

MARKET MONITORING REPORT

Balancing Market

December 2017

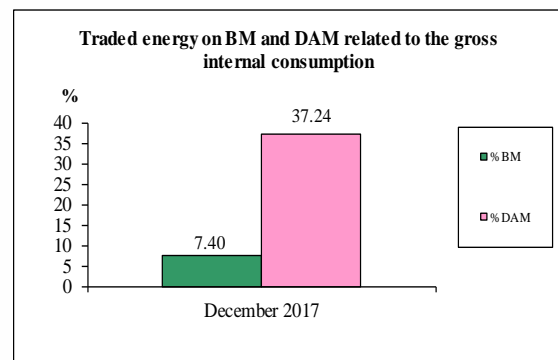
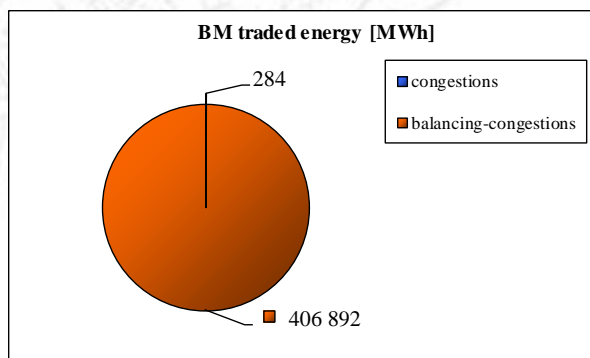
Abbrevations

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).

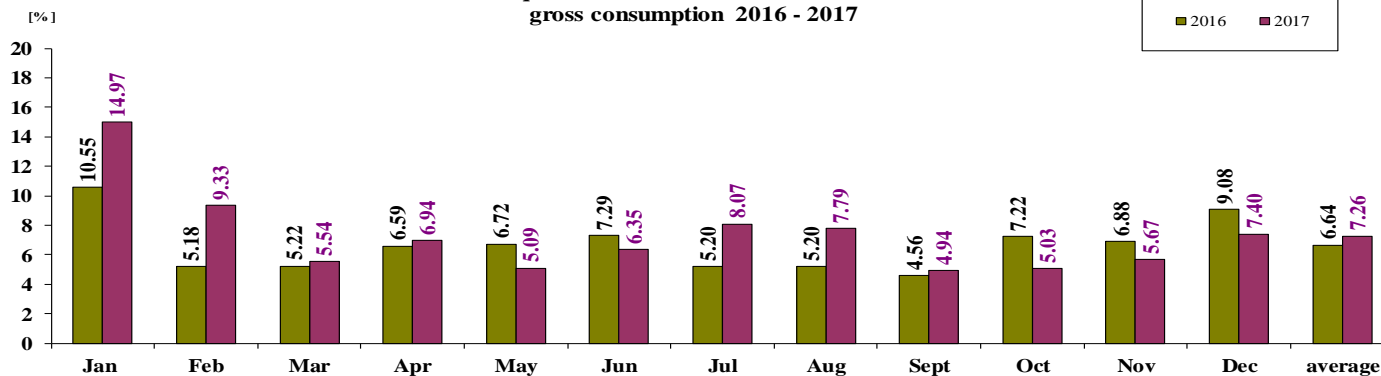
- The average monthly value of generated power was 8 099 MW and the actual internal gross consumption was 7 395 MW.
- The NDC consumption forecast was close to the actual consumption. the standard deviation being 1,62 %. Bigger differences were registered in case of consumption values. resulted as the sum between notified production and total scheduled exchanges with the neighbouring power systems. In this case the standard monthly deviation value was 3,57 %. The greatest daily deviation. regarding the notifications. was registered in 25.12 (13,13 %).
- The energy used in December 2017 for balancing the power system and congestion management was 407 176 MWh (with an average power of 547 MW, which means **7,40** % from the internal gross consumption).
 - the energy used for congestion management was 284 MWh (with an average power of 0,38 MW, which means 0,005 % from the internal gross consumption).
- The energy traded in December 2017 on Day Ahead Market was 2 049 089 MWh (with an average power of 2 754 MW, which means **37,24** % from the internal gross consumption). Data are shown in EET hours.
- The total cost of the energy traded on the Balancing Market was 76 515 652 lei (with an average weighted price of 188 lei/MWh).
 - the cost of the energy paid by C.N.T.E.E. Transelectrica S.A. for congestion management was 2 400 lei (with an average weighted price of 8,45 lei/MWh), which means 0,003 % from the total cost.



