

## **CONSIDERATIONS ON THE EVOLUTION OF ELECTRICITY PRICES IN EUROPEAN UNION COUNTRIES IN RECENT YEARS**

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**Abstract:** The last years have brought profound changes in the electricity sector materialized through: restructuring, liberalization, regulation, privatization. The late few years, significant electricity price increases took place in the electricity market, all over Europe and worldwide, which recorded record price increases almost every month.. the paper addresses an analysis of the increase in electricity prices in recent years in the countries of the European Union, seeking to identify its causes. we have detailed aspects related to the evolution of prices in romania, taking into account the price components.

**Keywords:** electricity, price, energy market

### **1. INTRODUCTION**

From July 1<sup>st</sup>, 2007, when the energy market became competitive, all non-household customers have the right to opt for a free electricity supplier.

Starting January 1<sup>st</sup>, 2021 prices for supplying electricity to customers households are no longer regulated by ANRE (National Energy Regulatory Authority) [8].

The advantages of liberalizing the electricity market are:

- encouraging the increase of energy efficiency and improving the quality of the services provided;
- the possibility for consumers to negotiate electricity supply contracts;
- ensuring services in conditions of transparency, objectivity and non-discrimination;
- new mentalities, specific to the competitive environment.

### **2. ELECTRICITY RATES COMPONENTS FOR CONSUMERS**

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In order to exercise the right of eligibility, the National Energy Regulatory Authority, ANRE, elaborates, establishes and monitors the application of the set of mandatory regulations at national level necessary for the functioning of the electricity sector and market.

The electricity produced in different types of power plants is introduced into the national energy grid (SEN) with the help of specialized equipment, is then transported through the high voltage networks of Transelectrica [7], and afterwards it is extracted from the grid, distributed through the medium and low voltage networks of distribution operators, which deliver it to consumers (households and non-households) and, in the end, consumed by them.

The price of electricity includes the following components (tab. 1) [3], [8]:

a) a component resulting from the application of regulated tariffs (ANRE), for the activities of transport, system services and distribution;

b) a negotiable tariff component, which represents the offer of the supplier to the consumer.

*Table 1. Electricity price components*

Supplier offer price	Rates regulated by ANRE					
	Transport		System services	Distribution		
Negotiable rate	TG	TL	TS	HV	MV	LV

These rates are approved by order issued by ANRE and include [2],[8]:

- networking tariff (TG)

It requires a series of equipment with the help of which some energy will be transformed before it is introduced in a transport network. This tariff covers the costs for the purchase, maintenance and operation of such electrical equipment.

- system service rate (TS)

Once introduced, the electricity is transported through the transmission network, through the electrical networks, to the border with one of the 8 territorial electricity distribution networks in Romania. All this operation is done with costs that are covered by this tariff.

- network withdrawal fee (TL)

Then, also with the help of specific equipment, the electricity is extracted from the transmission system and delivered to the distribution networks. The equipment is bought and maintained with money from this tariff.

- distribution tariff (TD)

Once they have received the energy, the distributors have to pass it through the transformer stations, in order to bring it from high (HV), to medium (MV) and then to low voltage (LV). And all these costs are paid out of the money raised from this distribution fee.

The path of electricity from producer to consumer represents several transactions which means, for the consumer, the payment of the tariffs listed above. The money from

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these rates is divided. Specifically, the tariffs for network introduction, system service and network extraction go to Transelectrica, and the distribution tariffs reach the 8 operators of the existing regional distribution networks in Romania.

### **3. LAST YEARS EVOLUTION OF THE ELECTRICITY PRICE IN THE EUROPEAN UNION COUNTRIES**

The world faces a global energy crisis. Demand for energy is climbing rapidly, but supply is down, [5].

