

REPORT
ON ANCILLARY SERVICES AND BALANCING MARKET
OPERATIONS IN BOSNIA AND HERZEGOVINA FOR 2021

Abbreviations:

SERC – State Electricity Regulatory Commission

NOSBiH – Independent System Operator in Bosnia and Herzegovina

ASP – Ancillary Service Provider

BRP – Balance Responsible Party

ENTSO-E - European network of transmission system operators for electricity

EPBiH – Public Enterprise Electric Utility of Bosnia and Herzegovina d.d. Sarajevo

EPHZHB – Power utility Elektroprivreda Hrvatske Zajednice Herceg Bosne d.d. Mostar

ERS – Mixed holding Elektroprivreda Republike Srpske, Parent Company stk. company Trebinje

EFT Stanari – EFT- Coal mine and Thermal Power Plant d.o.o Stanari

EMS – Elektromreža Srbije

CGES – Electricity Transmission System of Montenegro

HOPS – Croatian Transmission System Operator

ELES – Elektro-Slovenija d.o.o. – Electricity Transmission System Operator in Slovenia

FSkar - Financial Settlement of KΔf, ACE and ramping period

Introduction

Balancing energy market is a part of the wholesale energy market and it comes after the bilateral energy market. Unlike the bilateral energy market whose participants in purchase or sale transactions may be any licenced market participant, in the balancing energy market it is obligatory to have transmission system operator as one of the participants in the purchase/sale transaction.

Pursuant to the Law on Establishing Independent System Operator in BiH, NOSBiH is responsible for managing the balancing market in BiH which is defined as ‘the central market for electricity purchase and sale managed by NOSBiH with the purpose to maintain continuous balance of demand and supply in real time, as well as additional mechanisms conducted by NOSBiH in order to ensure system services’. In addition, one of NOSBiH’s operations is to provide ancillary services which are defined by the Law on Establishing Independent System Operator in BiH as “all services, with the exception of electricity generation and transmission, which are delivered to NOSBiH with the purpose of providing the system services including, among others, regulation of frequency and reserve, reactive power, voltage regulation and a power plant capability to start up without an external electricity supply”. Therefore, the balancing market and the mechanism of providing ancillary services are the “tools” by which NOSBiH maintains the balance between generation, exchange and consumption of electricity in real time, maintains required level of reserve for ancillary services of secondary and tertiary regulation and enables safe operations of the electric power system. Participation in the balancing market is regulated by an agreement which NOSBiH concludes with a power market participant in line with the Market rules.

The main principles of the balancing in 2021

In Bosnia and Herzegovina, the Market rules¹ entered into force on 1st January 2016 thus establishing the market principles in the balancing processes and in allocation of the balancing costs of the power system in BiH.

An organized market of capacity reserve and balancing energy was established for secondary and tertiary regulation, while primary regulation was obligatory for the generation units connected to the transmission system, without compensations.

The control capacity market was established for secondary and tertiary regulation and the right to participate belong to those ancillary service providers (ASPs) whose capacities satisfy the technical preconditions for providing mentioned ancillary services. The capacity prices in 2021 were limited in line with relevant decisions made by State Electricity Regulator Commission (SERC). In case that the required scope of secondary and tertiary control capacity were not provided in the market, there was a possibility to procure the missing quantities. If ancillary service providers had failed to deliver certain amount of secondary and tertiary control capacity, they would incur penalty in amount which was equal to 10% of the price cap for secondary i.e. tertiary control capacity.

¹ Market rules are issued by NOSBiH, adopted by SERC by its Decision no 04-28-9-154-3/15 as of 21 May 2015

The reserved (contracted) capacity had to be offered at the balancing electricity market where power and electricity price were also offered in case of activation. At the daily balancing energy market the right to participate also belonged to the bids without reserved capacity i.e. voluntary bids.

The procurement of secondary control capacity was done symmetrically for positive and negative range of control, and the procurement of tertiary control capacity was done separately for upward and downward control.

SERC's Decision on determination of coefficients and price caps for ancillary services as of 14 September 2017 and 17 December 2021 determined hourly price caps² for control capacity and delivered balancing energy:

- Under SERC's new decision of 17 December 2021 the price for energy for upward tertiary regulation is limited to 414.70 BAM/MWh.
- Under SERC's new decision of 17 December 2021 the price for energy for downward tertiary regulation is limited to -401.28 BAM/MWh.
- Difference in prices of energy for upward and downward secondary regulation bids is limited to 40.00 BAM/MWh.
- The price cap for secondary control capacity amounts to: 43.00 BAM/MWh.
- The price cap for upward tertiary control capacity amounts to: 9.00 BAM/MWh.
- The price cap for downward tertiary control capacity amounts to: 2.10 BAM/MWh.

