

MARKET MONITORING REPORT

Balancing Market

August 2018

Abbrevations

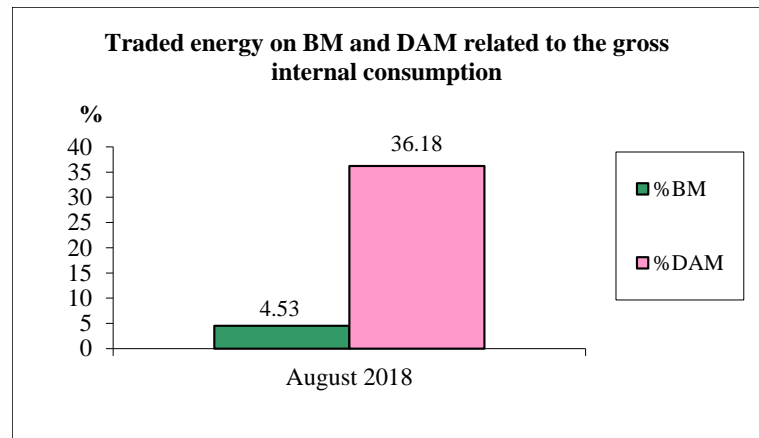
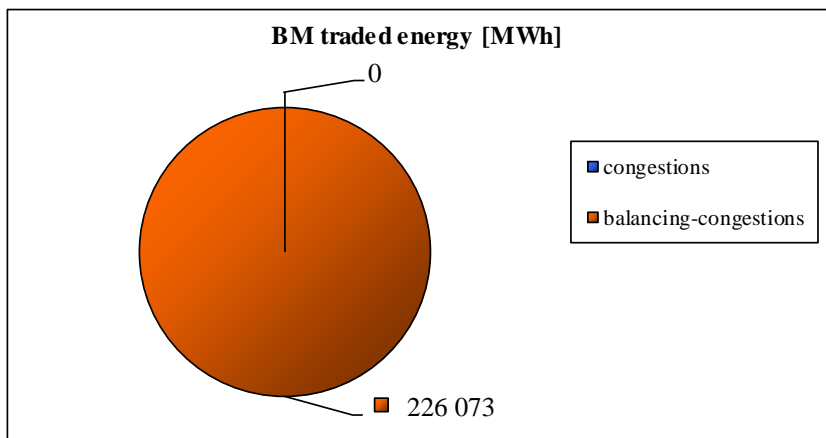
ANRE - Romanian Energy Regulatory Authority
HHI - Herfindahl-Hirschman Index
BRP - Balance Responsible Party
BM - Balancing Market
DAM - Day Ahead Market
TSO - Transmission System Operator
DU – Dispatchable Unit
PN – Physical Notification
NDC - National Dispatching Center
C1 – The market share of the 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 Balance Generation/Consumption

