

*Tatiana Gutium,  
D.Sc. (Econ.), Associate professor,  
National Institute for Economic Research,  
Academy of Economic Studies of Moldova,  
Republic of Moldova, Chisinau,  
Email: gutium.tatiana1@gmail.com*

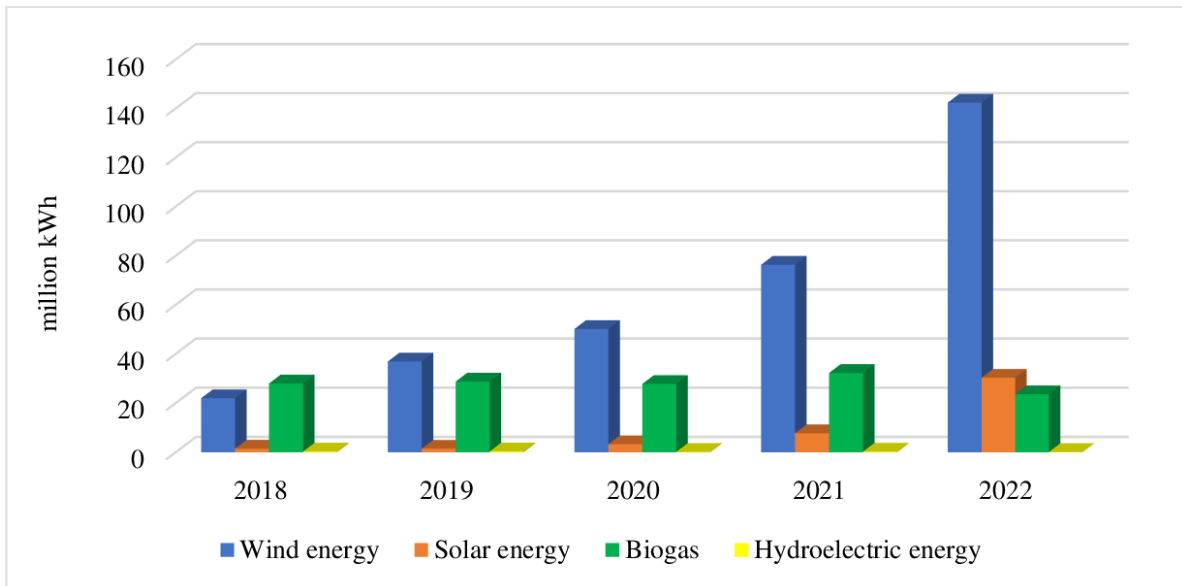
## **GREEN ENERGY AS A SOLUTION TO INCREASE ENERGY EFFICIENCY AND COMPETITIVENESS: CASE OF THE REPUBLIC OF MOLDOVA**

The potential for economic growth, increasing the competitiveness of the national economy, and the development of both industrial branches and industry as a whole depends on the efficiency of the energy sector. Therefore, it increases the relevance of the analysis of the situation in the energy sector, the evaluation of the efficiency of this sector in question, the economic justification of the change in tariffs for energy resources, and the analysis of the impact of the increase in tariffs on the competitiveness of goods and services, the competitiveness of the national economy, the key macroeconomic indicators.

The main reasons for low energy efficiency are the following: lack of knowledge, underestimation of advanced energy-saving tools, design and management methods [1], and changes in systemic connections between elements of the economic and energy structure [12]. An analysis of scientific works on this topic showed that researchers believe that low energy efficiency leads to a decrease in energy [9] and national security, the well-being of the population [5], a reduction in competitiveness both at the micro level [4] [7] [13] and at the macro level [6] [15], and to climate change [2].

The main proposals for increasing energy efficiency involve planning experiments [1], using the potential for improving the energy efficiency of SMEs [2], including energy efficiency in the corporate strategy [8], and energy-economic zoning of territories [14].