In line with bids activated for balancing energy for secondary and tertiary control there were created imbalance prices which were used in calculation of imbalance costs of balance responsible parties (BRPs) in BiH. Imbalance prices were determined for each hour according to the most expensive bid activated, for realized electricity shortage and surplus respectively.

Ancillary Services in 2021

Table 1 presents specific values related to ancillary services capacity in 2021. Image 1 graphically presents the share that the ASPs had in providing specific ancillary services and the share of undelivered capacity on an annual basis. Detailed monthly realization of capacity for some ancillary services is shown in tables 2 - 5.

Low operational availability especially of secondary control capacity in off-peak load periods is still obvious. Despite this fact, during the year, there were no longer periods of large deviations of BiH Control Area towards the remaining part of the interconnection which would have caused larger disturbances or jeopardized the system's safety.

² The price caps are determined by SERC – Decision on determination of coefficients and price caps for ancillary services

Table 1: Report on ancillary services in BiH for the year 2021

Reserve capacity and capacity cost					
		Sec. Con. Off-peak load (00.00 - 06.00 hrs)	Sec. Con. Peak load (06.00 - 24.00 hrs)	Tert. Con. Upward	Tert. Con. Downward
Required capacity	<i>MW</i>	26,92	44,25	196,00	68,00
Contracted capacity	<i>MW</i>	26,92	44,25	196,00	68,00
Capacity contracted at the market	<i>MW</i>	21,77	44,25	196,00	68,00
Price of contracted capacity	<i>KM/MW/h</i>	42,63	35,46	2,90	1,47
Contracted cost	<i>KM</i>	2.512.903	10.309.952	4.971.674	875.040
Delivered capacity	<i>MW</i>	12	31	157	57
Delivered capacity	<i>%</i>	43%	71%	80%	84%
Capacity cost	<i>KM</i>	1.087.108	7.317.501	3.971.194	721.590
Unprovided capacity	<i>MW</i>	15	13	39	11
Penalty for unprovided capacity	<i>KM</i>	-143.637	-361.179	-310.861	-19.661

The table shows average capacity values presented in 1 hour.

BSP's share in delivered capacity					
EP BiH	<i>MW</i>	10	23	54	17
EP BiH	<i>%</i>	82%	74%	35%	29%
ERS	<i>MW</i>	2	5	20	28
ERS	<i>%</i>	15%	15%	13%	49%
EP HZHB	<i>MW</i>	0	4	82	13
EP HZHB	<i>%</i>	3%	12%	52%	22%
EFT	<i>MW</i>	0	0	0	0
EFT	<i>%</i>	0%	0%	0%	0%

The table shows average capacity values presented in 1 hour.

Secondary regulation

In 2021 NOSBiH had around 12 MW of secondary control capacity in off peak load periods (from midnight until 6:00 a.m.), which makes around 43% of required secondary control capacity and it has doubled in comparison to 2020. In peak load periods (from 6:00 a.m. until midnight) there was average amount of 31 MW of secondary control capacity which makes 71% of the capacity required. The cost of secondary control capacity in 2021 amounted to KM 8.4 million. In 2021 three companies with their regulation resources were registered to provide ancillary service of secondary control.

Tertiary regulation

In 2021 NOSBiH had around 157 MW of upward tertiary control capacity and 57 MW of downward tertiary control capacity which makes 80% of required upward and 84% of required downward tertiary control capacity. The cost of provided tertiary control capacity in 2021 amounted to KM 4 million for upward tertiary control and KM 0,7 million for downward tertiary control. Within the BiH power system the balancing capacities were often missing which can be related to extremely high prices in the electricity market i.e. to the participants' decision to sell their energy at the bilateral market. For this reason SERC brought the decision on increase to the price cap for balancing energy.

In this year 4 companies were registered as providers of ancillary service of tertiary control

