

Analysis of the Energy System Market of the Republic of Moldova in the Context Global Energy Crises

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Abstract

In this paper, I set out to present the results of the analysis of the energy sector of the Republic of Moldova, and particularly the field of electricity, natural gas and petroleum products. Although I do not claim exclusivity in terms of the aspects researched through this paper, I consider that these aspects have been insufficiently analyzed over time, which is why I express my hope that the conclusions of the undersigned presented in this paper will bring a certain level of usefulness both theoretically and, as well as practice.

In this sense, the scientific novelty and originality of the obtained results is embodied in the making of a clear opinion regarding the development of future strategies regarding the sustainability of the energy sector.

Key words: electricity sector, natural gas market, energy services, energy sustainability

J.E.L classification: F16, F40, F62

1. Introduction

Energy can be considered the cornerstone of the modern economy, providing an essential ingredient for almost all human activities: it provides services for cooking and space/water heating, lighting, health, food production and storage, education, mineral extraction, industrial production and transportation. Modern energy services are a powerful driver of economic and social development, and no country has been able to develop much beyond a subsistence economy without ensuring at least minimal access to energy services for a wide range of its population. All over the world, the energy resources available to them and their ability to pay largely determine how people live their lives.

The energy market is a complex concept and refers to the economic and institutional system in which energy transactions take place. This can include the production, distribution and trading of energy, whether it is electricity, natural gas, oil, coal or other energy sources. The energy market is essential to the functioning of modern economies, as it provides the energy needed to support various activities, from industrial production to household consumption.

This market is influenced by several factors such as energy supply and demand, energy resource price trends, available technologies for energy production and distribution, energy policy and legislation, geopolitical factors and many others.

2. Theoretical background

There are two main types of energy market:

Wholesale market (or spot market): This is where energy producers, suppliers and traders meet to transact energy in bulk. Energy prices on this market can vary depending on demand and supply, being also influenced by weather conditions, resource availability, political events or international markets.

Consumer market (or retail market): This refers to the relationship between energy suppliers and consumers, whether they are households, businesses or other institutions. In this market, rates and contractual terms are negotiated between suppliers and customers.

In many countries, the energy market is regulated by governments to ensure proper functioning, to promote fair competition and to protect the interests of consumers. I have also adopted policies and measures to promote the use of renewable energy sources, in the context of increasing concerns regarding climate change and energy security.

The energy market can be influenced by major changes in technology, demand and supply, as well as global geopolitical and economic developments. It is therefore a dynamic and complex field that remains central to the development of modern society.

3. Research methodology

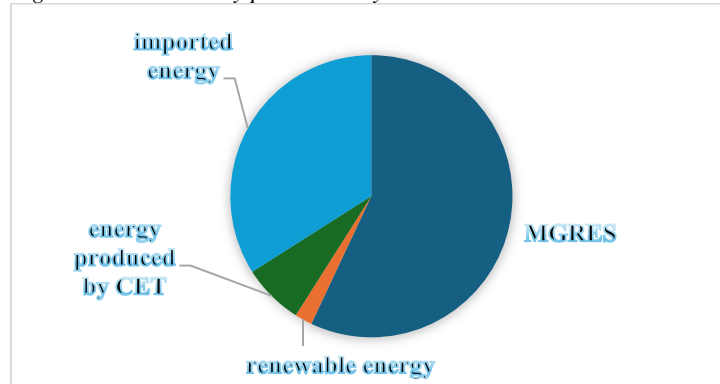
The set research questions are "can the energy market be influenced by major technological changes, worldwide?" and "what possible trends and values would Moldovan companies and businesses achieve in times of sustainability and globalization?". The research method is focused on an initial literature review, literature relevant to the research topic and research that has a qualitative and quantitative descriptive approach based on statistics and data, followed by data interpretation and analysis.

4. Findings

The electricity sector of the Republic of Moldova is based on the limited sources of production located on the territory of the Republic of Moldova and controlled by its constitutional authorities (combined thermal and electric power plants and a hydropower plant, covering approximately 21% of Moldova's consumption (excluding the Transnistria region) in 2021). About 79% of Moldova's consumption was covered in 2021 by the supply from "Cuciurgani - Moldavskaya GREȘ" (a gas-fired power plant located in the Transnistria region and owned by the Russian company "Inter-RAO") and/or by Ukrainian companies.