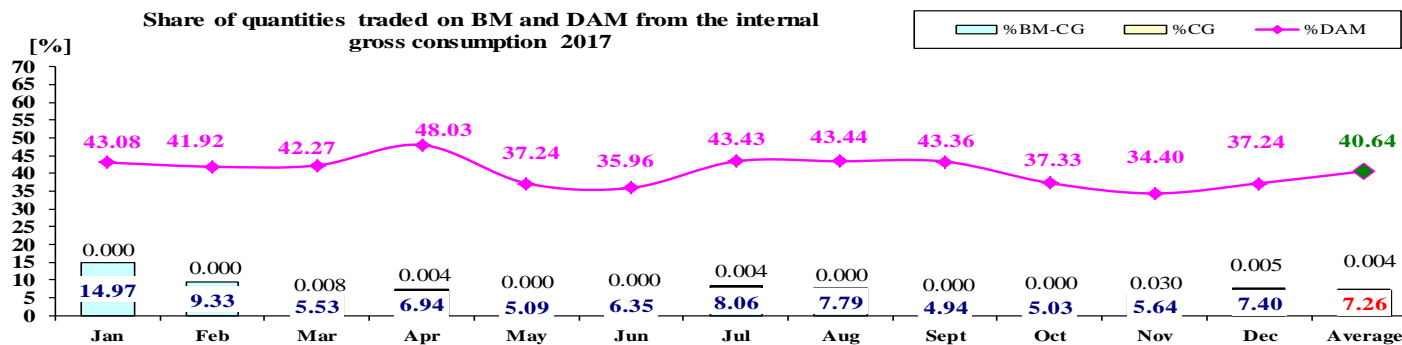
• Monthly percentage values resulted are calculated as ratio between traded volumes on BM and gross internal consumption.

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).