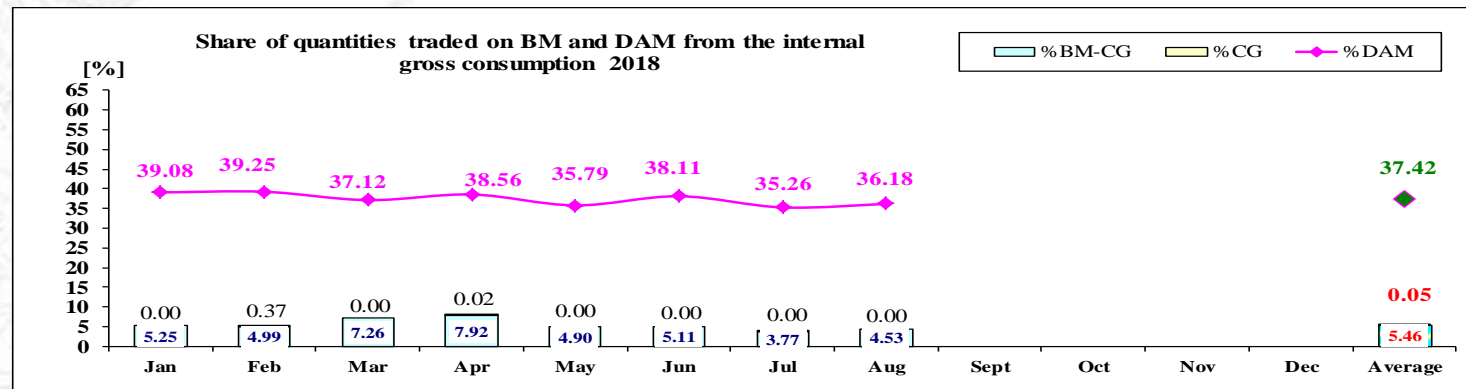
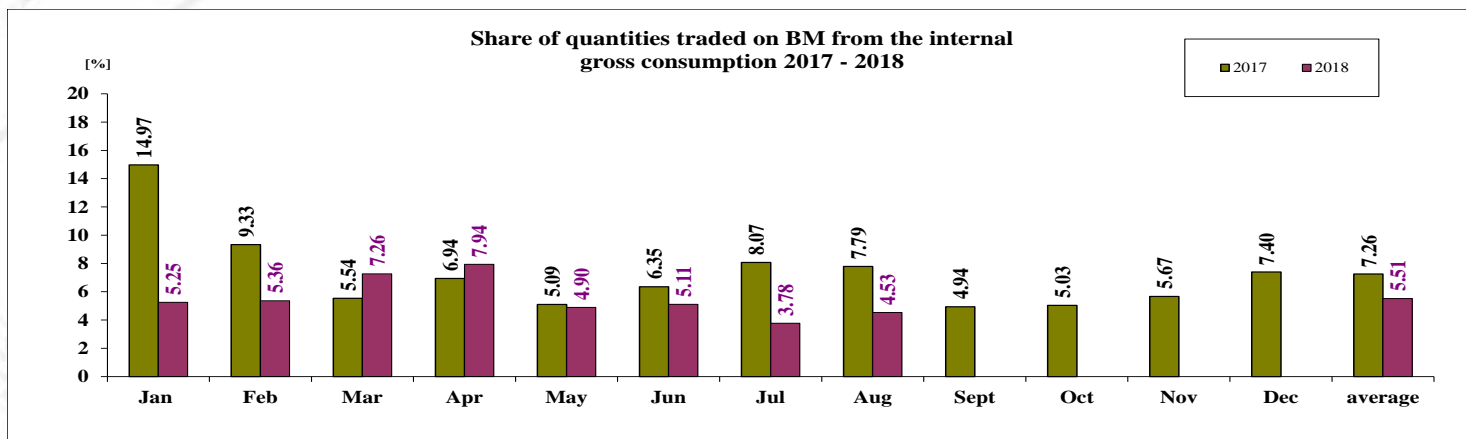
- The average monthly value of generated power was 7 195 MW and the actual internal gross consumption was 6 710 MW.
- The NDC consumption forecast was close to the actual consumption, the standard deviation being **1.66%**. Bigger differences were registered in case of consumption values resulted as the sum between notified production and total scheduled exchanges with the neighbouring power systems. In this case the standard monthly deviation value was **2.61%**. The greatest daily deviation regarding the notifications was registered in **28.08 (5.41%)**.
- The energy used in August 2018 for balancing the power system and congestion management was 226 073 MWh (with an average power of 304 MW, which means 4.53% from the internal gross consumption).
- The energy traded in August 2018 on Day Ahead Market was 1 806 242 MWh (with an average power of 2 428 MW, which means **36.18%** from the internal gross consumption). Data are shown in EET hours.
- The total cost of the energy traded on the Balancing Market was **47 954 034 lei** (with an average weighted price of 121 lei/MWh).



