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DEVELOPMENT OF RECOMMENDATIONS AND PROPOSALS FOR INCREASING THE INTRODUCTION OF NEW GENERATING CAPACITIES IN THE FIELD OF RENEWABLE ENERGY IN UKRAINE

РОЗРОБКА РЕКОМЕНДАЦІЙ ТА ПРОПОЗИЦІЙ ЩОДО ЗБІЛЬШЕННЯ ВВЕДЕННЯ НОВИХ ГЕНЕРУЮЧИХ ПОТУЖНОСТЕЙ У СФЕРІ ВІДНОВЛЮВАЛЬНОЇ ЕНЕРГЕТИКИ В УКРАЇНІ

Abstract. This article explores strategic, technological, and socio-economic aspects of renewable energy development in Ukraine. Emphasis is placed on new generating capacities as a foundation for energy independence, resilience, and European integration. The study analyzes the current state of renewables, highlights systemic barriers, and proposes recommendations combining regulatory, financial, infrastructural, and social measures. Special attention is given to grid

modernization, decentralization of production, and mobilization of domestic and international investment. The novelty lies in a holistic approach that integrates technical solutions with socio-political strategies, offering a roadmap for Ukraine's sustainable energy transition. Ref. 5.

Keywords: renewable energy, generating capacities, energy transition, energy independence, grid modernization, decentralization.

Анотація. У цій статті досліджуються стратегічні, технологічні та соціально-економічні аспекти розвитку відновлюваної енергетики в Україні. Акцент робиться на нових генеруючих потужностях як основі енергетичної незалежності, стійкості та європейської інтеграції. У дослідженні аналізується поточний стан відновлюваних джерел енергії, висвітлюються системні бар'єри та пропонуються рекомендації, що поєднують регуляторні, фінансові, інфраструктурні та соціальні заходи. Особлива увага приділяється модернізації мережі, децентралізації виробництва та мобілізації внутрішніх та міжнародних інвестицій. Новизна полягає в цілісному підході, який інтегрує технічні рішення із соціально-політичними стратегіями, пропонуючи дорожню карту для переходу України до сталого енергоспоживання. Бібл. 5.

Ключові слова: відновлювальна енергія, генеруючі потужності, енергетичний перехід, енергетична незалежність, модернізація мережі, децентралізація.

Introduction. The global energy system is undergoing a profound transformation, driven by climate change, geopolitical instability, and rapid technological innovation. Renewable energy sources (RES) have become central to modern energy strategies worldwide. For Ukraine, the transition to RES is not only an environmental necessity but also a matter of national security and survival. Wartime destruction of conventional infrastructure and dependence on imported fossil fuels have revealed deep vulnerabilities that threaten economic stability and political sovereignty.

Ukraine possesses significant renewable potential: high solar irradiation in central and southern regions, favorable wind corridors along the Black and Azov Seas, abundant agricultural residues for biomass and biogas, and opportunities for small hydropower in mountainous areas. Yet, despite this resource base, the pace of renewable integration remains slow and fragmented [1, 2].

This study addresses the gap by analyzing the current state of RES development, identifying systemic barriers, and proposing pathways for expanding new generating capacities. The relevance of the research lies in its contribution to strengthening Ukraine's energy independence, resilience, and alignment with European integration processes.

The purpose and objectives of the research. The purpose of this study is to develop a comprehensive framework for accelerating renewable energy deployment in Ukraine, with particular emphasis on expanding new generating capacities and strengthening energy independence.

To achieve this goal, the article analyzes the current state and dynamics of renewable energy development, identifies systemic barriers to integration, and assesses technological, financial, and regulatory challenges. It also formulates recommendations for grid modernization, decentralization of energy production, and mobilization of investment, while exploring opportunities for international cooperation and alignment with European energy standards.

Research materials and results. Over the past decade, Ukraine has achieved uneven progress in RES development. Solar power grew rapidly between 2015–2020 due to favorable tariffs, but regulatory instability slowed expansion. Wind projects in southern regions show promising capacity factors yet face grid connection and bureaucratic hurdles. Biomass and biogas remain underutilized despite strong agricultural potential, while small hydropower encounters environmental and financial constraints. Overall, RES share in Ukraine’s energy mix remains below European averages, highlighting the need for strategic planning. Key barriers include regulatory instability, limited financial instruments, outdated grid infrastructure, and geopolitical risks.

Challenges. The barriers to renewable energy expansion in Ukraine are complex and multifaceted.

Regulatory instability is perhaps the most critical. Frequent changes in legislation, tariff structures, and licensing procedures undermine investor confidence. Without long-term guarantees, both domestic and foreign investors hesitate to commit capital.

Financial barriers further constrain growth. Limited access to affordable credit, insufficient state-backed guarantees, and high interest rates make renewable projects financially risky. The absence of robust mechanisms for mobilizing private capital exacerbates the problem.

Grid limitations represent another major obstacle. Ukraine’s grid infrastructure is outdated and ill-equipped to handle decentralized and variable generation. Curtailments, inefficiencies, and losses are common, reducing the economic viability of renewable projects [3–5].

Geopolitical risks add another layer of complexity. The ongoing military conflict has damaged energy infrastructure, created uncertainty, and deterred investment. Political instability and corruption further erode trust in the system.

Recommendations. To overcome these challenges, a comprehensive strategy is required.

1. Establishing a stable regulatory framework. Long-term guarantees for investors, transparent tariff structures, and clear licensing procedures are essential. Regulatory stability will create a predictable environment conducive to growth.

2. Strengthening financial incentives. Tax benefits, green bonds, and mechanisms for public-private partnerships can mobilize capital and reduce investment risks. International financial institutions should be engaged to provide credit lines and guarantees.

3. Modernizing the grid. The development of smart grids, integration of energy storage systems, and digitalization of dispatching processes will enable efficient management of variable renewable generation. Investment in transmission infrastructure is critical to connect new projects to the grid.

4. Encouraging decentralization. Community-based projects, prosumer participation, and municipal energy cooperatives can democratize energy production and enhance local resilience. Decentralization reduces dependence on centralized infrastructure and empowers local communities.

Conclusions. Ukraine stands at a critical juncture in its energy transition. The country's renewable energy potential is vast, but its realization requires coordinated action across multiple domains. Stable regulation, robust financial incentives, and modernization of infrastructure are indispensable. Decentralized generation and community participation offer additional pathways to accelerate progress.

The implementation of the proposed recommendations will not only increase the volumes of new generating capacities but also strengthen Ukraine's energy independence, reduce vulnerability to external shocks, and align national policy with European integration objectives. In the long term, these measures will contribute to a sustainable, resilient, and secure energy system capable of supporting economic growth and environmental protection.

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