



Transelectrica®
Societate Administrată în Sistem Dualist

MARKET MONITORING REPORT

Balancing Market

March 2022

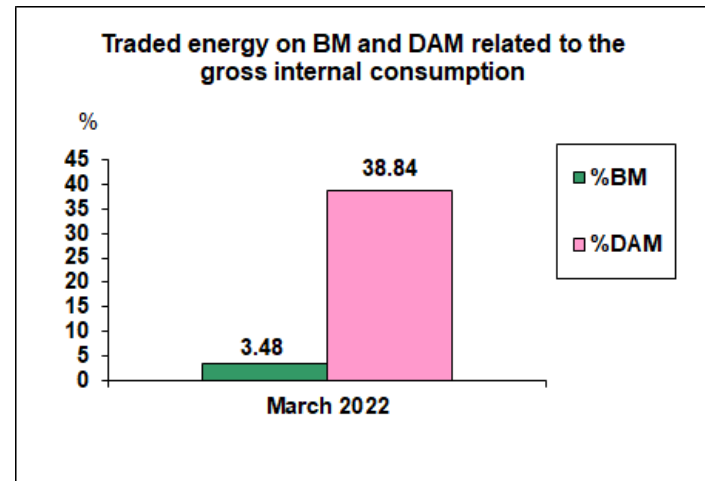
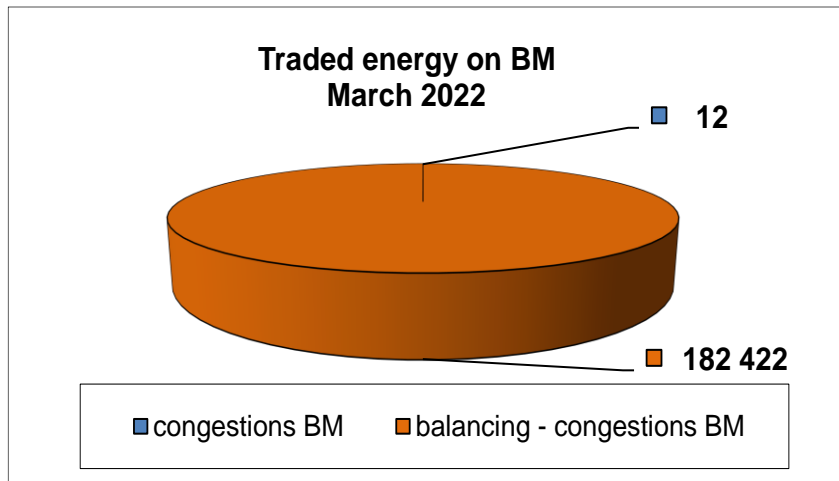
ANRE - Romanian Energy Regulatory Authority
HHI - Herfindahl-Hirschman Index
BRP - Balance Responsible Party
BM - Balancing Market
DAM - Day Ahead Market
TSO - Transmission System Operator
DU – Dispatchable Unit
PN – Physical Notification
NDC - National Dispatching Center
C1 – The market share of the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

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 6 475 MW and the actual internal gross consumption was 7 057 MW.
- The NDC consumption forecast was close to the actual consumption, the standard deviation being **1.74%**. 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 **3.17%**. The greatest daily deviation regarding the notifications was registered on the 27th of March (**7.21%**).
- The energy used in March 2022 for balancing the power system and congestion management was 182 434 MWh (with an average power of 246 MW, which means **3.48%** from the internal gross consumption). The energy used for congestion management was 12.12 MWh (with an average power of 0.02 MW, which means 0.0002% from the internal gross consumption).
- There were no transactions outside BM (with financial compensation).
- The energy used in March 2022 on Day Ahead Market was 2 036 469 MWh (with an average power of 2 741 MW, which means **38,84%** from the internal gross consumption). Data are shown in EET hours.
- The total cost of the energy traded on the Balancing Market was 211 125 690 lei (with an average weighted price of 1 157.27 lei/MWh. The cost of the energy paid by C.N.T.E.E. Transelectrica S.A. for congestion management was 3 224 lei.





