

2023

Annual Report



Table of Contents

INTRODUCTION	1
DAY AHEAD MARKET General data, Volumes, Prices	3
INTRADAY MARKET General data, Volumes, Prices	10
AUCTIONS Guarantees of Origin, Losses in the transmission system	16

Introduction

As we reflect on the accomplishments of 2023, I am delighted to present an overview of CROATIAN POWER EXCHANGE's performance, marking a year of remarkable achievements and resilience in Croatia's power exchange landscape.

Our commitment to operational excellence has been a driving force behind our success. CROATIAN POWER EXCHANGE Ltd. (CROPEX) witnessed unprecedented growth in 2023, with record-breaking volumes traded across all segments with almost doubling the traded volumes on the Intraday Market. This accomplishment solidifies CROPEX's position as the preferred marketplace for energy trading and as a reliable partner.

Initiatives integrating renewable energy sources into our trading platforms have not only contributed to a greener future but also positioned us as a leader in fostering a sustainable energy ecosystem through our dedicated Auctions for Guarantees or Origin.

After unprecedented power prices in 2022, in 2023 we have witnessed stabilization of the power prices on the short-term markets and our robust risk management framework continues to safeguard our operations. In 2023 we have successfully cleared energy with total value of just above 1,1 billion of Euros.

In 2023 several pivotal milestones have shaped the trajectory of CROPEX and solidified our position in Croatia's power exchange landscape.

Introduction of Croatian Power Futures

One of the standout achievements was the successful introduction of Croatian Power Futures on EEX, in June 2023. This significant milestone not only broadens product offering for Croatian Market but also provides market participants with valuable tools for managing risk and optimizing their energy portfolios. The introduction of futures enhances the overall depth and sophistication of short-term markets that we are operating, reinforcing our commitment to innovation in the energy trading sector.

Expansion of Guarantees of Origin Market

CROPEX executed a strategic expansion of the Guarantees of Origin Market. This initiative reflects our dedication to promoting renewable energy sources and supporting the transition to a sustainable energy future. By broadening the Guarantees of Origin Market with Guarantees outside of the incentivized systems, we have enabled transparent Market for all power producers regardless on the country of production.

Setup of Intraday Backup Solution

Our commitment to operational excellence was further underscored by introduction of an Intraday backup solution. This crucial development enhances the reliability and resilience of our Intraday trading platform, ensuring uninterrupted operations even in the face of unexpected challenges with the central XBID (SIDC) systems.

Launch of CROPEX Educational Seminars

Education and human resources are a cornerstone of our mission, and in 2023, we took a proactive step by launching CROPEX Educational Seminars. These seminars aim to empower market participants and energy industry professionals with valuable insights, knowledge, and best practices in energy trading. By fostering a culture of continuous learning, we contribute to the overall growth and professionalism of the energy community, creating a more informed and dynamic marketplace.

With support of our dedicated team, valued Members and our shareholders we will continue to shape the future of Croatia's energy market.

Sincerely,



Ante Mikulić, CEO

Chapter 1

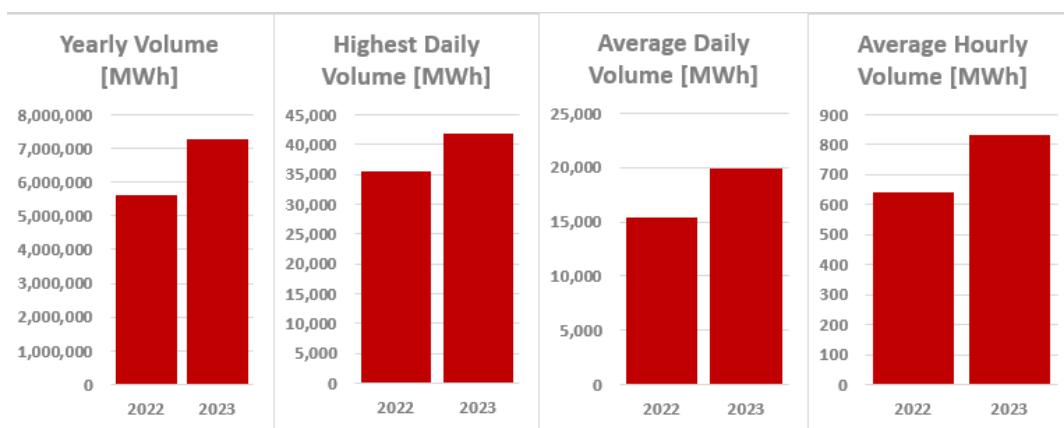
CROPEX DAY AHEAD MARKET

General 2023 - Trading Data

Total Traded Volume on Day Ahead Market in 2023 increased compared to 2022.

In general, an decrease in prices is recorded compared to 2022; both Day Ahead Average Base Price and Average Peak Price.

Volume Traded [MWh]	2023	2022	
Total Volume	7,259,544	5,590,392	29.9 % ↑
Highest Monthly	782,206	696,183	12.4 % ↑
Average Monthly	604,962	465,866	29.9 % ↑
Highest Daily	41,607	35,374	17.6 % ↑
Average Daily	19,889	15,316	29.9 % ↑
Highest Hourly	2,178	1,927	13.0 % ↑
Average Hourly	829	638	29.9 % ↑



Price [EUR/MWh]	2023	2022	
Base Average	103.72	272.40	61.9 % ↓
Peak Average	107.01	291.23	63.3 % ↓
Highest hourly	429.78	920.00	53.3 % ↓
Lowest hourly	-500.00	-50.10	898.0 % ↓

