

DOI: <https://doi.org/10.15407/techned2019.05.060>

SIMULATION MODEL OF DAY AHEAD MARKET WITH IMPLICIT CONSIDERATION OF POWER SYSTEMS NETWORK CONSTRAINTS

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 5, 2019 (September/Oktobor)
Pages	60 – 67

Authors

O.V. Kyrylenko^{1*}, I.V. Blinov^{1}, Ye.V. Parus^{1***}, H.A. Ivanov²**

¹- Institute of Electrodynamics National Academy of Sciences of Ukraine,
pr. Peremohy, 56, Kyiv, 03057, Ukraine,
e-mail: paruseugene@gmail.com

²- SE "Enerhorynok",
str. Symona Petliury, 27, Kyiv, 01032, Ukraine

* ORCID ID : <http://orcid.org/0000-0003-3610-7670>

** ORCID ID : <http://orcid.org/0000-0001-8010-5301>

*** ORCID ID : <http://orcid.org/0000-0001-9087-3902>

Abstract

The approaches to solving the problem of taking into account network constraints in the "day-ahead" markets are described in the context of the liberalization of interstate electricity trade and further integration of the Ukrainian electricity market with the corresponding European markets. The features of pricing modeling in this market segment are shown. The requirements for the main methods of market price forming are determined based on the results of solving the problem of finding the optimal hourly volumes of electrical energy exchange between price zones. The architecture and mathematical apparatus of simulation tools for the main functions of the "day ahead" market are proposed. The simulation results are present confirming the performance of the proposed solutions. The results of the assessment of the influence of the

ancillary services market on the electricity price in the day-ahead market segment are shown in terms of the reservation of production capacities due to requirements of the regulation of the IPS Ukraine electrical regime. According to the analysis of the prospects for interstate electricity trade in Ukraine, Hungary and Romania, the export potential of Ukrainian power plants was confirmed. The problematic aspects of IPS of Ukraine coupling with European energy systems in the “day-ahead” market segments were noted. References 8, figures 5.

Key words: day-ahead market, network constraints, simulation modeling, electricity market, mathematical modeling.

Received: 21.05.2019

Accepted: 27.05.2019

Published: 01.08.2019

References

1. On Electricity Market: The Law of Ukraine of 13.04.2017 No 2019-VIII. (Ukr) URL: <http://zakon3.rada.gov.ua/laws/show/2019-19> . (accessed 23.05.2019).
2. On approval of market rules a day ahead market and intraday market: Decree of National Commission for the State Regulation Energy and utilities from 14.03.2018 No 308. (Ukr) URL: <https://zakon.rada.gov.ua/laws/show/v0308874-18> (accessed 23.05.2019).
3. EuroPEX Position Paper on Cross-Border Congestion Management and Market Coupling. 6th of October, 2006. URL: <https://www.europex.org/wp-content/plugins/download-attachments/includes/download.php?id=675> (accessed 23.05.2019).
4. Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management. *Official Journal of the European Union*. 2015. Vol. 58. Pp. 24–72. URL: <https://publications.europa.eu/en/publication-detail/-/publication/b91aa370-3293-11e5-9f85-01aa75ed71a1/language-en> (accessed 23.05.2019).
5. Basagoiti P., Gonzalez J.J., Alvarez M. An algorithm for the decentralized market coupling problem. *Electricity Market*. 2008. EEM 2008. *5th International Conference on European*. Lisboa, Portugal. 28-30 May, 2008. URL: [http://oa.upm.es/4174/1/INVE MEM 2008 58764.pdf](http://oa.upm.es/4174/1/INVE_MEM_2008_58764.pdf) (accessed 23.05.2019). DOI:

<https://doi.org/10.1109/EEM.2008.4579046>

6. EUPHEMIA Public Description Single Price Coupling Algorithm. NEMO Committee, 2019. 55 p. URL: <https://www.nordpoolspot.com/globalassets/download-center/pcr/euphemia-public-description.pdf> (accessed 23.05.2019).
7. Blinov I.V., Parus Ye.V. Congestion management and minimization of price difference between coupled electricity markets. *Tekhnichna Elektrodynamika*. 2015. No 4. Pp. 81-88. (Ukr)
8. Kyrylenko O.V., Blinov I.V., Parus Ye.V. Balancing electricity market of Ukraine and his mathematical model. *Tekhnichna Elektrodynamika*. 2011. No 2. Pp. 36-43. (Ukr)

[PDF](#)