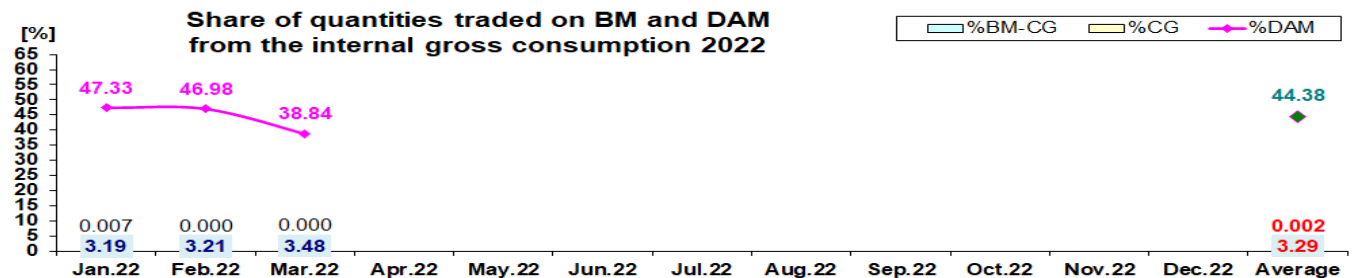
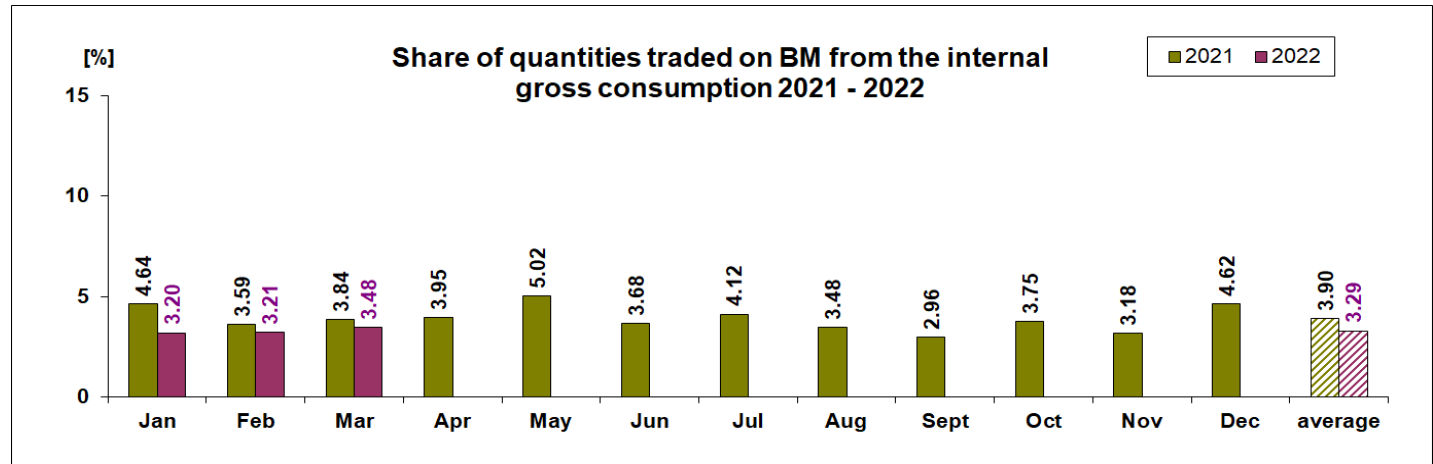
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Societate Administrată în Sistem Dualist

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).