Share of quantities traded on BM from the internal gross consumption 2016 - 2017

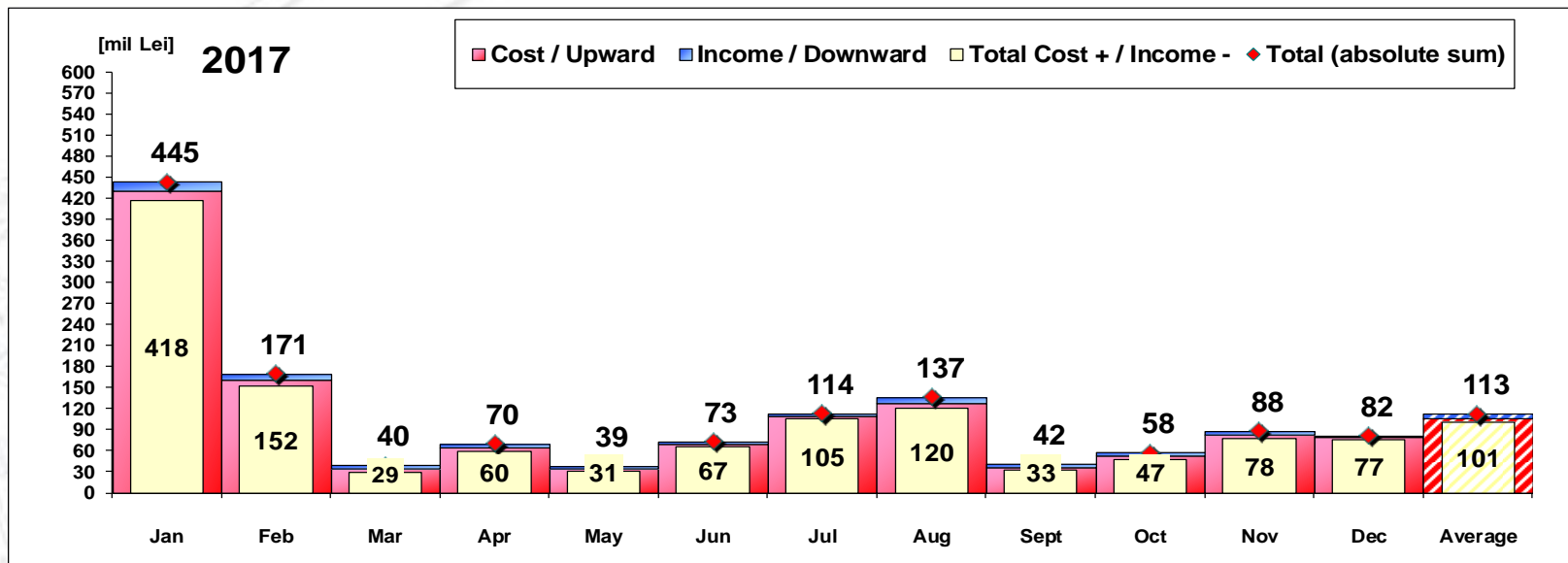


Share of quantities traded on BM and DAM from the internal gross consumption 2017



	2017												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Average
%BM	14.97	9.33	5.54	6.94	5.09	6.35	8.07	7.79	4.94	5.03	5.67	7.40	7.26
%DAM	43.08	41.92	42.27	48.03	37.24	35.96	43.43	43.44	43.36	37.33	34.40	37.24	40.64
%CG	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.004
%BM-CG	14.97	9.33	5.53	6.94	5.09	6.35	8.06	7.79	4.94	5.03	5.64	7.40	7.26