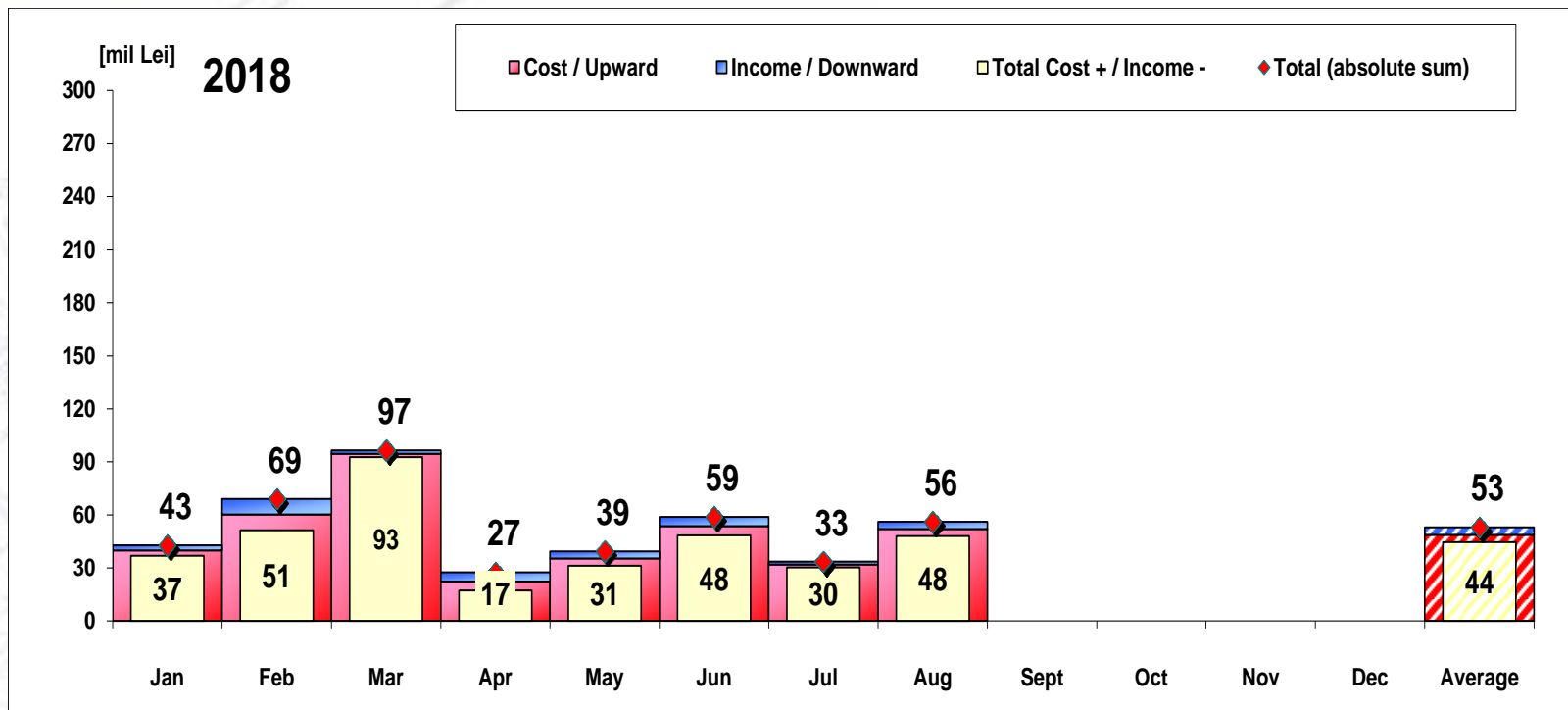
August 2018

The Balance Generation / Consumption

• 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).



| | 2018 | | | | | | | | | | | | |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|------|-----|-----|-----|---------|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Average |
| %BM | 5.25 | 5.36 | 7.26 | 7.94 | 4.90 | 5.11 | 3.78 | 4.53 | | | | | 5.51 |
| %DAM | 39.08 | 39.25 | 37.12 | 38.56 | 35.79 | 38.11 | 35.26 | 36.18 | | | | | 37.42 |
| %CG | 0.00 | 0.37 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | | | | | 0.049 |
| %BM-CG | 5.25 | 4.99 | 7.26 | 7.92 | 4.90 | 5.11 | 3.77 | 4.53 | | | | | 5.46 |