In 2022, the electricity market of the Republic of Moldova was strongly influenced by the invasion of the Russian Federation in Ukraine. As a result, the Republic of Moldova was left without a reliable supply of electricity. Since then, electricity supply agreements have been concluded on a monthly basis. Until September 2022, "Cuciurgani - Moldavskaya GREȘ" covered about 67% of the electricity supplied to Moldova, while 28% was covered by Ukrainian suppliers and only 4-5% was covered by local suppliers. The crisis deepened in October 2022, when Ukrainian authorities banned the export of electricity to other countries. This escalated even further in November 2022, when no agreement was concluded with "Cuciurgani-Moldavskaya GREȘ" due to disagreements regarding the supply of natural gas. In December 2022, approximately 47% of electricity was supplied to Moldova by "Cuciurgani-Moldavskaya GREȘ", approximately 31% from local sources (including 3.5% from renewable sources), while the remaining amount was provided by suppliers Romanians.

Figure no. 1 Electricity purchased by ENERGOCOM S.A. between May and December 2022



Source: www.energocom.md

In general, between May and December 2022, the supplier Energocom S.A. purchased electricity as follows: about 57% of the electricity was supplied to Moldova by "Cuciurgani-Moldavskaya GREȘ", about 9% from local sources (including 2% from renewable sources), while the remaining amount (34 %) was provided by foreign suppliers.

As a contracting party to the Treaty on the Energy Community starting from May 1, 2010, the Republic of Moldova has a continuous obligation to implement the energy acquis in force. In this context, the primary legislation in the field of electricity is constituted by Law no. 107 of May 27, 2016 "on electricity", partially transposing the Third Electricity Directive, the Electricity Regulation and Directive 2005/89/EC of the European Parliament and of the Council of January 18, 2006. In addition, on September 21, 2017, the Parliament of the Republic of Moldova adopted Law no. 174 of September 21, 2017 "on energy".

The Electricity Law and the Energy Law establish a general legal framework for the organization and regulation of the energy sectors in the Republic of Moldova (and, in particular, the electricity sector). The provisions are intended to ensure the efficient operation and monitoring of the energy sector in the Republic of Moldova and to create conditions for the liberalization of the electricity market and the promotion of competition on this market. Moreover, since the entry into force of Law no. 107 of May 27, 2016 "on electricity", the electricity market in Moldova was declared open, whereby each customer had the right to choose and change his supplier.

According to Law no. 107 of May 27, 2016 "on electricity", the following activities are regulated:

- operation of the electricity market.
- electricity transport.
- centralized management of the electrical system.
- electricity distribution; and
- electricity supply.

Such activities are carried out based on licenses issued by the National Agency for Energy Regulation ("ANRE"). ANRE, as the national regulatory authority of the electricity sector of the Republic of Moldova, also monitors and controls the compliance of the licensed entities with the license conditions.

As examples, the following five entities hold licenses to produce electricity: Termoelectrica S.A., CET-Nord S.A., Picador-Grup S.R.L., Nodul Hidroenergetic Costesti Î.S. and Moldavskaya GREȘ (located in the region of Transnistria, not controlled by the constitutional authorities of the Republic of Moldova). Moldelectrica U.S. is the only entity that holds a license for electricity transmission. In addition, two entities hold licenses for the distribution of electricity (RED Nord S.A. and Î.C.S. RED Union Fenosa S.A.) and 62 entities hold licenses for the supply of electricity (According to the Licensing Register published by ANRE)

The Republic of Moldova has borders with Romania (to the west) and Ukraine (to the north, east and south). The parallel operation of the electrical systems between the Republic of Moldova and Ukraine is carried out through seven overhead lines of 330 kV and eleven overhead lines of 110 kV, while the insular mode of operation of the electrical systems in Romania and Moldova is carried out through an overhead line of 400 kV (Vulcănești - Isaccea) and four 110 kV overhead lines. Below is the list of existing interconnections of the Republic of Moldova:

Moldova - Romania:

- ✓ Overhead line 400kV Vulcanesti - Isaccea;
- ✓ Air line 110kV Costesti - Stanca;
- ✓ Air line 110kV Cioara - Huși;
- ✓ Air line 110kV Ungheni - Tutora; and
- ✓ Air line 110kV Gotesti - Fălciu.