The EU has been working to liberalize the electricity market since the second half of the 1990s. The directives adopted in 2003 laid down common rules for the internal markets in electricity and natural gas. Deadlines have been set for the opening of electricity markets, so that from 1 July 2007 customers were allowed to choose their supplier. In 2014, in response to a request from the European Council, the European Commission developed an in-depth analysis of energy prices and costs in Europe to help policymakers understand the underlying context, the impact of recent consumer price increases and policy implications. Data deficiencies have led to the recommendation to improve the detail, transparency and consistency of the collection of energy price data, as well as to the Commission proposal and the adoption of Regulation (EU) 2016/1952. Transparency in electricity prices is more effective when it is published and disseminated as widely as possible, i.e., at EU level.

Increased transparency in electricity prices should help to promote fair competition by encouraging consumers to choose between different suppliers. The price of electricity is a key element in a country's strategy for electricity supply, but also for consumers in order to manage costs as efficiently as possible. Electricity prices are of particular importance for international competitiveness, as electricity is usually a significant percentage of total energy costs for industrial consumers and service providers. Unlike the price of fossil fuels, which are usually traded on global markets at relatively uniform prices, electricity prices vary widely between countries around the world.

The price of energy in the European Union countries depends on a range of different supply and demand conditions, including the geopolitical situation, the national energy mix, import diversification, network costs, environmental protection costs, severe weather conditions, or levels of excise and taxation.

For household consumers in the EU (defined for the purpose of this article as medium-sized consumers with an annual consumption between 2 500 kWh and 5 000 kWh), electricity prices in the first half of 2021 were highest in Germany (EUR 0.3193 per kWh), Denmark (EUR 0.2900 per kWh), Belgium (EUR 0.2702 per kWh) and Ireland (EUR 0.2555 per kWh); see Figure 1. The lowest electricity prices were in Hungary (EUR 0.1003 per kWh), Bulgaria (EUR 0.1024 per kWh) and Malta (EUR 0.1279 per kWh). The price of electricity for household consumers in Germany was more than three times higher than the price in Hungary and 45.6 % higher than the EU average price.

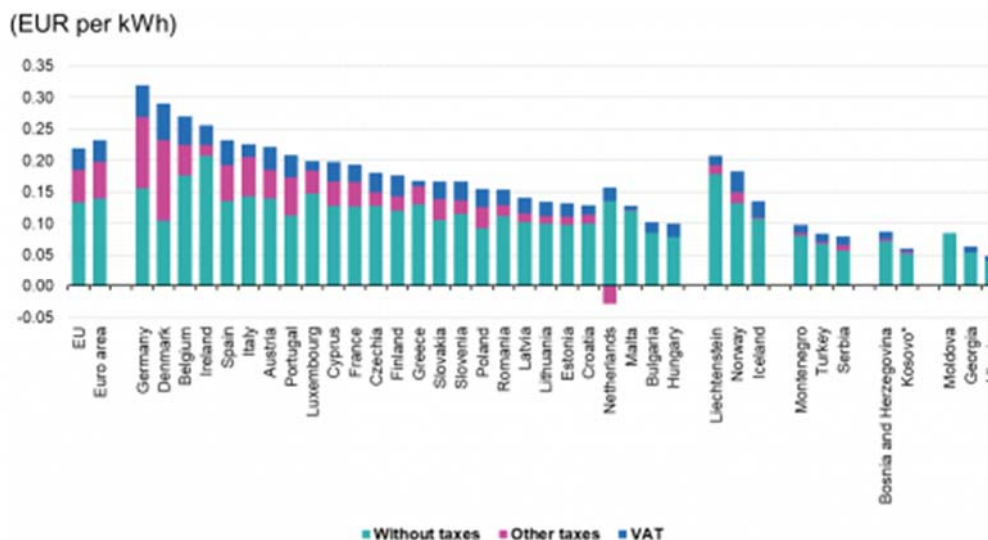
In European Union countries, the rates of energy depend on a number of different supply and demand conditions: geopolitical state, energy mix, diversification of imports, grid costs, environmental protection costs, weather conditions, taxes amount.

