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HELLENIC ASSOCIATION for ENERGY ECONOMICS

20 | 25

REMARC

ROMANIAN ENERGY MARKET ANNUAL REPORT

by CIGA & HAEE

POWERED BY

BCR

IN COOPERATION WITH

energynomics

REMARC

Romanian Energy Market Annual Report

By CIGA & HAEE

2025

Ciga Energy. Advisory

CIGA Energy Advisory

CIGA Energy Advisory (CEA), a proud member of the RCI Holding, is a specialized boutique advisory firm delivering high-impact solutions across the energy value chain. Drawing on more than 25 years of group experience and a portfolio of over 3,000 completed projects in 18 countries, RCI Holding combines deep sector expertise with innovation-driven consulting.

CEA has become a trusted advisor for shaping strategies and operations in electricity, gas, district heating, and sustainable energy solutions. With a multidisciplinary team and strong regional partnerships, and guided by ESG principles and a commitment to decarbonization, CEA empowers clients to align with European Green Deal objectives while ensuring competitiveness, resilience, and energy security. Projects delivered throughout the CSE region allow CEA to leverage lessons learned from different economic environments and varying levels of client size and maturity. Recent years saw CEA become an advisor of choice for international investors in RES projects, having also supported hundreds of assessments and transactions in this field.

RCI Holding supports governments, regulators, utilities, and private investors in navigating today's complex energy landscape. Its services span regulatory and market advisory, project finance, renewable energy development, energy trading, balancing responsibility, and digital innovation, including advanced forecasting, AI/ML applications, and cybersecurity. The company also provides technical assistance, project preparation, and owner's engineering services for large-scale infrastructure projects.

Hellenic Association for Energy Economics

Hellenic Association for Energy Economics (HAEE) brings together all those who study, debate and promote the knowledge of energy, environment and economy in our country. HAEE is the Greek affiliate of the International Association for Energy Economics (IAEE), which is a non-profit research and professional organization acting as an interdisciplinary forum for the exchange of ideas and experiences among energy experts.

HAEE was founded in 2015 in Greece and has a global orientation welcoming the participation of researchers and practitioners from around the world interested in energy, environmental and economic related subjects. It acts as an independent consulting body for national and international organizations to whom it provides a broad contribution on issues related to energy, economics, policymaking and theory.

Through meetings and joint initiatives HAEE also provides a means of professional communication and exchange within its members and the authorities defining the Greek energy policy. HAEE organizes meetings amongst experts and specialists interested in networking - organizes conferences and seminars on both national and international levels - promotes training initiatives in the energy and economic sector - provides researches, studies and other services for its members.

HAEE promotes the understanding of energy, environment and economy related topics within universities and encourages the participation in the Association's activities of young students who are invited to seminars and conferences and can make use of the IAEE library for their academic works. HAEE is financially supported by member dues, contributions for research activities carried out for companies and bodies involved in the energy field, and by the sale of conference proceedings as well as conference fees and other initiatives.

Foreword by CIGA Energy Advisory

Cristina Popescu

COO, RCI Holding

It is with great pride that we present the Romanian Energy Market Annual Report by CIGA (REMARC), developed in close partnership with the Hellenic Association for Energy Economics (HAEE).

This publication marks not only a continuation of our commitment to provide high-quality insights into Romania's energy sector, but also a renewed call for collaboration and forward-looking action at a moment of profound transformation for the region.

Romania stands today at a pivotal point in its energy evolution. The country possesses a unique mix of advantages – strong domestic resources, a growing renewable base, strategic geographic positioning, and access to substantial European funding mechanisms. Yet, turning these structural strengths into long-term competitive advantages requires more than incremental progress. It demands vision, consistency, and a shared determination across institutions, the private sector, and society at large.

At CIGA Energy Advisory, we have long believed that Romania has the potential to emerge as a regional anchor for energy security and sustainable investment. The shift is already underway. From the acceleration of solar developments to the renewed interest in grid digitalization and the maturation of Romania's gas and district heating sectors, we see increasing momentum from investors and policymakers alike. The continued evolution of the market – whether through deeper integration of flexibility services, the rise of prosumers, or a stronger emphasis on innovation and data-driven decision making – signals a sector preparing for the future.

However, this transition is not without its complexities. Romania faces challenges that are familiar across Europe: an aging infrastructure that requires accelerated modernization, regulatory frameworks that must evolve with the pace of technology, and the imperative to maintain affordability during a period of global volatility. The country must also navigate an increasingly interconnected landscape, in which energy security, decarbonization, and competitiveness are no longer separate ambitions but deeply interdependent objectives.

In this context, REMARC aims to serve as both a mirror and a roadmap. It reflects where the Romanian energy sector stands today – its strengths, pressures, and inflection points – while offering insights into the opportunities that lie ahead. Our analysis rests on the conviction that good policy, responsible investment, and regional cooperation are the pillars of a resilient and sustainable energy system.

We are honored to support this journey and to contribute through research, expertise, and collaboration. I extend my deepest thanks to our partners at HAEE, and BCR, to the CEA team, and to the many stakeholders who continue to engage with us in shaping Romania's energy future. Together, we can turn today's challenges into tomorrow's opportunities.

Foreword by BCR

Sergiu Manea
CEO, Banca Comercială Română

The Romanian Energy Market Annual Report (REMARC), developed by CIGA Energy Advisory (CEA), offers an insightful analysis of Romania's energy sector. I am proud that BCR is one of the partners in this endeavor, and even prouder that we stand among the leading supporters of energy investment in Romania, helping to transform our energy system into a driver of innovation, sustainability, and regional leadership.

Energy has always been one of the great enablers of economic growth and competitiveness. Yet today, as the world enters a new phase of the energy transition, shaped by technology and geopolitical change, Romania finds itself in a unique position of strength. Therefore, the decisions we make now will determine our resilience and our place in Europe's future energy landscape.

Romania begins this transition with strong fundamentals. We have a diversified energy mix based on domestic gas, reliable hydro and nuclear power, and expanding solar and wind capacity - making our system one of the most resilient in Central and Eastern Europe. Moreover, with one of the lowest import dependencies in the EU and 68% clean electricity generation, Romania is well positioned to become a regional hub for both energy security and transition leadership.

The imperative now is to translate these advantages into long-term competitiveness. For investors, Romania offers a dynamic opportunity landscape: renewable expansion, grid and interconnection upgrades, digitalization, flexibility markets, and large-scale storage. For policymakers, the path is equally clear: treat energy as a national strategic pillar, accelerate permitting and infrastructure renewal, and mobilize both European and private capital to embed Romania within continental value chains, from advanced grids and battery systems to hydrogen and prosumer ecosystems.

For all of us, this report serves as a call to action and confirms a simple truth. Romania has the resources, the momentum, and the institutional capacity to turn the energy sector into a lasting strategic advantage. What matters now, and will define our future, is the power of execution. Which needs vision, speed, and coordination, altogether.