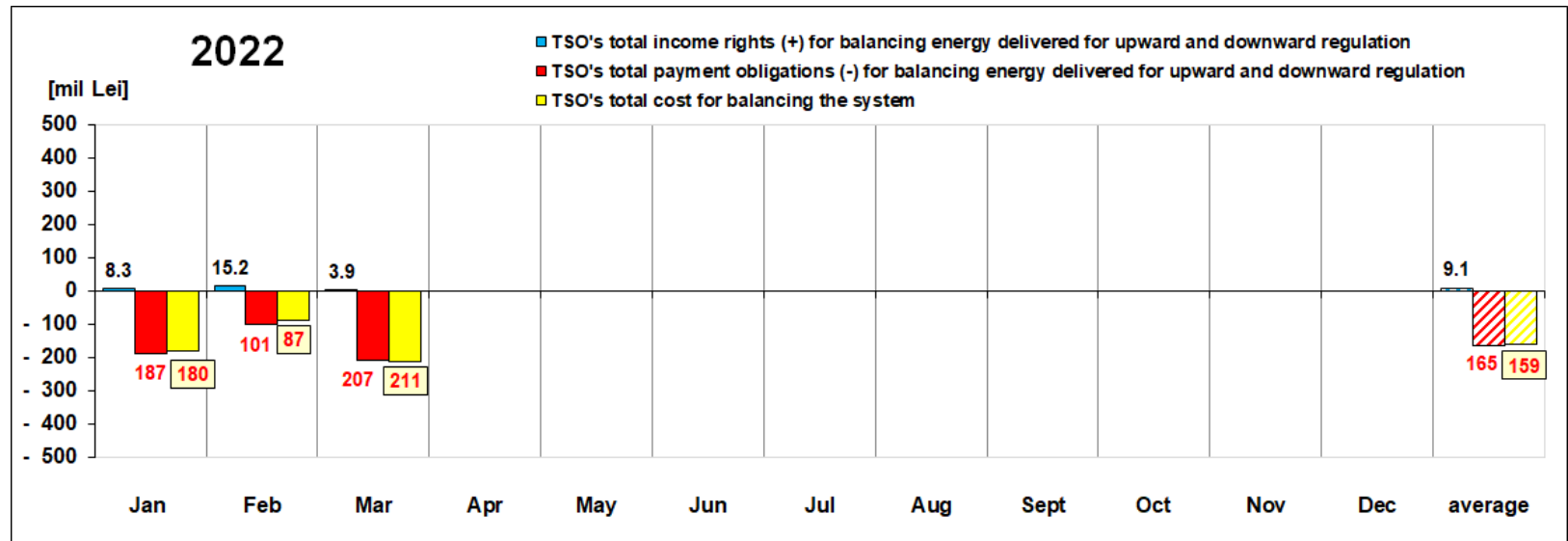
| | 2022 | | | | | | | | | | | | |
|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| | Jan.22 | Feb.22 | Mar.22 | Apr.22 | May.22 | Jun.22 | Jul.22 | Aug.22 | Sep.22 | Oct.22 | Nov.22 | Dec.22 | Average |
| %BM | 3.20 | 3.21 | 3.48 | | | | | | | | | | 3.29 |
| %DAM | 47.33 | 46.98 | 38.84 | | | | | | | | | | 44.38 |
| %CG | 0.01 | 0.00 | 0.00 | | | | | | | | | | 0.0024 |
| %BM-CG | 3.191 | 3.206 | 3.479 | | | | | | | | | | 3.292 |
| % outside BM | 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 | 8 344 244 | 15 164 350 | 3 932 020 | | | | | | | | | | 9 146 871 | 27 440 613 |
| | payments (-) prices < 0 | - 40 999 | - 12 132 | - 96 136 | | | | | | | | | | - 49 755 | - 149 266 |
| TSO's payment obligations / income rights for balancing energy delivered for upward regulation | payments (-) prices ≥ 0 | -186 598 444 | -100 703 503 | -206 992 197 | | | | | | | | | | -164 764 715 | -494 294 145 |
| | incomes (+) prices < 0 | 0 | 0 | 0 | | | | | | | | | | 0 | 0 |
| TSO's total income rights (+) for balancing | | 8 344 244 | 15 164 350 | 3 932 020 | | | | | | | | | | 9 146 871 | 27 440 613 |
| TSO's total payment obligations (-) for | | -186 639 443 | -100 715 635 | -207 088 333 | | | | | | | | | | -164 814 470 | -494 443 411 |
| TSO's total cost for balancing the system | | -180 209 876 | -86 965 620 | -211 125 690 | | | | | | | | | | -159 433 729 | -478 301 186 |
| Value of transactions outside BM (with | | 0 | 0 | 0 | | | | | | | | | | 0 | 0 |
| Congestion Cost on BM | | - 157 055 | 0 | - 3 224 | | | | | | | | | | - 53 426 | - 160 279 |
| Congestion Cost outside BM | | 0 | 0 | 0 | | | | | | | | | | 0 | 0 |