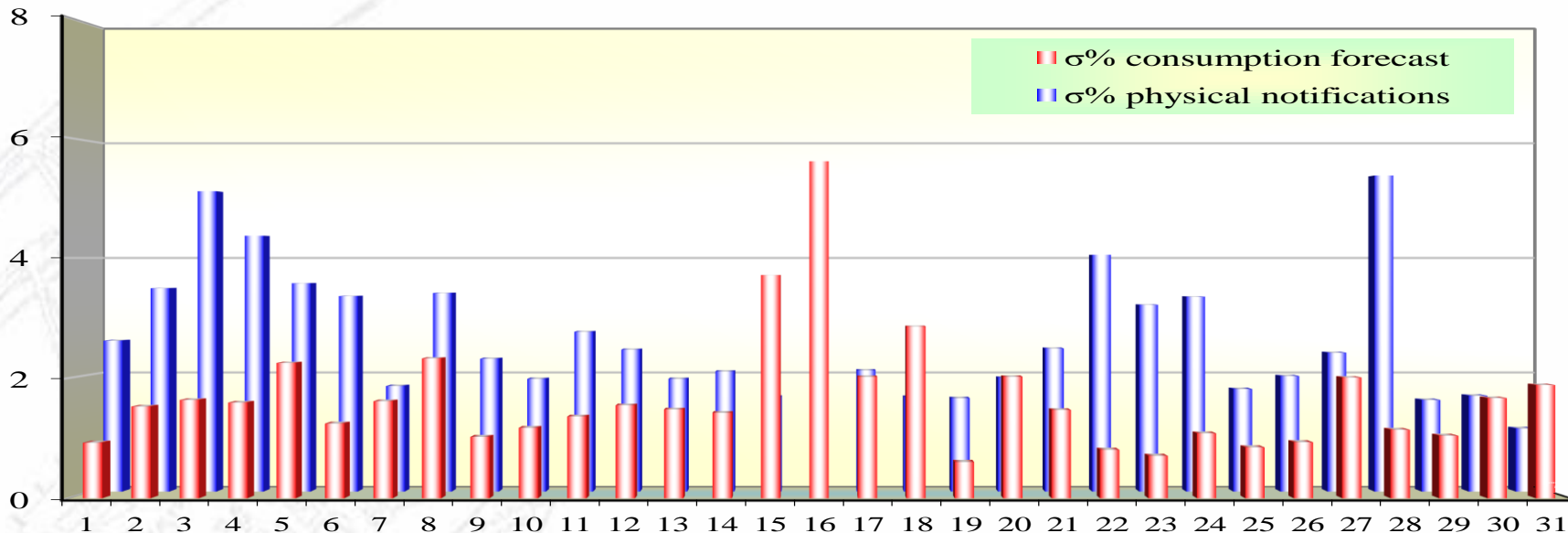


| [Lei] | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Average | Total |
|-------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------|-----|-----|-----|------------|-------------|
| Cost / Upward | 39 819 143 | 60 149 383 | 94 609 129 | 22 294 472 | 35 295 644 | 53 570 278 | 31 866 958 | 52 018 823 | | | | | 48 702 979 | 389 623 829 |
| Income / Downward | 2 909 103 | 8 808 101 | 1 928 773 | 5 128 228 | 4 077 888 | 5 193 747 | 1 602 287 | 4 064 789 | | | | | 4 214 114 | 33 712 915 |
| CE Cost | 0 | 5 234 582 | 0 | 154 594 | 0 | 0 | 3 449 | 0 | | | | | 674 078 | 5 392 625 |
| Total Cost + / Income - | 36 910 039 | 51 341 283 | 92 680 357 | 17 166 243 | 31 217 756 | 48 376 531 | 30 264 672 | 47 954 034 | | | | | 44 488 864 | 355 910 914 |
| | | | | | | | | | | | | | | |
| Total (absolute sum) | 42 728 246 | 68 957 484 | 96 537 902 | 27 422 700 | 39 373 531 | 58 764 024 | 33 469 245 | 56 083 612 | | | | | 52 917 093 | 423 336 744 |

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 August 2018



August 2018

| 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 | 0.92 | 1.53 | 1.64 | 1.59 | 2.25 | 1.24 | 1.62 | 2.33 | 1.02 | 1.17 | 1.36 | 1.55 | 1.48 | 1.42 | 3.71 | 5.61 | 2.02 | 2.86 | 0.60 | 2.02 | 1.47 | 0.81 | 0.71 | 1.08 | 0.85 | 0.93 | 2.01 | 1.14 | 1.04 | 1.67 | 1.88 |
| σ% physical notifications | 2.58 | 3.48 | 5.14 | 4.38 | 3.57 | 3.35 | 1.81 | 3.40 | 2.27 | 1.93 | 2.74 | 2.43 | 1.93 | 2.06 | 1.62 | 2.02 | 2.08 | 1.62 | 1.60 | 1.95 | 2.45 | 4.05 | 3.20 | 3.34 | 1.75 | 1.98 | 2.38 | 5.41 | 1.57 | 1.64 | 1.08 |

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

R = Realized Consumption;

N = Physical Notifications;

P = Consumption Forecast.

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

σ_{average % consumption forecast} = 1.66

σ_{average % physical notifications} = 2.61

Balancing energy – Selected prices and quantities

- At the beginning of the month on the Balancing Market operated 91 BRPs, 113 market participants, holding 224 commercially operating dispatchable units. Starting with 7th of August dispatchable unit METROM (30W-BEPCOMETRM-D) was registered.

