016 (inclusive), CROPEX has enabled market participants safe, anonymous, and transparent electricity trading on the day-ahead market, and since this date, the price of electricity has been defined on an hourly basis for the first time Croatia's history. Considering the trading volume, the amount of offers for purchase and sale, the number and shares of market participants in the purchase and sale, and prices at the level of prices on neighbouring exchanges, it can be said that CROPEX is developing well in the sense of efficient market competition, but also that it is necessary to further improve its operation by setting up an EKO balance group and by connecting CROPEX with other markets.

In addition to connecting CROPEX with exchanges in Hungary and Slovenia, with whom Croatia has the greatest cross-border capacities and with whom it must connect within a single energy market, if a number of preconditions are fulfilled, it will also be possible to connect with exchanges in the Southeast Europe and outside the European Union, when and if such markets are established. For example, Bosnia and Herzegovina, Montenegro, Serbia, Macedonia, Albania, and Kosovo committed to implementing integrated electricity trading on electricity exchanges in 2015.³ Connecting with neighbouring exchanges would result in a greater degree of market efficiency and market competition. In 2016 and 2017, HERA did not receive any requests for information from market competition regulators, and it provided information and data to everyone possible. No cases of disruption or limitation of market competition were found.

In 2016, CROPEX performed activities aimed at the establishment of an intraday electricity market, which would reinforce the implementation of Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management in the part which refers to organised electricity markets, which will enable reduction in the deviations of balance groups and enable the determination of a wholesale price of electricity closer to real time. CROPEX also became a full member of IBWT, and, together with HOPS, it must take timely action in order to connect with neighbouring exchanges. For the first time in history, on 26 April 2017, CROPEX opened and completed an intraday auction, with a volume of 305MWh during the first day.

As the significant amount in cross-border trading on intraday levels makes it apparent that there is a need for intraday trading, it is necessary to establish intraday allocation of cross-border transmission capacities with Hungary as soon as possible in order to open the intraday market on the border with Hungary, as it has been opened on the other three borders.

As regards the quantity of electricity imports and exports to and from neighbouring countries, we can see significant amounts both in imports (19TWh) and exports (13TWh), which, when compared to total consumption (17.7TWh), speak to the high degree of development and openness of the market and market competition with other countries on the wholesale level.

As regards the promotion of market competition, transparency in data publication is necessary. In this regard, when all the imperfections in 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 are rectified, and when HOPS is enabled to deliver and publish data on the central platform for information transparency in a simpler manner, the transparency of the wholesale electricity market will increase, which will also

³ https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/WB6

improve the functioning of the market. 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. Additionally, market competition and the wholesale electricity market was promoted in the media (Internet, press) and during professional conferences throughout 2016 and 2017.

As regards 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, HERA performed activities regarding HOPS in 2016, the goal of which was to secure the conditions that will enable HOPS to fulfil the obligations from this regulation. In this regard, HOPS submitted a list of difficulties it faces and the intended manner of their resolution; in 2017, HERA requested a review of the completeness of certain types of data by category from HOPS. Such an approach also includes the monitoring of the degree of transparency on the electricity market. It should also be noted that the website <http://remit.hep.hr/> publishes data on the availability of generating units in the territory of Croatia that are owned by HEP d.d. Therefore, progress is evident as regards the transparency of electric power companies, and as transparency in this regard needs to improve, HERA will increase its activities to this end. It should be noted that completing this platform with the remaining neighbouring countries would contribute to the consistency of data exchange procedures for the most important market processes.

4.3.2 Allocation of cross-border transmission capacities and congestion management

Systems of allocation of cross-border transmission capacities in 2016

Pursuant to the **Regulation of Energy Activities Act**, HERA, in co-operation with the regulatory bodies of neighbouring countries with which it maintains electric power system connections, pays special attention to the rules on the introduction and allocation of connection line capacities and the structure that solves congestion within the national transmission network. The supervision of the allocation of cross-border capacities is one of the regulator's duties as defined by EU legislation, especially by Regulation (EC) 714/2009.

Table 4.3.2. shows the allocation of cross-border transmission capacities by Croatian border in 2016.

Table 4.3.2. *Systems of allocation of cross-border transmission capacities per border of the Republic of Croatia with neighbouring countries in 2016*

Border	Annual 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

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

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

At the border with Serbia, joint bilateral auctions continued for the allocation of cross-border transmission capacities such that HOPS performs annual and monthly auctions and the Serbian transmission operator performs daily and intraday auctions in both directions for the total transmission capacity.

Table 4.3.3. shows cross-border transmission capacities allocated at the annual auction for 2016 (period from 1 January 2016 to 31 December 2016).

Table 4.3.3. Capacities allocated at the annual auctions by border in 2016

Direction ⁴	Offered capacity [MW]	Number of participants	Number of participants with accepted offers	Allocated [MW]	HOPS income [HRK]
HR ← BA	400	12	9	400	1,989,789
HR → BA	400	9	5	400	397,958
HR ← SI	800	19	9	799	6,345,368
HR → SI	800	19	13	800	1,323,606
HR ← RS	150	11	7	150	598,369
HR → RS	150	10	5	150	299,185
HR ← HU	700	23	10	700	6,254,039
HR → HU	600	20	12	600	2,183,950
					19,392,264

Source: HOPS

The majority of revenue from allocations of cross-border capacities at annual auctions was realized through imports. Total HOPS income from annual auctions is HRK 19.4 million, which is HRK 5.3 million less as compared to 2015, or HRK 19.8 million less as compared to 2014.

The most significant decline in revenue as compared to 2015 was recorded in imports from Slovenia and Hungary.

Figure 4.3.4. shows the average value of cross-border transmission capacities by Croatian border in 2016. The value part of net transfer capacity (NTC) for monthly auctions are calculated on a monthly basis. This figure shows the already allocated capacities on the annual level (AAC), capacities allocated on the monthly level ("Allocated"), capacities specifically intended for daily level allocation ("Intended for daily"), transmission reliability margin (TRM), and capacity that was 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 values of capacity.

⁴ 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).

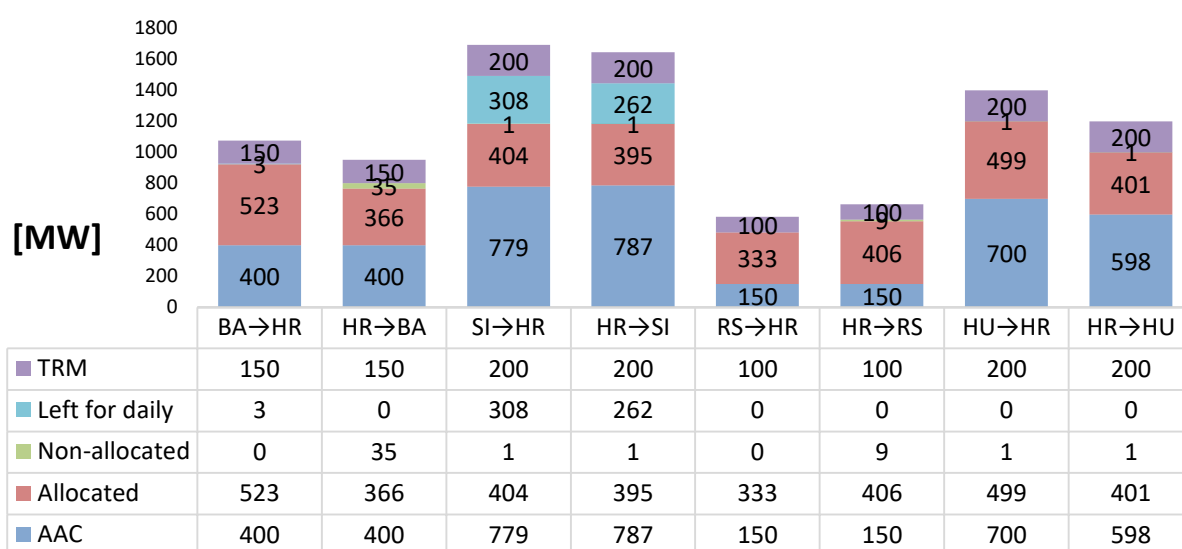


Figure 4.3.4. Average monthly values of cross-border transmission capacities by Croatian border in 2016

Table 4.3.4. shows the average winter and summer values of NTC for 2015 and 2016. 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 by border for 2015 and 2016

Winter values [MW]						Summer values [MW]					
Direction		2015	2016	Change		Direction		2015	2016	Change	
HR	← BA	766	999	30%	HR	← BA	632	851	35%		
HR	→ BA	657	814	24%	HR	→ BA	651	786	21%		
HR	← SI	1,489	1,483	0%	HR	← SI	1,464	1,500	2%		
HR	→ SI	1,489	1,433	-4%	HR	→ SI	1,464	1,457	0%		
HR	← RS	586	528	-10%	HR	← RS	385	438	14%		
HR	→ RS	546	583	7%	HR	→ RS	470	546	16%		
HR	← HU	1,200	1,200	0%	HR	← HU	1,200	1,200	0%		
HR	→ HU	1,000	1,000	0%	HR	→ HU	1,000	1,000	0%		
Imports		4,041	4,210	4%	Imports		3,681	3,989	8%		
Exports		3,692	3,830	4%	Exports		3,585	3,789	6%		

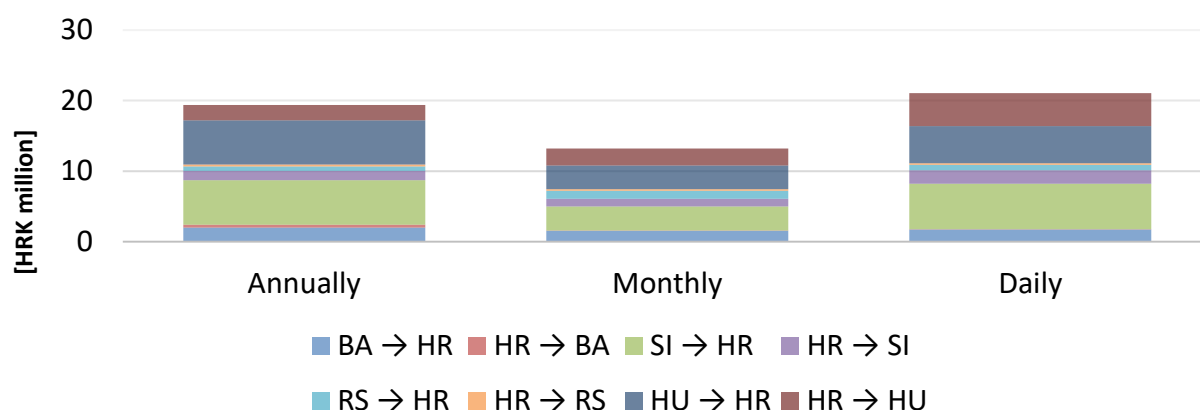
Source: HOPS

As compared to 2015, NTC values increased significantly at the border with Bosnia and Herzegovina in both directions.

The largest amounts of capacity were allocated at the borders with Hungary and Slovenia, which resulted in the largest income for HOPS.

Unallocated capacity at monthly auction, which is intended for daily auctions, and capacity not reported for use, is offered again at daily auctions. Leftover capacity from daily auctions, taking transactions in the opposite direction into account, was allocated without fee in the day of delivery at the borders with Serbia, Slovenia, and Bosnia and Herzegovina, in the order requests were received.

Figure 4.3.5. shows the structure of HOPS's income from annual, monthly, and daily auctions by direction for cross-border transmission capacities in 2016.



Source: HOPS

Figure 4.3.5. Structure of HOPS's income from annual, monthly, and daily auctions by direction for cross-border transmission capacities in 2016.

In terms of the secondary market for cross-border capacities, it is possible to transfer allocated capacity to a new market participant at all borders, and at the borders with Slovenia, Hungary, and Bosnia and Herzegovina, it is possible to resell capacities allocated to annual and monthly capacities to the relevant auction office.

In addition to income, HOPS also had expenditures related to the allocation of cross-border capacities, i.e. fees to JAO and SEE-CAO and the cost of the resale of capacities from participants in the secondary market.

Table 4.3.5. shows the structure of HOPS's revenues and expenditures from auctions for the allocation of cross-border transmission capacities in 2016.

Table 4.3.5. Structure of HOPS's revenues and expenditures from auctions for the allocation of cross-border transmission capacities in 2016.

Income/expenditure	Amount [HRK million]
Annual auctions	19.4
Monthly auctions	13.2
Daily auctions	21.1
Resale of capacities	-16.2
JAO and SEE CAO costs	-2.5
Total	35.0

Although approximately the same (net) income was recorded in 2016 as in 2015 (HRK 35 million), a decline in revenue from annual auctions was recorded, while revenue from monthly and daily auctions increased, with a simultaneous increase in the cost of resale capacities.

Observations on the allocation of cross-border transmission capacities and congestion management

The capacities offered at annual auctions by border in 2016 were the same as those offered in the previous year.

The NTC values vary significantly at the border with Bosnia and Herzegovina, with winter NTC values in general higher than summer ones, particularly for the incoming direction.

Unlike previous years, at the end of 2016, it was noted that a portion of capacities allocated at annual auctions were already being resold at monthly auctions at the border with Slovenia in both directions and in the export direction with Hungary.

It is necessary to set up the intraday allocation of transmission capacities at the border with Hungary. At the end of 2016, HOPS and the Hungarian transmission system operator agreed on a roadmap of activities, based on which the joint allocation of intraday capacities in both directions is expected to begin in mid-2017.

The majority of revenue from allocations at annual auctions was realised in the import direction. At monthly auctions, the majority of revenue was realized at the borders with Hungary and Slovenia.

Before allocating capacity for 2017 and its use, HERA must provide prior approval for the relevant *Regulations for the Allocation and Use of Cross-Border Capacities*. In order to monitor the process of allocation and use cross-border transmission capacities more easily, in line with the practice of transmission system operators from the European Union, HERA granted prior approval to separate rules exclusively regulating the use of capacities at the end of 2016, which shall apply indefinitely, i.e. until they are rescinded.

The *Regulations on the Allocation and Use of Cross-Border Transmission Capacities* stipulate that the use of transmission capacity allocated at annual, monthly, and daily auctions and intra-day allocations are to be reported to HOPS in the manner and according to deadlines published on HOPS Web site.

In addition to the above, at the end of 2016, HERA granted prior approvals to all individual rules for the allocation of capacities for 2017 at individual borders, without any significant changes to the capacity allocation process as compared to the current year.

In 2016, HERA published a report on the use of HOPS revenue from the allocation of cross-border capacities from July 2015 to June 2016, in which it was confirmed that HOPS had net income from the allocation of cross-border resources in the amount of HRK 34.97 million HRK during said period, and that these finances were used purposefully in accordance with Regulation (EC) 714/2009.

The CACM Regulation stipulates that implicit methods that allocate energy and capacity together through electricity exchanges should be used for the daily and intraday allocation of resources. In the case of day-ahead market coupling, implicit allocations should be used, while continuous implicit allocations should be used for intraday market coupling. Also, the flow base method is stipulated as the first choice for calculating cross-border capacities, while the use of the coordinated NTC method is allowed only in exceptional cases.

Market coupling allows two or more bidding zones to connect into a single market. With market coupling, daily capacity is allocated implicitly on the day-ahead and intra-day markets as part of a transaction on the electricity exchange on both sides of a border between bidding zones. The main precondition for market coupling is the existence of an electricity exchange.

In accordance with the CACM Regulation, each TSO from the EU submitted a harmonised proposal regarding the determination of capacity calculation regions to its according national regulator in November 2015. Since the national regulators have not reached a consensus regarding the acceptance of the proposal, in November 2016, ACER adopted Decision No. 6/2016, whereby it defined the capacity calculation regions in the EU. The participation of an individual EU border in a certain region has long-term consequences, as the calculation of long-term and short-term capacities must be harmonised within each region, which reflects on a range of system maintenance operational processes.

Croatia's borders with Slovenia and Hungary were included in the CORE region, which is also the largest region for capacity calculation in the EU, as seen in Figure 4.3.6.

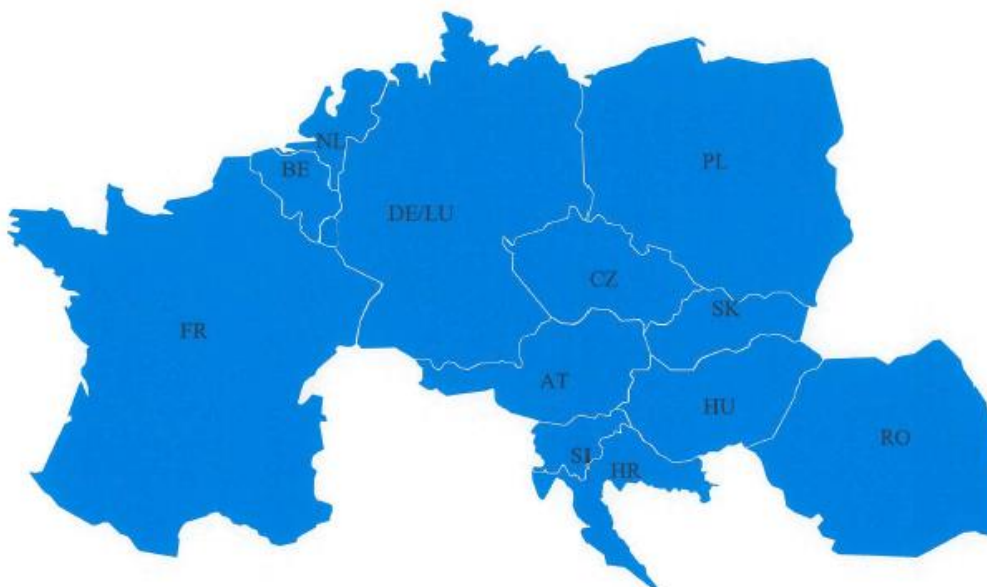


Figure 4.3.6. CORE region for capacity calculation

At the said borders, the application of day-ahead market coupling is anticipated using the power flow method. However, due to the complexity of the project and harmonisation on the regional level, this manner of market coupling is expected only at the beginning of 2019.

As Serbia and Bosnia and Herzegovina have not yet incorporated the CACM Regulation into their legislation, the relevant Croatian borders are not specifically listed in ACER's Decision 06/2016, but when said preconditions are fulfilled, they will be a component part of the region for Southeast Europe.

It is important to note that the CACM Regulation stipulates the obligation of the national regulators to unanimously approve a range of regulations and conditions or methodologies prepared by all NEMOs or transmission system operators for the calculation of capacities both on the EU level and on the regional level. As certain acts are directly or indirectly interdependent, a delay in the addition of a single act may jeopardise the adoption of other acts, particularly bearing in mind the fact that the national regulators should approve all acts unanimously. When the regulators cannot agree, as in case of determining the capacity calculation regions, ACER must take the final decision.

In December 2016, HERA provided approval to HOPS for the first act prepared pursuant to the CACM Regulation in cooperation with other transmission system operators regarding the methodology of providing and generating load data. This act, together with the common grid model methodology, which is in the process of adoption, should define the data for the establishment of a unified network model at the EU level.

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-border capacities. Said initiative is a provisional solution for coupling the Croatian and Slovenian markets until the establishment of regional market coupling as foreseen by the CACM Regulation.

As the Slovenian participants were not ready to establish a bilateral NTC project to couple day-ahead markets, it was agreed that the project would continue using already-existing mechanisms and procedures developed within regional projects, i.e. initiatives of market coupling, as this was deemed quicker, more efficient, and more cost-effective.

In March 2017, CROPEX and HOPS officially became members of the Italian Borders Working Table (IBWT) regional project, which made it possible to connect the Croatian

electricity market with the European market within the MRC project, which currently includes 19 countries accounting for 85% of Europe's electricity consumption.

In addition to the aforementioned MRC project, in Europe, there is also the 4MMC project (Four Markets Market Coupling), which is a joint coupled day-ahead market between Hungary, Slovakia, the Czech Republic, and Romania that uses capacities calculated based on the NTC method.

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

As the Slovenian participants were focused solely on establishing market coupling with Austria for the majority of 2016, and bearing the relevant limitations in human and technical resources in mind, it is expected that the coupling of the Croatian and Slovenian day-ahead market could be implemented in the period from September 2017 to March 2018.

Regulation (EU) 2016/1719 establishing a guideline on forward capacity allocation was adopted in September 2016, and it stipulates detailed rules for capacity allocation between trading zones on long-term markets, for establishing a common methodology for determining long-term capacity, and for establishing a common allocation platform on the European level on which long-term transmission rights are offered.

One of the first tasks stipulated by the FCA Regulation is the adoption of harmonised rules for the allocation of long-term rights to transmission capacities, and the proposal of said rules should be submitted by each transmission system operator to the relevant national regulator within six months from the date the FCA Regulation entered into force. As part of the early implementation of the FCA Regulation, the transmission system operators within ENTSO-E prepared the Harmonised Allocation Rules (HAR), for which HERA gave its prior approval in September 2016, and which began to apply for the allocation of long-term rights to cross-border capacities in 2017 (for the annual and monthly periods) at Croatia's borders with Slovenia and Hungary.

In addition to day-ahead market coupling, the CACM Regulation also stipulates the coupling of intraday markets using the continuous allocation procedure during the day. Said process should be implemented through the XBID project, which began even before the CACM Regulation entered into force. Thus, CROPEX and HOPS are currently participating in the accession stream project together with other participants from Eastern and Central Europe, with the main goal of transferring knowledge between existing and new project members.

Since, according to the CACM Regulation, the implementation of the harmonised intraday allocation of resources within the region for the calculation of capacities will be time consuming, the EU initiated activities regarding the implementation of projects on a smaller geographic scale (Local Implementation Project – LIP), however, the participation of Croatian members in LIPs is not planned.

4.3.3 Electric power system balancing and ancillary services

Settlement of imbalances for balance responsible parties

For the first (monthly) settlement of imbalances, the *Methodology for Establishing Balancing Energy Prices for Balance Responsible Parties* ("Official Gazette" No. 121/13, 82/14 and 132/14) was applied until September 2016, and from September (inclusive) until the end of 2016, the *Methodology for Establishing Balancing Energy Prices* ("Official Gazette" No. 71/16 and 112/16) was applied, which HERA adopted in 2016,.

Using the *Methodology for Establishing Balancing Energy Prices* from 2017 (inclusive), balancing costs in the first (monthly) settlement of imbalances shall reflect on the amount

collected from balance groups. However, transitional provisions in the remaining part of 2016 provided that the methodology has approximately the same effect as if the previous methodology applied, in order for market participants to have stable operating conditions.

By comparing the average daily prices for imbalances in the first (monthly) settlement of imbalances in the Croatian environment, Figure 4.3.7. shows that the prices for positive imbalances in Hungary were lower than those in Croatia and Slovenia in 2016, while prices for negative imbalances in Slovenia and Croatia were lower than those in Hungary. The prices of positive and negative imbalances in Croatia were on par with those in Slovenia. This means that the settlement of imbalances for participants on the Croatian market during 2016 was more favourable than in Hungary, and on par with that in Slovenia.

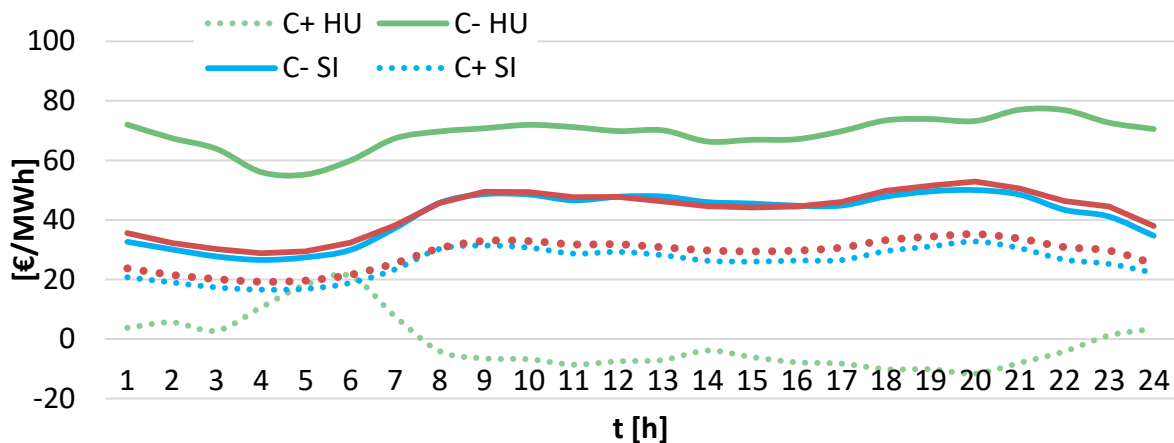


Figure 4.3.7. Average daily prices for imbalances in 2016 in Croatia, Hungary and Slovenia

Figure 4.3.8. shows the average monthly prices of positive and negative imbalances. The highest average monthly price for negative imbalances C_n was achieved in July (€139/MWh), while the highest average monthly price for positive imbalances C_p was achieved in January (€33/MWh).

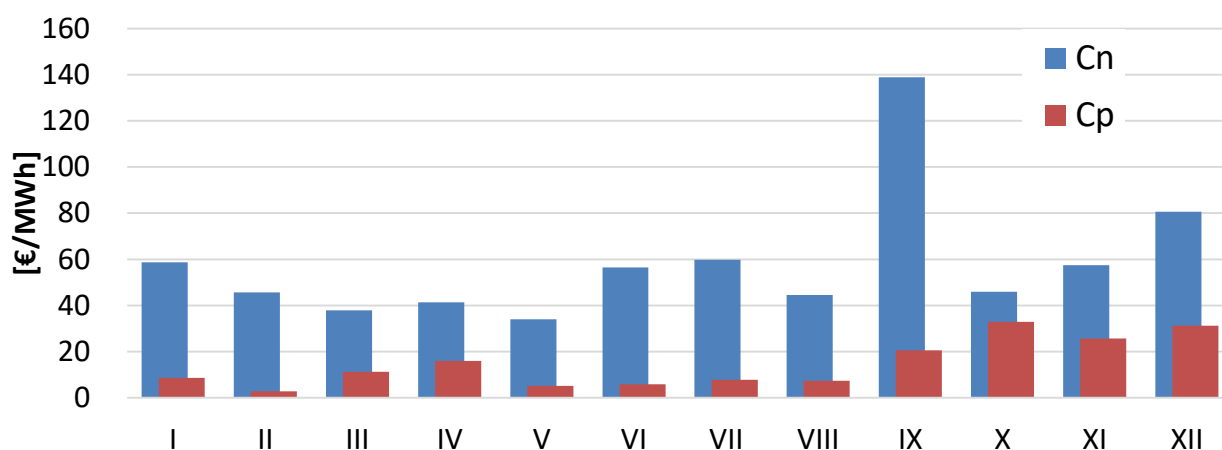


Figure 4.3.8. Average monthly prices of positive and negative imbalances in 2016

Figure 4.3.9. shows the amounts for imbalances which HOPS invoiced by months in 2016 (I_{uk} – total amount, I_n – amount for negative imbalances, I_p – amount for positive imbalances). For all of the months in 2016, HOPS invoiced a total of 56 million HRK.

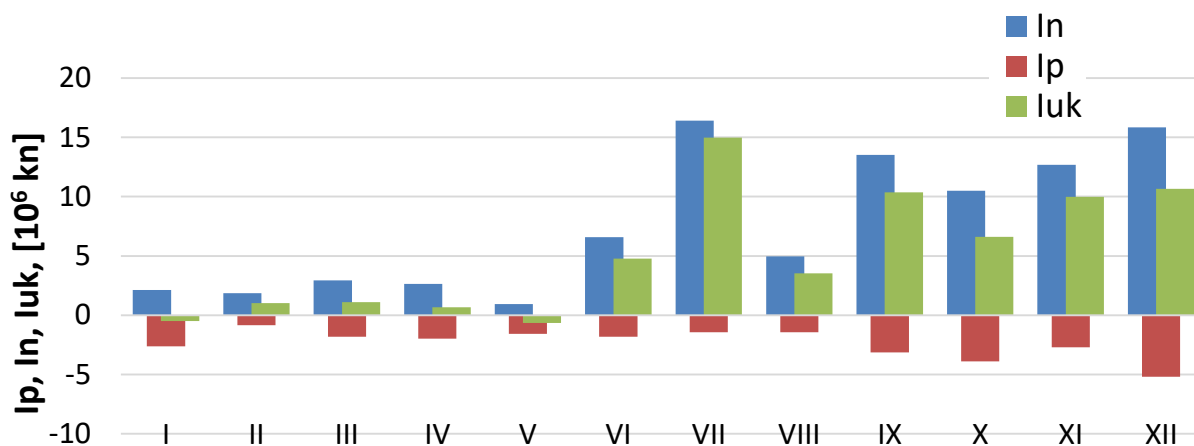


Figure 4.3.9. Amounts invoiced for imbalances in 2016

In 2016, HOPS adopted the *Rules on Electric Power System Balancing (HOPS, 5/2016)*. These rules stipulated that all imbalances, except imbalances of the planned EKO balance group, from September (inclusive) until the end of 2016 would be included in the first (monthly) settlement of imbalances. In 2017, all imbalances were to have been included in the first (monthly) settlement of imbalances, which was changed through the adoption of 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.

During the process of adopting said regulation, HERA provided an opinion on said regulation on the same day it was requested (20 December 2016). In its opinion, HERA pointed out the consequences of this manner of solution on the settlement of imbalances, the market, balance groups, the electric power system balancing mechanism, and further possibilities of integrating renewable energy sources. HERA pointed out that it is necessary to consider the impact of said **Regulation** on possible changes in by-laws concerning the electricity market, as they were prepared under the assumption that the **Renewable Energy Sources and High-efficiency Cogeneration Act** would apply as of 1 January 2017 in the form in which it was adopted. It was pointed out that retaining the existing manner of production planning and preparation of agreed schedules would reflect on balancing and the further ability to integrate renewable energy source power plants into the electric power system. Further, HERA pointed out the consequences of the irrational approach to production planning from renewable energy sources, which reflects on changes in fees for transmission network usage, to HOPS and other market participants, as neither producers under the incentives system nor HROTE have any responsibility for imbalances on the electricity market.

The *Rules on Electric Power System Balancing* stipulate the market mechanisms for the procurement of ancillary services and for the acquisition of balancing energy, as well as making it possible to provide ancillary services to all network users with adequate technical capabilities. These rules introduced the second (annual) settlement of imbalances, which must be applied for the first time for 2017 with the cancellation of correction factor k . These rules also stipulate the establishment of balance groups, whose imbalances shall be the responsibility of balance responsible party.

On 16 December 2016, HEP-ODS adopted the *Rules on the Application of Standard Load Profiles (HEP-ODS, 12/2016)*, which should be applied as of 1 January 2017. These rules allocate on the hourly level a part of the hourly rate in the distribution system that cannot be measured due to technical restrictions, and allocated to the balance groups on the

hourly level. This includes billing metering points that do not take measurements hourly and losses of HEP-ODS (hereinafter: *remaining load*). According to these rules, the hourly rate of losses is determined by multiplying the known coefficient with the load profile of the distribution system. The hourly rate of billing metering points with monthly metering is determined by using known standard load profiles and the meter reading for the month in question. The hourly rate of households with semi-annual readout is determined by subtracting the previous hourly rates from the remaining load.

The *Rules on the Application of Standard Load Profiles* also stipulate the manner in which imbalances are calculated in the second (annual) settlement of imbalances. The purpose of the second (annual) settlement of imbalances is the settlement of imbalances that occur due to differences between the amount of electricity the supplier buys on the wholesale market and the first (monthly) settlement of imbalances for this electricity, for which end consumers are invoiced.

The *Methodology for Establishing Balancing Energy Prices* determines the price in the second (annual) settlement of imbalances, as an average hourly rate on the Croatian, Hungarian, and Slovenian electricity exchange in a given month, which is applied to imbalances for that month.

As the adoption of the **Regulation on Amendments to the Renewable Energy Sources and High-efficiency Cogeneration Act** in the final days of 2016 caused a delay in establishing the EKO balance group in 2017, on 17 March 2017, with prior public consultation and the approval of HERA, HOPS adopted the amendments to the *Rules on Electric Power System Balancing (HOPS, 5/2016)* in order to accommodate the framework of the bylaw to new circumstances. These changes include imbalances caused by agreed schedules prepared by HROTE and the achievements of producers under the incentives system into the settlement of imbalances, while the financial obligation from this settlement until the establishment of EKO balance group is added to HOPS. Additionally, these changes provide for the earlier implementation of the second (annual) settlement of imbalances.

Due to frequent corrections to the settlement of imbalances due to the calculation of performance on the distribution network, as well as the large number of complaints from suppliers regarding the calculation of performance and imbalances, HOPS requested that HERA supervise the operation of HEP-ODS. In this regard, HERA started the stipulated activities.

Provision of balancing services

The electricity price for the purpose of electric power system balancing in 2016 was calculated according to the *Methodology for Establishing Prices for Providing Balancing Services*.

Currently, the sole balancing service provider is HEP-Proizvodnja d.o.o., which, upon the request of HOPS and within the provision of balancing services, activated the total amount of 257GWh in balancing energy for increases and 186GWh for decreases. Also, within the imbalance netting cooperation, 40GWh was exchanged for increases and 43GWh for decreases. In 2016, HOPS and the Slovenian and Austrian transmission system operators implemented imbalance netting cooperation, which increases the efficiency of the balancing mechanism.

HOPS's total costs for the balancing service in 2016 were HRK 59 million. This amount does not include the cost of the compensation of unintentional imbalances of the Croatian regulation area from the exchange programme with neighbouring regulation areas, which amounted to HRK 3 million, nor does it include the amount for the imbalance netting process, which is negligible.

Ancillary services

In 2016, with the prior approval of HERA, HOPS adopted the *Methodology for Establishing Prices for the Provision of Ancillary Services (HOPS, 7/2016)*. This methodology determines the method by which unit prices for ancillary services are calculated – specifically, for automatic secondary frequency restoration reserve, reserve capacity for tertiary regulation for balancing, reserve capacity for tertiary regulation for system security, compensation operation for the purpose of voltage and reactive power control, possibility of starting production units without external power supply, production units without external power supply, availability of generating units for insular operation, and delivered electricity in insular operation mode.

The *Methodology for Establishing Prices for the Provision of Ancillary Services (HOPS, 7/2016)* was applied for the first time in 2016, and pursuant to it, HOPS executed contracts with HEP-Proizvodnja d.o.o. for 2017.

The ancillary services used for electric power system balancing are automatic secondary frequency restoration reserve, reserve capacity for tertiary regulation for system balancing, and reserve capacity for tertiary regulation for system security.

The need for ancillary services in 2016 in terms of balancing for automatic secondary frequency restoration reserve were $\pm 56,83$ MW per hour on average. The need for reserve capacity for tertiary regulation for system balancing were ± 120 MW, and the need for tertiary regulation for system security was $+180$ MW per hour. HOPS determined the need for these services and agreed their provision with HEP-Proizvodnja d.o.o.

Ancillary services and balancing energy were paid for pursuant to unit prices and realised quantities. The total cost of providing ancillary services was HRK 341 million, of which 83% relates to reserve capacity for balancing.

In mid-2016, HOPS initiated a public consultation on the proposal of network codes of the transmission system operators, after which HERA and HOPS worked on the approval of HOPS's proposal, as defined by the approval procedure.

Observations on electric power system balancing

During 2016, HROTE prepared for the establishment of the EKO balance group and performed all activities within its formal competences and obligations in order to fulfil the preconditions for the efficient operations of this balance group when it is established. The achieved day-ahead forecast quality of HROTE wind power plants in 2016 was 5.5% of the installed capacity of wind power plants (an average of 23.24 MWh/h) with a maximum positive error of +130 MWh/h and negative error of -143 MWh/h. For solar power plants, day-ahead forecast quality was 3.2% of installed solar power plant capacity (1,52 MWh/h). For biogas, biomass, geothermal, and high-efficiency cogeneration power plants, forecasting was done according to historical operational data. Forecast improvements are expected when the ministry responsible for energy provides approval to HROTE for the *Rules for Managing the EKO Balance Group*, as after that, HROTE expects cooperation with the owners of these facilities. The exception is "Combined cogeneration block L of 100 MWe/80 MWt power in TETO Zagreb", which provides daily generation plans for day-ahead. HROTE expects that HOPS and HEP-ODS, after adopting the *Rules for Managing the EKO Balance Group*, will be obliged to provide the data required for the production planning of the members of the EKO balance group.

The establishment of the EKO balance group as stipulated by the **Renewable Energy Sources and High-efficiency Cogeneration Act** will have positive effects on the balancing mechanism, as its establishment will lead to minimising the imbalances of eligible producers under the incentives system, for which HROTE must report the agreed schedules, which will subsequently lead to a reduced need for reserve capacity demands and the increased possibility of integrating renewable energy sources and developing the intraday electricity market. A public consultation was conducted for 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 the *Ordinance on Renewable Energy Sources and High-Efficiency Cogeneration*, the *Electricity Selling Rules*, and the *Rules for Managing the EKO Balance Group*.

With regard to the above, it is necessary to establish the EKO balance group as soon as possible, as it is assumed it will have the largest imbalances. As of September 2016, everyone except the EKO balance group was included in the settlement of imbalances.

As problems with the calculation of hourly rates for those billing metering points without measurements of hourly load profiles also appeared during 2016, and because remaining load is also allocated on the basis of monthly readings, it is necessary to review the introduction of algorithms in the *Rules on the Application of Standard Load Profiles (HEP-ODS, 12/2016)*, according to which the *remaining load* would be allocated without the use of monthly readings. According to the *Rules on the Application of Standard Load Profiles* monthly meter readings are still used for allocation of the remaining load. However, it should be mentioned that none of the suppliers complained about the algorithms in these rules at the workshop which HEP-ODS held in 2016 as a part of public consultation.

For the planning of consumption and production, HEP-ODS and HOPS must establish an efficient mechanism by which to deliver historical data for billing metering points as soon as possible (e.g. day by day). This would reduce the imbalances and expenses of balance groups, reserve capacity demands would drop, and the ability to accept renewable energy sources would increase. In this regard, HERA began consultations in 2016 with all balance responsible parties, HEP-ODS, and HOPS.

After establishing models of balance groups as of September 2016 (inclusive), based on the monitoring of imbalances, HERA noticed that the majority of balance groups could work on reducing their imbalances, which should be eased by the *Methodology for Establishing Balancing Energy Prices*, as the amounts charged to balance groups reflect actual balancing costs. In this regard, concerning imbalances in the balance groups, January 2017 was particularly problematic as there were significant imbalances and high costs in the settlement of imbalances, which will motivate the balance groups to reduce imbalances in the future.

When the EKO balance group is established and when balance groups reduce their imbalances, due to standardised imbalances, HOPS will be able to better estimate the balance group imbalances based on stochastic laws, and thus also the reserve capacity demands and the ability to accept electricity from renewable energy sources.

From September 2016 until the end of the year, it was noticed that HEP-ODS is not able to initially reliably calculate the realisation of the balance groups on its network. One of the reasons is the poor fit-out of all the measuring points of HEP-Proizvodnja d.o.o. on the HEP-ODS network, and the other is the unreliability of monthly readouts of billing metering points that cannot measure hourly load profiles.

Except for the RHE Velebit pumped hydro unit, which is included in the mechanism of regulating voltage and reactive power and in the calculation, the other resources in the electric power system (e.g. the operation of power plants with changes of power factor and the operation of idling transformers) are not included by these mechanisms, and HOPS and HEP-ODS should work together in this regard.

The network codes for the transmission system should improve the technical framework to liberalise the ancillary services and balancing energy market by facilitating the participation of all network users who can offer their flexibility and ancillary services – therefore, they must be adopted as soon as possible.

HEP-ODS should prepare a proposal of distribution system network codes and initiate a public consultation, after which it should submit the proposal to HERA for approval, since these network codes are intended to regulate the issue of flexibility and ancillary services on the distribution network.

It can be seen that there is insufficient time between adoption of these bylaws and their entry into force, which denies the participants in the system ample time to adapt to new conditions; this must change in the future, as it is necessary to provide participants in the system ample time to adjust.

In the future, it is necessary to ensure that the costs of system balancing are allocated more to those participants who cause the imbalance, so they are better motivated to reduce such imbalances. It is necessary to clearly determine responsibility for each imbalance and roles in the system, and during changes in regulations, it is necessary to consider the manner in which the effects of their implementation will reflect on the balancing mechanism.

On 16 March 2017, the EU member states approved the Guideline on Electricity Balancing. This guideline, when adopted, entered into force, and implemented in practice, will result in the liberalisation of the reserve capacities and balancing energy market, the implementation of imbalance netting cooperation mechanisms between countries, the standardisation of the mechanism of determining the price of balancing and imbalance energy, and the standardisation of the manner in which balancing energy and reserve capacities are procured. It should be noted that HOPS has already implemented an imbalance netting mechanism at the border with Slovenia.

4.4 Retail electricity market

4.4.1 Basic features of electricity consumption

Sale of electricity in 2016

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

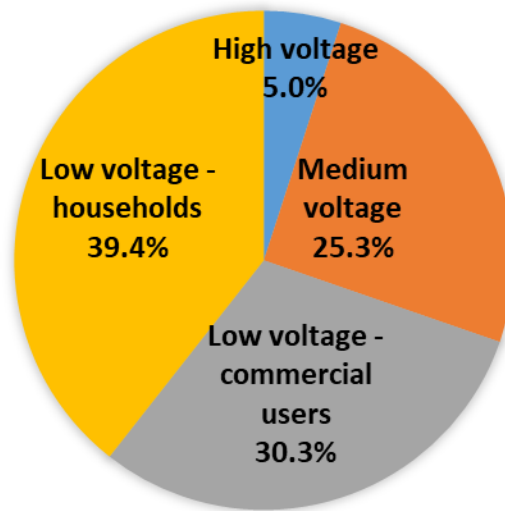
Table 4.4.1. Number of metering points and the sale, average sale, and share in the sale of electricity to end consumers by consumption category in the Republic of Croatia in 2016

Consumption category	Number of BMPs	Sale [MWh]	Sale per BMP [kWh]	Share in total sale (%)	Sale 2016/2015 [%]
High voltage - 110 kV ⁵	48	784,678	16,347,457	5.0	-7.2
Medium voltage	2,165	3,946,965	1,823,084	25.3	4.8
Total high and medium voltage	2,213	4,731,643		30.4	2.6
Low voltage - commercial users (blue)	44,731	235,508	5,265	1.5	-0.9
Low voltage - commercial users (white)	127,805	1,242,898	9,725	8.0	-4.3
Low voltage - commercial users (red)	21,182	2,805,788	132,459	18.0	3.5
Low voltage - street lights (yellow)	21,650	426,208	19,686	2.7	0.4
Total low voltage - commercial consumers	215,368	4,710,402		30.3	0.8
Low voltage - households (blue)	732,687	1,490,042	2,034	9.6	-1.9
Low voltage - households (white)	1,433,833	4,622,585	3,224	29.7	-1.1
Low voltage - households (black)	3,012	7,307	2,426	0.05	-0.8
Low voltage - households (red)	293	8,108	27,660	0.05	
Total low voltage - households	2,169,826	6,128,043	2,824	39.4	-1.2
Total low voltage	2,385,194	10,838,445		69.6	-0.3
Overall total	2,387,407	15,570,088		100.0	0.5

Source: HEP-ODS, HOPS

⁵ There are 13 end customers connected to high voltage, from the industrial sector and traffic (Croatian railways electro-traction) and 35 power plants which are in this case end customers (own consumption).

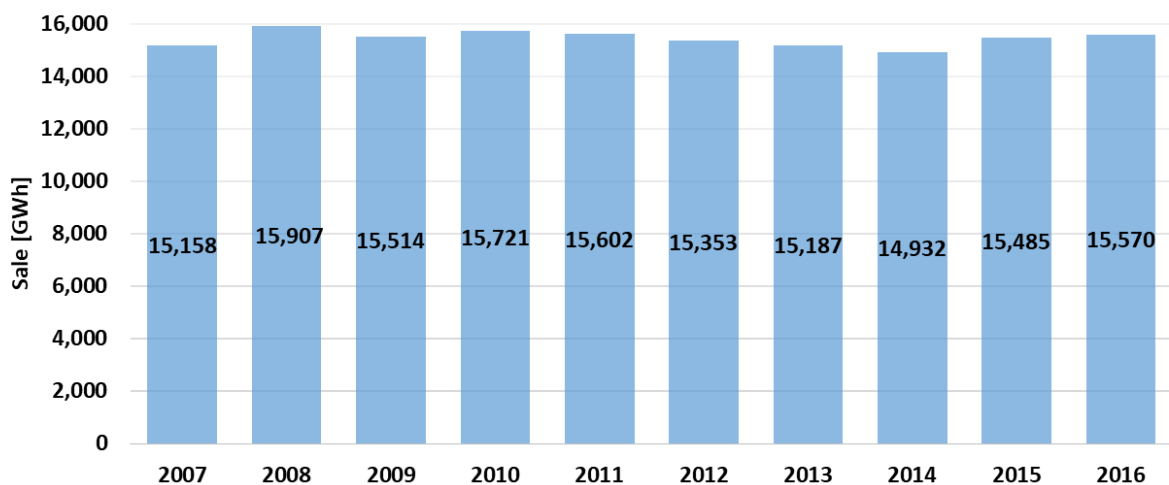
Figure 4.4.1. shows the structure of electricity sales by end consumer category.



Source: HEP-ODS

Figure 4.4.1. Share of individual end consumer categories in total electricity sales in the Republic of Croatia in 2016

Figure 4.4.2. shows sales of electricity to end consumers from 2007 to 2016



Source: HEP-ODS, HOPS

Figure 4.4.2. Sales of electricity to end consumers in the period from 2007 to 2016

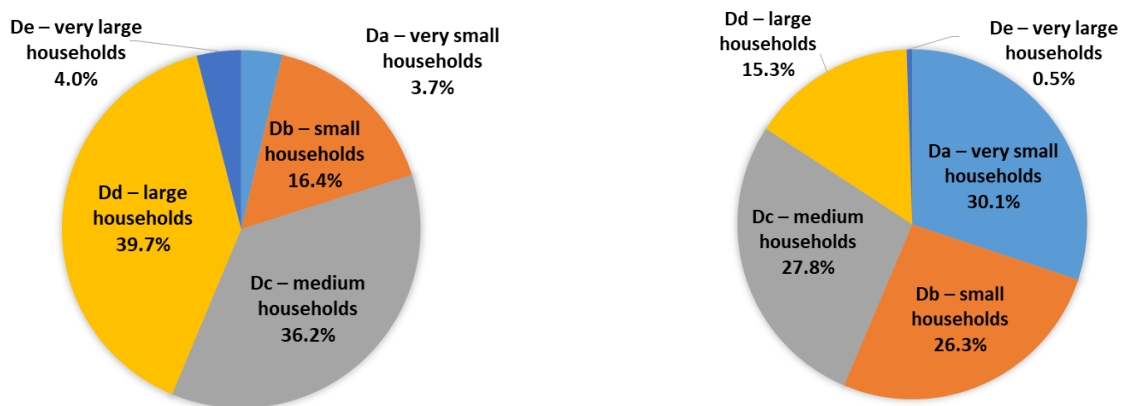
Distribution by EUROSTAT consumption categories

Since 2007, European statistical organisation EUROSTAT has used the monitoring of average electricity prices defined by consumption category for "household" and non-household (commercial consumers) end consumer categories.

Table 4.4.2. and Figure 4.4.3. show the distribution of consumption and billing metering points of end consumers from the "household" category by EUROSTAT consumption category.

Consumption category	Lowest consumption [kWh/yr]	Highest consumption [kWh/yr]	Consumption [%]	Number [%]
Da – very small households	1	< 1,000	3.7	30.1
Db – small households	1,000	< 2,500	16.4	26.3
Dc – medium households	2,500	< 5,000	36.2	27.8
Dd – large households	5,000	< 15,000	39.7	15.3
De – very large households	≥ 15,000		4.0	0.5

Source: EUROSTAT and HEP-ODS



Consumption distribution

Distribution of number of billing metering points

Source: HEP-ODS

Figure 4.4.3. Distribution of consumption and distribution of billing metering points for end consumers from the household category by EUROSTAT consumption category in 2016

The largest share of electricity sold belongs to the Dd (large households) and Dc (medium households) categories, and the largest share in the number of billing metering points belongs to the Dc (medium households) and Da (very small households) categories. Table 4.4.3. shows the categories of electricity consumption and indicative peak loads for consumers in the commercial category according to EUROSTAT, and Table 4.4.4. shows the distribution of consumption and billing metering points of end users in the commercial category on low, medium, and high voltage by EUROSTAT consumption category.