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

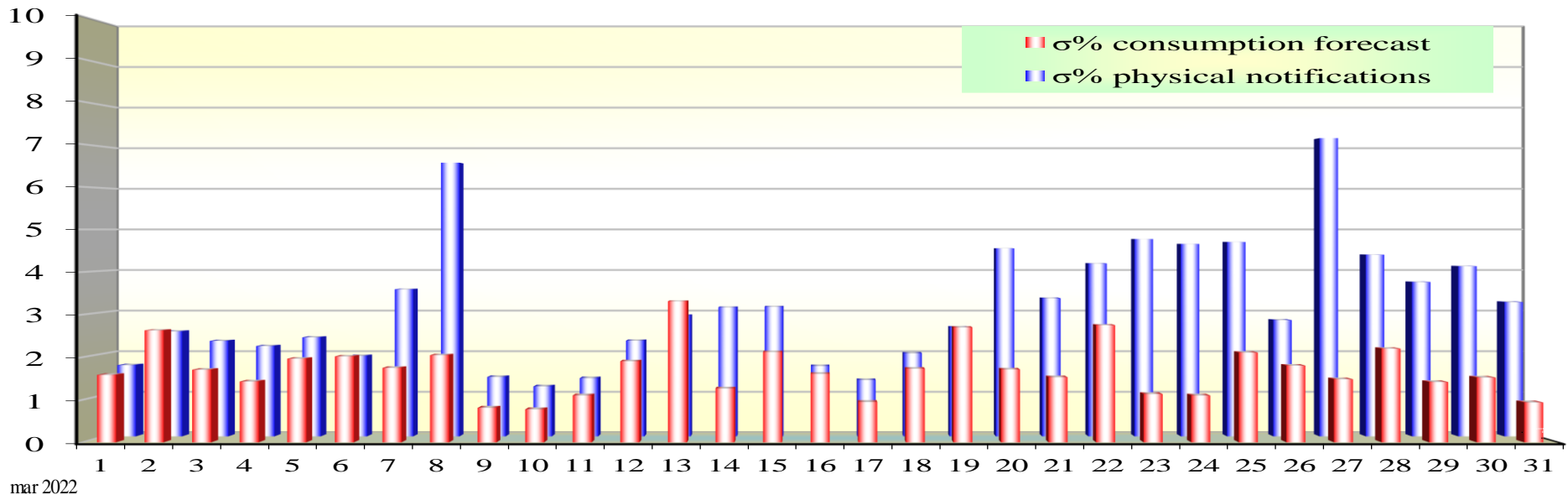
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Balancing Market

Standard deviation of physical notifications and consumption forecast against the actual consumption in March 2022



| 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 | 1.58 | 2.63 | 1.70 | 1.43 | 1.96 | 2.02 | 1.75 | 2.05 | 0.81 | 0.77 | 1.10 | 1.90 | 3.31 | 1.26 | 2.12 | 1.61 | 0.95 | 1.73 | 2.70 | 1.71 | 1.53 | 2.75 | 1.13 | 1.10 | 2.11 | 1.80 | 1.48 | 2.20 | 1.42 | 1.52 | 0.94 |
| σ% physical notifications | 1.72 | 2.54 | 2.31 | 2.18 | 2.39 | 1.94 | 3.55 | 6.61 | 1.43 | 1.21 | 1.41 | 2.31 | 2.92 | 3.12 | 3.13 | 1.70 | 1.36 | 2.01 | 2.64 | 4.54 | 3.34 | 4.18 | 4.77 | 4.65 | 4.70 | 2.81 | 7.21 | 4.39 | 3.73 | 4.11 | 3.24 |

σ_{average} % consumption forecast = 1.71

σ_{average} % physical notifications = 3.17

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

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

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 66 BRPs, 95 market participants, holding 187 commercially operating dispatchable units. Starting with the 15th of March 2022, VIERU dispatchable production unit, belonging to BMP SIMICO PROD FACTORY S.R.L. (30XROSIMICOPF--I), was removed from the DU list as a result of the separation into three production units of 2 MW each, and BMP SIMICO PROD FACTORY S.R.L. (30XROSIMICOPF--I) withdrew as a BMP.

March 2022

Downward Regulation

| Downward Regulation | Prices | | | Quantities | | | Participants | | | | | | |
|---------------------|-----------|-----------|-----------|------------|-----------|-----------|--------------|------------|----------------------|------------|------------|------------|------|
| | Weighted | | | | Actually | | C1 | | C3 | | HHI | HHI | |
| | Average | Maximum | Minimum | Selected | Delivered | Deviation | | | | | | (actually | |
| | | | | | | | Number | (selected) | (actually delivered) | (selected) | (selected) | delivered) | |
| | [lei/MWh] | [lei/MWh] | [lei/MWh] | [MWh] | [MWh] | [%] | | | | | | | |
| Secondary | 0.04 | 0.10 | -10.00 | 31987.13 | 31987.13 | 0.00% | 2 | 73.67% | 100% | 73.67% | 100% | 6120 | 6120 |
| Fast Tertiary | 53.68 | 300.00 | -165.00 | 76842.99 | 73816.19 | 3.94% | 7 | 52.96% | 98.38% | 52.15% | 98.35% | 4321 | 4299 |
| Slow Tertiary | 0.50 | 0.50 | 0.50 | 358.00 | 352.17 | 1.63% | 4 | 47.77% | 99.44% | 46.93% | 99.43% | 4437 | 4430 |
| | | | | 109188.12 | 106155.50 | 2.78% | | | | | | | |

