

INVESTMENTS IN ENERGY STORAGE SYSTEMS AS A DRIVER OF COMPETITIVENESS IN THE RENEWABLE ENERGY SECTOR OF MOLDOVA

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Abstract. The rapid expansion of renewable energy sources (RES) in Moldova has created both opportunities and challenges for the national energy system. Intermittent generation from solar and wind power leads to frequent imbalances between electricity production and consumption, resulting in inefficiencies, higher system costs, and potential risks to energy security. In this context, large-scale energy storage systems (ESS) have emerged as a critical solution to enhance the flexibility, stability, and efficiency of the energy sector.

The purpose of this study is to assess the role of investments in ESS as a factor of economic growth and enterprise competitiveness in Moldova. The research focuses on evaluating how ESS integration can mitigate the volatility of renewable energy generation, reduce dependence on imported electricity, and improve energy reliability for enterprises. The study employs a comparative analysis of international experiences, combined with an assessment of Moldova's investment potential, regulatory framework, and current barriers. Financial models, state incentives, and innovation-driven adoption strategies are also examined.

The findings indicate that strategic investments in ESS can provide multiple benefits. At the enterprise level, ESS reduces energy costs, lowers exposure to price fluctuations, and increases operational resilience. At the macroeconomic level, energy storage enhances national energy security, supports the efficient utilization of RES, and contributes to Moldova's alignment with the EU Green Deal and sustainable development goals. The study concludes that targeted ESS investments represent a significant opportunity to strengthen the competitiveness of Moldovan enterprises, stimulate innovation, and foster long-term economic resilience.

Keywords: Energy storage systems; renewable energy; investments; economic growth; innovation; sustainability

JEL Classification: Q42, Q43, Q48, O13

1. Introduction

The rapid expansion of renewable energy sources (RES) worldwide and in the Republic of Moldova creates new opportunities for sustainable development and the reduction of dependence on fossil fuels. In recent years, the accelerated deployment of solar and wind generation has contributed to the decarbonization of the economy and the country's integration into the European energy space. However, the inherent intermittency of RES electricity generation leads to imbalances between production and consumption, increasing systemic risks, raising costs, and reducing the reliability of energy supply.

In Moldova, this challenge is particularly acute due to the limited flexibility of the national energy system, insufficient balancing capacities, and a high dependence on imported energy resources. Under these circumstances, the deployment of energy storage systems (ESS) emerges as a key strategic direction. ESS technologies enable the smoothing of generation fluctuations, enhance grid resilience, stimulate new investments, and ultimately strengthen the competitiveness of the renewable energy sector.

The purpose of this paper is to examine the role of investments in ESS as a factor in enhancing the competitiveness of Moldova's renewable energy sector. The study addresses

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international experience, national specificities, and the prospects for the development of energy storage technologies, as well as their implications for the energy transition and the country’s economic growth.