Table 4.4.3. Categories of electricity consumption and indicative peak loads for consumers in the commercial category according to EUROSTAT

Consumption category	lowest consumption [MWh/yr]	Highest consumption [MWh/yr]	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 4.4.4. Distribution of consumption and distribution of billing metering points for end consumers from the commercial category on low, medium, and high voltage in the Republic of Croatia by EUROSTAT consumption category in 2016

Consumption category	Commercial consumers on low voltage		Commercial consumers on medium voltage		Commercial consumers on high voltage		Total commercial consumers	
	Consumption [%]	Number [%]	Consumption [%]	Consumers [%]	Consumption [%]	Consumers [%]	Consumption [%]	Consumers [%]
Ia	9.1	78.5	0.0	0.0	0.0	0.0	9.1	78.5
Ib	28.9	20.0	0.2	0.2	0.0	0.0	29.1	20.2
Ic	9.9	0.5	1.6	0.2	0.1	0.0	11.6	0.7
Id	2.0	0.0	19.0	0.5	0.6	0.0	21.6	0.5
Ie	0.0	0.0	17.1	0.1	2.1	0.0	19.2	0.1
If	0.0	0.0	3.9	0.0	5.4	0.0	9.3	0.0
> 150,000 MWh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All categories	49.9	99.0	41.8	1.0	8.3	0.0	100.0	100.0

Source: HEP-ODS and HOPS

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

In the category of end consumers using medium voltage, the most electricity was sold in the Id consumption category, which also includes the largest number of end consumers (in terms of metering points). In the category of end consumers using high voltage, the most electricity was sold in the If category.

Observations on the main characteristics of electricity sales in 2016

Electricity sales in 2016 were 0.5% higher as compared to 2015. The increase in total consumption was caused by an increase in consumption from clients in the commercial category, specifically on medium voltage and low voltage (red model). High voltage consumers saw a significant decrease in consumption, and a moderate reduction was also recorded for consumers in the household category.

The share in total electricity sold for end consumers in the household category was 39.4%, while the share of electricity sold to end consumers in commercial category was 60.6%. This caused a minor increase in the share of electricity sales to end consumers in the commercial category as compared to 2015.

Figure 4.4.2. leads to the conclusion that the past ten-year period has seen a very moderate increase in electricity sales to end consumers. Data on electricity sales during this ten-year period were compared to predicted electricity sales in the sustainable development scenario from the Energy Development Strategy of the Republic of Croatia (October 2009). This document predicted an average annual increase in electricity sales from 2006 to 2020 at an annual rate of 3.7%. Had said prediction come true, electricity sales in 2016 would have been 21,655GWh, i.e. it would have been 39% more than actual sales.

4.4.2 Development of the retail electricity market

Market electricity supply and public electricity supply service

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

The electricity supply of consumers in the household category may be provided as market supply or as supply as part of the universal service, which is a public electricity supply

service supplying electricity of regulated quality across the entire territory Croatia under realistic, clearly comparable, and transparent prices.

End consumers in the household category who do not choose a supplier on the electricity market shall be supplied by the supplier as a part of the universal service. Also, if a consumer from the household category is left without a supplier for any reason whatsoever, this consumer will automatically be transferred to supply as a part of the universal service. If so desired, consumers from the household category supplied by a market supplier may return to supply as a part of the universal service at any time.

Supply for consumers from the household category is offered by suppliers who satisfy the requirements for electricity market operations, while the supply as a part of the universal service was provided by HEP-ODS as a public service in 2016.

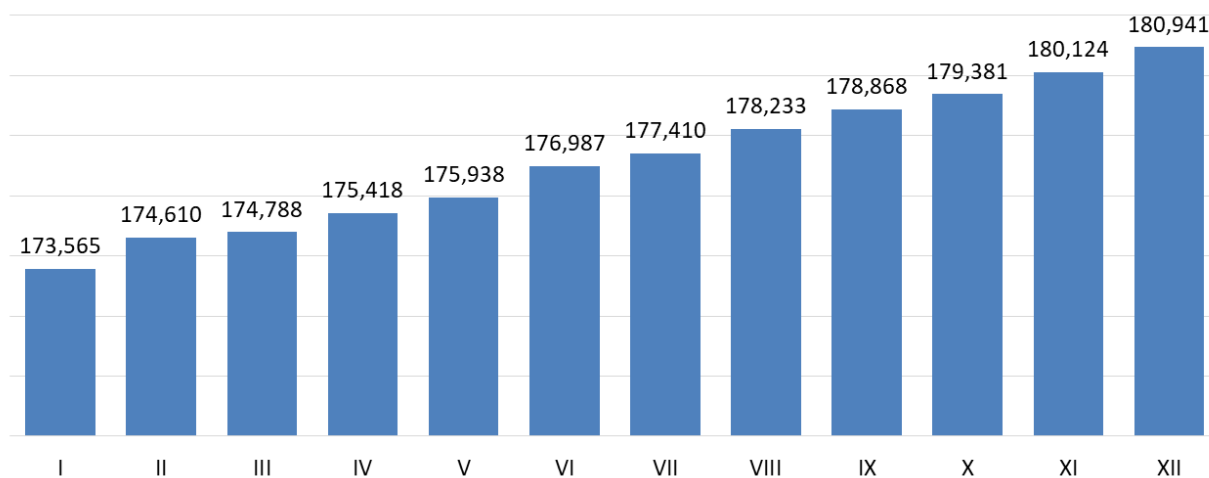
Commercial consumers should select a market supplier, otherwise they will be provided by a guaranteed supplier whose prices are higher than average market prices in order to stimulate consumers to select another market supplier. The public service of guaranteed supply was also provided by HEP-ODS in 2016.

Amendments to the **Electricity Market Act** introduced significant changes in the retail electricity market. One of the more important changes is that, as of 1 January 2016, the price of electricity under the universal service is no longer regulated, which is in line with European Commission recommendations and practice in most European Union member states. Furthermore, at the end of 2016, HEP-ODS unbundled electricity supply provided as a public service through the status change of a division of the company through demerger. As of 1 January 2017, electricity supply performed as a public service is provided by HEP-Elektra d.o.o. Also as of 1 January 2017, each supplier with billing metering points connected to the low voltage network began sending single invoices for electricity and network use.

The retail market in 2016

In December 2016, the share in electricity of households being supplied outside the universal service, i.e. on the market, was about 11%, while the share of commercial consumers supplied on the market was about 95% (Figure 4.4.5.). The share of HEP Group (HEP-Opkrba d.o.o. and HEP-ODS) in the supply of all consumers was 84% in December 2016.

Figure 4.4.4. shows the number of billing metering points for end consumers from the household category who were supplied outside the universal service in 2016.



Source: HEP-ODS and HOPS

Figure 4.4.4. Number of billing metering points for the end consumers from the household category outside the universal service in 2016

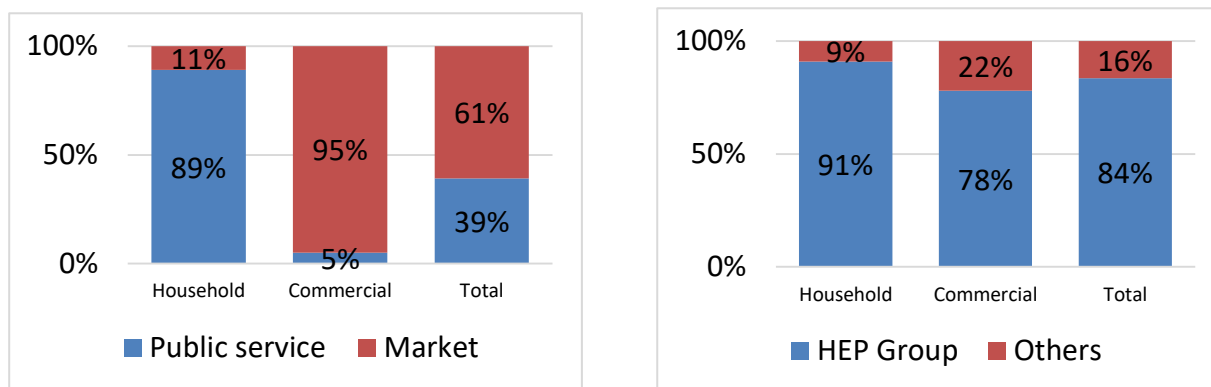


Figure 4.4.5. Supply shares according to energy in December 2016

At-risk consumers

The Croatian government adopted the *Regulation on Criteria for Acquiring the Status of an Endangered Purchaser of Electricity from Networked Systems* ("Official Gazette", No. 95/15), which entered into force on 1 October 2015. The government adopted this regulation in regular procedure, pursuant to Art. 30, Par. 3 of the **Act on the Government of the Republic of Croatia**. Said regulation has not been changed since: it is in force, and based on this regulation, suppliers must charge household category consumers an additional solidarity fee in the amount of HRK 0.03/kWh. The funds collected from the solidarity fee shall be remitted once a month by the supplier to the state budget, and shall be recorded as fixed-purpose funds of the ministry responsible for social care.

Observations on the development of the retail market in 2016

Taking into account the CEER Guidelines "Position Paper on Well-Functioning Retail Energy Market", Brussels, Ref C15-SC-36-03, of 14 October 2015, on a well-functioning retail electricity market involving a high degree of market competition and innovations for the benefit of network consumers, it can be concluded that the retail market in Croatia is developing well and that the number of suppliers with licenses for electricity supply and those who are actively participating in the retail market is increasing. The number of innovative products, the number of consumers with own generation, and the number of consumers who changed suppliers is increasing.

The share of sales of electricity to households outside the universal service has grown slightly compared to 2015 (from 10% to 11%), while the share of electricity sales of suppliers outside HEP d.d. remained at 2015 levels (16%).

As regards the concentration of the retail electricity market expressed in electricity sold, in December 2016, three suppliers had a total market share of 97.5% of end consumer supply in the household category, while three suppliers had a total market share of 84.7% in the supply of commercial end consumers. From the above, it follows that the concentration of supply in the retail market to household end consumers increased slightly compared to 2015 (97% in 2015), while it slightly decreased for supply to commercial end consumers (86% in 2015).

Two new suppliers appeared on the retail market in 2016. During the year, these two suppliers merged. Thus, there were 12 active suppliers besides HEP-ODS on the retail market at the end of 2016, of which 8 supplied end consumers in the household category.

In 2016, all electricity suppliers were obliged to buy the total generated electricity under the incentives system, proportional to their share in total energy delivered to end consumers, at the regulated price of HRK 0.42/kWh. The annual average price of electricity on the Hungarian and Slovenian electricity exchanges in 2016 was HRK 0.26/kWh. This obvious difference is a cost for electricity suppliers, which they transfer indirectly to their customers through the price of electricity. The **Renewable Energy**

Sources and High-Efficiency Cogeneration Act stipulates that the regulated obligatory purchase should have been repealed after 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 the Renewable Energy Sources and High-Efficiency Cogeneration Act** extended the obligation for suppliers to purchase electricity from the incentives system until 31 December 2017. Said regulation will lead to increased supplier costs in purchasing electricity and will affect their income, subsequently causing an increase in the price of electricity for end consumers.

As of the end of 2015, a new interface for the implementation of the process of supplier change is in place, in accordance with the *Rules on Changing Electricity Supplier* ("Official Gazette", Nos. 56/15 and 33/17). The number of supplier changes is monitored at the level of the customer billing metering point.

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 implemented supplier switches in 2016 was 85,915, which yields a switching rate of 3.57%. Of said switches, 33,817 were in the commercial category and 52,098 were in the household category.

4.4.3 Electricity prices for end consumers

Electricity prices in Croatia in 2016

The average total selling prices for end consumers⁶ by tariff category and voltage level from 2011 to 2016 are shown in Table 4.4.5. The prices are determined based on the amounts of tariff items from the tariff systems for regulated energy activities from 2011 to 2016 and pursuant to supplier data (for the first half of 2016). Table 4.4.6. shows average electricity prices (without the fee for network usage, other fees, and taxes) for end consumers on the electricity market (commercial consumers) and for end consumers within the universal supply (households) from 2011 to 2016.

Table 4.4.5. Average total selling prices of electricity for end consumers from 2010 to 2016 [HRK/kWh]

End consumer category	2011	2012	2013	2014	2015	2016
Consumers on medium voltage	0.58	0.61	0.60	0.58	0.57	0.55
Consumers on low voltage – commercial	0.73	0.79	0.78	0.75	0.74	0.73
Consumers on low voltage – households	0.70	0.78	0.82	0.79	0.79	0.78
Consumers on low voltage	0.72	0.79	0.80	0.78	0.77	0.76

Source: HEP-ODS, market suppliers

Table 4.4.6. Average prices of electricity for end consumers on the market (outside public service) and within the universal service (households) in the period from 2011 to 2016 [HRK/kWh]

Type of supply	2011	2012	2013	2014	2015	2016
Market (high and medium voltage)	0.37	0.37	0.37	0.36	0.34	0.33
Market (low voltage, commercial consumers)	0.41	0.42	0.42	0.40	0.38	0.37
Universal service (households)	0.42	0.47	0.49	0.46	0.45	0.45

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

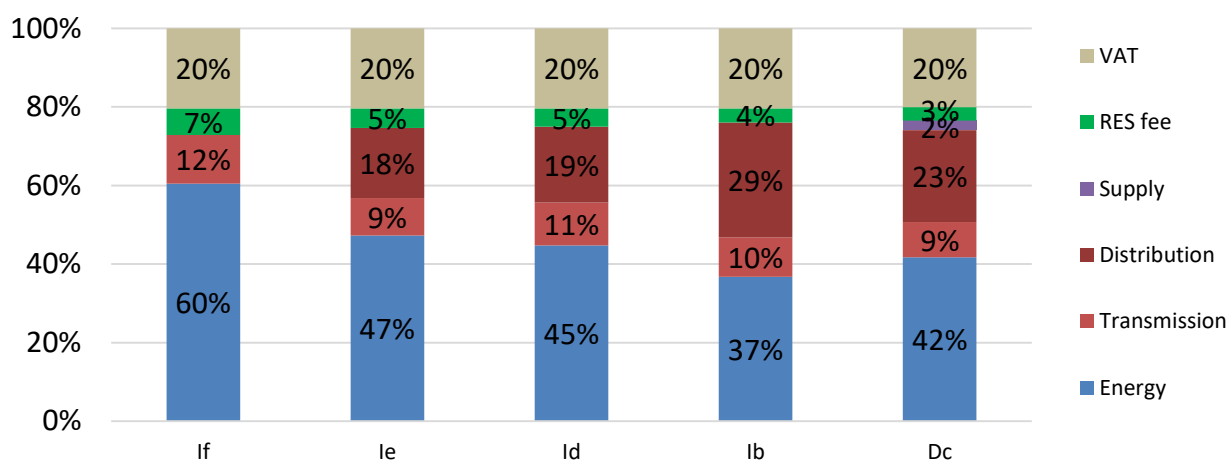
Table 4.4.7. shows the characteristics of typical end consumers in Croatia by EUROSTAT consumption category in 2016, while Figure 4.4.6. shows the structure of the total

⁶ Total selling price includes fee for using the transmission and distribution networks and the price of energy.

electricity price for end consumers, including all fees and taxes, by EUROSTAT consumption category.

Table 4.4.7. Characteristics of typical electricity end consumers in the Republic of Croatia in 2016

Type of end consumer	Consumption category label	Consumption [MWh/yr.]	Peak load [MW]	Consumption ratio day/night	Category by tariff system
Very large industry	If	100,000	15.00	60/40	Commercial consumers - high voltage (VN)
Large industry	Ie	24,000	4.00	60/40	Commercial consumers - medium voltage - SN (35 kV)
Medium industry	Id	2,000	0.50	65/35	Commercial consumers - medium voltage - SN (10 kV)
Medium commercial consumers	Ib	150	0.05	70/30	Commercial consumers - low voltage - NN (red)
Medium households	Dc	3.5		70/30	Households (white)

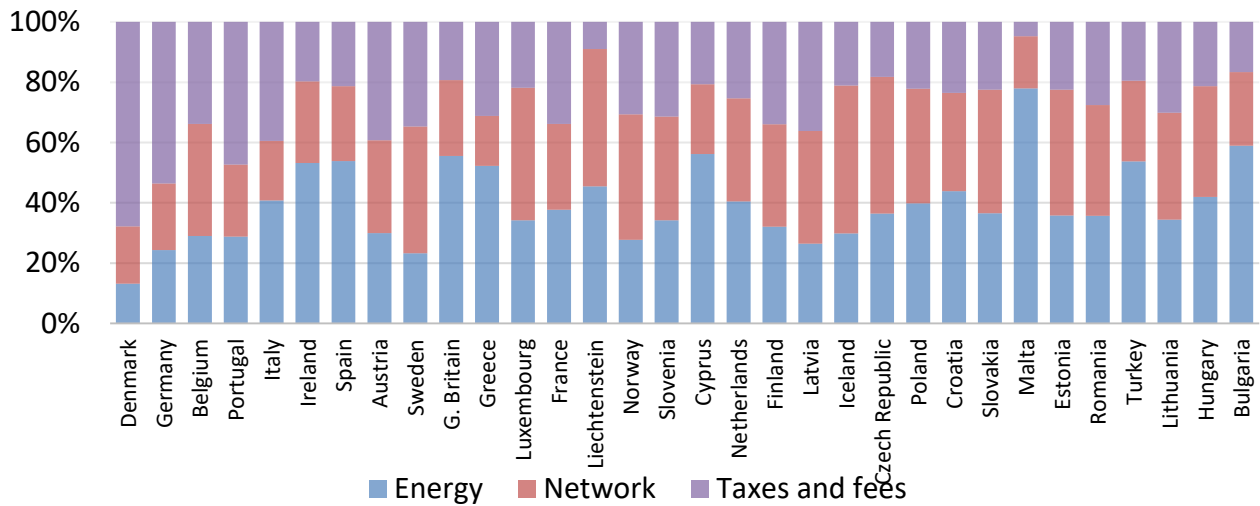


Source: HEP-ODS, suppliers on the market

Figure 4.4.6. Structure of the total electricity price for end consumers in the Republic of Croatia by EUROSTAT consumption categories in 2016

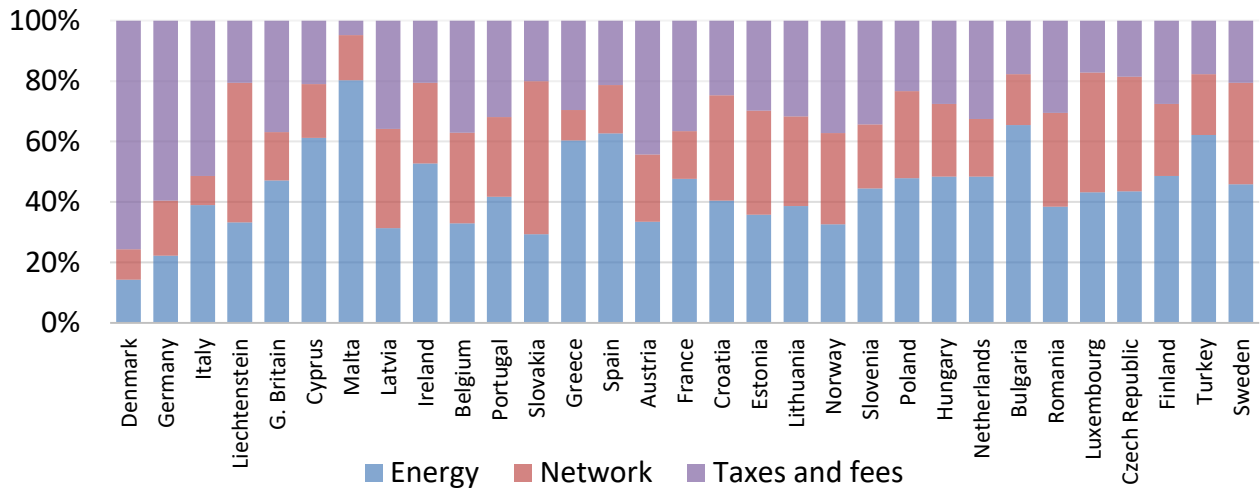
Electricity prices in European countries in 2016

Figures 4.4.7. and 4.4.8. show the structure of total electricity prices for end consumers from categories Dc and Ic for the second half of 2016 in EU member states and several other countries for which EUROSTAT records data.



Source: EUROSTAT

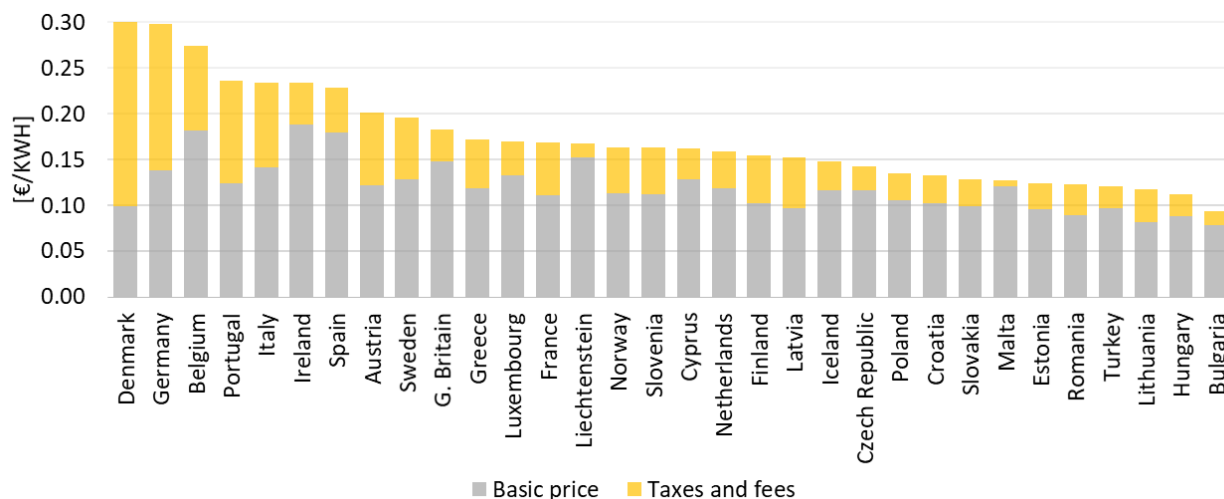
Figure 4.4.7. Structure of total electricity prices in EU member states for household consumers from the Dc consumption category in the second half of 2016



Source: EUROSTAT

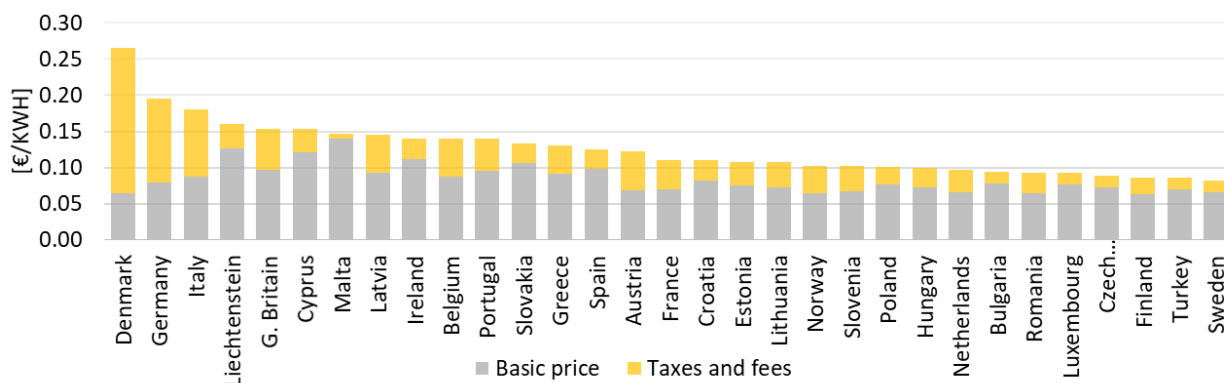
Figure 4.4.8. Structure of total electricity prices in EU member states for commercial consumers from the Ic consumption category in the second half of 2016

Figures 4.4.9. and 4.4.10. show total prices of electricity for categories Dc and Ic in EU member states, Norway, Iceland, and Turkey in the second half of 2016



Source: EUROSTAT

Figure 4.4.9. Total electricity prices for household consumers from the Dc consumption category, including fees and taxes, in the second half of 2016



Source: EUROSTAT

Figure 4.4.10. Total electricity prices for commercial consumers from the Ic consumption category, including fees and taxes, in the second half of 2016

Observations on electricity prices for end consumers in 2016

The Croatian electricity market saw a further slight decrease in electricity prices in 2016 as compared to 2015, which was caused by the positive influence of market competition in electricity supply and lower wholesale prices in 2016. In this regard, it should be noted that electricity prices in Croatia are fully deregulated – this includes the price of electricity under the universal service to which consumers in the household category are entitled, with the exception of guaranteed supply.

For end consumers in Croatia from the EUROSTAT Dc category (medium households), the share of electricity with supply costs amounts to 44% of the total price of electricity, while the rest is derived from fees for the use of the transmission and distribution network, the supply fee, the fee for the incentive for generating electricity from renewable sources and cogeneration (OIE), and value added tax (VAT).

According to EUROSTAT statistics, the average share of taxes and fees in the total price of electricity in 2016 for household consumers from the Dc consumption category was 28% in Europe as opposed to 24% in Croatia, the average share of electricity with supply costs

was 40% in Europe as compared to 44% in Croatia, and the average fee for network use was 32% in Europe, which is the same as in Croatia.

The incentive fee for generating electricity from renewable sources is expected to increase in 2017, which will affect the total price of electricity. If the decrease of VAT for electricity to 13% is also taken into account, the share of taxes and fees in the total price of electricity will also change.

In order to facilitate the choice of supplier for electricity end consumers, HERA has prepared a new version of its tariff calculator, which shows parallel tariff models and the 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, prices for informational purposes, and additional information on the calculation of prices, price structure, and other data and information. The calculation is purely for informational purposes and does not include any possible additional discounts. The new version was made available at the beginning of 2017.

A common product which would include both electricity and natural gas supply is currently not offered in the Republic of Croatia.

In 2017, HERA will complete a study of the function of the electricity market, which will also provide data on variation in electricity prices.

4.4.4 Quality of the electricity supply

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

From 25 July to 23 September 2016, HERA conducted a public consultation on the proposal of the Conditions for the Quality of Electricity Supply. The comments received during the public consultation also included the request that certain formulations and deadlines referring to the issuance of documents in the connection procedure should be harmonised with the regulation on connection, which should have been adopted by the relevant ministry. The relevant ministry's failure to adopt the regulation on connection directly affected a delay in the adoption of the Conditions for the Quality of Electricity Supply.

The Conditions for the Quality of Electricity Supply, as a fundamental document in the area of electricity supply quality, were adopted pursuant to Article 60, Par. 2. of the **Electricity Market Act** in March 2017.

A group of regulations, including the network code for the transmission system, the network code for the distribution system, the ordinance on connection to transmission systems, and the ordinance on connection to distribution systems, provides technical regulations and parameters governing the facilities to be connected to the electric power network in order to secure the safe operation and optimal function of the system. As HOPS and HEP-ODS have not yet adopted said regulations under their jurisdiction at the time this this annual report was written, they should hasten their adoption in order to secure better and more functional system operation .

Continuity of supply in 2016

Continuity of supply is measured by the number and duration of supply interruptions. The quality of continuity of supply rises alongside a decrease in the number of supply interruptions and the duration of supply interruptions. Supply interruption is 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 has been announced in the manner and within the time frame defined in *General Terms and Conditions for Using The*

Network 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 the estimated undelivered electricity due to supply interruptions, Table 4.4.8.

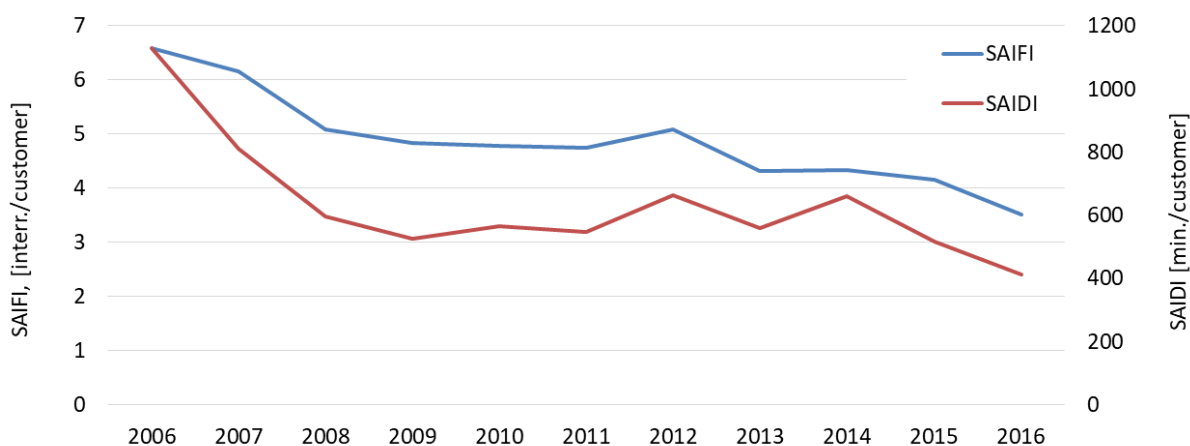
Table 4.4.8. Supply interruptions in the HOPS network from 2008 to 2016

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

Source: HOPS

The indicators of continuity of supply, which are systematically monitored in the distribution network, indicate the average annual number of interruptions per consumer (System Average Interruption Frequency Index - SAIFI) and the average total annual duration of interruptions per consumer (System Average Interruption Duration Index - SAIDI).

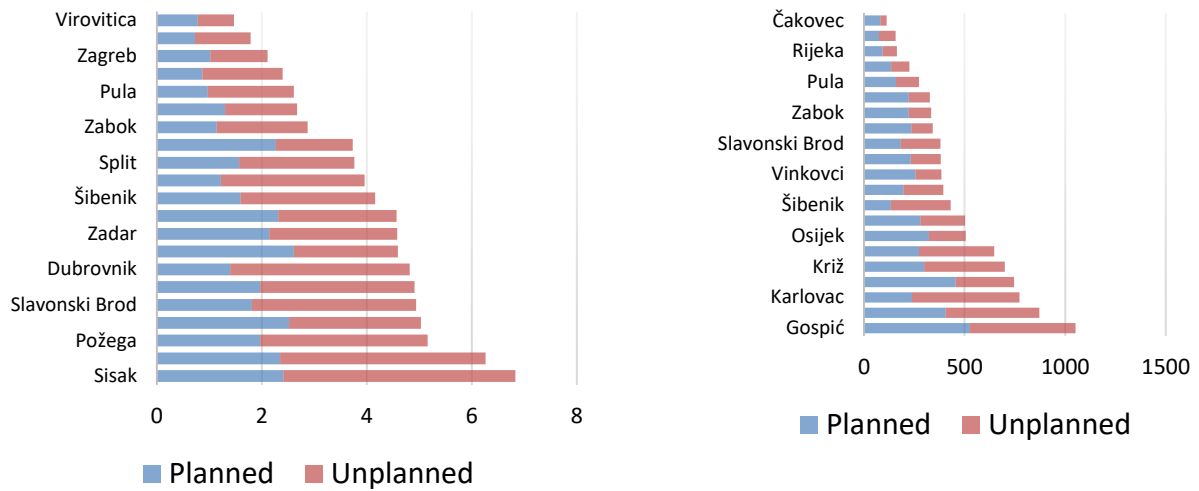
In 2016, SAIFI was 3.5 supply interruptions per consumer in the HEP-ODS network, of which 43% were planned interruptions. SAIDI was 412 minutes per consumer, of which 54% were planned interruptions. SAIFI and SAIDI indicators show that the continuity of supply in HEP-ODS's network has improved over the years (Figure 4.4.11.).



Source: HEP-ODS

Figure 4.4.11. Indicators of the continuity of supply in HEP-ODS's network from 2006 to 2016

As far as distribution areas are considered, DP Elektra Virovitica attained the best SAIFI and SAIDI indicators in 2016, while the worst indicators were attained by DP Elektra Sisak and DP Elektrolika Gospić, as shown in Figure 4.4.12., as these are distribution areas with extreme weather conditions and specific network characteristics (long overhead lines).



Average annual number of interruptions per consumer – SAIFI

Average annual duration of interruptions per consumer in minutes - SAIDI

Source: HEP-ODS

Figure 4.4.12. Indicators of the continuity of supply in HEP-ODS's network by distribution area in 2016

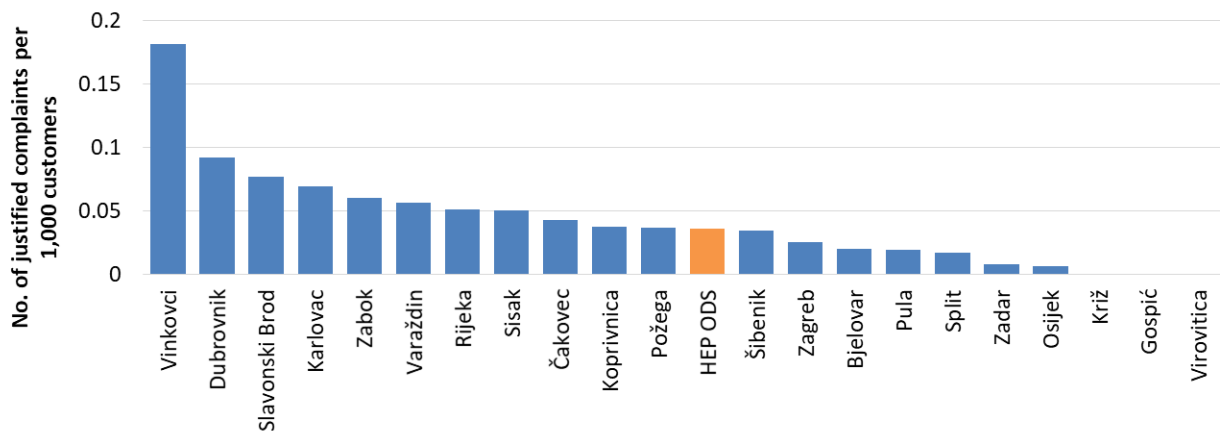
Voltage quality in 2016

According to the *General Terms and Conditions for Using the Network and Electricity Supply*, voltage quality is defined as the compliance of measured voltage at an electricity reception and/or delivery point with values listed in the Croatian HRN 50160 standard.

A network user may submit a written request once a year to the transmission operator or distribution system operator, depending on whose network the user is connected to, for a report on voltage quality at an electricity reception and/or delivery point.

The transmission system operator or the distribution system operator must perform measurements and prepare and deliver a report on voltage quality at an electricity reception and/or delivery point to the network user within 30 days.

A total of 244 complaints concerning the voltage quality in the distribution network were received, of which 86 were justified and resolved in favour of the complainant. Figure 4.4.13. shows the number of justified complaints concerning voltage quality per 1,000 consumers in the HEP-ODS distribution network by distribution area in 2016.



Source: HEP-ODS

Figure 4.4.13. Number of justified complaints concerning voltage quality per 1,000 consumers in the HEP-ODS distribution network by distribution area in 2016

Quality of service in 2016

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

Table 4.4.9. shows statistics on issued prior electric power approvals (PEPA) and electric power approvals (EPA) to end consumers in HEP-ODS's network in 2016, while Table 4.4.10. shows the statistics of PEPAs and EPAs issued to producers in HEP-ODS's network in 2016.

Table 4.4.9. Issued PEPAs and EPAs to end consumers connected to HEP-ODS's network in 2016

Consumer category	PEPA		Number of issued EPAs			
	No. of issued	Days of issuing	Total	New consumers	Construction site connection	Temporary connection
SN ⁷	221	20	142	62	0	1
NN ⁸ – households	7,052	15	6,901	3,635	1,092	547
NN – households	19,305	19	37,646	29,941	412	1
NN – public lighting	375	13	429	292		
TOTAL	26,953		45,118	33,930	1,504	549

Source: HEP-ODS

The time required to issue PEPAs to end consumers in HEP-ODS's network is the longest for the consumers in the commercial consumer category on medium voltage: on average, it is 20 days.

Table 4.4.10. PEPAs and EPAs issued to producers and end consumers with own production in HEP-ODS's network in 2016

Voltage level	PEPA		EPA
	No. issued	Days to issue	No. issued
SN	49	18	92
NN	349	28	36
TOTAL	556		128

Source: HEP-ODS

The time required to issue PEPAs to producers and end consumers with own production in HEP-ODS's network is the longest for producers and consumers with own production on low voltage: on average, it is 28 days.

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

Observations on the quality of electricity supply in 2016

In 2016, estimated undelivered electricity in the transmission network was reduced as compared to 2015, but a significant increase in the number and duration of supply interruptions was recorded.

The distribution network saw an improvement in SAIDI indicators as compared to 2015.

⁷ Medium voltage – connection to 10, 20 and 35(30) kV network.

⁸ Low voltage – connection to 0.4 kV network.

The worst continuity of supply indicators for HEP-ODS were recorded at DP Elektrolika Gospić, where SAIDI is two and a half times higher than the HEP-ODS average. The considerably poor continuity of supply indicators at DP Elektrolika Gospić were greatly influenced by harsh weather conditions.

During the first quarter of 2016, the areas of Elektra Zagreb, Elektra Bjelovar, Elektra Križ, Elektra Karlovac, Elektra Sisak, and Elektrolika Gospić were affected by harsh winter conditions, which caused an increased number of unplanned delivery interruptions.

There were no major disruptions in the delivery of electricity.

During the third quarter, there were multiple preventative transmission line disconnections due to fires on the island of Brač, in Trogir, and in Bilice. There were also some long-term supply interruptions due to storms in the areas of Slunj, Našice, Ozalj, Lipik, Obrovac, Požega, Zadar, and Poreč.

Significant supply interruptions occurred in the area of Lovran and the greater Požega area during the fourth quarter due to storms.

The largest number of justified complaints regarding voltage quality was recorded at DP Elektra Vinkovci (15 justified complaints per 82,525 end consumers), which is also the largest number of justified complaints in terms of the ratio per number of end consumers.

During 2016, there was a significant decrease in the number of issued PEPAs and EPAs to producers and end consumers with own production in HEP-ODS's network as compared to 2015, which is largely due to the quota for the solar power plant incentive being met.

In 2015, HERA participated in the preparation of CEER's document entitled "6th Benchmarking Report on the Quality of Electricity and Gas Supply" (hereinafter: Quality Report) which was published in September 2016, and which included all three aspects of quality of electricity supply.

The statistics for Croatia, as a new member of the European Union, were included in the main part of the Quality Report for the first time. The previous Quality report was published in 2011, when Croatia was a contractual party to the Energy Community.

The comparison with 2014 in the Quality Report shows that Croatia is among those countries with the largest number of recorded minutes of undelivered electricity per consumer, both as planned and unplanned interruptions.

4.4.5 Protection of end consumers

Petitions in the electricity sector in 2016

Table 4.4.11. shows the classification of cases in the electricity sector received in 2016, and Table 4.4.12. shows statistics for the 254 complaints received in the electricity sector. As regards the protection of end consumers in 2016, HERA received 254 complaints and 215 other petitions – questions and requests for opinions and the interpretation of regulations.

Table 4.4.11. Classification of petitions in the electricity sector received by HERA in 2016

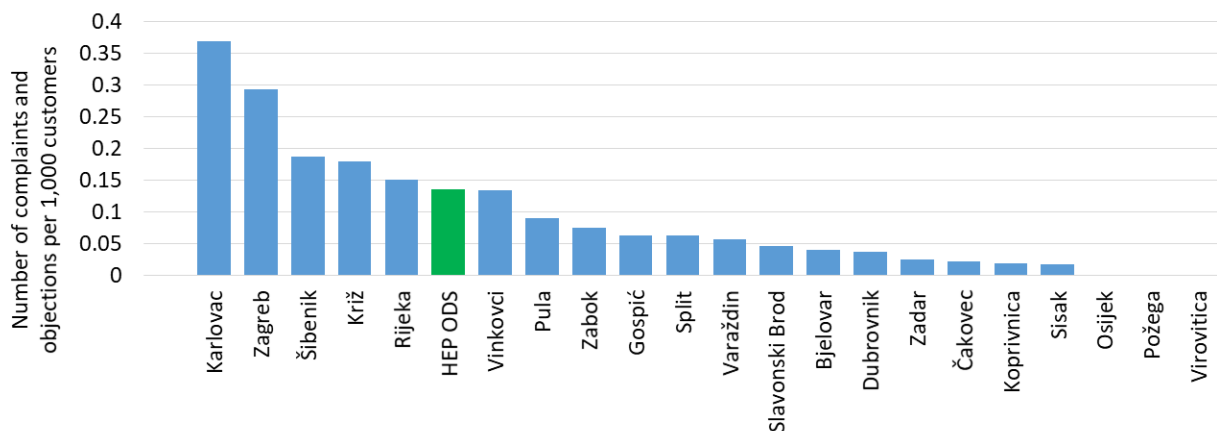
Description	Number	Share [%]
Complaints and objections	254	40%
Request for HERA's approval	36	6%
Request for opinion/interpretation/instruction from HERA	215	34%
HERA decisions	8	1%
HERA new licenses and extensions	29	5%
HERA decisions and preliminary decisions	93	15%
TOTAL	635	100%

Table 4.4.12. Statistics of complaints and objections in the electricity sector received by HERA in 2016

No.	Description	Number	Share [%]
1.	Objections related to the calculation and use of electricity		16%
1.1.	Objections regarding the calculation of electricity consumption	40	
1.2.	Objections to the calculation of balancing energy	1	
1.3.	Objections regarding the unauthorised use of electricity	0	
2.	Complaints regarding electricity supply quality		2%
2.1.	Objections regarding continuity of supply	1	
2.2.	Objections regarding voltage quality	3	
2.3.	Objections regarding service quality	2	
3.	Complaints concerning connection		19%
3.1.	Complaints regarding rejected requests for the issuance of PEPA in the process for issuing a site permit	0	
3.2.	Complaint regarding rejected request for the issuance of a PEPA	23	
3.3.	Complaint regarding the conditions in an issued PEPA	7	
3.4.	Complaint regarding rejected request for the issuance of an EPA	1	
3.5.	Complaint regarding conditions in an issued EPA	0	
3.6.	Complaint regarding the fee for the connection contract	7	
3.7.	Complaint regarding the failure to fulfil the provisions of the contract on network connection - failure to connect	0	
3.8.	Complaints regarding network access - other reasons	0	
4.	Objections and complaints related to disconnection		4%
4.1.	Complaints regarding disconnection from the electric power network	0	
4.2.	Objections regarding suspension of electricity supply	9	
5.	Complaint regarding supplier operations	70	28%
6.	Complaint regarding the system operator operations	55	22%
7.	Other	33	10%
	TOTAL	254	100%

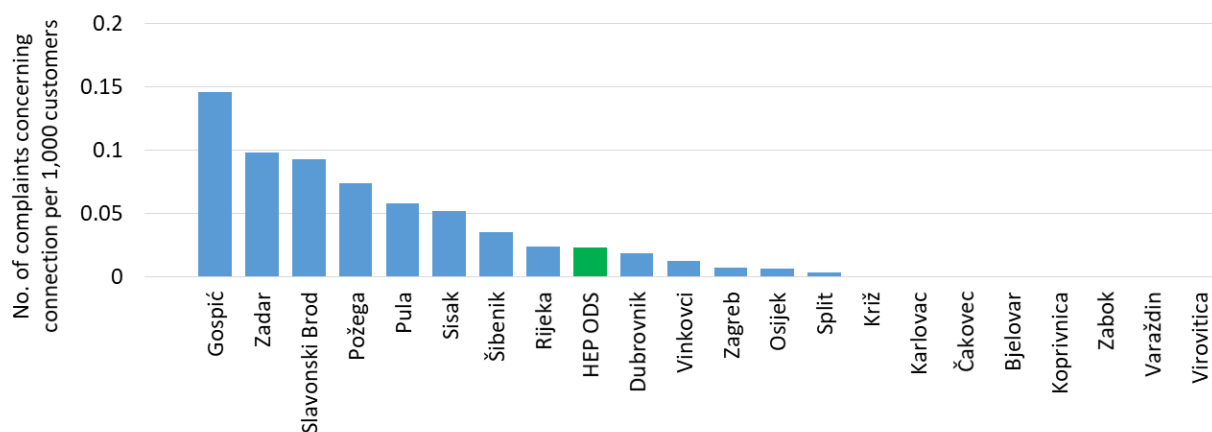
The majority of the appeals and complaints HERA received in 2016 refer to the operations of electricity suppliers (collection of administrative fees), connections to the electric power network (refusal to issue PEPA), and the work of the operators (loss of consumer status).

Regarding the work of the HEP-ODS Complaints Committee, Figure 4.4.14. shows the number of complaints and appeals per 1,000 consumers per distribution area, while Figure 4.4.15. shows the number of complaints regarding connection per 1,000 consumers per distribution area of HEP-ODS in 2016.



Source: HEP-ODS

Figure 4.4.14. Number of complaints and appeals per 1.000 consumers per distribution area of HEP-ODS in 2016



Source: HEP-ODS

Figure 4.4.15. Number of complaints concerning connection per 1,000 consumers per distribution area of HEP-ODS in 2016

Complaints regarding the operations of suppliers and misleading business practices

In 2016, HERA received a large number of complaints regarding the operations of suppliers, of which the majority were related to suppliers' misleading business practices, in particular of 220V d.o.o. and RWE ENERGIJA d.o.o. There was also a large number of complaints regarding supplier 220V d.o.o. for charging administrative fees for termination.

HERA forwarded the received consumers' complaints concerning the suppliers, after which the suppliers usually terminated the appropriate contracts. In its opinions for consumers, HERA pointed out the right to terminate a contract within 14 days of its execution in accordance with the **Consumer Protection Act**. If the consumers suspected misleading business practices, HERA instructed them to contact the authorities with jurisdiction in such matters.

In 2016, in connection with the application of the *General Terms and Conditions for Using the Network and Electricity Supply*, suppliers who supply end consumers in the household category were supervised. Within this supervision, each supplier was ordered to harmonise their conditions for supplying electricity to end consumers in the household category with the provisions of **Electricity Market Act**, the **Consumer Protection Act**, and the *General Terms and Conditions for Using the Network and Electricity Supply*. Also, minor charges were brought against one supplier for charging "contract termination fees" when terminating electricity supply contracts before the agreed termination date, as such fees are contrary to the provisions of the *General Terms and Conditions for Using the Network and Electricity Supply*.

Performance of the Complaints Committee and HEP-ODS's Consumer Complaint Committees in 2016

HEP-ODS's Consumer Complaint Committees resolve complaints concerning electricity consumption calculations, meter malfunctions, connections/disconnections, voltage issues, etc. HEP-ODS has made it possible to receive and process queries and complaints via e-mail, at the address prodaja@hep.hr.

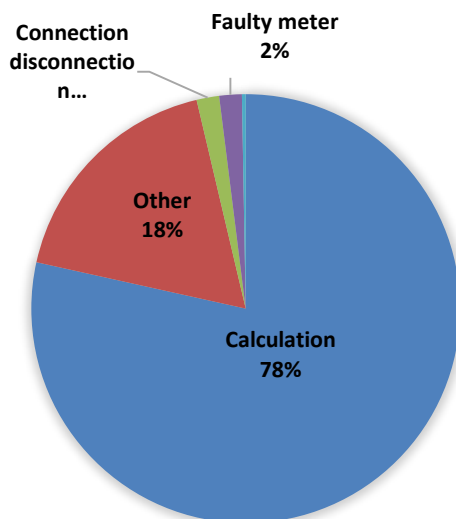
Complaints from network users regarding network access are resolved by the Complaints Processing Committee at the level of HEP-ODS. This greatly standardises access to complaint resolution and the application of by-laws and regulations in all of HEP-ODS's distribution areas.

