



Transelectrica®
Societate Administrată în Sistem Dualist

MARKET MONITORING REPORT

Balancing Market

December 2021

ANRE - Romanian Energy Regulatory Authority
HHI - Herfindahl-Hirschman Index
BRP - Balance Responsible Party
BM - Balancing Market
DAM - Day Ahead Market
TSO - Transmission System Operator
DU – Dispatchable Unit
PN – Physical Notification
NDC - National Dispatching Center
C1 – The market share of the largest market participant
C3 – Total market share of top 3 market participants
NPS – Minimum number of residual generators
TTC – Total Transfer Capacity
NTC – Net Transfer Capacity
ATC – Available Transfer Capacity

According to the Commercial Code, Transelectrica, the Romanian Transmission System Operator, operates and monitors the activity of 3 types of markets: Balancing Market, Ancillary Services Market and Market for Allocation of Cross-Border Capacities.

Using the records from the markets data bases, Transelectrica prepares daily, weekly and monthly monitoring reports. A part of the data included in these reports (those data which are not confidential) are published on the website www.transelectrica.ro (section Transparency).



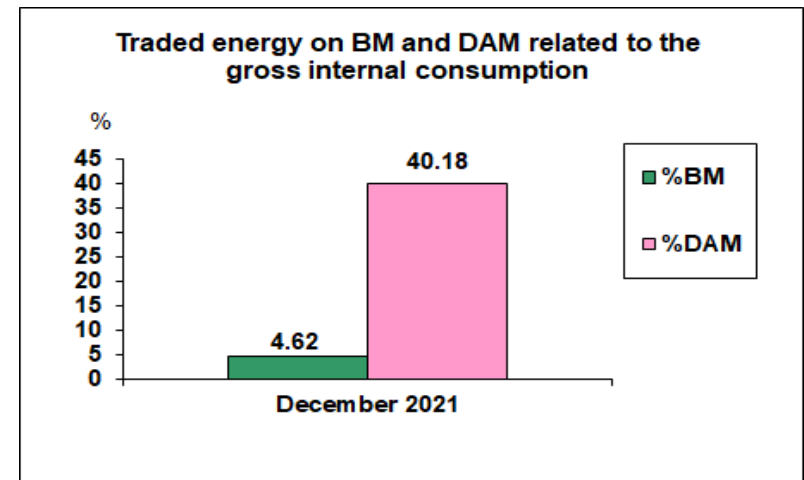
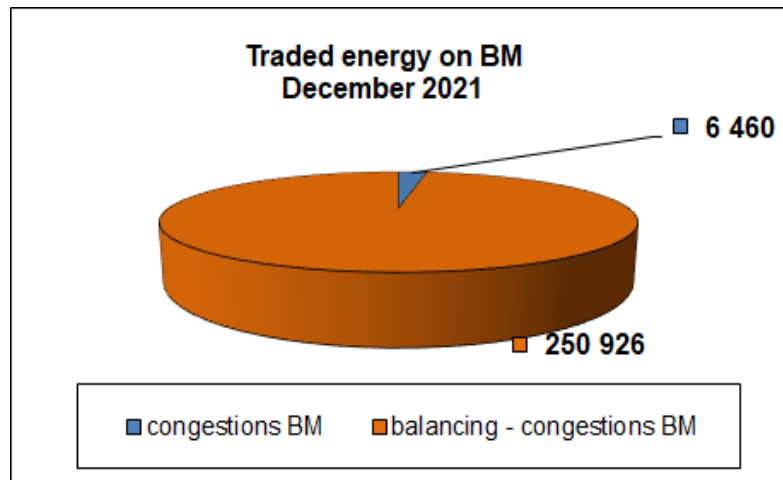
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Balancing Market

The Balance Generation/Consumption

- The average monthly value of generated power was 7 165 MW and the actual internal gross consumption was 7 494 MW.
- The NDC consumption forecast was close to the actual consumption, the standard deviation being **1.75%**. Bigger differences were registered in case of consumption values resulted as the sum between notified production and total scheduled exchanges with the neighbouring power systems. In this case the standard monthly deviation value was **2.86%**. The greatest daily deviation regarding the notifications was registered on 21st of December 2021 (**9.36%**).
- The energy used in December 2021 for balancing the power system and congestion management was 257 386 MWh (with an average power of 346 MW, which means **4.62%** from the internal gross consumption). The energy used for congestion management was 6 460.27 MWh (with an average power of 8.68 MW, which means 0.1159% from the internal gross consumption).
- There were no transactions outside BM (with financial compensation).
- The energy used in December 2021 on Day Ahead Market was 2 240 206 MWh (with an average power of 3 011 MW, which means **40.18%** from the internal gross consumption). Data are shown in EET hours.
- The total cost of the energy traded on the Balancing Market was 352 281 800 lei (with an average weighted price of 1 368.69 lei/MWh. The cost of the energy paid by C.N.T.E.E. Transelectrica S.A. for congestion management was 1 522 009 lei.