2. Research results

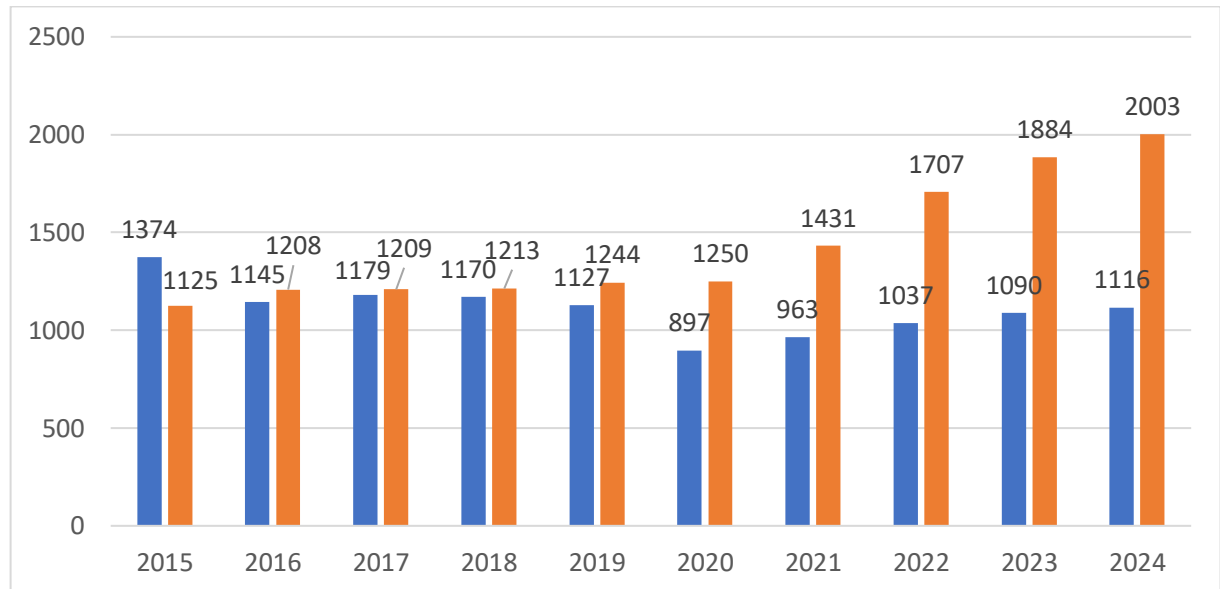


Figure 1. Global investment in Clean Energy and Fossil Fuels, 2015-2024

Source: own work based on (Statista, 2025)

According to the chart, we observe that investments in the energy sector have steadily increased over the past ten years, while investments specifically in renewable energy have grown even more significantly. This indicates a continuing trend of rising investments, particularly in the field of renewable energy.

Let us now examine the renewable energy capacities commissioned over the past decade at the global, European, and Moldovan levels.

Table 1. Capacity of renewable energy sources commissioned in 2015-2024.

Indicators	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
World power, MW	1 851 114	2 019 709	2 187 425	2 358 285	2 542 854	2 812 981	3 075 931	3 378 790	3 862 881	4 448 051
Growth compared to the previous year, %		9%	8%	8%	8%	11%	9%	10%	14%	15%
Capacity in Europe, MW	463 982	487 282	511 310	535 501	572 231	606 045	647 049	705 139	778 511	848 627
Growth compared to the previous year, %		5%	5%	5%	7%	6%	7%	9%	10%	9%
Power in Moldova, MW	69	71	81	106	110	116	153	255	422	538
Growth compared to the previous year, %		3%	14%	31%	4%	5%	32%	67%	65%	27%

Source: own work based on (IRENA, 2025)

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As we can see from the table, the installed capacities of renewable energy power plants have increased both globally and in Europe as well as in Moldova. While worldwide growth ranged from 8% to 15% year-on-year, and in Europe from 5% to 9%, in Moldova it varied between 3% and 67%, particularly in recent years. The trend of deploying new renewable energy capacities in Moldova is expected to continue in the future.

Let us now examine the structure of renewable energy capacities commissioned in Moldova as of the end of July 2025.

	Producer			Net Accounting	Net invoicing	TOTAL
	Law 160-XVI/2007	Law 10/2016/fixed tariff	Free market			
Solar panels	0,59	139,62	241,38	115,31	48,71	545,61
Wind power plants	27,23		187,35			214,58
Biogas	5,17	1,99				7,16
Hydropower	0,25		16,5			16,75
Total	33,24	184,11	439,94	115,31	58,43	784,09

Figure 2. Installed electricity production capacities from RES in MW as of 01/08/2025.

Source: own work based on (CNED, n.d.)