August 2018

Downward regulation

| | Prices [lei/MWh] | | |
|---------------|------------------|---------|---------|
| | Monthly | Maximum | Minimum |
| average | | | |
| Secondary | 41.88 | 150.00 | 0.10 |
| Fast Tertiary | 57.51 | 345.00 | 0.20 |
| Slow Tertiary | 58.47 | 166.56 | 1.00 |

| | Quantities [MWh] | | |
|----------|------------------|----------|-----------|
| | Total | Actually | Deviation |
| | | | |
| selected | delivered | % | |
| 42299.72 | 42299.72 | 0.00% | |
| 42513.52 | 39915.11 | 6.11% | |
| 905.58 | 838.74 | 7.38% | |
| 85718.82 | 83053.57 | 3.11% | |

| | Participants | | | | | |
|--------|--------------|----------------------|------------|----------------------|------|------|
| | C1 | C3 | C1 | C3 | HHI | HHI |
| | | | | | | |
| Number | (selected) | (actually delivered) | (selected) | (actually delivered) | | |
| 5 | 76.58% | 97.14% | 76.58% | 97.14% | 6134 | 6134 |
| 10 | 42.78% | 98.30% | 42.89% | 98.66% | 3582 | 3589 |
| 4 | 54.70% | 99.56% | 55.15% | 99.96% | 4946 | 5008 |

Upward regulation

| | Monthly | Maximum | Minimum |
|---------------|---------|---------|---------|
| | | | |
| average | | | |
| Secondary | 352.18 | 470.00 | 249.00 |
| Fast Tertiary | 363.69 | 470.00 | 50.00 |
| Slow Tertiary | 386.79 | 400.00 | 350.00 |

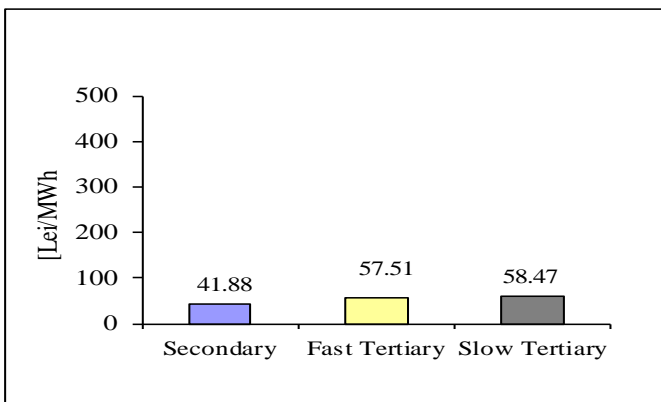
| | Total | Actually | Deviation |
|-----------|-----------|----------|-----------|
| | | | |
| selected | delivered | % | |
| 35718.06 | 35718.06 | 0.00% | |
| 95319.50 | 92936.26 | 2.50% | |
| 14538.83 | 14365.53 | 1.19% | |
| 145576.39 | 143019.85 | 1.76% | |

| | C1 | C3 | C1 | C3 | HHI | HHI |
|--------|------------|----------------------|------------|----------------------|------|------|
| | | | | | | |
| Number | (selected) | (actually delivered) | (selected) | (actually delivered) | | |
| 5 | 78.44% | 96.71% | 78.44% | 96.71% | 6346 | 6346 |
| 9 | 82.99% | 92.13% | 84.17% | 92.59% | 6949 | 7141 |
| 2 | 74.12% | 100.00% | 73.81% | 100.00% | 6164 | 6134 |

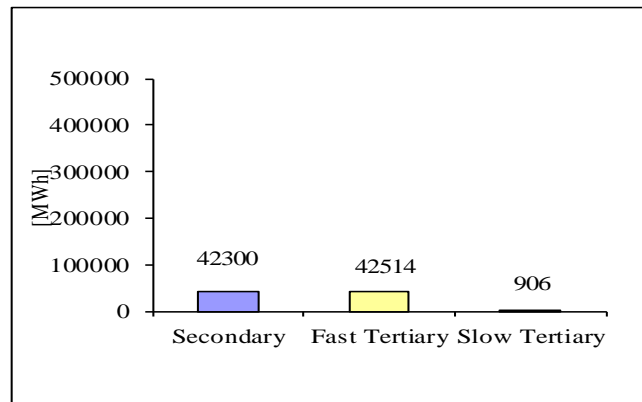
Balancing energy – Selected prices and quantities in August 2018