Foreword by HAEE

Prof. Dr. Kostas Andriosopoulos
BoD member, HAEE
Project Coordinator

This report is the result of a fruitful partnership between HAEE and the CIGA Energy and reflects the spirit of cooperation. Through joint research, data analysis, and expert dialogue, the study offers a comprehensive view of Romania's evolving energy landscape and its strategic position within Southeast Europe.

It captures not only the current dynamics of Romania's energy market but also the broader regional context in which Greece and Romania are called to work together — advancing shared goals of decarbonisation, integration, and energy security across the European Union.

Over the past decade, Romania has taken significant strides towards transforming its energy landscape. The steady liberalisation of its electricity and gas markets, investments in grid modernization, and its increasing participation in cross-border interconnections are gradually repositioning the country as a regional energy hub. Its ambitious targets for renewable energy underline a strong commitment to align with the European Green Deal's objectives and to deliver sustainable, affordable, and secure energy to its citizens and industries alike.
In this evolving environment, the synergy between Greece and Romania becomes not only relevant but essential. Both nations share a common strategic vision: to ensure that Southeast Europe becomes a stable, resilient, and sustainable energy corridor within Europe. Greece's experience in integrating renewables, advancing energy storage, and diversifying supply routes through LNG and interconnectors complements Romania's growing capacity in power generation and its position as a net energy producer in the region.

This collaboration is already visible across multiple dimensions — from the integration of electricity markets and cross-border interconnections under the SEE Coupling framework, to joint initiatives in research, innovation, and clean energy investment. As both countries advance their energy strategies for 2030 and beyond, the prospect of deeper bilateral engagement becomes increasingly compelling. Shared investments in renewable projects, grid resilience, hydrogen infrastructure, and digitalisation can open new pathways for regional growth, while fostering knowledge exchange and technological partnerships between companies, universities, and policy institutions.

The Hellenic Association for Energy Economics (HAEE) has long advocated for such regional collaboration, viewing it as a cornerstone of Southeast Europe's energy transition. Reports like this one on the Romanian energy market are designed to illuminate the opportunities, highlight challenges, and inspire action among policymakers, investors, and researchers. Romania's story is not one of transition alone — it is one of transformation, driven by the ambition to lead, the capacity to innovate, and the will to collaborate.

Looking ahead, I am confident that Greece and Romania, working together with our European partners, will continue to build a cleaner, more secure, and more competitive energy future — one that strengthens not only our markets but also the ties that unite our region. The decade ahead will be decisive, and Romania will undoubtedly play a pivotal role in shaping the new energy reality of Europe.

Foreword by Energynomics

Varinia Radu
CEO and co-founder of Energynomics

In every market shift, there is a moment when facts must meet trust. This report is one of those moments for Romania's energy community.

From Energynomics' perspective, the value of this report derives from its ability to translate global data and trends into the specific context of the Romanian market. As a media platform specializing in energy, Energynomics has documented every stage of Romania's energy transition for over a decade—from market liberalization to the explosion of investment in renewables and the urgent need to modernize the grid. The CIGA–HAEE report is now an essential tool for the energy community. For us, it is a welcome addition to journalistic analysis—a solid database and relevant projections for decision-makers, investors, and companies active in the local market.

Who will benefit most from this report
The Romanian Energy Market Assessment Report – REMARC is designed for those who make or influence strategic choices in energy — policymakers seeking to design credible transition pathways, investors and financiers assessing risk and opportunity, and business leaders navigating the competitive dynamics of Romania's evolving market. It will also serve researchers, analysts, and international partners aiming to understand how Romania fits within the broader energy transformation of Central and Southeastern Europe. For each of these audiences, the report offers a bridge between macroeconomic analysis and operational insight, turning statistics into strategic direction.

What the readers will find inside
The study opens with a comprehensive macroeconomic and market overview, grounding the reader in Romania's economic fundamentals, energy dependency profile, and emissions performance. This section traces how shifts in GDP growth, inflation, and industrial output shape energy demand and investment appetite, while also highlighting Romania's comparative position within the EU in terms of resource security and decarbonization progress.

The following chapters examine the core sectors of Romania's energy system — electricity, renewables, natural gas, and oil — each through the lens of data, structure, and trajectory. The electricity chapter details generation, consumption, pricing, and trade dynamics, illustrating Romania's move from exporter to importer and the implications for grid flexibility. The renewables section provides one of the most detailed accounts to date of installed capacity, generation patterns, PPA development, and permitting trends, particularly in solar and storage. Natural gas and oil chapters assess domestic production, infrastructure, and regional interconnectivity, revealing both Romania's enduring strengths and the modernization still required for long-term resilience.

Foreword by Energynomics

Finally, the report advances toward thematic chapters on energy transition and green finance, where decarbonization meets economics. Readers will find insight into carbon intensity trends, clean energy shares, and emerging technologies such as SMRs and EV infrastructure — complemented by a detailed review of green bonds, EU funding mechanisms, and Romania's ESG landscape. Taken together, these sections deliver a panoramic, data-driven view of the national energy landscape and its integration within Europe's evolving low-carbon future — a tool meant not just to inform, but to guide action.

Connecting information with decision-making

At a time when the energy transition is becoming increasingly integrated—economically, technologically, and geopolitically—collaborations between the analysis, research, and communication communities are more valuable than ever. For Energynomics, involvement in this project marks a natural continuation of our mission to connect analytical information with economic decision-making, to provide a platform for dialogue between those who shape the market and those who support it through investment and innovation. In an increasingly fragmented industry, where data circulates rapidly but often without context, the report provides a coherent and credible picture of Romania's energy sector — a market with high potential but still searching for a stable pace of transformation.

We are delighted to be part of this project and to facilitate knowledge sharing across the Romanian and regional energy communities. We will continue to support such initiatives that bring together data, expertise, and dialogue to strengthen informed decision-making and accelerate the energy transition.

For us, the added value of this report is measured not only in the accuracy of the data,

but also in the way it can be converted into decisions, projects, and sustainable public policies. In the following pages, readers will find not only an overview of the energy system, but also the benchmarks of a joint conversation between experts, authorities, and the private sector. This is, in essence, the role that Energynomics consistently pursues: to reduce uncertainty through applied knowledge and to steer public debate towards concrete solutions and opportunities, anchored in the realities and aspirations of Romania's energy future.

energynomics

Energynomics is Romania's leading communication platform dedicated to the energy industry, connecting companies, institutions, and experts across the full energy value chain. Since 2013, Energynomics has built a multi-channel ecosystem that combines editorial, event, and digital communication to foster dialogue and accelerate the country's energy transition.

Through its bilingual magazine, website, podcasts, video interviews, and more than 15 annual conferences and thematic forums, Energynomics provides high-quality information and networking opportunities for decision-makers in energy, finance, technology, and sustainability.

Our flagship events – such as the Energy Strategy Summit, the Energynomics Awards Gala, the Energy Efficiency series, and the Regional Approach forums – bring together policymakers, business leaders, investors, and innovators to identify solutions for a competitive and resilient energy system.

