DOI: https://doi.org/10.15407/techned2019.01.0_68

JUSTIFICATION FOR USE OF VOLTAGE CLASS 20 KV IN URBAN ELECTRICAL NETWORKS

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 1, 2019 (January/February)
Pages	68 – 71

Authors

R.O. Buinyi^{1*}, A.V. Krasnozhon¹, V.V. Zorin^{2}, A.O. Kvytsynskyi³**

¹ – Chernihiv National University of Technology,
str. Shevchenka, 95, Chernihiv, 14035, Ukraine,
e-mail: buinyiroman@gmail.com

² – NTUU «I. Sikorsky Kyiv Polytechnic Institute»,
pr. Peremohy, 37, Kyiv, 03056, Ukraine,
e-mail: vla.vla.zo@gmail.com

³ – Research & design center for development of the IPS of Ukraine,
str. Dorohozhytska, 11/8, Kyiv, 04111, Ukraine,
e-mail: Kvytsynskyi.AO@ua.energy

* ORCID ID : <http://orcid.org/0000-0002-5432-2924>

** ORCID ID : <http://orcid.org/0000-0001-5913-401X>

Abstract

For biradial power supply networks it was derived an objective function that allows to analyze

the effect of technological and economic factors on the efficiency of power supply. It was found that utilizing the voltage class of 20 kV in the urban power supply networks would be efficient only when they are constructed with transformers of unit capacity 630 kVA and aluminum cables of 240 mm² or larger cross-section. Analytic expressions were derived and visualizations were created to analyze minimal specific density of electric load and maximum distance between electric substations for which construction of power supply network of 20 kV is justified as a function of allowed outage time for the network.

References 6, figure 3.

Key words: power supply network, biradial structure, economic efficiency, integral effect, payback period, objective function, power loss.

Received: 02.03.2018

Accepted: 18.05.2018

Published: 10.01.2019

References

1. Astashev D.S., Bedretynov R.Sh., Kysel D.A., Sosnyna E.N. 20 kV Voltage Applling of Russian Electric Distribution Networks. *Vestnyk NHIEI*. 2015. No 4(47). Pp. 6-9. (Rus)
2. Buinyi R., Perepechenyi V., Zorin V. Regression relationships for costs of facilites in electrical power networks 10-35 kV. *Visnyk NTU KhPI*. Series: New solutions in modern technologies. 2017. No 7 (1229). Pp.18–23. DOI: <https://doi.org/10.20998/2413-4295.2017.07.03>. (Ukr)
3. Zorin V.V., Shtogryn E.A., Buinyi R.O. Electrical power networks and systems. Nizhyn: Aspekt-Poligraf, 2011. 248 p. (Ukr)
4. Liakh V.V., Palaida O.B. Questions need to move to 20 kV voltage class or question unanswered. *Enerhetyka ta elektryfikatsiia*. 2016. No 9-10. Pp. 3-4. (Ukr)

5. Tsyhanenko B.V., Kyryk V.V. Linguistic Model of Criterion of Transfer of Distributive Network on Voltage 20 kV. *Visnyk Vinnytskoho politekhnichnoho instytutu*. 2016. No 5. Pp. 58-67. (Ukr)
6. Borscevskis O., Gavrilovs G. 20kV Voltage Adaptation Problems in Urban Electrical Networks. URL: <http://egdk.ttu.ee/> (accessed 26.09.2017).

[PDF](#)