

COMPARATIVE ANALYSIS ON ENERGY CONSUMPTION IN ROMANIA AND NEIGHBORHOOD COUNTRIES

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Abstract

In this article, the main objective is the comparative analysis of Romania and its neighboring countries regarding the final energy consumption by product indicator. By analyzing this indicator in dynamics, the main goal is to present Romania’s situation compared to other neighboring countries. Of the countries analyzed, three of the states are member states of the European Union (Romania, Bulgaria and Hungary) and three are candidate states (Republic of Moldova, Serbia and Ukraine). This paper aims to identify the differences in the final energy consumption by product behavior of the five neighboring countries of Romania, regardless of whether they are part of the European Union or not.

Keywords: *energy consumption, Romania’s neighboring countries,*

Clasificare JEL : *M40, M41*

1. Introduction and context of the study

Energy efficiency is becoming crucial for the good management of energy resources. An increased degree of efficiency implies productive results with minimal negative impact on the environment. However, measuring progress through aggregate indicators is not enough to justify the heterogeneity of the energy performance of EU states (Fortea, 2026).

Energy efficiency improvements have a profound effect on aggregate energy consumption (Clementi et al., 2026). In the European Union there are regulations and policies containing energy efficiency measures. These measures emphasize sustainability and accessibility (Grzebyk et al., 2026). The green energy transition paths have action goals set in absolute values for the fixed indicators (Salim et al., 2026) and with time periods for implementing the measures (Fernandes et al., 2026).

World population influences energy consumption (Li & Wu, 2026). More consumers imply a greater need for produced energy for consumption (Moussa et al., 2026). That is why a breakdown of number of people for each country is provided in Table no. 1.

Table No. 1. Population by country in 2026

Country	Population	EU/NON EU
Bulgaria	6.667.659	EU
Hungary	9.585.818	EU
Moldova	2.961.253	NON EU

Romania	18.800.605	EU
Serbia	6.641.964	NON EU
Ukraine	39.535.849	NON EU

Source: Created by authors use: <https://www.worldometers.info/geography/countries-of-the-world/>

In Table no. 1 the values for the total population of each participating country for the year 2026 in the research analysis were collected. The density of countries will be useful in analyzing total energy consumption values. Also, a column was added with the classification of countries that are or not part of the European Union.

In another vein, energy consumption is influenced by the density of a country but also by other factors such as advanced technology (Caglar et al., 2026), legal regulations in force, or the use of green energy sources (Tansuchat & Yosthongnam, 2026).

2. Dynamics of final energy consumption by product

The graphs resulting from processing the Eurostat database have marked the comparison countries in blue and Romania is highlighted in orange.