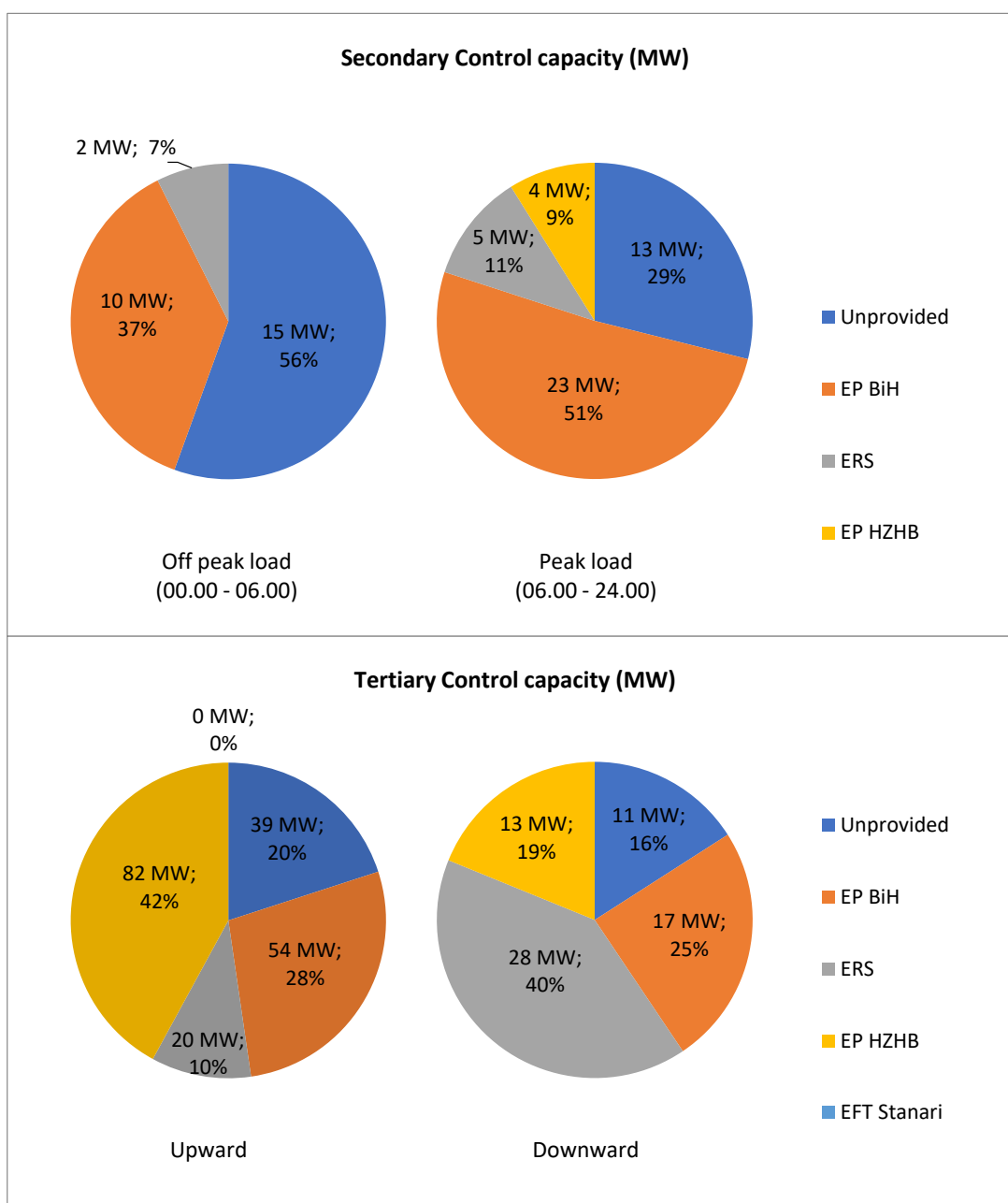


Image 1: Share of ASPs in delivered control capacity in BiH in 2021

Table 2: Report on ancillary services in BiH for the year 2021
Secondary control - off-peak load (00.00 - 06.00)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20	
Required capacity	MW	32	29	27	25	24	24	26	25	25	27	28	31	26,92	86%
Contracted capacity	MW	32	29	27	25	24	24	26	25	25	27	28	31	26,92	86%
Capacity contracted at the market	MW	29	29	27	25	24	21	5	5	16	24	28	29	21,77	103%
Price of contracted capacity	KM/MW	42,55	42,55	42,53	42,51	42,62	42,62	42,96	42,95	42,68	42,56	42,54	42,58	42,63	99%
Contracted cost	KM	253.237	207.287	212.437	191.299	190.250	184.113	207.734	199.736	192.060	214.863	214.394	245.492	2.512.903	85%
Delivered capacity	MW	31	28	25	18	14	5	2	2	2	4	7	4	11,66	203%
Delivered capacity	%	96%	96%	92%	70%	59%	22%	9%	9%	7%	14%	26%	13%	43,33%	
Capacity cost	KM	242.361	197.980	194.441	134.620	111.708	39.620	18.662	18.791	13.890	28.859	54.857	31.318	1.087.108	200%
Undelivered capacity	MW	1	1	2	7	10	19	24	23	23	23	21	27	15,25	59%
Penalty for undelivered capacity	KM	-1.118	-937	-1.819	-5.732	-7.921	-14.577	-18.929	-18.116	-17.948	-18.774	-16.125	-21.642	-143.637	59%
The table shows average capacity values and prices presented in 1 hour.															
BSP's share in delivered capacity															
EP BiH	MW	24	24	22	17	9	4	2	2	1	4	7	1	9,57	268%
EP BiH	%	77%	85%	89%	97%	66%	79%	66%	89%	79%	99%	91%	26%	82%	
ERS	MW	6	4	3	0	5	0	0	0	0	0	1	3	1,76	138%
ERS	%	18%	15%	11%	3%	34%	1%	0%	0%	0%	1%	9%	74%	15%	
EP HZHB	MW	1	0	0	0	0	1	1	0	0	0	0	0	0,33	36%
EP HZHB	%	5%	0%	0%	0%	0%	20%	34%	11%	21%	0%	0%	0%	3%	
The table shows average capacity values presented in 1 hour															