Table 4.4.13. provides an overview of complaints processed by HEP-ODS's Complaints Processing Committee, and Figure 4.4.16. shows statistics on the work of the Consumer Complaint Committee for HEP-ODS distribution areas in 2016.

Table 4.4.13. Overview of complaints processed by HEP-ODS's Complaints Processing Committee in 2016

Type of complaint	Total	Accepted	Rejected
Rejected request to issue PEPA	16	12	4
Non-acceptance of conditions in PEPA and/or the connection fee	36	11	25
Other (objection regarding the fee for unauthorised consumption, calculation of consumption, etc.)	4	0	4
TOTAL	56	23	33

Source: HEP-ODS



Source: HEP-ODS

Figure 4.4.16. Structure of complaints processed by Consumer Complaint Committees of HEP-ODS's distribution areas in 2016

Observations on the protection of end consumers in 2016

The protection of end consumers complies with the provisions of Directive 2009/72/EC of the European Parliament and the Council dated 13 July 2009 and Attachment 1 "Consumer Protection Measures". Certain provisions of the Directive and Attachment 1 were assumed by our legal system through the following laws and bylaws:

- **Energy Act**, in force as of 26 September 2015,
- **Electricity Market Act**, in force as of 3 October 2015,
- **Energy-Related Activities Regulatory Act**, in force as of 8 November 2012,
- **Consumer Protection Act**, in force as of 21 October 2015,
- *General Terms and Conditions for Using the Network and Electricity Supply*, and
- articles from *General Terms and Conditions for Electricity Supply* ("Official Gazette" No. 14/06), which shall remain in force until the regulations from Art. 32, Par. 1 of the **Energy Act** enter into force.

Acting in accordance with the regulations and results of analyses of complaints from previous years, HERA paid a great deal of attention to the issue of consumers' initial connection to the network, as this had been the dominant problem in previous years, and it is at the very top of the aforementioned Attachment 1 "Consumer Protection Measures". Through the analysis of complaints and their resolution, which required a great deal of expert work due to the incompatibility of regulations with laws and the lack of good practices across the entire territory of Croatia, steps were taken towards the

systematic solution of these problems. The steps taken to standardise practices were the establishment of HEP-ODS's Complaints Processing Committee, which took over the function of the first instance appeal body regarding initial connections to the network. As the body of second instance, HERA systematically resolved the received complaints, and simultaneously worked on establishing uniform criteria throughout Croatia. Said uniform criteria are now used in all distribution areas as enforced by HEP-ODS's Complaints Committee, and a more thorough review is done in order to prevent the ungrounded rejection of connections. The result was a significant reduction in the number of complaints from this sector in 2016.

The other direction for resolving this problem was the adoption of new regulations intended to be clearer and easier to interpret and to present to consumers and new network users. In this regard, HERA adopted the *Methodology for Establishing Fees for Connection to the Electric Power Network for New Network Users and for Increasing the Connection Capacity of Existing Network Users*, which was published on 31 May 2017, and which shall enter into force as of 1 January 2018. HERA further provided an opinion in this regard during the public consultation procedure for the *Draft Regulation on Determining the Conditions and Procedures for Connection to the Electric Power Network*. After the adoption of these two documents, HERA will provide approval for an ordinance on connection to transmission systems and an ordinance on connection to distribution systems, which will be adopted by HOPS and HEP-ODS in accordance with these documents. During this procedure, care will be taken to protect consumers in accordance with the aforementioned Directive and Attachment 1.

As a consequence of the **Act on Procedures Involving Illegally Built Buildings ("Official Gazette", Nos. 86/12, 143/13)**, a large number of buildings were legalised outside of construction areas and far from existing electric power infrastructure. Through legalisation, these buildings now comply with the basic precondition for connection to the distribution network. The resolution of the majority of these requests is very demanding, and sometimes even impossible, as the structures are not accessible from public areas and/or they are not located in areas where spatial plans stipulate the building 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 includes the resolution of legal ownership rights with the private owners of the land on which the infrastructure should be built. This is the reason for some of the complaints of the owners of some of the legalised structures regarding the conditions of a PEPA or the refusal to issue a PEPA. A large number of such complaints is also expected in coming years, which is why the local authorities should adopt new spatial plans that will also include the legalised facilities and their infrastructure, for which access roads should be provided.

In addition to the package of energy laws and by-laws, end consumers in the household category are also protected by the **Consumer Protection Act**, meaning that they, as the most sensitive category, are relatively well-protected and all their rights are respected in accordance with the Directive and Attachment 1. As an additional, significant benefit for this category of end consumers, HERA has developed an informational tool (tariff calculator for household electricity) for comparing offers from various suppliers based on the annual consumption of end consumers in the household category, and has made it available on its website. This tool has been prepared in accordance with CEER recommendations,⁹ and such tools are considered an important means of promoting and developing the retail market.

End consumers from the commercial category are not protected under the **Consumer Protection Act**, however, they enjoy protection under all other regulations mentioned

⁹ CEER Guidelines of Good Practice on Price Comparison Tools, 10 July 2012.

above. The relatively large number of supplier switches (15.34% annually) shows that the retail market in this segment is relatively well-developed.

The majority of complaints and appeals that HERA received refer to the operation of suppliers, mostly regarding misleading business practices the charging of administrative fees for contract terminations, and supplier switches (28%). The next largest group (22%) of complaints refers to the operation of system operators, mostly due to the loss of consumer status.

In resolving such complaints related to connections, HERA first asks for the opinion of the relevant system operator, during which a certain number of complaints are resolved in favour of the network user, while those the operators do not retract are sent to HERA for further action. In 2016, HERA resolved 12 such complaints, 7 of which were accepted and 5 of which were rejected.

HERA received the same total number of complaints and appeals from end consumers in 2016 as it had during the previous year; the most significant increase was due to complaints concerning the operation of suppliers, mainly concerning misleading business practices of electricity suppliers on the retail market, most of which related to the false identification of sales agents and the charging of administrative fees for contract termination.

A large number of complaints and appeals against the work of HEP-ODS refer to the loss of consumer status.

Of the total of 320 complaints received by the HEP-ODS Consumer Protection Committees, 78% of them concern the calculation of spent electricity. HEP-ODS's Consumer Protection Committees accepted 16.5% of these complaints.

4.4.6 Guarantee of origin system

Development of the guarantee of origin system

The guarantee of origin system enables suppliers of electricity to offer end consumers supply contracts or tariff models in which a share of one or more of the sources of electricity they sell is guaranteed. On the other hand, end consumers of electricity can rely on this system when choosing a tariff model, as it ensures the sale of electricity of a guaranteed structure.

Methodology for Establishing the Origin of Electricity ("Official Gazette", No. 133/14) for the suppliers of electricity stipulates the delivery of reports to end consumers defining the structure of the electricity that was sold to them during the previous year once per year, from 1 to 31 July of the current year. As 2015 was the first reporting period, in 2016, all electricity end consumers should have received a report for the first time elaborating the structure of the electricity that was sold to them. As the methodology does not stipulate any sanctions for failure to comply with this stipulation, the majority of suppliers failed to comply with this obligation. Those suppliers who sent reports to their end consumers provided only a minority of the stipulated data (basic data and basic structure of the electricity sold).

According to the aforementioned methodology, 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.

HROTE published said reports on its web site, together with the stipulated annual report on the origin of electricity in Croatia for 2016, which provides an overview of the structure of the electricity produced and sold in Croatia, information on reporting to suppliers

regarding the origin of electricity, the use of guarantees of origin of electricity, and other related data.

The reporting obligation is based on electronic documents – Guarantees of Origin, which are 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, i.e. on *Regulation on the Establishment of the Guarantees of Origin System* ("Official Gazette", Nos. 84/13, 20/14 and 108/15). The framework defined by the 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.

The guarantee of origin, among other data, contains data on the quantity of electricity (the basic unit being 1MWh of electricity), the date of the beginning and end of the electricity generation for which the guarantee of origin is issued, the type of primary energy source, and data on the production plant itself, 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 the guarantees of origin separately from the produced electricity, on a separate guarantee of origin market, 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 said methodology and through the use of guarantees of origin, and excludes the use of other certificates, certificates of generation of electricity, or contracts showing the origin of electricity.

In 2015, the preparation of a MedReg (Mediterranean Energy Regulators) report on systems of certification of guarantees of electricity from renewable energy sources and cogeneration began, entitled "Report on Certification Systems of Origin for Electricity from RES and CHP". The preparation of said report continued throughout 2016, and the report was published in January of 2017. HERA participated in the preparation of said report, wherein the Croatian implementation of the guarantee of origin system was presented in a separate chapter.

Register of guarantees of origin of electricity

As the authority with jurisdiction over the issuance of guarantees of origin in Croatia, HROTE keeps a Register of Guarantees of Origin – a computer system that stores guarantees of origin of electricity, which is used to issue, transfer, and rescind 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 international association of bodies competent for issuing guarantees of origin (Association of Issuing Bodies – AIB), and the Croatian register is connected with other registers in the EU member states through the AIB network node.

HROTE issues guarantees of electricity 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 of Electricity*. In 2016, HERA provided approval for amendments to said rules. The rules are published on HROTE's web site.

The register was implemented in full on 2 February 2015, and five suppliers and one producer of electricity had opened user accounts by the end of 2016. The register registers two facilities for which the issue of guarantees of origin is possible. Table 4.4.14. provides an overview of registrations.

Table 4.4.14. Registrations in the Register of Guarantees of Origin of Electricity in 2016

Type of registration	Number
User account of an eligible electricity producer	1
User account of other Register users	5
Total user accounts	6
Total registered generating facilities	2

In 2016, three registered suppliers traded in guarantees of origin, while guarantees of origin were issued for the production of the Lešće and Varaždin hydro power plants. The overview of transactions in guarantees of origin is provided in Table 4.4.15.

Table 4.4.15. Activities in the Register of Guarantees of Origin of Electricity in 2016

Activity	Number (1 guarantee = 1 MWh)
The number of issued guarantees of origin for electricity produced in Croatia in 2016	603,336
Number of imported guarantees of origin	98,500
Number of exported guarantees of origin	3,386
Number of rescinded guarantees of origin for consumption in 2016	116,072
Number of expired guarantees of origin	0

In accordance with the *Decision on the Amount of Fees for Participation in the Guarantees of Origin System ("Official Gazette", No. 34/15)* adopted by HERA, HROTE collected HRK 299,855 in 2016. Simultaneously, the cost of keeping the register and other activities in the guarantees of electricity origin system in 2016 amounted to HRK 233,352. This ratio between income and expenditure shows that the guarantees of electricity origin system has improved in terms of sustainability, as compared to the previous year.

Observations on the guarantees of origin system

Although the obstacle that prevented built hydro power plants with installed capacity exceeding 10MW from acquiring the status of an eligible electricity producer was removed in 2015, the registration of a large number of hydro plants in the Register of Guarantees of Origin failed to materialise. Except for the "Lešće" and "Varaždin" hydro power plants, for which HEP-Proizvodnja acquired eligible electricity producer status, HEP-Proizvodnja did not obtain the status of an eligible electricity producer for other built hydro power plants in 2016. The prevailing reason is the lengthy and still incomplete organisation of billing metering points and other required changes in switching facilities of older power plants for the purpose of clear separation from the transmission system operator and the distribution system operator.

In 2016, the need for improvements to the legal framework concerning the guarantee of origin system became evident. The **Energy Act** and the **Electricity Market Act** only list the adoption of by-laws that would regulate the guarantee of origin system, but they do not state what would be regulated by these bylaws, particularly in terms of obligations. The lack of punitive 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.

Despite this, further registrations of users and facilities are expected in the Register of Guarantees of Origin of Electricity in 2017, together with the more active competition of suppliers with tariff models with a guaranteed structure of electricity. According to these expectations, a shift towards 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 is defined as securing the required quantities of electricity to end consumers, together with the capability of the transmission and distribution networks to enable the delivery of this electricity to end consumers.

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

- **Short-term level of 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 level of supply security** is related to the adequacy of the electric power system in a typical investment cycle of three to five years. The adequacy of the electric power system means that, within the framework of the nominal values of the load elements of the system and voltage limits, it is sufficiently developed to meet electricity consumption, taking planned and unplanned outages into consideration.
- **Long-term supply security** refers to a longer period of time in which market and investment risks caused by the regulatory framework and market model are taken into account, and the diversity of electricity generating facilities by primary energy source is considered.

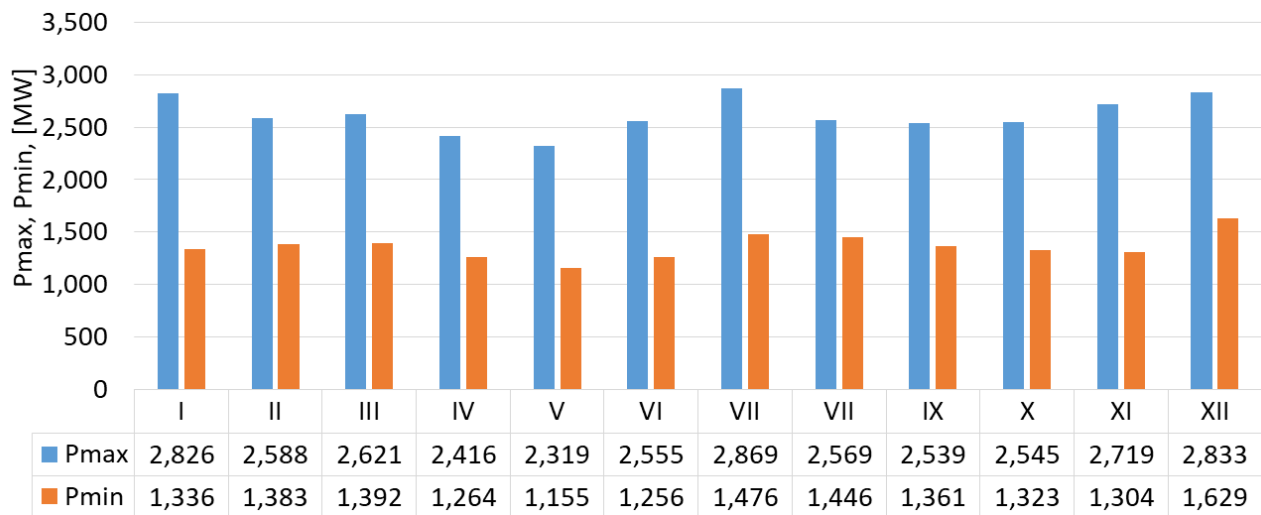
System load characteristics

As regards the mid-term level of supply security, the adequacy of electricity generation in Croatia and electricity from imports is considered, along with the capacity of the Croatian transmission network to meet total electricity consumption in Croatia. This chapter provides an overview of mid-term level of supply security with regard to the adequacy of production and imports. Table 4.5.1 shows the maximum and minimum loads (P_{\max} and P_{\min}) of the Croatian electric power system, the times of their occurrence, and the corresponding import and export of electricity.

Table 4.5.1. Maximum and minimum loads of the Croatian electric power system

Year	Maximum load				Minimum load			
	P_{\max} [MW]	Time	Imports with P_{\max} [MW]	Exports with P_{\max} [MW]	P_{\min} [MW]	Time	Imports with P_{\min} [MW]	Exports with P_{\min} [MW]
2007	3,098	17.12. 18:00	1,538	734	1,143	02.05. 04:00	975	288
2008	3,009	31.12. 18:00	1,903	892	1,182	25.05. 06:00	1,207	672
2009	3,120	21.12. 18:00	1,448	548	1,151	13.04. 05:00	687	440
2010	3,121	16.12. 18:00	1,589	955	1,113	23.05. 06:00	1,253	1,060
2011	2,970	25.01. 19:00	1,493	721	1,185	25.04. 04:00	1,368	687
2012	3,193	06.02. 19:00	2,340	881	1,132	27.05. 06:00	1,314	609
2013	2,813	11.02. 20:00	1,626	878	1,105	31.03. 04:00	661	1,347
2014	2,974	31.12. 18:00	1,462	674	1,166	11.05. 06:00	1,181	1,070
2015	3,009	22.07. 13:00	2,296	474	1,188	22.06. 06:00	1,339	600
2016	2,869	12.07. 14:00	2,142	441	1,155	22.05. 06:00	1,022	641

Figure 4.5.1. shows the maximum and minimum loads of the Croatian electric power system during 2016.



Source: HOPS

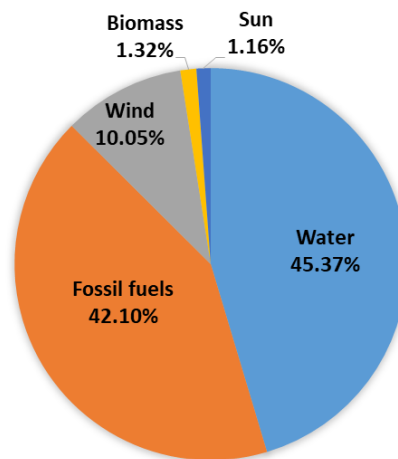
Figure 4.5.1. Maximum and minimum loads of the Croatian electric power system during 2016

It is important to note that, for the second year in a row, the maximum system load occurred during the summer. HOPS claims the reason for this is an exceptionally mild winter and a good tourist season (increased use of air conditioning units).

Adequacy of production and imports

The power of all power plants in the territory of Croatia amounted to 4,794MW at the end of 2016. HEP d.d. is a co-owner of the Krško nuclear power plant in Slovenia, and holds 50% of its power, i.e. 348MW.

Figure 4.5.2. shows the share of individual primary power sources in the power of power plants in Croatia at the end of 2016.



Source: HOPS and HEP-ODS

Figure 4.5.2. Shares of individual primary power sources in the power of power plants in the Republic of Croatia at the end of 2016

Figure 4.5.3. shows the power of power plants in Croatia and maximum system loads in the period from 2007 to 2016. The ratio of the power of power plants in Croatia to the maximum load of the Croatian electric power system for 2016 was 1.67.

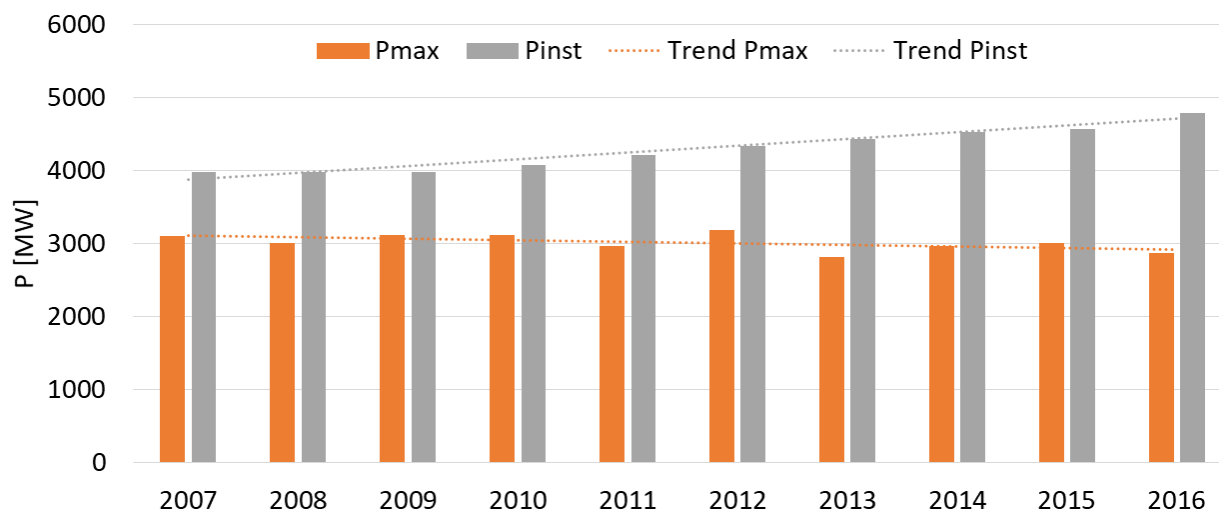


Figure 4.5.3. Overview of the maximum load of the Croatian electric power system (P_{max}) and the installed power of power plants in the territory of the Republic of Croatia (P_{inst}) from 2007 to 2016

The electricity required for the Croatian electric power system is provided by generating capacities in power plants in Croatia and by import over cross-border lines. Figure 4.5.4. shows the share of individual sources of electricity for the requirements of the Croatian electric power system. 50% of the generation of Krško Nuclear Power Plant for HEP d.d was presented separately for net imports.

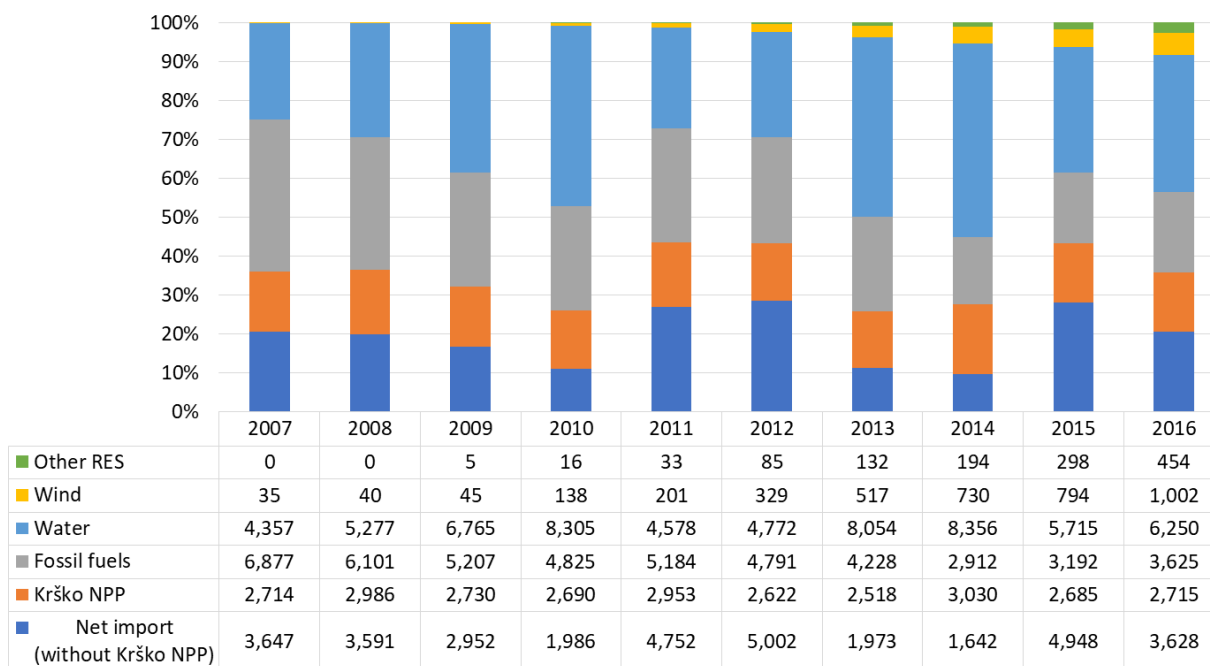


Figure 4.5.4. Shares of individual sources of electricity procurement for the requirements of the Croatian electric power system from 2007 to 2016

The following conclusions can be drawn:

- the reduced generation from hydro power plants (dry year) coincides with increased imports, and increased generation coincides with reduced imports,
- the share of generation from fossil fuels is gradually decreasing,
- the share of generation from wind and other renewable sources is slowly rising, and
- the share of generation from Krško Nuclear Power Plant is relatively constant.

A noticeable decline in consumption is evident from 2010 to 2014, as a result of negative economic trends. However, in 2015, an upward trend in consumption begun, and a slight increase also continued in 2016.

Compared to the previous year, electricity generation in Croatia increased in 2016 (with increased generation from each of the primary sources) while net imports were reduced, both in absolute and relative terms (as compared to total consumption).

Figure 4.5.5. shows net electricity imports into the electric power system of Croatia in the past 10 years, which also includes electricity generated at Krško Nuclear Power Plant for HEP d.d. The net import of electricity in 2016 amounts to 36% of the total consumption of the Croatian electric power system.

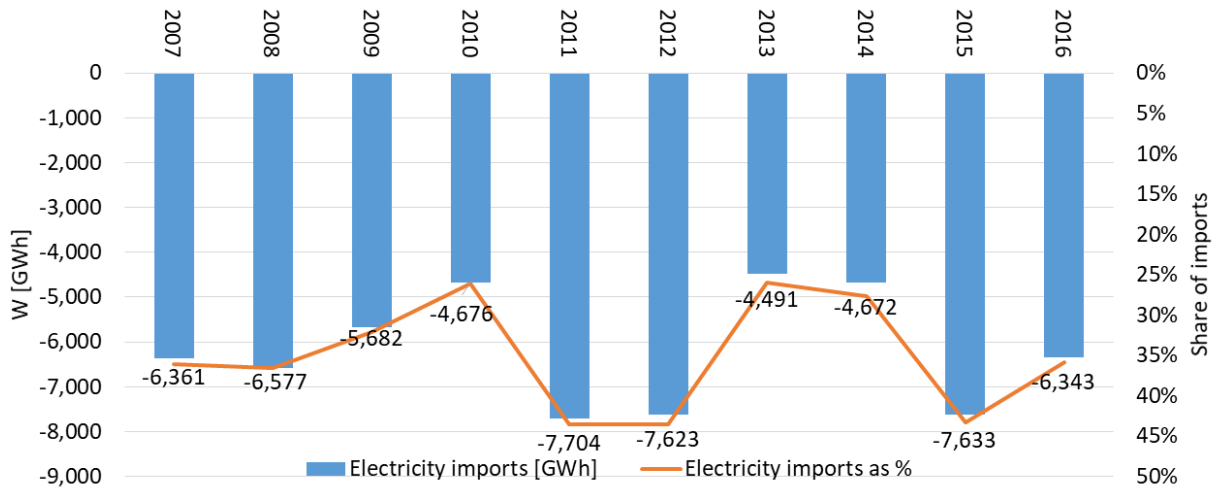
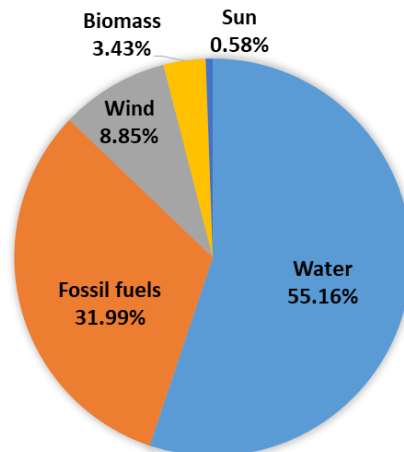


Figure 4.5.5. Net imports of electricity for the needs of domestic consumption and share of imports in the total consumption in the Republic of Croatia

Figure 4.5.6. shows the structure of electricity delivered to the electric power system that was generated in power plants in Croatia by primary source of energy . A significant share of renewable energy sources is evident.



Source: HOPS and HEP-ODS

Figure 4.5.6. Electricity generated in power plants in the Republic of Croatia delivered to the electric power system in 2016 by primary source

Measures for maintaining supply security and development plans

In 2010, HOPS prepared and adopted the Plan for the Defence of the Electric Power System from Major Disruptions. The main purpose of this plan is to provide protective procedures to prevent the disruption of the stable and secure operation of the electric power system. The measures from the plan are implemented as obligatory measures by all users of the transmission system. In accordance with the defence plan, HEP-ODS prepares 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 distribution network, which are filed with HERA once yearly for approval. The ten-year development plans also define measures to guarantee network adequacy and security of supply.

The **Electricity Market Act** stipulates that the transmission system operator or the distribution system operator is obliged to monitor the security of electricity supply, and must publish an annual report on supply security in the distribution system for the previous year with HERA's prior approval by 30 April of the current year at the latest. Pursuant to these reports, the ministry prepares its own annual report on the state of security in electricity supply and expected electricity demands in Croatia. In cooperation with the ministry and pursuant to these reports, HERA may require the distribution system operator, transmission system operator, and other electric power entities to implement certain measures to improve the security of electricity supply. In 2016, HERA provided prior approval for reports on security of supply for both system operators. Said reports are for 2015. HERA has no knowledge of whether the ministry prepared its own corresponding report for 2015.

Further, based on HOPS's contributions and the contributions of other transmission system operators, ENTSO-E prepares and publishes two reports on short-term and long-term security of supply: the "ENTSO-E Winter and Summer Outlook Report" and the "ENTSO-E Scenario Outlook and Adequacy Forecast (SO&AF) Report".

In 2015, HOPS also joined ENTSO-E's pilot project, which analyses the short- and mid-term adequacy of supply – SMTA. As a result of the pilot project, transmission system operators will have access to indications of possible difficulties regarding the adequacy of supply in the short- and mid-term. TSC (Transmission System Operator Security Cooperation) supports said project. TSC is an initiative of 13 transmission system operators from 10 countries in continental Europe, including HOPS, the aim of which is to increase system security through the development of multiple procedures for eliminating bottlenecks in the transmission network.

Several factors must be considered in assessing the security of electricity supply, especially expected increases in the consumption of electricity, construction plans for new generating facilities, and the decommissioning of outdated generation units.

Basic guidelines on the further development of the electric power system in Croatia are laid down in the Energy Development Strategy of the Republic of Croatia, which defines the development of the Croatian energy sector until 2020.

Figure 4.5.7. shows achieved peak loads from 2001 to 2016 as compared to forecasts according to 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. Also, according to said strategy, the decommissioning of thermal power plants at a total power of 1,100MW is expected by 2020. However, due to economic crisis in recent times, the increase of consumption of electricity forecasted by the strategy was not realised.

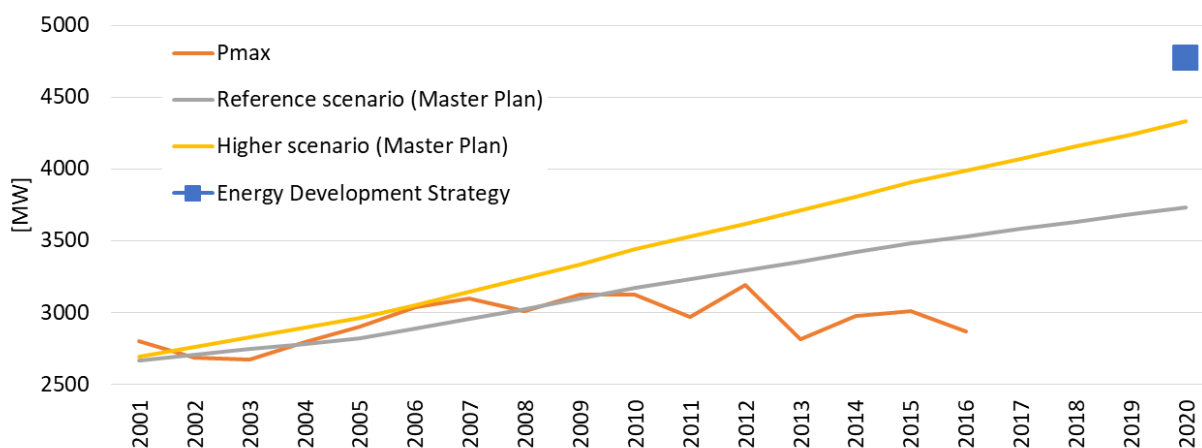
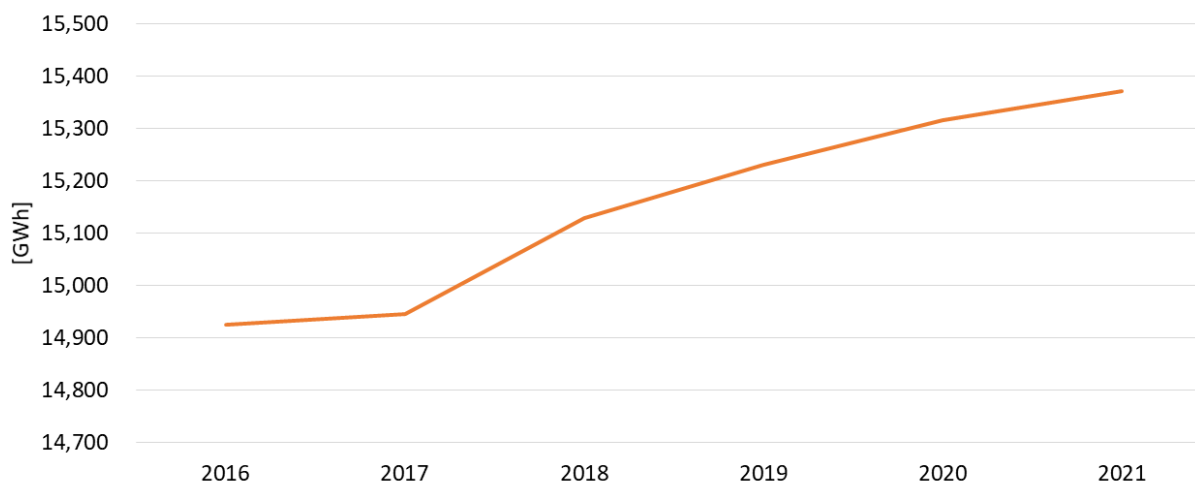


Figure 4.5.7. Achieved peak loads from 2001 to 2016 as compared to forecasts according to the Master Plan and the Energy Development Strategy of the Republic of Croatia

Figure 4.5.8. shows the planned increase in consumption by end consumers on the distribution network in the next 5 years, which is 0.59% per year on average, as stated in HEP-ODS's plans.



Source: HEP-ODS

Figure 4.5.8. Consumption by end consumers on the distribution network in 2016 and planned consumption by 2021

According to the Ten-Year Development Plan for the Croatian Transmission Network (2017 – 2026), the following existing thermal power plants and certain blocks are planned by 2026: TE Sisak 1, TE Plomin 1, EL-TO Zagreb, TE Rijeka, KTE Jertovec, and TE-TO Osijek. This amounts to a total installed power of 478MW, i.e. 611MW, depending on decommissionings dependent on remaining operational hours, thermal energy consumption, and the need to provide the system with tertiary service.

Said ten-year development plan places the power of planned (new) thermal power plants and hydro plants at 836MW with the adopted preliminary analysis of connection possibilities, and another 4,731MW without the adopted analysis (very early development stage). The same period also lists 1,462MW of planned wind power plants. For the time being, the connection of wind power plants of a total power of 750MW is expected, due to the transitional provisions of the **Electricity Market Act**, which stipulates that the transmission system operator is obliged to execute connection agreements with

natural or legal persons who have executed an electricity buy-off agreement with HROTE prior to said **Act's** entry into force. HOPS expects it to be possible to secure an adequate reserve of secondary and fast tertiary P/f regulation in said period, which depends primarily on the implementation of construction plans for new conventional generation facilities.

Further, according to data from HEP d.d., the decommissioning of 1,160MW of thermal power plants is expected by 2023; depending on reconstruction or investment, this amount may be reduced to 909MW of installed power. In 2018, the decommissioning of generating facilities with 558MW of installed power is already possible, which amounts to approx. 12% of the current generating capacity in Croatia. If generation from these generating facilities in the past two years is taken into account, the amount is not significant, except for one facility (TE Plomin 1). However, by decommissioning these generating facilities, the loss for the electric power system is primarily in regulation capabilities.

HEP d.d. is also planning the construction, revitalisation, and acquisition of generating facilities up to 1,721MW by 2027 (quantities depend on the results of construction tenders, agreements with other stakeholders, and sources of financing). Of these, approximately 216MW are cogeneration (biomass or fossil fuels), approx. 605MW are hydro power plants, and approximately 900MW are plants using other renewable energy sources. The revitalisation and construction of approx. 90MW of hydro power plants is planned by 2018.

In accordance with the provisions of the **Energy Act**, the ministry is liable for securing the reliable and secure supply of energy. The Croatian government, upon the proposal of the ministry (which obtains the opinion of HERA), issues a report once a year on the state of the security of electricity supply and expected energy needs.

Observations on the security of electricity supply

At the beginning of 2017, HERA received requests for prior approval for reports on monitoring the security of supply for 2016 by HOPS and HEP-ODS, and provided its prior approval for both reports. From said reports and the currently available data supplied to HERA by HOPS and HEP-ODS, it can be concluded that the level of security of electricity supply in the Croatian electric power system is satisfactory.

Taking into account the adequacy of generating capacities and the stochastic nature of electricity generation from hydro power plants and other renewable energy sources, it is evident that some of the electricity required to meet consumption demands must be imported. However, the transmission network is developed enough to enable significant exchanges (primarily imports) with neighbouring electric power systems. Significant quantities of energy, with adequate security, are imported from Slovenia, Bosnia and Herzegovina, and Hungary.

With the aim of preventing and managing possible crisis situations regarding the supply of electricity on the European level, the so-called "winter package" of regulations presented by the European Commission in 2016 also includes a draft 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 security of supply, leaving member states too much freedom to decide how to achieve them. With the interconnected systems in Europe, a crisis situation that occurs in one member state often has consequences in neighbouring states (and possibly in larger areas), or a certain scenario, such as extreme weather conditions, may affect several states at the same time. Due to the above, a regulation shall be passed repealing Directive 2005/89/EC, and said regulation shall apply in full and directly in all member states.

4.6 Incentives for generating electricity from renewable sources and cogeneration

Eligible electricity producers

In accordance with bylaws in force until the end of 2015, HERA issued preliminary decisions (hereinafter: preliminary decision) on the granting of eligible producer status to legal and natural persons (project leaders) for individual planned power plants. After the completed construction of a facility, HERA issues a decision granting eligible electricity producer status (hereinafter: final decision) for a period of 25 years. In 2016, HERA ceased issuing preliminary decisions, as the **Renewable Energy Sources and High-efficiency Cogeneration Act** (hereinafter: the **Act**) does not provide a legal basis for the issuance of such preliminary decisions.

In case of the construction of facilities considered simple structures in terms of regulations on spatial planning and construction (currently only in the case of solar power plants on existing buildings), the project leaders are not required to obtain a preliminary decision or a final decision – instead, pursuant to the **Act**, they obtain eligible producer status based on evidence that the electricity producer has obtained the right to permanent connection to the electric power network for a generating facility that uses renewable energy sources or high-efficiency cogeneration.

Table 4.6.1. shows the number of preliminary and final decisions issued by HERA in 2016.

Table 4.6.1. Preliminary and final decisions issued by HERA in 2016

Type of plant / primary energy source	No. of decisions issued		Plant power [MW]	
	Preliminary ¹⁰	Final ¹¹	Preliminary	Final
Solar power plants	0	6	0.000	5.494
Hydroelectric power plants	2	5	0.330	95.143
Wind power plants ¹²	0	2	6.000	40.150
Biomass power plants	5	2	11.075	1.370
Geothermal power plants	0	0	0.000	0.000
Power plants fuelled by biogas ¹²	0	8	1.000	8.502
Cogenerations	0	1	0.000	100.000
Other plants using renewable sources	0	0	0.000	0.000
Total	7	24	18.405	250.659

In 2016, HERA also issued three decisions on amendments to preliminary decisions, six decisions changing the project leader from preliminary decisions, 34 decisions on the extension of preliminary decisions, eight decisions rejecting requests for extensions of preliminary decisions, and four decisions changing the project leader in the decision; HERA also rejected 16 requests for the issuance of a preliminary decision and two requests for the extension of preliminary decisions. Table 4.6.2. offers an overview of final decisions issued by HERA from 2007 to 2016¹³.

¹⁰ Preliminary decisions issued in 2016 for requests received by 31 December 2015.

¹¹ Final decisions include those for the purpose of guarantee of origin.

¹² Increase of power in the preliminary decision.

¹³ The data refers to decisions issued by HERA, therefore the number and the total power of facilities does not necessarily match the number of facilities in the incentives system (e.g. eligible producers who are not eligible, integrated solar power plants which do not obtain decision from HERA, etc.).

Table 4.6.2. Final decisions issued by HERA from 2007 to 2016

Type of plant / primary energy source	Number of plants	Total capacity [MW]
Solar power plants	223	20.471
Hydroelectric power plants	15	141.290
Wind power plants	20	417.950
Biomass power plants	12	25.905
Power plants fuelled by biogas	27	33.435
Power plants fuelled by landfill gas and gas from wastewater treatment plants	1	2.500
Cogeneration plants	6	112.943
Total	304	754.494

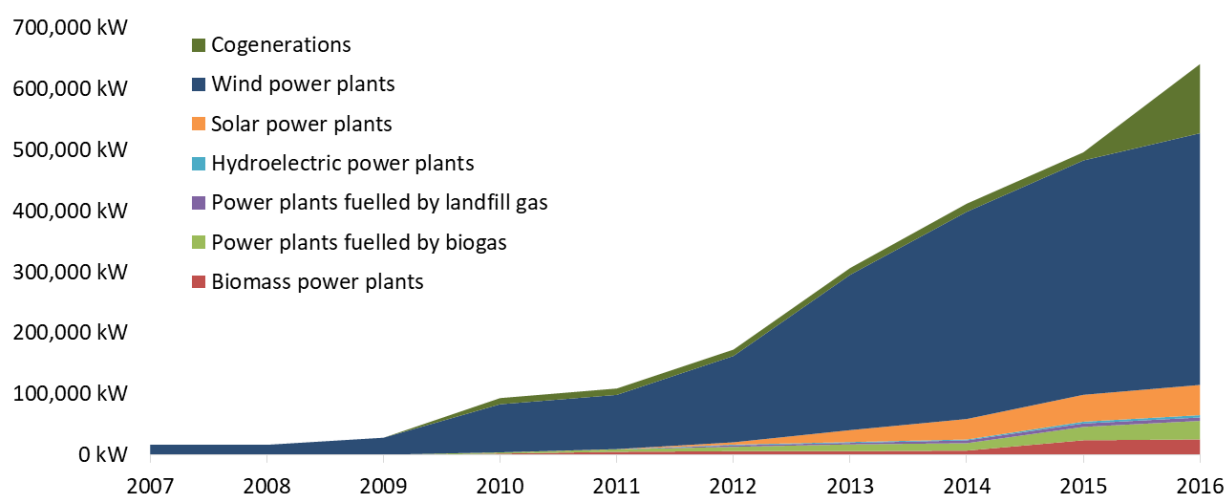
In addition to securing priority rights in the delivery of electricity into the electric power system, eligible producer status was one of the conditions for receiving incentives in accordance with the tariff systems for electricity generation from renewable energy sources and cogeneration, and it is one of the conditions for the incentives system as stipulated by the **Act**. It is important to emphasize that eligible producer status does not equal the right to realise incentivised prices for delivered electricity – rather, it is only one of the conditions for realising the right to incentives.

In cases where an eligible electricity producer cannot meet the conditions for admission to the incentives system, producers may participate in the guarantee of origin system pursuant to the *Regulation on the Establishment of the Guarantee of Origin System*. Plants cannot be in the incentives system and simultaneously sell guarantees of origin of electricity.

Incentives system for electricity generation from renewable energy sources and cogeneration

Project leaders who meet the requirements for participation in the incentives system for electricity generation from renewable energy sources and cogeneration executed a long-term agreement on the buy-off of electricity generated in such facilities with a guaranteed purchase price with HROTE by 31 December 2015. The incentive price for each group of facilities was defined in the appropriate tariff systems for electricity generation from renewable energy sources and cogeneration.

During 2016, HROTE executed 13 electricity buy-off agreements with a total connection capacity of 109.414MW, based on requests submitted by the end of 2015. In 2016, 21 electricity buy-off contracts from generation facilities with a total connection capacity of 150.464MW were executed, and these 21 facilities were commissioned and included in the incentives system. Figure 4.6.1. shows the gradual entry of facilities into the incentives system since its introduction in 2007, while Table 4.6.3. shows the basic indicators of the incentives system.



Source: HROTE

Figure 4.6.1. Installed capacity of plants in the incentives system from 2007 to 2016 by type of plant

Table 4.6.3. Generation and paid incentives to eligible producers in 2016 by type of plant

Type of plant / primary energy source	Number of plants	Installed capacity [MW]	Electricity generation [MWh]	Share in generation [%]	Paid incentives (without VAT) [mil. HRK]	Share in disbursements [%]
Solar power plants	1,219	49.479	61,448	3.57%	123.8132	8.01%
Hydroelectric power plants	11	3.885	16,768	0.98%	15.90413	1.03%
Wind power plants	18	412	1,018,783	59.26%	787.2599	50.90%
Biomass power plants	12	25.955	177,911	10.35%	221.0835	14.30%
Geothermal power plants	0	0	0	0.00%	0	0.00%
Power plants fuelled by biogas	26	30.435	210,162	12.22%	269.9445	17.45%
Power plants fuelled by landfill gas and gas from wastewater treatment plants	2	5.5	81.85	0.00%	0.036096	0.00%
Cogenerations	6	113.293	234,053	13.61%	128.5101	8.31%
Total	1,294	640.547	1,719,207	-	1,546.55	-

Source: HROTE

The share of energy generated in plants under the incentives system was 9.7% of total electricity consumption in Croatia (17,674GWh).

Figure 4.6.2. shows average incentivised prices by plant type as compared to the annual average electricity prices on the Hungarian and Slovenian electricity exchanges in 2016 (HRK 0.26/kWh). Although the observation of incentivised prices in comparison with the actual electricity market price is important from the standpoint of market efficiency, it should be noted that incentivised prices reflect the average sale price (Long-Term Cost of Electricity – LCOE), which includes the construction cost of as-of-yet non-competitive technologies, costs connected with project financing, etc.

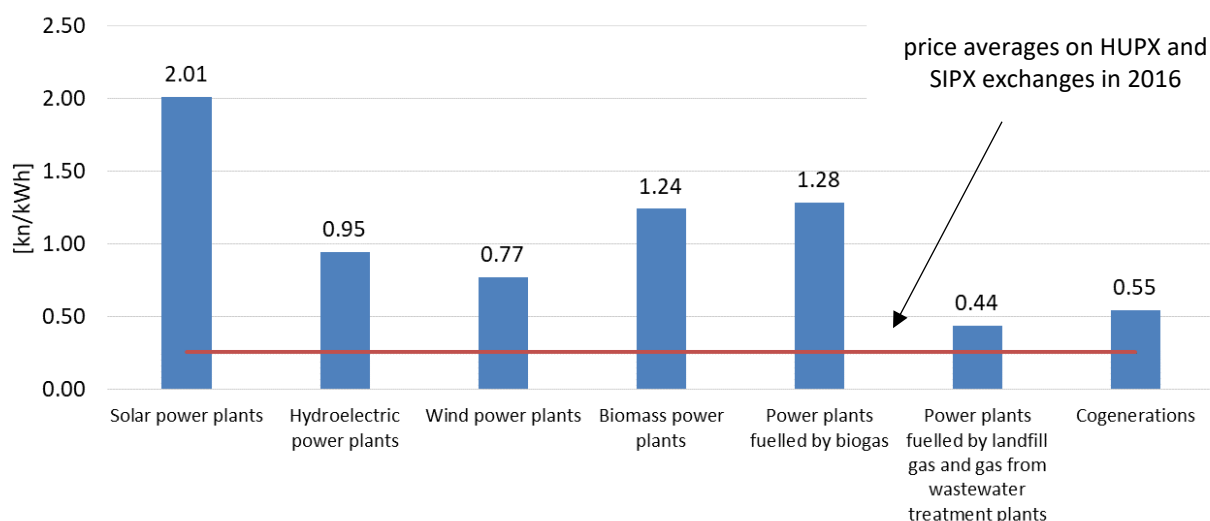


Figure 4.6.2. Average weighted buy-off price by plant type in 2016

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

- all end consumers in Croatia also pay a fee for the incentive for the generation of electricity from renewable sources and cogeneration, which is included in their electricity bill in the amount of HRK 0.035/kWh, or HRK 0.005/kWh for consumers who are obliged to obtain a permit for greenhouse gas emissions, and
- all suppliers are obliged to buy off electricity generated in the incentives system at the regulated price of HRK 0.42/kWh in an amount proportional to their share in total electricity delivered to consumers. Electricity generated in plants of eligible producers is allocated to suppliers in two ways:
 - o 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)
 - o by allocating the day-ahead planned values for suppliers HEP-ODS (now HEP Elektra) and HEP-Opskrba.

Table 4.6.4. shows the increase in HROTE's expenses in 2016, which resulted from additional generating plants entering the incentive system. HROTE has duly settled its obligations in the incentives system for electricity generation from renewable energy sources and cogeneration using unallocated funds from previous periods.

Table 4.6.4. Overview of cash flows in the incentives system [HRK mil.]