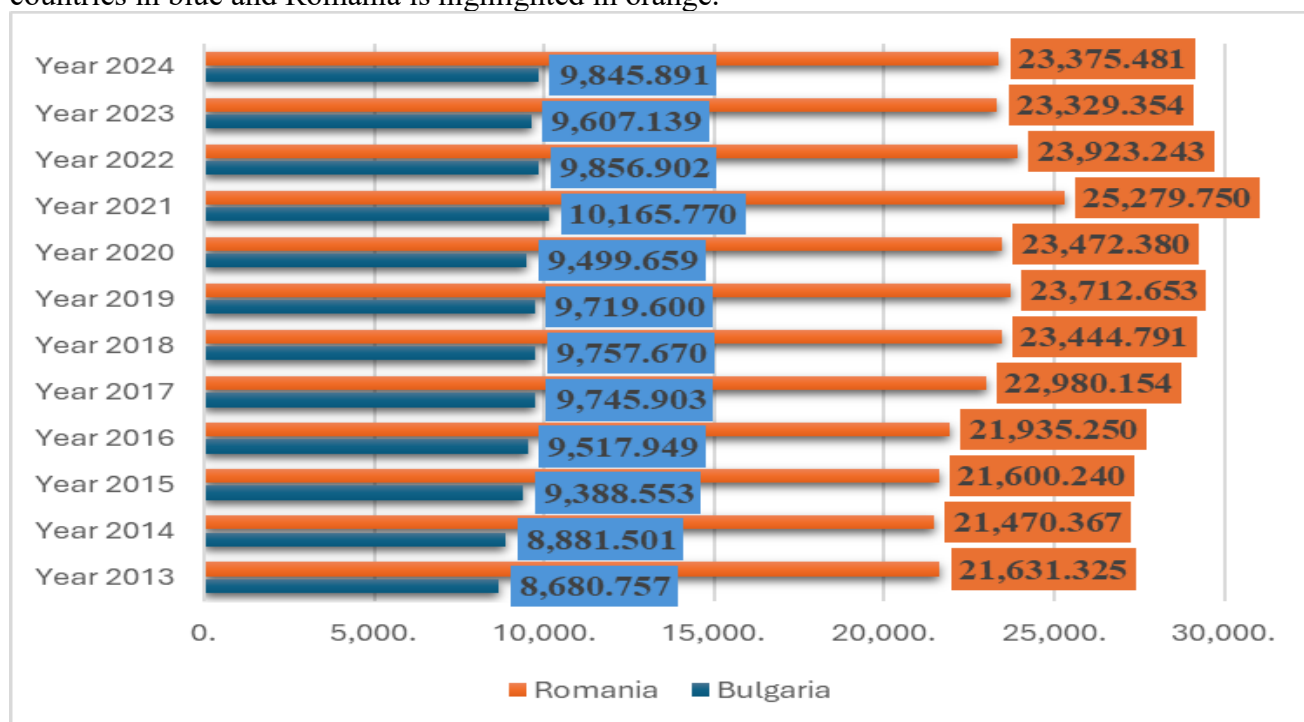


Figure no. 1 "Final energy consumption Romania-Bulgaria, 2013-2024"

Source: Created by authors use the Eurostat database:

https://ec.europa.eu/eurostat/databrowser/view/ten00123/default/table?lang=en&category=t_nrg.t_nrg_indic

Figure no.1 shows how, throughout the period analyzed, Romania surpasses Bulgaria for final energy consumption by product. In the year 2013, when Bulgaria recorded a value of only 8,680.757 thousand tonnes of oil equivalent, Romania had an energy consumption of 21,631,325 thousand tonnes of oil equivalent. Large differences between the two states remain in 2024 when Bulgaria records 9,845.891 thousand tonnes of oil equivalent and Romania has 23,375.481 thousand tonnes of oil equivalent.

The significant differences in consumption are justified primarily by the fact that Romania has a population almost three times larger than Bulgaria. Dividing each country's value by the total number of inhabitants results in fairly close values for this indicator. A larger country means greater consumption of fuels, energy, gas and electricity.

Figure no. 2 highlights the dynamics of final energy consumption by product during the period 2013-2024, presenting the trajectory of Hungary and Romania by comparison.