Upward Regulation

| | Prices | | | Quantities | | | Participants | | | | | | |
|---------------|---------------------|-----------|-----------|------------|-----------------------|-----------|--------------|------------|----------------------|------------|------------|--------------------------------|------|
| | Weighted Average | Maximum | Minimum | Selected | Actually Delivered | Deviation | C1 | C3 | C1 | C3 | HHI | HHI (actually delivered) | |
| | [lei/MWh] | [lei/MWh] | [lei/MWh] | [MWh] | [MWh] | [%] | Number | (selected) | (actually delivered) | (selected) | (selected) | (actually delivered) | |
| Secondary | 3671.13 | 5000.00 | 3500.00 | 22366.07 | 22366.07 | 0.00% | 2 | 72.51% | 100% | 72.51% | 100% | 6014 | 6014 |
| Fast Tertiary | 2316.69 | 3736.00 | 484.59 | 54521.23 | 53912.81 | 1.12% | 7 | 90.24% | 95.88% | 90.29% | 95.91% | 8167 | 8175 |
| Slow Tertiary | - | - | - | 0.00 | - | - | 0 | - | - | - | - | - | - |
| | | | | 76887.29 | 76278.87 | 0.79% | | | | | | | |



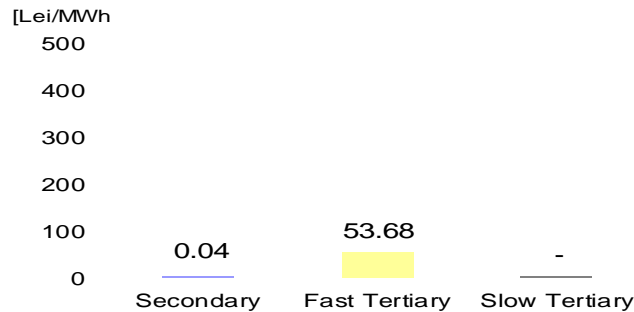
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Balancing Market

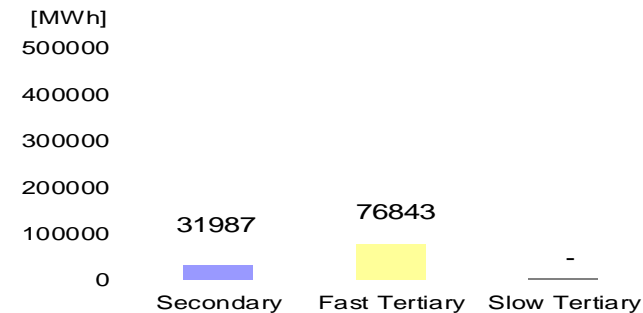
Balancing energy – Selected prices and quantities in March 2022

March 2022

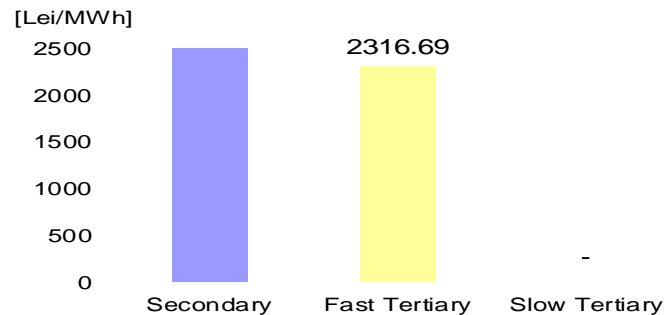
Downward regulation - average price [lei/MWh]



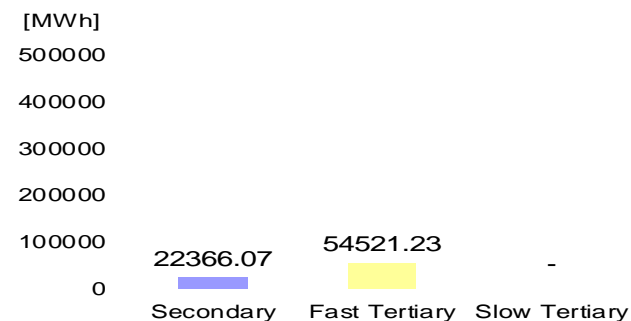
Downward regulation - selected quantities



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 .