Moldova - Ukraine:

- ✓ Overhead line 330kV CERS Moldoveneasca - Novoodeskaia;
- ✓ Overhead line 330kV CERS Moldoveneasca - Usatovo;
- ✓ Overhead line 330kV CERS Moldoveneasca - Podolskaia;
- ✓ Overhead line 330kV CERS Moldoveneasca - Artiz;
- ✓ Overhead line 330kV Podolskaia - Ribnița 1;
- ✓ Overhead line 330kV Podolskaia - Ribnița 2;
- ✓ Air line 110kV CERS Moldoveneasca - Beleaevka;

- ✓ Air line 1 lOkV CERS Moldoveneasca - Razdelinaia;
- ✓ Air line 1 lOkV CERS Moldoveneasca - Starokazace;
- ✓ Air line 1 lOkV Vasilievka - Kr. windows;
- ✓ Air line 1 lOkV Vul cănești - Bol grade 1;
- ✓ Air line 1 lOkV Vul cănești - Bol grade 2;
- ✓ 35kV overhead line Etulia - Nagomaia;
- ✓ Overhead line 330kV Balti - CHE Dnestrovsk;
- ✓ Air line 1 lOkV UZ Briceni - CHE Dnestrovsk;
- ✓ Air line 1 lOkV Ocnita - Sahti;
- ✓ Air line 1 lOkV Otaci - Nemia;
- ✓ Air line 11 OkV Larga - Nelipovti;
- ✓ Air line 1 lOkV Poroghi - Soroca; and
- ✓ Air line lOkV Mamliga - Criva.

Projects:

- ✓ 400kV overhead line Balti - Suceava; and
- ✓ 400kV overhead line Iasi - Ungheni – Strășeni

If we are to discuss the natural gas market in the Republic of Moldova, I mention that in 2021 the entire volume of natural gas for the market of the Republic of Moldova (1205.7 million cubic meters) was imported. The main player on the natural gas market in the Republic of Moldova is Moldovagaz S.A., a natural gas supplier, whose shareholders are PAO Gazprom (50%), the Republic of Moldova (35.33%), the Transnistria Property Management Committee (13.44%) and certain minority shareholders (1.23%).

As a supplier of natural gas, among others, Moldovagaz S.A.:

- ✓ signed an agreement with PAO Gazprom regarding the supply of natural gas to the Republic of Moldova;
- ✓ is the founder (sole partner) of the 12 operators of the natural gas distribution system. The total length of the natural gas network of these operators is 21,750.50 km; and
- ✓ is the founder (sole partner) of Moldovatransgaz S.R.L., the main operator of the natural gas transportation system in the Republic of Moldova. Moldovatransgaz S.R.L. transports natural gas using its transmission network (including main pipelines with a total length of 656.24 km and branch pipelines with a total length of 903.42 km).

In 2022, similarly to the electricity market, the natural gas market in the Republic of Moldova was strongly affected by the invasion of the Russian Federation in Ukraine and by the deterioration of business relations between PAO Gazprom and its customers from the European Union and the Republic of Moldova. starting from October 2022, the amount of natural gas supplied by PAO Gazprom to the Republic of Moldova was significantly lower than the demand of consumers in the Republic of Moldova (both on the right and left sides of the Dniester River) and lower than the quantities initially indicated in the agreement signed between Moldovagaz S.A. and PAO Gazprom. Although the agreement concluded between Moldovagaz S.A. and PAO Gazprom appeared to indicate a quantity of 406 million cubic meters to be supplied to the Republic of Moldova in December 2022 (including 217 million cubic meters for the Transnistria region), only 177 million cubic meters of natural gas were supplied.

We must also mention that in 2014 a new transport system operator was established: Î.S. Vestmoldtransgaz, later became Vestmoldtransgaz S.R.L. Associates Vestmoldtransgaz S.R.L. are Eurotransgaz S R L. (holding 75% of the share capital and wholly owned by Transgaz S.A. (Romania)) and the European Bank for Reconstruction and Development (25% of the share capital). Vestmoldtransgaz S.R.L. operates the gas interconnector Iasi (Romania) - Ungheni (Republic of Moldova) (with a total length of 43.2 km) and the natural gas pipeline Ungheni - Chisinau. The gas interconnector Iasi (Romania) - Ungheni (Republic of Moldova) and the natural gas pipeline Ungheni - Chisinau are active, and on December 3, 2022, one million cubic meters of natural gas were transported with their help.

Further, according to Art. 10 of Law no. 108 of May 27, 2016 "regarding natural gas", the following activities are subject to licenses issued by ANRE:

- ✓ natural gas production.