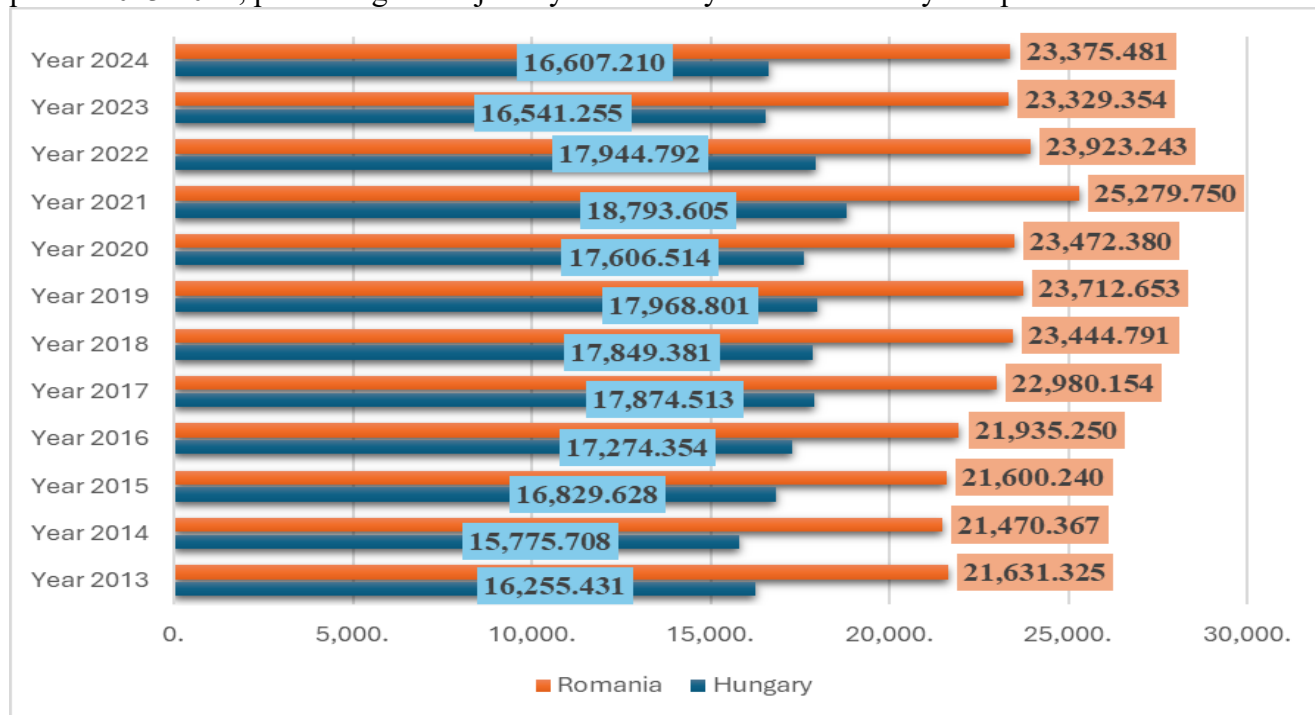


Figure no. 2 "Final energy consumption Romania-Hungary, 2013-2024"

Source: Created by authors use the Eurostat database:

https://ec.europa.eu/eurostat/databrowser/view/ten00123/default/table?lang=en&category=t_nrg.t_nrg_indic

As can be seen in Figure no.2, in the year 2013 Hungary recorded an energy consumption of 16,255.431 thousand tonnes of oil equivalent while Romania reached the value of 21,631.325 thousand tonnes of oil equivalent. During the period 2013-2024 there were fluctuations such that Hungary recorder a value of the analyzed indicator of 16,607.210 in the year 2024 and Romania redorded a value 6,768,271 thousand tonnes of oil equivalent higher.

It is worth considering that Romania has double the density of Hungary, as shown in Table no. 1. Social vulnerability is felt intensely in countries with defective infrastructure. Hungary has made improvements over the years in energy infrastructure but there is room for improvement (Jaber et al., 2026). Romania is surpassed by Hungary in terms of industry integrated into European chains. Hungary has modernized economy and better efficiency investments than Romania (Schmidt & Gov, 2026).

Figure no. 3 presents the comparative analysis between Romania and Moldova for the same indicator, Hungary being highlighted in blue. Moldova reached a value of 2,294.391 thousand tonnes of oil equivalent, while Romania had an energy consumption almost ten times higher, 21,631.325. Moldova reached a consumption of 2,431.340, while Romania also has ten times more. One of the explanations for this diffrence also comes from the density of the two countries, given that Romania has approximately 6 times more inhabitants than Moldova.

