

DIRECTIONS FOR THE DEVELOPMENT OF COKE AND NON-COKE METALLURGY© V.Ye. Khaustova¹, M.O. Kyzym², Ye.I. Kotlyarov³*Research Centre for Industrial Development Problems of the National Academy of Sciences of Ukraine (RCIDP of NASU), 611661, Kharkiv, 1a Inzhenerny Lane, Ukraine***I.V. Shulga⁴***STATE ENTERPRISE 'UKRAINIAN STATE RESEARCH INSTITUTE FOR CARBOCHEMISTRY (UKHIN)', 61023, Kharkiv, 7 Vesnina St., Ukraine*¹ Khaustova Viktoriya Yevgenivna, Doctor of Economics, Prof., Director, e-mail: v.khaust@gmail.com² Kyzym Mykola Oleksandrovych, Doctor of Economics, Prof., Corresponding Member of the National Academy of Sciences of Ukraine, Chief Researcher, e-mail: m.kyzym@gmail.com³ Kotlyarov Yevgen Ivanovich, Ph.D. in Economic Sciences, Associate Professor, Head of the Economic Security and Energy Conservation Sector, e-mail: ekotlarov@i.ua⁴ Shulga Igor Volodymyrovych, Ph.D. in Technical Sciences, Associate Professor, Senior Researcher, Head of the Coke Department, e-mail: ko@ukhin.org.ua

The article is devoted to a comparison of possible directions for the development of the metallurgical sector of the Ukrainian economy.

It has been shown that well-founded scientific and practical proposals for the post-war restoration of Ukraine's metallurgical industry based on green technologies: direct reduction of iron and production of alloys with specified properties in electric furnaces. Hydrogen-enriched generator gas from coal is proposed as a reducing agent. The source of energy for electric furnaces and enrichment of generator gas with electrolytic hydrogen is electricity from the utilization of the enthalpy of the generator gas obtained. Coke production will retain its importance for the production of ferroalloy coke and, possibly, blast furnace coke for smelting cast iron. At the same time, the production of coke in furnaces without the capture of chemical products is promising, which, unlike coking in regenerative furnaces under excess pressure, is carried out in furnace chambers under vacuum, which significantly reduces emissions of pollutants into the environment. The use of hydrogen to recover metals from ores will also significantly reduce greenhouse carbon dioxide emissions. Low-metamorphosed coal (brown, long-flamed and gas) is most suitable for chemical and technological processing. The destruction of most coal-fired power generation has led to a surplus of coal mined in Ukraine. Therefore, the development of metallurgy based on the use of low-metamorphic coal will not only provide the country with high-quality metal products, but also preserve the coal mining industry and, moreover, create new opportunities for its development, ensuring stable sales of products and profitable operations.

Keywords: green metallurgy, direct iron reduction, low-metamorphosed coal, coal gasification, coking, coke ovens, chemical product capture, two-product coking.

Corresponding author: I.V. Shulga, e-mail: ko@ukhin.org.ua

Manuscript received 2025/09/08
Accepted for publication 2025/09/29
Published 2025/10/20