- ✓ natural gas transportation.
- ✓ natural gas distribution.
- ✓ natural gas storage.
- ✓ natural gas training.
- ✓ supply of natural gas.
- ✓ sale of compressed natural gas for vehicles at gas stations; and
- ✓ ownership of the natural gas transmission networks in case of the appointment of an independent system operator.

According to the data published by ANRE on its official website, ANRE issued two licenses for the transport of natural gas (to Moldovatrangaz S.R.L. and Vestmoldtransgaz S.R.L.), 25 licenses for the supply of natural gas at regulated rates, 21 licenses for the distribution of natural gas and 5 licenses for the supply of natural gas at unregulated rates (with the help of filling stations).

Now, the Republic of Moldova has the following natural gas interconnection points with Ukraine and Romania

Republic of Moldova - Ukraine:

- Ananiev-Tiraspol-Ismail (Grebeniki);
- Razdelinaia - Ismail (Grebeniki);
- Sebelinca - Dnepropetrovsk - Krivoi Rog - Ismail (Grebeniki);
- Ananiev - Chernivtsi - Bohorodchany (Alexeevca - Ananiev); and
- Odessa - Chisinau.

Republic of Moldova - Romania:

- Iasi - Ungheni

According to the Report on the activity of ANRE in 2021, the consumption of petroleum products in the Republic of Moldova is mainly ensured by imported petroleum products. In 2021, the volume of imported petroleum products was 883,287 tons (648,867 tons of diesel; 173,325 tons of gasoline; and 61,094 tons of liquefied petroleum gas).

The main supplier of petroleum products for the Republic of Moldova in 2020 was Romania (with a share of 56.20% for diesel and 99.35% for gasoline). Other notable suppliers of petroleum products are the Russian Federation, Turkey, Bulgaria, Turkmenistan, Belarus and Kazakhstan. In addition, according to the Energy Balance of the Republic of Moldova for 2021, a volume of 5,000 tons of petroleum products was covered by the means of primary production.

The main regulatory act that regulates the oil products sector in Moldova is Law no. 461 of July 30, 2001 "regarding the oil products market". The purpose of this law is to create an organizational, legal and economic framework to ensure the economic security of the Republic of Moldova and to regulate the import, transport, storage and sale of petroleum products, as strategic products. In this context, a licensing regime is provided for the following activities:

- ✓ import and wholesale of diesel and gasoline.
- ✓ import and wholesale sale of liquefied petroleum gas.
- ✓ retail sale of diesel and gasoline; and
- ✓ retail sale of liquefied petroleum gas.

Licenses are issued by ANRE for a period of 5 years. According to the data published by ANRE on its official website, 27 licenses were issued for the import and wholesale of diesel and gasoline, 14 licenses for the import and wholesale of liquefied petroleum gas, 82 licenses for the retail sale of diesel and gasoline using filling stations and 74 licenses for the retail sale of liquefied petroleum gas using filling stations".

According to the information published by the Agency for Energy Efficiency of the Republic of Moldova, the share of energy produced with the use of renewable sources in the final consumption of gross energy in 2020 was 25.06% (consisting mostly of biomass used for heating in rural areas). This share should increase in the next few years due to the current energy crisis. The increase in the amount of electricity generated from renewable sources in 2021 can be considered a sign of such potential development (116552000kWh) compared to 2020 (81353000kWh).

The concept of the Energy Strategy of the Republic of Moldova 2050 mentions that, since the Republic of Moldova does not have primary energy sources, the authorities must focus on renewable energy sources. In this context, the Moldovan authorities will support the construction of new renewable energy installations with a total installed capacity of 410MW.

5. Conclusions

The energy system of the Republic of Moldova was characterized by certain aspects:

Dependence on imports: The Republic of Moldova imports a large part of its energy, especially from Ukraine and Romania. This made the country vulnerable to regional energy price fluctuations.

Energy sources: in the Republic of Moldova, the main energy sources were electricity produced from thermal power plants based on fossil fuels, hydropower plants and electricity purchased from imports. The energy sector has been characterized by a gradual shift towards renewable energy sources such as solar and wind, but this transition has been gradual.

Infrastructure: The energy infrastructure of the Republic of Moldova was constantly developing, but additional investments and modernization were needed to ensure a stable and efficient supply of electricity.

Market liberalization: Moldova has expressed its desire to continue liberalizing its energy market, promoting competition between energy suppliers and encouraging foreign investment in the energy sector.

Energy efficiency: Like many other countries, the Republic of Moldova has been interested in improving its energy efficiency, reducing energy consumption and implementing energy conservation measures, conservation of energy.

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