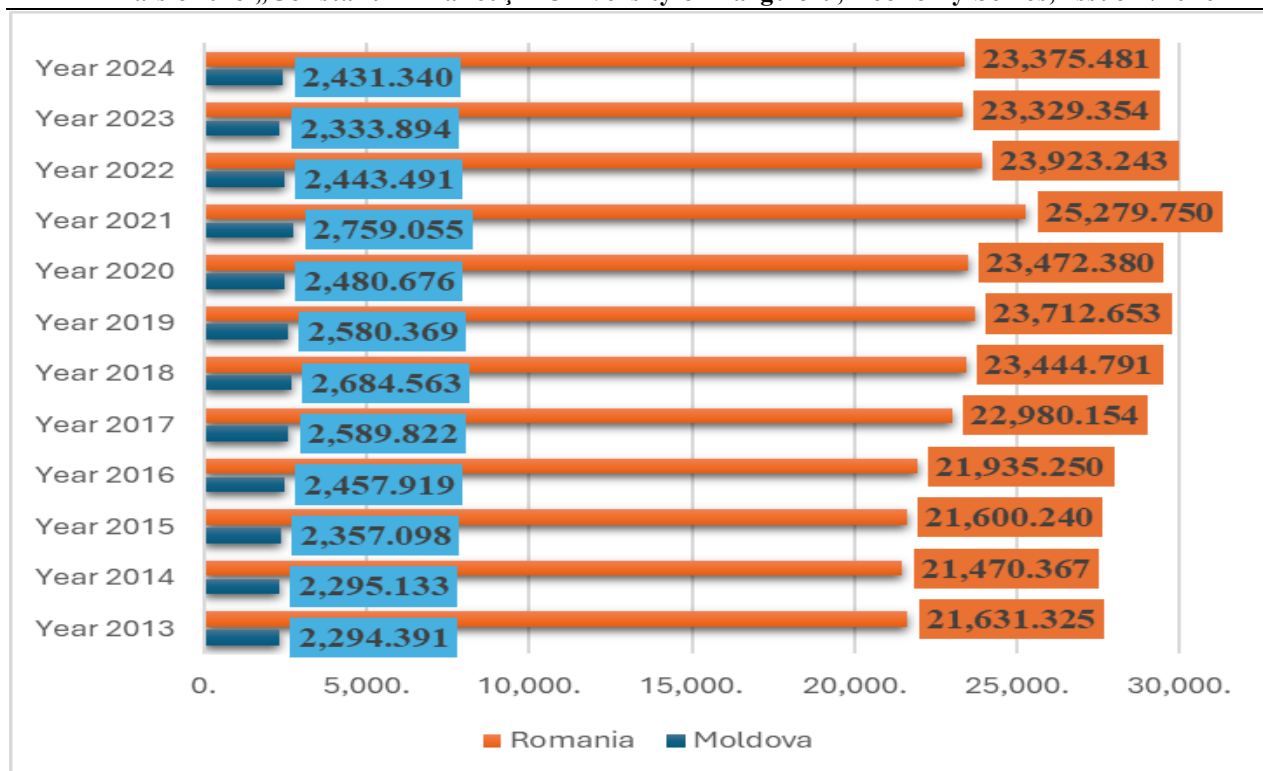


Figure no. 3 "Final energy consumption Romania-Moldova, 2013-2024"

Source: Created by authors use the Eurostat database:

https://ec.europa.eu/eurostat/databrowser/view/ten00123/default/table?lang=en&category=t_nrg.t_nrg_indic

Moldova is a country with a deficit of mineral resources, which is why it is fundamental for this country to invest in alternative sources of sustainable energy to reduce energy imports (Peleavschi, 2026)

In Figure no. 4 it can be observed the comparative analysis of Romania with Serbia.

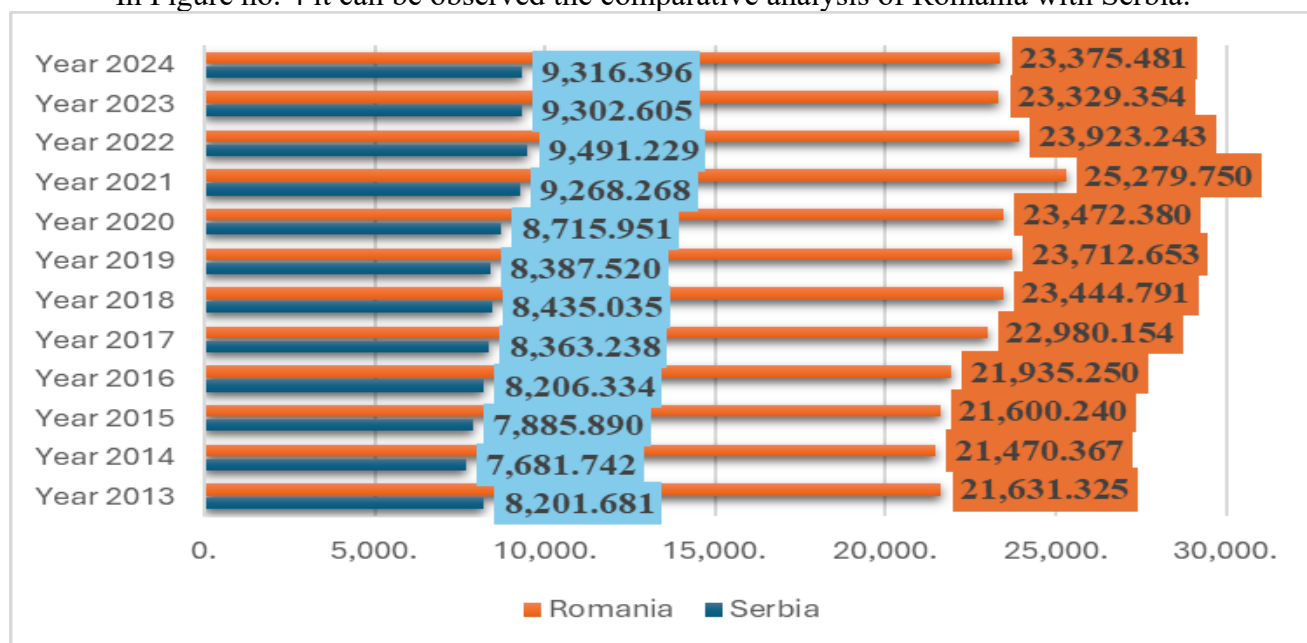


Figure no. 4 "Final energy consumption Romania-Serbia,2013-2024"

Source: Created by authors use the Eurostat database:

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Figure no. 4 leads the dynamics of final energy consumption for the period 2013-2024 of final energy consumption by product in Romania and Serbia by comparing the two neighboring countries. In 2013, Serbia had a final energy consumption of 8,201,681 thousand tonnes of oil equivalent and Romania had 21,631.325 thousand tonnes of oil equivalent. In 2024, the consumption difference is maintained, with Serbia having 9,316.396 thousand tonnes of oil equivalent, and Romania having 14,059.085 more.