To analyze the evolution of electricity prices for household consumers, we specify that in this category we refer to those whose annual consumption is in the range of 2500 kWh to 5000 kWh.

For household consumers the weighted average price for electricity in the first semester of 2021 was 0.2192 EUR/kWh, comparing to 0,1173 EUR/kWh in the second half of 2019. That mean an increase of 1.869 times during the last two years.

If we look at the price in 2020, average household electricity price was 0.213 EUR/kWh, meaning that in the first half of 2021 the price increased slightly compared with the same period of 2020.

As it can be seen in figure 1, prices were the highest in Germany - 0.3193 EUR/kWh (more than three times higher than the Hungarian price and 45.6% higher than the EU average price), Denmark -0.2900 EUR/kWh, Belgium - 0.2702 EUR/kWh and Ireland - 0.2555 EUR/kWh. The lowest prices were in Hungary - 0.1003 EUR/kWh, Bulgaria - 0.1024 EUR/kWh and Malta - 0.1279 EUR/kWh.



**Fig.1.** Electricity prices for household consumers in the first semester of 2021 (source Eurostat, [4])

In Romania, electricity price rose in the first half of 2021, compared with the first half of 2020 by 7%, one of the highest increments in EU. Household electricity prices rose in 16 EU Member States

Household electricity prices rose in 16 EU Member States in the first half of 2021, compared with the first half of 2020. The largest increase (expressed in national

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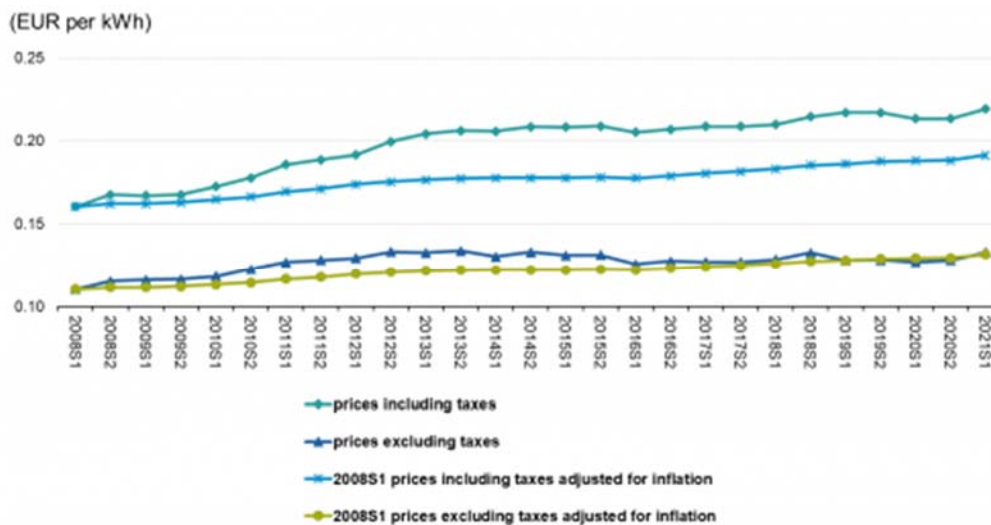
currencies) was registered in Slovenia (+15%), ahead of Poland (+8%) and Romania (+7%).

In June 2021, in Romania, the electricity prices were:

- For households: 0.151 EUR/kWh; the average price in the world is 0.121 EUR/kWh.
- For business: 0.121 EUR/kWh; the average price in the world is 0.110 EUR/kWh.