Coordinators

Zoltán Nagy-Bege, Energy Market director at CEA, brings more than 16 years of experience at the Romanian Energy Regulatory Authority (ANRE), where he held senior leadership positions, including Vice President and Director across several key departments such as the Natural Gas Market, Energy Efficiency, Renewable Energy and Cogeneration, and Thermal Energy. He also contributed in non-executive roles, serving as a member of the Regulatory Committee.

Over the past two years, he has led the regulatory practice at Ciga Energy Advisory, where he has been responsible for a range of projects focused on energy markets and regulatory policy.

Prof. Dr. Kostas Andriosopoulos is Af. Professor in Finance and Energy Management and the Director of the HELLENiQ ENERGY Center for Sustainability and Energy @Alba Graduate Business School. Kostas is a member in various professional and academic associations, including President of the Energy Committee of the American Hellenic Chamber of Commerce; Founder, former Chairman and active Member of the BoD of the Hellenic Association for Energy Economics; board member of the Global Gas Center - World Energy Council as a Gas and LNG markets expert; member of the board of the International Association for Energy Economics (IAEE); founding board member of the Financial Engineering and Banking Society. As of August 2018, he is the Country Manager of Akuo Energy in Greece.

Research Team

CEA Team

Luciana Cotutiu is the Deputy Director of the European Finance Department at RCI. With over 20 years of experience in public administration, she coordinated the preparation of programming documents by conducting informal negotiations with the European Commission services for 2014-2020 and 2021-2027 as well as for the National Recovery and Resilience Plan. She has an in-depth knowledge of the institutional mechanisms at European and national level, of the political and regulatory aspects related to the financing of national strategic projects. Luciana stands out for her expertise in the field of programs with both European and international funding, with a deep knowledge of the working methods of national, regional and central authorities. She also has a deep knowledge of the management cycle of projects financed from European funds managed directly by the European Commission.

Raul Toma, Managing Partner at EVOLVE, has more than 25 years of expertise in power utility sector, in DSOs and in services provided for distribution operators, experience in wholesale electricity market: forecasting and acquisition of electricity, experience in electricity metering: AMR systems, smart metering, experience in identifying, determining and reducing losses in electricity distribution grid and experience in providing services to distribution operators in terms of electricity measurement and field detection of fraudulent electricity consumption

HAEE Team

Konstantinos Sfetsioris is Senior Project Manager at Hellenic Association for Energy Economics. He holds an MSc in Mechanical Engineering with a postgraduate degree in Energy Production and Management from National Technical University of Athens. Since 2019, he has been an Advisor to the General Secretariat for Energy & Mineral Resources at the Ministry of Environment and Energy. He is a Regular Member of the Committee for the drafting of the National Hydrogen Strategy.

Ilias Tsopelas holds a bachelor (BSc) and a master's (MEng) degree in Mechanical Engineering from the National Technical University of Athens (NTUA). He is currently working as a Research Associate at the Hellenic Association for Energy Economics (HAEE), participating in EC-funded projects. His research profile focuses mainly on energy system modelling and analysis, and energy and climate policy assessment. He also has a computational research background.

Ciga Energy®
Advisory

Powering decisions. Supporting reliable execution.

CEA's aim is to deliver decisive insight, enabling reliable outcomes.

We combine strategic advisory, technical analysis, regulatory guidance and hands-on M&A support to offer investors and decision makers the clarity they need and the execution they can trust. Our strong track record in the Power and Utilities sector is a testament to our commitment for excellence.

Our dedicated, multi-disciplinary team turns complex technical and commercial challenges into measurable value, while ensuring alignment with modern sustainability principles.

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Executive Summary

Romania's energy sector stands at a critical juncture. The country benefits from robust domestic resources, notably natural gas, hydro, and nuclear, which keep its energy import dependency among the lowest in the EU at 34.5%. Yet, despite these structural advantages, Romania's progress toward EU climate and transition goals remains uneven. Economic headwinds, sluggish renewable deployment, and persistent fossil fuel reliance, especially in transport, constrain its decarbonization pathway.

After **years of steady expansion**, Romania's GDP growth slowed sharply to 0.9% in 2024 amid cyclical volatility and industrial exposure, while inflation (5.6%) continued to surpass EU averages, intensifying affordability pressures. Unemployment remains relatively stable at 5.2%, though shortages in skilled labor risk slowing down major energy transition projects. Fiscal fragility adds to investor uncertainty despite strong appetite for green finance.

Romania's **electricity market** reflects both its resilience and structural weaknesses. In 2024, generation totaled 52.45 TWh, slightly below consumption at 55.42 TWh, shifting the country from a net exporter to a net importer. Hydro and nuclear anchor system stability, but fossil fuels still play a substantial role. Wholesale prices remain volatile, averaging €93/MWh but spiking to €168/MWh in late 2024, highlighting the need for stronger grid flexibility, interconnections, and energy storage.

Renewables represent 25.8% of total energy, on par with the EU average, though growth has stagnated due to Romania's reliance on hydropower. Solar is the only dynamic segment, having doubled in capacity between 2021 and 2023, while wind power remains flat around 3 GW, limited by permitting and regulatory barriers. The absence of large-scale storage and grid modernization continues to constrain renewable integration.

Executive Summary

In **natural gas**, Romania's strong domestic base covers up to 90% of demand, ensuring one of Europe's most secure supplies. Still, seasonal imports persist in winter, and aging pipeline infrastructure — much of it over 30 years old — undermines efficiency and safety. Future energy security will hinge on developing Black Sea gas reserves and enhancing regional interconnections. In oil, domestic production meets only a quarter of demand, but Romania remains a net exporter of refined products thanks to its 240,000 bpd refining capacity. However, modernization is needed to meet EU standards. Transport, accounting for over 70% of oil demand, poses a significant decarbonization challenge.

The **clean share of electricity generation** reached 68% in 2024, supported by hydro and nuclear, yet the carbon intensity of power remains high (250–270 gCO_2/kWh), above the EU average. The EU ETS, with prices exceeding €65/tCO_2, is accelerating the shift away from fossil generation. Meanwhile, **green finance** momentum is strong: over $10 billion in green bonds were issued in 2024, and more than €70 billion in EU funds are available through national and cohesion mechanisms.

Romania's strengths lie in its resource base, low emissions, and emerging green finance ecosystem. Yet vulnerabilities persist in its dependence on diesel-driven transport, outdated infrastructure, and regulatory inefficiencies. With targeted reforms in permitting, grid modernization, and project management, Romania can turn current opportunities — notably EU funding, Black Sea gas, and solar expansion — into the foundations of a resilient, low-carbon energy future.

Credem în energie sustenabilă și afaceri responsabile.

Scanează aici
și află mai multe:

Ai încredere în tine.