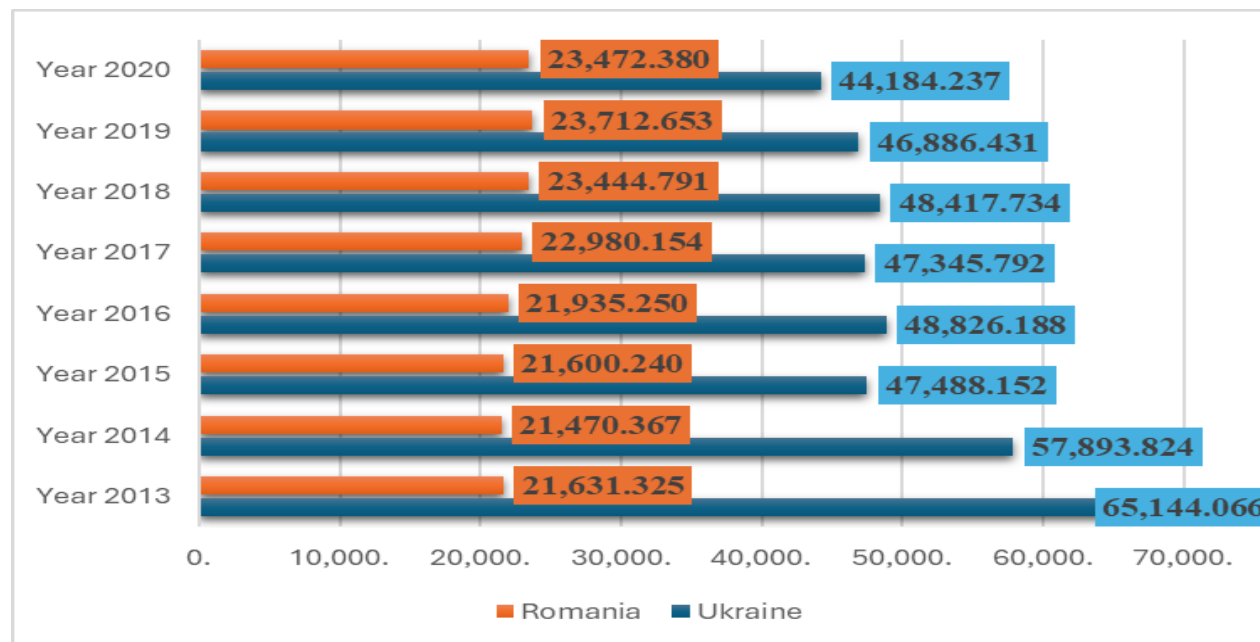


Figure no. 5 "Final energy consumption Romania-Ukraine, 2013-2020"

Source: Created by authors use the Eurostat database:

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In the case of Ukraine, the latest data published in the Eurostat database are from 2020. From Figure no. 5 it can be observed that for the year 2013, Ukraine recorded an energy consumption of 65,144.066 thousand tonnes of oil equivalent, while Romania had 21,631.325. Over time, Ukraine has had a significant decrease in final energy consumption compared to 2013, reaching a value of 44,184.237 thousand tonnes of oil equivalent.

In Ukraine, heavy industry, especially metallurgy and chemistry, has not benefited from infrastructure investments (Yakymchuk et al., 2023) and suffers from existing technological progress (Mysak et al., 2024). Processing technologies are outdated and do not provide the desired efficiency. Ukraine has also suffered throughout history and is still in post-war recovery (Wejnert-Depue, 2026).

5. Conclusions

The indicator of final energy consumption by product, whose values were collected from the Eurostat database, is relevant because it justifies the energy intensity of the economy of the six analyzed states. These include Romania and its five neighboring countries, represented graphically by comparison for a more conclusive analysis. This analyzed indicator manages to clarify the state of energy intensity of a country, which gives us a vision of the structure of the economy.

From this article it is worth remembering that Bulgaria is weaker than Romania while Hungary is more efficient due to investments in infrastructure, regarding EU states analyzed.

Moldova has low economic productivity and is dependent on energy imports. On the other hand, Serbia is more industrial than Serbia and there is also import dependence here but to a lesser extent because Serbia has a higher energy efficiency. And Ukraine suffers from old technologies that complicate production processes, resulting in large energy losses.

Every country faces challenges, but despite this, for the analyzed indicator there was progress during the analyzed period.

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