Income/expenditure	2014	2015	2016
Incentives system income			
Income from electricity end consumers (from RES&C fees)	505.21	524.92	514.70
Proceeds from the sale of electricity from incentives system to the suppliers	492.51	579.78	724.89
Incentives system expenditures			
Costs of electricity bought off from eligible producers	824.68	1,038.74	1,546.55
Resources for financing HROTE's activities in the RES&C incentives system	4	6	9
Balancing energy costs	-	-	-
The costs of special fees to suppliers	-	-	-
Difference at the annual level	169.04	59.96	-315.96

The Renewable Energy Sources and High-Efficiency Cogeneration Act

The **Renewable Energy Sources and High-Efficiency Cogeneration Act** (hereinafter: the **Act**) entered into force on 1 January 2016: it stipulates the elimination of the existing incentives system, except for those project leaders who have already executed buy-off contracts with HROTE. As regards the more important issues, the **Act** also:

- stipulates the framework for new incentives: an incentives system through market premiums and guaranteed buy-in prices, wherein the execution of the agreement is based on a tender in both cases,
- introduces the EKO balance group for balancing plants within the incentives system,
- stipulates the elimination of the mandatory buy off of electricity from the incentives system by suppliers at regulated prices and introduces the sale of such electricity on the electricity market.

On two occasions in 2016, a public consultation was held on the draft *Ordinance on the Use of Renewable Energy Sources and High-Efficiency Cogeneration* as envisaged by the **Act**, which stipulates the acquisition of eligible electricity producer status and new incentives systems in detail. As a part of the public consultation, HERA provided its comments during both rounds of consultations, however opinions for said draft ordinance were not provided as no request was filed with HERA for the provision of an opinion in accordance with the **Act** during 2017. Said ordinance should have been adopted within six months from the entry into force of the **Act**. The consequence of the failure to pass this ordinance and other bylaws as stipulated by the **Act** is stagnation in the development of new renewable source and high-efficiency cogeneration projects.

On 29 December 2016, the **Regulation on Amendments to the Act** was adopted, which:

- shifts the obligation of sale of electricity from the incentives system to the electricity market from 1 January 2017 to 1 January 2018, at the latest, and extends obligatory supplier buy-off for another year, and
- extends the time limit for the start of operations of the EKO balance group from 1 January 2017 to 1 January 2018.

The EKO balance group, which includes the producers under the incentives system, should have begun operating in January 2017. Regarding the volume of electricity, the operation of the EKO balance group may reflect on both the retail and wholesale electricity market, as well as on aspects connected with electric power system balancing. For the EKO balance group to become fully functional in accordance with the **Act**:

- HROTE must adopt electricity selling rules for which HERA provided an opinion in 2016, and for which the ministry responsible for energy has yet to provide prior approval,
- with the prior opinion of HOPS and HEP-ODS and with the approval of the ministry, HROTE must adopt rules for managing the EKO balance group, which should regulate various aspects of the functioning of this balance group, and
- in accordance with the **Act** and the opinion of HERA, the ministry responsible for energy must adopt the *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 costs arising from their imbalance.

In accordance with the **Act**, HROTE prepared draft *Electricity Selling Rules*, which regulate the sale of electricity from the incentives system in the electricity market, and initiated the public consultation on these rules. HERA provided a prior opinion on said rules, also in accordance with the **Act**. However, at the time this annual report was written, said rules have not yet been adopted.

Observations on incentives for the generation of electricity from renewable sources and cogeneration

The average weighted price of electricity paid to eligible producers under the incentives system in 2016 (HRK 0.90/kWh) is almost three and a half times higher than the annual average electricity prices on the Hungarian and Slovenian electricity exchanges.

As suppliers participated in more than 58% of the funds collected for the incentives system in 2016, the reduction of the regulated price and the possible elimination of the mandatory buy-off of electricity is expected to result in an increase in the incentive fee paid by end consumers, and this would also result in an increase in the total electricity price for end consumers.

The obligation of suppliers of electricity to buy off electricity which HROTE buys off from eligible producers was supposed to have ended with the outset of the operations of the EKO balance group, and the sale of electricity from the EKO balance group on the electricity market, for which HROTE has completed all required actions, was supposed to have begun. The initially planned term for beginning of the operation of the EKO balance group was set at 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, postponed the deadline for the full functionality of the EKO balance group to 1 January 2018, along with the deadline for the beginning of the sale of electricity from the EKO balance group on the electricity market. The consequences of this postponement are:

- increased costs for suppliers who had, at the time, already purchased energy, cross-border capacities, etc., not expecting the extension of the obligation to receive the electricity from the incentives system, and
- problems with other bylaws already adopted regarding the electricity market, which planned on the operation of EKO balance group and the sale of electricity from the incentives system on the market.

In addition to the earlier bylaws, the Act also stipulates the adoption of a regulation whereby the Croatian government, at the proposal of the ministry, will determine additional quotas to be used in tenders for stimulating electricity generation projects from 2016 to 2020. Said regulation has not been adopted yet.

Although, according to the **Act**, the Croatian government was obliged to stipulate by a decree defining the amount of the fee for renewable energy sources and cogeneration for 2017 by 31 October 2016 at the proposal of the Ministry of Environmental Protection and Energy, no such decree was adopted within the legal deadline. Because of this delay, HROTE was placed in a difficult financial position due to increasing financial obligations from the buy-off of electricity from plants in the incentive system. In March 2017, the Ministry of Environmental Protection and Energy initiated a public consultation on a proposed decree through which the fee would increase to HRK 0.075/kWh for end consumers and to HRK 0.007/kWh for consumers who are obliged to obtain a permit for greenhouse gas emissions. The public consultation was completed on 31 March 2017.

Of the new facilities which began operating in 2016, the most significant is the Rudine wind power plant, with 34.2MW installed power, which started operating at the beginning of 2016. As the amendments to the **Electricity Market Act** and the **Act** stipulate that HOPS is obliged to provide connection to all wind power plants that have executed a buy-off agreement with HROTE, a total of 744MW of wind power plants in the incentive system with guaranteed buy-off is expected. Following the construction and entry into the incentive system of the remaining wind power plants that have executed agreements with HROTE (Glunča, ZD6, Krš Pađene, Pađene, Kom-Orjak-Greda, Jasenice, Lukovac, and Katuni wind power plants), there will be a further increase in the quantity of electricity generated by wind power plants, and a resultant increase in the amount of paid incentives. The increase in the quantity of electricity generated in the incentives system and the elimination of the mandatory buy-off of electricity from the incentives system by

suppliers at regulated prices will necessarily lead to an increase in incentive fees for the generation of electricity from renewable sources, which are paid by all electricity end consumers.

VE Ravne 1 wind power plant, which has an installed power of 5.95MW, was the first to leave the incentive system following the expiry of its electricity buy-off agreement. The power plant again obtained the status of an eligible electricity producer, however it is no longer in the incentive system.

The previous manner of allocating electricity generated under the incentives system from the previous month via buy-off schedules with a time shift of 3 months was changed for suppliers HEP-ODS and HEP-Opkrba as of July 2016, such that the buy-off schedules are allocated on a day-ahead basis in accordance with the daily generation plan. In accordance with the above, electricity is allocated in two ways:

- by allocating the day-ahead planned values for HEP-ODS and HEP-Opkrba, and
- 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.

The approach whereby electricity is allocated to other suppliers with a three-month time shift is causing certain difficulties. In accordance with the Act, HROTE is required to sell electricity from the incentives system on the electricity market, but the allocation for the first three months will have to be adjusted. In particular, HROTE will probably adjust the agreed schedules during the first three months by buying/selling the difference on the market due to the agreed schedule from the previous three months, while it must simultaneously continue to pay for electricity taken over by eligible producers under the incentives system.

Billing for electricity that all suppliers are obliged to receive from HROTE at a regulated price, each according to its market share, has not changed.

During 2016, HERA conducted a review of requests for extensions to preliminary decisions due to doubts regarding notarised statements claiming that 50% of funds were spent on the construction of facilities, which were the basis for the issuance of decisions extending preliminary decisions.

As regards the obligation to comply with the stipulation of savings of primary energy and the minimum annual efficiency of facilities which simultaneously produce electric and thermal power, it should be noted that, instead of stipulating efficiency criteria and imposing the supervision of compliance with these criteria, a more socially useful solution would be to establish an incentives system wherein producers would be motivated to use the produced thermal energy productively (e.g. with lower incentivised prices for delivered electricity, producers would have to secure the sale of thermal energy to make their project more cost-effective, i.e. they would have to internalise the use of thermal energy for their own purposes). This is particularly evident after 2015, when a large number of preliminary decisions were issued for cogeneration facilities. As it is likely that the vast majority of these facilities will be built and commence operating, a review of the efficiency of all these facilities would present a significant administrative effort. In 2016, HERA adopted 8 decisions determining total annual production facility efficiency. Said decisions, the adoption of which is stipulated by by-laws regulating the incentives system, are the basis for HROTE's corrections of incentivised prices (in the case of biomass) or for requesting the return of a portion of disbursed incentives (in the case of biogas plants that did not meet the minimum total annual production facility efficiency requirement of 50%).

In practice, there are situations wherein eligible producers deliver electricity exceeding the power approved in their decision approving their status as an eligible producer. In 2016, HERA began preparing the *Operating Rules in Cases of Exceeded Load on the Part of Eligible Electricity Producers*. The adoption of said rules is not directly stipulated as HERA's obligation in the regulations defining its work. However, the **Act** stipulates HERA's actions in cases in which irregularities or defects are detected, i.e. temporary irregularities

in the fulfilment of conditions of the use of production plants and/or production units based on which a decision granting eligible electricity producer status was issued. HERA recognised the need for unambiguous and transparent procedures, and has defined it in said rules. These rules entered into force in the first quarter of 2017, and have been published on HERA's website.

4.7 Energy efficiency in the electricity sector

Energy efficiency in the electric power infrastructure

Pursuant to Art. 16, Par. 1 of the **Energy Efficiency Act**, in implementing regulatory tasks in accordance with the provisions regulating the electricity and gas markets, HERA must take energy efficiency into account when adopting decisions on the operation of the electricity and gas infrastructure.

Pursuant to Art. 16, Par. 4 of the **Energy Efficiency Act**, HERA is obliged to:

- ensure the assessment of the potential for increasing the energy efficiency of the electricity infrastructure for gas and electricity is enforced, in particular as related to transmission, i.e. transport, distribution, load management, interoperability, and the connection of facilities for energy generation, including access for microgenerators of energy, and
- determine particular measures and investments to introduce cost-effective improvements to energy efficiency in the network infrastructure, including deployment target dates.

The term "energy efficiency of the electricity infrastructure" refers to the reduction of technical losses in the transmission and distribution network resulting from the operation of the transmission and distribution systems. Technical losses 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 and in transformer windings).

With the aim of implementing the stipulated tasks, HERA ordered the preparation of 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 energy efficiency measures implemented.

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. The above measures follow the need to increase the safety of operation and comply with technical regulations; these investments are too high to be justified solely through savings from loss reduction.

Particular measures and investments related to losses in the transmission and the distribution network were considered.

The target deployment dates for the considered measures are determined by the ten-year development plans of the transmission and distribution networks, with a detailed elaboration for the initial three- and one-year periods, which HERA approves each year, taking into account cost-effective improvements to the network infrastructure.

When the preconditions are met for the introduction of advanced technologies, such as load management, HERA will revise its estimate of the potential for increases in the energy efficiency of the infrastructure for electric power and will define target deployment dates for the introduction of advanced measures.

Introduction of advanced metering devices

According to the **Energy Act**, HEP-ODS is obliged to determine the technical requirements and costs of introducing advanced metering devices and the systems to network them (smart meter mass roll-out) and submit these requirements to HERA, after which HERA will perform a cost analysis and obtain the opinion of the representatives of consumer protection bodies, so that the minister responsible for energy may determine the plan and programme of measures for introducing smart meters for end consumers.

During 2016, HERA ordered the preparation of a study entitled "Documents for the preparation of an analysis of the costs and benefits of introducing advanced metering devices and systems to network them with electricity end consumers".

The study was completed at the end of 2016. The study results show that the financial and economic cost/benefit analyses show a positive result. The study reviews the scenario of introducing advanced metering devices over a period of 11 years, based on a concept pursuant to which the advanced metering devices will be installed at the end consumers' location during the replacement of existing metering devices with an expired calibration lifecycle.

End consumers in the commercial category on high and medium voltage and commercial consumers on low voltage (red model) are already equipped with advanced metering devices.

During 2017, HERA will perform further required activities with the intent of providing the minister responsible for energy with all the necessary documents to adopt a plan and programme of measures to introduce advanced metering devices for end consumers.

Observations on energy efficiency in electricity consumption

Electricity suppliers currently do not publicly offer end consumers their tariff models, which would differ in terms of tariff elements from the tariff systems for the transmission and distribution of electricity. In other words, regardless of whether end consumers have meters that monitor consumption in shorter intervals or in several tariff periods, electricity suppliers do not offer separate products aimed at specific groups of end consumers and their consumption patterns (e.g. tariff models suited for holiday homes).

Although electricity suppliers provide advice on the efficient use of energy through their communications channels with end consumers (current and future), it is necessary for electricity suppliers to provide more information regarding electricity consumption in individual communication, which would enable end consumers to save, change their behaviour, or decide to purchase energy efficient devices.

As regards consumption management, it is necessary to initiate the appropriate activities in order to enable end consumers simple access to data on their electricity consumption in sufficiently short time intervals, based on which they would be able to manage their consumption in order to achieve savings or additional income. A solution will likely be implemented through the HEP-ODS web site.

5 NATURAL GAS

5.1 Regulation of the legislative framework for natural gas

The legal framework of the gas sector and gas market in the Republic of Croatia consists of the **Energy Act**, **Gas Market Act**, **Energy-Related Activities Regulatory Act**, and by-laws adopted pursuant to said laws.

In 2016 and early 2017, HERA adopted the following by-laws:

- *Modification of the Methodology for Establishing Tariff Items for Public Service Gas Supply and Guaranteed Supply (Official Gazette No. 25/16),*
- *Methodology for Establishing Tariff Items for the Reception and Dispatch of Liquefied Natural Gas (Official Gazette No. 71/16),*
- *Methodology for Establishing Tariff Items for Public Service Gas Supply and Guaranteed Supply (Official Gazette No. 26/17),*
- *Methodology for Establishing the Price of Balancing Energy in the Gas System (Official Gazette No. 49/16),*
- *Amendments to the Methodology for Establishing the Price of Non-Standard Services for Gas Transport, Distribution, Storage, and Public Service Gas Supply (Official Gazette No. 91/16),*
- *Amendments to the Methodology for Establishing the Price of Non-Standard Services for Gas Transport, Distribution, Storage, and Public Service Gas Supply (Official Gazette No. 116/16).*

In addition, HERA also adopted the following decisions:

- *Decision on Gas Distribution Tariff Items (Official Gazette No. 122/16),*
- *Correction of the Decision on Gas Distribution Tariff Items (Official Gazette No. 14/17),*
- *Decision on Gas Transport Tariff Items (Official Gazette No. 26/17),*
- *Decision on Gas Storage Tariff Items (Official Gazette No. 122/16),*
- *Decision on Fees for Connection to the Gas Distribution or Transport System and for Increases in Connection Capacity for the 2017 – 2021 Regulation Period (Official Gazette No. 122/16),*
- *Decision on Average Hourly Rates for Providers of Non-Standard Services in the Gas Sector for the Second 2017 – 2021 Regulation Period ("HERA" No. 11/2016),*
- *Decision on Public Service Gas Supply Tariff Items for the Period from 1 April 2016 to 31 December 2016 (Official Gazette No. 28/16),*
- *Decision on Public Service Gas Supply Tariff Items for the Period from 1 January 2017 to 31 March 2017 (Official Gazette No. 122/16), and*
- *Decision on Fees for Gas Market Organisation (Official Gazette No. 23/16).*

In February 2016, November 2016, and March 2017, HERA gave PLINACRO d.o.o. approval for the *Network Code for the Transmission System (PLINACRO d.o.o., 2/16, 11/16 and 3/17)*, and in February 2017, it approved amendments to the *Network Code for the Transport System (PLINACRO d.o.o., 2/17)*.

In February 2017, HERA gave Hrvatski operator tržišta plina d.o.o. approval for amendments to the *Rules on Gas Market Organisation (HROTE d.o.o., 2/17)*, and in March 2017, it approved the *Rules on Gas Market Organisation (HROTE d.o.o., 3/17)*.

In December 2016 and March 2017, HERA gave Podzemno skladište plina d.o.o. approval for the *Rules for Use of the Gas Storage System (PSP d.o.o., 12/16 and 2/17)*, and in January and February 2017, it approved amendments to the *Rules on Gas Market Organisation (PSP d.o.o., 1/17, 1-2/17 and 2/17)*.

In April 2017, HERA prepared 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 allows public service suppliers to procure gas under market conditions.

In December 2016, Croatian Parliament adopted the **Deployment of Alternative Fuel Infrastructure Act**, and in February 2017, it adopted the **Act on Amendments to the Gas Market Act**.

In March 2016, the Croatian government, pursuant to Article 5.a of the **Gas Market Act**, adopted the following decisions:

- *Decision on the Gas Price at which Natural Gas Producers are Obligated to Sell Natural Gas Produced in the Territory of the Republic of Croatia to Gas Suppliers on the Wholesale Gas Market (Official Gazette No. 27/16)*, and
- *Decision on the Gas Price at which Suppliers on the Wholesale Gas Market are Obligated to Sell Gas to Suppliers in the Public Service of Gas Supply for Households (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 Suppliers on the Wholesale Gas Market are Obligated to Sell Gas to Suppliers in the Public Service of Gas Supply for Households (Official Gazette No. 18/17)*.

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

Modification of the Methodology for Establishing Tariff Items for Public Service Gas Supply and Guaranteed Supply (Official Gazette No. 25/16)

On 21 March 2016, HERA adopted a modification to the *Methodology for Establishing Tariff Items for Public Service Gas Supply and Guaranteed Supply*. This modification to the methodology changed the method by which gas supply cost is determined, consisting of a variable amount of the fee for supply of gas – T11s (HRK/kWh) – and the amount of the fixed monthly fee for gas supply – T12s,TMa (HRK). The variable amount of the fee for gas supply – Ts1o – was set at HRK 0.0149/kWh, and this fee is set to remain unchanged in relation to changes in the unit cost of gas procurement. In addition, the amount of the fixed monthly fee for gas supply – T12s,TMa – was set such that it is no longer calculated based on a fixed monthly fee for gas distribution under particular tariff models – instead, only the absolute amounts of the fixed monthly fee for gas supply from the applicable *Decision on the Amounts of Tariff Items for Public Gas Supply Service for 2016 (Official Gazette No. 31/15)* are retained.

Methodology for Establishing Tariff Items for Public Service Gas Supply and Guaranteed Supply (Official Gazette, No. 26/17)

On 16 March 2017, HERA issued a new *Methodology for Establishing Tariff Items for Public Service Gas Supply and Guaranteed Supply*. The methodology applicable before this date defined, inter alia, the structure and method by which tariff item 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 price of gas supply. The new methodology retains both the same final gas price structure and the same method of determining gas distribution and supply costs.

The **Act on Amendments to the Gas Market Act**, as adopted by Croatian Parliament on 17 February 2017, created the conditions for the adoption of a new *Methodology for Establishing Tariff Items 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. Furthermore, this act foresees that the wholesale gas market

supplier is 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 allows public service suppliers to procure gas under market conditions.

In addition, on 28 February 2017, the Croatian government adopted a *Decision on the Price of Gas at which the Wholesale Market Supplier [ed. HEP d.d.] is Obligated to Sell Gas to Suppliers in the Household Gas Supply Public Service*; this price of gas was established in the amount of HRK 0.1809/kWh for the period from 1 April 2017 to 31 March 2018. Until 31 March 2017, the price amounted to HRK 0.1734/kWh.

For the reasons stated above, after completing analyses and holding public consultation, HERA issued a new *Methodology for Establishing Tariff Items 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 amount and retaining the same fixed monthly gas supply fee resulted in an average total unit gas supply cost of HRK 0.0112/kWh at the level of all 34 public service suppliers.

Methodology for Establishing the Price of Balancing Energy in the Gas System (Official Gazette No. 49/16)

On 24 May 2016, HERA issued the new *Methodology for Establishing the Price of Balancing Energy in the Gas System*, primarily in order to harmonise the Croatian gas system balancing model with the European Union's balancing system, as foreseen by Commission Regulation (EU) No 312/2014 establishing a Network Code on Gas Balancing of Transmission Networks (hereinafter: Regulation). The issuing of the new *Methodology* represents the first step towards harmonising the entire legislative and regulatory framework defining Croatia's gas system balancing model (**Gas Market Act**, *Rules on Gas Market Organisation*, *Network Code for the Transmission System*, *Network Code for the Gas Distribution System*, and *Rules for Use of the Gas Storage System*) with the provisions of the regulation.

The new methodology, as compared to the previous one, introduced modifications in establishing the reference gas price and positive and negative prices of balancing energy, which, pursuant to the new methodology, are established daily for each gas day in HRK/MWh, as opposed to the previous methodology, which established them monthly in HRK/kWh. Furthermore, the reference price of gas for a gas day is calculated as the sum of the price of gas at the Central European Gas Hub AG (the "CEGHIX®" price index) gas exchange, applicable for the trading day on which the gas day begins, and a fixed amount reflecting the adjustment of the reference gas price to the conditions of the wholesale gas market in Croatia. The positive and negative prices of balancing energy for a given gas day are set based on the reference gas price by increasing the positive and/or negative price of balancing energy by the amount of imbalance established in the fixed amount of HRK 50.00/MWh. The above fixed amount of imbalance in relation to the reference price is set so that, when there is insufficient wholesale gas market liquidity at the daily level, the resulting levels of positive and negative balancing energy limit the price bracket within which participants on the Croatian wholesale gas market will be encouraged to balance their portfolio as a motivation for them to offer balancing energy.

Methodology for Establishing Tariff Items for The Reception and Dispatch of Liquefied Natural Gas (Official Gazette No. 71/16)

On 22 July 2016, HERA issued the *Methodology for Establishing Tariff Items 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 (hereinafter: the LNG terminal), was declared a strategic investment project of significance to Croatia at a 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 (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 "EU Strategy for LNG and Gas Storage", which particularly focuses on diversifying supply routes, ensuring gas supply security, and the role of liquefied natural gas in this respect. The LNG terminal is mentioned in this document as a significant project that will enable 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.

The project to build this liquefied natural gas terminal defines four construction phases, of which phase one includes a floating terminal that would consist of a vessel serving for the reception, storage, and regasification of liquefied natural gas. In this respect, the Croatian government adopted a "Conclusion on Support for the Development of the LNG Terminal Project, Phase One – Construction of a Floating Terminal for the Storage and Regasification of Liquefied Natural Gas on the Island of Krk" at a session held on 8 June 2016.

Consequently, in order to create the necessary conditions for the regular and efficient function of the natural gas market and the function of the LNG terminal itself, HERA issued the *Methodology for Establishing Tariff Items for the Reception and Dispatch of Liquefied Natural Gas*. This methodology takes into consideration the provisions of all laws and by-laws for the gas sector in Croatia, and it is based on a method of incentive regulation that establishes the LNG terminal operator's maximum permitted income.

Amendment to the Methodology for Establishing the Price of Non-Standard Services for Gas Transport, Distribution, Storage, and Public Service Gas Supply (Official Gazette No. 91/16)

On 10 October 2016, HERA issued amendments to the *Methodology for Establishing the Price of Non-Standard Services for Gas Transport, Distribution, Storage, and Public Service Gas Supply*, which introduced a new non-standard service to be provided by the Plinacro d.o.o. transport system operator with the goal of covering expected costs of pressure management service at the Croatian-Hungarian interconnection through the use of a compressor station managed by Hungarian transport system operator FGSZ Ltd. The amendments to the methodology define who is required to pay for the new non-standard service, the price calculation method for the new non-standard service, and the method of implementation and purpose of the final calculation. A time limit for providing this service was also set at 31 December 2017.

Amendments to the Methodology for Establishing the Price of Non-Standard Services for Gas Transport, Distribution, Storage and Public Service Gas Supply (Official Gazette No. 116/16)

On 9 December 2016, HERA issued amendments to the *Methodology for Establishing the Price of Non-Standard Services for Gas Transport, Distribution, Storage, and Public Service Gas Supply*. On 8 September 2016, HERA sent an invitation via an electronic message to all non-standard service providers (distribution system operators, public service gas suppliers, the transport system operator, and the gas storage system operator) for preliminary consultations to draft amendments to the methodology. Consequently, HERA received draft amendments from two non-standard service providers – one distribution system operator and the gas storage system operator. In addition to the preliminary research, during its development of the amendments to the methodology, HERA took into account suggestions sent to it in written form during the first regulation period (2014 – 2016), which proved both significant and controversial in the operations of non-standard service providers during the first regulation period. The adopted amendments resulted in

improved stipulations in particular articles of the methodology and its annexes, included some new non-standard services, and stipulated a number of man-hours HERA deems justified for all amended or new services.

Network Code for the Transport System (2/16)

On 26 February 2016, PLINACRO d.o.o., with HERA's approval, issued the new *Network Code for the Transport System* to stipulate additions or changes to the format of requests for capacity booking on the tri-monthly level, as well as payment guarantee instruments the transport system user is obliged to submit to the transport system operator prior to taking part in auctions for booking interconnection capacities.

Network Code for the Transport System (11/16)

On 4 November 2016, PLINACRO d.o.o., with HERA's approval, issued the new *Network Code for the Transport System* to define the method of contracting interruptible capacity from Croatia to Hungary at the Croatian-Hungarian interconnection until 31 December 2017 and the relevant fee calculation following the introduction of a new non-standard service entitled "Use of Interruptible Capacity with Reduced Interruptibility at the Croatia-Hungary Interconnection".

Rules for Use of the Gas Storage System (12/16)

On 30 December 2016, PODZEMNO SKLADIŠTE PLINA d.o.o., with HERA's approval, issued new *Rules for Use of the Gas Storage System*, which modified and redefined non-standard services, added new annexes containing the *Rules of Allocation of Continued Services*, *Rules for Selling Stored Gas under Open Procedures*, and other changes describing particular vital concepts, deadlines, rules, and procedures in greater detail.

Amendments to the Rules for Use of the Gas Storage System (1/17)

On 12 January 2017, PODZEMNO SKLADIŠTE PLINA d.o.o., with HERA's approval, issued amendments to the *Rules for Use of the Gas Storage System*, shifting the time limit for the receipt of applications for booking standard storage capacity packages from 15 January to 31 January of the current storage year.

Amendments to the Rules for Use of the Gas Storage System (1-2/17)

On 30 January 2017, PODZEMNO SKLADIŠTE PLINA d.o.o., with HERA's approval, issued amendments to the *Rules for Use of the Gas Storage System*, allowing applications for booking standard storage capacity packages on the yearly level to be received in two rounds.

Amendments to the Rules for Use of the Gas Storage System (2/17)

On 28 February 2017, PODZEMNO SKLADIŠTE PLINA d.o.o., with HERA's approval, issued amendments to the *Rules for Use of the Gas Storage System* at the request of the Ministry of Environment and Energy, in order to extend the deadline for applications for booking standard storage capacity packages on the yearly level from 28 February 2017 to 24 March 2017.

Rules for Use of the Gas Storage System (3/17)

On 31 March 2017, PODZEMNO SKLADIŠTE PLINA d.o.o., with HERA's approval, issued the *Rules for Use of the Gas Storage System* 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 allowed gas storage system users a total of five renominations per gas day, the reversal of nominations, and changes in storage work cycles.

Amendments to the Network Code for the Transport System (2/17)

On 24 February 2017, PLINACRO d.o.o., with HERA's approval, issued amendments to the *Network Code for the Transport 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, in the section stipulating the obligation of the transport system operator to implement a tender to select a balancing service provider.

Network Code for the Transport System (03/17)

On 31 March 2017, PLINACRO d.o.o., with HERA's approval, issued the new *Network Code for the Transport 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, the provision of information on balancing, the behaviour of the transport system operator, balancing actions, the order in which offers are accepted, trade transactions on the gas market operator platform, and the establishment of gas quantities for daily, intraday, and monthly reports.

Amendments to the Rules on Gas Market Organisation (2/17)

On 24 February 2017, HROTE d.o.o., with HERA's approval, issued amendments to the *Rules on Gas Market Organisation* for the purpose of harmonisation with Commission Regulation (EU) No 312/2014 of 26 March 2014 establishing a Network Code on Gas Balancing of Transmission Networks (BAL Regulation), in the section introducing the service of balancing and adjusting the calculation of remaining imbalances of the balance group and calculations in the event the balance group ceases to function.

Rules on the Gas Market Organisation (03/17)

On 31 March 2017, HROTE d.o.o., with HERA's approval, issued the *Rules on Gas Market Organisation* 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: the manner in which trading facilities are organised and managed; the fulfilment of the role of trading facility operators; allowing balance responsible parties access to trading facilities; trading calculations at trading facilities; balancing actions taken by the transport system operator; the calculation of the fee for daily imbalances; the implementation of the principle of financial neutrality.

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

The **Act on Amendments to the Gas Market Act** eliminated the obligation of natural gas producers to offer the entire volume of gas produced primarily to Croatia's wholesale market supplier and guaranteed supplier. Additionally, it introduced changes to the gas procurement business model for public service supply by stipulating that public service suppliers 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 based on a public invitation, HEP d.d. has been appointed as the wholesale gas market supplier from 1 April 2017. The gas storage system operator is obliged to allocate 60% of the total available number of storage capacity standard packages to the wholesale gas market supplier. Furthermore, certain provisions defining gas system balancing were amended and adjusted with respect to the trading facility, balancing services, the calculation of fees and costs, and financial neutrality. Finally, to ensure the implementation of REMIT, penalty provisions are defined 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 enrol in the national register maintained by HERA pursuant to REMIT.

Deployment of Alternative Fuel Infrastructure Act of 21 December 2016 (Official Gazette No. 120/2016)

The adoption of the **Deployment of Alternative Fuel Infrastructure Act** on 21 December 2016 and its entry into force created the conditions for the adoption of the National Policy Framework for the Establishment of Infrastructure and the Development of the Alternative Transport Fuel Market (NPF), with the goal of transposing the Directive on the deployment of alternative fuels infrastructure 2014/94/EU of the European Parliament and of the Council of 22 October 2014. Directive 2014/94/EU on the deployment of alternative fuels infrastructure establishes a common framework of measures to introduce alternative transport fuels in order to substitute oil in transport in the long term, with the goal of minimising dependence on oil and mitigating the environmental impact of transport. This directive is being implemented based on the national policy frameworks the member states were obliged to adopt no later than 18 November 2016.

Decision Adopting the National Policy Framework for the Establishment of Infrastructure and the Development of the Alternative Transport Fuel Market (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 the Development of the Alternative Transport Fuel Market*. The purpose of the NPF is to define and elaborate goals and measures to establish infrastructure and develop the alternative transport fuel market. With respect to the gas market, compressed natural gas and liquefied natural gas are deemed alternative transport fuels.

5.2 Regulated activities in the natural gas sector

5.2.1 Natural gas transport

Natural gas transport is a regulated energy-related activity performed as a public service. PLINACRO d.o.o. Zagreb is the transport system operator in Croatia, and it is owned by the Croatian state.

PLINACRO d.o.o. manages the system of trunk and regional gas pipelines through which domestically produced natural gas (the northern part of continental Croatia and the Northern Adriatic) and natural gas from imports via interconnections with Slovenia (Zabok–Rogatec) and Hungary (Donji Miholjac–Dravaszerdahely) is transported to exit metering-reducing stations, where the gas is delivered to gas distribution systems and to end (industrial) consumers directly connected to the transport system. Croatia's gas transport system is shown in Figure 5.2.1.



Figure 5.2.1. The Croatian gas transport system

The operation of the transport system to which the gas production fields of Pannonia and the Northern Adriatic, the Okoli UNDERGROUND GAS STORAGE FACILITY (hereinafter: UGSF), 35 distribution systems, and 21 active end consumers are directly connected is constantly monitored and managed by the national control centre in Zagreb, which is equipped with a modern Supervisory Control and Data Acquisition System (SCADA). The operational management and maintenance of the system is organised into five gas transport regions: “Eastern Croatia,” based in Donji Miholjac; “Central Croatia,” based in Popovača; “Northern Croatia,” based in Zabok; “Western Croatia,” based in Rijeka; and “Southern Croatia,” based in Benkovac.

The total length of Croatia’s gas transport system amounted to 2,694km at the end of 2016, of which 952km were gas pipelines with a working pressure of 75 bar and 1,742km were gas pipelines with a working pressure of 50 bar.

Gas can be received into the transport system via 10 connections at entry metering stations, of which six active connections serve to receive gas from production fields in Croatia (the Legrad connection was not active in 2016). Two connections are international and serve to receive gas from import routes, while one is for withdrawing gas from the Okoli UGSF (underground gas storage facility).

Gas from the transport system is delivered to 199 connections (157 exit metering-reducing stations), of which 37 connections serve to deliver gas to industrial consumers connected to the transport system, 161 connections serve to deliver gas to distribution systems operated by the 35 distribution system operators, and one connection serves to inject gas into the UGSF Okoli underground gas storage facility.

In terms of investments realised in 2016, transport system operator PLINACRO d.o.o. began preparatory activities including the creation of environmental impact assessments, research work, the preparation of surveying plans, preliminary and final project design, the settlement of property rights issues, the acquisition of site permits and construction permits, and the specification and procurement of equipment, all with the goal of realising the preconditions to begin construction on the Omišalj – Zlobin gas pipeline, the KS1 compressor station, and 12 standard metering-reducing stations.

Investments in gas pipeline projects were not realised in accordance with the plans for 2016 – their total amount was less than planned for 2016 due to long-term administrative procedures concerning amendments to county spatial plans, the cadastral verification of surveying plans, and the implementation of long-term strategic environmental impact assessment procedures. The planned amount of investment into metering-reducing stations in 2016 was realised in full through the development of 12 standard container stations. Planned investment into the KS1 compressor station project was not realised because of the lengthy public procurement procedure for hiring design, construction supervision, and consulting services. However, following the signing of the contract in October 2016, activities began concerning the preparation of design documents and the technical specifications of major equipment. With respect to the metering system project, investment concerning the design, procurement, and installation of some metering equipment was realised. In addition, investment into supervision, management, and upgrades to the technical security system was also realised. Investments into power facilities were also realised, and power facilities in Stankovci and Ogulin were built according to schedule.

In 2013, 44 gas suppliers associated into 13 balancing groups used the gas transport service.¹⁴

Transport system operator PLINACRO d.o.o. carried out capacity and congestion management in 2016 in accordance with the provisions of the *Network Code for the Transport System*, which were harmonised with 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 transport systems, methods of cooperation between adjacent transport system operators to facilitate the sale of capacity, the booking of transport system interconnection capacity using IT capacity booking platforms, standard capacity types, and capacity coupling on both sides of particular interconnections.

In 2016, a total of 957 applications for annual, quarterly, monthly, daily, and intraday capacity bookings were received via the SUKAP system and auctions on the PRISMA and RBP internet platforms. Applications were received from 13 balance groups. The capacity booking applications received concerned 50 transport system users and 1,275 “balance group – transport system user – connection” combinations.

In the gas year 2016/2017, capacity booking was performed on a quarterly basis at interconnections and on the national market for the first time. Interconnection capacity booking on a quarterly basis can be performed once per year for all four quarters, and the same is possible on the internal market four times per year for the coming quarter. Additionally, interest in capacity booking on a yearly basis at transport system exit points declined for the 2016/2017 gas year, however, quarterly interest in capacity booking is

¹⁴ The number of balance groups on 31 December 2016

significant. Furthermore, capacities booked on the monthly and daily level increased as compared to the 2015/2016 gas year.

Transport system balancing was managed in the manner stipulated by the *Rules on Gas Market Organisation (HROTE, 12/2014)*. 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 balancing group submitted in a single booking application form a single gas transport contract. Implementation continued of Commission Regulation (EU) No 312/2014 establishing a Network Code on Gas Balancing of Transmission Networks, which stipulates a balancing code. In 2016, HERA issued a new *Methodology for Establishing the Price of Balancing Energy in the Gas System*, and the gas market operator developed a trading facility for the transaction of balancing products. The new balancing rules entered into force on 1 April 2017 through the gas market operator's adoption (with HERA's approval) of new *Rules on Gas Market Organisation*, the transport system operator's new *Network Code for the Transport System*, and the gas storage system operator's new *Rules for use of the Gas Storage System*.

Data is shared daily with neighbouring transport system operators at interconnection points with Hungary (*Donji Miholjac – Dravaszerdahely*) and Slovenia (*Zabok – Rogatec*) in order to balance gas quantities nominated by both operators, as is data on measured gas quantities, gas content, and other obligations under mutually agreed rules. Commission Regulation (EU) 2015/703 establishing a network code on interoperability and data exchange rules, which was adopted in April 2015, entered into force on 1 May 2016. The transport system operator informed HERA that it had fully implemented this regulation.

The regular activities of transport system capacity management were conducted during 2016 under the following business processes:

- gas transport 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 disclosure of data, and
- gas quality data monitoring and disclosure.

The number of transport system users in 2016 by category was as follows:

- 14 users using entries into the transport system at interconnections,
- 1 user using an entry into the transport system from an upstream pipeline network,
- 44 users using exits from the transport system to distribution systems, and
- 9 users using exits from the transport system to end consumers.

According to data submitted by PLINACRO d.o.o., the total quantity of transported gas in Croatia in 2016 amounted to 27,647,684,078kWh, which represents a 4.8% increase as compared to the total transported quantity in 2015. Total losses and imbalances in gas metering in 2016 amounted to 0.18%. The largest quantity of gas transported in a single day for final consumption¹⁵ amounted to 126,710,755kWh/day. The total technical capacity of all entries into the transport system as of 31 December 2016 was 11,257,570kWh/h. According to data submitted by PLINACRO d.o.o., technical capacities were determined for ten entries into the transport system, the largest being the following: Dravaszerdahely – 2,880,000kWh/h; Pula Terminal – 2,592,996kWh/h; UGSF Okoli – 2,277,600kWh/h; Rogatec – 2,016,000kWh/h. The maximum used capacity at all transport system entry points per hour in 2016 amounted to 5,336,388kWh/h, while the maximum used capacity during the year at the level of particular transport system entry points was attained at the UGSF Okoli entry point in the amount of 2,052,058kWh/h. The quantities

¹⁵ Exits to the distribution systems and the exits to the customers directly connected to the transport system.

of gas transported by transport system entry groups by month for 2016 are shown in Figure 5.2.2.

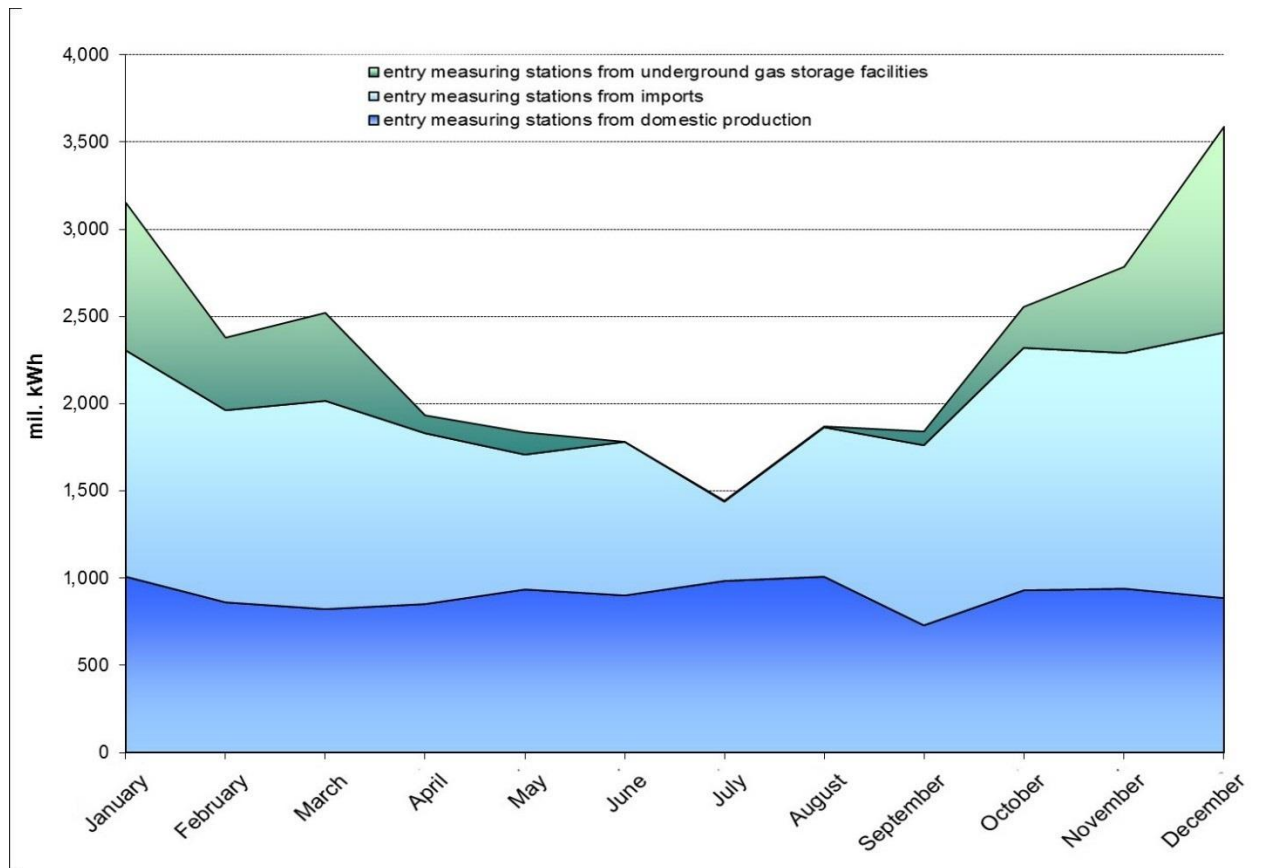


Figure 5.2.2. Quantities of gas transported by transport system entry groups by month for 2016

The total technical capacity of the exits from the transport system as of 31 December 2016 was 18,650,842kWh/h. Of this amount, the total technical capacity of exits to distribution systems amounted to 11,005,354kWh/h, the total technical capacity of exits to end consumers directly connected to the transport system was 6,127,088kWh/h, and the technical capacity of the exit to UGSF Okoli was 1,518,400kWh/h. The maximum hourly used capacity at all transport system exits in 2016 amounted to 5,279,615kWh/h, whereas the maximum used capacity at the level of particular transport system exit points was recorded at the exit to distribution systems in the amount of 3,313,246kWh/h. The quantities of gas transported per transport system exit groups by month in 2016 are shown in Figure 5.2.3.

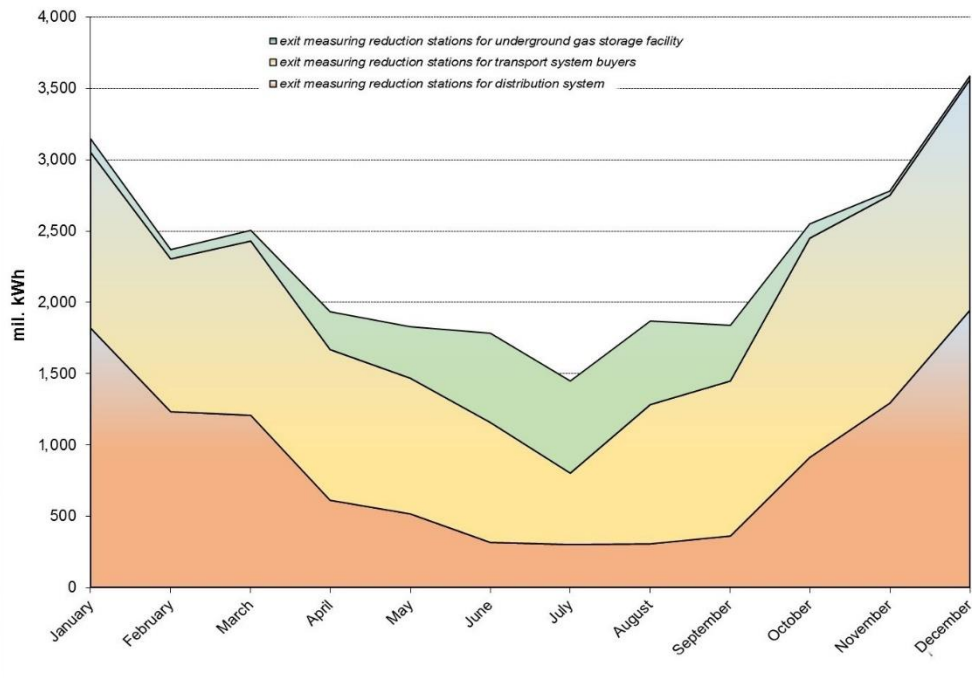


Figure 5.2.3. Quantities of gas transported by transport system exit groups by month in 2016

The slight rise in gas consumption that began in 2015 continued in 2016, following a three-year period of decline in consumption and record low consumption in 2014. Compared to 2015, a 6.05% increase in gas consumption was recorded in 2016. The total annual quantities of gas transported by consumer groups are shown in Figure 5.2.4.

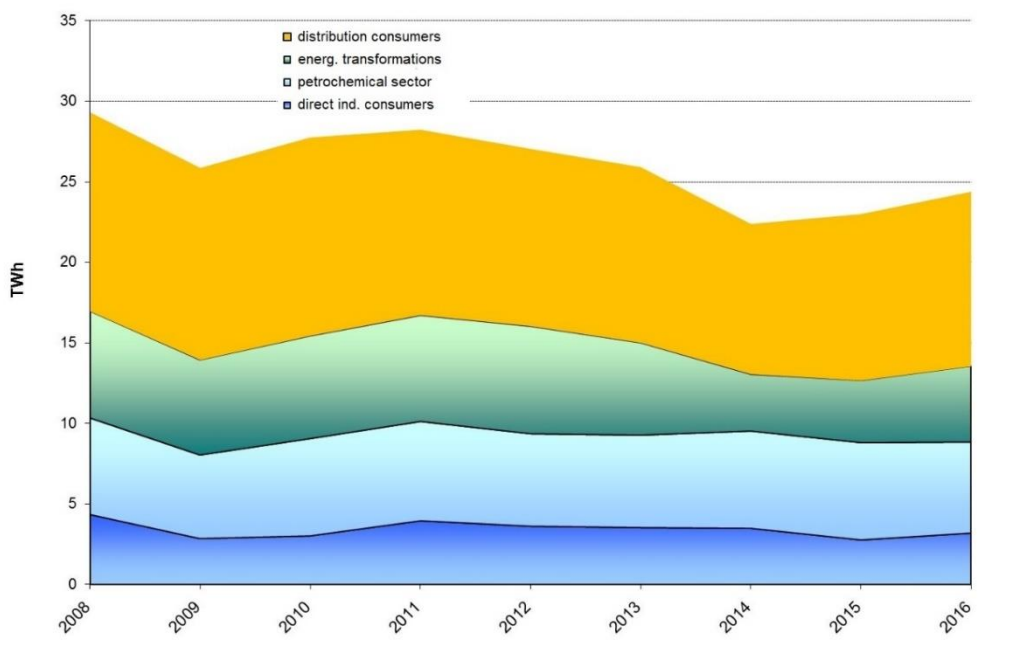


Figure 5.2.4. Total annual quantities of gas transported by consumer groups

The price of natural gas transport in 2016 was established based on the *Methodology for Establishing Gas Transport Tariff Items* (hereinafter: the Methodology). The Methodology is based on the principle of maximum allowed transport 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 projection of value of regulated assets for a regulation period of five years is determined with the *ex-ante* approach of approving investment plans, as well as with the *ex-post* evaluations of realised investments. Upon the expiry of a regulation period, allowed revenues are audited, including the operating and capital costs, and realised revenues are compared based on the tariff items for gas transport with audited allowed revenues, and all 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, i.e. gas storage, liquefied natural gas terminal management, and gas distribution.

The *Methodology* stipulates eight tariff items, contained in the following groups: tariff items for annual contracted firm capacity for entries into the transport system; tariff items for annual contracted firm capacity for exits from the transport system; a tariff item for gas quantities at exits from the transport system; a tariff item for the entry from the liquefied natural gas terminal.