Compared to 2024, installed capacities increased by 46%, mainly due to the expansion of solar panels and, to a lesser extent, wind power plants. With the growth of newly commissioned renewable energy capacities, particularly solar and wind power plants, the imbalance between electricity production and consumption is increasing. Solar power plants are characterized by fluctuations in electricity generation depending on the season, time of day, and current weather conditions. For example, solar power plants produce significantly less electricity during the winter months and much more in summer. Electricity is generated during daylight hours, whereas at night—when peak demand often occurs, no generation takes place. Cloudy or rainy weather, as well as heavy cloud cover, can also reduce output. Electricity generation at wind power plants is likewise influenced by seasonal factors, wind availability, and geographical conditions. The instability, variability, and unpredictability of solar and wind energy pose serious challenges for the operation and management of the power system, affecting its resilience, reliability, stability, and predictability.

Analyzing the data from the table over the course of the year, it can be observed that the installed capacity of renewable energy sources (RES) in early 2025 reaches its maximum relative to peak monthly energy demand during the spring and autumn months, amounting to 112%. With the further addition of new capacities, this indicator may continue to rise and could exceed peak demand in other months as well. Since it is well known that power plants generate only a fraction of their installed capacity throughout the year, we determined that the maximum value relative to peak demand reaches 24% in autumn.

The time of day when solar and wind power plants jointly generate their maximum output falls between 9:00 a.m. and 3:00 p.m. As a result, we identified that the maximum generation relative to peak demand reaches 46% during the summer period, which indicates that moments

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when RES generation exceeds peak demand are relatively rare. However, since peak demand most often occurs during morning and evening hours, there may be instances during daytime when electricity supply exceeds demand.

Table 2. Maximum electricity consumption, power and peak production in Moldova at the end of July 2025

Indicator	January	February	March	April	May	June	July	August	September	October	November	December
Maximum peak consumption of MW per unit of time per year	948	948	750	700	700	900	900	900	700	700	750	948
Solar panel power, MW	545,61	545,61	545,61	545,61	545,61	545,61	545,61	545,61	545,61	545,61	545,61	545,61
Wind energy power, MW	214,58	214,58	214,58	214,58	214,58	214,58	214,58	214,58	214,58	214,58	214,58	214,58
Other RES, MW	23,91	23,76	23,76	23,76	23,76	23,76	23,76	23,76	23,76	23,76	23,76	23,76
Total RES capacity, MW	784,10	783,95	783,95	783,95	783,95	783,95	783,95	783,95	783,95	783,95	783,95	783,95
Ratio of RES power to peak values, %	83%	83%	105%	112%	112%	87%	87%	87%	112%	112%	105%	83%
Average power used by wind turbines, MW	66	66	66	50	50	50	50	50	50	66	66	66
Average power consumed by solar panels, MW	27	27	71	82	82	131	131	131	82	76	71	27
Total average power, MW	118	117	161	155	155	204	204	204	155	167	161	117
Ratio of average power to peak values, %	12%	12%	21%	22%	22%	23%	23%	23%	22%	24%	21%	12%
Maximum power of solar and wind power plants from 9:00 to 15:00	139	141	287	297	297	417	417	417	297	289	271	139
Ratio of RES peak production to peak demand 9:00 to 15:00	15%	15%	38%	42%	42%	46%	46%	46%	42%	41%	36%	15%

Source: own work based on cned.gov.md, logos-pres.md, Energocom.md, MyBusiness.md, ener-gy.com.ua, www.lnln.gov, solar.md, e-solarpower.ru

Table 3. Ratio of renewable energy generation to average purchases over twelve months, based on latest capacity at the end of July 2025