CROPEX DAY AHEAD MARKET

General 2023 data – Monthly Volumes and Prices

2023 Volumes [MWh]

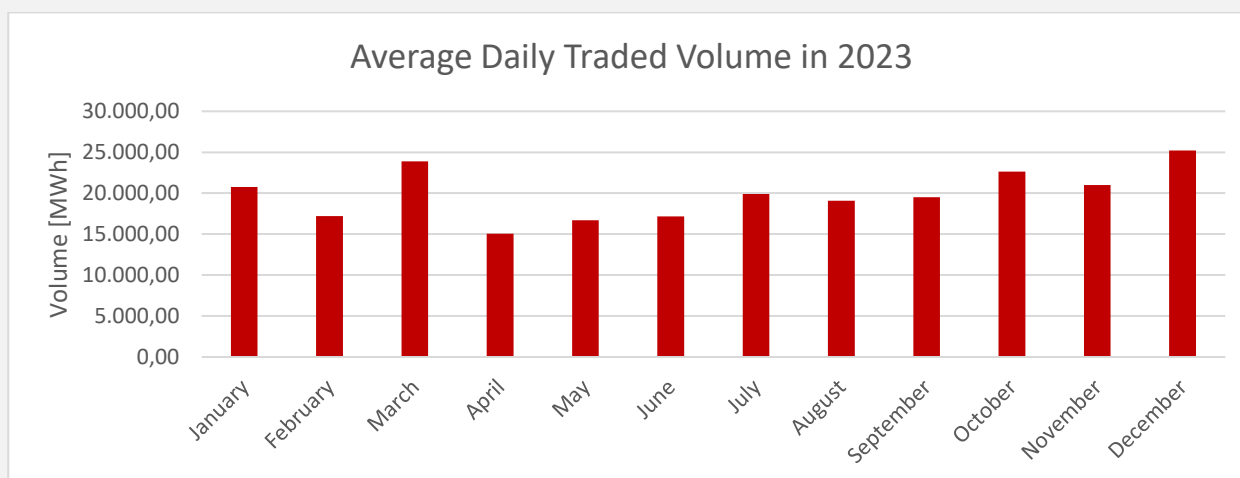
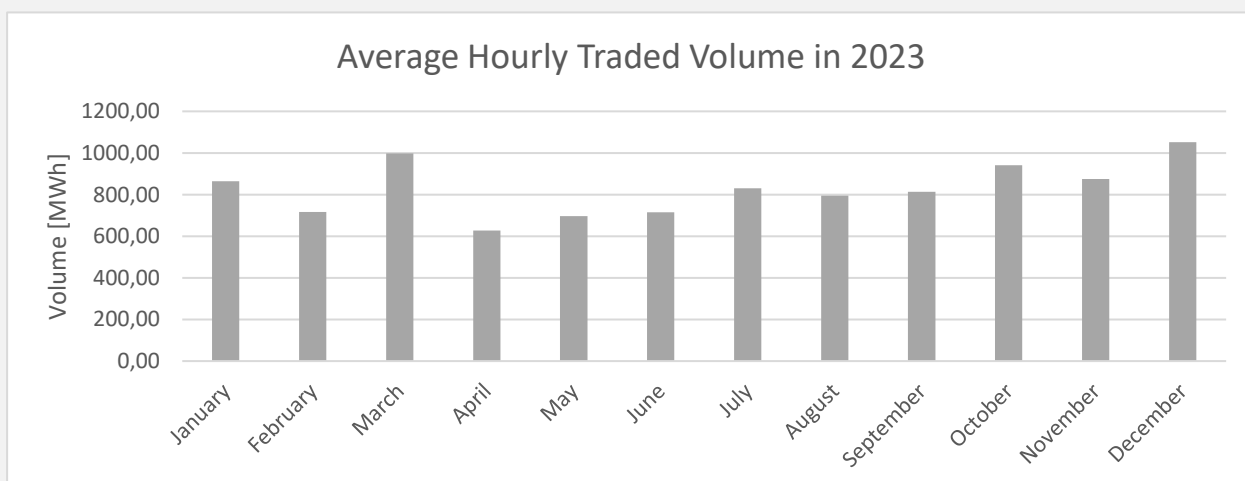
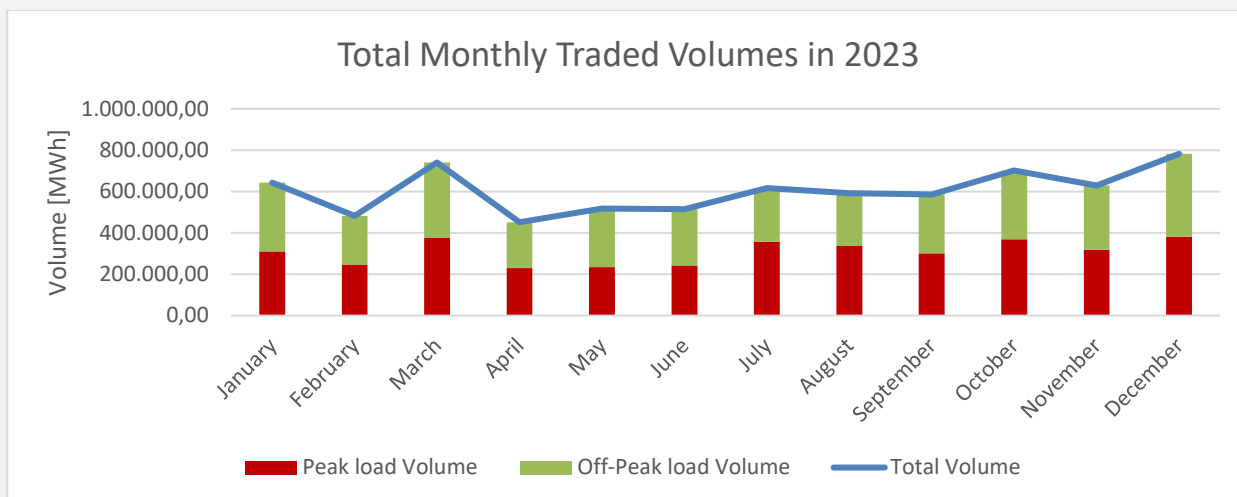
Month	Base Volume	Peak Volume	Off-Peak Volume	Average Daily Traded Volume	Average Hourly Traded Volume
January	643,523.00	310,773.40	332,749.60	20,758.81	864.95
February	481,899.70	246,235.40	235,664.30	17,210.70	717.11
March	741,063.80	374,997.70	366,066.10	23,905.28	997.39
April	451,786.10	230,515.40	221,270.70	15,059.54	627.48
May	517,869.70	234,193.20	283,676.50	16,705.47	696.06
June	515,348.50	242,699.70	272,648.80	17,178.28	715.76
July	617,330.90	356,083.40	261,247.50	19,913.90	829.75
August	592,022.30	336,480.20	255,542.10	19,097.49	795.73
September	585,225.50	301,038.10	284,187.40	19,507.52	812.81
October	701,495.40	369,829.40	330,638.30	22,628.88	941.60
November	629,773.00	317,930.10	311,842.90	20,992.43	874.68
December	782,206.40	382,252.30	399,954.10	25,232.46	1,051.35

2023 Prices [EUR/MWh]

Month	Average Baseload Price	Average Peak Price	Average Off-Peak Price	Hourly Minimum Price	Hourly Maximum Price
January	136.86	165.86	107.87	-24.97	263.51
February	145.19	153.86	136.52	50.43	245.60
March	111.69	114.39	108.81	1.09	217.09
April	105.38	99.98	110.79	0.91	199.56
May	86.87	75.49	98.25	-33.68	231.47
June	94.25	83.31	105.18	-20.74	188.77
July	92.43	84.29	100.57	-500	228.60
August	96.11	89.97	102.25	-4.82	289.69
September	102.69	100.74	104.63	-1.12	429.78
October	104.13	112.87	95.47	-1.02	245.71
November	96.60	114.61	78.58	0.07	258.27
December	76.04	92.31	59.77	-10.26	214.39

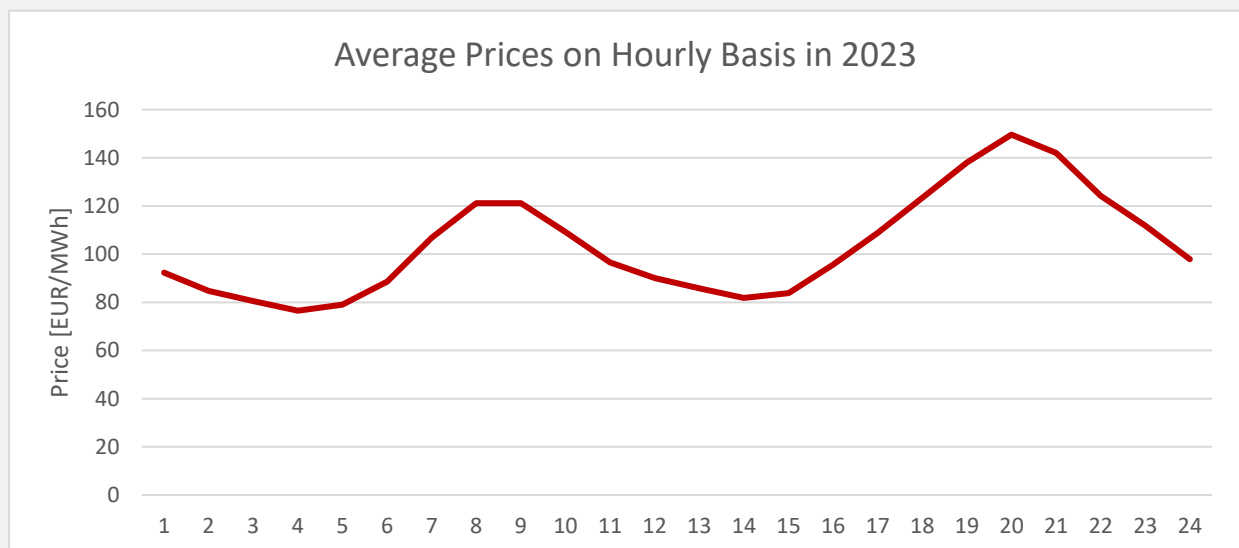
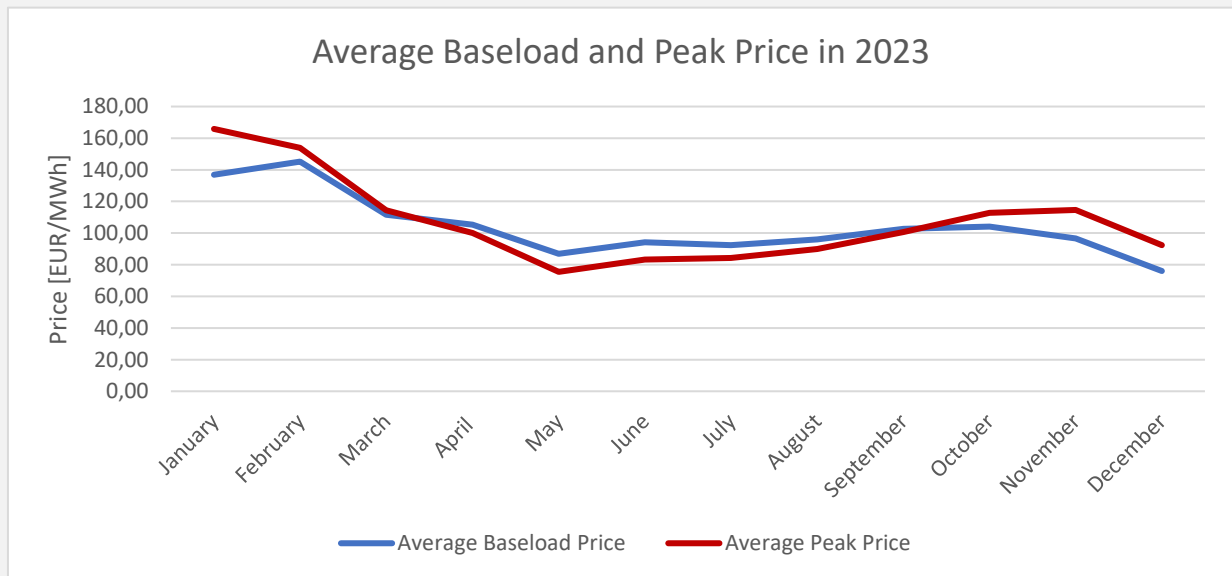
CROPEX DAY AHEAD MARKET