Balancing Energy Market Transactions

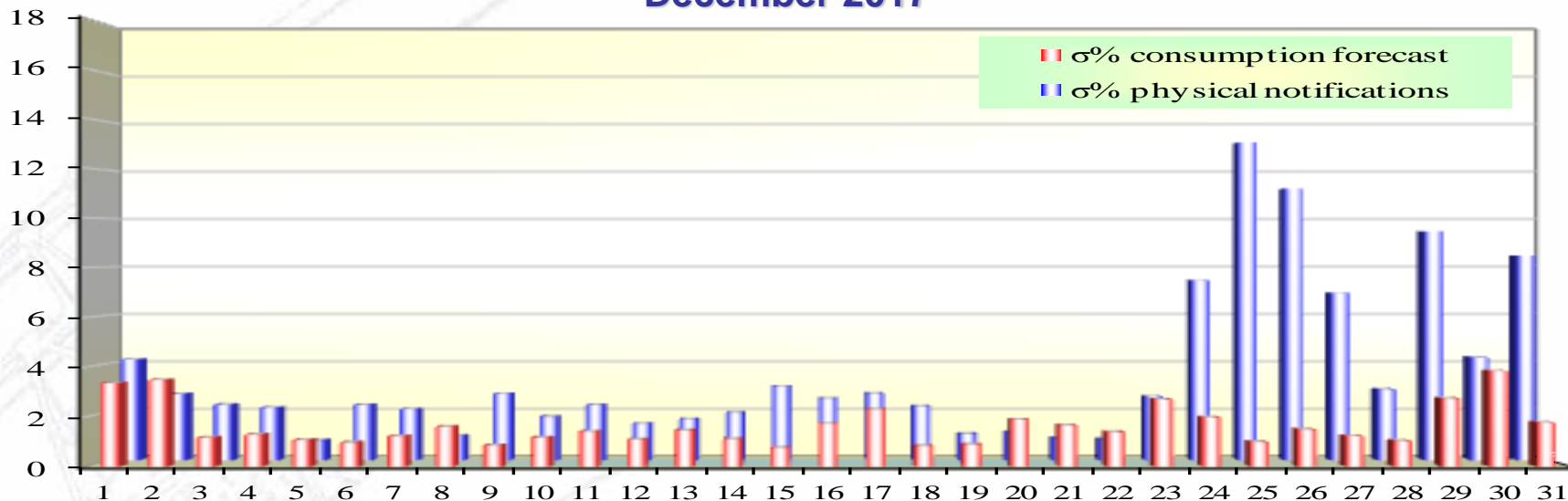


[Lei]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Average	Total
Cost / Upward	431 393 249	161 133 423	34 549 755	65 001 668	35 309 182	70 005 187	109 496 928	128 792 754	37 214 349	52 659 598	83 036 011	79 175 443	107 313 962	1287 767 545
Income / Downward	13 186 568	9 389 350	5 081 592	5 304 021	3 844 149	3 382 836	4 036 941	8 429 060	4 319 729	5 626 857	5 291 993	2 659 791	5 879 407	70 552 886
CE Cost	0	0	39 746	1 614	0	0	52 284	0	0	0	144 999	2 400	20 087	241 042
Total Cost + / Income -	418 206 681	151 744 073	29 468 163	59 697 647	31 465 033	66 622 351	105 459 987	120 363 694	32 894 619	47 032 740	77 744 018	76 515 652	101 434 555	1217 214 659
Total (absolute sum)	444 579 817	170 522 773	39 631 347	70 305 689	39 153 331	73 388 022	113 533 869	137 221 813	41 534 078	58 286 455	88 328 003	81 835 234	113 193 369	1358 320 431

CE – Congestion Energy

* The average annual value of BM transactions (the absolute sum of upward and downward transactions) was calculated as average of monthly values.

Standard deviation of physical notifications and consumption forecast against the actual consumption in December 2017



December 2017

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	3.35	3.48	1.16	1.28	1.06	0.96	1.22	1.59	0.85	1.16	1.40	1.09	1.45	1.10	0.75	1.72	2.30	0.82	0.88	1.88	1.66	1.37	2.69	1.97	0.99	1.48	1.22	1.03	2.73	3.85	1.77
σ% physical notifications	4.17	2.73	2.30	2.18	0.82	2.29	2.11	1.01	2.75	1.80	2.29	1.51	1.69	1.97	3.05	2.56	2.76	2.24	1.08	1.16	0.92	0.88	2.64	7.45	13.13	11.25	6.92	2.93	9.48	4.26	8.47

σ_{average} % consumption forecast = 1.62

σ_{average} % physical notifications = 3.57

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

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

Public

R = Realized Consumption;

N = Physical Notifications;

P = Consumption Forecast.

Balancing Market

Balancing energy – Selected prices and quantities

- At the beginning of the month on the Balancing Market operated 91 BRPs, 122 market participants, holding 241 commercially operating dispatchable units.

December 2017

Downward regulation

	Prices [lei/MWh]			Quantities [MWh]		
	Monthly	Maximum	Minimum	Total	Actually	Deviation
	average			selected	delivered	%
Secondary	24.58	250.00	0.10	50066.81	50066.81	0.00%
Fast Tertiary	16.32	349.00	0.10	64030.81	57357.05	10.42%
Slow Tertiary	12.48	190.00	0.10	41094.83	40255.25	2.04%
				155192.46	147679.12	4.84%

Upward regulation

	Monthly	Maximum	Minimum	Total	Actually	Deviation
	average			selected	delivered	%
Secondary	310.63	500.00	250.00	43257.68	43257.68	0.00%
Fast Tertiary	301.48	500.00	0.10	182720.06	177826.88	2.68%
Slow Tertiary	302.33	500.00	0.10	38559.93	38412.18	0.38%

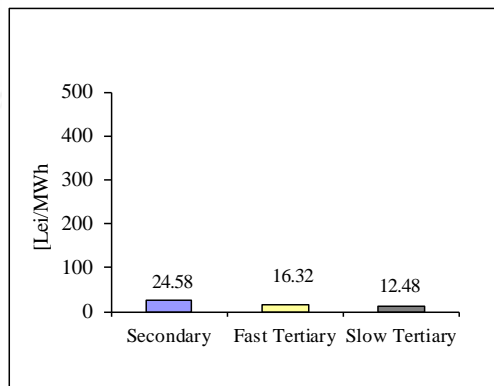
Participants

C1		C3		C1		C3		HHI		HHI	
										(actually delivered)	
Number	(selected)		(actually delivered)		(selected)		(selected)		(actually delivered)		
5	59.53%	96.72%	59.53%	96.72%	4658		4658				
11	63.36%	95.43%	61.67%	95.47%	4540		4384				
6	76.98%	98.07%	77.48%	98.04%	6242		6309				