Indicator	January	February	March	April	May	June	July	August	September	October	November	December	Total
Average electricity purchases, MW	434 000	403 000	384 000	339 000	321 069	334 613	364 810	343 271	352 000	344 343	380 000	499 894	4 500 000
Electricity production by wind power plants according to average capacity, MW	49 417	44 635	49 417	35 689	36 879	35 689	36 879	36 879	35 689	49 417	47 823	49 417	507 830
Electricity production by solar power plants according to average capacity, MW	20 297	18 332	52 771	58 926	60 890	94 281	97 424	97 424	58 926	56 831	51 069	20 297	687 469
Electricity production by other types of renewable energy power plants according to average capacity, MW	12 446	11 171	12 368	11 969	12 368	11 969	12 368	12 368	11 969	12 368	11 969	12 368	145 702
Total production from renewable energy sources according to the latest capacity, MW	82 160	74 139	114 557	106 584	110 137	141 939	146 671	146 671	106 584	118 616	110 861	82 082	1 341 000
Ratio of renewable energy production to average electricity purchases, %	19%	18%	30%	31%	34%	42%	40%	43%	30%	34%	29%	16%	30%

Source: own work based on cned.gov.md, logos-pres.md, Energocom.md, MyBusiness.md, ener-gy.com.ua, www.lnln.gov, solar.md, e-solarpower.ru

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Analyzing the table, we can see that, given the currently commissioned RES capacities and the calculated amount of electricity to be produced throughout the year in relation to total electricity consumption, the share reaches 30%. During the year, the maximum ratio of generation to consumption occurs in the summer period, peaking at 43% in August. Considering that the trend of commissioning new RES power plants is expected to continue, this indicator will approach close to 100% of total consumption.

We observe that the risks of imbalance between production and consumption are increasing. To address this, it is necessary to develop a well-interconnected grid with neighboring countries for exporting surplus electricity and importing when needed, or alternatively, to expand the deployment of energy storage systems.

Many European countries have already faced similar challenges, and they were compelled to sell electricity at negative prices, curtail production, or introduce energy storage solutions

Table 4. Hours with negative prices in Europe

Year	UK	France	Germany	Spain
2020	0	102	298	0
2021	7	64	139	0
2022	26	12	83	0
2023	106	144	292	0
2024	179	356	468	247

Source: own work based on komersant.ua

Last year, European power markets experienced record periods of negative electricity prices as the rapid expansion of wind and solar capacity boosted generation. In Germany, according to Epex Spot, this indicator increased by 60% compared to the previous year, reaching 468 hours. In France, the number of hours with negative prices more than doubled, amounting to 356.

On the sunniest or windiest days, electricity can overwhelm the grid, causing prices to drop below zero and leading to situations where consumers are paid to use electricity. However, due to the structure of subsidies for renewable energy producers, some generators are incentivized to continue producing even when prices fall below zero, further distorting the market. Experts are calling on governments to adjust these mechanisms in order to reduce the frequency of negative prices. (Renew, 2023)

In the absence of ESS, renewable energy surplus is often curtailed, meaning that power plants are forced to reduce their output. In 2024 alone, seven European countries lost a total of €7.2 billion worth of renewable energy due to the inability to connect it to the grid, including €3.3 billion in Germany as a result of redispatch measures. Meanwhile, more than 1,700 GW of renewable energy projects remain in the connection queue. (Dzikowski, 2025)

Table 5. Curtailment of electricity generation (%) in several European countries

Indicator	Germany	Greece	Spain	Ireland
Curtailment of RES generation (%)	3,50%	3,50%	2,90%	6%-10%

Source: own work based on strategicenergy.eu, pv-magazine.com, ess-news.com, consult.eirgrid.ie

In Europe, curtailment has increased in certain areas and is expected to rise further. Research and analytical studies show that batteries and long-duration energy storage (LDES) can significantly reduce economic curtailment. On average, curtailment has ranged from 3.5% to 10%,

depending on the region or country. European countries are seeking to reduce curtailment through the deployment of energy storage systems or pumped hydro storage facilities.

The effect of storage deployment varies across countries:

Spain – Modeling shows that batteries with 200 Wh of storage per 1 kW of PV capacity can substantially reduce curtailment; in some nodes curtailment could be reduced by up to 80% (research estimate). According to the same study, after the deployment of battery storage, curtailment could fall to 0.5–1% (with batteries of around 200 Wh/kW PV). (ESS News, 2025).

