

## ECONOMIC EFFICIENCY OF INVESTMENT IN RENEWABLE ENERGY SOURCES

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The most urgent global problem today is climate change due to anthropogenic impact on the environment and the concentration of greenhouse gases in the atmosphere. Based on emissions reports regularly submitted by national governments to the Secretariat of the United Nations Framework Convention on Climate Change, on agriculture accounts for approximately 15% of global greenhouse gas emissions. On the other hand, greenhouse gases change the climate and thus affect agricultural production. At the same time, the share of agriculture in world GDP is about 4%, which indicates that the carbon intensity of agriculture (the amount of emissions per unit of output) is quite high.

In order to reduce the environmentally destructive impact on the atmosphere, it is necessary to take measures to promote the reduction of carbon emissions (CO<sub>2</sub>) – decarbonization. The use of waste-free biogas technologies has become a generally recognized method of decarbonization of production, but today the introduction and implementation of biogas projects related to the prevention of the accumulation of agricultural waste and their processing requires the involvement of a significant amount of investment resources.

Investing in renewable energy is one of the most reliable and cost-effective areas for investing. Renewable energy sources are actively developing all over the world, including in Ukraine. In many countries, the share of renewable energy sources in the energy balance is already 20-30%. However, even despite such high rates, there is a tendency to increase the volume of electricity production from renewable energy sources.

In Ukraine, the process of transition to renewable energy sources is not so fast. However, the interest of investors in alternative energy sources in our country is constantly growing. One of the most popular areas for investment today is waste-free biogas technologies.

As of 2021, the share of foreign direct investment in the development of fossil resources on a global scale was insignificant compared to renewable energy sources, which attracted almost 15% of the total volume of foreign direct investment. According to Bloomberg NEF, global investment in the energy transition in 2021 was \$755 billion – is a new record and 21% more than in 2020. According to the report, global investments in renewables, which comprise the largest share of total investments in the energy transition, increased by 6.5% in 2021, setting a new record of nearly \$366 billion (Fig. 1).

Investment in renewables and biofuels varied by region, for example in China, India, the Middle East and Africa, while investment increased but decreased in the

Americas (mainly due to a reduction in investment in renewable energy in the United States), as well as in Europe and Asia (with the exception of China and India) (Table 1).

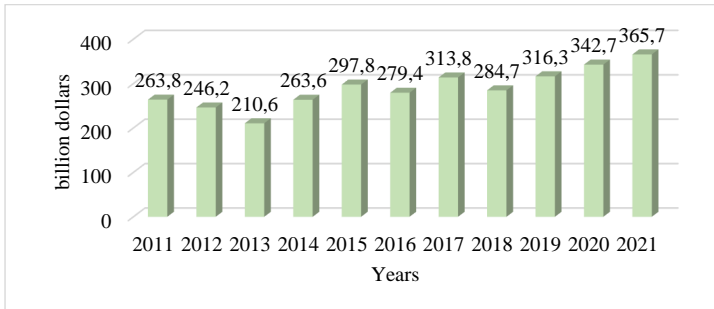


Figure 1 – Global investment in renewable energy and biofuels, 2011-2021, billion dollars

China continues to account for the largest share of global investment in renewable energy (with the exception of hydropower with a capacity of more than 50 MW) – 37%, followed by Europe (22%), Asia and Oceania (excluding China and India; 16%) and the United States (13%). All other regions of the world accounted for 4% or less of total investment in renewable energy and biofuels.

Table 1 – Global investment in renewable energy sources and biofuels by country and region, 2011-2021

Country (region)	USA	Brazil	America (except USA and Brazil)	Africa and the Middle East	Europe	China	India	Asia and Oceania (except China and India)
2011	44.2	9.5	9.1	3,3	126,1	39,6	11,3	20,4
2012	34.7	7.4	15.8	10,1	90,3	53,9	6,4	27,4
2013	29.1	3.4	12.0	7,2	52,6	60,6	4,7	41,0
2014	31.7	5.4	14,6	8,8	60,2	58,9	6,1	50,9
2015	37.0	6.7	11,5	11,3	59,0	116,4	7,5	48,3
2016	41.0	5.1	6,5	7,0	64,7	103,3	13,0	38,7
2017	45.6	6.0	13,1	9,3	46,6	142,1	13,4	37,6
2018	41.3	3.9	9,8	16,8	59,4	96,7	10,6	46,1
2019	62.0	7.1	13,7	11,6	56,9	107,4	9,6	47,5
2020	56.1	9.1	9,0	10,4	83,9	103,9	6,6	63,7
2021	46.7	11.6	9,7	12,8	79,7	137,2	11,3	56,8
Deviation, +/-	2.5	2.1	0,6	9,5	-46,4	97,6	0	36,4

\*Investment volumes do not include those directed to large hydropower projects with a capacity of more than 50 MW.