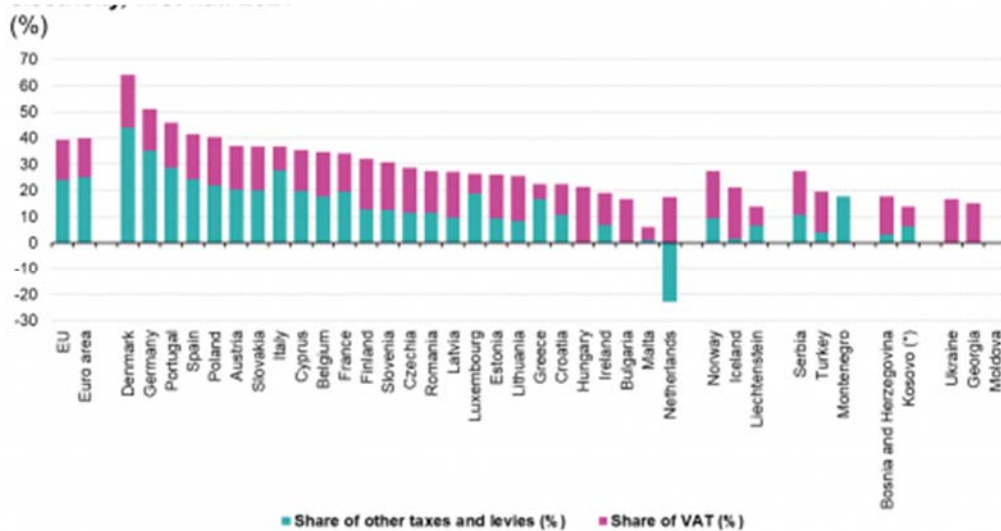
The evolution of electricity prices for domestic consumers in EU countries since 2008 is shown in figure 2. The energy price, for electricity and grid only, rose rather more than the global inflation rate getting to 0.1338 EUR/kWh in the second half of the year 2013. From 2014 to 2019 it was quite constant. In the first half of 2021 it was 0.1339 EUR/kWh, a bit higher than the 0.1282 EUR/kWh at the end of 2020. The share of taxes increased by 8.8 % in the last 13 years, from 31.2% in 2008 to 39.4% in 2021.

For inflation-adjusted prices, the total price for domestic consumers, all taxes included, was 0.1914 EUR/kWh in the first semester of 2021 compared to 0.1604 EUR/kWh in the first half of 2008. We conclude the actual price without taxes is quite the same as the 2008 inflation-adjusted price.



**Fig.2.** Development of electricity prices for household consumers, EU, 2008-2021 (source: Eurostat, [4])

Figure 3 shows the ratio between taxes and fees and the total retail selling price of residential electricity. As it can be seen, among EU countries Netherlands had the lowest tax rate in the first half of 2021, where the values are actually negative (-5.5%), [1], [4]. The average weight of taxes and duties at EU level was 39.4%. VAT is 15.5% of the total price in the EU. It ranges from 4.8% in Malta to 21.3% in Hungary.



**Fig.3.** Weight of Taxes and duties paid by household consumers for electricity, first half of 2021 (source Eurostat, [4])

The maps in figure 4.a show the prices of electricity for residential customers in the Purchasing Power Standard (PPS- that is an artificial currency unit; which can buy the same amount of goods and services in each country) in the first half of 2021, classifying the EU countries into six categories, with categories of electricity prices ranging from over 25 PPS / 100 kWh to under 15 PPS / 100. kWh. Romania (29) and Germany (28) have the highest electricity prices according to the purchasing power standard. According to the purchasing power standard, the lowest electricity prices are in the Netherlands (11) and Finland (14).