Germany – Published assessments and analysts’ comments highlight that batteries reduce hours with negative electricity prices and improve grid flexibility; however, the current scale of ESS is still insufficient to fully eliminate curtailment. Significant capacity expansion will be required. A modeled estimate suggests that adding +2–5 GW of batteries would reduce negative price hours and curtailment. (Reuters, 2024).

Ireland – After the deployment of battery storage, curtailment of renewable electricity generation is expected to decrease to 1–3%, depending on battery capacity (empirical data). (Doherty et al., 2024)

As for Moldova, already today, depending on weather conditions and electricity demand, there are times when production exceeds consumption. The excess is redistributed into the grid, which is interconnected with neighboring countries. At peak demand hours, Moldova also imports electricity from these networks. Imports are mainly secured through bilateral contracts with companies from Romania and Ukraine, while part of the electricity is purchased on the Romanian Opcom exchange. Importantly, it is during peak demand periods—morning and evening hours—that additional purchases are made on the exchange, where prices are significantly higher than under bilateral contracts.

Let’s look at the electricity procurement structure in Moldova for August 2025

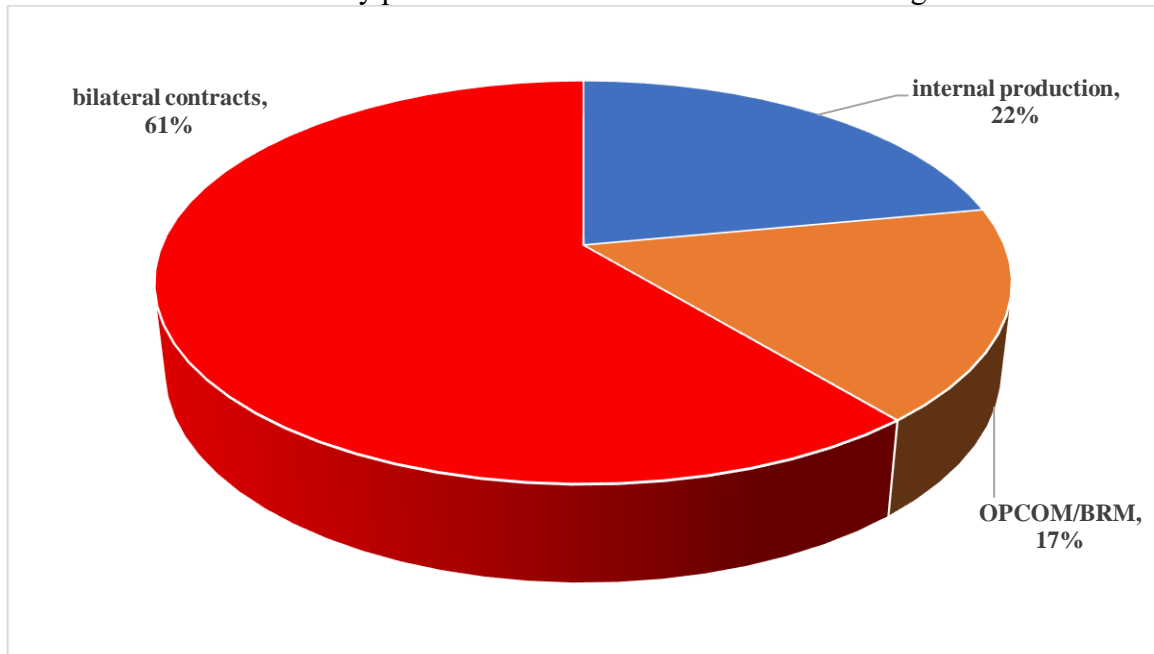


Figure 3. Electricity procurement structure in Moldova for August 2025

Source: authors own study or based on Energocom, 2025

As we can see, 17% of the required electricity was purchased on the exchange. In the winter months, exchange purchases reached up to 25%. The average purchase price in August amounted to €121.17/MWh, while the average exchange purchase price for 2024 was €200/MWh. Considering that the pace of renewable power plant deployment in Moldova will continue, the country could reach the European curtailment level of 3%.