Table 3: Report on ancillary services in BiH for the year 2021
aFRR - peak load (06:00 - 24.00 hrs)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20	
Required capacity	MW	51	47	45	42	38	40	44	41	45	46	51	44,25	90%	
Contracted capacity	MW	51	47	45	42	38	40	44	41	45	46	51	44,25	90%	
Capacity contracted at the market	MW	51	47	45	42	38	40	44	41	45	46	51	44,25	90%	
Price of contracted capacity	kM/MW	35,49	35,36	35,29	35,18	35,50	35,75	35,91	35,79	35,13	35,35	35,33	35,49	35,46	122%
Contracted cost	kM	1.009.924	837.719	886.249	797.818	752.720	772.195	881.584	818.709	777.870	887.633	877.608	1.009.924	10.309.952	109%
Delivered capacity	MW	49	45	44	39	33	31	30	30	29	10	6	31,47	87%	
Delivered capacity	%	95%	97%	99%	93%	86%	76%	68%	73%	82%	64%	21%	71,12%		
Capacity cost	kM	960.415	809.096	874.793	742.486	646.550	589.863	596.852	593.018	633.301	561.796	187.994	121.335	7.317.501	79%
Undelivered capacity	MW	2	2	1	3	5	9	14	11	16	36	45	12,78	99%	
Penalty for undelivered capacity	kM	-5.857	-3.440	-1.376	-6.755	-12.668	-21.853	-33.497	-26.617	-17.553	-39.216	-84.164	-108.184	-361.179	99%
The table shows average capacity values and prices presented in 1 hour.															
BSP's share in delivered capacity															
EP BiH	MW	35	35	36	33	23	18	19	20	30	24	5	0	23,17	161%
EP BiH	%	73%	78%	80%	85%	69%	60%	64%	66%	89%	84%	55%	6%	73,62%	
ERS	MW	5	5	5	5	5	5	4	4	4	4	4	5	4,63	45%
ERS	%	10%	11%	11%	13%	15%	17%	14%	14%	11%	15%	45%	81%	14,70%	
EP HZHB	MW	8	5	4	1	5	7	7	6	0	0	0	1	3,67	32%
EP HZHB	%	17%	12%	9%	2%	16%	23%	22%	20%	0%	1%	0%	13%	11,68%	
The table shows average capacity values presented in 1 hour.															

Table 4: Report on ancillary services in BiH for the year 2021
Upward tertiary control

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20	
Required capacity	MW	196	196	196	196	196	196	196	196	196	196	196	196,00	100%	
Contracted capacity	MW	196	196	196	196	196	196	196	196	196	196	196	196,00	100%	
Capacity contracted at the market	MW	196	196	196	196	196	196	196	196	196	196	196	196,00	100%	
Price of contracted capacity	KM/MW	2,57	2,57	2,57	2,57	2,75	4,70	3,25	3,36	2,62	2,62	2,58	2,90	82%	
Contracted cost	KM	374,187	337,976	373,684	362,117	374,931	388,656	684,740	473,511	473,803	382,550	369,173	376,345	4,971,674	82%
Delivered capacity	MW	179	167	189	193	193	187	162	174	164	124	66	82	156,57	85%
Delivered capacity	%	92%	85%	96%	99%	98%	95%	83%	89%	84%	63%	34%	42%	79,88%	
Capacity cost	KM	343,054	288,068	359,927	357,480	368,657	370,521	548,401	419,347	393,253	240,912	123,707	157,867	3,971,194	71%
Undelivered capacity	MW	17	29	7	3	3	9	34	22	32	72	130	114	39,43	309%
Penalty for undelivered capacity	KM	-11,109	-17,660	-4,922	-1,648	-2,241	-6,037	-22,905	-14,751	-20,769	-48,302	-84,120	-76,397	-310,861	308%
The table shows average capacity values and prices presented in 1 hour:															
BSPs share in delivered capacity															
EP BiH	MW	56	54	63	68	67	56	59	78	50	67	19	14	54,14	59%
EP BiH	%	31%	32%	34%	35%	35%	30%	36%	45%	30%	54%	29%	17%	34,58%	
ERS	MW	7	9	8	9	26	33	60	34	40	11	4	4	20,47	86%
ERS	%	4%	5%	5%	5%	13%	18%	37%	19%	24%	9%	6%	5%	13,08%	
EP HZHB	MW	116	105	117	116	100	98	43	63	74	46,255034	43	65	81,96	122%
EP HZHB	%	65%	63%	62%	60%	52%	53%	26%	36%	45%	37%	65%	79%	52,35%	
EFT Stanari	MW	0	0	0	0	0	0	0	0	0	0	0	0	0,00	
EFT Stanari	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0,00%	
The table shows average capacity values presented in 1 hour.															