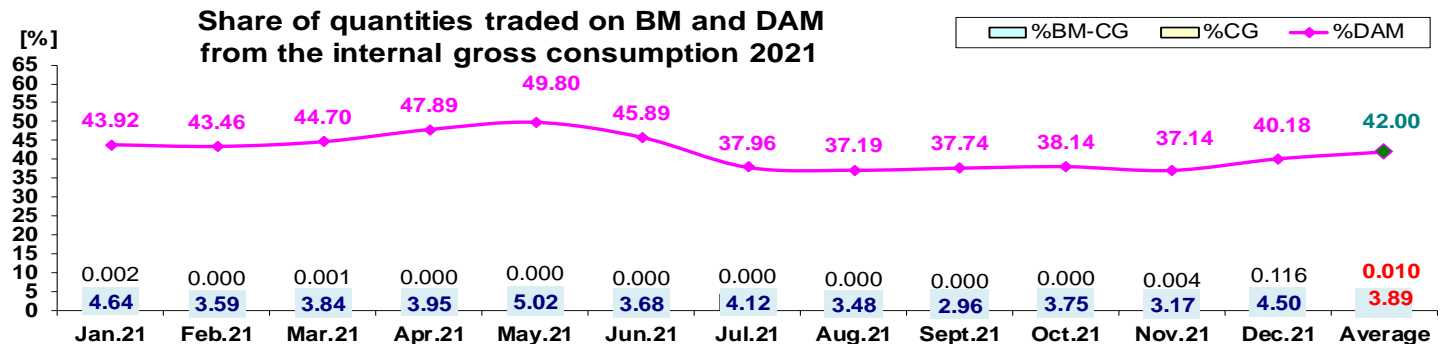
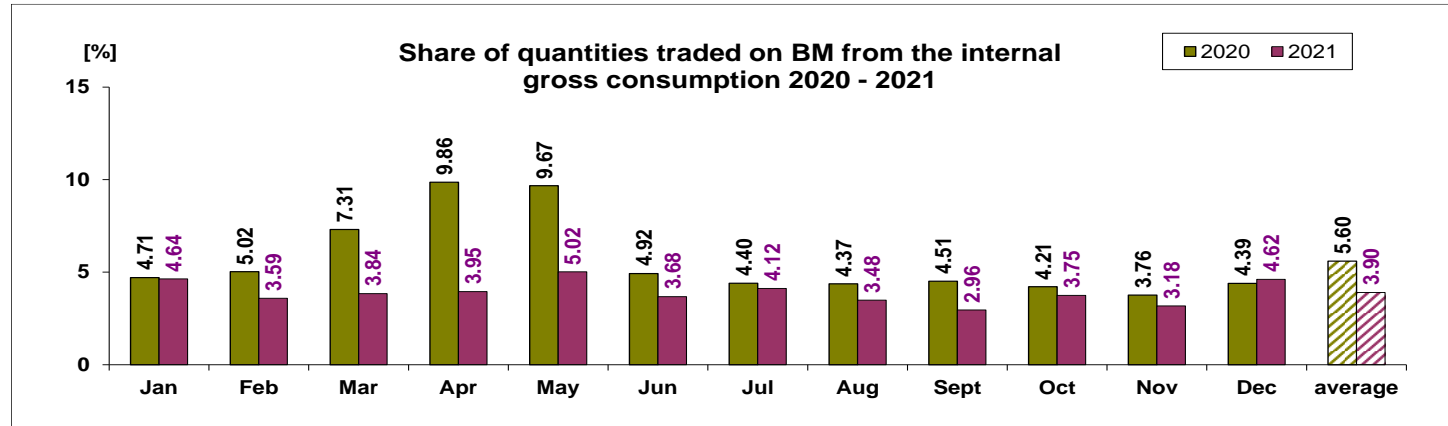
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Balancing Market

The Balance Generation / Consumption

• Monthly percentage values resulted are calculated as ratio between traded volumes on BM / outside BM with financial compensation and gross internal consumption. The annual average value was calculated as average of monthly values.
(BM – Balancing Market, DAM – Day Ahead Market, BM-CG – difference between Balancing Market and traded volume on congestion).