2023 Charts – Volumes



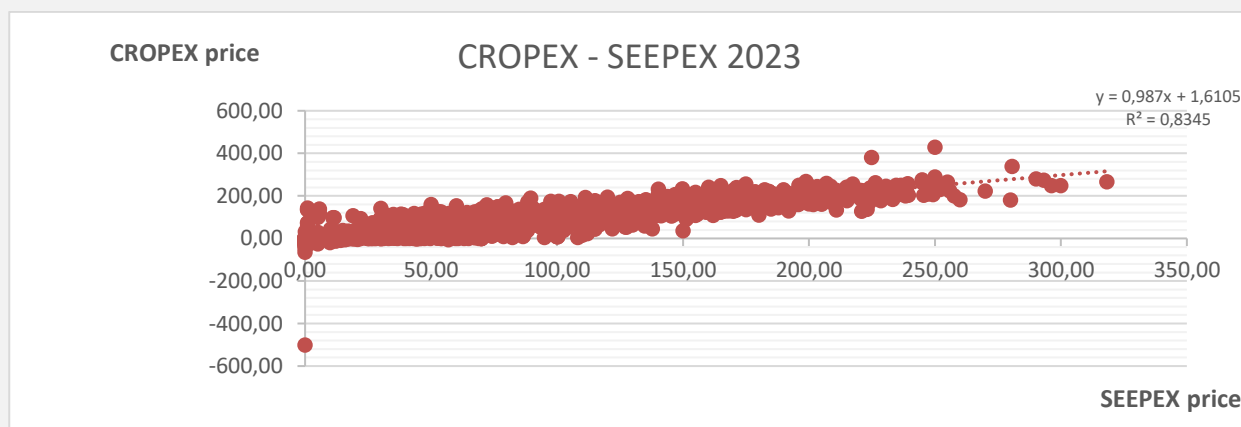
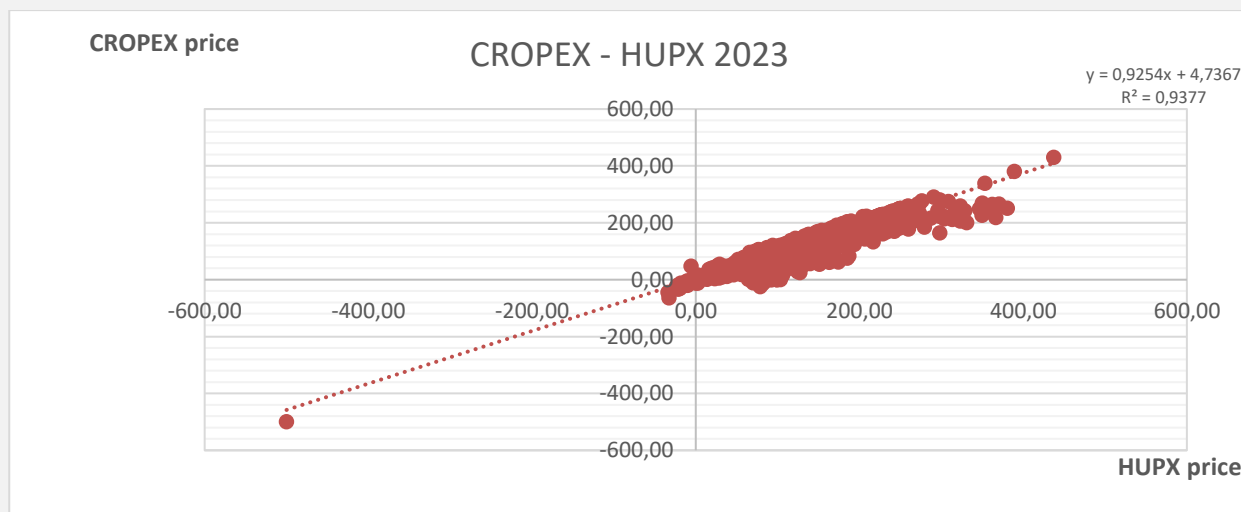
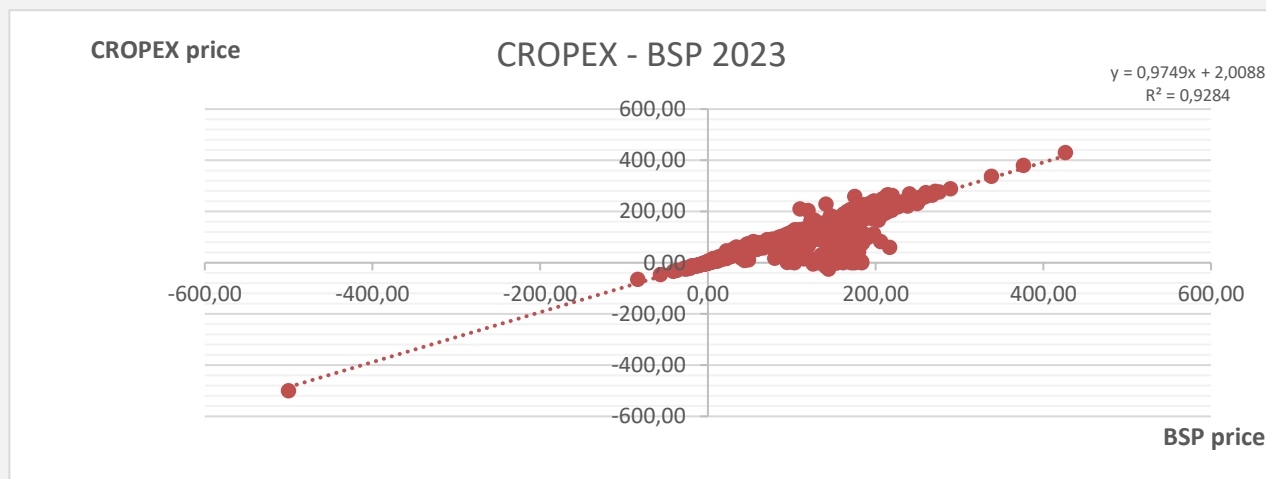
CROPEX DAY AHEAD MARKET

2023 Data – Prices



CROPEX DAY AHEAD MARKET

2023 Data – Price Comparison



CROPEX
DAY AHEAD
MARKET

Liquidity Indicators

Market with the **Herfindahl–Hirschman Index** of less than 1,000 considers to be a competitive marketplace, an HHI of 1,000 to 1,800 considers to be a moderately concentrated marketplace and an HHI of 1,800 or greater considers to be a highly concentrated marketplace.

Herfindahl–Hirschman Index	
Buy	798
Sell	1,102
Total	819

According to the HHI analysis **CROPEX Day Ahead Market** is a **competitive market**, thus providing all the Members enough liquidity for their trading activities.

Concentration ratio (“CR”) is a traditional structural measure of market concentration based on market shares, for the concentration ratio “CR3” measures the total market shares of the top 3 Members, by Trading Volume.

