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Prospects of Algae-Based Biofuel Production for the Development of a Carbon-Neutral Economy

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ABSTRACT

In the context of aggravation of the climate agenda and continuing instability in the global energy market, the diversification of the energy structure in favour of innovative and low-carbon technologies and resources, among which bioenergy occupies a special place, is becoming an urgent area of the countries' strategies. According to the Global Bioenergy Statistics Report 2024, biofuels, including bioethanol, biodiesel, biochar and biogas, account for about 9% of global energy production, which is characterised by low greenhouse gas emissions and high energy efficiency. Taking into account the current trends in the development of bioenergy technologies and its potential to address the climate agenda, this study analyses the possibilities of implementing biocarbon projects and provides an economic assessment of alternative options for biomass production with a focus on the production of third-generation biofuels based on seaweed. The object of special attention is the systematisation of technologies and infrastructural conditions for scaling up third-generation bioenergy, including for diversification of the global energy balance and development of a carbon-neutral economy. As one of the key results of the study, recommendations on the formation of institutional and infrastructural environment for achieving commercial feasibility and effective scaling of biocarbon projects have been developed.

Keywords: bioenergy, biofuels, biocarbon project, carbon-neutral economy, assessment of economic efficiency

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