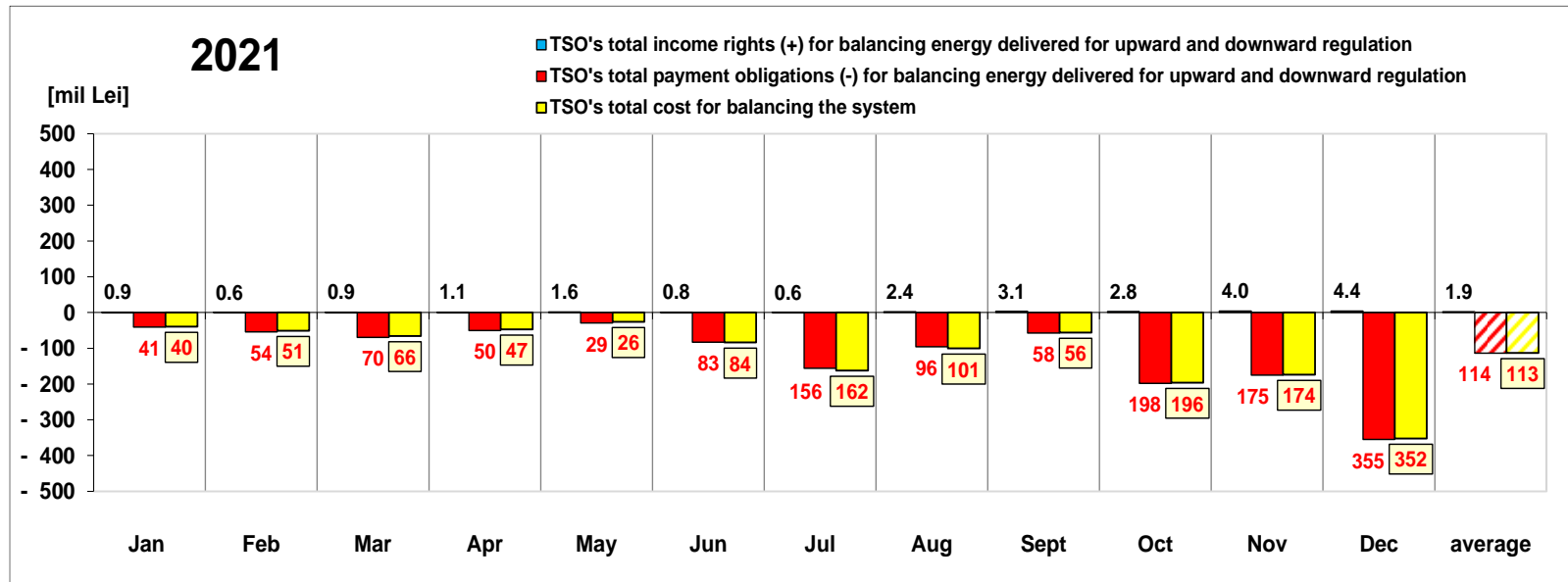
2021													
	Jan.21	Feb.21	Mar.21	Apr.21	May.21	Jun.21	Jul.21	Aug.21	Sept.21	Oct.21	Nov.21	Dec.21	Average
%BM	4.64	3.59	3.84	3.95	5.02	3.68	4.12	3.48	2.96	3.75	3.18	4.62	3.90
%DAM	43.92	43.46	44.70	47.89	49.80	45.89	37.96	37.19	37.74	38.14	37.14	40.18	42.00
%CG	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.0003	0.000	0.000	0.0045	0.1159	0.0103
%BM-CG	4.636	3.592	3.836	3.947	5.019	3.675	4.122	3.485	2.961	3.748	3.172	4.500	3.891
% outside BM	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



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Balancing Energy Market Transactions



[Lei]		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	average	Sum
TSO's income rights / payment obligations for balancing energy delivered for downward regulation	incomes (+) prices ≥ 0	878 222	633 581	912 692	1 127 724	1 558 592	805 841	648 010	2 432 702	3 133 558	2 819 066	4 020 754	4 352 959	1 943 642	23 323 702
	payments (-) prices < 0	- 367 742	- 8 158	- 280 354	- 849 859	0	- 295 584	- 340 681	- 65 874	- 7 763	- 660	- 41 713	- 822 485	- 256 739	- 3 080 873
TSO's payment obligations / income rights for balancing energy delivered for upward regulation	payments (-) prices ≥ 0	-40 134 420	-54 045 144	-69 270 145	-49 547 577	-29 085 259	-82 840 786	-155 567 405	-95 476 521	-57 690 962	-198 267 624	-174 947 245	-354 275 055	-113 429 012	-1 361 148 143
	incomes (+) prices < 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TSO's total income rights (+) for balancing		878 222	633 581	912 692	1 127 724	1 558 592	805 841	648 010	2 432 702	3 133 558	2 819 066	4 020 754	4 352 959	1 943 642	23 323 702
TSO's total payment obligations (-) for		-40 502 162	-54 053 301	-69 550 500	-50 397 436	-29 085 259	-83 136 370	-155 908 086	-95 542 395	-57 698 725	-198 268 284	-174 988 958	-355 097 540	-113 685 751	-1 364 229 016
TSO's total cost for balancing the system		-39 649 686	-50 861 284	-65 692 590	-47 412 381	-26 133 778	-83 889 171	-162 448 175	-100 539 890	-55 923 174	-196 277 620	-173 729 452	-352 281 800	-112 903 250	-1 354 839 001
Value of transactions outside BM (with		- 25 803	0	0	0	0	0	0	0	0	0	0	0	- 2 150	- 25 803
Congestion Cost on BM		- 56	0	- 121	0	0	0	0	- 178	0	0	- 81 088	-1 522 009	- 133 621	- 1 603 452
Congestion Cost outside BM		0	0	0	0	0	0	0	0	0	0	0	0	0	0

* The annual average value was obtained as arithmetic average of the monthly values.