The gas transport tariff item amounts are established by HERA, and they are the same for all transport system users. The *Decision on the Amounts of Tariff Items for Gas Transport* for PLINACRO d.o.o., which entered into force on 1 January 2014, defines the gas transport tariff items for individual years of the first regulation period 2014 – 2016, which were applied until 30 September 2015. In June 2015, during an extraordinary audit procedure, HERA issued a *Decision on the Amounts of Tariff Items for Gas Transport* for PLINACRO d.o.o. It entered into force on 1 October 2015, and established new gas transport tariff items for 2015 and 2016 within the first regulation period 2014 – 2016. The applicable tariff item amounts, excluding VAT,¹⁶ for gas transport in 2016 are shown in Table 5.2.1.

Table 5.2.1. Amounts of tariff items for gas transport in 2016

Tariff item type	Tariff item ID	Tariff item name	Tariff item amount	Unit of measurement
Tariff items for annual contracted firm capacity for entries into transport system	T _{U,IN}	Tariff item for entry at interconnection	3.4147	HRK/kWh/day
	T _{U,PR}	Tariff item for entry from production	3.0732	HRK/kWh/day
	T _{U,SK}	Tariff item for entry from gas storage system	0.3415	HRK/kWh/day
Tariff items for annual contracted firm capacity for exits from transport system	T _{I,IN}	Tariff item for exit at interconnection	8.6399	HRK/kWh/day
	T _{I,HR}	Tariff item for exit in Croatia	1.2960	HRK/kWh/day
	T _{I,ZZ}	Tariff item for exit in separate zone	-	HRK/kWh/day
Tariff item for gas quantity at exits from transport system	T _K	Tariff item for gas quantity	0.0022	HRK/kWh

¹⁶ All tariff items and prices mentioned in this chapter are net of VAT.

The price of gas transport for particular transport system users, i.e. the fee for use of the gas pipeline transport system, is established pursuant to the *Methodology for Establishing Gas Transport Tariff Items*, according to the previously leased use and actual use of transport system capacities for particular users in one year. Transport system entry or exit capacities are contracted separately, on an annual, monthly, or daily basis.

The total average price of gas transport in 2016 for all transport system users amounted to HRK 0.0208/m³, which was an increase of 8.74% as compared to the total average gas transport price in 2015.

In March 2017, pursuant to the *Methodology for Establishing Gas Transport Tariff Items*, HERA issued a *Decision on the Amounts of Tariff Items for Gas Transport Defining the Amounts of Tariff Items for Gas Transport for the Second Regulation Period 2017 – 2021*. The tariff item amounts for gas transport pursuant to the above *Decision* are shown in Table 5.2.2.

Table 5.2.2. Amounts of tariff items for gas transport for the period 2017 – 2021

Tariff item type	Tariff item ID	Tariff item name	Tariff items for regulation period years (excluding VAT)					Unit of measurement
			T 2017	T+1 2018	T+2 2019	T+3 2020	T+4 2021	
Tariff items for annual contracted firm capacity for entries into transport system	T _{U,IN}	Tariff item for entry at interconnection	2.7432	2.7476	2.6778	2.5404	2.4112	HRK/kWh/day
	T _{U,PR}	Tariff item for entry from production	2.4689	2.4728	2.4100	2.2864	2.1701	HRK/kWh/day
	T _{U,SK}	Tariff item for entry from gas storage system	0.2743	0.2748	0.2678	0.2540	0.2411	HRK/kWh/day
	T _{U,UPP}	Tariff item for entry from LNG terminal	-	-	-	-	-	HRK/kWh/day
Tariff items for annual contracted firm capacity for exits from transport system	T _{I,IN}	Tariff item for exit at interconnection	6.9710	7.0118	6.6107	5.6222	5.6789	HRK/kWh/day
	T _{I,HR}	Tariff item for exit in Croatia	1.0457	1.0518	0.9916	0.8433	0.8518	HRK/kWh/day
	T _{I,ZZ}	Tariff item for exit in separate zone	-	-	-	-	-	HRK/kWh/day
Tariff item for gas quantity at exits from transport system	T _K	Tariff item for gas quantity	0.0018	0.0018	0.0018	0.0018	0.0018	HRK/kWh

5.2.2 Natural gas storage

Natural gas storage is a regulated energy-related activity performed as a public service. Since 2009, the gas storage system operator in Croatia has been PODZEMNO SKLADIŠTE PLINA d.o.o., which uses UGSF Okoli for natural gas storage. The geographical position of this facility is shown in Figures 5.2.1 and 5.2.8.

UGSF Okoli consists of an underground deposit (geological structure), operating and control wells, and an aboveground facility with main structures such as well platforms, connection pipelines, a regulation station, a gas drying station, a metering station, a compression station, and auxiliary installations. As a rule, natural gas is injected into the underground deposit from 1 April to 31 September, and withdrawn from 1 October to 31 March.

The technical capacities of the gas storage system¹⁷ are defined in the Additional Mining Design for the Okoli production field – UNDERGROUND GAS STORAGE, dated 25 November 2005. Technical working volume capacity amounts to 5,050,000MWh, technical withdrawal capacity amounts to 2,226MWh/h (53,424MWh/day), while technical injection capacity amounts to 1,391MWh/h (33,384MWh/day).

During 2016, a total of 2,631,843MWh of natural gas was injected into UGSF Okoli, while 3,367,969MWh of natural gas was withdrawn. There were a number of periods in the UGSF Okoli work cycle in 2016 – four periods of gas withdrawal, two periods of stand-by, and three periods of gas injection. The end of the natural gas withdrawal cycle and the beginning of the injection cycle, as established according to the minimum gas quantity in the storage facility per calendar year, was 1 April 2016, when the balance of working volume was 2,202,861MWh. The beginning of the final gas withdrawal cycle was 24 October 2016, when the working volume balance amounted to 4,667,839MWh, which was the highest working volume balance of UGSF Okoli. The natural gas working volume balance of UGSF Okoli on specific dates during 2016 is shown in Figure 5.2.5. The largest gas withdrawal capacity achieved in 2016 amounted to 2,226MWh/h, while the largest gas injection capacity achieved was 1,391MWh/h.

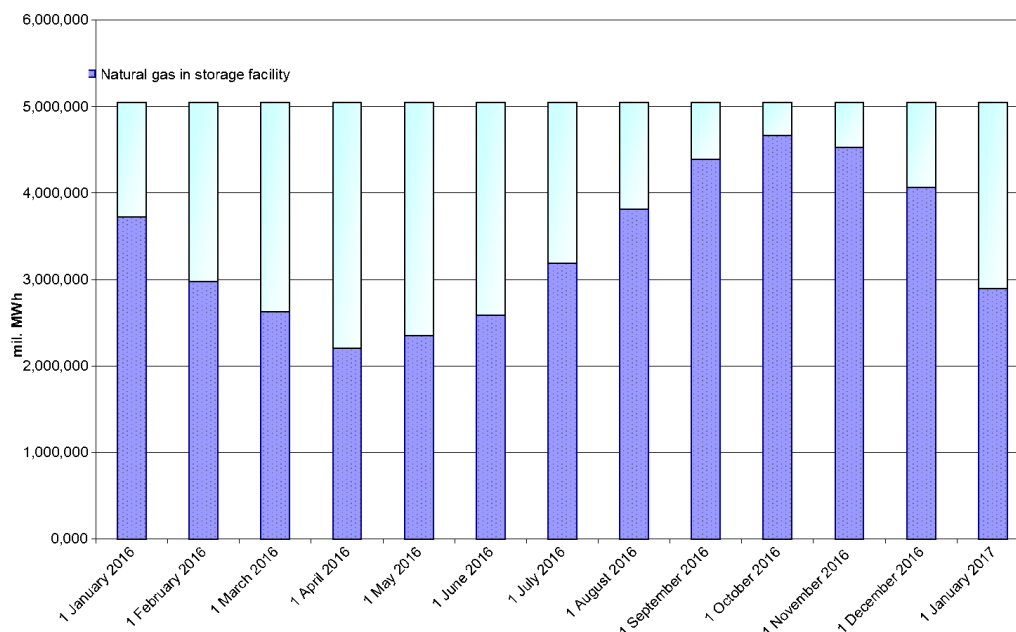


Figure 5.2.5. Natural gas supplies at UGSF Okoli on specific days in 2016

Investment by PODZEMNO SKLADIŠTE PLINA d.o.o. into the development and expansion of the UGSF Okoli gas storage system during 2016 included completing the construction of two new operating wells, Ok-62 and Ok-63, completing work on a project to connect wells Ok-20, Ok-26, and Ok-1D (which had been converted into operating wells for underground gas storage through prior mining work), and completing the construction of a formation water injection system. Simultaneously, activities concerning a compressor

¹⁷ Technical capacity represents the total gas storage system capacity the gas storage system operator can offer system users, taking into consideration the integrity and technical capabilities of the gas storage system.

station expansion project and the development of an integrated computer model for UGSF Okoli continued in 2016.

Furthermore, as part of a project to construct the new Grubišno underground gas storage facility, additional research work was carried out in 2016 to establish the possibility of gas storage in geological structures at "Grubišno polje" hydrocarbon production field.

In 2016, the applicable tariff items for gas storage were those issued by HERA in the *Decision on Gas Storage Tariff Items* for the first regulation period 2014 – 2016, pursuant to the *Methodology for Establishing Gas Storage Tariff Items*. The amounts of tariff items pursuant to this decision, which were applicable from 1 January 2016 to 31 December 2016, are shown in Table 5.2.3.

Table 5.2.3. Amounts of tariff items for natural gas storage in 2016

Tariff item type	Tariff item ID	Tariff item name	Tariff item amount	Unit of measurement
Tariff item for annual contracted standard storage capacity package	T _{SBU}	Tariff item for standard storage capacity package (SBU)	1,745,171.57	HRK/SBU
Tariff items for individual annual contracted firm services	T _{S,UTIS}	Tariff item for firm injection capacity	1.4318	HRK/kWh/day
	T _{S,POV}	Tariff item for firm withdrawal capacity	1.1454	HRK/kWh/day
	T _{S,RV}	Tariff item for firm working volume	0.0155	HRK/kWh
Tariff item for individual daily contracted interruptible services	T _{P,UTIS}	Tariff item for interruptible non-nominated injection capacity	0.0105	HRK/kWh/day
	T _{P,POV}	Tariff item for interruptible non-nominated withdrawal capacity	0.0084	HRK/kWh/day

In December 2016, pursuant to the *Methodology for Establishing Gas Storage Tariff Items*, HERA issued the *Decision on Gas Storage Tariff Items (Official Gazette No. 122/16)*, which defined the amounts of tariff items for gas storage for the second regulation period 2017 – 2021. The tariff item amounts for gas storage pursuant to the above decision are shown in Table 5.2.4.

Table 5.2.4. Amounts of tariff items for gas storage for the period 2017 – 2021

Tariff item type	Tariff item ID	Tariff item name	Tariff items – HERA adjustment (excluding VAT)					Unit of measurement
			T 2017	T+1 2018	T+2 2019	T+3 2020	T+4 2021	
Tariff items for annual contracted standard storage capacity package	T _{SBU}	Tariff item for standard storage capacity package	1,339,094	1,324,608	1,310,279	1,296,105	1,282,084	HRK/SBU
Tariff items for individual annual contracted firm services	T _{S,UTIS}	Tariff item for firm injection capacity	1.2243	1.2110	1.1979	1.1850	1.1721	HRK/kWh/day
	T _{S,POV}	Tariff item for firm withdrawal capacity	0.9794	0.9688	0.9583	0.9480	0.9377	HRK/kWh/day
	T _{S,RV}	Tariff item for firm working volume	0.0205	0.0203	0.0201	0.0199	0.0196	HRK/kWh
Tariff item for individual daily contracted interruptible services	T _{P,UTIS}	Tariff item for interruptible non-nominated injection capacity	0.0100	0.0099	0.0098	0.0097	0.0096	HRK/kWh/day
	T _{P,POV}	Tariff item 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 is directly related to other gas market components, particularly in the context of market liberalisation. In this sense, the operations of the gas storage system operator were marked by several phases – up to 31 March 2014, when the storage system was used by only one user; from 1 April 2014 to 31 March 2017, when the storage system was used by a number of users for the first time (four gas suppliers and the transport system operator); and a further increase in the number of users after 1 April 2017, since when the gas storage service has been used by up to nine users (eight gas suppliers and the transport system operator). It should be pointed out here that the gas storage system operator was obliged¹⁸ to provide priority allocation of a portion of standard storage gas system capacity packages (SBUs) to the

¹⁸ The Decision of the Croatian government on Establishing Priorities during the Gas Storage System Capacity Allocation Procedure for the Wholesale Gas Market Supplier (Official Gazette 29/14), and Article 31, Paragraph 2 of the Act on Amendments to the Gas Market Act (Official Gazette 16/17),

wholesale market supplier. Thus, from 1 April 2014 to 31 March 2017, the wholesale market supplier was allocated 70% of the total available number of standard packages, while the number of packages was reduced to 60% of the total available number of standard packages after 1 April 2017. The gas storage system operator conducted a capacity booking procedure for the five-year period beginning on 1 April 2017, during which 18 users expressed interest to lease. After this procedure, some of these users took advantage of the opportunity to take part in the secondary gas storage system capacity market. The allocation standard gas storage capacity packages during the aforementioned periods is shown in Figure 5.2.6. To adapt to market demands and the new balancing rules, the gas storage system operator provided gas storage system users with a number of renominations for the use of storage capacities over the gas day, the reversal of nominations, and changes in storage work cycles.

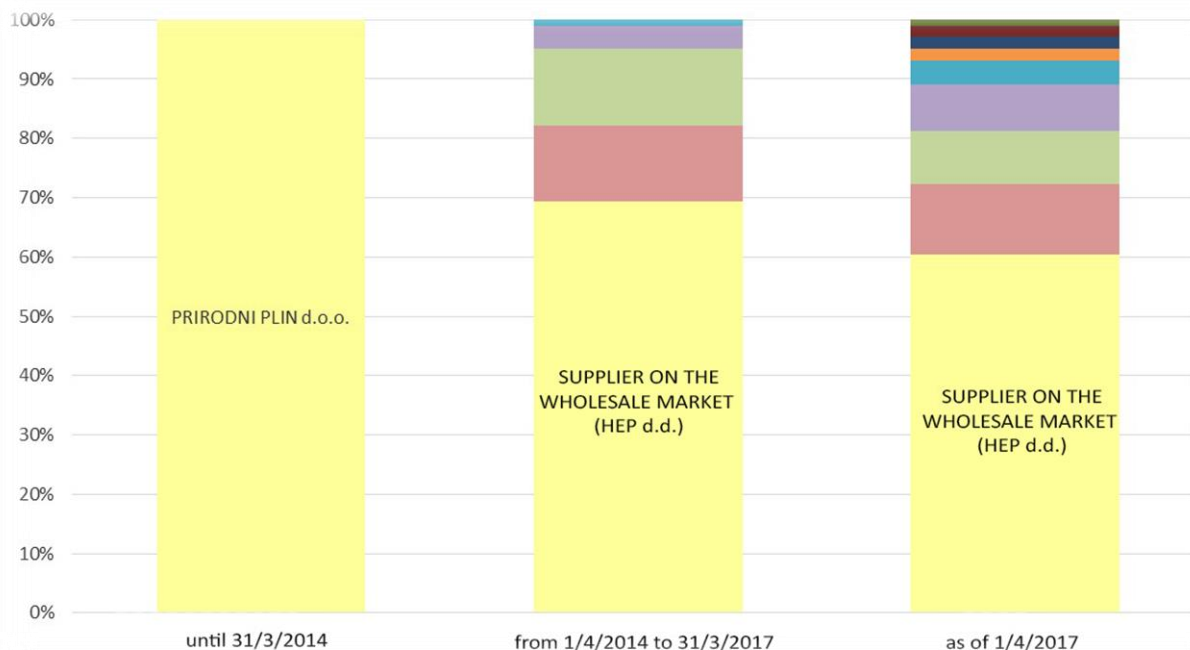


Figure 5.2.6. Allocation of UGSF Okoli's standard gas storage capacity packages

5.2.3 Gas distribution

Gas distribution is a regulated energy-related activity performed as a public service. In 2016, gas distribution in Croatia was performed by 35 energy entities.

According to data collected by HERA from the 35 distribution system operators, the total distributed gas quantities¹⁹ in Croatia amounted to 10,837 million kWh in 2016, which represents an increase of 5% as compared to distributed gas quantities in 2015. Of the total quantity of distributed gas, the largest quantities were distributed to TM2 (4,026 million kWh), TM5 (1,330 million kWh), and TM3 (1,151 million kWh) tariff model users.

The total number of billing metering points for end consumers connected to the distribution system amounted to 659,914 in 2016, which represented an increase of 0.54% as compared to the total number of billing metering points in 2015. Of the total number of billing metering points in 2016, 654,148 were under TM1-TM4 tariff models (with annual consumption of up to 100,000 kWh), while 5,766 were under TM5-TM12 tariff models (with annual consumption exceeding 100,000 kWh).

The total length of all gas distribution systems in Croatia amounted to 19,153km at the end of 2016, which represents an increase of 0.9% as compared to the total length of all

¹⁹ Natural gas and associated gas.

gas distribution systems at the end of 2015, according to data collected from the distribution system operators. Of the total length of the distribution system at the end of 2016, low-pressure pipelines accounted for 16.3%, medium-pressure pipelines accounted for 77.0%, and high-pressure pipelines accounted for 6.7%. In terms of the type of material, 17.8% of the total length of the distribution system at the end of 2016 was made of steel, 81.9% was made of polyethylene pipes, and 0.3% was made of other materials. The total number of odourisation stations in all distribution systems at the end of 2016 was 134. A comparison of the length of distribution systems, the total technical capacity of entries into distribution systems, and gas losses by distribution system operators in Croatia in 2016 are shown in Figure 5.2.7. The geographical layout of the distribution system operators' distribution areas in 2016 is shown in Figure 5.2.8.

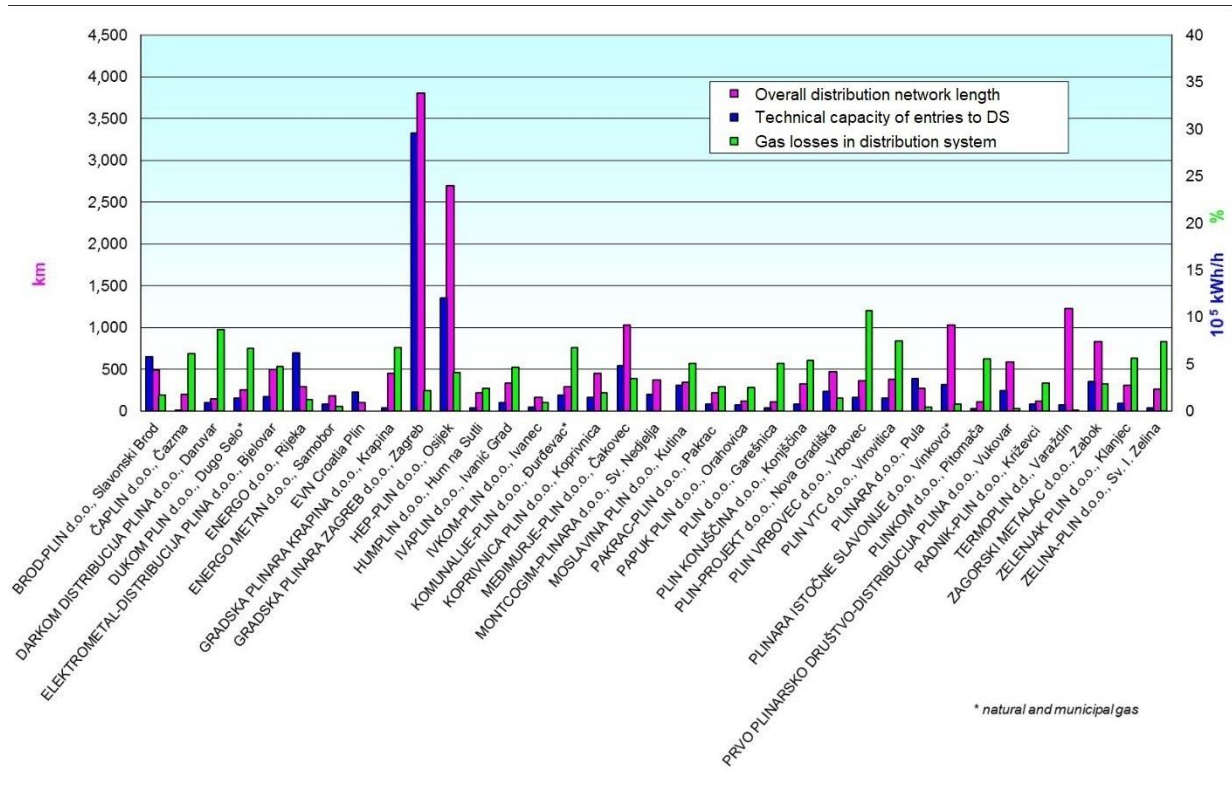


Figure 5.2.7. Comparison of the length of distribution systems, the total technical capacity of entries into distribution systems, and gas losses by distribution system operators in Croatia in 2016

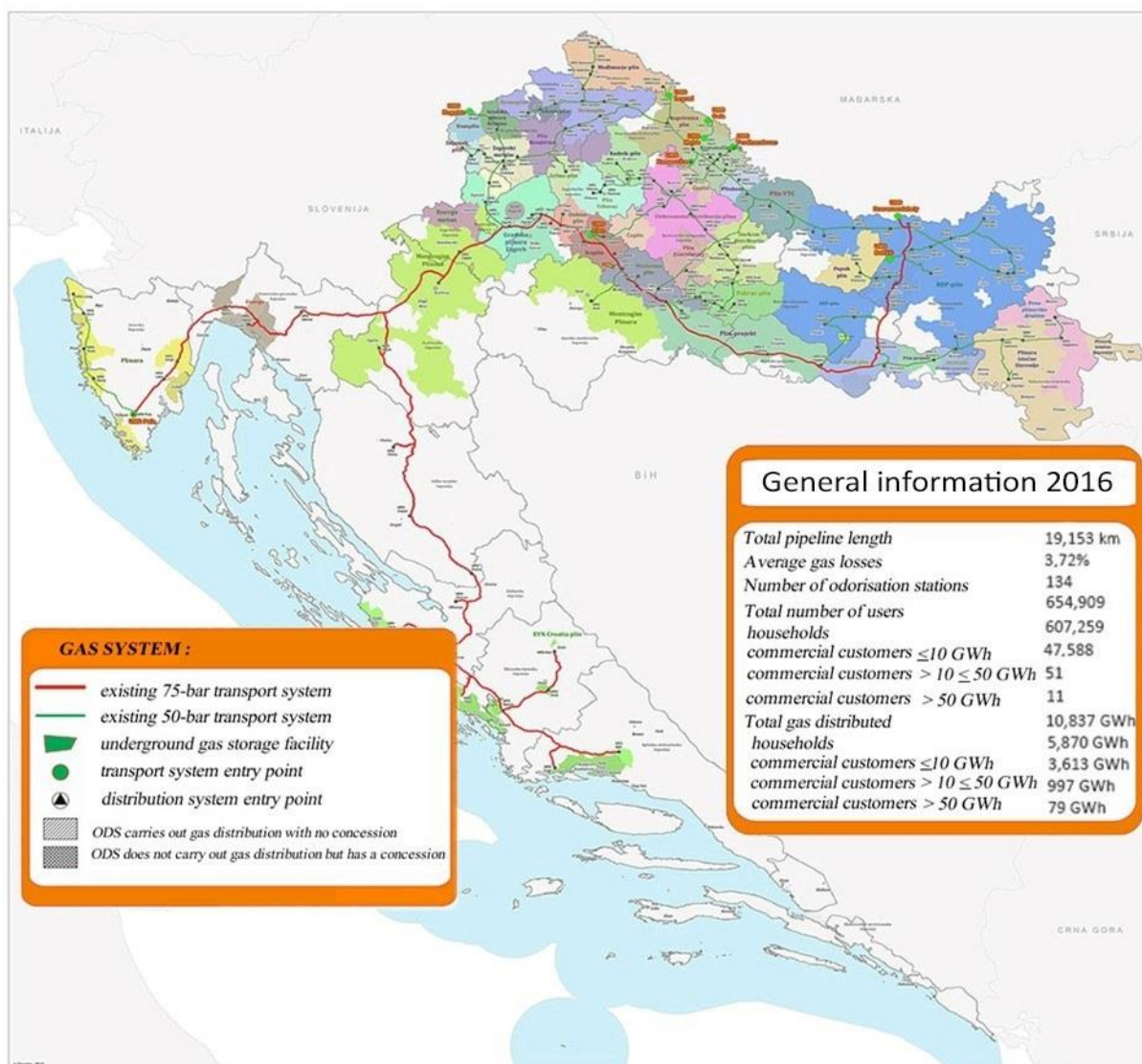


Figure 5.2.8. Locations of the distribution system operators' distribution areas, and basic information on gas distribution activities in Croatia in 2016

The price of gas distribution, pursuant to the **Energy Act**, was regulated and established in 2016 through the application of the *Methodology for Establishing Gas Distribution Tariff Items*. The methodology classifies billing metering points into 12 tariff models according to annual gas consumption. The gas distribution price consists of the Ts1 tariff item for the distributed quantity of gas, which is established separately for each distribution system operator, and the Ts2 tariff item, representing a fixed monthly fee that is the same for all operators for a particular tariff model. The gas distribution tariff item amounts for the period from 1 January 2016 to 31 December 2016 were established in the *Decision on Gas Distribution Tariff Items*.

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 gas distribution price for the period from 1 January 2016 to 31 December 2016 of all distribution system operators in the Republic of Croatia was HRK 0.0513/kWh, which represents a decrease of 9.1% as compared to the total average weighted gas distribution price in 2015. The average prices of gas distribution by distribution system operators in 2016 are shown in Figure 5.2.9.

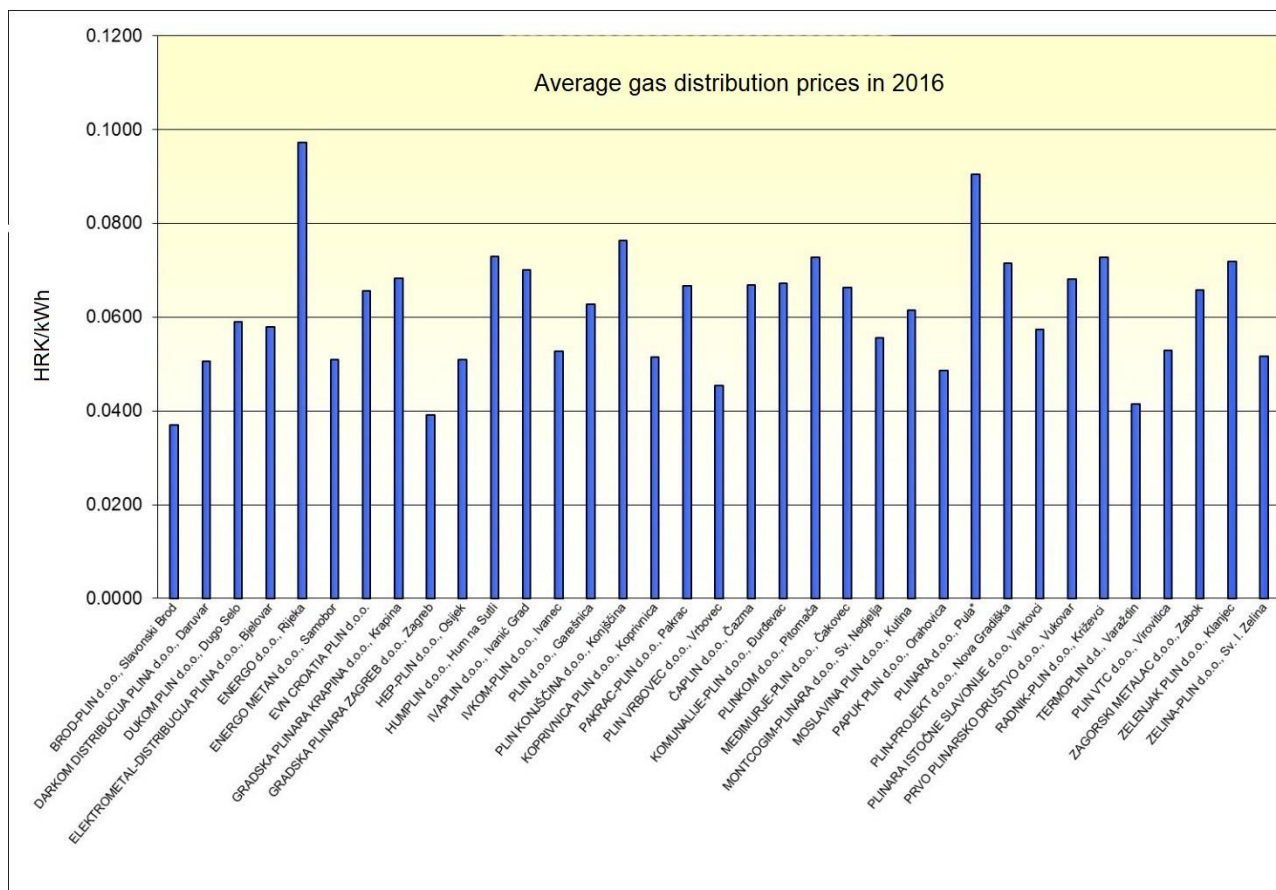


Figure 5.2.9. Average prices of gas distribution by distribution system operators in the Republic of Croatia in 2016

In December 2016, pursuant to the *Methodology for Establishing Gas Distribution Tariff Items*, HERA issued the *Decision on Gas Distribution Tariff Items*, which defined the amounts of tariff items for gas distribution for the second regulation period 2017 – 2021 for all 35 distribution system operators in Croatia. The total expected average weighted gas distribution price for the period from 1 January 2017 to 31 December 2017 of all distribution system operators in Croatia is HRK 0.0498/kWh, which represents a decrease of 2.9% as compared to the total average weighted gas distribution price in 2016 (for the same annual distributed gas quantities).

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 transport system operator, distribution system operator, 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 requirement to unbundling activities was fulfilled by all market participants by 2010. In 2016, gas was transported by gas entity PLINACRO d.o.o., while gas storage was handled by energy entity PODZEMNO SKLADIŠTE PLINA d.o.o.

In 2016, gas was distributed by 35 energy entities and actively supplied by 42 out of 55 licenced energy entities. Of 35 distribution system operators, 13 were organised as independent legal entities dealing with gas distribution only, 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 supply. The structure of energy entities in the

gas sector at the end of 2016, with respect to their energy activities and unbundling requirements, is shown in Figure 5.2.10.

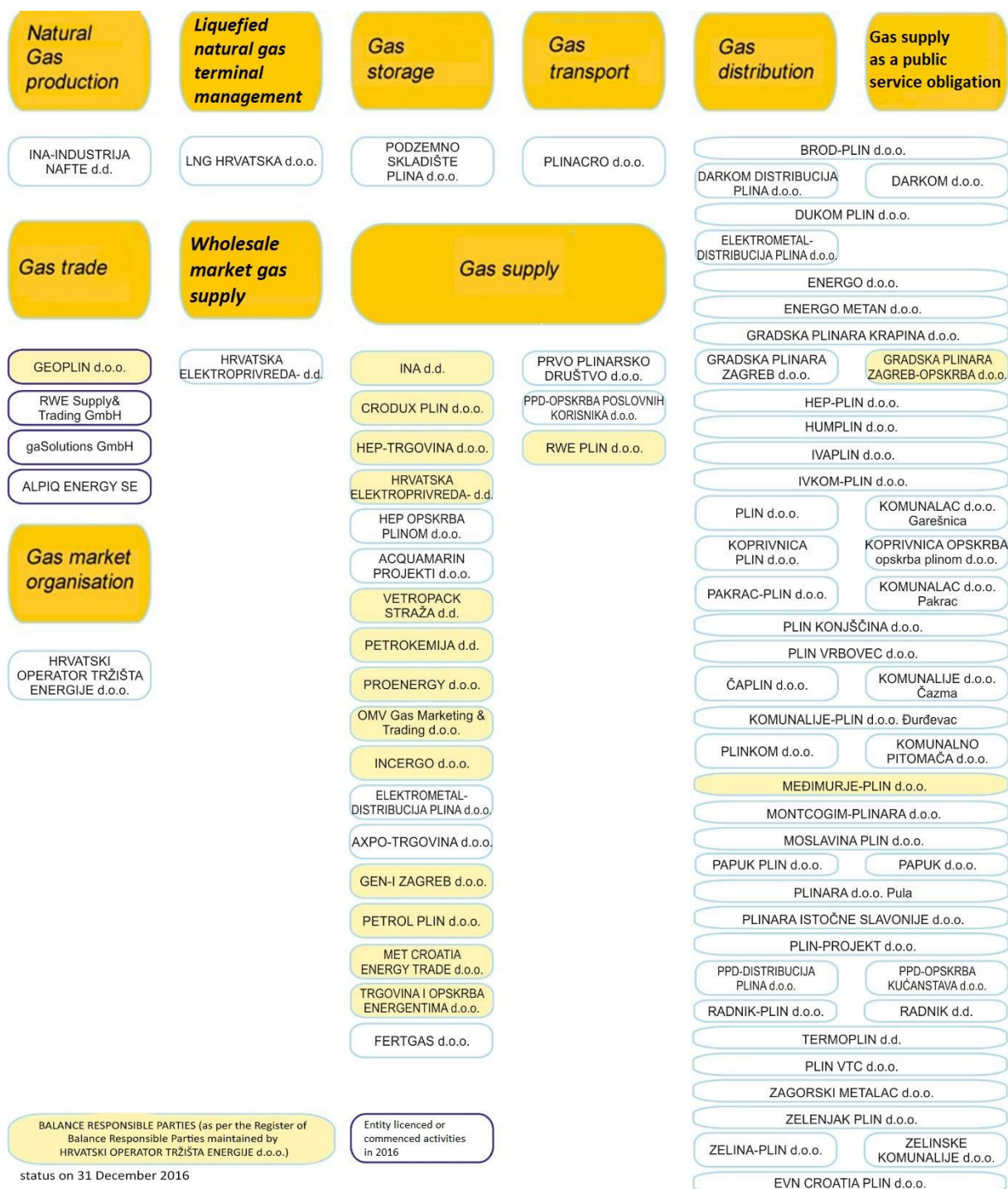


Figure 5.2.10. Structure of energy entities by their role in the gas market of the Republic of Croatia

The certification of energy entity PLINACRO d.o.o. is a procedure founded in the principles of the European Union single internal electricity and gas market, through which HERA, as the national energy regulator, affirms the conformity of the transport system operator with the provisions of the **Gas Market Act**, which define the unbundling, independence, and organisational structure of the transport system operator for gas. The **Gas Market Act** lays down three possible models under which the operator can be certified:

- as a transport system operator unbundled in terms of ownership,
- as an independent system operator, or

- as an independent transport operator.

In May 2013, PLINACRO d.o.o. submitted to HERA an application for certification as a gas transport system operator according to the model of an operator unbundled in terms of ownership, and met the majority of requirements. PLINACRO withdrew the application in April 2015 and resubmitted 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 that deal in electricity production, trade, and supply, as well as natural gas production. HERA continuously cooperates with PLINACRO d.o.o., as well as with relevant Croatian institutions, in order to finalise the certification procedure of the Croatian transport system operator as soon as possible.

5.3 Gas market

5.3.1 Natural gas balance

In 2016, the total natural gas quantity that entered the transport system amounted to 27,689 million kWh, of which 10,855 million kWh (39.2%) was from domestic production, 12,836 million kWh (46.4%) was from imports, and 3,998 million kWh (14.4%) was from UGSF Okoli (Figure 5.3.1).

In 2016, the total gas quantity that exited the transport system amounted to 27,647 million kWh, of which 13,543 million kWh (49.0%) was for end consumers directly connected to the transport system, 10,837 million kWh (39.2%) was for consumers on the distribution system, and 3,267 million kWh (11.8%) was for UGSF Okoli.

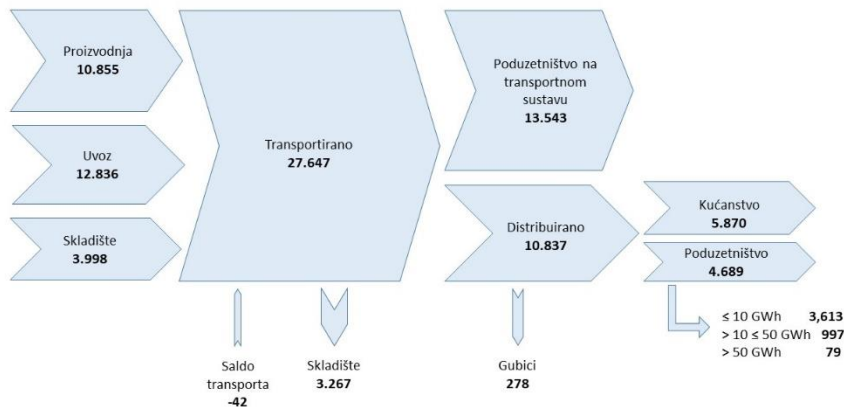


Figure 5.3.1. Natural gas balance in the Republic of Croatia in 2016

According to data from gas suppliers, a total of 10,559 million kWh of gas was delivered to end consumers in 2016 from the distribution systems, of which 5,870 million kWh (56%) was delivered to households and 4,689 million kWh (44%) was delivered to commercial consumers.

In 2016, 44 gas suppliers associated into 13 balancing groups used the gas transport service. According to the share of individual balancing groups in the quantity of gas transported by transport system exit groups, balance responsible party INA d.d. took 31.6% of gas quantities from the transport system, balance responsible party Prvo plinarsko društvo d.o.o. took 24.4% of gas quantities, balance responsible party HEP d.d. took 17.8% of gas quantities, balance responsible party HEP-Trgovina plina d.o.o. took

12.2% of gas quantities, and the remaining nine balancing groups took 14.0% of gas quantities. The shares of respective balancing groups in 2016 are shown in Figure 5.3.2.

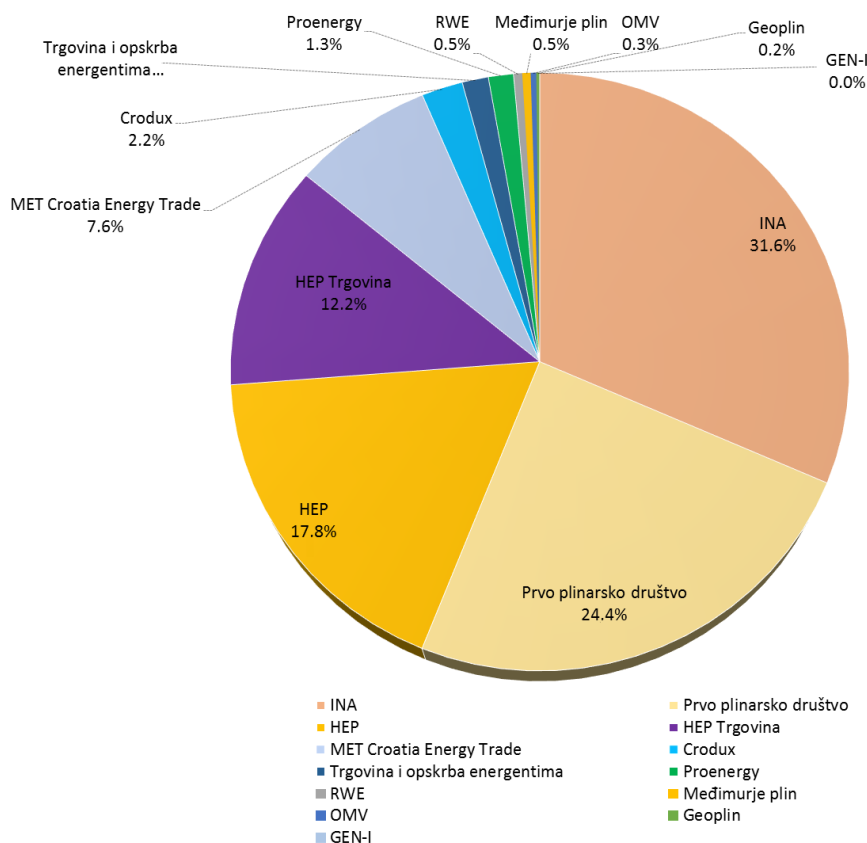


Figure 5.3.2. The share of balancing groups in total natural gas quantities delivered by the transport system in 2016

A significant component of Croatia's wholesale gas market is trade at the virtual trading point (hereinafter: VTP). The VTP is a notional (virtual) point within the gas system (the transport system and the gas storage system) where balance responsible parties can trade gas. Transactions are agreed upon bilaterally and confirmed and carried out via the system provided by the gas market operator – HROTE d.o.o. In addition, certain transactions are related to the time of the gas day, and can be agreed upon and registered either for the following or the current gas day. In 2016, there were 13 active balance responsible parties (one more than in 2015) who traded a total of 14,714,689 MWh of gas (15% more than in 2015).

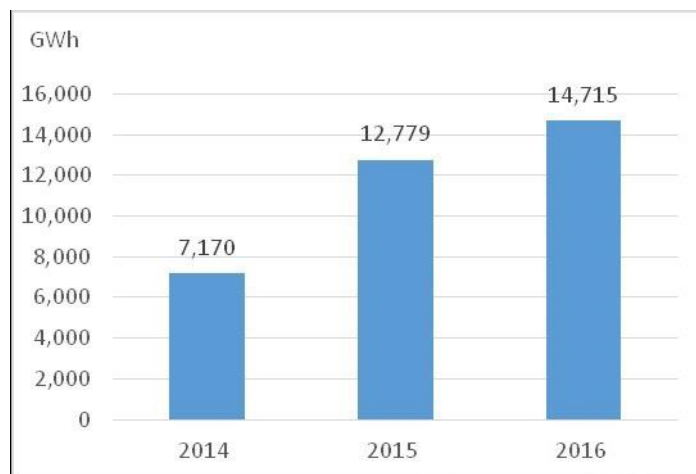


Figure 5.3.3. Gas quantities traded at the virtual trading point (VTP) in 2014, 2015, and 2016

Pursuant to the REMIT Regulation, gas market participants trading on the organised and unorganised wholesale markets are obliged to register with the Centralised European Register of Energy Market Participants (CEREMP). CEREMP unifies the national registers of all the countries of the European Union, whereas HERA, as Croatia's national regulatory agency, is obliged to establish a national register of participants on the Croatian market. 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 concerning the registration of gas traders, gas suppliers, the transport system operator, and the gas storage system operator.

5.3.2 Natural gas supply and final consumption

In 2016, natural gas was supplied by 44 energy entities in Croatia, even though 55 energy entities were licenced to supply gas. According to data collected by HERA from gas suppliers quarterly for 2016, the gas supply structure in 2016 was as follows:

- 5,870 million kWh was delivered to end consumers connected to the distribution system, using the gas supply public service²⁰ (*hereinafter: end consumers using the public service*),
- 4,689 million kWh was delivered to end consumers connected to the distribution system supplied under market conditions (*hereinafter: end consumers connected to the distribution system*),
- 13,543 million kWh was delivered to end consumers in the gas market directly connected to the transport system (*hereinafter: end consumers connected to the transport system*),

The delivery structure in 2016 is shown in Figure 5.3.4.

²⁰ 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 the energy entities, legal and natural persons which use such gas to generate thermal energy supplied to households pursuant to the **Thermal Energy Market Act**.

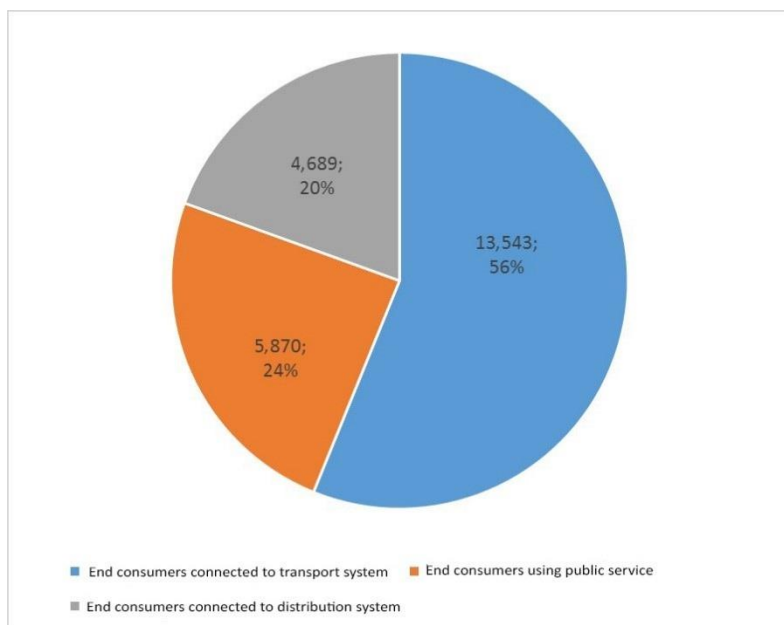


Figure 5.3.4. Structure of natural gas delivery from the transport system in 2016 (gas quantities in million kWh)

In 2016, the total gas quantities that gas suppliers delivered to end consumers connected to the distribution system amounted to 10,559 million kWh, of which 86 million kWh of associated gas was delivered. Of this quantity, 5,870 million kWh of gas was delivered to end consumers using the public service, which represents an increase of 3.9% as compared to 2015. A total of 4,689 million kWh of gas was delivered to end consumers connected to the distribution system, which represents an increase of 5.3% as compared to 2015. A total of 13,543 million kWh of gas was delivered to end consumers connected to the transport system, which represents an increase of 7.0% as compared to 2015.

The total number of end consumers in the gas market at the end of 2016 was 654,930, of whom 607,259 were end consumers using the public service, 47,650 were end consumers supplied under market conditions on the distribution system, and 21 were end consumers supplied under market conditions on the transport system.

In 2016, the trend of developing competition in the retail market continued, which reflected on a significant rise in the number of supplier switches. Compared to 2015, the number of supplier switches increased by 61% in terms of the number of customers (5,076 switches in 2016 compared to 3,158 switches in 2015) and 21% in terms of delivered gas quantities (702,760 MWh) (Figures 5.3.5 and 5.3.6). The second half of 2016 was marked by the beginning of market liberalisation for household consumers. The activities of certain gas suppliers, in terms of contracts offered for gas supply to households on market (unregulated) bases brought about the first supplier switches for households, i.e. relinquishing the use of supply as part of the public service.

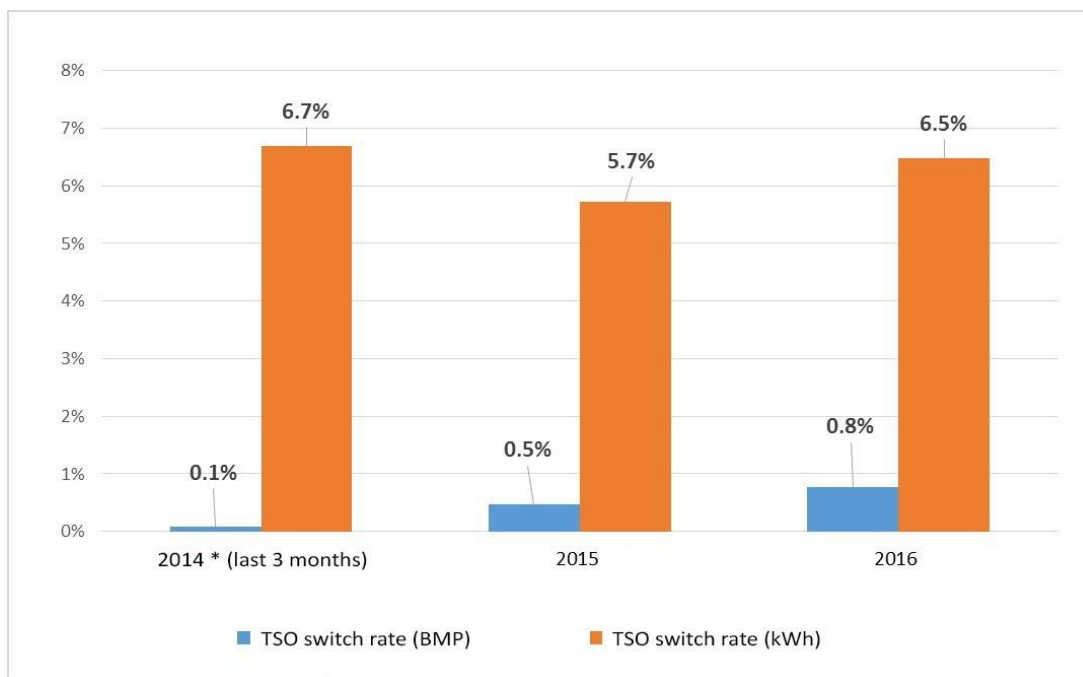


Figure 5.3.5. Rates of gas supplier switches with regard to the number of billing metering points (BMPs) and gas consumption (kWh) since the outset of retail market liberalisation in the Republic of Croatia

The process of actual 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 2016, 6,774 supplier switching procedures were terminated (33% more than the number of completed procedures – 5,076) (Figure 5.3.6). The reasons for which supplier switching procedures were terminated and the subject of complaints concerning the related actions of energy entities were mostly connected to existing suppliers' amounts past due to customers, incorrect customer information, and customers' withdrawals from supplier switches. In order to eliminate obstacles to the development of the retail market, HERA has implemented a number of measures, the most important of which are the following: resolving complaints; enhancing the 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 consumers by means of surveys, etc. In addition, HERA plans to adjust the supplier switching rules and to supervise the operations of the energy entities within the framework of its authority in order to ensure an efficient retail market on which end consumers can realise the best conditions for gas supply.