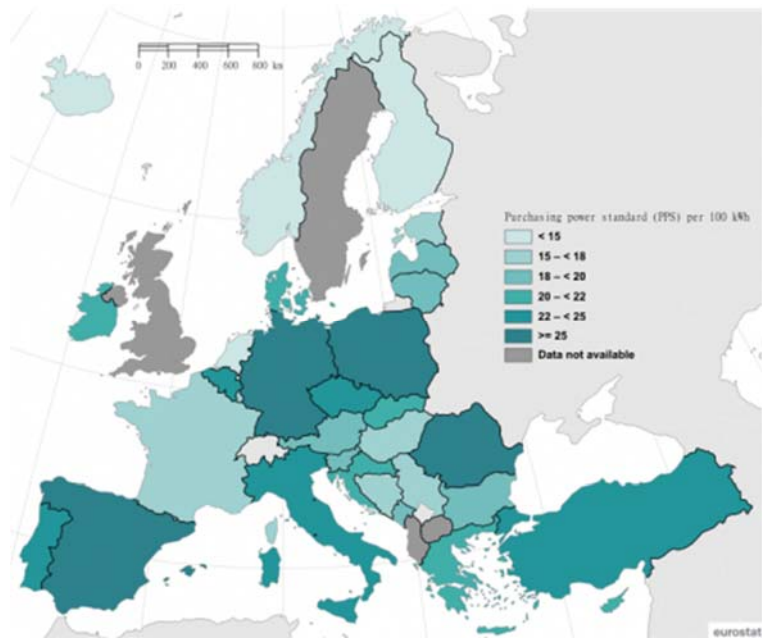
If we refer to the EU countries for non-household consumers and we look at the evolution of electricity prices during the last two years, we can see that there were fluctuations from country to country and from a year to another, so the electricity market was changing a lot.

The electricity prices in the second half of 2019 reached the highest values in the EU Member States in Cyprus and Italy (figure 5). The average price for the EU in the second half of 2019 (a weighted average based on the latest 2018 data on electricity consumption for non-household customers) was EUR 0.173 per kWh.

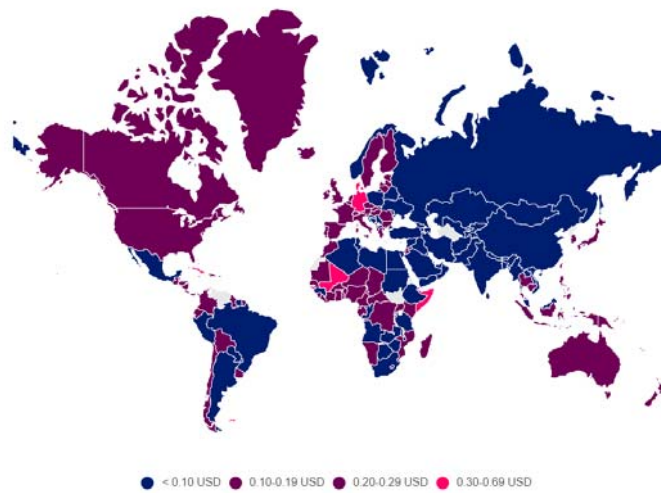
The change in electricity prices for non-household consumers, including all non-refundable taxes and duties, between the second half of 2018 and the second half of 2019 is shown in figure 5. These prices have fallen in six EU Member States. The largest decreases were recorded in Denmark (-13.4%), followed by Poland (-6.3%) and Portugal (-2.1%). In 21 other EU Member States, prices have risen. The highest increases were recorded in Romania (19.5%), Hungary (18.4%), Italy (12.7%), the Netherlands (11.1%) and Slovenia (10.0%).