Table 5: Report on ancillary services in BiH for the year 2021
Downward tertiary control

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20
Required capacity	68	68	68	68	68	68	68	68	68	68	68	68	68,00	100%
Contracted capacity	68	68	68	68	68	68	68	68	68	68	68	68	68,00	100%
Capacity contracted at the market	68	68	68	68	68	68	68	68	68	68	68	68	68,00	100%
Price of contracted capacity	1,43	1,43	1,43	1,43	1,50	1,50	1,50	1,50	1,50	1,50	1,43	1,43	1,47	85%
Contracted cost	72.503	65.486	72.405	70.164	76.104	73.649	76.104	76.104	73.649	76.206	70.164	72.503	875.040	84%
Delivered capacity	65	66	66	65	62	51	48	50	46	53	57	58	57,31	115%
Delivered capacity	96%	98%	97%	95%	91%	75%	71%	73%	68%	78%	85%	85%	84,28%	0%
Capacity cost	69.745	63.808	69.663	66.485	68.900	53.546	51.833	53.789	47.897	57.652	57.850	60.423	721.590	95%
Undelivered capacity	3	2	2	3	6	17	20	18	22	15	11	10	10,69	58%
Penalty for undelivered capacity	-411	-217	-345	-477	-958	-2.544	-3.065	-2.832	-3.261	-2.329	-1.589	-1.633	-19.661	58%
The table shows average capacity values and prices presented in 1 hour.														
BSP's share in delivered capacity														
EP BiH	18	20	20	19	17	15	14	14	14	16	18	15	16,66	
EP BiH	28%	30%	30%	29%	28%	29%	29%	28%	31%	30%	32%	25%	29,07%	
ERS	32	32	31	31	34	26	23	25	21	26	25	29	27,88	93%
ERS	50%	48%	47%	48%	55%	50%	48%	50%	46%	49%	43%	50%	48,65%	
EP HZHB	15	15	15	15	11	11	11	11	11	11	14	14	12,77	
EP HZHB	22%	22%	23%	23%	17%	21%	23%	22%	23%	21%	25%	25%	22,28%	
EFT Stanari	0	0	0	0	0	0	0	0	0	0	0	0	0,00	0%
EFT Stanari	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0,00%	
The table shows average capacity values presented in 1 hour.														

Balancing market

In 2021, for the needs of balancing the power system of BiH 51 898 MWh of upward balancing energy was engaged (injected energy) with average price of 187.03 KM/MWh. In 2021 there was engaged around 60% more upward balancing energy by prices which were 73% higher than in 2020.

In 2021, engaged downward balancing energy (takeover of electricity from the system) amounted to 37 973 MWh. Average price for this energy was 71.22 KM/MWh taking into account the energy with offered negative price also. In 2021 less downward balancing energy was engaged but by prices which were around 40% higher than in 2020.

Imbalance

There were 6 balance responsible parties (BRPs) active in BiH in 2021, not counting so called 'trading BRPs' i.e. the BRPs with no imbalance realized within BiH. Average imbalance prices in 2021 were 168.57 KM/MWh for shortage and 77.88 KM/MWh for surplus of energy. These prices were significantly higher than in 2020 and were moving in a wide range from -190.00 KM/MWh up to 1249.78 KM/MWh, depending on the energy situation. These high prices for balancing energy were achieved on the basis of engaged cross-border balancing energy in periods with extremely high electricity prices in the Region and Europe.

The data on engaged balancing energy and on realized imbalance suggest that in 2021 the BiH power system more often experienced electricity shortage. Table 2 and 6 present imbalances of BiH Control Area for the last few years.

Table 6. Indicators of imbalance in BiH for the last five years

Imbalance BiH		Energy shortage					Energy surplus				
		2017	2018	2019	2020	2021	2017	2018	2019	2020	2021
Total	MWh	-31.200	-45.062	-42.010	-29.318	-80.435	56.105	39.814	38.864	52.587	35.417
Max. Hourly	MW	-179	-190	-186	-149	-742	157	199	171	218	118

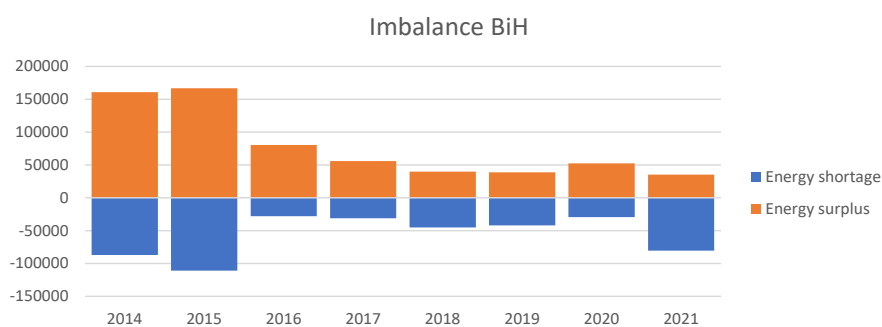


Image 2: Annual imbalance of BiH Control Area

Table 7 presents engaged balancing energy values, energy prices and adequate expenses by taking into consideration cross-border engagements for the needs of BiH Control Area, exempting the energy engaged within BiH for the needs of other system operators.