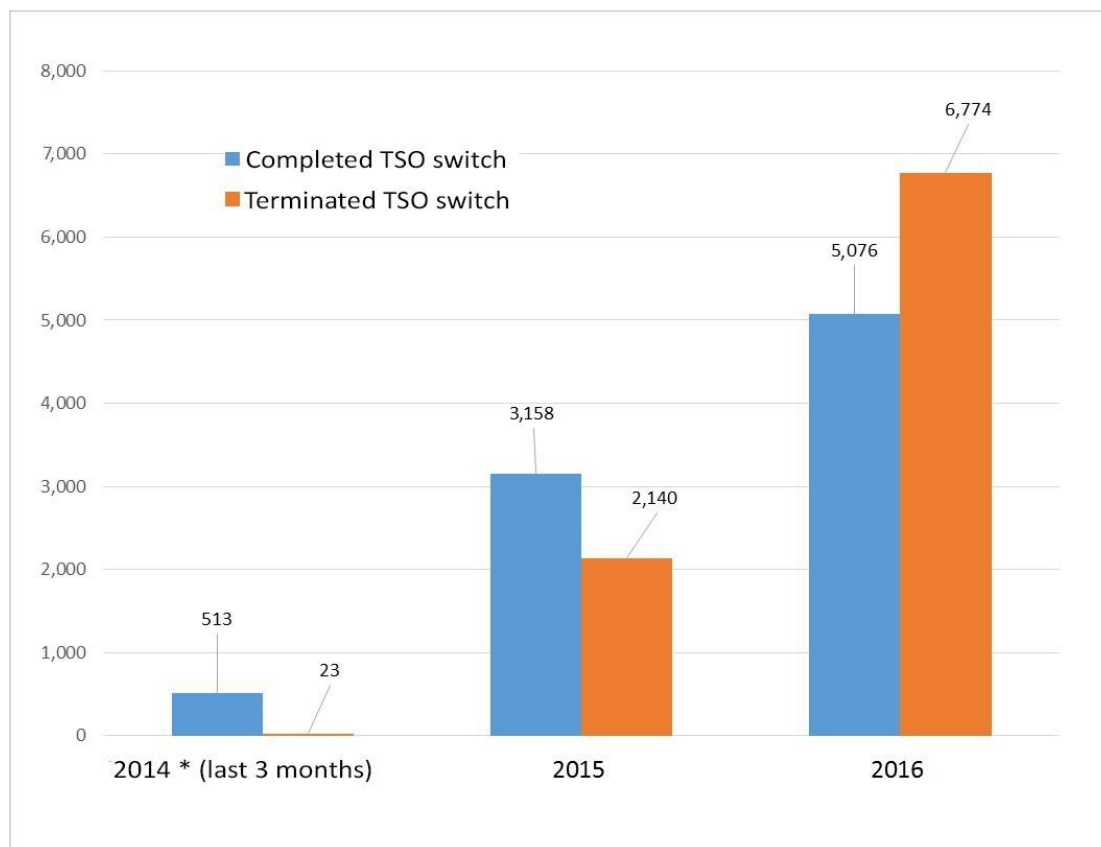


Figure 5.3.6. Number of completed and terminated gas supplier switches since the outset of retail market liberalisation in the Republic of Croatia

5.3.3 Gas supply quality

The **Gas Market Act** defines the obligations of gas producers and transport, distribution, storage, and LNG system operators, as well as the obligations of gas suppliers with regard to publishing and maintaining the defined quality parameters of gas supply for consumers. Gas supply quality comprises quality of service, reliability of delivery, and gas quality.

The framework for ensuring gas supply quality from transport, distribution, and gas storage system operators, as well as from gas suppliers, is defined in the *General Terms and Conditions of Gas Supply*. In this sense, quality of service encompasses the commercial requirements of gas supply, which, when observed by the system operator or gas supplier, ensures a satisfactory level of services provided to system users or end consumers. Reliability of delivery implies the continuity of gas delivery from the transport or distribution system throughout a period of time, and is expressed with indicators of 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 defined 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 they deliver into the transport or distribution system.

Furthermore, the transport 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. By doing so, 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 define 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 collected on attained indicators of supply quality for guaranteed standards of supply quality, no later than 30 days from the end of the quarter a given gas supply quality indicator refers to. Furthermore, gas system operators and suppliers are obliged to provide HERA their 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 transport system operator, with regard to the monitoring of the following:

- general standards of supply quality: reliability of delivery (monitoring delivery interruptions, transport 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, with regard to the monitoring of the following:

- 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, with regard to the monitoring of the following:

- 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).

The implementation of incentives and reimbursement for services rendered beyond the guaranteed standard is planned to begin in 2017; before this is done, values and criteria for the adjustment of general standards of gas supply quality must be established, as must the amounts of reimbursement for respective guaranteed standards of gas supply quality.

During 2016, the transport system operator recorded 18 planned interruptions in gas delivery on the gas transport system and one unplanned delivery interruption. The duration of all delivery interruptions in 2016 was 796 hours.

During 2016, distribution system operators recorded an average of eight planned gas delivery interruptions in the gas transport network, and 45 unplanned delivery interruptions. The total average duration of all delivery interruptions on an individual distribution system in 2016 was 486 hours.

5.3.4 Prices of natural gas

Regulated gas prices

The wholesale regulated gas price from 1 January 2016 to 31 March 2016 was, as in 2015, defined in the *Decision on the Gas Price by which Suppliers Participating on the Wholesale Gas Market are Required to Sell Gas to Suppliers in the Public Gas Supply Service for Household Consumers*, which was adopted by the Croatian government in March 2015 and entered into force on 1 April 2015. The gas price pursuant to this decision was equal for all end consumers using the public service – HRK 0.2289/kWh.

Furthermore, in March 2016, the Croatian government adopted a new *Decision on the Gas Price by which Suppliers Participating on the Wholesale Gas Market are Required to Sell Gas to Suppliers in the Public Gas Supply Service for Household Consumers for the Period from 1 April 2016 to 31 March 2017*. The gas price from this decision was set at HRK 0.1734/kWh.

The retail regulated gas price, which was applicable for end consumers using the public service, end consumers from the household category, and end consumers using gas for thermal energy generation to supply households (boiler rooms) is established pursuant to the *Methodology for Establishing Tariff Items for the Public Gas Supply Service and Guaranteed Supply*.

The tariff item amounts for the public gas supply service and guaranteed supply for the twelve models of all public service gas suppliers in the territory of Croatia for the period from 1 January to 31 March 2016 were defined by the *Decision on the Amounts of Tariff Items for the Public Gas Supply Service for 2016*, and were defined for the period from 1 April to 31 December 2016 by the *Decision on Public Gas Supply Service Tariff Items for the Period from 1 April 2016 to 31 December 2016*.

In 2016, the total average gas selling price for end consumers using the public service in Croatia, varied from HRK 0.2542/kWh to HRK 0.3645/kWh, VAT excluded. In 2016, the average gas selling price for end consumers using the public service²¹ in Croatia amounted to HRK 0.2737/kWh, VAT excluded, which represents a decrease in the total average price of 15% as compared to 2015.

The trend of average gas prices excluding VAT for end consumers using the public service in Croatia by quarter during 2016, in total and separately for end consumers from the household category and separately for 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 gas selling prices by quarter for end consumers using the public service in the Republic of Croatia in 2016, VAT excluded*

	HOUSEHOLDS	BOILER ROOMS
Q1	0.2992	0.2770
Q2	0.2739	0.2197
Q3	0.3247	0.2234
Q4	0.2446	0.2205
TOTAL	0.2759	0.2455
TOTAL (PUBLIC SERVICE)	0.2737	

The structure of the regulated final gas price is defined in the *Methodology for Establishing Tariff Items for the Public Gas Supply Service 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 mark-up. 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 suppliers on the wholesale gas market (hereinafter: SWMs), and its share on average accounted for 71% of the total regulated final price of gas in 2016, excluding VAT. In this respect, the cost of capacities for the gas transport and storage systems, operating costs, and SWMs' supply mark-up accounted for a total of 16% of the final gas price, while 55% of the final gas price in 2016 was related to the cost of SWMs' gas procurement from the gas producer, also defined in a decision adopted by the Croatian government. Furthermore, the cost of gas

²¹ The weighted average by the delivered gas quantities for the end consumers using the public service, for each respective gas supplier.

distribution represented a share of 23% in the average final gas price in 2016, excluding VAT, while gross supply mark-up of public service suppliers (hereinafter: PSSs) was 6%. The structure of the regulated gas price in 2016 for end consumers using the supply as a public service is shown in Figure 5.3.7.

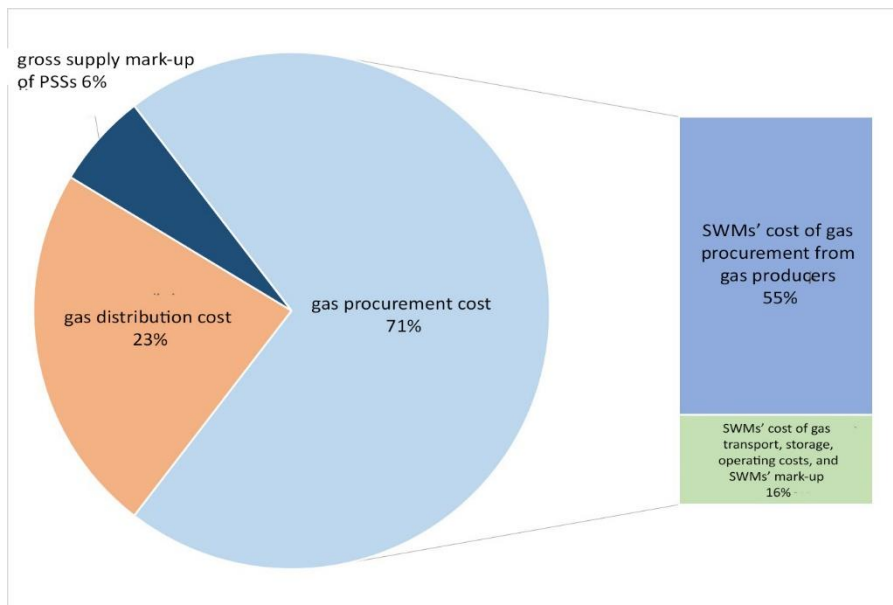


Figure 5.3.7. Structure of the regulated final price of gas in 2016, VAT excluded

Market gas prices

In 2016, HERA continued collecting data from gas suppliers and traders in Croatia on a quarterly basis by means of a questionnaire on gas supply and trade. 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 (as per bilateral agreements, including the virtual trading point, excluding imports) and under regulated conditions, as well as the average purchase price of gas bought from imports. In addition, the questionnaire included data on gas sales in the retail market by category of gas consumption for end consumers using the public service, end consumers on the market, and direct consumers. The questionnaire also included information on gas sales on the wholesale market.

The average selling price of gas for end consumers connected to the distribution system²² in Croatia in 2016 amounted to HRK 0.2792/kWh, VAT excluded, which represents a decrease of 17% as compared to 2015.

In 2016, the average gas selling price in Croatia for end consumers connected to the transport system²³ was HRK 0.1781/kWh, VAT excluded, a decrease of 31% as compared to 2015. The lowest price was recorded in Q2 (HRK 0.1577/kWh), and the highest was recorded in Q1 (HRK 0.1986/kWh).

The average gas selling prices in Croatia in 2016 by respective category are shown separately for end consumers in the market and separately for direct end consumers in Table 5.3.2, as are the total average selling prices of gas for all consumers not using the public service in Croatia.

²² The weighted average by the delivered gas quantities for the end consumers in the market, connected to the distribution system, for each respective gas supplier.

²³ The weighted average by the delivered gas quantities for the end consumers in the market, connected to the transport system, for each respective gas supplier.

Table 5.3.2. Average gas selling price for end consumers on the market in the Republic of Croatia in 2016, VAT excluded

Categories	End consumers connected to the TRANSPORT system	End consumers connected to the DISTRIBUTION system	TOTAL
I1-1	-	0.3347	0.3347
I1-2	-	0.3018	0.3018
I2	0.1561	0.2875	0.2853
I3-1	0.1975	0.2604	0.2590
I3-2	0.1894	0.2424	0.2363
I4-1	0.1747	0.2299	0.2111
I4-2	0.1734	0.2258	0.1808
I5	*	vs	*
I6	0.1783	-	0.1783

* Pursuant to Directive 2008/92/EC, HERA does not publish the average price for this category for reasons of confidentiality, as in 2016 there were less than three end consumers in this category

The trend in average retail gas prices by quarter in 2016 by all end consumer categories on the market is shown in Figure 5.3.8. The categories relate to annual gas consumption, starting with category I1-1, with gas consumption less than or equal to 100,000kWh, while in the last category – I6 – gas consumption is in excess of 1,000,000,000kWh. In this respect, the average retail price of gas in 2016 in total for all categories was HRK 0.2072/kWh. This represents a decrease of 26% as compared to 2015.

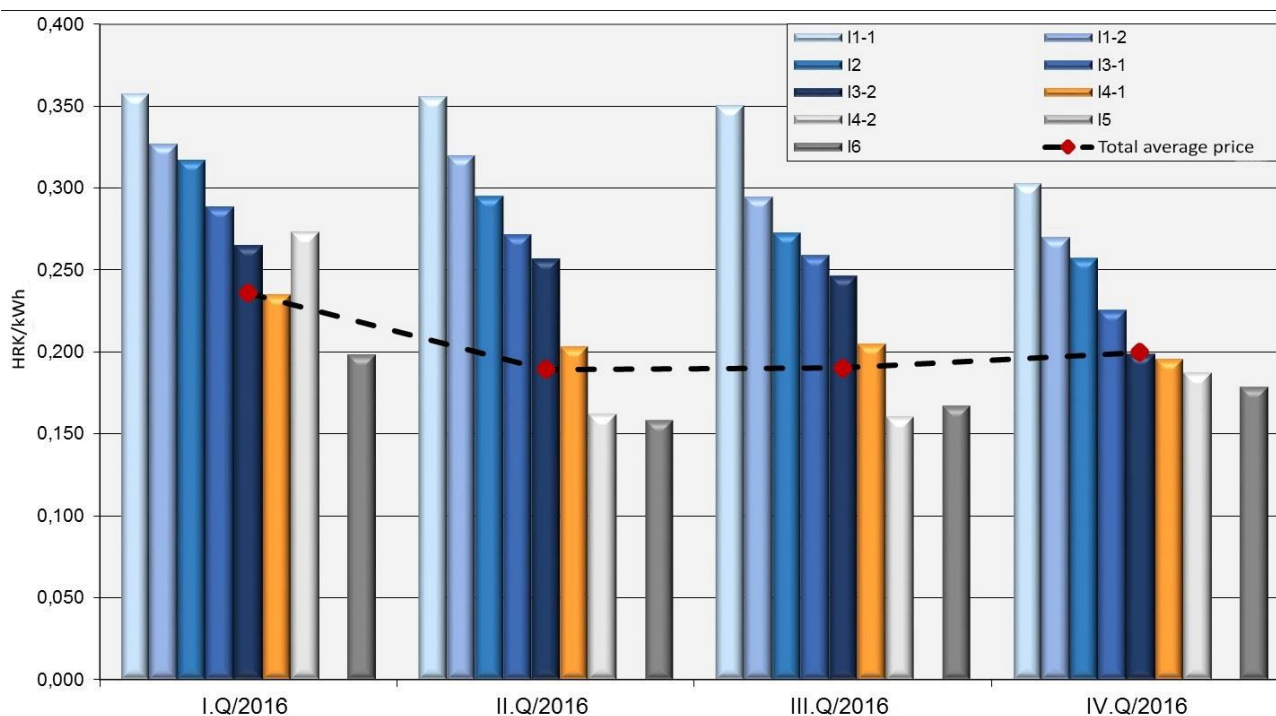


Figure 5.3.8. Average retail prices of gas by quarter for end consumer categories on the market in the Republic of Croatia in 2016, VAT excluded

The categorisation of HERA's end consumers is structured in accordance with Directive 2008/92/EC and EUROSTAT methodology, as well as with the previous categorisation used by HERA, where, as opposed to the six categories of industrial end consumers according to the EUROSTAT methodology, HERA established a total of nine categories of end

consumers. The reason for this is to enable the continuous monitoring of prices and gas price comparisons with previous years. The previous categorisation consisted of three gas consumption categories – a category with gas consumption less than or equal to 10GWh, a category with gas consumption in excess of 10GWh but less than or equal to 50GWh, and a category with gas consumption in excess of 50GWh.

The average retail market gas prices in Croatia for the above three gas consumption categories by quarters from 2012 to 2016 are shown in Figure 5.3.9. It is evident that, in the second part of 2015, all three gas consumption categories, following a slight drop in prices during 2013 and stagnation during 2014, noted a pronounced decrease in gas prices, which lasted until the end of 2016. This decrease in the category with gas consumption lower than or equal to 10GWh, as well as in the category with gas consumption in excess of 10GWh but lower than or equal to 50GWh, was uniform, whereas the price in the category with gas consumption in excess of 50GWh fluctuated from quarter to quarter before rising again in Q3 and Q4 of 2016, as well as in Q1 of 2017.

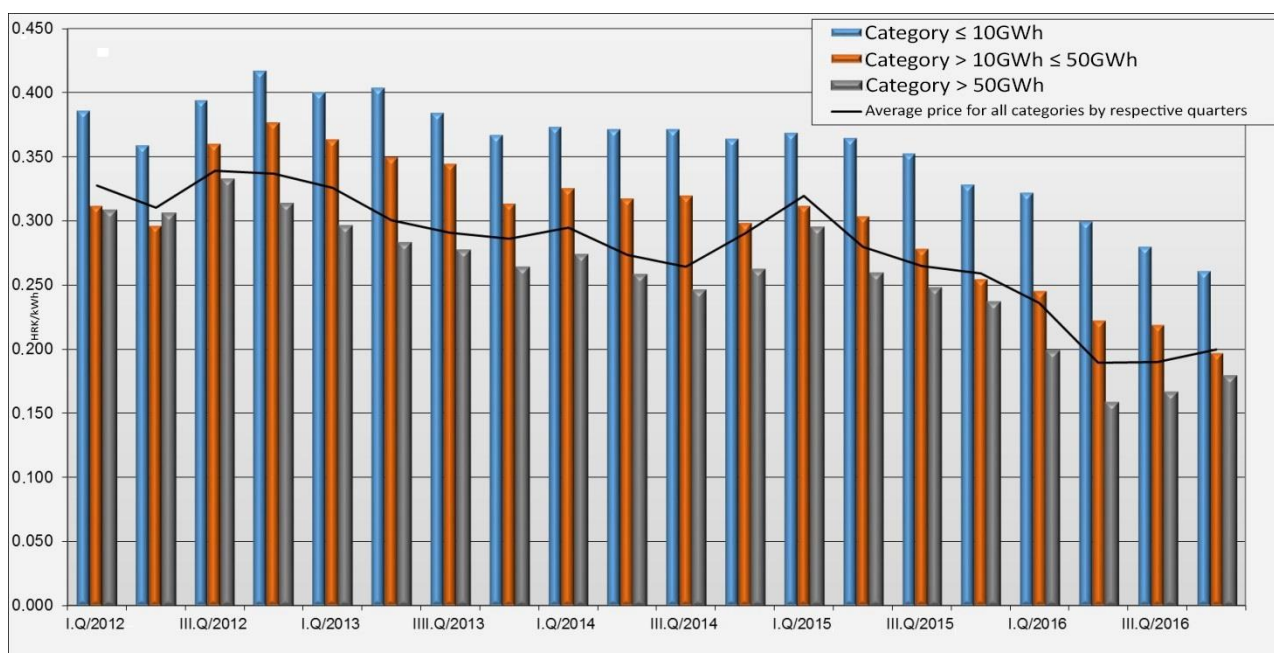


Figure 5.3.9. Average retail prices of gas by quarter for end consumer categories on the market in the Republic of Croatia from 2012 to 2016, VAT excluded

At the wholesale level, the average gas selling price in 2016 (sale under bilateral agreements, including the virtual trading point) was HRK 0.1855/kWh, VAT excluded, which represents a decrease of 29% as compared to 2015, when it amounted to HRK 0.2596/kWh. In 2016, a total of 12 suppliers sold gas on the wholesale market. The highest average wholesale gas price including imports by individual gas suppliers in 2016 was HRK 0.2709/kWh, while the lowest was HRK 0.1426/kWh.

The average gas purchase price on the market in 2016 (procurement under bilateral agreements, at the virtual trading point, and from imports) was HRK 0.1624/kWh, VAT excluded, which represents a decrease of 31% as compared to 2015, when it amounted to HRK 0.2342/kWh. The average purchase price of gas in 2016 was marked by a continued downward trend in price, which began in Q2 of 2015 and ended in Q3 of 2016, when a slight increase in price was recorded; slight increases were noted again in Q4 of 2016 and Q1 of 2017. During 2016, the average purchase price of gas on the market was highest in Q1, when it amounted to HRK 0.1737/kWh, and lowest in Q2, when it amounted to HRK 0.1534/kWh.

Comparing the retail and wholesale market prices of gas at the annual level in 2016, it is notable that the average retail price was 27% higher than the average purchase price of

gas. The trend in average gas prices on the retail market according to HERA's previous categorisation in relation to the average purchase price of gas on the market from 2012 to 2016, VAT excluded, is shown in Figure 5.3.10.

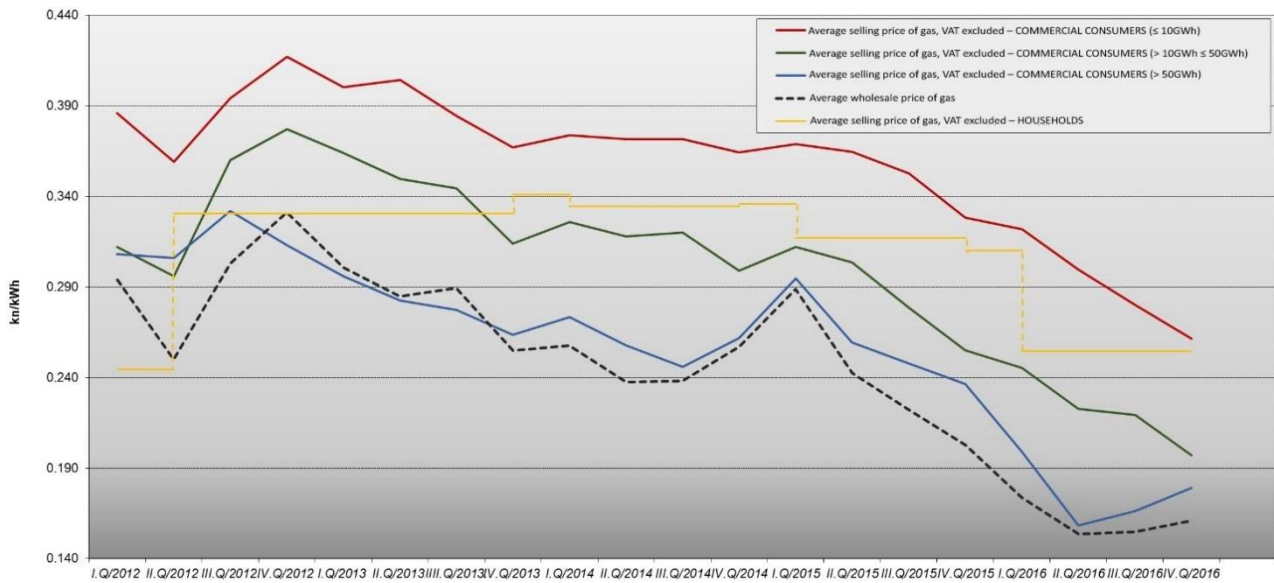


Figure 5.3.10. The trend of average gas prices on the retail market in relation to the average purchase price of gas on the gas market from 2012 to 2016 [HRK/kWh]

In early 2014, HERA published an information service application on its official website for gas consumers from the household category using the public supply service, accessible at <http://www.hera.hr/hrvatski/iplin/>. The iPlin application enables consumers to select gas suppliers and enter annual gas consumption, and thus receive information on applicable gas prices by individual distribution area and various tariff models, as well as on the indicative amount of annual savings for individual consumers in any area of Croatia. A graphic representation of the iPlin application is shown in Figure 5.3.11.

iPLIN
INFORMATION SERVICE APPLICATION for
GAS consumers using supply as part of the public service

Please select a supplier: GPZ-OPSKRBA d.o.o. – for the Zagreb area

Enter annual consumption in kWh
12,500 **Calculate**

The gas supplier will furnish you with information on your gas consumption during the previous year, along with other information necessary for the safe and efficient use of gas, every year by 1 March.
If, however, you do not have information on annual gas consumption, you can use the calculation for informational purposes.

Your tariff model (TM), the amount of tariff items, and the annual amount for gas consumed:

Tariff model	TM2	
Range of annual gas consumption for the tariff model	5.001 – 25.000kWh	
	Tariff applicable as of 1/4/2017	Tariff applicable until 31/3/2017
Tariff item for delivered gas quantity (Ts1)	HRK 0.2236/kWh	HRK 0.2236/kWh
Fixed monthly fee for the selected tariff model (Ts2)	HRK 14.00	HRK 14.00
ANNUAL AMOUNT to be paid by end consumer (VAT excluded)	HRK 2,963.00	HRK 2,963.00
ANNUAL AMOUNT to be paid by end consumer (VAT included)	HRK 3,703.75	HRK 3,703.75
Balance	HRK 0.00 (0.00%)	

Monthly consumption

If you wish to know the invoice amount for monthly consumption as per applicable tariff items, please enter:

Monthly consumption: 1,000 kWh **Calculate**

Amount of invoice (VAT included): HRK 297.00

Figure 5.3.11. Graphic representation of the iPlin application

In addition, the iPlin application allows gas consumption recalculations from the measurement unit of kWh into m³, and from m³ into kWh, which facilitates comparisons of the quantity of gas delivered as shown in the invoice with the quantity of delivered gas as recorded at the billing metering point. Users of the iPlin application must enter correct data on lower heat values, which can be obtained at the website of the applicable distribution system operator.

Furthermore, the iPlin application also offers end consumers other useful information, such as price lists of non-standard services of applicable gas suppliers and the distribution system operator, as well as all relevant laws and by-laws, shown in Figure 5.3.12.

Other useful information

[Prices of non-standard services of your gas supplier](#)

[Prices of non-standard services of your distribution system operator](#)

If you wish to convert kWh into m³, or m³ into kWh, please use the following calculation:

Conversion from m ³ into kWh		Conversion from kWh into m ³	
Amount	120,000 m ³	Amount	120,000 kWh
Lower heat value	9.5 kWh/m ³	Lower heat value	9.5 kWh/m ³
Amount in kWh	1,140,000 kWh	Amount in m ³	12,632 m³

You can get information on the lower heat value on your distribution system operator's website

Figure 5.3.12. A part of the iPlin application from HERA's website

Natural gas prices for end consumers in European countries

Natural gas prices for end consumers from the household category in most European countries increased continuously from 2010 to 2012. This trend ended during 2013, 2014 and 2015, whereas in 2016 the price of natural gas for households decreased in most European countries, with significant price drops (more than 25%) recorded in some countries, such as Hungary, Spain, and Great Britain. Natural gas prices for end consumers from the household category in Croatia, according to EUROSTAT data, followed European average gas price trends. Despite these changes, the natural gas price for households in Croatia was still significantly below the European average in 2016.

The trend in natural gas retail prices for households in the D₂ category, with annual natural gas consumption from 20 to 200GJ, corresponding approximately to annual natural gas consumption from 600 to 6,000m³/year, in individual European countries from 2002 to 2016²⁴ is shown in Figure 5.3.13.

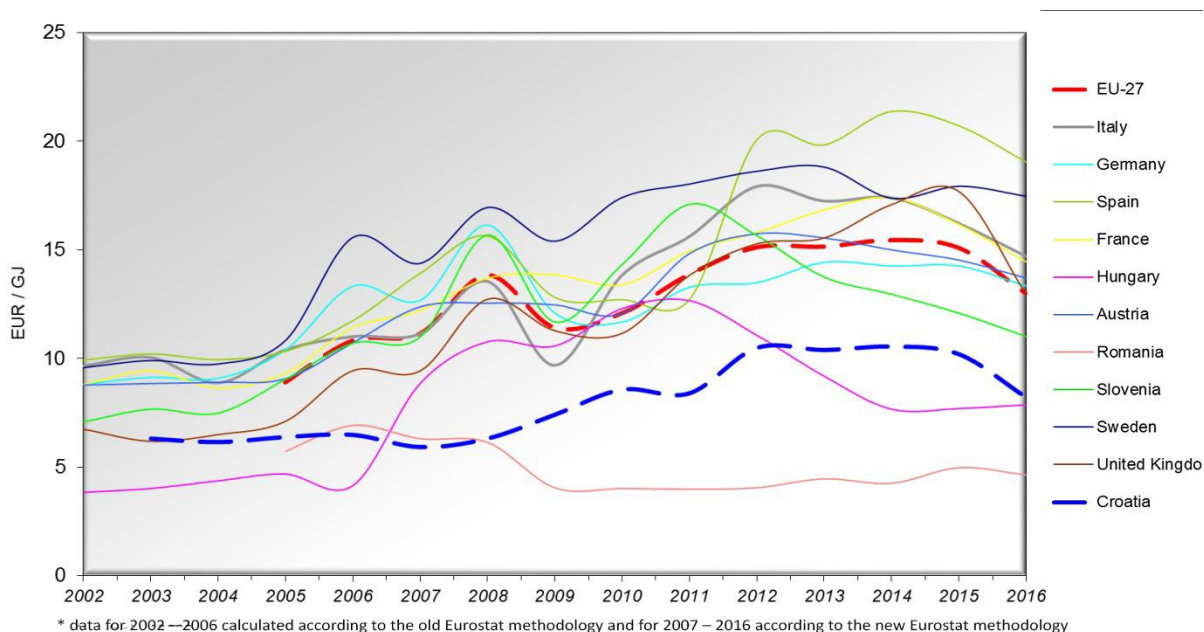


Figure 5.3.13. The trend in retail prices of natural gas for households in the D₂ category in individual European countries from 2002 to 2016 (excluding taxes) [EUR/GJ]

²⁴ The prices are calculated as average amounts of retail prices from July to December in relevant years.

According to EUROSTAT statistics, the price of natural gas for households in the D₂ category in the European Union in 2016 were 13.84 lower than in 2015.

Average natural gas prices for households in the D₂ category from July to December 2016, including and excluding taxes, are shown in Figure 5.3.14.

The average natural gas selling price, including taxes, for households in the D₂ category in the second half of 2016 was highest in Sweden (EUR 31.73/GJ), Spain (EUR 23.82/GJ), and Italy (EUR 23.29/GJ), and lowest in Turkey (EUR 8.36/GJ), Bulgaria (EUR 8.65/GJ), and Romania (EUR 8.98/GJ). It is evident that the proportion of taxes in the total price of natural gas for the aforementioned consumer category varied significantly and was highest in Denmark (58.3%), the Netherlands (50.7%), Romania (48.3%), and Sweden (44.9%), and lowest in Great Britain (7.0%), Luxembourg (15.7%), Slovakia (16.7%) and Bulgaria (16.7%).

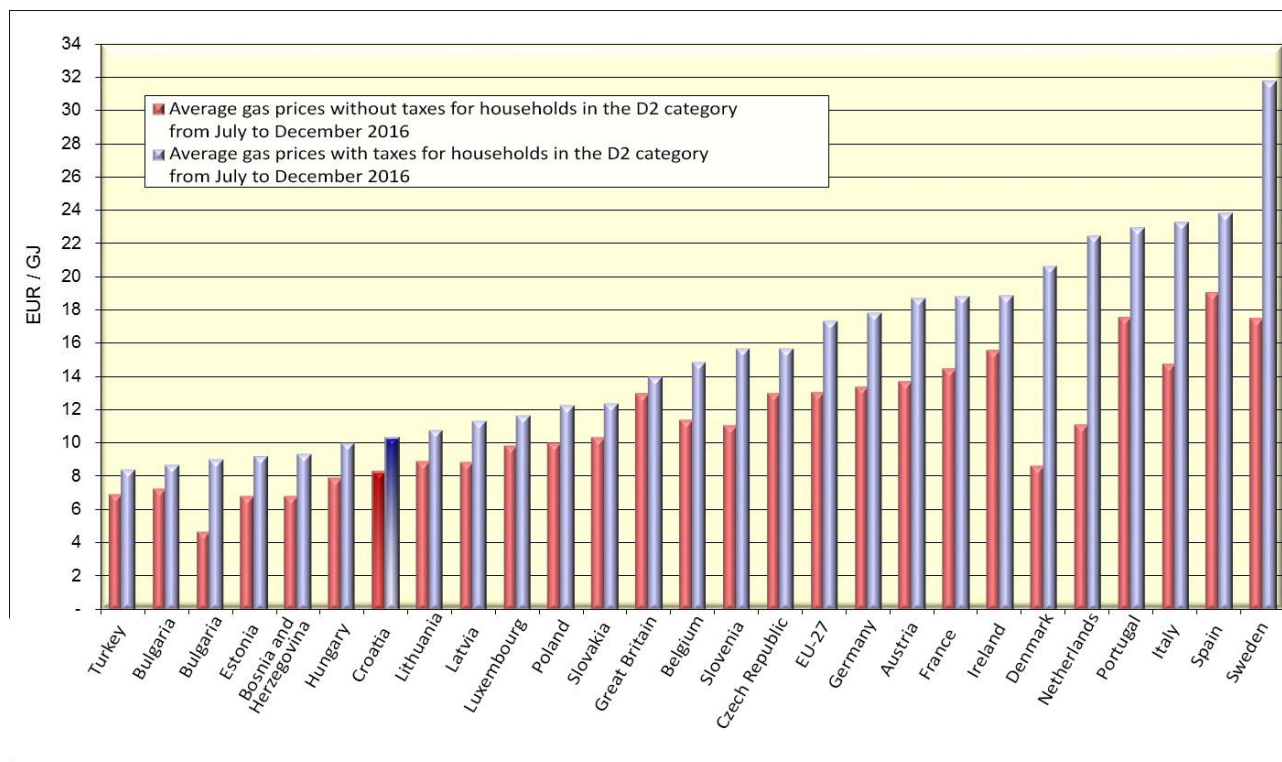


Figure 5.3.14. Average natural gas prices for households in the D₂ category for the period from July to December 2016 (including and excluding taxes)

A comparison of European natural gas retail prices for households in the D₂ category, including taxes, from July to December 2015 and from July to December 2016, respectively, is shown in Figure 5.3.15. The international PPS/GJ unit has been used as a price unit²⁵ to eliminate differences in the prices of goods/services between respective countries.

²⁵ PPS (purchasing power standards) is a unit that equalises the purchasing power between countries.

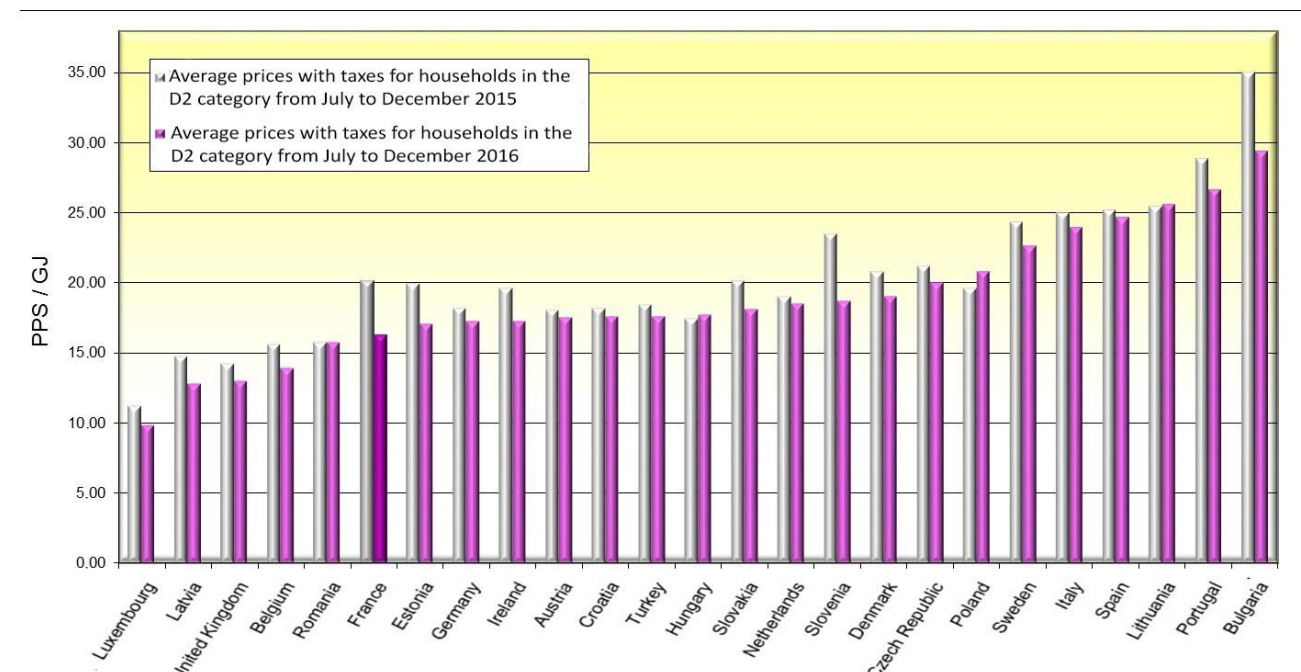


Figure 5.3.15. Comparison of average natural gas prices for households in the D2 category with the price of goods/services in European countries (including taxes) from July to December 2015 and from July to December 2016, respectively

In the European Union in 2016, according to EUROSTAT statistics, natural gas prices, including taxes, decreased on average by 8% for industrial consumers in the I₃ category with annual natural gas consumption from 10,000 to 100,000GJ, which approximately corresponds to natural gas consumption of 300,000 to 3,000,000m³/year.

Average natural gas prices for industrial consumers in the I₃ category in European countries from July to December 2016, including and excluding taxes, are shown in Figure 5.3.16.

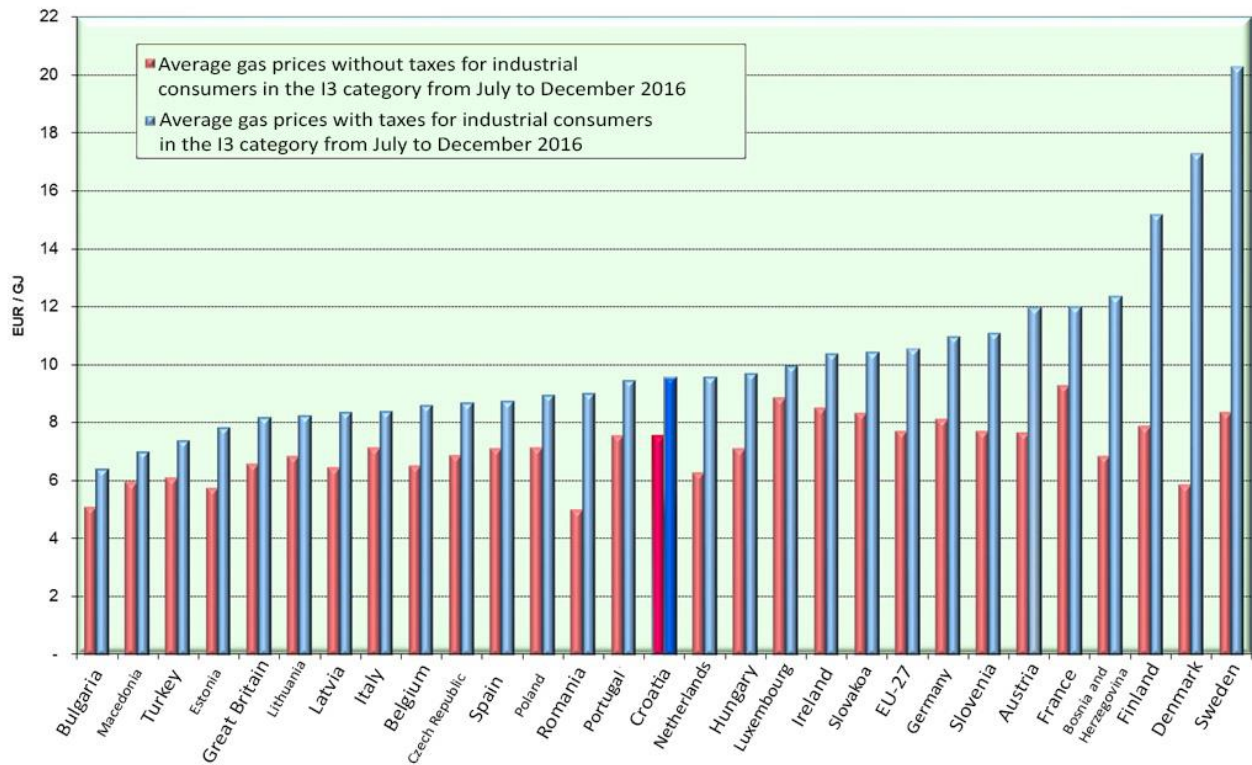


Figure 5.3.16. Average natural gas prices for industrial consumers in the I3 category from July to December 2016 (including and excluding taxes)

The average natural gas selling price, including taxes, for industrial consumers in the I₃ category in the second half of 2016 was highest in Sweden (EUR 20.24/GJ), Denmark (EUR 17.27/GJ) and Finland (EUR 15.14/GJ), and lowest in Bulgaria (EUR 6.40/GJ), Macedonia (EUR 6.97/GJ), and Turkey (EUR 7.36/GJ). It is evident that the proportion of taxes in the total price of natural gas for the aforementioned consumer category varied significantly – it was highest in Denmark (66.3%), Sweden (58.9%), and Finland (48.2%), and lowest in Luxembourg (11.3%), Macedonia (15.3%), and Italy (15.4%).

A comparison of European average natural gas prices, including taxes, for industrial consumers in the I₃ category from July to December 2015 and July to December 2016, respectively, using the international unit PPS/GJ as a price unit to eliminate differences in the price of goods/services between countries, is shown in Figure 5.3.17.

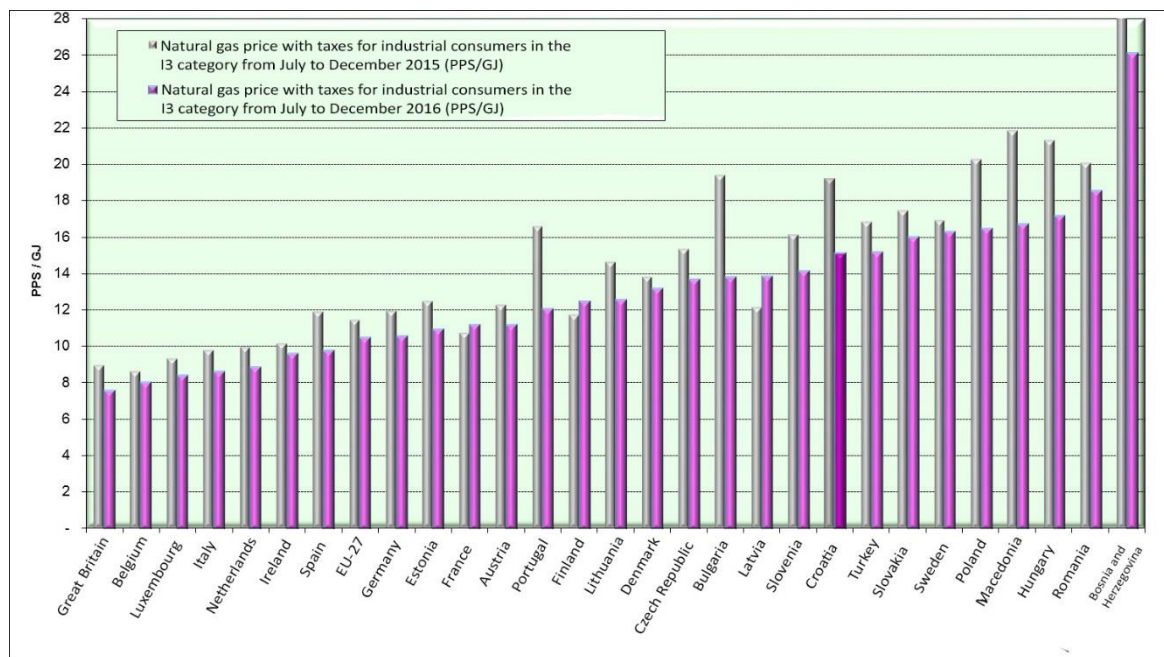


Figure 5.3.17. Natural gas prices for industrial consumers in the I3 category in relation to the price of goods/services in European countries (including taxes) from July to December 2015 and July to December 2016, respectively

5.3.5 Consumer protection

During 2016, HERA received and resolved a total of 58 consumer petitions regarding consumer protection in the gas sector. All 58 were complaints or other petitions by consumers, meaning that HERA received no complaints from its area of jurisdiction. Complaints and other consumer petitions are shown in Table 5.3.3.

Table 5.3.3. Complaints and other consumer petitions by type in 2016

Case type	Number	Share
Complaints	0	0%
Other consumer petitions	58	100%
Total	58	100%

In addition to the complaints shown in Table 5.3.3, in 2016 HERA also received 75 other petitions, inquiries, and requests for an opinion or interpretation of regulations from gas end consumers.

The gas end consumer protection framework is defined 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. Certain provisions of the above directive and Annex I have been transposed to our legal system through the following laws and by-laws:

- **Energy Act** (in force since 26 September 2015),
- **Gas Market Act** (in force since 23 February 2017),
- **Energy-Related Activities Regulatory Act** (in force since 8 November 2012),
- **Consumer Protection Act** (in force since 21 October 2015),
- *General Terms and Conditions for Gas Supply* (in force since 1 January 2014).

Of particular note is the measure protecting gas consumers and gas system users against the actions of gas system operators and suppliers, pursuant to Article 82 of the **Gas**

Market Act, which stipulates that parties dissatisfied with an action, i.e. an act or a failure to act on the part of the transport system operator, distribution system operator, storage operator, LNG terminal operator, gas market operator, or supplier, which affects the rights, obligations, or legal interests of the parties that are not resolved through administrative procedure, or when judicial or other legal protection is mandated by law, may file a complaint regarding such action. The gas system operator and/or supplier must make a decision concerning the complaint within fifteen days of the date of the complaint; if, following this decision, the dissatisfied party should still regard its rights or legal interests to have been violated, it can, for the purpose of protecting its 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 dissatisfied 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, and the procedure before the administrative court will be heard urgently.