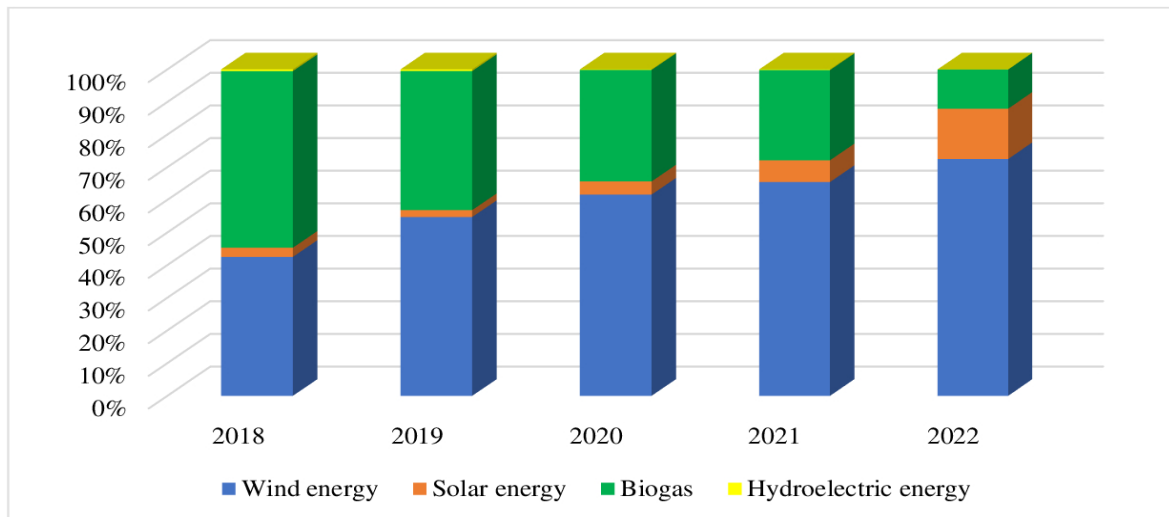
The volume of electricity generated by installations using renewable sources in 2022 was 196.3 million kWh, representing an increase of about 68.45% compared to 2021. From 2018 to 2022, there was an upward trend in wind energy use. The electricity production from this kind of renewable sources increased 6.5 times in 2022 compared to 2018 (Figure 1). The most significant increase in solar energy occurred in 2022 (3.9 times compared to 2021). “The central electricity supplier issued guarantees of origin for 47.7 million kWh of electricity produced from renewable sources [10].”



Source: Data from the National Bureau of Statistics of the Republic of Moldova [11] and the National Energy Regulatory Agency [10].

**Figure 1. Production of electricity from renewable energy sources, the Republic of Moldova**

From 2018 to 2022, wind energy's share of the electricity produced from renewable energy sources increased significantly (42.52% in 2018, 72.52% in 2022) (Figure 2). The share of biogas in green energy has decreased in the last five years (54.12% in 2018 and 12.00% in 2022), but the share of solar energy in green energy has risen (2.82% in 2018 and 15.43% in 2022). Hydroelectric energy has never found its development in Moldova.



Source: Data from the National Bureau of Statistics of the Republic of Moldova [11] and the National Energy Regulatory Agency [10].

**Figure 2. Structure of production of electricity from renewable energy sources, the Republic of Moldova**

In this study, the energy efficiency of electricity and natural gas was calculated. The results are presented in Table 1.