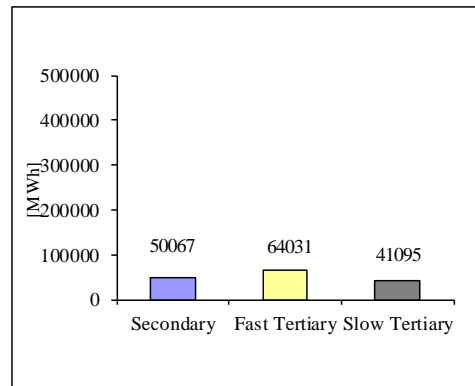
C1		C3		C1		C3		HHI		HHI	
										(actually delivered)	
Number	(selected)		(actually delivered)		(selected)		(selected)		(actually delivered)		
5	59.16%	96.90%	59.16%	96.90%	4669		4669				
12	81.89%	92.25%	83.15%	92.56%	6778		6974				
8	34.37%	81.58%	34.39%	81.58%	2652		2657				

December 2017

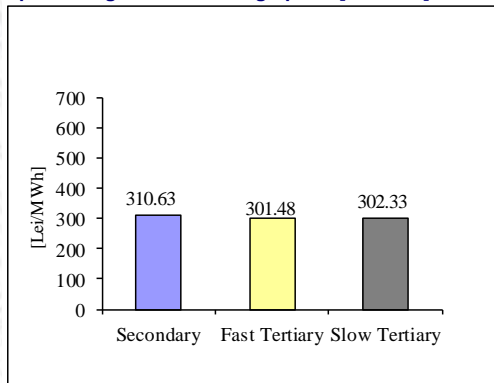
Downward regulation - average price [lei/MWh]



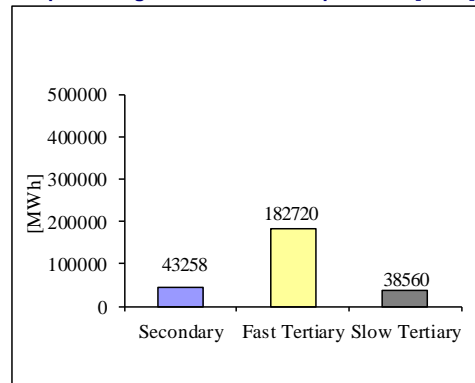
Downward regulation - selected quantities [MWh]



Upward regulation - average price [lei/MWh]