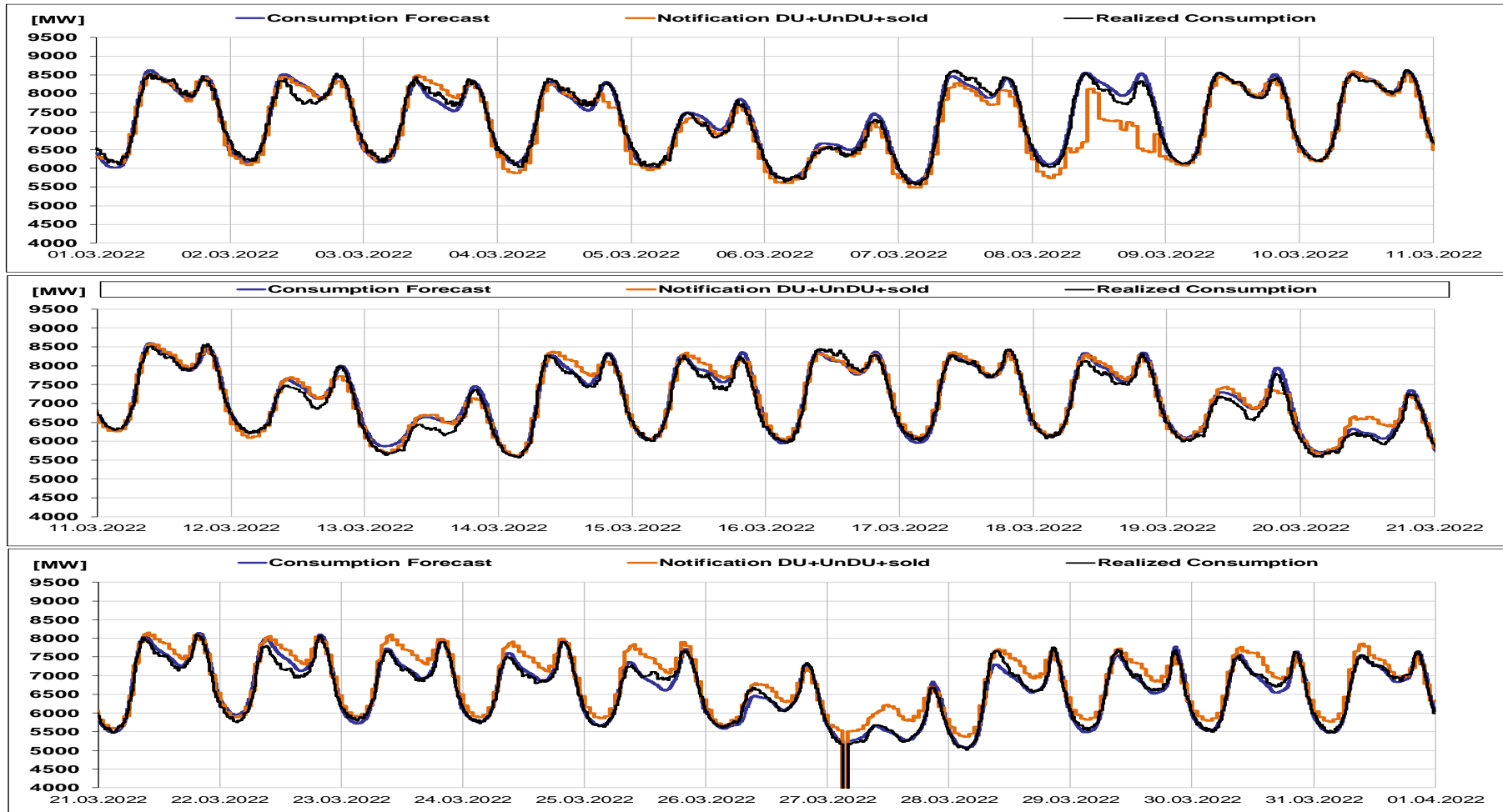


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Balancing Market

Realized consumption, forecast, notifications in D-1



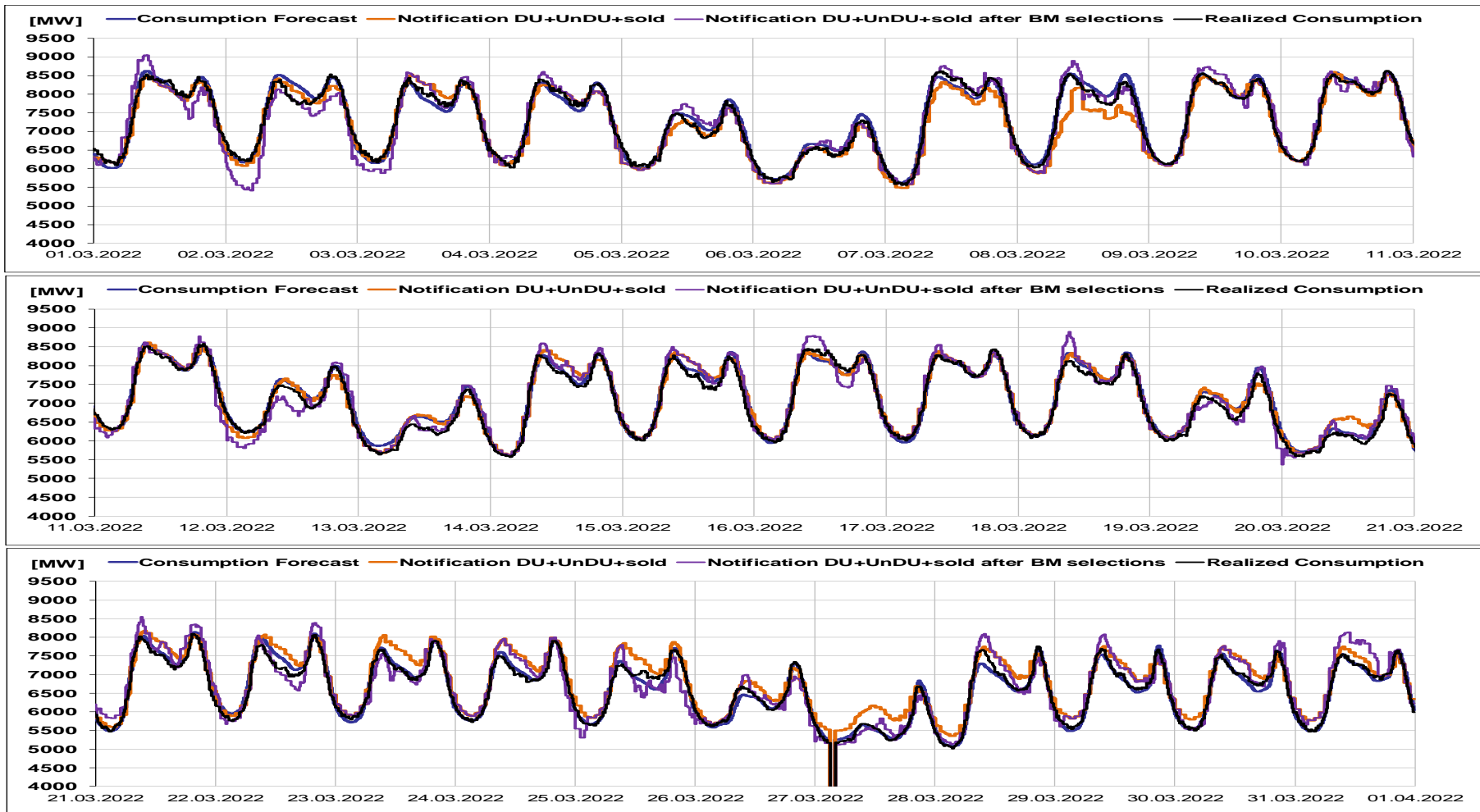


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Balancing Market

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



Balancing Market

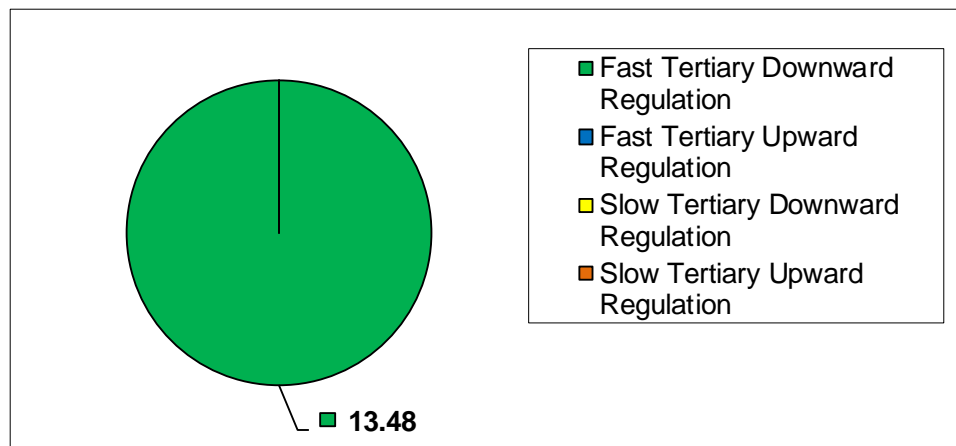
Congestion Management