Concentration Ratios – CR3, CR4, CR5



A concentration ratio that ranges from 0% to 50% indicates that the market is perfectly competitive and is considered a low concentration.

CROPEX DAY AHEAD MARKET

Market Coupling

Since **2018**, Croatian Day Ahead Market is coupled to the European SDAC market via **Croatian-Slovenian** border, while from **June 2022**, it is coupled via **Croatian-Hungarian** border as well.

Volume [MWh]	2023
CROPEX Volume Traded	7,259,544

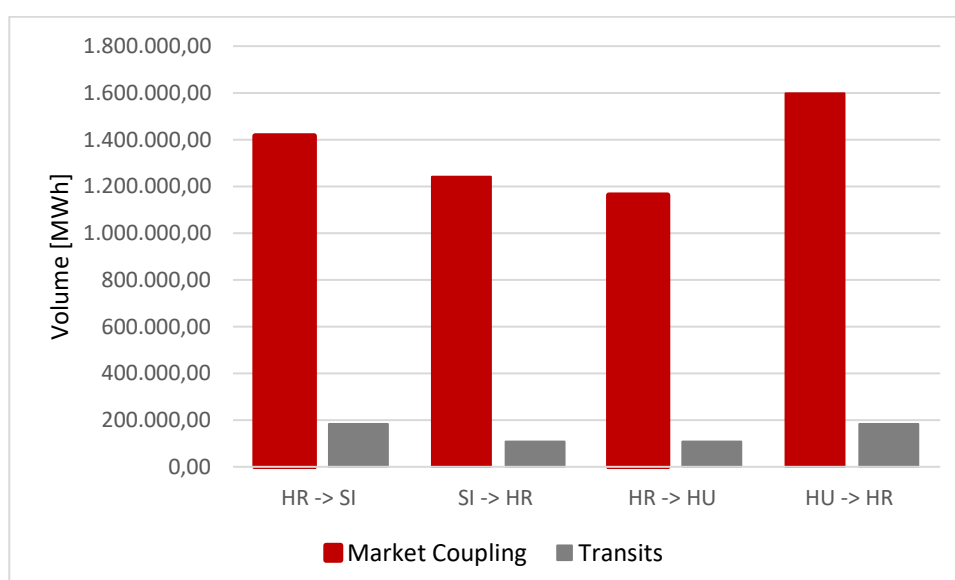
Market Coupling Total Volume	5,417,001.40
Market Coupling flow HR -> SI	1,415,811.50
Market Coupling flow SI -> HR	1,241,253.70

Market Coupling flow HR -> HU	1,161,952.90
Market Coupling flow HU -> HR	1,597,983.30

Transit Total Volume	582,720.60
Transit HR -> SI	183,850.30
Transit SI -> HR	107,510.00

Transit HR -> HU	107,510.00
Transit HU -> HR	183,850.30

Market Coupling and Transit Volumes



Chapter 2

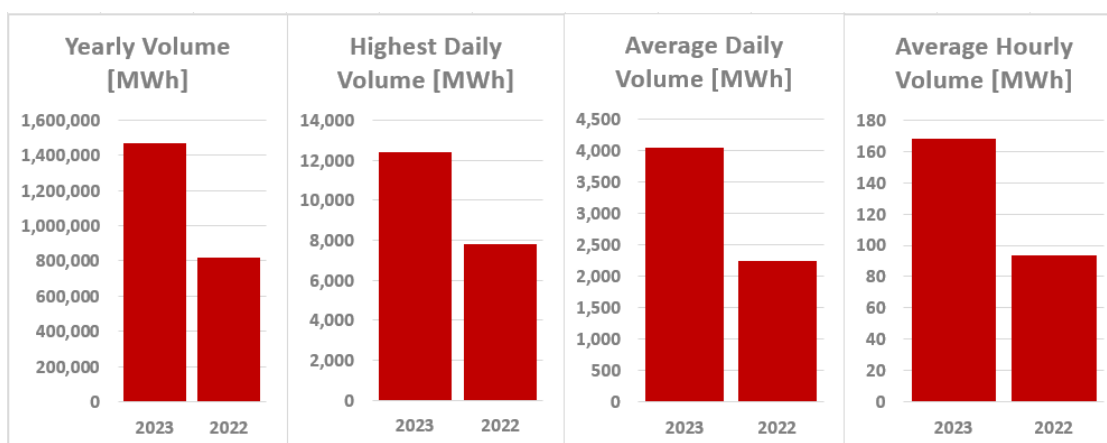
General 2023 - Trading Data

CROPEX INTRADAY MARKET

Following the successful coupling **through SIDC** in 2019, CROPEX Intraday Market continued with its growth in 2023, with record volumes achieved on a yearly, monthly, daily, and hourly basis.

Additionally, with the successful introduction of the API service in 2021, an increase in the number of **API trades** was recorded in **2023**, resulting in **48% of API trades** out of **total trade**.

Volume Traded [MWh]	2023	2022	
Total	1,468,253	815,576	80.3 % ↑
Highest Monthly	160,247	110,496	45.0 % ↑
Average Monthly	122,354	67,965	80.3 % ↑
Highest Daily	12,341	7,771	58.8 % ↑
Average Daily	4,023	2,230	80.4 % ↑
Highest Hourly	1,093	942	16.0 % ↑
Average Hourly	168	93	80.2 % ↑



Price [EUR/MWh]	2023	2022	
Volume Weighted Average Price	105.48	268.40	-60.7 % ↓
Highest Trade Price	725.00	1155.00	-37.2 % ↓
Lowest Trade Price	-379.99	-50.00	-860.0 % ↓
Number of Trades	587,740	241,534	143.3 % ↑

CROPEX INTRADAY MARKET

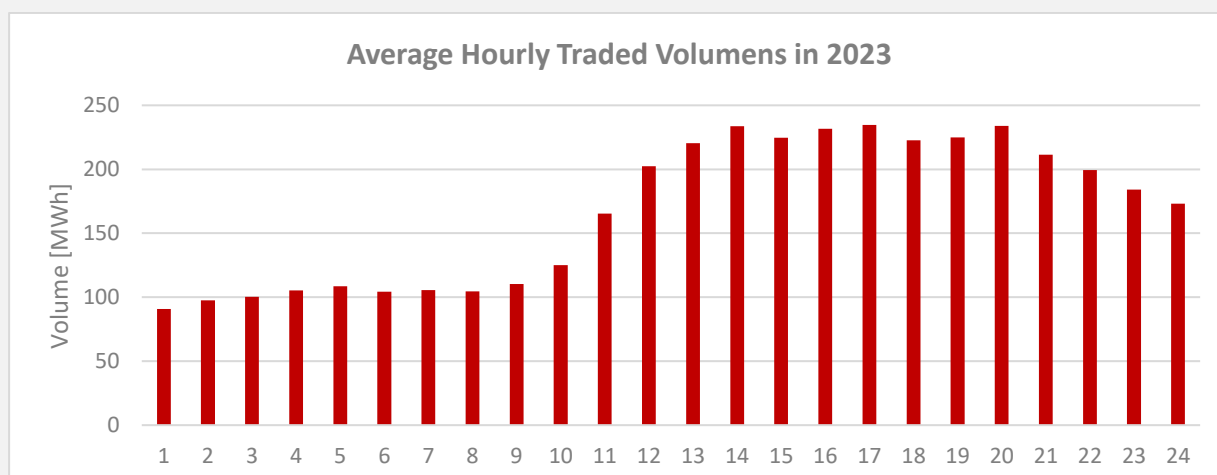
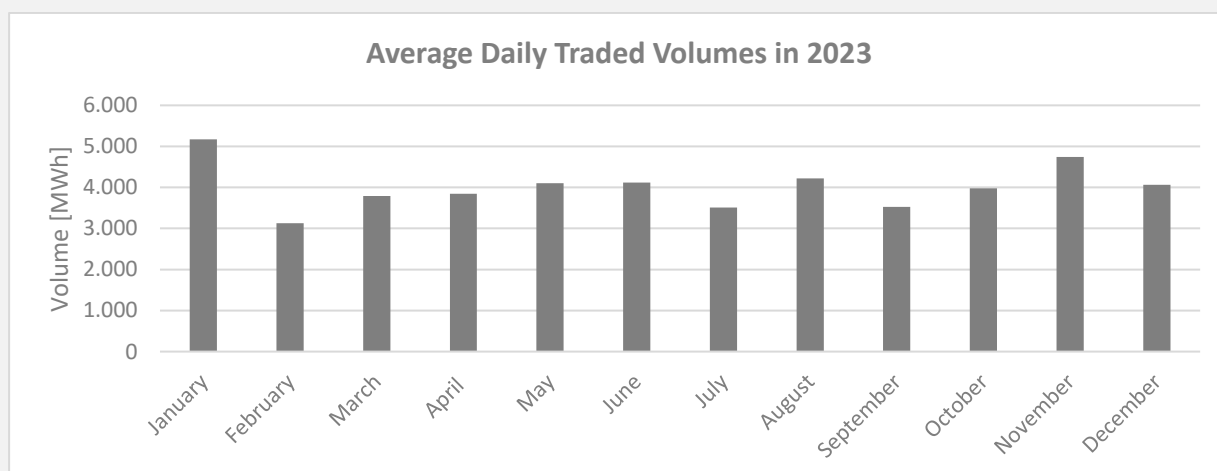
General 2023 Data – Monthly Volumes and Prices