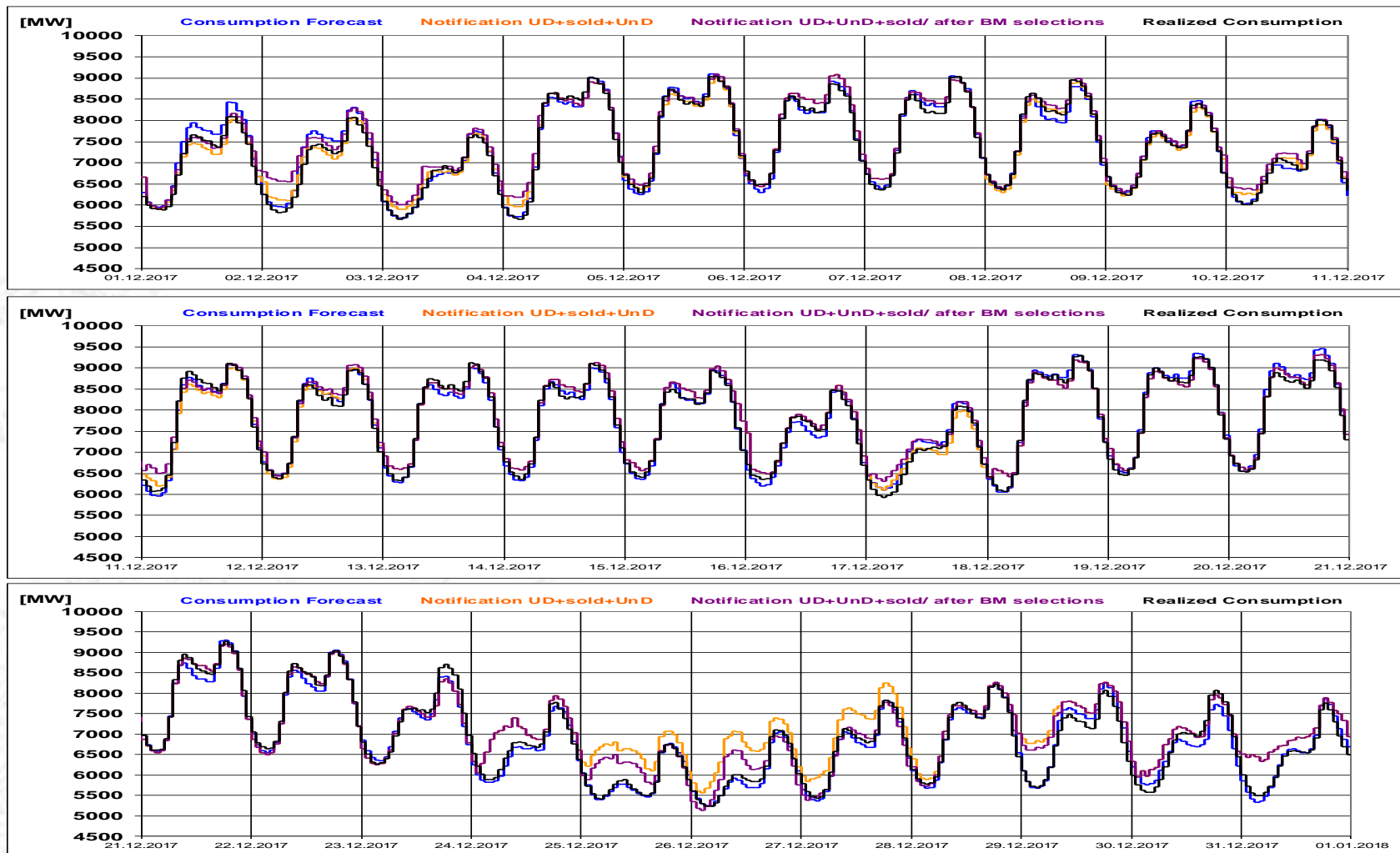


Upward regulation - selected quantities [MWh]