August 2018

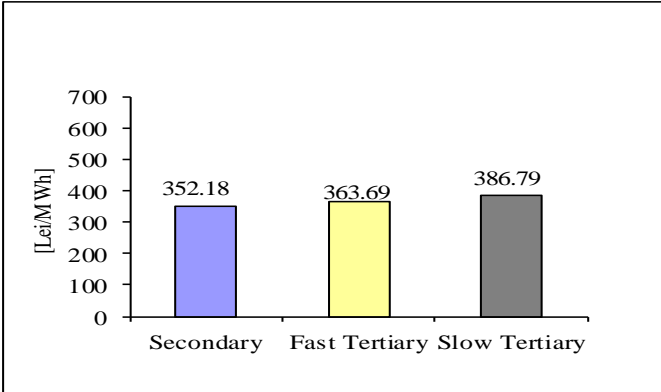
Downward regulation - average price [lei/MWh]



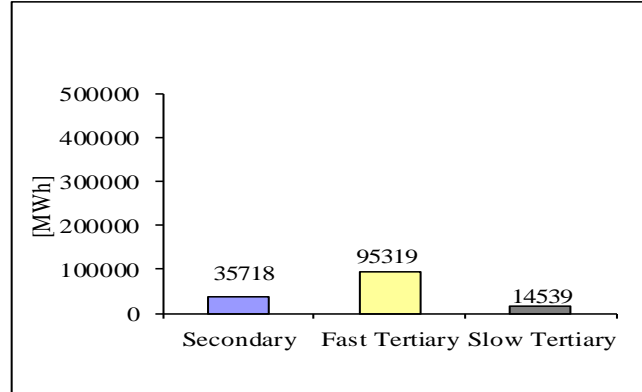
Downward regulation - selected quantities [MWh]



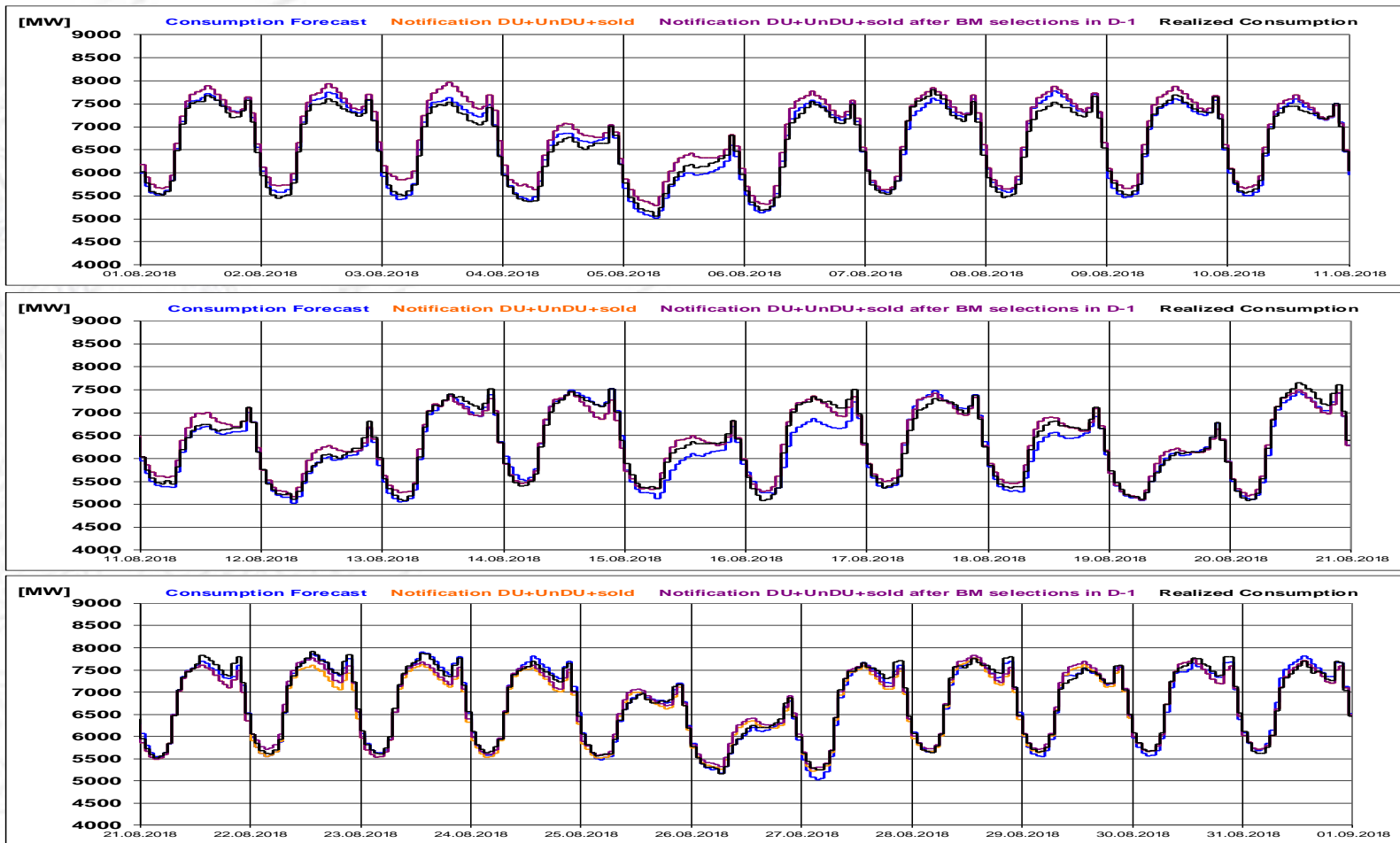
Upward regulation - average price [lei/MWh]