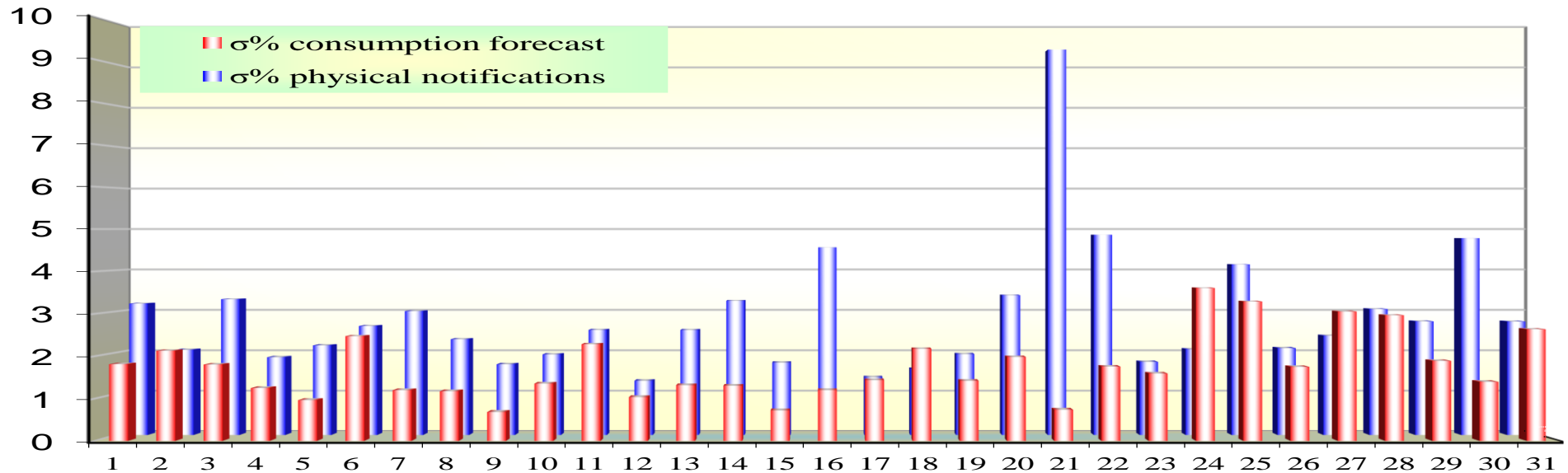


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Balancing Market

Standard deviation of physical notifications and consumption forecast against the actual consumption in December 2021



Dec 2021

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
σ% consumption forecast	1.81	2.13	1.80	1.25	0.96	2.47	1.20	1.17	0.68	1.35	2.28	1.03	1.31	1.30	0.72	1.20	1.43	2.17	1.42	1.98	0.73	1.75	1.59	3.61	3.29	1.75	3.05	2.97	1.89	1.39	2.64
σ% physical notifications	3.19	2.07	3.30	1.89	2.17	2.65	3.01	2.32	1.72	1.96	2.55	1.31	2.55	3.26	1.75	4.55	1.40	1.60	1.96	3.39	9.36	4.86	1.77	2.08	4.14	2.11	2.41	3.06	2.76	4.78	2.75

$$\sigma_{\text{average}\% \text{ consumption forecast}} = \frac{\sqrt{\frac{1}{n} \sum_{i=1}^n (R - P)^2}}{R} \cdot 100$$

σ_{average}% consumption forecast = 1.75

σ_{average} % physical notifications = 2.86

$$\sigma_{\text{average}\% \text{ notifications}} = \frac{\sqrt{\frac{1}{n} \sum_{i=1}^n (R - N)^2}}{R} \cdot 100$$

R = Realized Consumption;

N = Physical Notifications;

P = Consumption Forecast.

Public

Balancing Market

Balancing energy – Selected prices and quantities

- At the beginning of the month on the Balancing Market operated 67 BRPs, 101 market participants, holding 193 commercially operating dispatchable units. Starting with 15th of December 2021, according to the provisions of ANRE Order no. 213/2020, amended and supplemented by ANRE Order no. 33/2021, BRP GENESIS BIOTECH (PROBE) (30XRO-GBTPROBE-D) was registered in the Balancing Market, having as production unit during the trial period GENESIS2.