2023 Volumes [MWh]

Month	Total Traded Volume	Highest Daily Traded Volume	Average Daily Traded Volume	Highest Hourly Traded Volume	Average Hourly Traded Volume
January	160,247	12,275	5,169	937	215
February	87,688	6,727	3,132	710	130
March	117,444	6,899	3,789	809	158
April	115,481	8,574	3,849	913	160
May	127,171	12,341	4,102	879	171
June	123,442	7,577	4,115	1,074	171
July	108,802	7,123	3,510	1,033	146
August	130,705	7,425	4,216	912	176
September	105,861	8,217	3,529	826	147
October	123,291	7,649	3,977	1,093	165
November	142,234	9,235	4,741	879	198
December	125,888	7,996	4,061	691	169

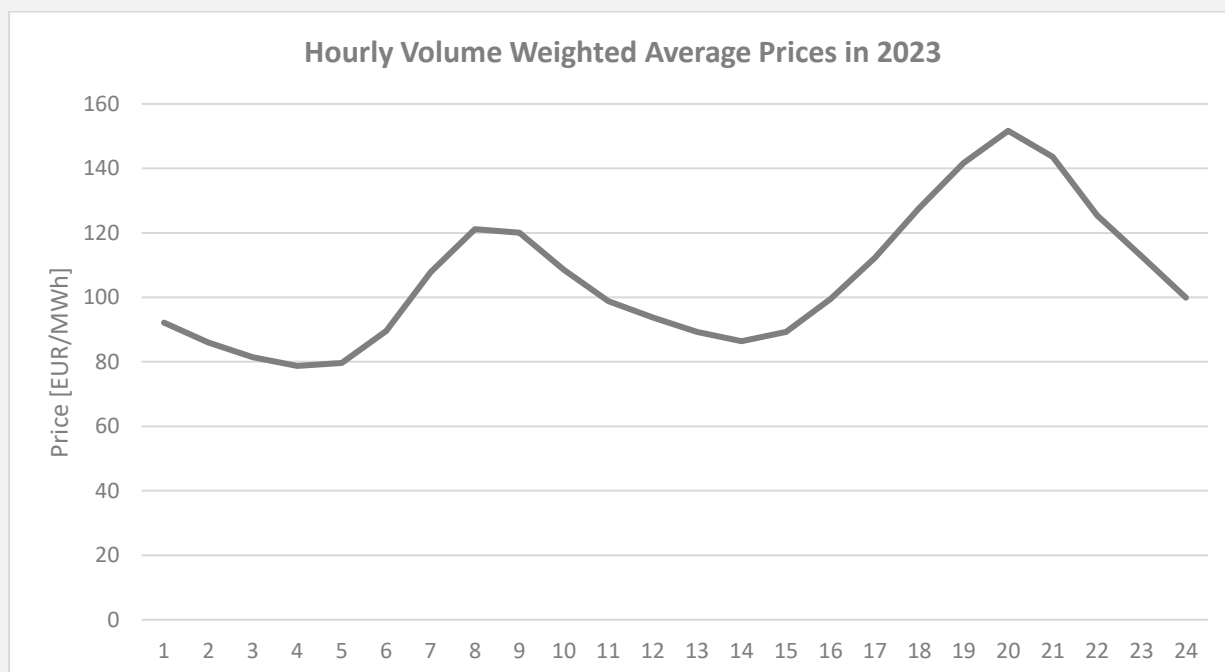
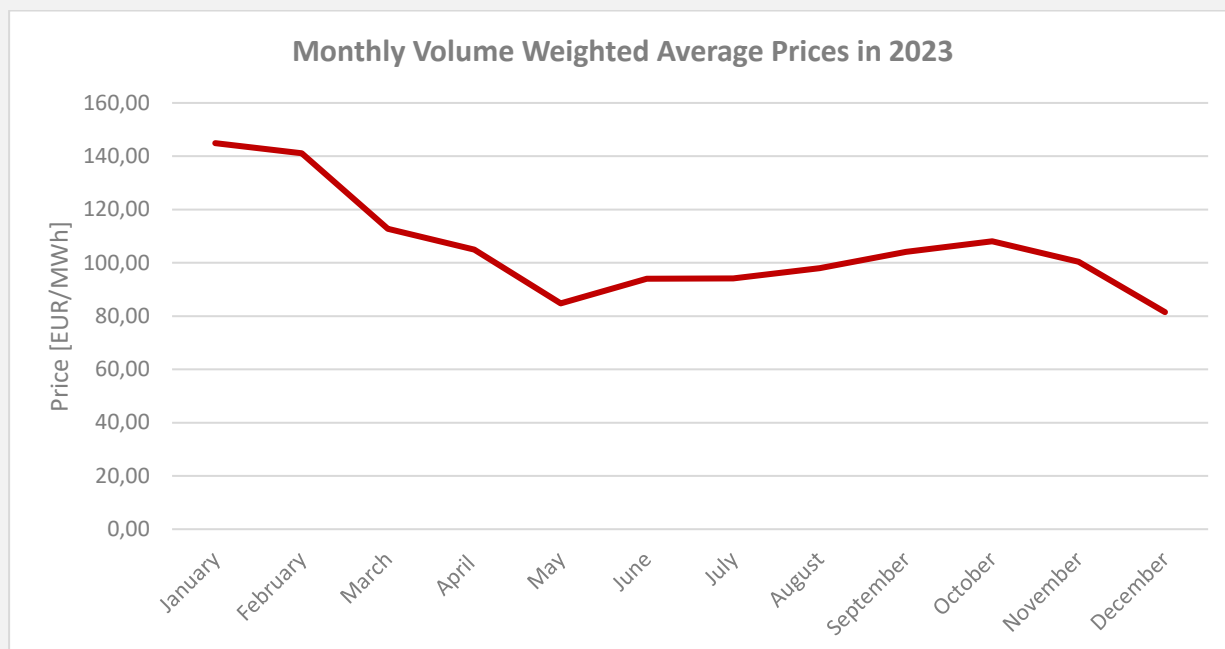
2023 Prices [EUR/MWh]

Month	Weighted Average Price	Peak Weighted Average Price	Off-Peak Weighted Average Price	Lowest Trade Price	Highest Trade Price
January	144.90	170.31	119.48	-15	530
February	141.14	149.17	133.10	11	290
March	112.73	115.40	110.05	-7	319
April	104.92	99.14	110.70	-39	260
May	84.78	77.05	92.50	-125	300
June	93.97	86.14	101.80	-45	205
July	94.11	88.23	100.00	-380	340
August	97.94	94.72	101.17	-56	725
September	104.16	104.01	104.31	-29	600
October	108.11	117.00	99.43	-12	330
November	100.38	120.11	80.66	-15	340
December	81.48	97.73	65.23	-22	239



CROPEX INTRADAY MARKET

2023 Charts – Prices



** Volume Weighted Average Price for completed trades per product – total sum, calculated as sum of each transaction volume multiplied with corresponding price, divided by the total volume*