Table 7: Report on balancing market in BiH for the year 2021

Engaged energy	2021												2021	2021/20	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec			
Energy for upward sec. control	MWh	2.955	6.962	2.700	4.684	1.938	5.422	5.557	2.678	3.302	4.604	1.221	683	42.704	139%
Energy for downward sec. control	MWh	7.771	3.023	6.458	3.080	5.512	1.327	1.374	3.097	1.836	1.509	1.167	1.234	37.388	66%
Energy for upward tert. control	MWh	588	2.228	227	0	25	909	803	298	26	2.380	981	731	9.195	575%
Energy for downward tert. control	MWh	0	162	0	0	176	0	0	0	0	0	40	208	586	237%
Balancing energy upward	MWh	3.543	9.189	2.926	4.684	1.963	6.331	6.360	2.975	3.328	6.984	2.202	1.414	51.898	160%
Balancing energy downward	MWh	7.771	3.184	6.458	3.080	5.688	1.327	1.374	3.097	1.836	1.509	1.207	1.443	37.973	67%
Balancing cost and realized average prices															
Upward - cost	KM	410.601	1.265.272	306.778	472.516	162.424	1.094.732	1.274.524	612.448	589.357	1.958.831	838.610	720.423	9.706.515	277%
Upward - average price	KM/MWh	115.90	137.69	104.84	100.89	82.76	172.92	200.41	205.85	177.10	280.48	380.85	509.43	187.03	173%
Downward - cost (pos. price)	KM	198.544	146.048	261.547	181.208	237.171	132.699	180.373	412.819	257.647	263.817	283.645	229.484	2.785.002	96%
Downward - cost (neg. price)	KM	-16.919	-18.987	-3.576	0	-15.880	0	0	4	0	0	-4.331	-20.696	-80.386	-171%
Downward - average price	KM/MWh	23.37	39.90	39.95	58.84	38.90	100.01	131.30	133.30	140.35	174.84	231.45	144.73	71.22	142%
Imbalance BiH															
Shortage - total	MWh	6.834	8.476	4.900	5.517	3.510	5.475	11.148	4.720	5.614	10.650	7.105	6.487	80.435	274%
Shortage - max hourly	MWh	742	178	66	84	105	71	109	101	57	122	86	140	742,22	498%
Surplus - total	MWh	1.183	1.274	2.591	2.769	5.677	3.049	1.240	3.206	2.117	1.284	4.073	6.955	35.417	67%
Surplus - max hourly	MWh	31	118	51	48	62	95	96	52	69	113	80	61	118,10	54%
Price shortage - average	KM/MWh	105.87	116.17	101.01	110.58	101.96	165.60	179.64	195.19	172.30	244.92	291.03	235.46	168,57	159%
Price shortage - maximum	KM/MWh	400,00	414,00	414,00	220,00	200,00	400,00	414,00	410,00	380,00	795,85	872,30	1.249,78	1.249,78	302%
Price surplus - average	KM/MWh	13,63	33,94	31,89	42,53	29,73	58,98	84,41	95,87	93,78	121,73	174,46	151,10	77,88	231%
Price surplus - minimum	KM/MWh	-40,00	-190,00	-30,00	0,00	-140,00	0,00	0,00	0,00	0,00	0,00	-100,00	-125,00	-190,00	-38%

Transmission losses and compensations

In 2021 energy to cover transmission system losses and compensations was purchased through public procurement procedures. Total cost of this service in 2021 was 42 320 978 KM which presents an increase of 13% in comparison to the year 2020. The energy prices obtained in the procurement procedure were in average 9% higher in comparison to the year 2020 (Table 8). In addition, transmission losses were 16% higher than in last year.

Additionally, from June 2021 the process of financial settlement of imbalance between control areas (LFC) started to apply – Fskar process. Upon entry into force of the Fskar process there were energy compensations appearing in second half of the year due to Ukraine's request to postpone the start of this process in terms of its imbalances. Pursuant to Fskar process NOSBiH is obliged to pay over 9 million KM for 7 months of its implementation.

Cross-border balancing energy exchange

On the basis of the Agreement on the provision of a joint reserve in the Slovenia-Croatia-Bosnia and Herzegovina control block, the capacity of tertiary regulation which was to be provided in 2021 within the BiH control area was 196 MW for upward regulation, and 68 MW for downward regulation. In 2017 Agreement on cross-border exchange of balancing energy was signed with Serbian Transmission System Operator – EMS, and in 2018 the same Agreement was signed with the Transmission System Operator in Montenegro – CGES.