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1. Country Profile

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Key Facts

GDP growth in 2024 was at 0.9%

2024 Inflation Rate is 5.6%

Unemployment rate for 2024 reached 5.5%

Permanent Resident Population for 2024 is 19,04 million

Energy domestic production for 2023 was 21,918 ktoe

Energy Dependency Rate for 2023 was at 34.5%

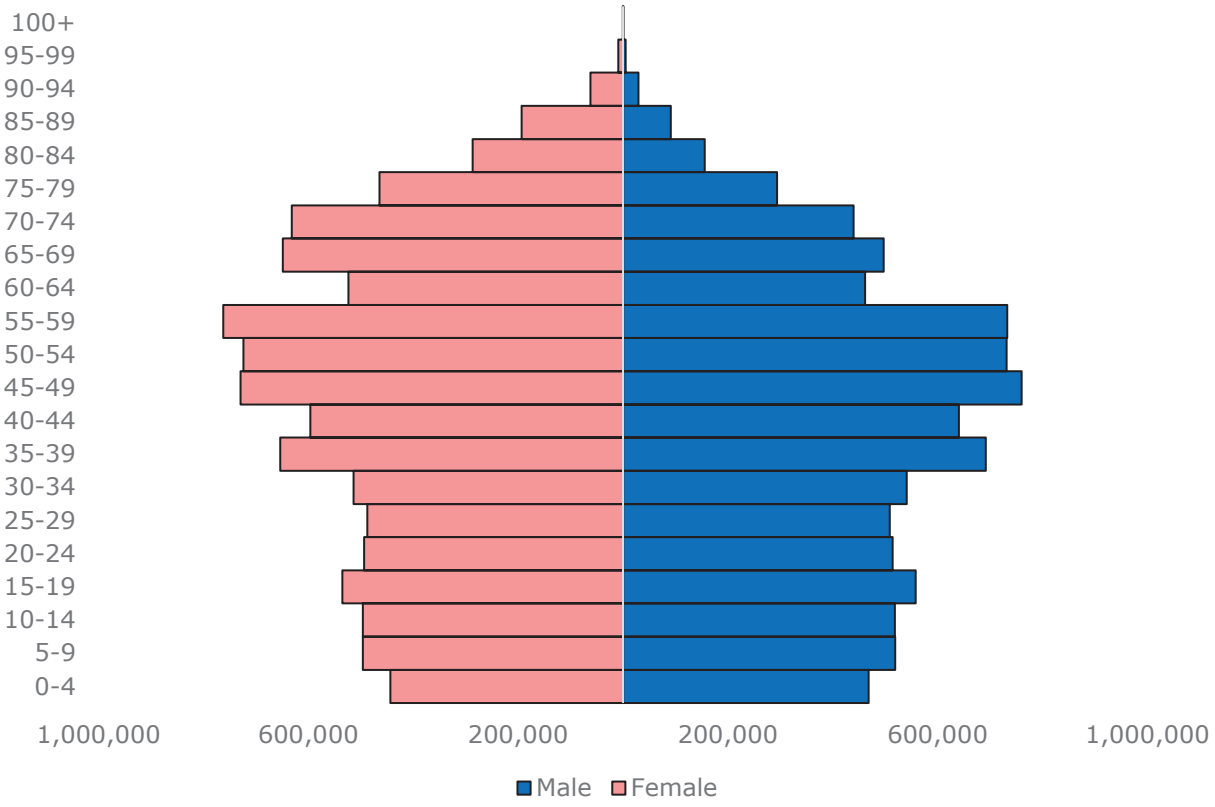
Emissions per capita was 2.97t_{CO2}, 2nd lowest in EU

Romania's already low CO_2 power mix is continuing its gradual shift from coal to renewables

The demographics of Romania will impact its future energy demand, social systems, and economic growth

- A shrinking working-age population signals future challenges in securing skilled labor for energy infrastructure projects, potentially slowing the pace of the transition.
- With women outliving men, many elderly households will be single-person. These dwellings are less efficient on a per-capita basis, creating higher energy needs.

Population by age and gender in Romania, [2025]



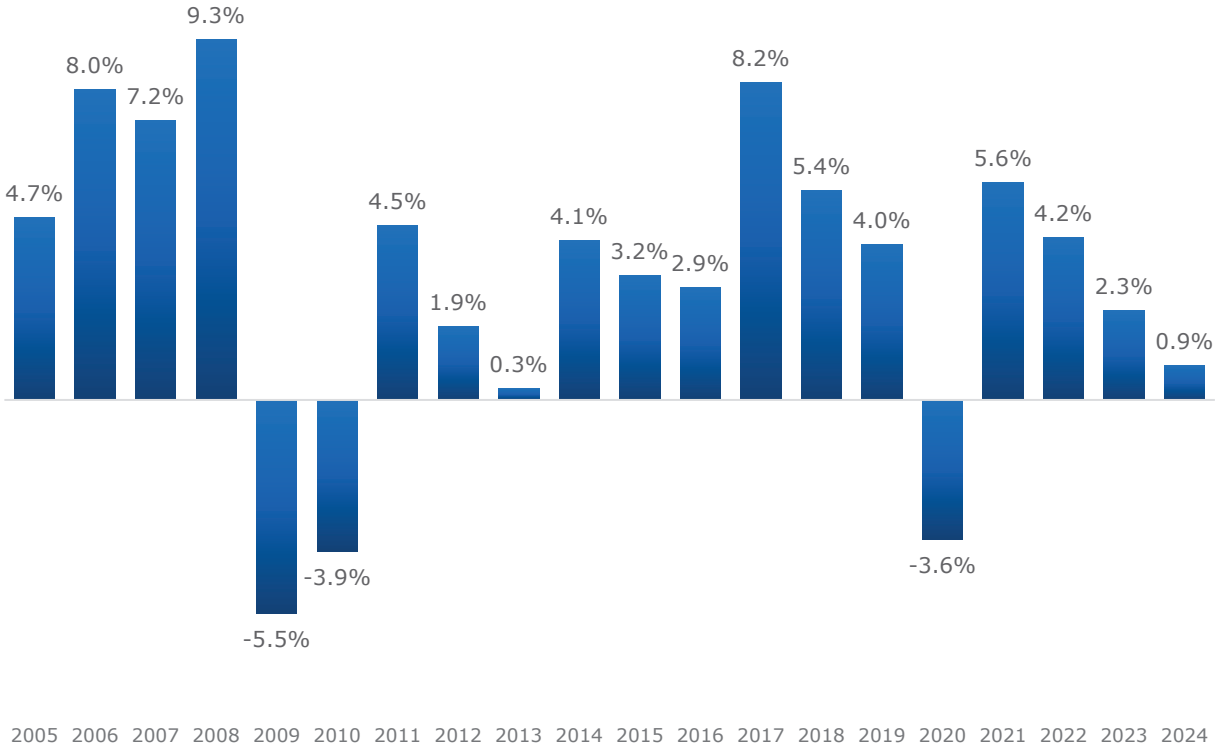
Source: UN

- A growing share of older citizens will increase demand for residential heating and cooling, as this group spends more time at home and is less flexible in adjusting consumption.
- Smaller younger cohorts suggest limited growth in new households, leading to slower increases in energy demand and shifting focus toward efficiency improvements.

Romania's GDP growth has been volatile, shaping energy demand cycles. The current path suggests moderate short-term consumption trends

- Despite downturns, Romania has repeatedly shown the ability to rebound quickly, creating a supportive environment for sustained energy transition investments.
- Romania's economy remains highly tied to manufacturing and construction, both energy-intensive sectors—meaning that economic downturns have an outsized effect on overall consumption and emissions.