March 2022

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

| Quantities [MWh] | | Participants |
|-------------------|-----------------------|--------------|
| Selected [MWh] | Actually Delivered | Number |
| 13.48 | 12.12 | 2 |
| 0.00 | - | 0 |
| 0.00 | - | 0 |
| 0.00 | - | 0 |
| 0.00 | - | 0 |
| 13.48 | 12.12 | |

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.



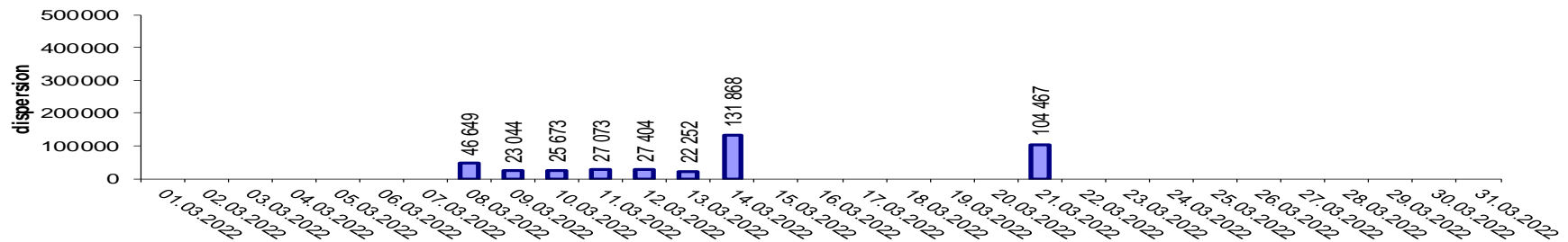