Table 9 shows the values of exchanged cross-border balancing energy in 2021 with the expenses included. Out of the total amount of 2 893 MWh of cross-border balancing energy, the amount of 2 253 MWh was used for the needs of BiH, and remaining 640 MWh was used as help to other system operators. The share of each system operator in the total cross-border exchange of balancing energy is shown in Image 3.

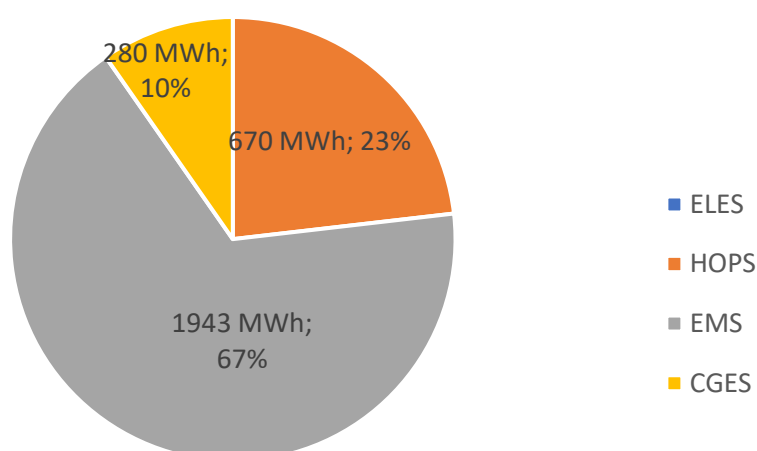


Image 3: Exchange of cross-border balancing energy

Table 8: Report on transmission losses and compensations for 2021

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20
Compensations	54	-5,506	-7,125	-2,816	-2,818	1,399	647	0	0	-2,156	-528	0	-18,849	-92%
Losses	40,380	35,463	31,786	27,828	24,735	23,443	26,900	25,878	26,291	29,206	32,871	42,988	367,767	116%
Reference price	117,17	109,97	93,18	92,80	95,61	98,55	111,03	117,11	124,87	123,87	117,05	111,47	109,39	87%
Cost	4,724,985	4,505,375	3,625,735	2,843,735	2,634,384	2,172,518	2,914,826	3,030,553	3,282,951	3,884,786	3,909,297	4,791,834	42,320,978	113%
Cost - Fskar	0	0	0	0	0	415,643	1,671,269	320,995	873,526	3,261,811	1,632,105	1,019,296	9,194,645	

Compensations: "-" direction - acceptance, "+" direction - giving.

Table 9 : Report on cross-border balancing energy exchange for 2021

Energy engaged in BiH for other TSOs needs														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2021	2021/20
XB Exchange - Import								60					60	
Price Import Average								-150,07					-150,07	
Cost Import								-9,004					-9,004	
XB Exchange - Export	170					100	200	110					580	79%
Price Export Average	235,29					391,17	398,99	399,88					349,83	196%
Cost Export	39,999					39,117	79,798	43,987					202,900	156%

Engaged cross-border energy

XB Exchange - Import	1,529									130	354	240	2253	
Price Import Average	242,17									734,82	760,42	1,015,39	434,39	
Cost Import	370,279									95,527	269,189	243,694	978,689	
XB Exchange - Export													0	
Price Export Average														
Cost Export													0	

Conclusion

All required balancing services capacity for 2021, apart from the secondary control capacity in off peak load periods, were procured in public procurement procedures mostly in the annual tender. In comparison to 2020 there were slightly higher prices for secondary control capacity in peak load period and slightly lower prices for tertiary control capacity. Prices of balancing capacity were significantly below the regulated price caps except for the price of secondary control capacity in off peak load period.

In 2021 43% of required secondary control capacity was delivered during the night hours. Other services were delivered in wider range of 70-85% of required capacity. Prevailing ancillary services providers were three elektroprivreda companies.

Average imbalance prices were 168.57 KM/MWh for realized electricity shortage, and 77.88 KM/MWh for realized electricity surplus and they are significantly higher than in previous years as the energy prices in European markets.

The cost in terms of losses and compensations was around 13% higher than it was in last year, although the realized prices in the public procurement procedure were 13% lower. This is due to the fact that in 2021 realized losses were 16% higher.

In 2021 there was often electricity shortage in BiH power system and it could not have been covered out of own balancing capacities. In those periods the cross-border balancing energy was engaged in amount of 2 253 MWh by quite high prices which amounted to 434.39 KM/MWh in average.

From June 2021 the process of financial settlement of imbalance between control areas (LFC) started to apply replacing previous energy compensations of unintentional deviations. Considering frequent electricity shortage in BiH system and high prices in European Energy Exchanges, BiH is obliged to pay the amount exceeding 9 million KM for realized shortage in second half of the year when Fskar process has been applied.