Real GDP growth rate (%) in Romania, [2005-2024]



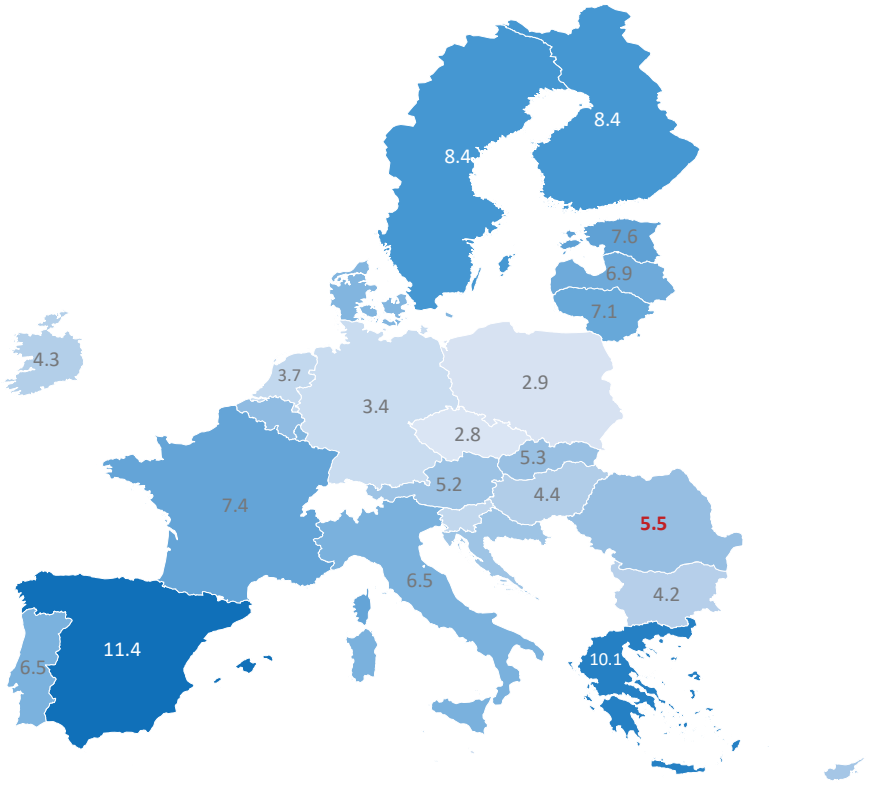
Source: INS

- Romania's economy has experienced strong cycles, with peaks above 6–8% and contractions such as –3.7% in 2020, that impacts industrial energy demand and complicates long-term investment planning for utilities and infrastructure.
- The strong recovery in 2021–22 boosted industrial output and electricity consumption, but momentum has since moderated, pointing to a steadying demand trajectory in the near future, but with potential for increase.

Romania's labor market is relatively stable, but the workforce development to support energy transition projects remains important

- Romania's unemployment rate at 5.5% is close to the EU average (6%), suggesting a relatively balanced labor market compared to high-unemployment countries like Spain and Greece.
- Low-to-moderate unemployment indicates that competition for skilled workers in energy infrastructure, renewables, and grid upgrades will remain strong, potentially driving up project costs.

Unemployment Rate in EU-27 (%), [2024]



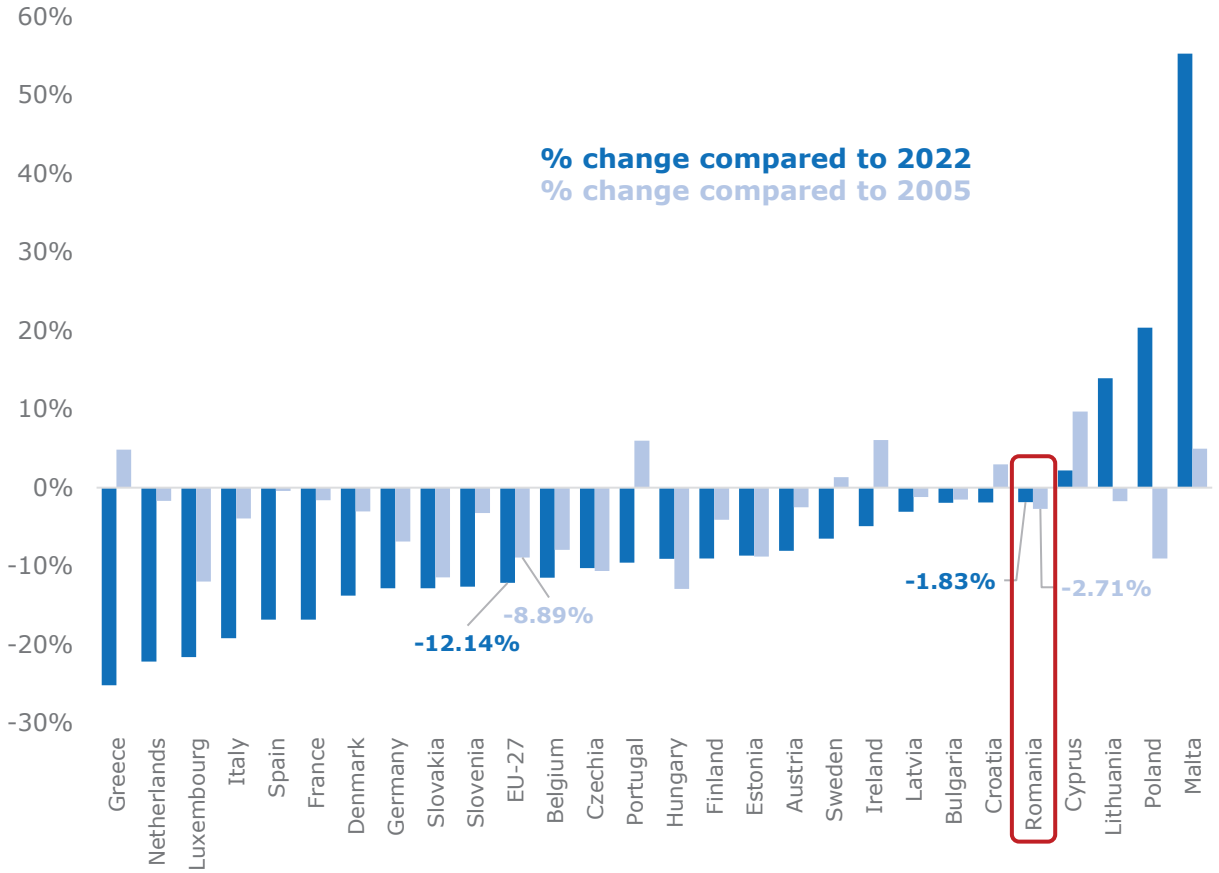
Source: Eurostat

- Romania's rate is higher than neighboring Bulgaria (4.2%) and Hungary (4.4%), which could affect cross-border investment attractiveness in labor-intensive energy projects.
- Stable but not excessively high unemployment reduces pressure for energy affordability policies, yet segments of the workforce may still need targeted support as energy prices evolve during the transition.