Thus, investment in renewable energy remains highly concentrated in a relatively small number of markets. China's total investment in renewable energy sources increased by 32% to \$137 billion USA in 2021. Renewable energy investment in China is partly driven by the country's long-term decarbonization goals and growing electricity demand, which is high compared to OECD countries. In Asia and Oceania (excluding China and India), investment in renewable energy fell by 11% to \$56.8 billion USA. In India, the total volume of new investments in renewable energy increased by 70% to \$11.3 billion USA. In 2021, investments in all renewable energy technologies increased in the country.

In 2021, Ukraine ranked 14-th among 100 developing countries in terms of attractiveness of investments in renewable energy, which is 6 places lower than in 2020 (Fig. 2). We believe that such a decline is due to the fact that Ukraine's investments in renewable energy in 2020 were the largest – \$ 3.773 billion. USA, while in 2021 it decreased to \$ 0.134 billion. USA.

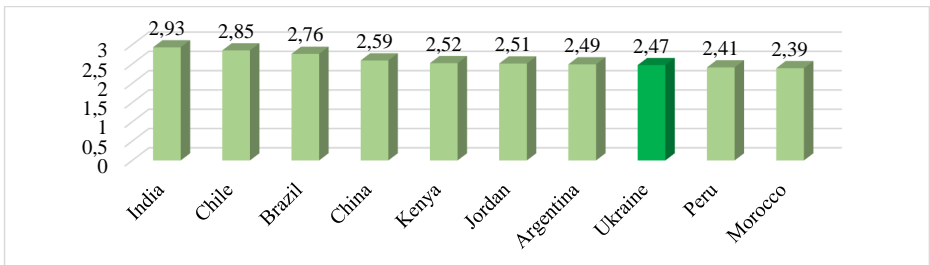


Figure 2 – Assessing the attractiveness of investments in renewable energy and biofuels among developing countries, 2021

Stimulating investment in the renewable energy sector is a key government priority in Ukraine, because this sector continues to play a major role in ensuring energy security, especially in the face of full-scale war and damage to a significant part of the energy infrastructure (lost access to a significant share of renewable energy, which last year provided 13% of all electricity generation, 67% of the installed capacity of wind power plants is located on the territory of Zaporozhye and Kherson regions), and promoting continued growth.

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## **ENVIRONMENTAL, SOCIAL, AND GOVERNANCE BUSINESS MANAGEMENT AS A GUARANTEE OF THE COMPANY'S MODERN INVESTMENT ATTRACTIVENESS**

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Modern world faces a number of global challenges: climate change, transitioning from a linear economy to a circular one, increasing inequality, balancing economic needs with societal needs. ESG is a set of company performance standards that socially responsible investors use to screen potential investments. Investors, regulators, as well as consumers and employees are now increasingly demanding that companies should not only be good stewards of capital but also of natural and social capital and have the necessary governance framework in place to support this. More and more investors are incorporating ESG elements into their investment decision making process, making ESG increasingly important from the perspective of securing capital, both debt and equity. The goal of ESG is to capture all the non-financial risks and opportunities inherent to a company's day to day activities.

Ecological component. Emissions such as greenhouse gases and emissions of air, water and soil pollution. Resource use, such as whether the company uses virgin or recycled materials in its manufacturing processes and how the company ensures that the maximum amount of materials in their products is returned to the economy rather than ending up in a landfill. Companies are also expected to be good stewards of water resources. Land use issues such as deforestation and biodiversity disclosure also fall under the Environmental Component. Companies also report the positive sustainability impact they can have, which can translate into long-term business benefits.

As part of the social component, companies report on how they manage the development of their employees and work. They communicate product liability regarding the safety and quality of their product. They also report on their labor supply chains, health and safety standards and controversial sourcing issues. Where appropriate, companies are expected to report how they make their products and services accessible to disadvantaged groups.