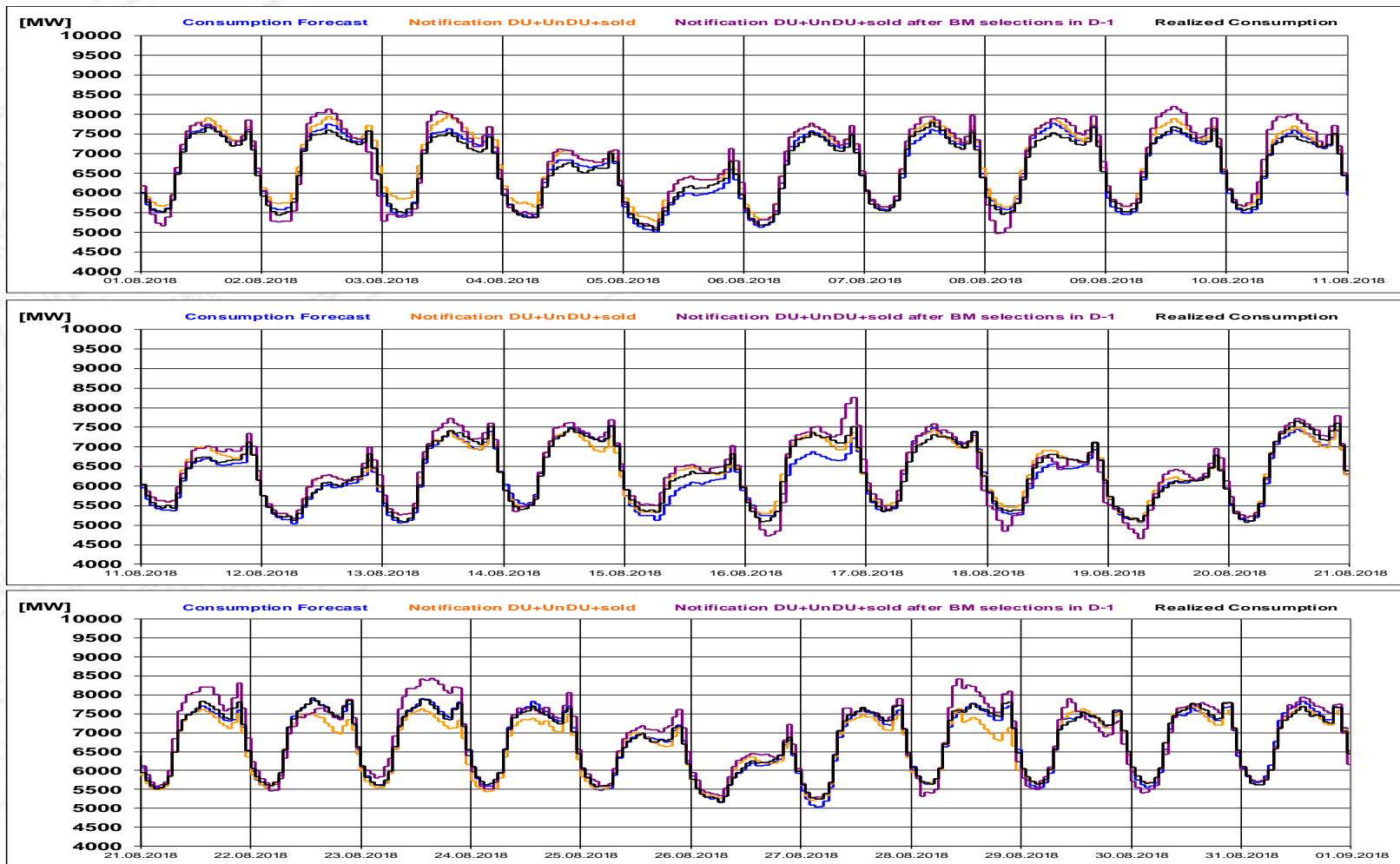
Upward regulation - selected quantities [MWh]