In addition, of particular note is a measure protecting gas consumers against the actions of the gas supplier, pursuant to Article 23 of the *General Terms and Conditions of Gas Supply*, which stipulates that an end consumer who is dissatisfied with an action, i.e. an act or a failure to act on the part of the supplier, which affects the rights, obligations, or legal interests of the parties that are 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 with respect to the following:

- the content of an invoice for delivered gas,
- default under the contract for public gas supply service,
- failure to continue gas deliveries within prescribed periods upon payment of overdue amounts from dunning letters, due to which gas delivery has been suspended, and
- supplier switches 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 to be violated due to the gas supplier's actions, it can, for the purpose of protection of its rights, object to HERA, which is obliged to inform without delay, and no later than 30 days from the date of the complaint, the end consumer in writing 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. HERA can take the following measures following complaints:

- make binding decisions on actions concerning complaints,
- propose non-binding procedures concerning complaints, or
- issue non-binding opinions concerning complaints.

In 2016, HERA received 133 petitions from natural and legal persons concerning gas, of which 58 were complaints and 75 were inquiries. Of the 58 complaints, 25 were submitted by citizens (natural persons) with respect to gas supply:

- 12 concerning suspended gas deliveries,
- seven concerning calculations, and
- six concerning complaints regarding supply contracts.

In addition to resolving consumer complaints, HERA recognises efficient market competition in the retail market as the most essential measure of end gas consumer protection, as well as informing consumers of their rights and obligations.

HERA provides consumers with information by:

- publishing information on HERA's official website,

- supervising information published on energy entities' websites,
- responding to consumer inquiries,
- the tariff calculator (iPlin) to provide information to consumers who use supply as part of the public service.

Efficient market competition includes rapid and simple gas supplier switches, and the measures HERA takes in this sense are:

- issuing rules for supplier switching (*General Terms and Conditions for Gas Supply*), and providing opinions or binding interpretations of the rules,
- continuous improvements to the IT system for the implementation of supplier switches, in cooperation with the gas market operator, which organises and maintains the system, and
- supervision of actions taken by energy entities with regard to the implementation of supplier switches upon receiving complaints, and the issuance of decisions on procedures following complaints (binding decisions, non-binding proposed follow-ups, opinions).

In addition, a precondition for efficient market competition is the availability of sufficient information for market participants. It is particularly essential to make information on gas consumption available to end consumers, and the measures HERA takes in this sense concern the issuance of relevant rules (*General Terms and Conditions for Gas Supply*):

- on mandatory content of invoices for delivered gas, and
- on gas suppliers' obligation to periodically provide information to consumers on historical gas consumption in the previous year and estimated gas consumption in the current year (by 1 March each year).

5.4 Security of natural gas supply

The basic framework defining the security of natural gas supply in Croatia is laid down in Regulation (EU) No 994/2010 of the European Parliament and of the Council concerning measures to safeguard security of gas supply (*hereinafter: Regulation No. 994/2010*).

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 ministry is responsible for the following:

- monitoring the relationship between 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 taking measures in the event an emergency is declared.

Regional units of government are responsible for the following:

- monitoring the relationship between supply and demand in their areas,
- preparing estimates of future consumption and available supply,
- planning the construction of additional capacities and the development of distribution systems in their areas, and
- proposing and taking measures within their powers under the law.

Furthermore, Regulation (EU) No. 994/2010 defines 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 taken 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 the 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.

In February 2016, the European Commission presented the proposed new rules to safeguard the security of gas supply, which include enhanced rules for regional cooperation and coordination, detailed responsibilities for requisite gas infrastructure, enhanced risk assessment and prevention, strengthened supervision of the responsibility to supply special consumer categories, a new explicit principle of solidarity amongst the states, new measures for implementing supply for protected consumers, the application of rules amongst Energy Community and European Union states, and a voluntary mechanism for joint procurement of gas.

In April 2017, the European Council and European Parliament agreed on the content of a new regulation concerning safeguarding the security of gas supply. Some of the major improvements are the introduction of the principle of solidarity (in the case of a serious crisis situation, neighbouring Member States will aid in safeguarding supply of households and key public services), stronger regional cooperation by means of regional groups, the joint assessment of security risks, harmonised joint preventive and emergency measures, and greater transparency – gas companies will provide information on long-term contracts relevant for safeguarding supply (at least 28% of annual consumption in a given Member State). The new regulation concerning safeguarding gas supply will be formally adopted by the European Council and European Parliament.

5.5 Public service obligation in the gas sector

Energy-related activities as public services are laid down in 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 accessing and using the energy service, which shall 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 shall be performed according to the principles of transparency and impartiality and supervised by the relevant 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 as follows:

- gas transport, gas distribution, gas storage, LNG terminal management (*hereinafter: system operator*),
- wholesale market supplier activities,²⁶
- gas supply as a public service obligation, guaranteed supply, and
- gas market organisation.

The system operator is obliged to connect legal and natural persons to the gas system, except in exceptionally stipulated circumstances. In addition, the system operator is obliged to provide users with objective, equal, and transparent access conditions to the gas system while applying the tariff item amounts pursuant to the methodology issued by

²⁶ *The Act on Modifications and Amendments to the Gas Market Act (Official Gazette No. 16/17) amended the definition of the gas wholesale market supplier – a gas supplier supplying the public service gas supplier, as a public service under regulated conditions.*

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*.

Supply as a public service obligation represents a measure of protection of a certain group of consumers by way of regulating gas supply conditions. The **Gas Market Act** lays down the above measure for households, energy entities, and legal and natural persons that use such gas to generate thermal energy supplied to households pursuant to the law governing the thermal energy market. The public service supplier is obliged to charge for delivered gas pursuant to the applicable tariff item amounts for the public gas supply service defined in the methodology issued by HERA, as well as to ensure gas quality and quality of service pursuant to the *General Terms and Conditions of Gas Supply*.

In addition, a measure of protection of all end consumers by means of the right to guaranteed supply is also stipulated. The role of a guaranteed supplier is to provide the public gas supply service during a limited period under regulated conditions to end consumers left without a supplier under certain conditions. The period during which this service is to be provided and the relevant conditions are stipulated in the *Methodology for Establishing Tariff Items for the Public Gas Supply Service and Guaranteed Supply*, while the tariff item amounts for guaranteed supply are established 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 last calculated gas price that the end consumer paid the existing supplier for gas,
 - for the following 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 the existing supplier for gas, and
 - upon the expiry of three months from the start date of guaranteed supply, supply is governed by market conditions.
- b) for end consumers subject to public procurement procedures:
 - for the first three months from the start date of guaranteed supply, in an amount equal to the last calculated gas price that the end consumer paid the existing supplier for gas,
 - for the following three months (up to a total of six months from the start date of guaranteed supply), in the amount 10% higher than the last calculated gas price that the end consumer paid the existing supplier for gas, and
 - upon the expiry of six months from the start date of guaranteed supply, supply is governed by market conditions.
- c) 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 tariff items for the public gas supply service issued by HERA for the gas supplier in a given area,
 - for the first three months (up to a total of six months from the start date of guaranteed supply), in an amount 10% higher than the tariff items for gas supply public service issued by HERA for the gas supplier in a given area, and
 - upon the expiry of six months from the start date of guaranteed supply, supply by the new supplier either as a public service obligation or governed by market conditions.

The nomination of a guaranteed supplier, pursuant to Article 56 of the **Gas Market Act**, involves the following:

- the Croatian government nominates the guaranteed supplier in the territory of Croatia for a period of three gas years at the proposal of the ministry, which procures HERA's prior opinion,

- HERA's opinion is based on conducted research on the function of the gas market.

The guaranteed supplier's obligation is related to gas supply for end consumers connected to the distribution system if:

1. HERA's licence of the existing supplier of the end consumer has expired,
2. HERA has revoked the licence of the existing supplier of the end consumer (temporarily or permanently), or
3. the gas market operator has provided written notice concerning the existing supplier of the end consumer, pursuant to Article 56, Paragraph 4, Item 3 of the **Gas Market Act**, through which the supplier acquires the status of a supplier in difficulties.

The current circumstances in the gas market in Croatia that are significant to the role of guaranteed supplier are:

- the transitional period, during which each supplier with a public service obligation played the role of a guaranteed supplier, which expired on 31 March 2014 (pursuant to Article 105 of the **Gas Market Act**).
- no guaranteed supplier is currently nominated in the territory of Croatia.

HERA is of the opinion that the guaranteed supplier should be nominated as soon as possible; therefore, in early 2017, based on conducted research on the function of the gas market, HERA provided the relevant ministry with possible scenarios, an estimated schedule, qualification criteria, and ranking criteria for the purpose of nominating a guaranteed supplier.

The nomination of a guaranteed supplier under the public service (pursuant to Article 55 of the **Gas Market Act**) implies the following:

- , the Croatian government can nominate a supplier with a public service obligation for the area of a unit of regional government at the proposal of the ministry and with an opinion from HERA,
- HERA's opinion is based on conducted research on the function of the gas market,
- the role of the present suppliers with a public service obligation has been imposed by law through the nomination of those firms that supplied consumers from the household category with gas on the date of the full liberalisation of the gas market in Croatia (1 August 2008) as suppliers with a public service obligation,
- in the event there is no public service gas supplier, or should the public service gas supplier cease to operate, the Croatian government will, at the proposal of the ministry and with HERA's prior opinion, nominate the supplier with the highest share in the gas market in the previous year in a given unit of regional government as the gas supplier with a public service obligation in the area concerning gas supply for consumers connected to the distribution system. On an exceptional basis, in the event there was no gas supply for the end consumers connected to the distribution system in a given unit of regional government in the previous year, the representative body of the unit of regional government must notify the ministry and HERA accordingly, and nominate the gas distribution concession holder as the supplier with a public service obligation.
- The obligations of the supplier with a public service obligation (pursuant to Article 55 of the **Gas Market Act**) include supply under regulated conditions. i.e. through the application of the applicable tariff item amounts for the gas supply public service, for households, and gas supply for energy entities and legal and natural persons who use such gas to generate thermal energy supplied to households.

In doing so, the supplier with a public service obligation has at its disposal the mechanisms to ensure gas for the needs of consumers who use the public service supply. The chain of gas procurement for consumers with a public service obligation is defined in decisions of the Croatian government concerning the procurement of gas for supply as a public service obligation in the following manner:

- the supplier in the wholesale gas market sells gas to suppliers with a public service obligation to consumers from the household category (under regulated conditions), or
- the supplier with a public service obligation to consumers from the household category procures gas under market conditions (an option introduced as of 1 April 2017)

In the process, the gas storage system operator has an obligation to provide priority allocation to suppliers on the wholesale gas market during the procedure of allocating gas storage system capacities (70% of working volume prior to 1 April 2017, and 60% of working volume as of 1 April 2017).

6 OIL AND OIL DERIVATIVES

6.1 Regulation of the legislative framework for oil and oil derivatives

The oil and oil derivative market and energy activities in the oil and oil derivative sector are governed by the **Energy Act**, the **Energy-Related Activities Regulatory Act**, the **Oil and Oil Derivatives Market Act**, and by-laws adopted based on said acts.

In addition, the frameworks for determining and monitoring liquid petroleum fuel quality are laid down in the *Regulation on Liquid Petroleum Fuel Quality (Official Gazette Nos. 113/13, 76/14 and 56/15)*, based on the **Air Protection Act (Official gazette Nos. 130/11 and 47/14)**.

The *2016 Programme for Monitoring Liquid Petroleum Fuel Quality (Official Gazette No. 136/15)* 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 by the supplier on the national market or used for personal needs, and laboratory analyses of liquid petroleum fuel samples.

The requirements for wholesale and foreign trade in oil derivatives 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 Regulation of oil transportation through pipelines

Oil transportation through pipelines in Croatia is performed by Jadranski naftovod d.d. (*hereinafter: JANAF d.d.*). Pursuant to the **Oil and Oil Derivatives Market Act**, JANAF 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, Slovenia, and Hungary, as shown in Figure 6.2.1. In addition, the system can also be used for oil imports by land.



Figure 6.2.1. JANA F d.d. oil pipeline system

In 2016, a total of 7.1 million tonnes of crude oil was transported through the oil pipeline system, which represents an increase of 14.5% as compared to the previous year. The oil quantities transported from 2005 to 2016 and the quantities planned for 2017 are shown in Figure 6.2.2.

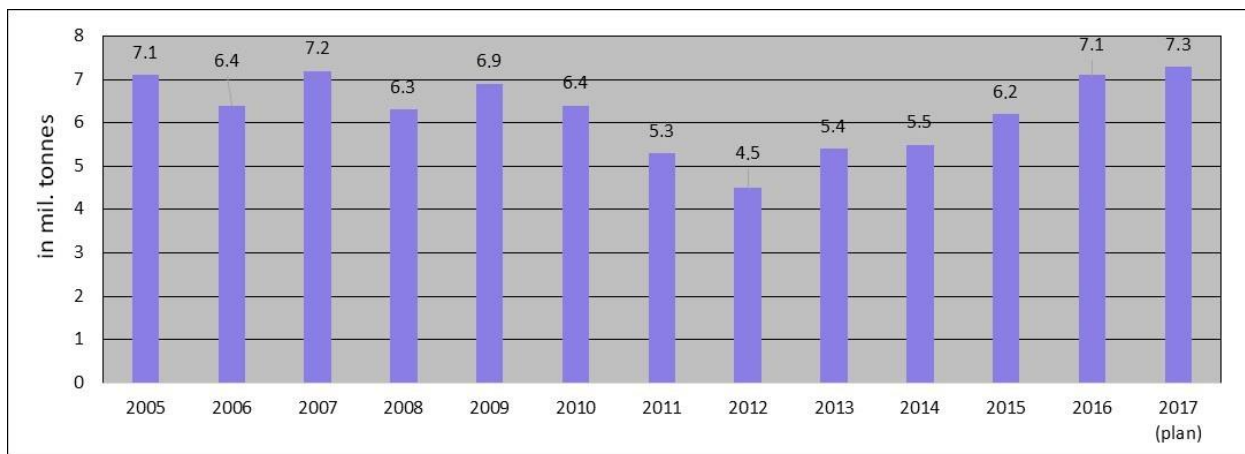


Figure 6.2.2. JANA F oil pipeline system – transported quantities [in millions of tonnes]

Of the other activities undertaken by JANAF d.d. concerning the development of the oil pipeline system in 2016, of particular note are 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.

Since the **Oil and Oil Derivatives Market Act** entered into force in February 2014, the price of oil transport has been 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 the JANAF oil pipeline system.

6.3 Development of the oil and oil derivatives market

6.3.1 Storage of oil and oil derivatives

In 2016, oil and oil derivative storage was performed by 23 energy entities, while the liquefied petroleum gas storage was carried out by one energy entity. The storage of oil and oil derivatives 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. The price of oil and oil derivative storage is not regulated, and it is defined according to market principles. According to data furnished by the energy entities, total available storage capacities amounted to 2.45 million m³ in 2016, whereas total available capacity was 2.40 million m³ in 2015 (excluding storage capacities within INA d.d.'s refineries). The increase in storage capacities resulted from newly-built storage capacities for oil derivatives at the Ploče location. The geographical locations of the most important oil and oil derivatives storage facilities in Croatia, according to the type of goods stored in respective storage facilities, are shown in Figure 6.3.1.



Figure 6.3.1. Geographical locations of oil and oil derivatives storage facilities according to the type of goods stored, and total storage capacities in 2016

6.3.2 Production of crude oil and oil derivatives; trade in oil derivatives

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. The production of national crude oil in Croatia is performed by INA d.d. at hydrocarbon production fields in the continental part of Croatia. National production of crude oil amounted to 684,000 tonnes in 2016, which represents an increase of 7% as compared to 2015. In addition to domestic production, Croatia also covers domestic demand for crude oil with imports, primarily from Azerbaijan, Iraq, and Kazakhstan, which amounted to 2.53 million tonnes in 2016, an increase of 14.4% compared to 2015. A comparison of imported and locally produced crude oil from 2006 to 2016 is shown in Figure 6.3.2.

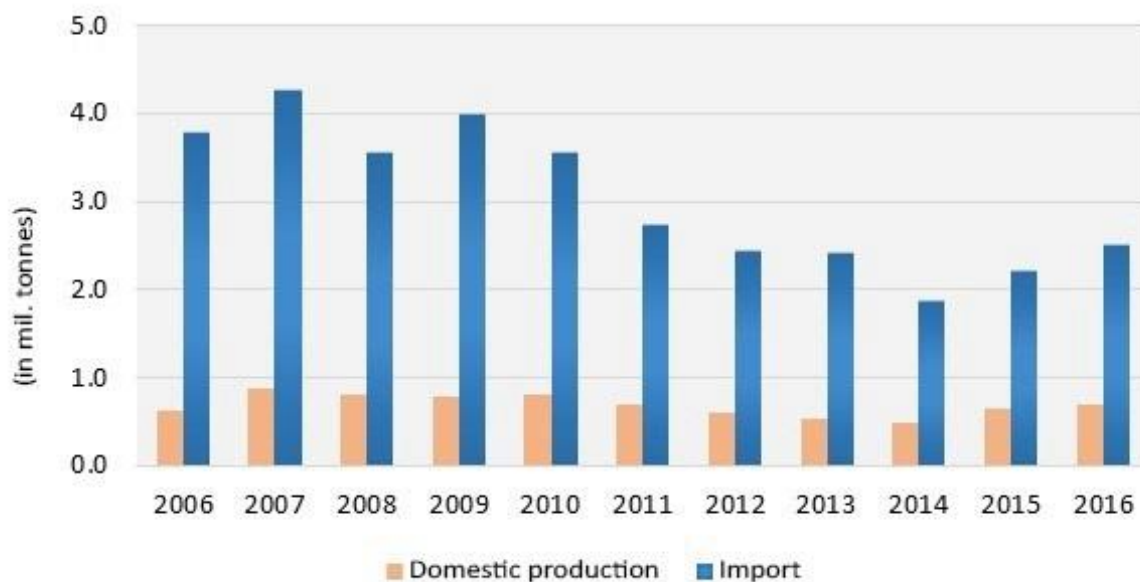


Figure 6.3.2. Crude oil quantities from domestic production and imports from 2006 to 2016 [in millions of tonnes]

Production of oil derivatives

Oil derivative production in Croatia is performed by INA d.d. The oil derivatives produced in the Rijeka and Sisak oil refineries, as well as at the Etan ethane facility in Ivanić Grad, include both engine fuels and industrial and household fuels. Imported crude oil and crude oil and condensates produced in Croatian oil and gas fields are used as raw materials in the production of oil derivatives. The structure of raw materials for refinery processing in 2016 is shown in Figure 6.3.3.

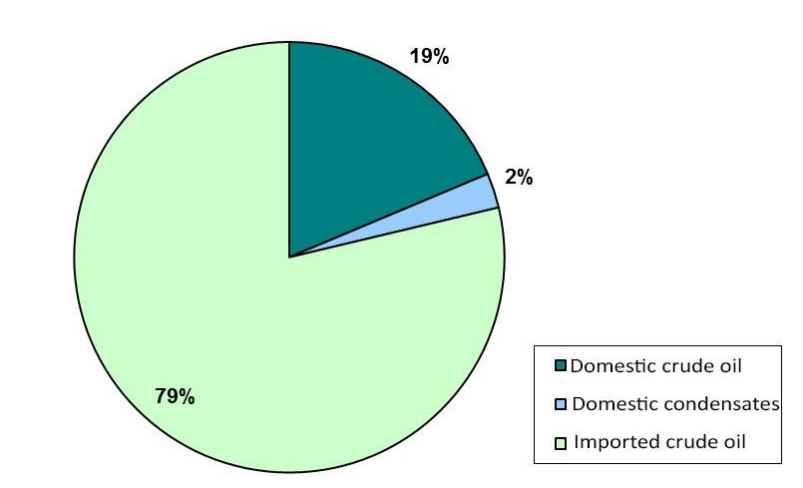


Figure 6.3.3. The structure of raw materials for refinery processing in 2016

The total production of oil derivatives in 2016 amounted to 3.4 million tonnes, which represents an increase of 10.8% as compared to 2015. The total quantities of oil derivatives produced from 2006 to 2016 are shown in Figure 6.3.4.

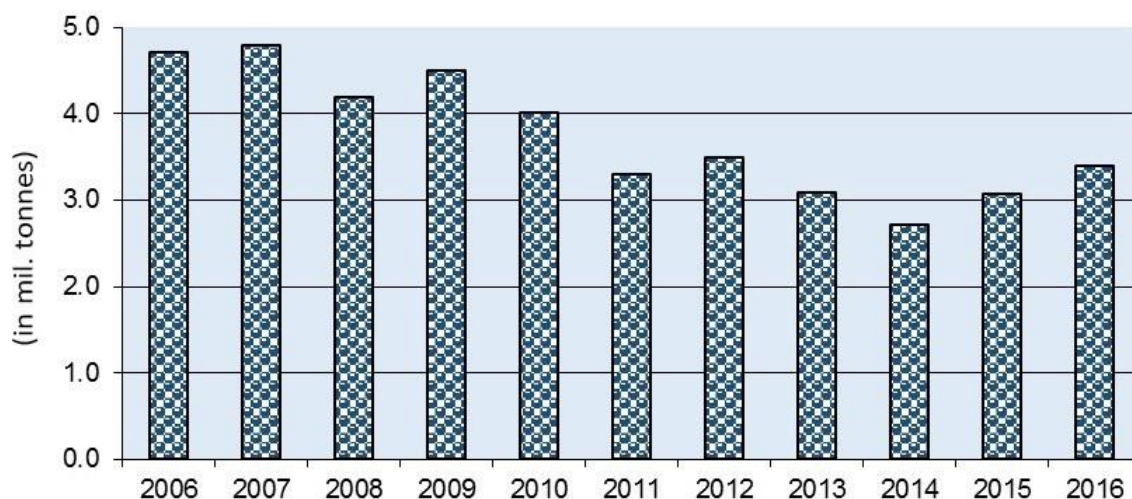


Figure 6.3.4. Produced quantity of oil derivatives from 2006 to 2016 [in millions of tonnes]

In 2016, INA d.d. continued the production of high-quality petrol and diesel fuels pursuant to the *Regulation on Liquid Petroleum Fuel Quality*, in accordance with European directives and standards and quality requirements for liquid petroleum fuels.

The total production of liquefied petroleum gas in 2016 amounted to 211,000 tonnes, which represents an increase of 0.5% as compared to 2015. The quantities of liquefied petroleum gas (LPG) produced from 2006 to 2016 are shown in Figure 6.3.5.

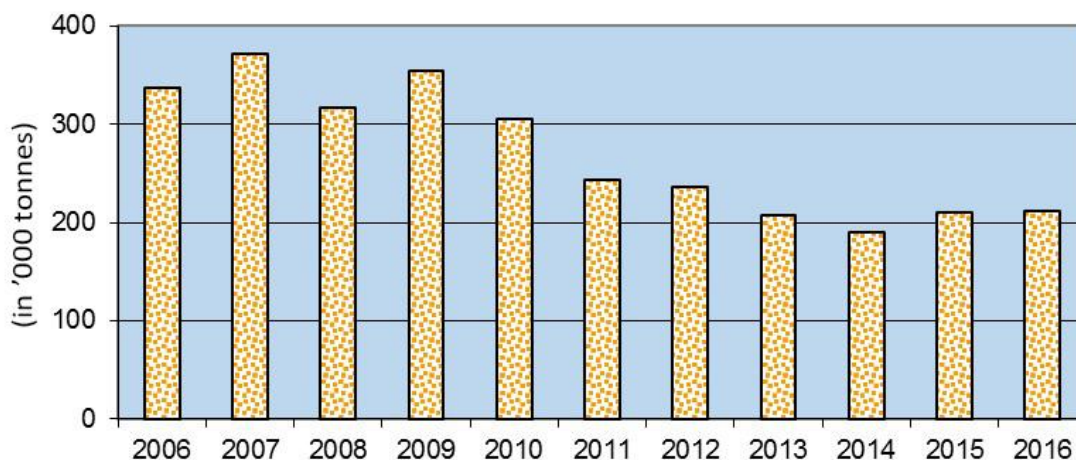


Figure 6.3.5. Produced quantity of LPG from 2006 to 2016 [in thousands of tonnes]

Trade in oil derivatives

Oil derivative trading implies the following energy activities:

- wholesale trade in oil derivatives,
- retail trade in oil derivatives,
- wholesale trade in LPG, and
- retail trade in LPG.

Wholesale trade in oil derivatives and LPG require licencing from HERA. In addition, approval from 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 2016, wholesale trade in oil derivatives was carried out by 53 energy entities, while wholesale trade in liquefied petroleum gas (LPG) was carried out by 13 energy entities.

The price of oil derivatives is not regulated, and it is defined according to market principles. In addition to oil derivatives from domestic production, imported oil derivatives account for a significant share on the Croatian market. According to data provided to HERA by energy entities, a total of 1.32 million tonnes of oil derivatives was imported in 2016. A comparison of the quantities of oil derivatives imported from 2006 to 2016 is shown in Figure 6.3.6.

It should be emphasised that the ministry simultaneously abolished limitations for ceiling prices in retail trade in oil derivatives and introduced reinforced monitoring of applied prices. Pursuant to the provisions of the *Ordinance on Amendments to the Ordinance on Data that Energy Entities are Obligated 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 as of 15 February 2015, energy entities dealing in retail trade in oil derivatives and liquefied petroleum gas are obliged to submit each change in the retail price of oil derivatives and/or biofuels to the ministry, which, based on the data collected, makes this information on the state of retail prices publicly available.

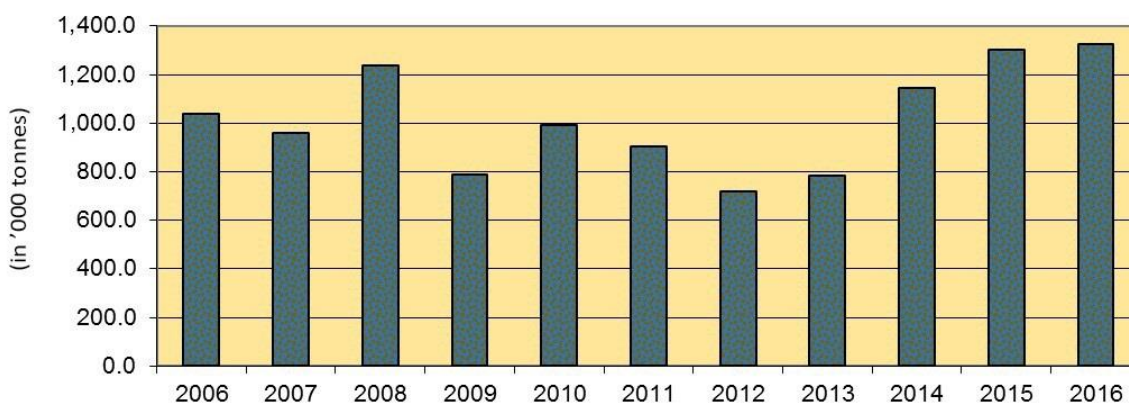


Figure 6.3.6. Imports of oil derivatives from 2006 to 2016 [in thousands of tonnes]

6.4 Security of supply of oil and oil derivatives

The prerequisites for secure supply of oil and oil derivatives on the Croatian market are laid down in the **Oil and Oil Derivatives Market Act**, transposing Council Directive 2009/119/EC imposing an obligation on EU member states to maintain minimum stocks of crude oil and/or petroleum products. In this context, the ministry establishes the necessary conditions and monitors the secure, regular, and quality supply of the oil and oil derivatives 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 Croatian Compulsory Oil and Oil Derivative Stocks Agency (HANDA).

A representative of HERA takes part in the capacity of a member of an expert committee for monitoring the regular market supply of oil and oil derivatives. The committee puts an emergency plan into action in the case of an unexpected supply disruption in the oil and oil derivatives market (Official Gazette No. 111/12). The emergency plan lays down the procedures and criteria for defining unexpected disruptions, as well as powers and responsibilities in the event of a supply disruption and procedures for supply normalisation in the oil and oil derivatives market. These involve measures to reduce the consumption of oil derivatives, as well as conditions for the consumption and renewal of compulsory oil and oil derivative stocks. The expert committee for monitoring the regular market supply of oil and oil derivatives did not meet in 2016.

With respect to the establishment of quantities of compulsory oil and oil derivative stocks, HANDA is obliged to establish compulsory stocks in the amount of 90 days' average consumption. Pursuant to the provisions of the **Oil and Oil Derivatives Market Act**, HERA provides a decision determining the quantity and structure of compulsory stocks for each year. HANDA issued the *Decision on the Quantity and Structure of Compulsory Oil and Oil Derivative Stocks for 2016* in the amounts shown in Table 6.4.1.

Table 6.4.1. *Quantity and structure of compulsory oil and oil derivative stocks for 2016*

Obligated party	motor gasoline [t]	diesel fuel [t]	gas oil [t]	jet fuel [t]	crude oil [t]
HANDA	39,000	141,000	30,000	20,000	404,000

The Plan Securing Compulsory Stocks of Oil and Oil Derivatives, Scheduling their Establishment and Replenishment, and Organising their Storage and Regional Distribution (Official Gazette No. 149/09) stipulates that the quantity and structure of compulsory stocks of oil and oil derivatives are public information, whereas the distribution of compulsory stocks of oil and oil derivatives in terms of quantity and structure is confidential. In addition, HANDA is obliged to provide the ministry with monthly reports on the status of total compulsory stocks of oil and oil derivatives. In compliance with the above, HANDA publishes the status of oil and oil derivative stocks on its website in the form of weekly reports on the status of oil and oil derivative stocks.

7 BIOFUELS

7.1 Regulation of the legislative framework for biofuels

The biofuel market and corresponding energy activities related to biofuels are governed by the **Energy Act**, the **Energy-Related Activities Regulatory Act**, the **Biofuels for Transportation Act**, and by-laws adopted based on the above laws.

The **Biofuels for Transportation Act** 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 area of biofuels comprises the following energy activities:

- biofuel production,
- biofuel storage,
- wholesale trade in biofuels, and
- retail trade in biofuels.

HERA's licence is required for the above energy-related activities, except for biofuel production exclusively for own needs or if less than 1TJ is produced annually, retail trade in biofuels and biofuel storage exclusively for own needs. In addition to HERA's licence, approval from the ministry is also required for wholesale trade in biofuels pursuant to the *Regulation on Requirements for Wholesale Trade and Trade with Third Countries in Certain Goods*.

Licences for the above energy activities have been obtained by three energy entities. In 2016, they produced and distributed a total of 6,031t of biodiesel, which represents a decrease of 65.4% as compared with 2015. The quantities of biofuel produced from 2009 to 2016 are shown in Figure 6.3.7.

It is presumed that the cause of the decrease in biofuel production lies in adverse market trends, initiated by the termination of cash incentives for the generation of biofuel for transportation paid to biofuel producers by Hrvatski operator tržišta energije d.o.o. (HROTE). HROTE's rights and obligations with respect to the payment of cash incentives are stipulated in the **Biofuels for Transportation Act** and by-laws governing the system of biofuel production incentives in Croatia. Pursuant to the **Biofuels for Transportation Act**, the incentives system for the production and use of biofuels in transportation was funded until 31 December 2012 out of a dedicated incentive fee for biofuel production, which HROTE collected from distributors and paid to biofuel producers as incentives. The amendments to the **Biofuels for Transportation Act** adopted in 2012 stipulated that HROTE would cease collecting the incentive fee for biofuel production as of 1 January 2013. Instead, funds for incentive payments represent the level of share in revenue from excise duties allocated for biofuel production. The 2014 Annual Business Report, made available on HROTE's publicly accessible website, clearly shows that incentive payments were regular until July 2014. The payment for August 2014 was partial, and then suspended, all due to a lack of funds that were supposed to be provided out of the Croatian state budget. In its 2015 Annual Business Report, HROTE indicated that it wrote the Ministry of Economy on 9 January 2015 requesting an opinion on HROTE's further role and activities in the field of biofuel production incentives in 2015, but no reply had been received by the time this report was completed.

The storage capacities that energy entities have at their disposal amount to 2,100m³ in total. The total capacity of biofuel production in 2016 was 242t/day. With respect to the

structure of raw materials, rapeseed accounted for the largest share with 93.2%, followed by waste edible oils with 6.6%; the share of sunflower oil was merely 0.2%.

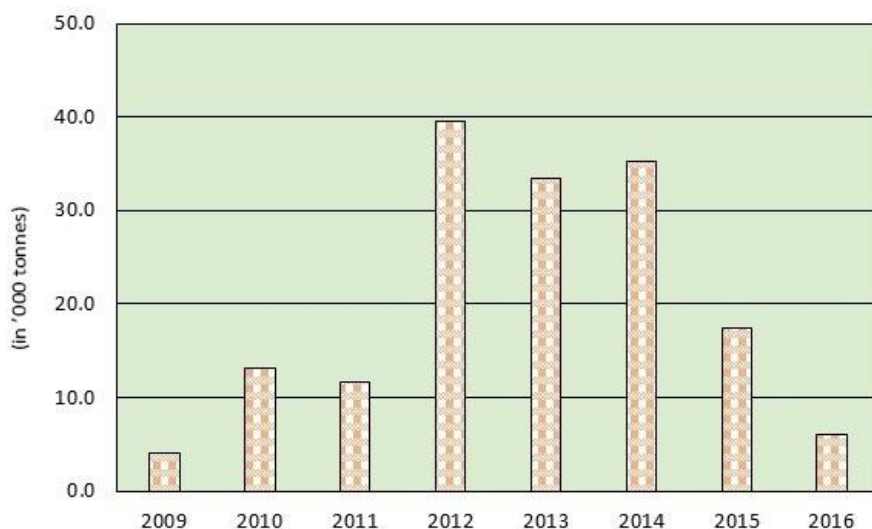


Figure 6.3.7. Produced quantity of biofuel from 2009 to 2016 [in thousands of tonnes]

Biofuels as a supplement or substitute for diesel or petrol for transport purposes

The **Oil and Oil Derivatives Market Act** recognises the utilisation of biofuels as a supplement to oil derivatives if they comply with legislation on the quality of biofuels.

The *Regulation on the Quality of Biofuels (Official Gazette Nos. 141/05 and 33/11)* stipulates the threshold values for the quality properties of biofuels intended for use as a supplement or substitute for diesel or petrol for transport purposes.

The **Biofuels for Transportation Act** provides for incentives in the production and consumption of biofuels in Croatia, particularly in terms of fostering the utilisation of biofuels and other renewable fuels for transport, thus aligning Croatian legislation with European Union *acquis*.

The *Regulation on the Incentive for the Production of Biofuels for Transportation (Official Gazette No. 1/2014)* stipulates the method by which incentives are provided in the production of biofuels for transportation, the methodology by which the highest selling price for biodiesel and bioethanol is calculated, the method by which the level of cash incentives are established, and the method by which the share in revenue from excise duties allocated for biofuel production are established; it also stipulates the powers, obligations, and responsibilities of the ministry in charge of energy, the ministry in charge of finances, and Hrvatski operator tržišta energije d.o.o. with regard to the disposal of funds from the share in revenue from excise duties allocated for biofuel production.

8 THERMAL ENERGY

8.1 Regulation of the Legal Framework for Thermal Energy

Regulation for the thermal energy sector and thermal energy generation, distribution, and supply activities in Croatia is based on the **Energy Act**, **Regulation of Energy Activities Act**, **Thermal Energy Market Act**, and by-laws adopted pursuant to said laws.

The **Thermal Energy Market Act** imposes new frameworks for changes in the thermal energy sector organisation, and 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 – thermal energy producers, thermal energy distributors, thermal energy suppliers, thermal energy consumers and end consumers. In 2014, 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 Establishing Tariff Items for Thermal Energy Generation (Official Gazette no. 56/14)*, and *Methodology for Establishing Tariff Items for Thermal Energy Distribution (Official Gazette no. 56/14)*. In addition, in 2014, the Ministry of Economy adopted the *Ordinance on the Method of Allocating and Calculating the Costs of Supplied Thermal Energy (Official Gazette no. 99/14)*, which was amended twice in 2015 (*Official Gazette nos. 27/15 and 124/15*).

In 2016 HERA adopted the *Methodology for Establishing the Fee for Connection to the Thermal Distribution Network and for Increase in the Connection Capacity (Official Gazette no. 42/16)*.

8.2 Thermal Energy Sector Organization, Activities, and Indicators

8.2.1 Thermal Energy Sector Organization

Energy entities for thermal energy generation, distribution, and supply in Croatia provide the services of space heating and preparation of sanitary hot water for 155,000 end consumers; 95% of said total number of end consumers falls under the household category.

The thermal energy necessary for space heating and the preparation of sanitary hot water is produced in cogeneration thermal power plants in Zagreb and Osijek, as well as in local district heating plants, i.e. separate boiler rooms.

In 2016, 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 430 kilometres. Average losses in the production and distribution of thermal energy for all heating systems and all energy entities in 2016 is 20%, as shown in Table 8.2.1.

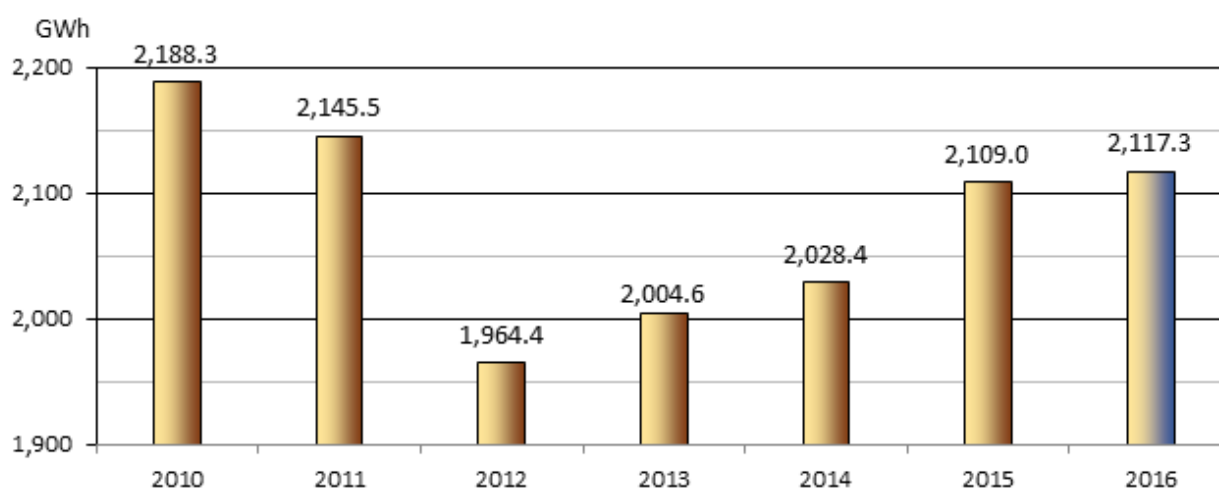


Figure 8.2.1. Supplied thermal energy in Croatia between 2010 and 2016

Table 8.2.1 contains information concerning energy entities, and Figures 8.2.2, 8.2.3, and 8.2.4 show supplied thermal energy, number of end consumers and installed capacity for thermal energy generation, as well as connection capacity in 2016.

Table 8.2.1. Information concerning energy entities in the thermal energy sector in 2016

ENERGY ENTITY	Number of end consumers	Network length	Total installed capacity	Generated thermal energy	Supplied thermal energy	Surface area	Fuel*
HEP-Proizvodnja d.o.o.			1,537.00	2,141.01			PP, LU
Zagreb			1,277.00	1,786.58			PP, LU
Osijek			190.00	254.61			PP, LU
Sisak			70.00	99.82			PP
HEP-Toplinarstvo d.o.o.	126,377	372.69	321.46	2,303.15	1,936.39	9,910,465	PP, LU, LUL
Zagreb	100,871	274.41	72.23	1,837.57	1,548.76	8,012,293	PP, LU, LUL
Osijek	11,708	56.39	140.50	261.01	228.59	1,123,156	PP, LU, LUL
Sisak	4,144	26.60	-	116.07	78.17	290,111	PP
Velika Gorica	5,902	9.84	69.61	59.18	53.21	306,007	PP, LU, LUL
Samobor	1,380	3.08	18.75	12.79	11.80	70,157	PP, LU, LUL
Zaprešić	2,372	2.37	20.36	16.53	15.86	108,740	PP, LU, LUL
Energo d.o.o., Rijeka	9,858	16.54	102.16	66.02	50.82	563,702	PP, LU, LUL
Gradska toplana d.o.o., Karlovac	7,988	21.20	117.63	71.24	56.97	505,262	PP
Brod-plin d.o.o., Slavonski Brod	3,762	7.05	34.24	38.16	34.43	197,669	PP
Tehno stan d.o.o., Vukovar	3,748	7.22	44.73	20.78	17.01	209,093	PP, LU
Vartop d.o.o., Varaždin	1,272	1.57	26.42	10.56	7.05	68,920	PP
GTG Vinkovci d.o.o., Vinkovci	1,647	1.60	17.83	8.79	8.58	89,435	PP, LU
Poslovni park Virovitica d.o.o., VT	443	0.84	9.80	3.30	2.79	28,370	PP
Komunalac d.o.o., Požega	417	0.80	5.40	2.28	2.15	19,839	PP
SKG d.o.o., Ogulin	92	0.58	4.40	1.48	1.12	6,120	LUL
TOTAL	155,604	430.09	2,221.06	2,525.75	2,117.31	11,598,875	

* NG – natural gas, FO – fuel oil, FOEL – fuel oil extra light, LFO – light fuel oil

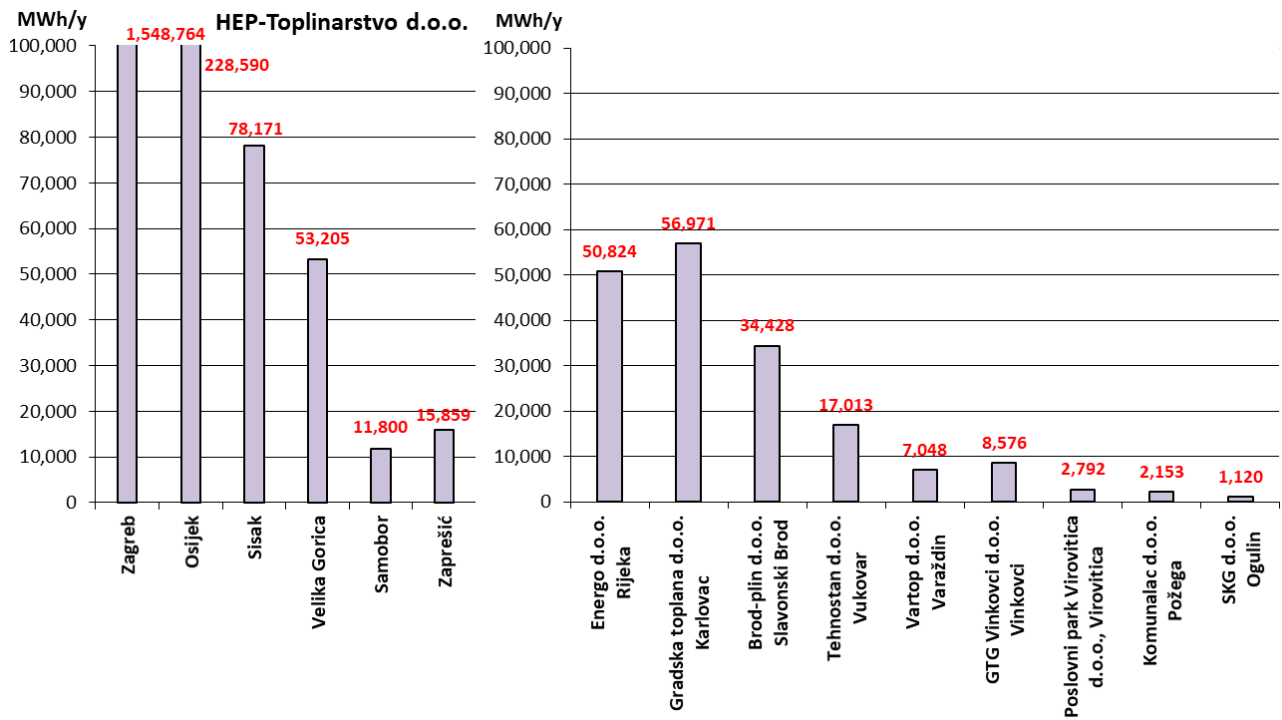


Figure 8.2.2. Supplied thermal energy in 2016

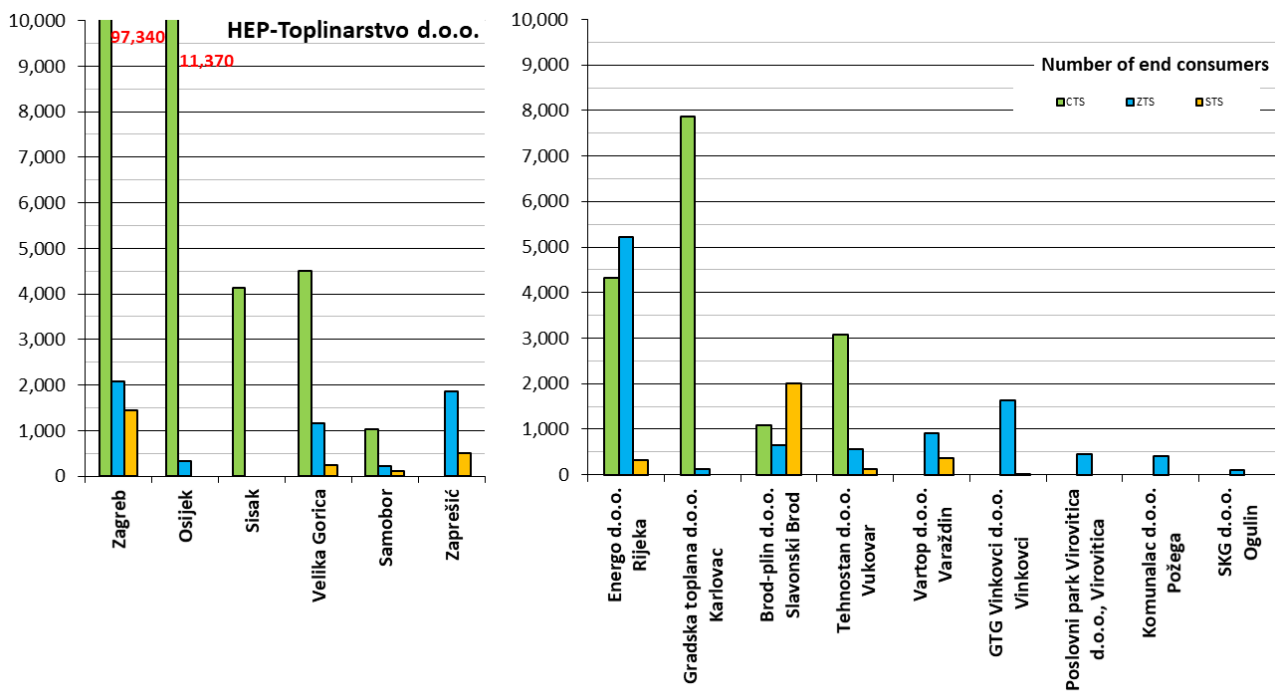


Figure 8.2.3. Number of end consumers in 2016

The majority of energy entities in the thermal energy sector have a considerable installed capacity reserve with regard to connection capacity. The HEP-Toplinarstvo d.o.o. energy entity generates only a small portion of supplied thermal energy in its own plants, while it purchases and assumes the remainder of the thermal energy from the HEP-Proizvodnja d.o.o. energy entity, a thermal energy producer. In 2016, HEP-Proizvodnja d.o.o. delivered 2,141.01 GWh of thermal energy to HEP-Toplinarstvo d.o.o.