**Table 1.**

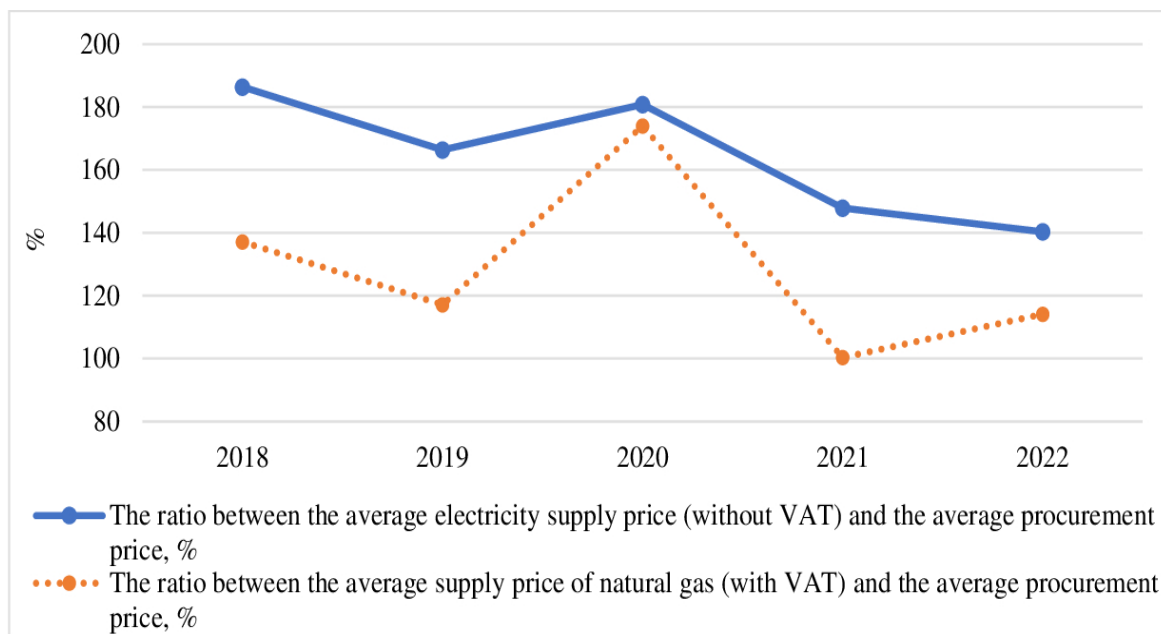
**Energy efficiency in the Republic of Moldova**

	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Gross Domestic Product, bln. \$	11.252	11.736	11.532	13.691	14.521
Gross Domestic Product per capita, \$	4156	4405	4376	5274	5719
Average annual resident population, thousands of persons	2707	2664	2635	2596	2539
Electricity consumption, TJ	13905.72	13950.36	13918.32	14960.88	14581.8
Electrical energy intensity, kJ/\$	1235.84	1188.68	1206.93	1092.75	1004.19
Specific electricity consumption, MJ/capita	5136.95	5236.62	5282.09	5763.05	5743.13
Natural gas consumption, TJ	39571.5	37577.2	38713.1	45313.9	31350.1
Natural gas intensity, kJ/\$	3516.84	3201.87	3357.02	3309.76	2158.95
Specific natural gas consumption, MJ/capita	14618.21	14105.56	14691.88	17455.28	12347.42

*Source: Data from the National Bureau of Statistics of the Republic of Moldova [11] and the National Energy Regulatory Agency [10].*

Although the population is decreasing, electricity and natural gas consumption increased considerably in 2021. At the same time, there was a considerable increase in the specific consumption of electricity and natural gas. The energy crisis at the end of 2021 and the year 2022 generated a significant decrease in the intensity of natural gas and the specific consumption of natural gas in 2022.

The Gross Domestic Product (GDP) registered an increasing trend in 2018-2022, except for the year of the COVID-19 pandemic. Since the rate of GDP growth is higher than the rate of consumption of energy resources, energy intensity decreases, so efficiency increases. However, the price of energy resources has the most significant impact on the evolution of energy intensity. The ratio between the average electricity supply price for final consumption (without VAT) and the average procurement price is too much (Figure 3) because the implementation of the III Energy Package led to an increase in the number of intermediaries and, as a result, the price of energy resources rises too. The increase in energy resource tariffs inevitably leads to a rise in the cost of the produced goods and a decrease in its competitiveness, both on foreign markets and on the domestic market.



Source: Data from the National Energy Regulatory Agency [10].

**Figure 3. The ratio between prices**

All of the above demonstrates that increasing the share of green energy is a solution to improve the efficiency of the energy sector.

### **Conclusion**

The Republic of Moldova, being a state without its own energy resources, must monitor the efficiency of used energy resources, develop and promote strategies for saving all kinds of energy resources, and develop green energy. Of course, green energy cannot replace total traditional energy. However, increasing the share of electricity produced from renewable resources is necessary.

The implementation of the III Energy Package, the energy crisis, and the refusal to procure energy resources directly from the producer for geopolitical and not economic reasons inevitably lead to an increase in the tariff for electricity and natural gas and, as a result, to inflation and a reduction in the competitiveness of domestic goods.

Another consequence of further promoting the III Energy Package is the modification of the export structure; it increases the share of goods whose manufacture does not require many energy resources and decreases the share of processed and high-value-added goods.

### **Acknowledgments**

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