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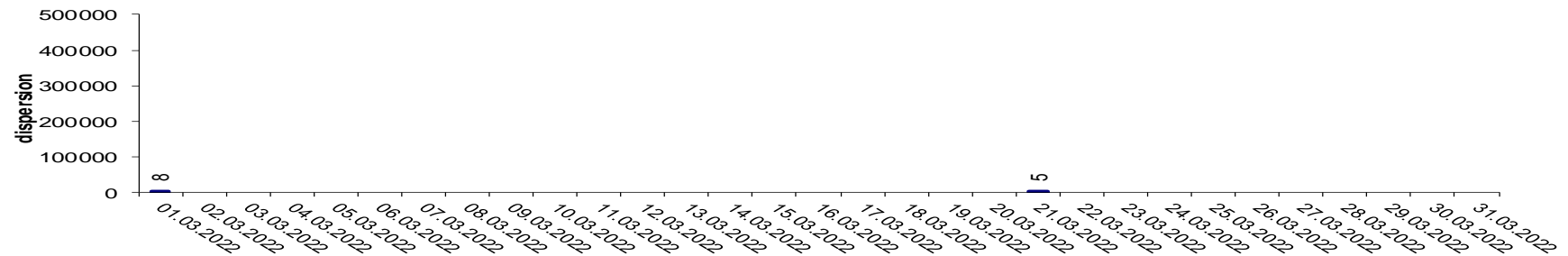
Balancing Market

Indicators – Price Volatility for Secondary Regulation

Price Volatility for Secondary Upward Regulation



Price Volatility for Secondary Downward Regulation



Volatility = price dispersion on studied interval:

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



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