Taking into account the actual tariff for system services, the realized revenue in 2021 amounted to 7.9 million KM on the basis of ancillary services.

However, the year 2021 was specific for the COVID-19 pandemic continuation and significant increase in electricity prices at the market. That also affected the energy prices realized in the balancing market in BiH.

Addendum: Financial overview

Table 10: Financial balance - ancillary services and balancing energy in 2021

Control capacity		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20
SC - capacity	KM	-1.202.777	-1.007.077	-1.069.234	-877.106	-758.258	-629.484	-615.514	-611.809	-647.191	-590.654	-242.851	-152.654	-8.404.609	86%
SC - capacity - penalty	KM	6.975	4.378	3.195	12.487	20.589	36.430	52.426	44.733	35.501	57.990	100.289	129.826	504.816	83%
TC upward - capacity	KM	-343.054	-288.068	-359.927	-357.480	-368.657	-370.521	-548.401	-419.347	-393.253	-240.912	-123.707	-157.867	-3.971.194	71%
TC upward - capacity - penalty	KM	11.109	17.660	4.922	1.648	2.241	6.037	22.905	14.751	20.769	48.302	84.120	76.397	310.861	308%
TC downward - capacity	KM	-69.745	-63.808	-69.663	-66.485	-68.900	-53.546	-51.833	-53.789	-47.897	-57.652	-57.850	-60.423	-721.590	95%
TC upward - capacity - penalty	KM	411	217	345	477	958	2.544	3.065	2.832	3.261	2.329	1.589	1.633	19.661	58%
Total	KM	-1.597.082	-1.336.698	-1.490.363	-1.286.459	-1.172.027	-1.008.540	-1.137.352	-1.022.628	-1.028.810	-780.597	-238.410	-163.089	-12.262.054	80%

Positive values are paid by the BSP and invoiced by NOSBIH, negative values are paid by NOSBIH and invoiced by the BSP

Engaged energy		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20
Upward	KM	-410.601	-1.265.272	-306.778	-472.516	-162.424	-1.094.732	-1.274.524	-612.448	-589.357	-1.958.831	-838.610	-720.423	-9.706.515	277%
Downward	KM	181.624	127.061	257.970	181.208	221.291	132.699	180.373	412.823	257.647	263.817	279.314	208.788	2.704.616	94%
Total	KM	-228.976	-1.138.211	-48.808	-291.308	58.867	-962.033	-1.094.151	-199.625	-331.711	-1.695.013	-559.295	-511.635	-7.001.899	1091%

Positive values are paid by the BSP and invoiced by NOSBIH, negative values are paid by NOSBIH and invoiced by the BSP

Imbalance		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20
Surplus	KM	-100.980	-153.741	-294.795	-374.649	-401.522	-382.889	-772.171	-920.809	-623.346	-556.945	-1.645.304	-1.849.387	-8.076.539	188%
Shortage	KM	1.263.615	3.342.292	973.324	1.511.687	804.971	2.786.428	4.740.959	2.392.341	2.073.393	5.152.801	4.392.424	3.832.344	33.266.579	324%
Total	KM	1.162.635	3.188.551	678.529	1.137.038	403.449	2.403.539	3.968.788	1.471.532	1.450.047	4.595.856	2.747.120	1.982.957	25.190.041	421%

Positive values are paid by the BRP and invoiced by NOSBIH, negative values are paid by NOSBIH and invoiced by the BRP

Losses and compensations		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20
Losses and compensations		-4.724.985	-4.505.375	-3.625.735	-2.843.735	-2.634.384	-2.172.518	-2.914.826	-3.030.553	-3.282.951	-3.884.786	-3.909.297	-4.791.834	-42.320.978	113%
Fskar		0	0	0	0	0	-415.643	-1.671.269	-320.995	-873.526	-3.261.811	-1.632.105	-1.019.296	-9.194.645	
Total	KM	-4.724.985	-4.505.375	-3.625.735	-2.843.735	-2.634.384	-2.588.160	-4.586.095	-3.351.548	-4.156.477	-7.146.597	-5.541.401	-5.811.130	-51.515.623	138%

Positive values are paid by the BSP and invoiced by NOSBIH, negative values are paid by NOSBIH and invoiced by the BSP (ENTSO-e by Fskar)

System service		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20
Total	KM	4.955.130	4.337.298	4.735.711	4.330.829	3.925.822	3.960.081	4.296.156	4.297.675	4.026.163	4.702.567	4.714.974	5.174.352	53.456.759	98%

Positive values are paid by NOSBIH and invoiced by the BSP

Balance		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2021	2021/20
Total	KM	-433.278	545.565	249.334	1.046.364	581.726	1.804.887	1.447.347	1.195.407	-40.787	-323.784	1.122.988	671.455	7.867.224	114%

Positive value - NOSBIH's surplus of assets