Romania has achieved only a modest reduction in energy consumption since 2005, signaling the need for accelerated efficiency gains to align with EU

- Romania's final energy consumption has declined by –1.8% since 2005, broadly in line with the EU average reduction (–8.9%), but less pronounced than in many Western states.
- Between 2022 and 2023, Romania shows minimal year-on-year change, suggesting consumption has plateaued after earlier fluctuations.

Final Energy Consumption in EU27 Member States
(% change compared to 2005 and 2022), [2023]



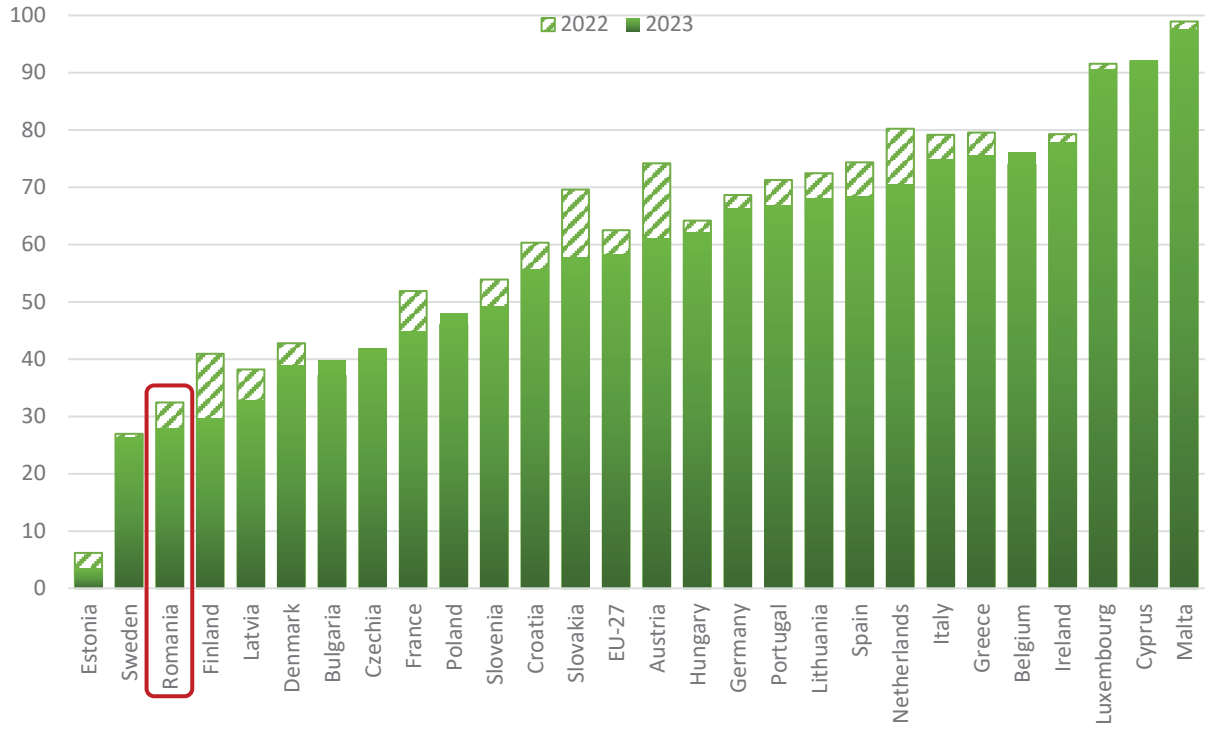
Source: EEA

- Compared to countries with double-digit reductions, Romania's progress reflects slower uptake of energy efficiency measures, particularly in buildings and transport.
- Romania's relatively modest reduction indicates continued reliance on energy-intensive sectors of the economy, limiting convergence with EU decoupling trends.

Romania's low energy dependency strengthens its energy security, but sustained investment in clean domestic resources remains critical

- Romania's energy import dependency rate stands at 28%, far below the EU average of 58%, reflecting strong domestic production capacity (notably natural gas and renewables).
- This lower reliance on imports shields Romania from external supply shocks and price volatility, enhancing security of supply compared to highly import-dependent states.

Energy Imports Dependency Rate in Europe (%), [2023]



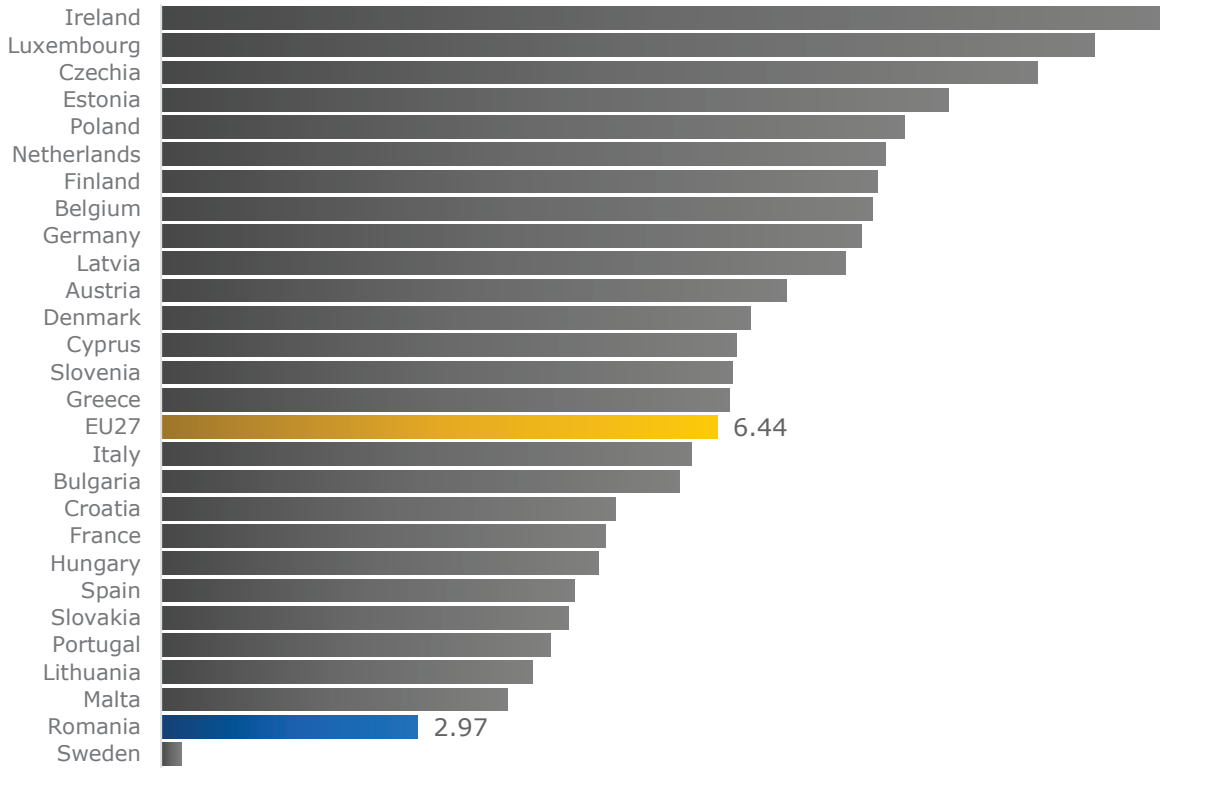
Source: Eurostat

- Domestic gas reserves and hydro resources underpin this low dependency, but maintaining the advantage requires investment in exploration, grid modernization, and renewable integration.
- While energy independence is relatively strong, the carbon intensity of domestic resources means that Romania must still prioritize decarbonization to align with EU climate targets.