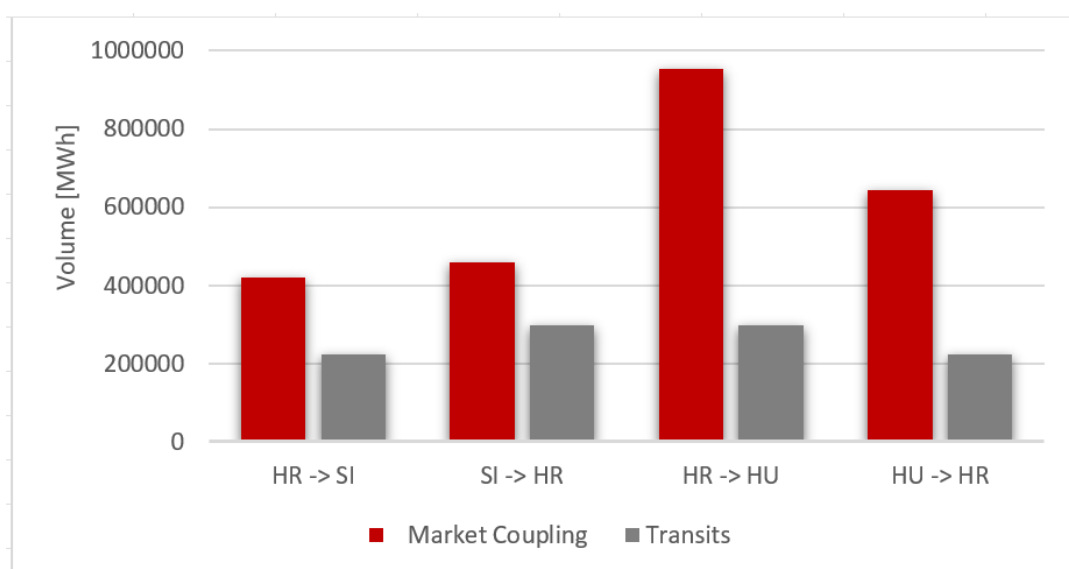
CROPEX INTRADAY MARKET

Market Coupling

Since **2019**, Croatian Intraday Market is coupled to European SIDC market via **Croatian-Slovenian** and **Croatian-Hungarian** borders.

Volume [MWh]	2023
CROPEX Volume Traded	1,468,253
Market Coupling Total Volume	2,478,299
Market Coupling flow HR -> SI	421,500
Market Coupling flow SI -> HR	458,992
Market Coupling flow HR -> HU	953,886
Market Coupling flow HU -> HR	643,922
Transit Total Volume	1,041,317
Transit HR -> SI	222,675
Transit SI -> HR	297,983
Transit HR -> HU	297,983
Transit HU -> HR	222,675

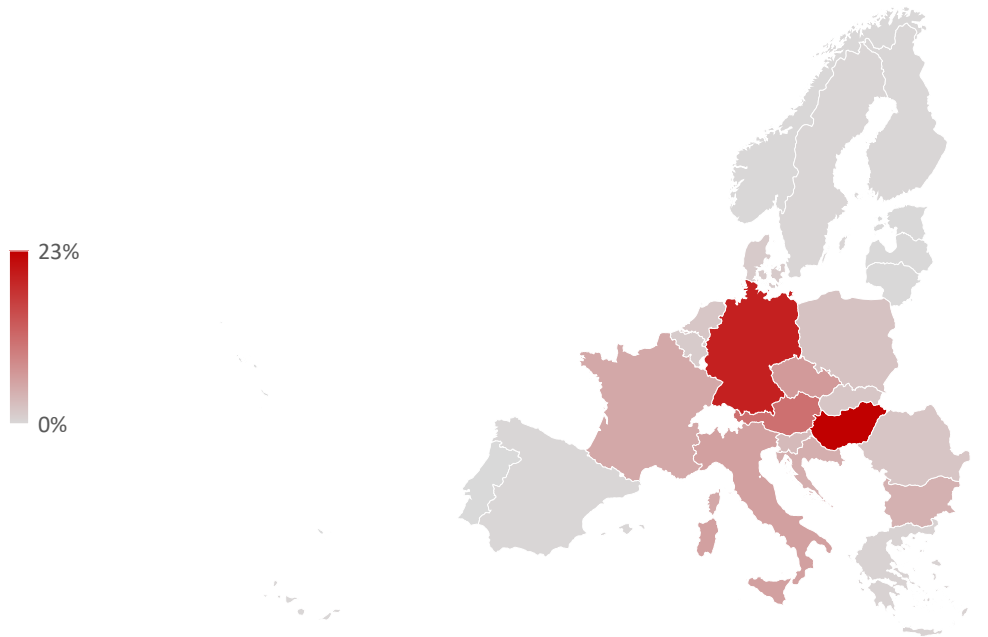
Market Coupling and Transit Volumes



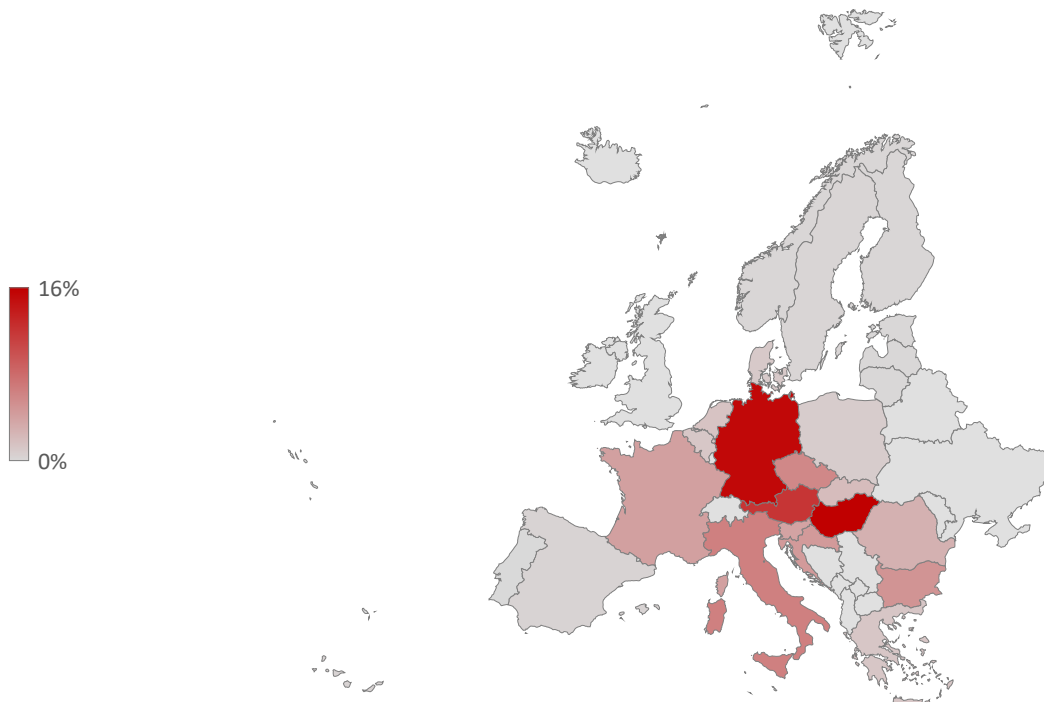
CROPEX INTRADAY MARKET

2023 Map of countries where CROPEX Intraday members sold and bought energy

Map of countries where CROPEX Intraday members sold energy



Map of countries where CROPEX Intraday members bought energy



Chapter 3

AUCTIONS

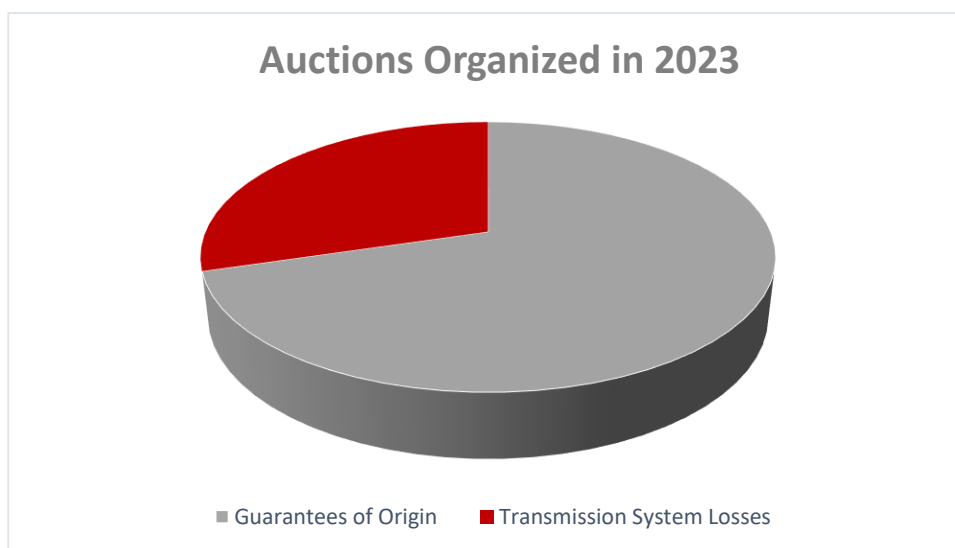
General 2023 - Data

During 2023 altogether **27** different auctions were organized by CROPEX.