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Table 6. Savings in case of reduction of purchases on the electricity exchange through the use of accumulated energy.

Indicators	Meaning
Estimated production from renewable energy sources according to the latest capacity, MW	1 341 000
Curtailement of RES generation (%)	3%
Average purchase price in August 2025 EUR/MW	121,17
The purchase price on the exchange is 2024 euros/MW.	200
Calculated curtailement of generation, MW	40 230
Savings in case of reduced purchases on the exchange, EUR	8 046 000
Savings in case of reducing purchases on the exchange and not selling abroad at the average purchase price, EUR	3 171 331

Source: own work based on cned.gov.md, logos-pres.md, Energocom.md, MyBusiness.md, ener-gy.com.ua, www.llnl.gov, solar.md, e-solarpower.ru

As we can see from the table, with the current RES capacities and applying the European curtailement limits, we obtain a production curtailement in MW. Considering that these volumes are purchased by Moldova during peak hours on the exchange, storing the excess energy in energy storage systems during periods of overproduction and then using it during peak consumption hours would result in savings of 8 046000 EUR.

If Moldova exports the surplus energy to neighboring countries and we use the country’s average purchase prices for the calculation, storing this energy and subsequently using it during peak hours would result in savings of 3 171 331 EUR.

3. Conclusion

The growth of renewable energy sources in Moldova is accompanied by an increasing imbalance between electricity production and consumption due to the variability of solar and wind generation. The limited flexibility of the national power system and high dependence on imports make this issue particularly critical.

The deployment of energy storage systems (ESS) allows for smoothing fluctuations in generation, enhancing grid resilience and economic efficiency by reducing losses from overproduction and price drops. With ESS, excess energy is stored, which increases the effectiveness of investments in renewable energy. Losses in the network are reduced, as ESS can be installed locally near consumers. ESS act as “reserve capacity,” stabilizing frequency and voltage in the grid. They decrease dependence on external supply (which is particularly important for Moldova, given its high import dependency) and improve supply reliability for enterprises—resulting in fewer outages and more stable prices. International experience shows that ESS significantly reduce curtailement and contribute to lowering negative electricity prices.

For Moldova, the use of ESS could save millions of euros annually, optimize electricity consumption and purchases, enhance the competitiveness of the renewable energy sector, and accelerate the country’s integration into the European energy market.

References:

1. Lagutins, N. (2024) Battery Energy Storage Systems for Wind Farm Integration and Curtailement Reduction: A Case Study in Ireland. Technological University Dublin. Available at: https://www.researchgate.net/publication/377500304_Battery_Energy_Storage_Systems_for_Wind_Farm_Integration_and_Curtailement_Reduction_A_Case_Study_in_Ireland [Accessed 29 September 2025].
2. Eckert, V. (2024) 'Germany, EU must match green power roll-out with more batteries, says Ember', Reuters, 25 September. Available at: https://www.reuters.com/markets/europe/germany-eu-must-match-green-power-roll-out-with-more-batteries-says-ember-2024-09-25/?utm_source=chatgpt.com [Accessed 29 September 2025].

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“Competitiveness and Innovation in the Knowledge Economy”
September 26-27, 2025
Chisinau, Republic of Moldova