December 2021

Downward Regulation

Downward Regulation	Prices			Quantities			Participants						
	Weighted Average	Maximum	Minimum	Selected	Actually Delivered	Deviation	C1		C3		HHI	HHI	
	[lei/MWh]	[lei/MWh]	[lei/MWh]	[MWh]	[MWh]	[%]	Number	(selected)	(actually delivered)	(selected)	(actually delivered)	(actually delivered)	
Secondary	-0.23	0.10	-10.00	42815.70	42815.70	0.00%	3	68.53%	100%	68.53%	100%	5237	5237
Fast Tertiary	81.29	300.00	0.10	45781.22	43337.89	5.34%	10	37.41%	83.82%	37.49%	84.13%	2934	2948
Slow Tertiary	-	-	-	0.00	-	-	0	-	-	-	-	-	-
				88596.93	86153.59	2.76%							

Upward Regulation

	Prices			Quantities			Participants						
	Weighted Average	Maximum	Minimum	Selected	Actually Delivered	Deviation		C1	C3	C1	C3	HHI	HHI
	[lei/MWh]	[lei/MWh]	[lei/MWh]	[MWh]	[MWh]	[%]	Number	(selected)	(actually delivered)	(selected)	(actually delivered)	(selected)	(actually delivered)
Secondary	2377.57	5000.00	2000.00	37122.20	37122.20	0.00%	3	72.85%	100%	72.85%	100%	5776	5776
Fast Tertiary	1983.20	3129.72	550.73	135644.57	134110.19	1.13%	12	84.53%	91.8%	84.6%	91.87%	7187	7200
Slow Tertiary	-	-	-	0.00	-	-	0	-	-	-	-	-	-
				172766.78	171232.40	0.89%							



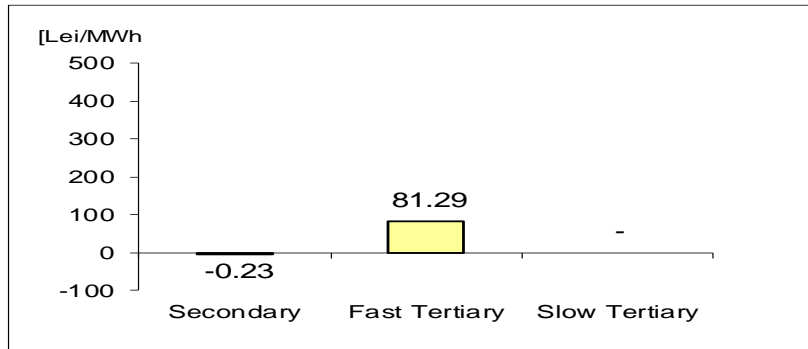
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Balancing Market

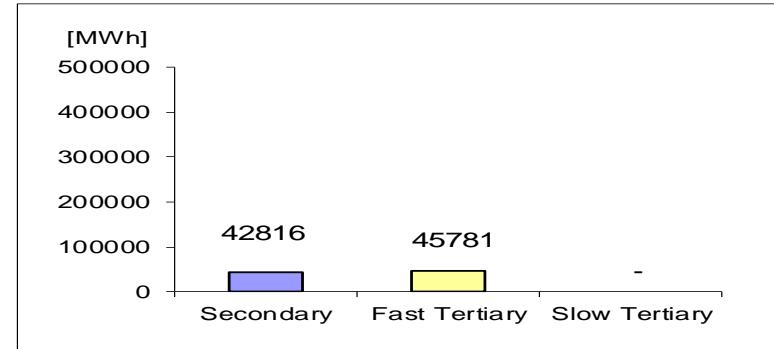
Balancing energy – Selected prices and quantities in December 2021

December 2021

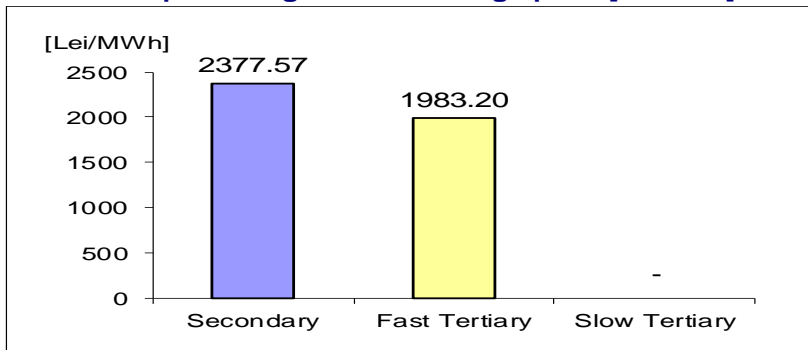
Downward regulation - average price [lei/MWh]



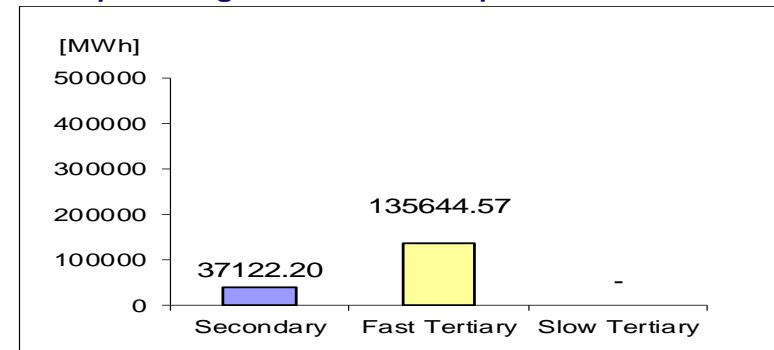
Downward regulation - selected quantities



