

# Economic Justification of Electrification of Hydrocarbon Production Facilities

O.A. Marinina<sup>1</sup>, St. Petersburg Mining University (Mining University), Assoc. Prof. PhD (Ec.)

A.R. Nechitaylo<sup>2</sup>, JSC Flag Alfa

G.A. Stroykov<sup>3</sup>, Mining University, PhD (Ec.)

A.Yu. Tsvetkova<sup>3</sup>, Mining University, Assoc. Prof. PhD (Ec.), Tsvetkova\_AYu@pers.spmi.ru

E.A. Reshneva<sup>4</sup>, Mining University, PhD (Ec.)

L.G. Turovskaya<sup>3</sup>, Mining University, Assoc. Prof. PhD (Tech.)

<sup>1</sup> Head of Department, St. Petersburg, Russia

<sup>2</sup> Design Engineer, St. Petersburg, Russia

<sup>3</sup> Associate Professor of Department, St. Petersburg, Russia

<sup>4</sup> Assistant of Department, St. Petersburg, Russia

**Citation:** Marinina O.A., Nechitaylo A.R., Stroykov G.A., Tsvetkova A.Yu., Reshneva E.A., Turovskaya L.G. Economic Justification of Electrification of Hydrocarbon Production Facilities, *Kompetentnost' / Competency (Russia)*, 2024, no. 4, pp. 50–57. DOI: 10.24412/1993-8780-2024-4-50-57

## key words

renewable energy sources, circular economy, resource efficiency

The relevance of the issue of technical and economic assessment of options for optimizing projects of electrification of hydrocarbon production facilities is due to the increasing need for the development of new fields in undeveloped and hard-to-reach territories, which necessitates the construction of large volumes of energy infrastructure facilities and requires new solutions in the field of increasing the energy efficiency and reducing the capital intensity of projects. Based on the calculations made and the analysis carried out, it can be concluded that the use of an autonomous energy complex based on wind generation as an alternative to standard electrification provides savings 2.58 roubles per square hour of energy used.

## References

1. Vasil'ev Yu.N., etc, *Russian economic online magazine*, 2023, no. 2. EDN. KRFMTE.
2. Ilyushin Y.V., *Energies*, 2022, vol. 15; <https://doi.org/10.3390/en15176462>.
3. Fetisov V.G., Ilyushin Y.V., Vasilev G.G., etc; <https://doi.org/10.1038/s41598-023-29570-4>.
4. Romanov M.T. Territorial organization of the economy of poorly developed regions (on the example of the Russian Far East), *Abs. diss. ... PhD (Geol.)*, Vladivostok, Pacific Institute of Geography of FEB of RAS, 2007.
5. Surzhikova O.A., *Vectors of well-being. Economy and society*, 2012, no. 3(4); <https://cyberleninka.ru/article/n/problemy-i-osnovnye-napravleniya-razvitiya-elektronsabzheniya-udalennyyh-i-malonaselennyh-potrebiteley-rossii>.
6. Kirsanova I.Yu., *Science and technology of pipeline transportation of oil and petroleum products*, 2021, vol. 11, no. 6; <https://doi.org/10.28999/2541-9595-2021-11-6-652-659>.
7. Kirsanova N.Yu., Lenkovets O.M., *North and market. Formation of an economic order*, 2022, no. 1. DOI: 10.37614/2220-802X.1.2022.75.004.
8. Pan'kov I.A., Frolov V.Ya., *Notes of Mining Institute*, 2017, vol. 227. DOI: 10.25515/pmi.2017.5.563.
9. Sychev Yu.A., Zimin R.Yu., *Notes of Mining Institute*, 2021, vol. 247; <https://doi.org/10.31897/PMI.2021.1.14>.
10. Sychev Y.A., Aladin M.E., Aleksandrovich S.V., *International Journal of Power Electronics and Drive Systems*, 2022, vol. 13(3); <http://doi.org/10.11591/ijped.v13.i3.pp1625-1634>.
11. Stroykov G.A., Cherepovitsyn A.Y., Iamshchikova E.A., *Resources*; <https://doi.org/10.3390/resources9110130>.
12. Nechitaylo A.R., Marinina O.A., *North and market. Formation of an economic order*, 2022, no. 2. DOI: 10.37614/2220-802X.2.2022.76.004.
13. Petrochenkov A., etc, *Sustainability*, 2022, vol. 14; <https://doi.org/10.3390/su14010299>.
14. Turysheva A.V., Gulkov Y.V., Krivenko A.V., *Proceedings of the Topical Issues of Rational Use of Natural Resources*, St. Petersburg, 2019, no. 1. DOI: 10.1201/9781003014577-56.
15. Leusheva E.L., Morenov V.A., *Neftyanoe Khozyaystvo — Oil Industry*, 2017, no. 7. DOI: 10.24887/0028-2448-2017-7-104-106.
16. Belsky A.A., etc, *Renewable and Sustainable Energy Reviews*, 2022, vol. 159. DOI: 10.1016/j.rser.2022.112239.
17. Zimin R.Y., Kuchin V.N., *Materials of FarEastCon*, 2020. DOI: 10.1109/FarEastCon50210.2020.9271103.
18. Abramovich B.N., Bogdanov I.A., *Notes of Mining Institute*, 2021, vol. 249; <https://doi.org/10.31897/PMI.2021.3.10>.
19. Riboldi L., etc, *Chemical Engineering Transactions*, 2017, vol. 61. DOI: 10.3303/CET176126.
20. Ostroukh A., etc, *Proceedings of the Transportation Research Procedia*, 2021, vol. 57. DOI: 10.1016/j.trpro.2021.09.064.
21. Shklyarskiy Y., Starshaya V., *E3S Web of Conferences*, 2021, vol. 266(2); <https://doi.org/10.1051/e3sconf/202126604006>.
22. Fedak W., etc, *Journal of Sustainable Development of Energy Water and Environment Systems*, 2017, no. 5(4); <https://doi.org/10.13044/jsdewes.d5.0160>.
23. Kozhevnikov D. Vostok Oil may become the main consumer of wind energy, 2020; <https://www.gazetazp.ru/>.
24. Governor of the Yamalo-Nenets Autonomous Okrug Resolution of 28.04.2021 N 65-PG On approval of the scheme and program for the long-term development of the electric power industry of the Yamalo-Nenets Autonomous Okrug for the period 2022–2026; <https://oemz.ru/ru/katalog>.
25. GC Vympel; <https://vympel.group>.
26. Information portal GIS renewable energy sources of Russia; <https://gisre.ru/>.
27. Typical power supply schemes; <https://yandex.ru/images/search?text=Executive%20scheme%20support%20vl%20110%20kv&source=related-duck&lr=2>.
28. Working draft power supply of installations for pumping operation of oil wells; <https://stroystandart.info/index.php?name=files&op=view&id=4757>.
29. Power supply to oil industry enterprises; <https://www.2d-3d.ru/2d-galereia/electro/7003-jelektrosabzhenie-predprijatija-neftjanoj-promyshlennosti-variant-9.html>.
30. SP 20.13330. SNIП 2.01.07–85 Loads and impacts, 2016.