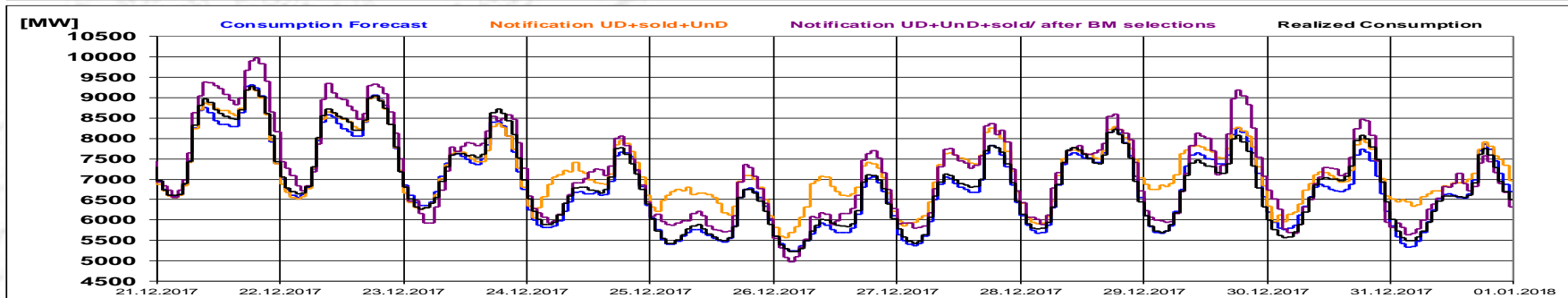
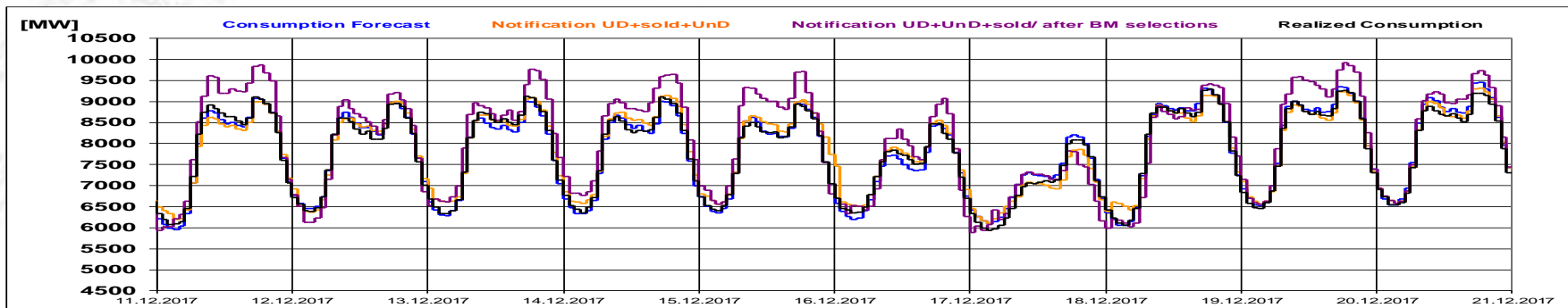
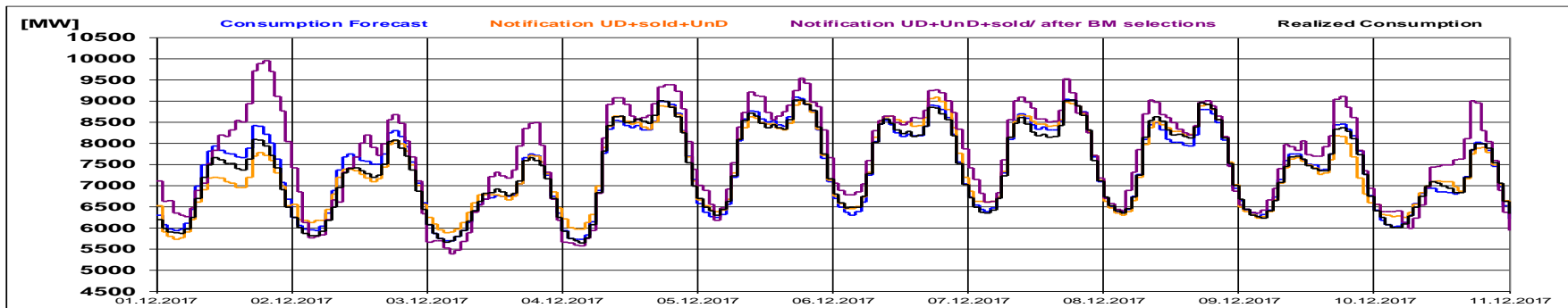
Balancing Market

Realized consumption. forecast. notifications.
notifications after BM selections in D-1