Romania is among the EU's lowest per-capita emitters, but sustaining this advantage will require continued effort towards the energy transition

- Romania reports 2.97 tCO_2 per capita, less than half the EU average of 6.44, positioning it among the lowest emitters in the EU, second lowest to be exact.
- This performance reflects Romania's lower industrial base per capita, reliance on domestic hydro and nuclear generation, and relatively modest household energy use.

GHG Emissions per Capita by Country (tCO_2/yr), [2023]



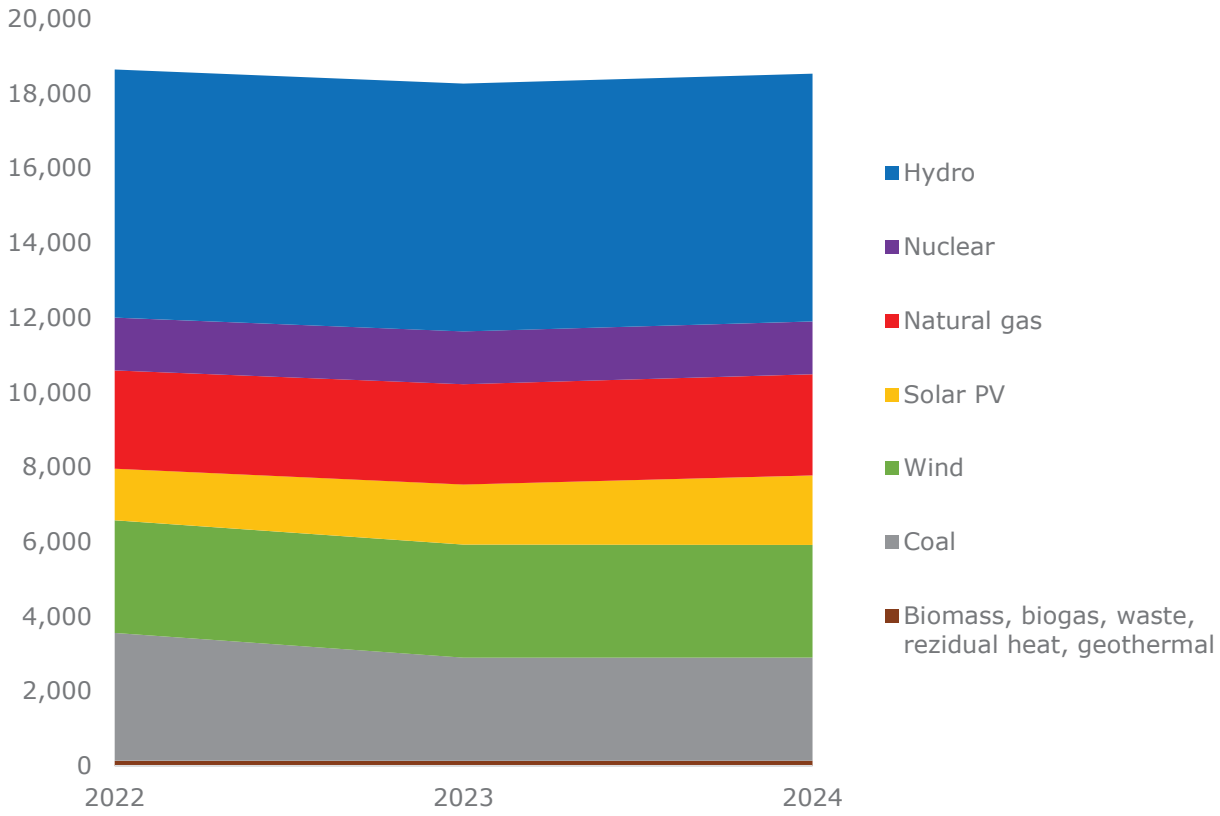
Source: Eurostat

- With such low baseline emissions, Romania faces less immediate pressure for drastic per-capita reductions, but must still align with absolute EU-wide climate neutrality goals.
- Continued reliance on fossil fuels in heating, transport, and parts of industry could raise emissions intensity as economic growth advances, unless electrification and efficiency policies accelerate.

Romania’s power mix is undergoing a gradual shift from coal to renewables, while hydro and nuclear continue to provide a stable backbone.

- Romania’s installed capacity has remained broadly steady around 18–19 GW, indicating limited net additions in recent years.
- Coal-fired capacity decreased between 2022 and 2023, reflecting the gradual phase-out of high-carbon sources in line with EU transition targets.

Power production capacity (MW) by source type in Romania, [2022-2024]