Most of the auctions (**19**) were held for the purpose of selling **Guarantees of Origin (GO)**. CROPEX has continued to successfully hold auctions (**5**) on behalf of Croatian Energy Market Operator (HROTE). Since May, 2023 CROPEX has also organized auctions for eligible producers outside the incentive system. On behalf of ENNA Opskrba d.o.o, **12** auctions were organized and for ENERGOVIA EOOD **2** auctions.

For Croatian Transmission System Operator (HOPS), **8** auctions were organized by CROPEX for the purpose of procurement of energy for covering losses in the Croatian transmission system.

Auction Type	Number of Auctions	Number of Participants
Guarantees of Origin	19	44
Transmission System Losses	8	8



AUCTIONS

List of 2023 GOs auctions

From **19** GO auctions organized during 2023, 7 auctions were held for production from the **Wind** power plant, 5 auctions were held for production from the **Biomass** power plant, 5 auctions were held for production from the **Biogas** power plant while on 2 auctions CROPEX organized auctions from **Hydro** power plants.

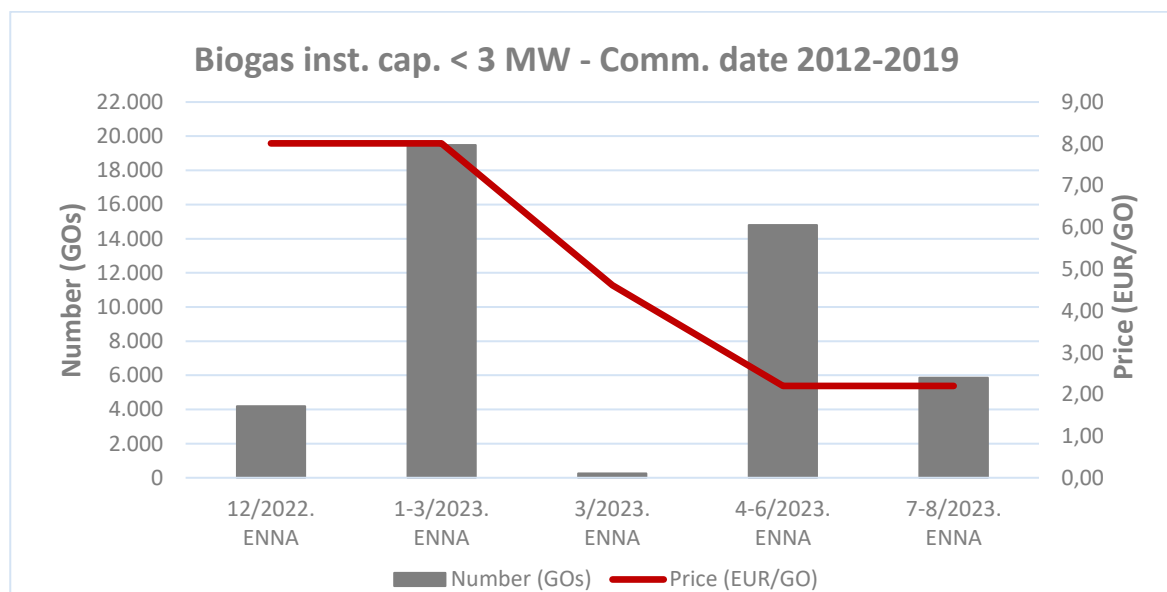
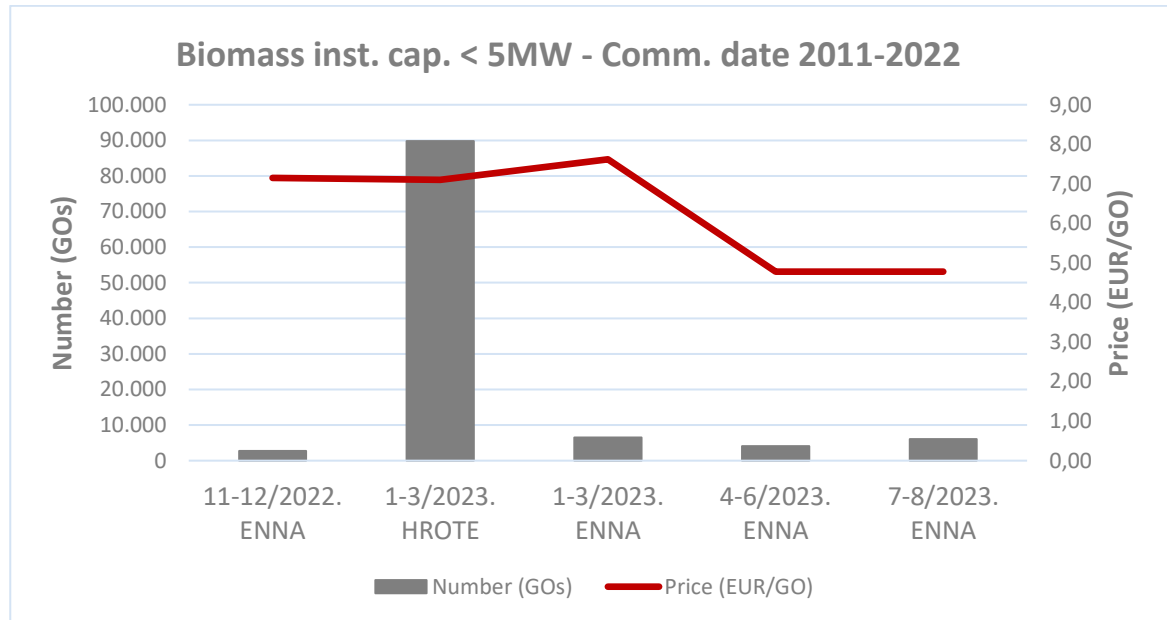
All GO auctions were split depending on the commissioning date of the power plants.