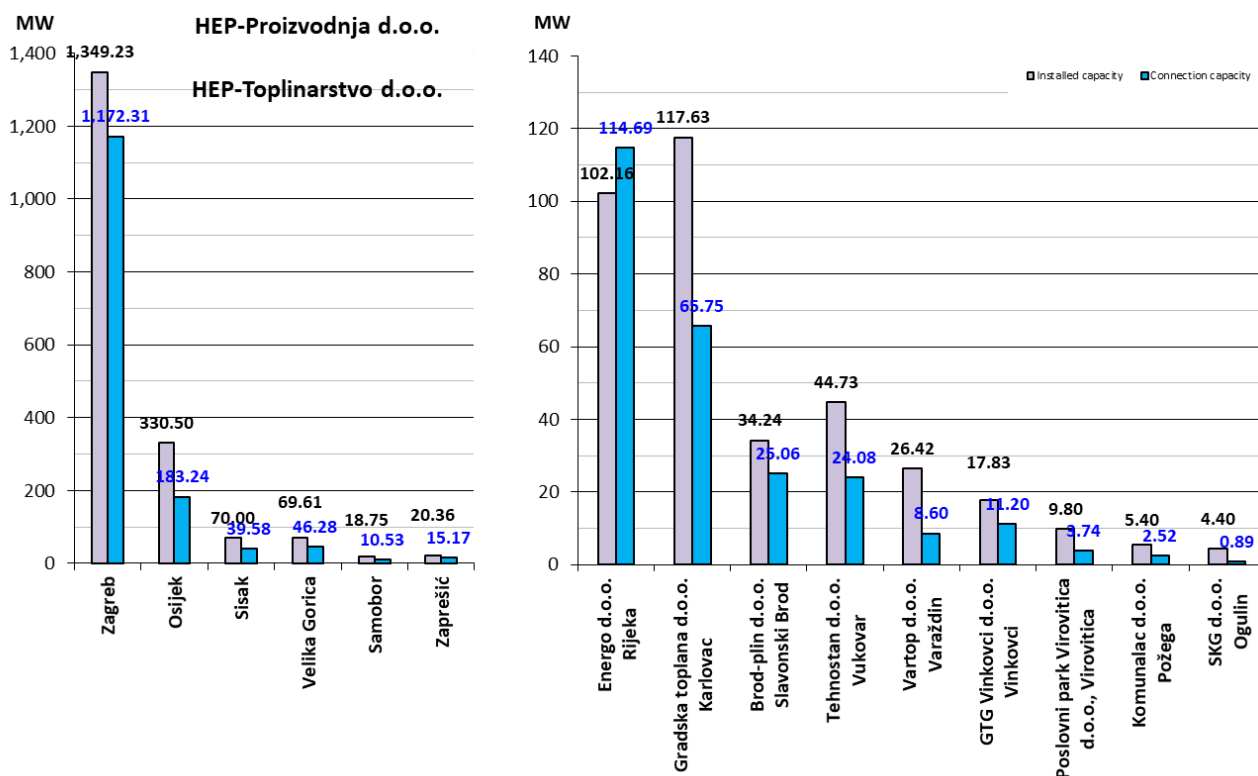


Figure 8.2.4. Installed capacity for thermal energy generation, including connection capacity in 2016

The majority of energy entities performing the energy-related activities of thermal energy generation, distribution, and supply are mostly owned by local government units or the state, and a smaller portion of energy entities are partially privately owned. In addition to thermal energy activities, these energy entities mostly deal in gas distribution, public utilities, and building management.

The percentage of end consumers connected to the centralised heating systems in Zagreb, Osijek, Sisak, Samobor, Velika Gorica, Rijeka, Karlovac, Slavonski Brod, and Vukovar, with regard to all other heating systems as shown in Table 8.2.1, is 86.6%, i.e. 88% of surface area, with the supplied thermal energy percentage being 93.2%, as shown in Figure 8.2.5.

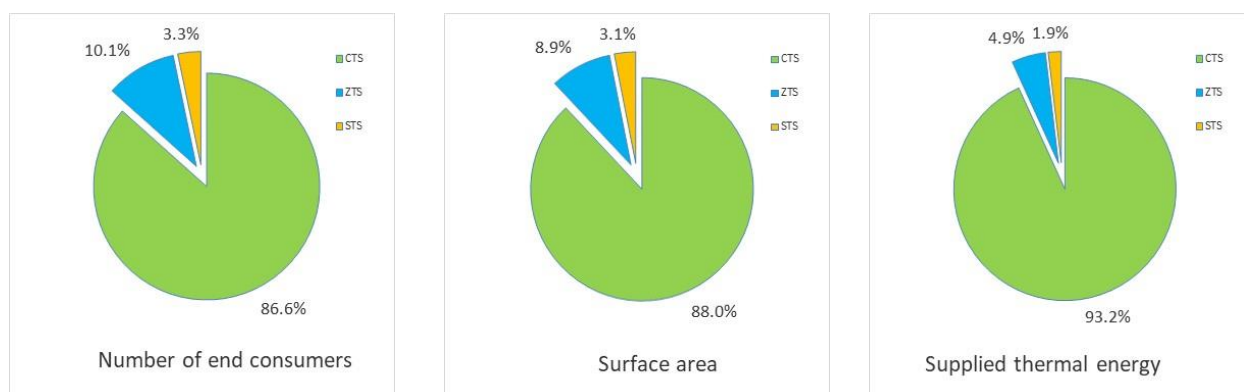


Figure 8.2.5. Share of end consumers, surface area, and supplied thermal energy per heating system

The average losses during the production and distribution of thermal energy show that there is a need for loss reduction, which can be achieved through investment into new technologies and renewable energy sources in thermal energy generation, as well as investment into the reconstruction of the existing distribution network.

8.2.2 Thermal energy sector activities

In 2016, HERA received and solved 149 cases in the thermal energy sector, which are grouped and shown in Table 8.2.2.

Table 8.2.2. Cases in the thermal energy area in 2016

Case type	Number	Share
Inquiries, complaints and statements	119	80%
Change in amounts of tariff items for centralised heating system energy	10	7%
Requests by energy entities and competent national authorities for opinions	20	13%
Total	149	100%

We would like to place special emphasis on the following activities:

- Issuing licences for energy activities of thermal energy supply:
 - TI-SAN d.o.o.
 - POSLOVNI PARK VIROVITICA d.o.o.
- extending licences for energy activities of thermal energy generation, distribution, and supply:
 - TOP-TERME d.o.o.
 - KOMUNALAC POŽEGA d.o.o.
- Expiration of licences to perform energy-related activities for thermal energy generation, distribution, and supply:
 - IVAKOP d.o.o.
- Adoption of the *Methodology for Establishing Fees for Connection to the Thermal Distribution Network and for Increasing the Connection Capacity (Official Gazette no. 42/16)*.

On December 31, 2016, the number of thermal energy sector licences was as follows:

- Thermal energy generation 25,
- Thermal energy distribution 10, and
- Thermal energy supply 23.

Pursuant to the **Thermal Energy Market Act**, HERA established and regularly updates and manages the register of thermal energy consumers on its website. HERA also manages the thermal energy consumer register, and all active thermal energy consumers have provided information for the thermal energy consumer register pursuant to the provisions of the **Thermal Energy Market Act**.

8.2.3 Thermal Energy Prices

Pursuant to the provisions of the **Thermal Energy Market Act**, and based on the *Methodology for Establishing Tariff Items for Thermal Energy Generation* and *Methodology for Establishing Tariff Items for Thermal Energy Distribution*, HERA establishes amounts of tariff items for thermal energy generation and tariff items for thermal energy distribution solely for centralised heating systems.

In 2016, there was a change in prices of primary energy sources used in thermal energy generation, more specifically natural gas for the public service of gas and fuel oil supply. The *Methodology for Establishing Tariff Items for Thermal Energy Generation* laid down the procedure for the change in the amounts of tariff items for energy in case of change

in the price of fuel used for thermal energy generation. In 2016, in centralised heating systems, where natural gas is used as an energy source for thermal energy generation, tariff item for energy was reduced in average by 21% when compared to the tariff item in 2015 (20% in Karlovac, 21% in Slavonski Brod, 27% in Vukovar, and 17% in Rijeka). Tariff item for energy in Vojak centralised heating system (Rijeka), where fuel oil is used in thermal energy generation, changed 5 times in 2016 (in January, March, April, July, and November), and increased by 14.6% with regard to the tariff item in 2015. The total price of thermal energy in cities where HEP-Toplinarstvo d.o.o. provides services in thermal energy activities did not change in 2016 (Zagreb, Osijek, Sisak, Velika Gorica, Samobor, and Zaprešić).

Table 8.2.3. Amounts of tariff items for thermal energy generation and thermal energy distribution for centralised heating systems on 31 December 2016 (VAT excluded)

ENERGY ENTITY	CENTRALISED HEATING SYSTEM	TARIFF GROUPS (Tg)*	TARIFF MODELS (TM)**	Amounts of tariff items – 31 December 2016					
				GENERATION		DISTRIBUTION		GEN + DISTR	
				Energy [HRK/kWh] [HRK/t]	Power [HRK/kW] [k/t/h]	Energy [HRK/kWh] [HRK/t]	Power [HRK/kW] [k/t/h]	Energy [HRK/kWh] [HRK/t]	Power [HRK/kW] [k/t/h]
Energ o 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
	KRNJEVO	Tg1	TM1	0.2800	11.00	0.0500	5.50	0.3300	16.50
		Tg2	TM2	0.2800	11.00	0.0500	5.50	0.3300	16.50
	VOJAK	Tg1	TM1	0.2572	11.00	0.0500	5.50	0.3072	16.50
		Tg2	TM2	0.2572	11.00	0.0500	5.50	0.3072	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	0.3321	12.60	0.0400	4.40	0.3721	17.00
Brod-plin d.o.o. Slavonski Brod	SLAVONIA	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
Tehno stan d.o.o. Vukovar	BOROVO NASELJE	Tg1	TM1	0.2686	9.50	0.0470	5.00	0.3156	14.50
		Tg2	TM2	0.3384	9.50	0.0470	5.00	0.3854	14.50
	OLAJNICA	Tg1	TM1	0.2696	9.50	0.0470	5.00	0.3166	14.50
		Tg2	TM2	0.3383	9.50	0.0470	5.00	0.3853	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 business consumers

(TM)** TM1 – Hot/warm water; TM2 – Hot/warm water; TM3 – Processing steam

Table 8.2.3 shows amounts of tariff items for thermal energy generation and thermal energy distribution for centralised heating systems on 31 December 2016 which represent

a regulated part of the thermal energy price, whereas the fees for thermal energy supply and fees for the activities of the thermal energy consumer are contracted freely pursuant to the provisions of the **Thermal Energy Market Act**. Therefore, the final price of thermal energy in centralised heating systems, without the regulated part, consists of the fee for thermal energy supply and fee for performing activities of the thermal energy consumer which account for market thermal energy price component and which are contracted freely.

Figure 8.2.6 contains a graph of the average shares of respective components in the total price of thermal energy for household end consumers for centralised heating systems in Croatia. Shares of respective thermal energy price components were calculated based on the information on supplied thermal energy, connection power, surface area, and number of end consumers for a centralised heating system in 2016, amounts of tariff items for the production and distribution of thermal energy, fees for thermal energy supply, and fees for thermal energy consumers on 31 December 2016.

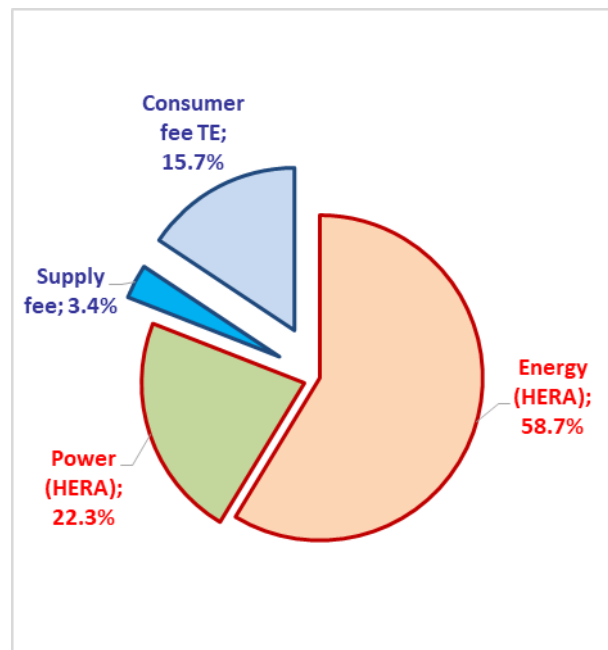


Figure 8.2.6. Average shares of respective components in the total price of thermal energy for household end consumers for centralised heating systems

Figure 8.2.6 shows that the average regulated part of the thermal energy price for all centralised heating system amounts to 81%.

Figure 8.2.7 offers a more detailed comparison in the form of a graph of respective centralised heating systems in Croatia with shares of individual components in the total price of thermal energy for household end consumers in 2016.

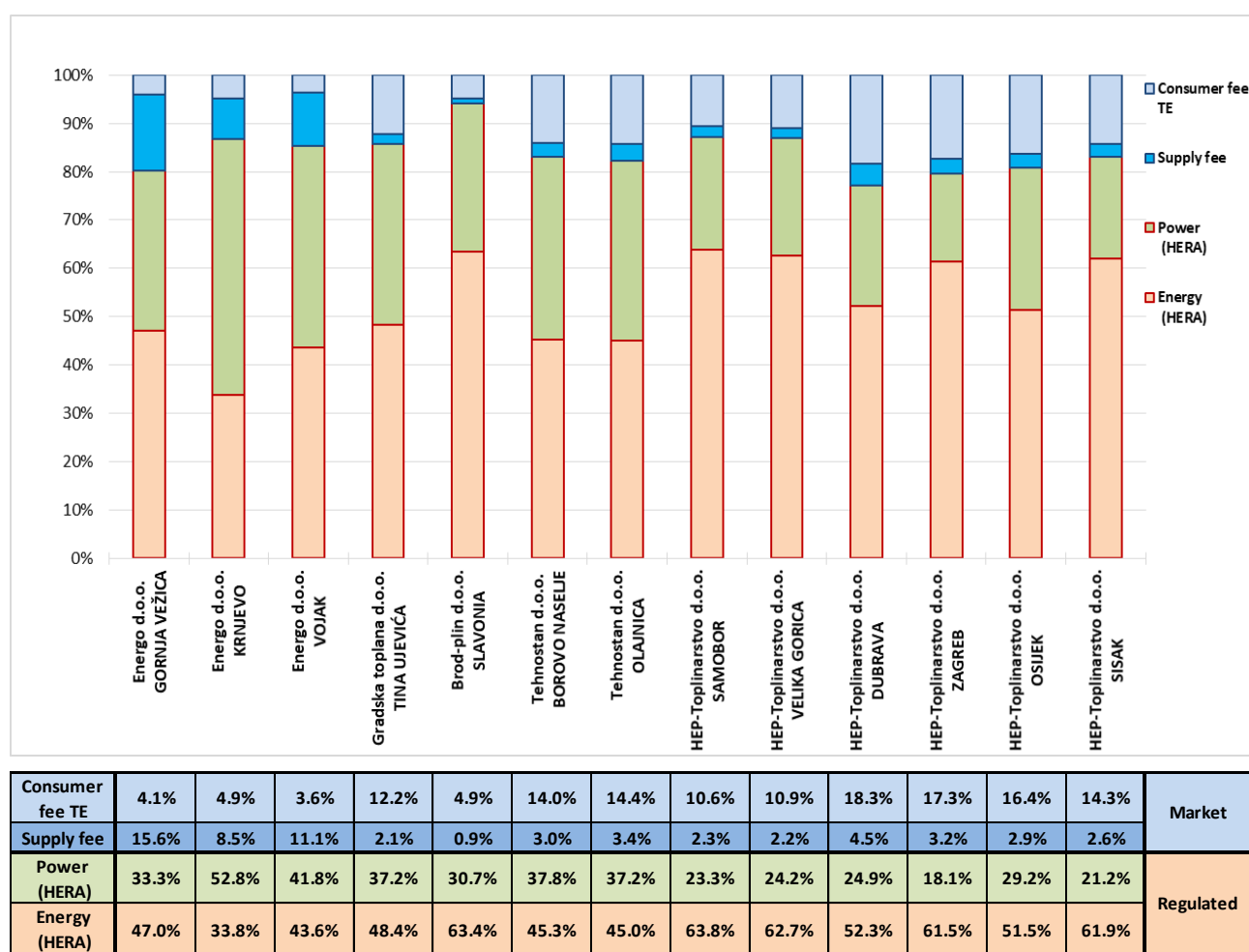


Figure 8.2.7. Shares of respective components in the total price of thermal energy for the end consumers in the household category for respective centralised heating systems in 2016

Closed heating system is a system entailing several industrial and/or residential-commercial buildings that share a common heating system, and where the thermal energy supplier ensures expert management, operation, and maintenance. The price of delivered thermal energy to thermal energy consumers in closed heating systems are defined freely in accordance with the market conditions.

Independent heating system consists of a boiler-room, thermal energy meter, and internal installations. Thermal energy consumer manages and maintains the independent heating system, and the price of delivered thermal energy to the end consumers are defined freely in accordance with the market conditions.

The total price of thermal energy in closed and independent heating systems does not contain a single regulated component, but it is defined freely in accordance with the market conditions.

Given that HERA does not define a single component of the price of thermal energy in closed and independent heating systems, Table 8.2.3 does not contain prices from those systems.

8.2.4 Consumer protection

In 2016, HERA received 119 inquires, complaints, and statements in the thermal energy sector. Table 8.2.4 classifies and further systematizes the case.

Table 8.2.4. Inquiries, complaints, and statements received in 2016

Case description	Number	Share
Disconnection from the thermal energy system	10	8%
Thermal energy methodology and prices	2	2%
Thermal energy quality, service quality, the transparency of calculating and issuing invoices for thermal energy consumption	29	24%
Ordinance on the Method of Allocating and Calculating the costs for the Supplied Thermal Energy and the Thermal Energy Market Act	12	10%
Installation and readings of heat cost allocators, heating quality after heat cost allocators installation	19	16%
End customers' requests for opinion on and interpretation of the Thermal Energy Market Act and by-laws	21	18%
Requests by other legal persons for opinion on and interpretation of the Thermal Energy Market Act and by-laws	26	22%
Total	119	100%

When compared with 2015, which was the year of inquiries and complaints made by end consumers with regard to the *Ordinance on the Method of Allocating and Calculating the Costs for the Supplied Thermal Energy* and **Thermal Energy Market Act**, the total number of inquiries and complaints was significantly smaller in 2016.

HERA gave representations or opinions or issued corresponding decisions to all inquiries, complaints, and statements, within its powers and responsibilities, and tried to provide guidelines and help to the 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

Table 4.2.1.	<i>Estimate of total investment in the development of transmission network for the ten-year period (2017 – 2026)</i>	45
Table 4.2.2.	<i>Realised annual investments in the transmission network from 2012 to 2016 in millions of HRK</i>	46
Table 4.2.3.	<i>Estimated investment in the development of the distribution network for the ten-year period (2017 – 2026)</i>	46
Table 4.2.4.	<i>Achieved annual investments in the distribution network from 2012 to 2016 in HRK million</i>	46
Table 4.2.5.	<i>Average transmission network usage fees for the period from 2012 to 2016</i>	49
Table 4.2.6.	<i>Average distribution network usage fees for the period from 2012 to 2016</i>	50
Table 4.3.1	<i>Electric power balance sheet of the Republic of Croatia in 2015 and 2016 in GWh</i>	58
Table 4.3.2.	<i>Systems of allocation of cross-border transmission capacities per border of the Republic of Croatia with neighbouring countries in 2016</i>	62
Table 4.3.3.	<i>Capacities allocated at the annual auctions by border in 2016</i>	63
Table 4.3.5.	<i>Structure of HOPS's revenues and expenditures from auctions for the allocation of cross-border transmission capacities in 2016</i>	65
Table 4.4.1.	<i>Number of metering points and the sale, average sale, and share in the sale of electricity to end consumers by consumption category in the Republic of Croatia in 2016</i>	74
Table 4.4.2. and Figure 4.4.3.	<i>show the distribution of consumption and billing metering points of end consumers from the "household" category by EUROSTAT consumption category</i>	76
Table 4.4.3.	<i>Categories of electricity consumption and indicative peak loads for consumers in the commercial category according to EUROSTAT</i>	76
Table 4.4.4.	<i>Distribution of consumption and distribution of billing metering points for end consumers from the commercial category on low, medium, and high voltage in the Republic of Croatia by EUROSTAT consumption category in 2016</i>	77
Table 4.4.5.	<i>Average total selling prices of electricity for end consumers from 2010 to 2016 [HRK/kWh]</i>	80
Table 4.4.6.	<i>Average prices of electricity for end consumers on the market (outside public service) and within the universal service (households) in the period from 2011 to 2016 [HRK/kWh]</i>	80
Table 4.4.7.	<i>Characteristics of typical electricity end consumers in the Republic of Croatia in 2016</i>	81
Table 4.4.8.	<i>Supply interruptions in the HOPS network from 2008 to 2016</i>	85
Table 4.4.9.	<i>Issued PEPAs and EPAs to end consumers connected to HEP-ODS's network in 2016</i>	87
Table 4.4.10.	<i>PEPAs and EPAs issued to producers and end consumers with own production in HEP-ODS's network in 2016</i>	87
Table 4.4.11.	<i>Classification of petitions in the electricity sector received by HERA in 2016</i>	88
Table 4.4.12.	<i>Statistics of complaints and objections in the electricity sector received by HERA in 2016</i>	89
Table 4.4.13.	<i>Overview of complaints processed by HEP-ODS's Complaints Processing Committee in 2016</i>	91
Table 4.4.14.	<i>Registrations in the Register of Guarantees of Origin of Electricity in 2016</i>	95
Table 4.4.15.	<i>Activities in the Register of Guarantees of Origin of Electricity in 2016</i>	95
Table 4.5.1.	<i>Maximum and minimum loads of the Croatian electric power system</i>	96
Table 4.6.1.	<i>Preliminary and final decisions issued by HERA in 2016</i>	103
Table 4.6.2.	<i>Final decisions issued by HERA from 2007 to 2016</i>	104
Table 4.6.3.	<i>Generation and paid incentives to eligible producers in 2016 by type of plant</i>	105
Table 4.6.4.	<i>Overview of cash flows in the incentives system [HRK mil.]</i>	106
Table 5.2.1.	<i>Amounts of tariff items for gas transport in 2016</i>	124
Table 5.2.2.	<i>Amounts of tariff items for gas transport for the period 2017 – 2021</i>	125
Table 5.2.3.	<i>Amounts of tariff items for natural gas storage in 2016</i>	127
Table 5.2.4.	<i>Amounts of tariff items for gas storage for the period 2017 – 2021</i>	128
Table 5.3.1.	<i>Average gas selling prices by quarter for end consumers using the public service in the Republic of Croatia in 2016, VAT excluded</i>	141
Table 5.3.2.	<i>Average gas selling price for end consumers on the market in the Republic of Croatia in 2016, VAT excluded</i>	143
Table 5.3.3.	<i>Complaints and other consumer petitions by type in 2016</i>	151
Table 6.4.1.	<i>Quantity and structure of compulsory oil and oil derivative stocks for 2016</i>	165
Table 8.2.1.	<i>Information concerning energy entities in the thermal energy sector in 2016</i>	169
Table 8.2.2.	<i>Cases in the thermal energy area in 2016</i>	172

Table 8.2.3. Amounts of tariff items for thermal energy generation and thermal energy distribution for centralised heating systems on 31 December 2016 (VAT excluded)	173
Table 8.2.4. Inquiries, complaints, and statements received in 2016	176

9.2 List of figures

Figure 3.1.1. Organisational chart of HERA	21
Figure 3.4.1. Scheme of ACER's ARIS platform.....	33
Figure 4.2.1. Basic information about the transmission system as of 31 December 2016	39
Figure 4.2.2. Basic information about the distribution system as of 31 December 2016	40
Figure 4.2.3. Losses of electricity in the transmission network from 2010 to 2016	41
Figure 4.2.4. Unit rates for coverage of losses for the year 2016 – ITC	42
Figure 4.2.5. Losses of electricity in the distribution network from 2010 to 2016	42
Figure 4.3.1. Cross-border trade by borders of Republic of Croatia with neighbouring countries in 2016 by amounts from agreed schedules of energy entities.....	58
Figure 4.3.2. Electricity purchased and sold to CROPEX by market participants in 2016	59
Figure 4.3.3. Share of production capacities and electricity generated by power plants on the territory of the Republic of Croatia per energy operator in 2016.....	60
Figure 4.3.4. Average monthly values of cross-border transmission capacities by Croatian border in 2016	64
Table 4.3.4. Average winter and summer NTC values by border for 2015 and 2016	64
Figure 4.3.5. Structure of HOPS's income from annual, monthly, and daily auctions by direction for cross-border transmission capacities in 2016	65
Figure 4.3.6. CORE region for capacity calculation	67
Figure 4.3.7. Average daily prices for imbalances in 2016 in Croatia, Hungary and Slovenia	69
Figure 4.3.8. Average monthly prices of positive and negative imbalances in 2016	69
Figure 4.3.9. Amounts invoiced for imbalances in 2016	70
Figure 4.4.1. Share of individual end consumer categories in total electricity sales in the Republic of Croatia in 2016	75
Figure 4.4.2. Sales of electricity to end consumers in the period from 2007 to 2016	75
Figure 4.4.3. Distribution of consumption and distribution of billing metering points for end consumers from the household category by EUROSTAT consumption category in 2016	76
Figure 4.4.4. Number of billing metering points for the end consumers from the household category outside the universal service in 2016.....	78
Figure 4.4.5. Supply shares according to energy in December 2016	79
Figure 4.4.6. Structure of the total electricity price for end consumers in the Republic of Croatia by EUROSTAT consumption categories in 2016.....	81
Figure 4.4.7. Structure of total electricity prices in EU member states for household consumers from the Dc consumption category in the second half of 2016	82
Figure 4.4.8. Structure of total electricity prices in EU member states for commercial consumers from the Ic consumption category in the second half of 2016	82
Figure 4.4.9. Total electricity prices for household consumers from the Dc consumption category, including fees and taxes, in the second half of 2016	83
Figure 4.4.10. Total electricity prices for commercial consumers from the Ic consumption category, including fees and taxes, in the second half of 2016	83
Figure 4.4.11. Indicators of the continuity of supply in HEP-ODS's network from 2006 to 2016.....	85
Figure 4.4.12. Indicators of the continuity of supply in HEP-ODS's network by distribution area in 2016	86
Figure 4.4.13. Number of justified complaints concerning voltage quality per 1,000 consumers in the HEP-ODS distribution network by distribution area in 2016	86
Figure 4.4.14. Number of complaints and appeals per 1.000 consumers per distribution area of HEP-ODS in 2016 ..	89
Figure 4.4.15. Number of complaints concerning connection per 1,000 consumers per distribution area of HEP-ODS in 2016	90
Figure 4.4.16. Structure of complaints processed by Consumer Complaint Committees of HEP-ODS's distribution areas in 2016	91
Figure 4.5.1. Maximum and minimum loads of the Croatian electric power system during 2016	97
Figure 4.5.2. Shares of individual primary power sources in the power of power plants in the Republic of Croatia at the end of 2016	97
Figure 4.5.3. Overview of the maximum load of the Croatian electric power system (P_{max}) and the installed power of power plants in the territory of the Republic of Croatia (P_{inst}) from 2007 to 2016	98

Figure 4.5.4.	Shares of individual sources of electricity procurement for the requirements of the Croatian electric power system from 2007 to 2016	98
Figure 4.5.5.	Net imports of electricity for the needs of domestic consumption and share of imports in the total consumption in the Republic of Croatia	99
Figure 4.5.6.	Electricity generated in power plants in the Republic of Croatia delivered to the electric power system in 2016 by primary source	99
Figure 4.5.7.	Achieved peak loads from 2001 to 2016 as compared to forecasts according to the Master Plan and the Energy Development Strategy of the Republic of Croatia	101
Figure 4.5.8.	Consumption by end consumers on the distribution network in 2016 and planned consumption by 2021	101
Figure 4.6.1.	Installed capacity of plants in the incentives system from 2007 to 2016 by type of plant	105
Figure 4.6.2.	Average weighted buy-off price by plant type in 2016	106
Figure 5.2.1.	The Croatian gas transport system	119
Figure 5.2.2.	Quantities of gas transported by transport system entry groups by month for 2016	122
Figure 5.2.3.	Quantities of gas transported by transport system exit groups by month in 2016	123
Figure 5.2.4.	Total annual quantities of gas transported by consumer groups	123
Figure 5.2.5.	Natural gas supplies at UGSF Okoli on specific days in 2016	126
Figure 5.2.6.	Allocation of UGSF Okoli's standard gas storage capacity packages	129
Figure 5.2.7.	Comparison of the length of distribution systems, the total technical capacity of entries into distribution systems, and gas losses by distribution system operators in Croatia in 2016	130
Figure 5.2.8.	Locations of the distribution system operators' distribution areas, and basic information on gas distribution activities in Croatia in 2016	131
Figure 5.2.9.	Average prices of gas distribution by distribution system operators in the Republic of Croatia in 2016	132
Figure 5.2.10.	Structure of energy entities by their role in the gas market of the Republic of Croatia	133
Figure 5.3.1.	Natural gas balance in the Republic of Croatia in 2016	134
Figure 5.3.2.	The share of balancing groups in total natural gas quantities delivered by the transport system in 2016	135
Figure 5.3.3.	Gas quantities traded at the virtual trading point (VTP) in 2014, 2015, and 2016	136
Figure 5.3.4.	Structure of natural gas delivery from the transport system in 2016 (gas quantities in million kWh) ..	137
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 outset of retail market liberalisation in the Republic of Croatia	138
Figure 5.3.6.	Number of completed and terminated gas supplier switches since the outset of retail market liberalisation in the Republic of Croatia	139
Figure 5.3.7.	Structure of the regulated final price of gas in 2016, VAT excluded	142
Figure 5.3.8.	Average retail prices of gas by quarter for end consumer categories on the market in the Republic of Croatia in 2016, VAT excluded	143
Figure 5.3.9.	Average retail prices of gas by quarter for end consumer categories on the market in the Republic of Croatia from 2012 to 2016, VAT excluded	144
Figure 5.3.10.	The trend of average gas prices on the retail market in relation to the average purchase price of gas on the gas market from 2012 to 2016 [HRK/kWh]	145
Figure 5.3.11.	Graphic representation of the iPlin application	146
Figure 5.3.12.	A part of the iPlin application from HERA's website	147
Figure 5.3.13.	The trend in retail prices of natural gas for households in the D ₂ category in individual European countries from 2002 to 2016 (excluding taxes) [EUR/GJ]	147
Figure 5.3.14.	Average natural gas prices for households in the D ₂ category for the period from July to December 2016 (including and excluding taxes)	148
Figure 5.3.15.	Comparison of average natural gas prices for households in the D ₂ category with the price of goods/services in European countries (including taxes) from July to December 2015 and from July to December 2016, respectively	149
Figure 5.3.16.	Average natural gas prices for industrial consumers in the I ₃ category from July to December 2016 (including and excluding taxes)	150
Figure 5.3.17.	Natural gas prices for industrial consumers in the I ₃ category in relation to the price of goods/services in European countries (including taxes) from July to December 2015 and July to December 2016, respectively	151
Figure 6.2.1.	JANAF d.d. oil pipeline system	159
Figure 6.2.2.	JANAF oil pipeline system – transported quantities [in millions of tonnes]	159

Figure 6.3.1.	Geographical locations of oil and oil derivatives storage facilities according to the type of goods stored, and total storage capacities in 2016	161
Figure 6.3.2.	Crude oil quantities from domestic production and imports from 2006 to 2016 [in millions of tonnes]	162
Figure 6.3.3.	The structure of raw materials for refinery processing in 2016	162
Figure 6.3.4.	Produced quantity of oil derivatives from 2006 to 2016 [in millions of tonnes].....	163
Figure 6.3.5.	Produced quantity of LPG from 2006 to 2016 [in thousands of tonnes].....	163
Figure 6.3.6.	Imports of oil derivatives from 2006 to 2016 [in thousands of tonnes].....	164
Figure 6.3.7.	Produced quantity of biofuel from 2009 to 2016 [in thousands of tonnes].....	167
Figure 8.2.1.	Supplied thermal energy in Croatia between 2010 and 2016.....	169
Figure 8.2.2.	Supplied thermal energy in 2016	170
Figure 8.2.3.	Number of end consumers in 2016	170
Figure 8.2.4.	Installed capacity for thermal energy generation, including connection capacity in 2016	171
Figure 8.2.5.	Share of end consumers, surface area, and supplied thermal energy per heating system.....	171
Figure 8.2.6.	Average shares of respective components in the total price of thermal energy for household end consumers for centralised heating systems	174
Figure 8.2.7.	Shares of respective components in the total price of thermal energy for the end consumers in the household category for respective centralised heating systems in 2016.....	175

10 ABBREVIATIONS

4MMC	and/or 4MMC Project – Four Markets Market Coupling Project (project entailing coupling of day-ahead markets between Hungary, Slovakia, Czech Republic, and Romania)
AAC	Already Allocated Capacity (already allocated capacities at the annual level)
ACER	Agency for the Cooperation of Energy Regulators
AIB	Association of Issuing Bodies
ARIS	ACER's platform for data reception, data processing, and report creation
BI	Business Intelligence
CACM	CACM Regulation – 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 (key EU financing instrument promoting growth, employment, and competition through target investments into infrastructure on the European level)
CEGHIX	Central European Gas Hub AG – “CEGHIX®” price index
CEP	Clean Energy Package – Clean Energy For All Europeans
CEREMP	Centralised European Register of Energy Market Participants
CHP	Cogeneration through combined heat and power
CORE	European Capacity Calculation Region
CROPEX	Croatian Power Exchange Ltd.
DCC	DCC Regulation – Commission Regulation (EU) on establishing network code on demand connection
EPA	Electric Power Approval
EC	European Commission
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSO-G	European Network of Transmission System Operators for Gas
EQS	CEER Electricity Quality of Supply Task Force
ERRA	Energy Regulators Regional Association
EU	European Union
EUPHEMIA	Pan-European Hybrid Electricity Market Integration Algorithm
EUROSTAT	Statistical office of the European Union / European statistical organisation
FCA	Forward Capacity Allocation/Guideline on Forward Capacity Allocation and/or FCA Regulation – Regulation (EU) 2016/1719 on establishing a guideline on forward capacity allocation (Forward Capacity Allocation / FCA GL Guideline on Forward Capacity Allocation)
FGSZ Ltd.	Hungarian transport system operator
GRI SSE	Gas Regional Initiative – Region South-South East
HANDA	Croatian Compulsory Oil and Oil Derivative Stocks Agency
HAR	Harmonised Allocation Rules
HEP d.d.	Hrvatska Elektroprivreda d.d. joint-stock company
HEP-ODS	HEP-Operator distribucijskog sustava d.o.o.
HERA	Croatian Energy Regulatory Agency
HHI	Herfindahl-Hirschman Index
HOPS	Hrvatski operator prijenosnog sustava d.o.o.

HROTE	Hrvatski operator tržišta energije d.o.o.
HUPX	Hungarian Power Exchange Company Limited by Shares, HUPX Ltd.
HVDC	HVDC Regulation – Commission Regulation (EU) on establishing a network code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules
IBWT	Italian Borders Working Table
INA d.d.	Industrija nafte d.d.
iPLIN	Application on HERA's official website – Application for the provision of information to gas consumers from the household category who use supply as part of the public service
IT	Information Technology / IT System
ITC	and/or ITC Agreement – Inter-Transmission System Operator Compensation (ITC) mechanism
ITO	Independent Transmission Operator
JANAF	Jadranski naftovod d.d.
JAO	Joint Allocation Office
Commission	European Commission
LCOE	Long Term Cost of Electricity (long term costs of electricity which includes construction costs, for technologies that are not yet competitive, costs associated with project financing, etc.)
MEDREG	Mediterranean Energy Regulators
MRC	Multi-Regional Coupling
LV	Lower Voltage Level
LT	Lower Daily Tariff Item
NTC	Net Transfer Capacity
RES	Renewable Energy Sources
BMP	Billing Metering Point
SWM	Supplier in the Wholesale Gas Market
PCI	Projects of Common Interest (Regulation 347/2013)
PEPA	Prior Electric Power Approval
PRISMA	IT platform for capacity reservation at the interconnection points of gas transport systems
UGSF Okoli	Okoli – Podzemno skladište plina d.o.o.
RBP	IT platform for capacity reservation at the interconnection points of gas transport systems
REMIT	Regulation (EU) 1227/2011 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 (average annual duration of interruptions per consumer)
SAIFI	System Average Interruption Frequency Index (average annual number of interruptions per consumer)
Council	Regulatory Affairs and Consumer Protection Council
SCADA	Supervisory Control and Data Acquisition System
SEE	South East Europe
SEE-CAO	South East Europe Coordinated Auction Office
SMTA	Short and Medium Term Adequacy (ENTSO-E pilot project analysing short and medium term adequacy)

MV	Medium Voltage Level
SODO	Electricity distribution system operator
TM	Tariff Model
TR	Power of transformer fleet
TRM	Transmission Reliability Margin
TS	Transformer Substation
TSC	Transmission System Operator Security Cooperation (initiative between 13 transmission system operators out of 10 Continental Europe states, including HOPS, which is aimed at increasing system security through the development of multilateral procedures for congestion removal from the transmission network)
TYNDP 2016	Ten-Year Network Development Plan (ten-year development plan for the European Union transmission network from 2016)
UNP	Liquefied Petroleum Gas
UPP	Liquefied Natural Gas
HV	Higher Voltage Level
HT	Higher Daily Tariff Item
VTP	Virtual Trading Point – virtual place within the gas system (gas transport systems and storage systems) where balance responsible parties can mutually trade with gas
XBID	Cross Border Intraday

11 APPENDIX – LICENCES TO PERFORM ENERGY-RELATED ACTIVITIES

List of licences issued from 1 January 2016 to 31 December 2016	No. of issued licences
Electricity generation	6
VJETROELEKTRANA RUDINE d.o.o. for electricity generation Bijenička cesta 21 10000 Zagreb	
Farma muznih krava Orlovnjak d.o.o. Orlovnjak Tovilište 1 31216 Antunovac	
BIOPLINARA ORGANICA KALNIK 1 trgovačko društvo za proizvodnju električne energije iz bioplina d.o.o. Sveti Petar Orehovec 135 48267 Sveti Petar Orehovec	
SLK PROJEKT d.o.o. for electricity generation, distribution, and trade Domagojeva 14 10000 Zagreb	
SENSE ESCO BELIŠĆE d.o.o. for services Ribnjak 40 10000 Zagreb	
MOSLAVINA PROIZVODI d.o.o. for production, trade, and services Siščani 31, Siščani 43240 Čazma	
Trade of electricity	11
Interenergo d.o.o. Tivolska cesta 48 1000 Ljubljana Slovenia	
ČEZ, a. s. Duhová 2/1444 140 53 Prague 4 Czech Republic	
Holding Slovenske elektrane d.o.o. Koprska ulica 92 1000 Ljubljana Slovenia	
DANSKE COMMODITIES A/S Varkmestergade 3 DK-8000 Aarhus C Denmark	
AYEN ENERGIJA, trgovanje z električno energijo, d.o.o. Zemljemerska ulica 12 1000 Ljubljana Slovenia	
ENERGI DANMARK A/S Hedeager 5 DK-8200 Aarhus N Denmark	
EPS Trgovanje, Družba za trgovino z električno energijo, d.o.o. Tivolska cesta 48 1000 Ljubljana Slovenia	

List of licences issued from 1 January 2016 to 31 December 2016	No. of issued licences
Neas Energy A/S Skelagervej 1 9000 Aalborg Denmark	
Ezpada s.r.o. Jungmannova 754/24 110 00 Prague 1 Czech Republic	
ALPIQ ENERGY SE Rohanské nábřeží 670/19, Karlin 18600 Prague 8 Czech Republic	
ENERGY SUPPLY EOOD Ulica Grafa Ignatieva 2 1000 Sofia Bulgaria	
Liquefied natural gas terminal management	1
LNG HRVATSKA d.o.o. for liquefied natural gas business operations Savska cesta 88A 10000 Zagreb	
Gas trade	5
GEOPLIN d.o.o. Ljubljana, Družba za trgovanje in transport zemeljskega plina Cesta Ljubljanske brigade 11 1000 Ljubljana Slovenia	
RWE Supply & Trading GmbH Altenessener Strasse 27 45141 Essen Germany	
gaSolutions GmbH Mariahilfer Straße 123/3 A-1060 Vienna Austria	
ALPIQ ENERGY SE Rohanské nábřeží 670/19, Karlin 18600 Prague 8 Czech Republic	
PRVO PLINARSKO DRUŠTVO DOO BEOGRAD Trešnjiog cveta 1 Belgrade – New Belgrade Serbia	
Thermal energy supply	2
POSLOVNI PARK VIROVITICA d.o.o. for performing services Trg bana Josipa Jelačića 21/III 33000 Virovitica	
TI-SAN d.o.o. for trade and services Industrijska 13 10431 Sveta Nedelja	
Biofuels generation	1
MEBU d.o.o. for production, trade, and services Netretić 31 47217 Netretić	
Biofuels wholesale trade	1
FAVERIA d.o.o. for business counselling Ulica Stjepana Babonića 95 10000 Zagreb	

List of licences issued from 1 January 2016 to 31 December 2016	No. of issued licences
Storage of biofuels	1
MEBU d.o.o. for production, trade, and services Netretić 31 47217 Netretić	
Oil derivatives wholesale trade	9
LE-ENERGIJA d.o.o. for production, trade, and services Dužice 17 10000 Zagreb	
GAS OIL RIJEKA d.o.o. for oil derivatives sale Spinčići 38 51215 Kastav	
GRŽINČIĆ usluge transporta i trgovine d.o.o. Podstrmac 6 51217 Klana	
MK Group d.o.o. for construction and services Riva 16 51000 Rijeka	
BENZIN PERIĆ, d.o.o. for oil derivatives trade Krbani 0 21220 Trogir	
UNIJA-TRADE d.o.o. for business services in trade and economy Pavičini 604 52208 Krnica	
BDM d.o.o. for trade and services Ante Starčevića 54 35000 Slavonski Brod	
ORA-FORM ZAGREB d.o.o. for production, trade, and services Oporovečki vinogradi 12 C 10000 Zagreb	
TROMILJA BENZIN d.o.o. for trade and services Tromilja 1/a 22221 Lozovac	
Oil derivatives storage	2
AGS HRVATSKA d.o.o. for trade and services Zagrebačka avenija 100 A 10000 Zagreb	
BDM d.o.o. for trade and services Ante Starčevića 54 35000 Slavonski Brod	
LPG wholesale trade	1
BRALA d.o.o. for trade and services Ulica braće Dežmalj 26 23242 Posedarje	
TOTAL	40

List of licences extended from 1 January 2016 to 31 December 2016	No. of licences extended
Electricity generation	4
KONČAR – OBNOVLJIVI IZVORI d.o.o. Fallerovo šetalište 22 10000 Zagreb	
STRIZIVOJNA HRAST d.o.o. wood production and trade B. Radića 82 31410 Strizivojna	

List of licences extended from 1 January 2016 to 31 December 2016	No. of licences extended
VJETROELEKTRANA CRNO BRDO d.o.o. for trade and services Krapanjska 8 22000 Šibenik	
Adria Wind Power d.o.o. for electricity generation Varaždinska 61 10360 Sesvete	
Electricity supply	6
HEP – Opskrba d.o.o. for electricity, thermal energy, and gas supply for consumers Ulica grada Vukovara 37 10000 Zagreb	
HEP-Toplinarstvo d.o.o. for production and distribution of thermal energy Miševečka 15/a 10000 Zagreb	
CRODUX PLIN d.o.o. for trade and services Savska Opatovina 36 10000 Zagreb	
PRVO PLINARSKO DRUŠTVO – TRGOVINA ENERGIJOM d.o.o. A. Stepinca 27 32000 Vukovar	
Hrvatski Telekom d.d. Roberta Frangeša Mihanovića 9 10000 Zagreb	
ENERGIA GAS AND POWER d.o.o. for trade and services Poljička 23 10000 Zagreb	
Trade of electricity	2
HEP-Trgovina d.o.o. for electricity trade Ulica grada Vukovara 37 10000 Zagreb	
Interenergo d.o.o. for trade and services Trg žrtava fašizma 14 10000 Zagreb	
Gas distribution	1
EVN Croatia Plin d.o.o. for gas distribution Zagrebačka avenija 104 10000 Zagreb	
Gas supply	5
IVAPLIN d.o.o. for gas distribution and supply Moslavačka 13 10310 Ivanić Grad	
HEP-Trgovina d.o.o. for electricity trade Ulica grada Vukovara 37 10000 Zagreb	
HRVATSKA ELEKTROPRIVREDA – d.d. Ulica grada Vukovara 37 10000 Zagreb	
GEN-I Zagreb d.o.o. trade and sale of electricity Radnička cesta 54 10000 Zagreb	
MET Croatia Energy Trade d.o.o. for trade and services Radnička cesta 80 10000 Zagreb	
Thermal energy supply	2
KOMUNALAC POŽEGA d.o.o. for public utilities Vukovarska 8 34000 Požega	

List of licences extended from 1 January 2016 to 31 December 2016	No. of licences extended
TOP-TERME d.o.o. for trade, hospitality, tourism, and services Trg Josipa Bana Jelačića 16 44415 Topusko	
Biofuels wholesale trade	1
MEBU d.o.o. for production, trade, and services Netretić 31 47271 Netretić	
Oil derivatives wholesale trade	9
ENERGOSPEKTAR d.o.o. for trade, services, and production Matije Divkovića 71 10000 Zagreb	
APIOS d.o.o. for oil derivatives and gas trade Budmanijeva 5 10000 Zagreb	
AGS HRVATSKA d.o.o. for trade and services Zagrebačka avenija 100 A 10000 Zagreb	
RIJEKATANK ekologija i zaštita okoliša, društvo s ograničenom odgovornošću Bartola Kašića 5/2 51000 Rijeka	
SIRO-NEK d.o.o. for trade and services Zagrebačka avenija 104 10000 Zagreb	
CRODUX PLIN d.o.o. for trade and services Savska Opatovina 36 10000 Zagreb	
RIJEKA TRANS d.o.o. for trade and real estate transactions Kukuljanovo 337 51227 Kukuljanovo	
ETRADEX proizvodnja i trgovina d.o.o. Benazići 99 52332 Pićan	
OKTAN ŽAŽINE d.o.o. for transportation and trade Dužica 199, Dužica 44272 Lekenik	
Oil and oil derivatives storage	2
KEPOL TERMINAL d.o.o. for storage and trade Gaženička cesta 34 23000 Zadar	
BUTAN PLIN d.o.o. for wholesale and retail oil and oil derivatives trade Ulica rijeke Dragonje 23 52466 Novigrad	
LPG wholesale trade, and	1
ISTRABENZ PLINI proizvodnja i distribucija industrijskih plinova d.o.o. Pristanište Podbok 3, Bakar-dio 51222 Bakar	
TOTAL	33

Energy-related activity	Issued licences As on 31 December 2016
Electricity generation	42
Electricity transmission	1
Electricity distribution	1

Electricity market organisation	1
Electricity supply	18
Trade of electricity	24
Gas generation	0
Natural gas production	1
Gas transport	1
Gas storage	1
Liquefied natural gas terminal management	1
Gas distribution	35
Gas market organisation	1
Gas trade	5
Gas supply	55
Thermal energy generation	25
Thermal energy supply	23
Thermal energy distribution	10
Biofuels generation	4
Biofuels wholesale trade	8
Storage of biofuels	4
Oil derivatives production	1
Oil transportation through pipelines	0
Transport of oil derivatives through product pipelines	0
Oil derivatives wholesale trade	47
Oil and oil derivatives storage	22
Storage of liquefied petroleum gas	1
LPG wholesale trade	11
Licences to perform energy activities issued under the Energy Act (Official Gazette nos. 68/01, 177/04, 76/07, 152/08, 127/10):	
Oil transportation through pipelines and other modes of transport, not elsewhere specified, under item 22, paragraph 1, Article 15 of the Energy Act	2
Transport of oil derivatives through product pipelines and other means of transportation, not elsewhere specified, under item 22, paragraph 1, Article 15 of the Energy Act	1
Transport of oil, oil derivatives, and biofuels by road vehicles	11
Trade, intermediation, and representation on the energy market	1
Liquefied petroleum gas retail and wholesale trade	1
TOTAL:	359

Number of licences issued as of 31 December 2016 was: 359 licences.

Transferred licences – 1 license

Expired licences – 4 licences

Information on licences to perform energy-related activities is available in the summary of the licence registry managed by HERA on HERA's website: <http://www.hera.hr/hrvatski/html/dozvole.html>.