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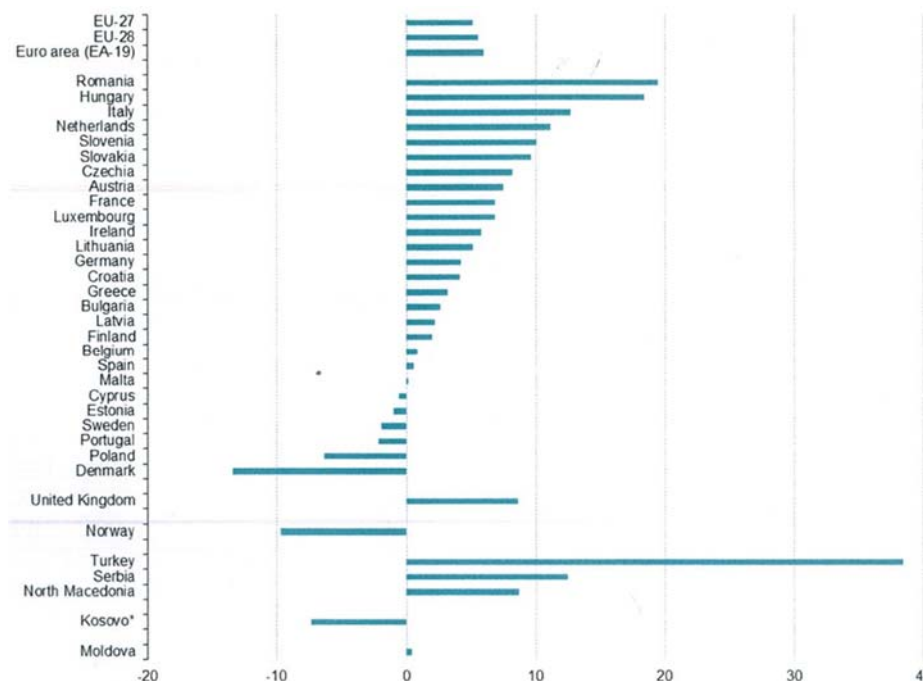


a.



b.

**Fig.4.** Electricity prices for household consumers, first half 2021, (PPS per 100 kWh) - (a.)  
(Source: Eurostat, [4]); interactive map for electricity prices worldwide - (b) [10]



**Fig.5.** Change in electricity prices in the EU for non-household consumers in the second half of 2019 compared to the previous year, same semester (%)

As for electricity prices in the second half of 2021, they reached the highest values in the EU Member States in Germany (0.1813 EUR/kWh) and Italy (0.1584 EUR/kWh). (Fig. 6). The average price for the EU countries in the second half of 2021 (a weighted average based on the latest data on electricity consumption for non-household customers) was 0.1283 EUR/kWh.

Figure 6 shows how electricity prices change for non-domestic consumers (including taxes and duties) from the first half of 2020 to the first half of 2021. We can see that they decreased the most in Slovenia (-6.5 %) and Portugal (-5.2 %), followed by Romania (-5.1 %). They increased in the other sixteen EU Member States (for example in Denmark (29.8 %), Bulgaria (18.0 %), Estonia (16.3 %)).