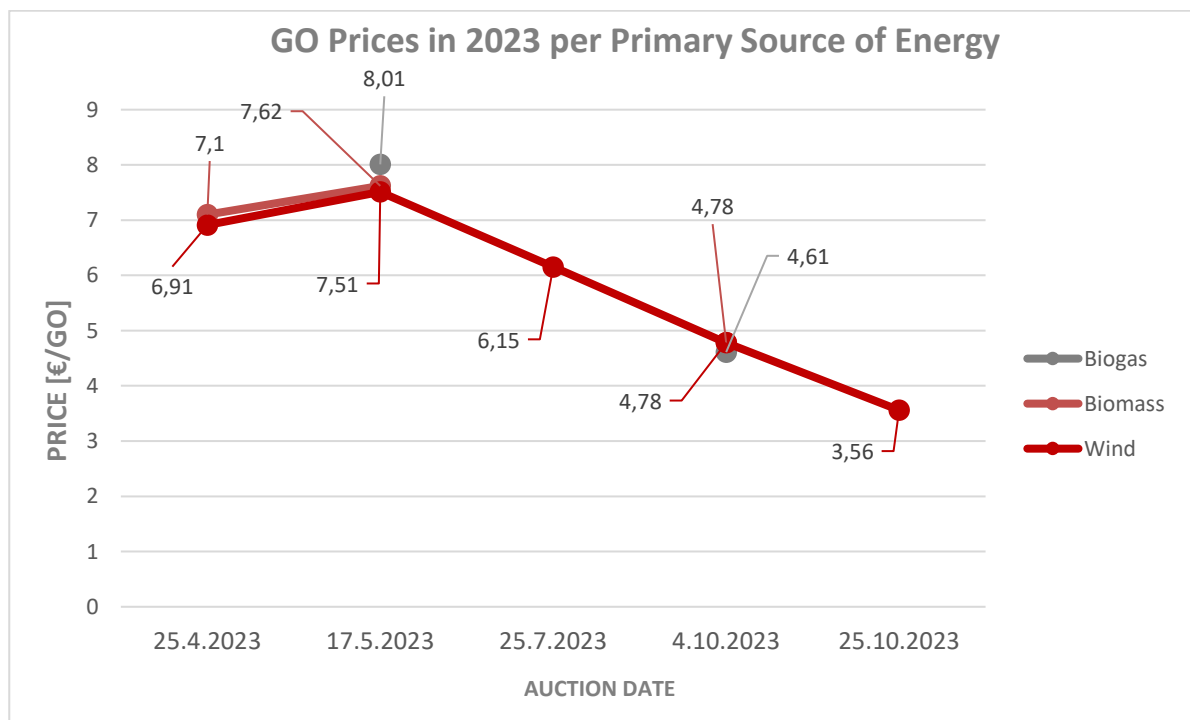
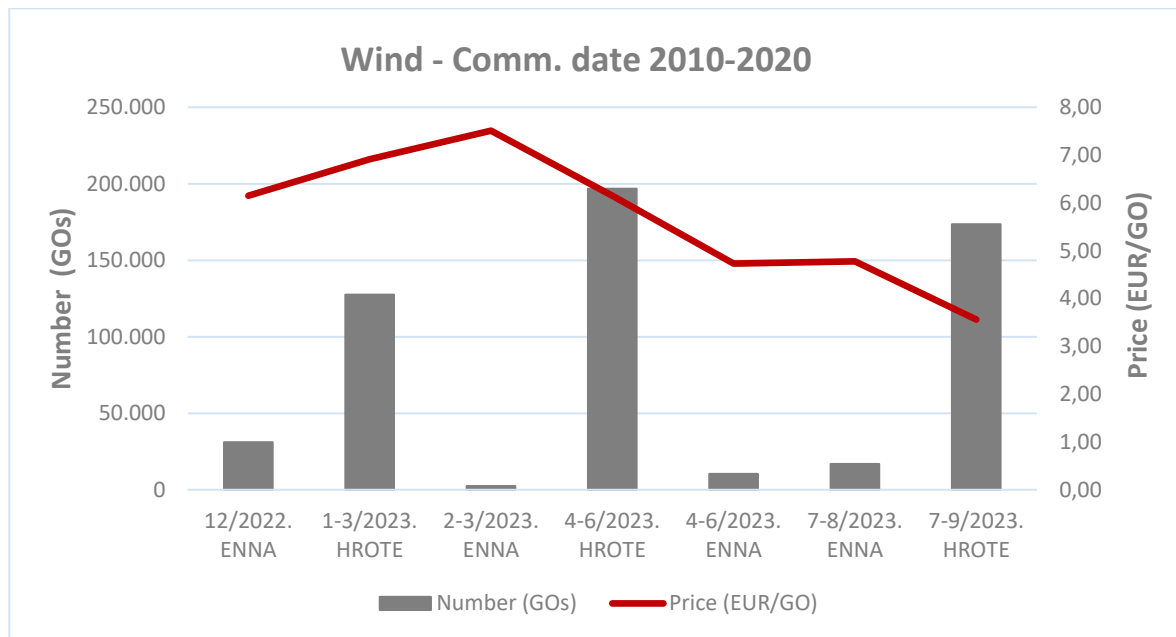
List of auctions in 2023	Auction type	Auction date	GOs sold	Price EUR/GO
HROTE – Croatia - Production 01/12/2022-31/12/2022 (Comm. date 12-2019 to 05-2020)	WIND	2023-04-25	31,122	6.15
HROTE – Croatia - Production 01/01/2023-31/03/2023 (Comm. date 06-2015 to 03-2022) - inst. cap. less than 5 MW	BIOMASS	2023-04-25	89,765	7.1
HROTE – Croatia - Production 01/01/2023-31/03/2023 (Comm. date 05-2018 to 05-2020)	WIND	2023-04-25	127,448	6.91
ENNA – Croatia - Production 01/12/2022-31/12/2022 (Comm. date 12/2015 to 05/2019) - inst. cap. less than 3 MW	BIOGAS	2023-05-17	4,188	8.01
ENNA – Croatia - Production 01/01/2023-31/03/2023 (Comm. date 04/2012 to 05/2019) - inst. cap. less than 3 MW	BIOGAS	2023-05-17	19,476	8.01
ENNA – Croatia - Production 01/11/2022-31/12/2022 (Comm. date from 09/2011) - inst. cap. less than 5 MW	BIOMASS	2023-05-17	2,758	7.15
ENNA – Croatia - Production 01/01/2023-31/03/2023 (Comm. date from 09/2011) - inst. cap. less than 5 MW	BIOMASS	2023-05-17	6,529	7.62
ENNA – Croatia - Production 01/02/2023-31/03/2023 (Comm. date from 02/2012)	WIND	2023-05-17	2,494	7.51
HROTE – Croatia -Production 01/04/2023-30/06/2023 (Comm. date 12-2014 to 05-2020)	WIND	2023-05-27	196,769	6.15
ENNA - Croatia - Production 01/07/2023-31/08/2023 (Comm. date from 04/2012 to 05/2019) - inst. cap. less than 3 MW	BIOGAS	2023-10-04	5,853	4.61
ENNA - Croatia - Production 01/04/2023-30/06/2023 (Comm. date from 04/2012 to 05/2019) - inst. cap. less than 3 MW	BIOGAS	2023-10-04	14,802	4.61
ENNA - Croatia - Production 01/03/2023-31/03/2023 (Comm. date from 01/2017) - inst. cap. less than 3 MW	BIOGAS	2023-10-04	259	4.61
ENNA - Croatia - Production 01/07/2023-31/08/2023 (Comm. date from 09/2011) - inst. cap. less than 5 MW	BIOMASS	2023-10-04	4,050	4.78
ENNA - Croatia - Production 01/04/2023-30/06/2023 (Comm. date from 09/2011) - inst. cap. less than 5 MW	BIOMASS	2023-10-04	6,027	4.78
ENNA - Croatia - Production 01/07/2023-31/08/2023 (Comm. date from 09/2010 to 02/2012)	WIND	2023-10-04	16,921	4.78
ENNA - Croatia - Production 01/04/2023-30/06/2023 (Comm. date from 09/2010 to 02/2012)	WIND	2023-10-04	10,383	4.78

ENERGOVIA - Bulgaria - Production 01/01/2023-31/08/2023 (Comm. date from 03/2015)	HYDRO	2023-10-04	0	
HROTE - Croatia - Production 01/07/2023-30/09/2023 (Comm. date 07-2014 to 05-2020)	WIND	2023-10-25	173,605	3.56
ENERGOVIA - Bulgaria - Production 01/01/2023-30/09/2023 (Comm. date from 03/2015)	HYDRO	2023-10-25	0	-

AUCTIONS

Guarantees of Origin – 2023 Charts*





*The charts show GOs Marginal Price (EUR/GO)

AUCTIONS

Losses Auctions

By the end of 2023 CROPEX also organized **eight** auctions in which 8 different registered auction participants were selling energy to HOPS for the purpose of covering losses in Croatian transmission system operated by HOPS.

Losses Auctions

List of auctions	Auction date	Number of participants	Power bought MWh/h
Energy delivery to cover transmission system losses in Q3/2023	2023-06-27	6	20
Energy delivery to cover transmission system losses in Q4/2023	2023-06-27	6	20
Energy delivery to cover transmission system losses in 2024	2023-07-12	8	5
Energy delivery to cover transmission system losses in 11 and 12, 2023	2023-10-10	7	5
Energy delivery to cover transmission system losses in Q1/2024	2023-10-10	7	10
Energy delivery to cover transmission system losses in 2024	2023-10-10	7	5
Energy delivery to cover transmission system losses in Q1/2024	2023-12-15	8	5
Energy delivery to cover transmission system losses in 2024	2023-12-15	8	5

CONTACT

CROATIAN POWER EXCHANGE Ltd.

Slavonska avenija 6/A
10000 Zagreb
Croatia

T: +385 1 55 40 400

E: info@cropec.hr

Ante Mikulić, CEO