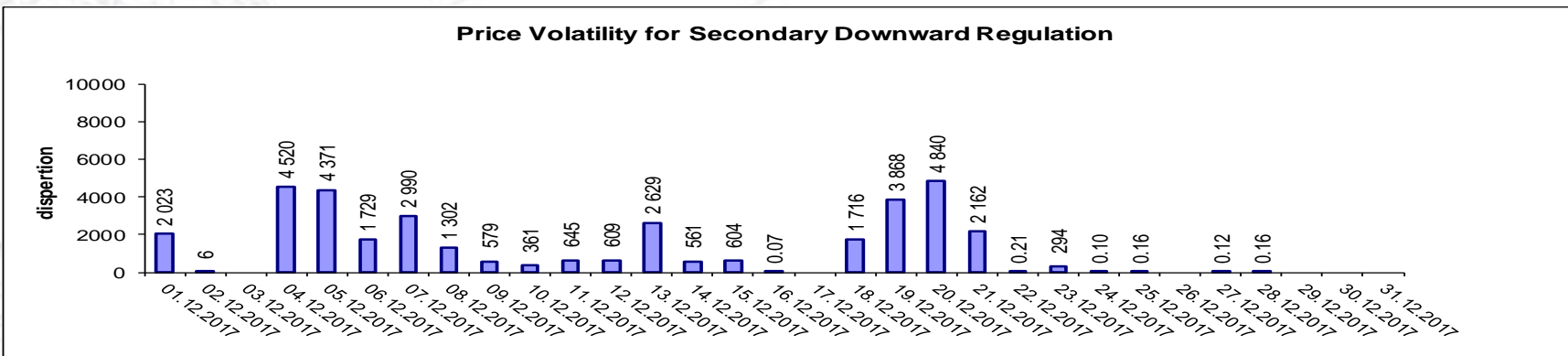
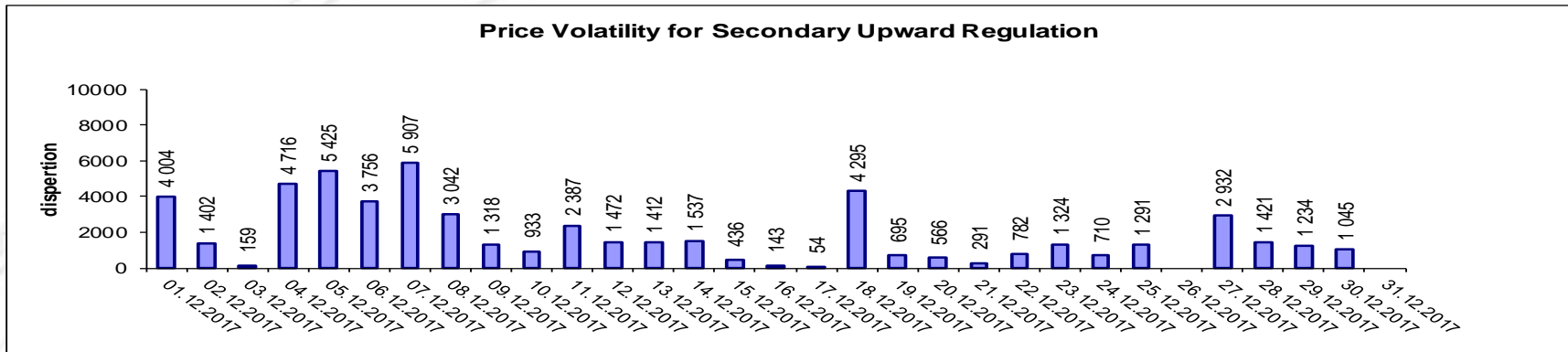
Balancing Market

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



Balancing Market

Indicators – Price Volatility for Secondary Regulation



Volatility = price dispersion on studied interval:

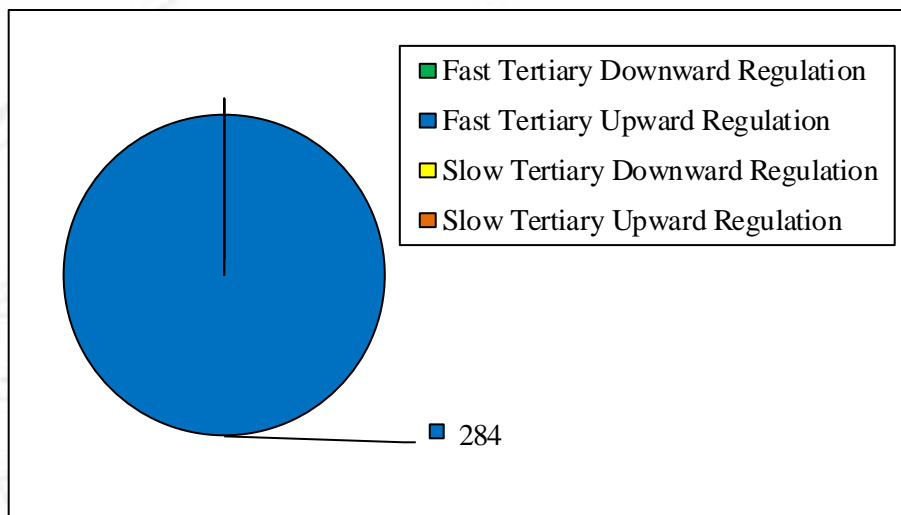
$$\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$$

Public

Balancing Market

Congestion Management

	Quantities [MWh]			Participants
	Selected	Delivered	Deviation[%]	Number
Fast Tertiary Downward Regulation	-	-	-	-
Fast Tertiary Upward Regulation	284.17	284.10	0.02%	1
Slow Tertiary Downward Regulation	-	-	-	-
Slow Tertiary Upward Regulation	-	-	-	-
	284.17	284.10	0.02%	



Note: The value of delivered energy for congestion management is the result of the algorithm used to determine the costs for balancing the power system and internal congestion management.

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