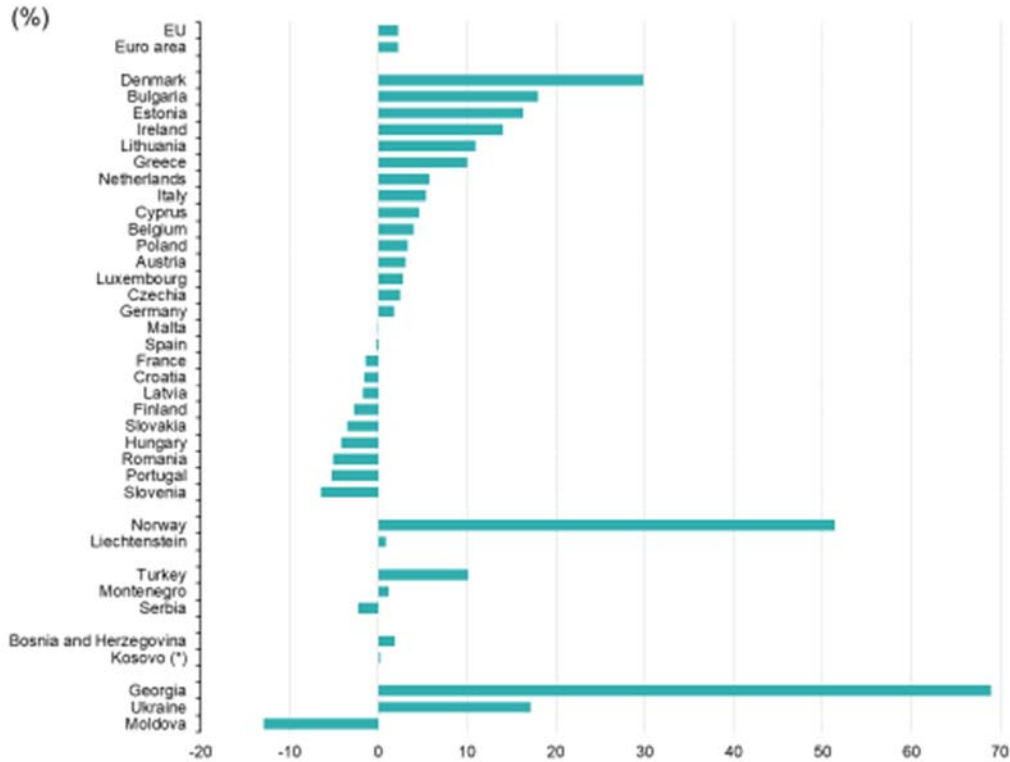
In Romania, in the late few years, the electricity market has recorded a continuously rising price that increases almost every month. Thus, July 2021 came with prices two and a half times higher than in the same month of 2020, with August and September reaching new records, increasing three times higher than the same periods in 2020. In August 2021, the average closing price of the market for the next day in Bucharest increased by 93 lei / MWh compared to the one in July, reaching 555 lei/MWh, and in September it was 662 lei/MWh. In November, the market reached new highs - over 1,200 lei/MWh, on DAM (Day Ahead Market), and over 1,000 lei/MWh quotations for the first quarter of 2022. Prices also increased on all spot markets in



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Europe, Romania being in the top half of ranking. Also, the unprecedented increase in the levels at which carbon certificates are traded, exceeding the threshold of 70 euro/t CO<sub>2</sub> in November, has led to an increase in the price of electricity, all over Europe.



**Fig.6.** Change in electricity prices for non-household consumers compared with previous year's same semester, first half 2021, % (Source: Eurostat, [4])

Association of Energy Suppliers in Romania - AFEER states that electricity prices borne by consumers recently reflect the evolution of energy markets, internal and international, lack of investment in Romania in production capacity in recent years, and high costs of certificates CO<sub>2</sub>, according to a press release, [6], [9].

#### 4. CONCLUSIONS

The current situation on the energy market is complicated: the prices of fuels, coal, natural gas, oil have increased in all European markets and, in addition, due to the EU's clear commitment to decarbonisation, the price of emission allowances has reached around 50 euro/ton (compared to a price of 21 euro/ton in June 2020), and, for the future, an upward trend is also estimated.

All these increases are also found in the price of electricity and that is why we cannot expect the prices of electricity and natural gas to be close to those of 2020. For example, at the beginning of June 2020, on the spot electricity market in Romania, as well as on the spot markets with which we are connected - Hungary, Czech Republic and Slovakia - the prices were 20-25 euros/MWh. At the middle of 2021, in all these markets the prices vary between 65 and 90 euro/MWh.

Romania can no longer ensure from internal sources the necessary consumption of electricity, at competitive prices. For natural gas, we almost always resorted to imports. Thus, all this has influenced and will continue to influence internal market prices. That is why we need investments in both natural gas and electricity production.

Stable and predictable legislation is also needed to ensure security in the supply of secure, sustainable, competitive and affordable energy.

Both end-customer supply and energy trading (electricity and natural gas) are activities which, by their nature, involve a high degree of risk, which increases all the more in an unpredictable legal framework.

In addition, the biggest competition in the energy market is in the supply segment. There are no less than 58 suppliers to the final customers of electricity and over 70 to the final customers of natural gas in Romania, which makes, practically, almost impossible agreements or concerted practices, coordinated between them.

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