Upward regulation - average price [lei/MWh]



Upward regulation - selected quantities



$$\text{Price}_{\text{average weighted, regulation type, direction}} = \frac{\sum (Q_{i,j} * P_{i,j})}{\sum Q_{i,j}}$$

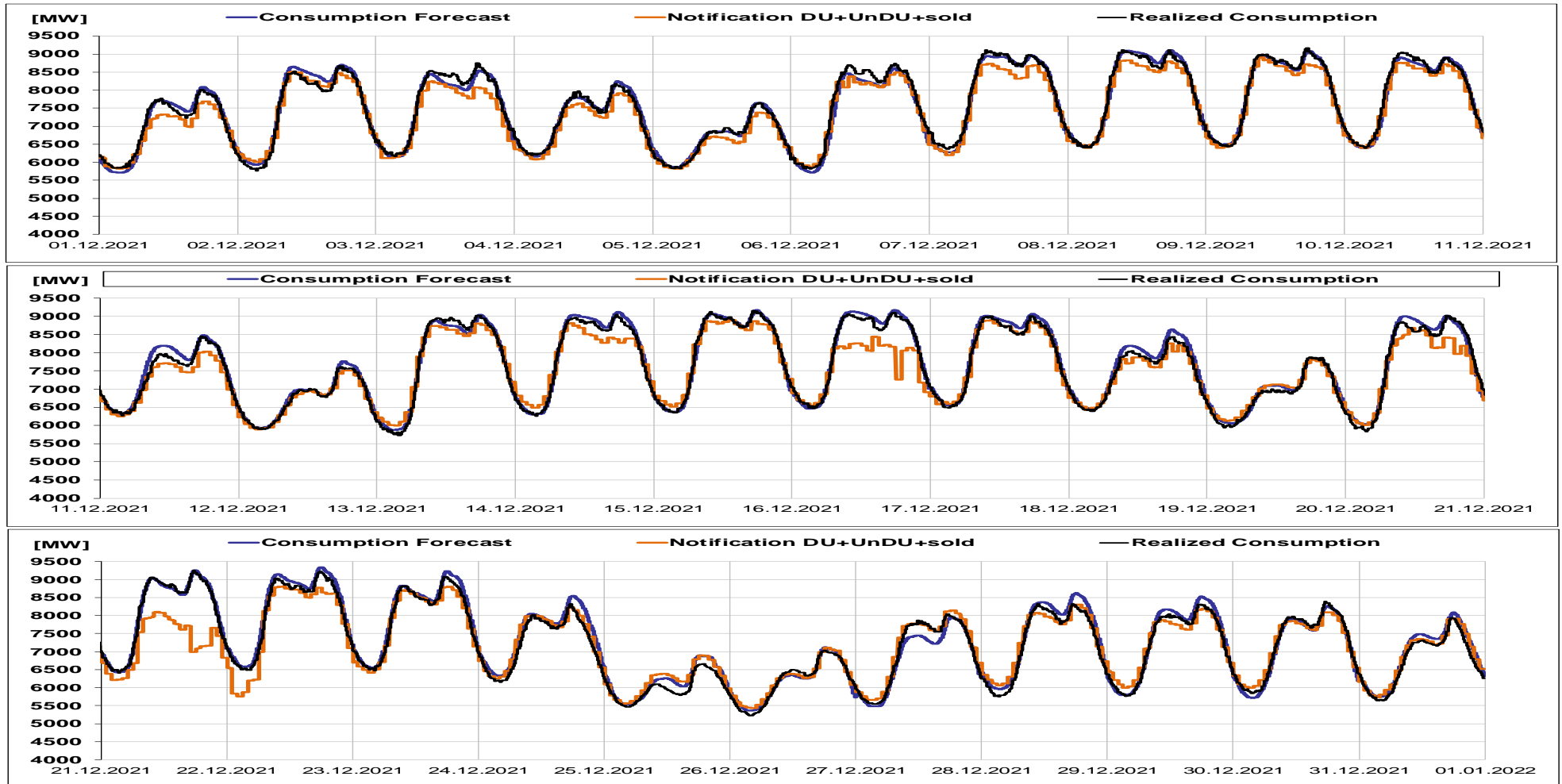
where $Q_{i,j}$, $P_{i,j}$ represents the quantity, respectively the price of the energy selected, corresponding to the selected transaction j in the dispatching interval i .