3. Sanchez Molina, P. (2025) 'Batteries with 200 Wh storage per kW of solar capacity could mitigate curtailment in Spain', *ESS News*, 1 July. Available at: https://www.ess-news.com/2025/07/01/batteries-with-200-wh-storage-per-kw-of-solar-capacity-could-mitigate-curtailment-in-spain/?utm_source=chatgpt.com [Accessed 29 September 2025]
4. Dzikowski, R. (2025) 'Turning curtailment into capacity: why Europe must rethink energy storage — now', *Energy Central*, 15 June. Available at: <https://www.energycentral.com/energy-management/post/turning-curtailment-into-capacity-why-europe-must-rethink-energy-storage--hKzJHUCVsRXSdt6> [Accessed 29 September 2025].
5. Farhat, E. (2025) 'Europe's negative power prices undermine 2030 clean energy goals', *Bloomberg*, 10 January. Available at: <https://www.bloomberg.com/news/articles/2025-01-10/europe-s-negative-power-prices-undermine-2030-clean-energy-goals> [Accessed 30 September 2025].
6. Сидорович, В. (2022) 'Мощности ВИЭ в мире вырастут на 2400 ГВт в период 2022–2027 гг.', *RenEn*, 6 декабря. Available at: <https://renen.ru/moshhnosti-vie-v-mire-vyrastut-na-2400-gvt-v-period-2022-2027-gg/> [Accessed 29 September 2025].
7. Остафійчук, Я. (2025) 'Record negative electricity prices in Europe: what's going on', *Komersant Ukrainian*, 3 января. Available at: <https://komersant.ua/en/rekordni-minusovi-tsiny-na-elektroenerhiu-v-yevropi-shcho-vidbuvaietsia/> [Accessed 29 September 2025].
8. CNED (2025) 'Capacități instalate', *Centrul Național pentru Energie Durabilă*. Available at: <https://cned.gov.md/ro/content/capacitati-instalate> [Accessed 29 September 2025].
9. Фомин, И. (2025) 'В Молдове может появиться бесплатная электроэнергия', *Logos Press*, 25 марта. Available at: <https://logos-pres.md/v-moldove-mozhet-poyavitisya-besplatnaya-elektroenergiya/> [Accessed 29 September 2025].
10. Nigai, B. (2025) 'Cum s-a aprovizionat Republica Moldova cu energie electrică în 2024?', *Moldova 1*, 24 ianuarie. Available at: https://moldova1.md/p/42891/cum-s-a-aprovizionat-republica-moldova-cu-energie-electrica-in-2024-?utm_source=chatgpt.com [Accessed 29 September 2025].
11. Statifacts (2025) 'From 2015 to 2024, clean energy investment nearly doubles fossil fuel spending', *Statifacts*, 13 June. Available at: https://www.statifacts.com/chart-detail/clean-energy?utm_source=chatgpt.com [Accessed 29 September 2025].
12. Energocom SA (2025) 'Achizițiile de energie electrică în august', *Energocom.md*, 2 septembrie. Available at: <https://energocom.md/achizitiile-de-energie-electrica-in-august/> [Accessed 30 September 2025].
13. Energocom SA (2024) 'Achizițiile de energie electrică în anul 2024: surse și prețuri', *Energocom.md*. Available at: <https://energocom.md/achizitiile-de-energie-electrica-in-anul-2024-surse-si-preturi/> [Accessed 29 September 2025].
14. Energocom SA (2025) 'În luna mai S.A. Energocom va livra cca 321 069 MWh de energie electrică pentru consumatorii de pe malul drept al Nistrului', *Energocom.md*. Available at: <https://energocom.md/in-luna-mai-sa-energocom-va-livra-cca-321-069-mwh-de-energie-electrica-pentru-consumatorii-de-pe-malul-drept-al-nistrului/> [Accessed 29 September 2025].
15. Energocom SA (2025) 'Prognoza achizițiilor de energie electrică pentru luna octombrie', *Energocom.md*. Available at: <https://energocom.md/prognoza-achizitiilor-de-energie-electrica-pentru-luna-octombrie/> [Accessed 29 September 2025].
16. Energocom SA (2025) 'În septembrie, 88% din necesarul de energie electrică pentru malul drept al Nistrului va fi achiziționată de la centrala de la Cuciurgan', *Energocom.md*. Available at: <https://energocom.md/in-septembrie-88-din-necesarul-de-energie-electrica-pentru-malul-drept-al-nistrului-va-fi-achizitionata-de-la-centrala-de-la-cuciurgan/> [Accessed 29 September 2025].
17. Energocom SA (2025) 'A fost coordonat graficul de livrare a energiei electrice de la MGRES în luna iunie', *Energocom.md*. Available at: <https://energocom.md/a-fost-coordonat-graficul-de-livrare-a-energiei-electrice-de-la-mgres-in-luna-iunie-2/> [Accessed 29 September 2025].
18. Energocom SA (2025) 'Prognoza achizițiilor de energie electrică pentru luna august', *Energocom.md*. Available at: <https://energocom.md/prognoza-achizitiilor-de-energie-electrica-pentru-luna-august/> [Accessed 29 September 2025].
19. Energocom SA (2024) 'Achizițiile de energie electrică în primele două trimestre ale anului 2024', *Energocom.md*. Available at: <https://energocom.md/achizitiile-de-energie-electrica-in-primele-doua-trimestre-ale-anului-2024/> [Accessed 29 September 2025].
20. Energocom SA (2024) 'Cantitățile de energie electrică cumpărate de S.A. Energocom în trimestrul 3 al anului 2024', *Energocom.md*. Available at: <https://energocom.md/cantitatile-de-energie-electrica-cumparate-de-sa-energocom-in-trimestru-3-al-anului-2024/> [Accessed 29 September 2025].