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

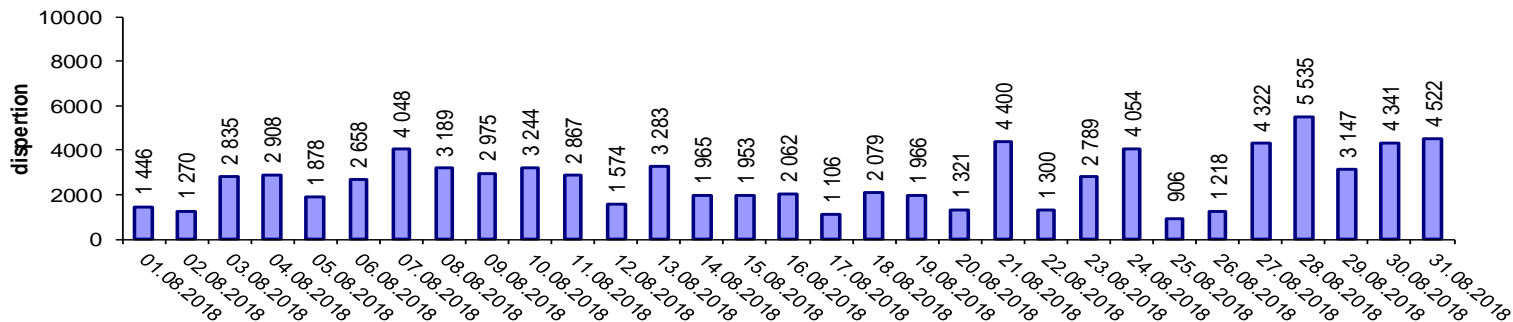


Realized consumption. forecast. notifications. notifications after BM selections in D (end of delivery day)

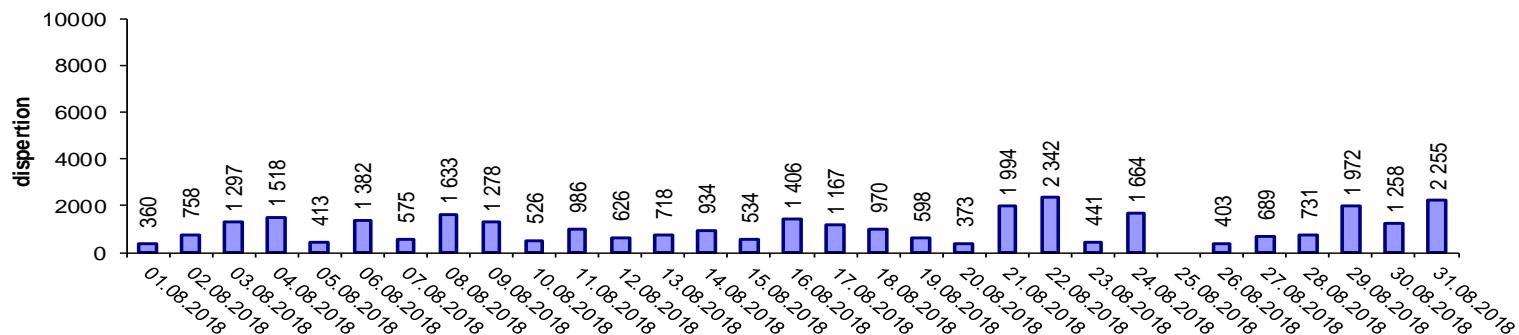


Indicators – Price Volatility for Secondary Regulation

Price Volatility for Secondary Upward Regulation



Price Volatility for Secondary Downward Regulation



Volatility = price dispersion on studied interval:

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

Public

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