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Realized consumption, forecast, notifications in D-1



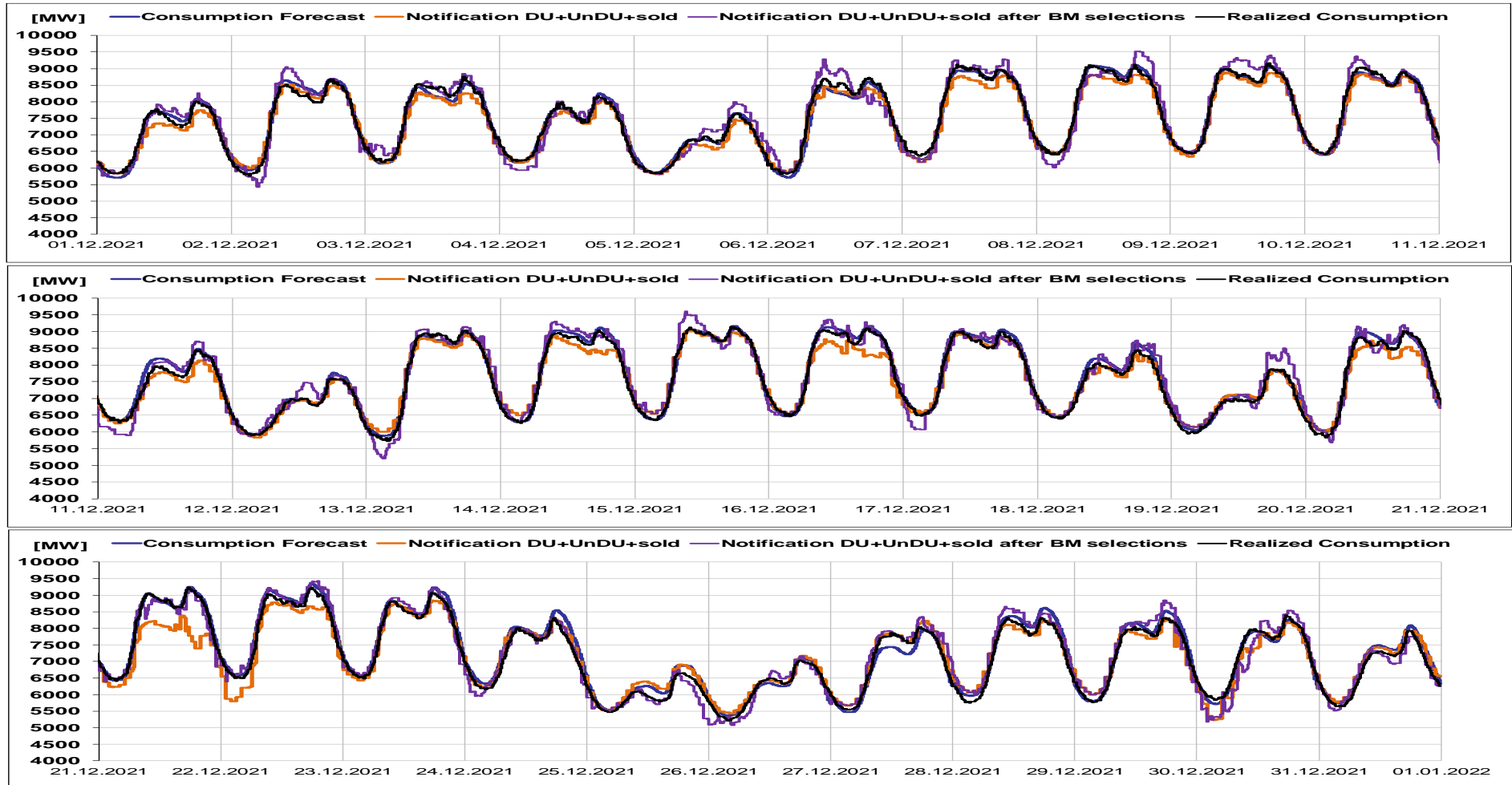


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Balancing Market

Realized consumption, forecast, notifications, notifications after BM selections in D (end of delivery day)