Annual International Scientific Conference
“Competitiveness and Innovation in the Knowledge Economy”
September 26-27, 2025
Chisinau, Republic of Moldova

21. Energocom SA (2025) 'În noiembrie va crește cantitatea energiei electrice achiziționate de pe piața locală și din România', *Energocom.md*. Available at: <https://energocom.md/in-noiembrie-va-creste-cantitatea-energiei-electrice-achizitionate-de-pe-piata-locala-si-din-romania/> [Accessed 29 September 2025].
22. Energocom SA (2025) 'A fost coordonat graficul de livrare a energiei electrice de la MGRES în luna iunie', *Energocom.md*. Available at: <https://energocom.md/a-fost-coordonat-graficul-de-livrare-a-energiei-electrice-de-la-mgres-in-luna-iunie/> [Accessed 29 September 2025].
23. Lawrence Livermore National Laboratory. (2012). *Power generation is blowing in the wind*. [online] Available at: <https://www.llnl.gov/article/37626/power-generation-blowing-wind> [Accessed 29 Sep. 2025].
24. Solar.md. (2023). *Сколько реально выдают солнечные панели?* [online] Available at: <https://solar.md/sovety/skolko-realno-vydayut-solnechnye-paneli/> [Accessed 29 Sep. 2025].
25. E-SolarPower. (n.d.). *Калькулятор солнечных батарей - расчет выработки энергии*. [online] Available at: <https://e-solarpower.ru/kalkulyator-vyrabotki-sb/> [Accessed 29 Sep. 2025].
26. Смирнов, А. (2025). *Сколько вырабатывает ветрогенератор энергии в час?* [online] ENER-GY. Available at: <https://ener-gy.com.ua/blog/skolko-vrabatvaet-vetrogenerator-v-chas-energyy/> [Accessed 30 Sep. 2025].
27. MyBusiness.md. (n.d.). *Ветровая энергетика в Молдове развивается, хотя и очень медленно*. [online] Available at: <https://mybusiness.md/ru/categories/analitika-i-rassledovaniya/item/29174-vetrovaya-energetika-v-moldove-razvivaetsya-khotya-i-ochen-medlenno> [Accessed 29 Sep. 2025].
28. IRENA, 2025. *Renewable capacity statistics 2025*. International Renewable Energy Agency. [pdf] Available at: <https://www.rinnovabili.it/wp-content/uploads/2025/07/IRENA-RENEWABLE-CAPACITY-STATISTICS-2025.pdf> [Accessed 29 Sep. 2025].