Balancing Market

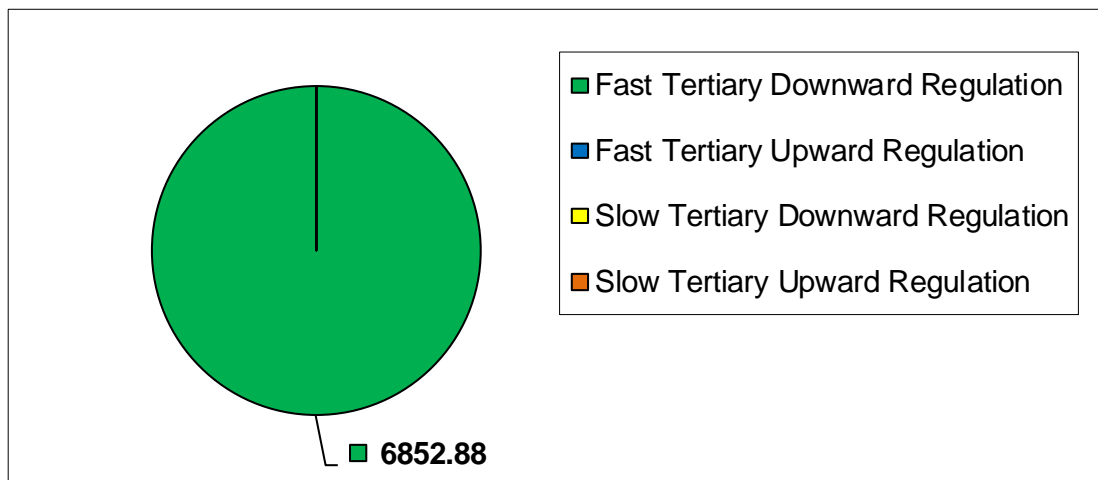
Congestion Management

December 2021

Fast Tertiary Downward Regulation
Fast Tertiary Upward Regulation
Slow Tertiary Downward Regulation
Slow Tertiary Upward Regulation

Selected [MWh]	Quantities [MWh]	Participants
	Actually Delivered	Number
6852.88	6460.27	4
0.00	-	0
0.00	-	0
0.00	-	0
6852.88	6460.27	

Selected energy [MWh]



The value of the delivered energy related to the final transactions for the management of internal congestions is the one resulting from the application of the algorithm for determining the costs for system balancing and for management of internal congestions from the settlement stage on the BM.



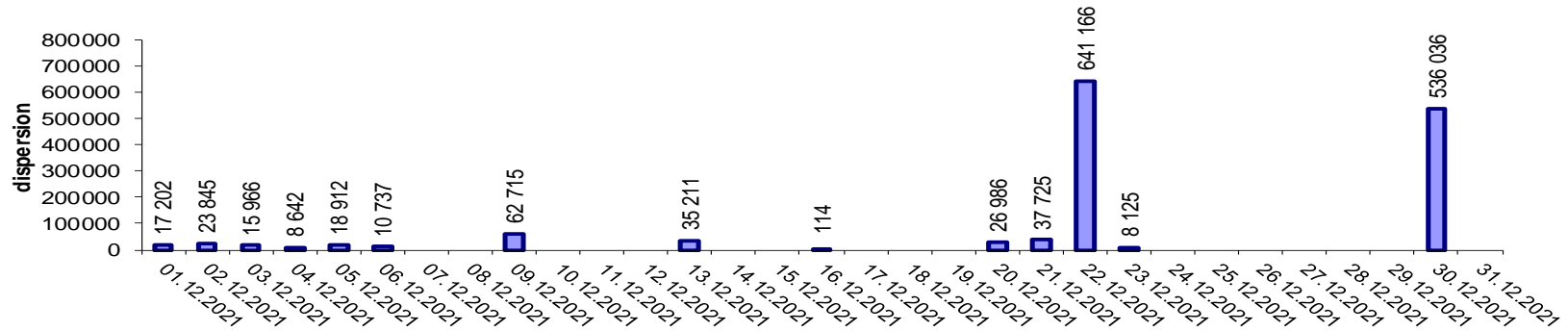
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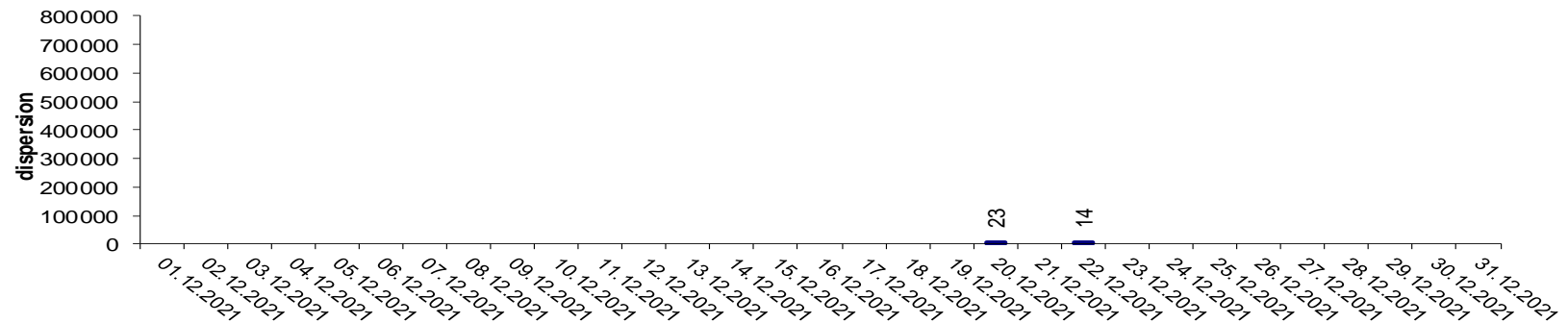
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Indicators – Price Volatility for Secondary Regulation

Price Volatility for Secondary Upward Regulation



Price Volatility for Secondary Downward Regulation



Volatility = price dispersion on studied interval:

$$\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$$



Email: Monitorizare.Piata@transelectrica.ro

Fax: 021 3035630