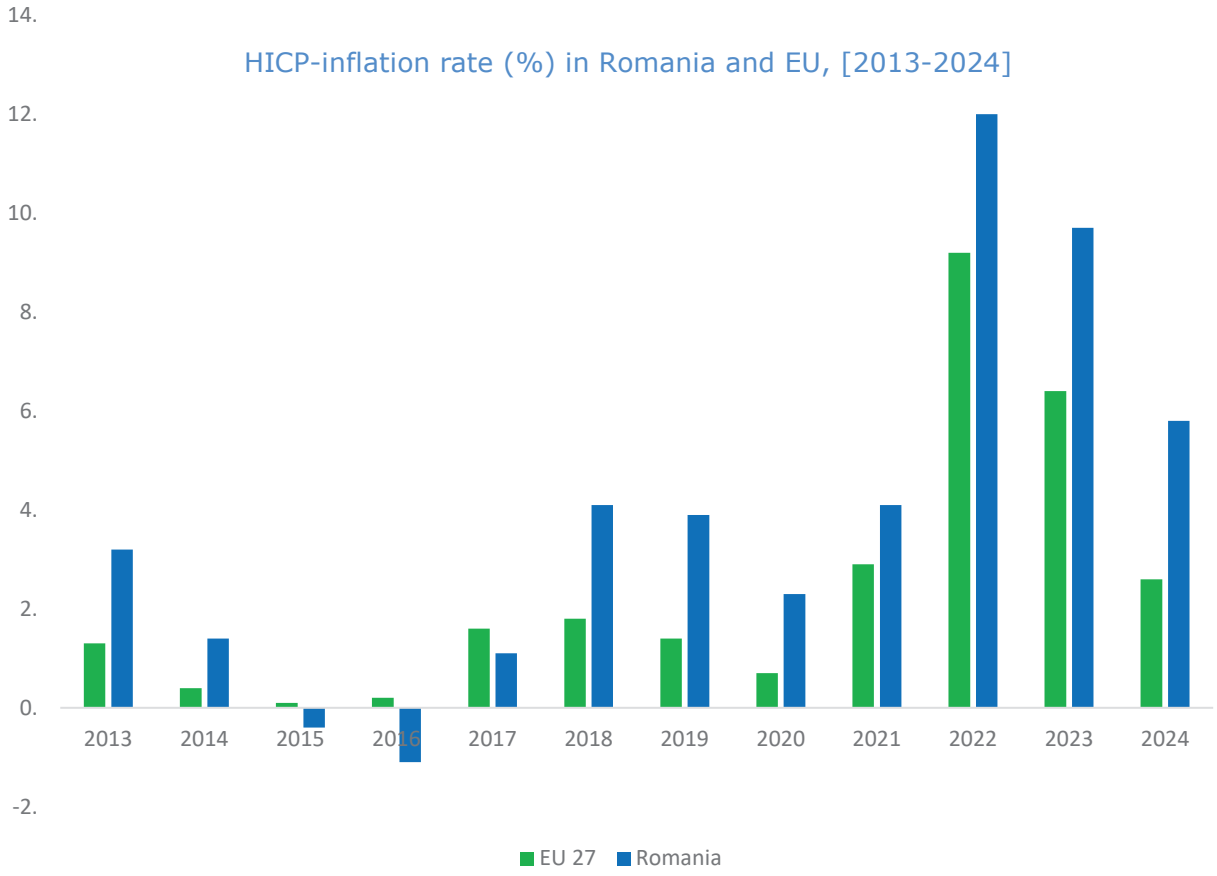


Source: ANRE

- Solar PV and wind maintained growth, contributing to a higher share of low-carbon generation within the capacity mix.
- Hydro remains the single largest capacity contributor, complemented by nuclear, ensuring strong baseload stability compared to peers more reliant on gas.

Romania's persistently higher inflation, amplified by energy price shocks, underscores the need for price stability measures and efficiency gain

- Romania consistently records higher inflation than the EU average, peaking at around 12% in 2022, compared to ~9% for the EU.
- The 2022–2023 spike reflects energy price shocks following the war in Ukraine, highlighting Romania's sensitivity to imported fuel and electricity price volatility.



Source: Eurostat

- Inflation has eased since 2022 but remains above EU levels, maintaining pressure on households' energy affordability.
- Elevated inflation constrains investment financing conditions for energy projects, as higher interest rates increase the cost of capital.

2. Electricity

Contents

Key Facts

Total electricity generation reached 52.45 TWh

The highest share of electricity generation was from hydro, at almost 30%

Romania for 2024 was a net importer of electricity

Electricity spot prices averaged 93 €/MWh

Electricity consumption for 2024 was at 55.42 TWh

The highest share of generation originated from thermal plants, with 17.46 TWh

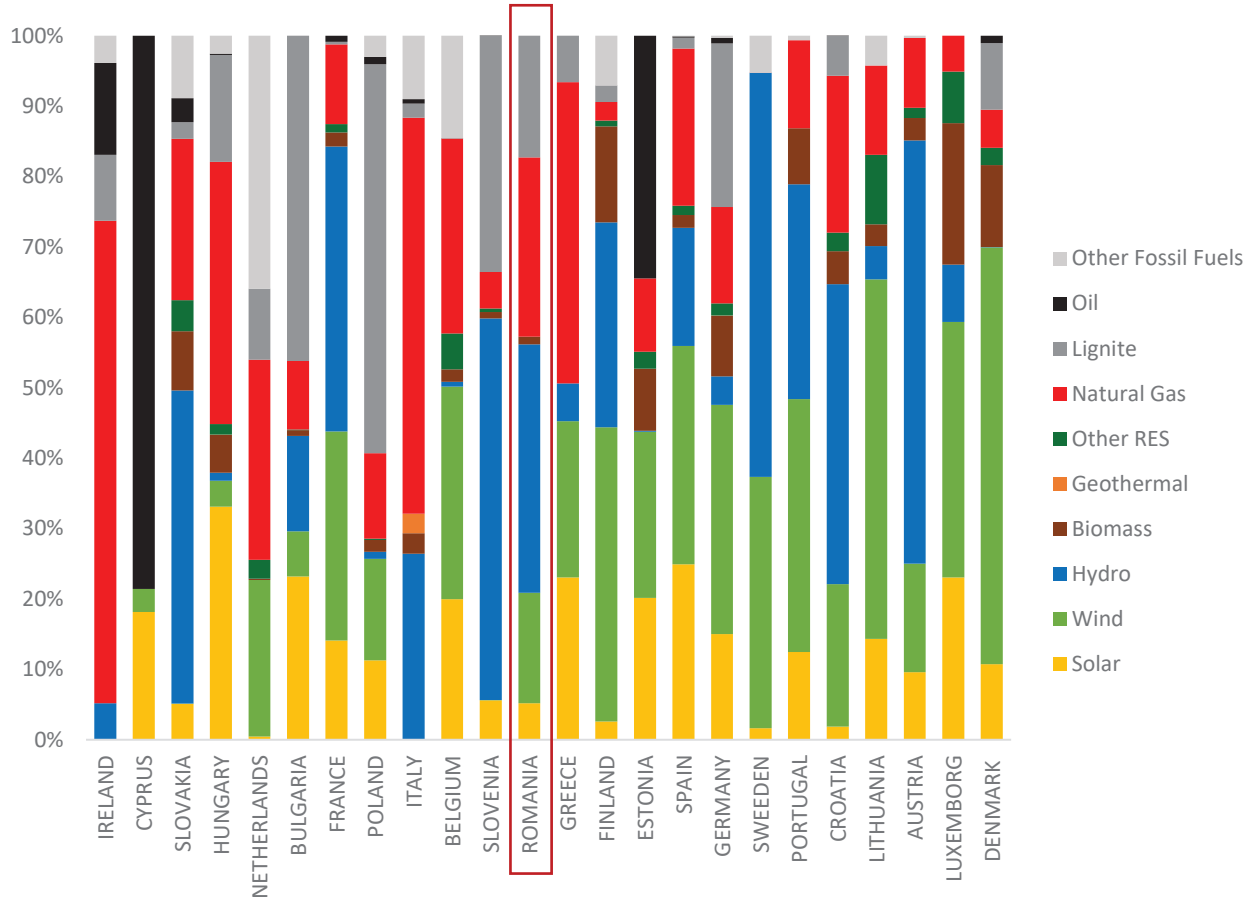
The highest average monthly price was in November with 168 €/MWh

Romania was a net importer in 2024, relying on electricity from neighboring countries

Romania's electricity mix is more diversified than many EU states, but low wind and solar power signal the need for faster renewable expansion

- Romania's power generation is diversified, combining hydro, nuclear, and fossil fuels, reducing reliance on a single source compared to many EU peers.
- Hydropower provides a significant share of electricity, enhancing low-carbon generation but also exposing the system to climate-related hydrological risks.

Gross Electricity Generation by Fuel in EU (%), [2024]



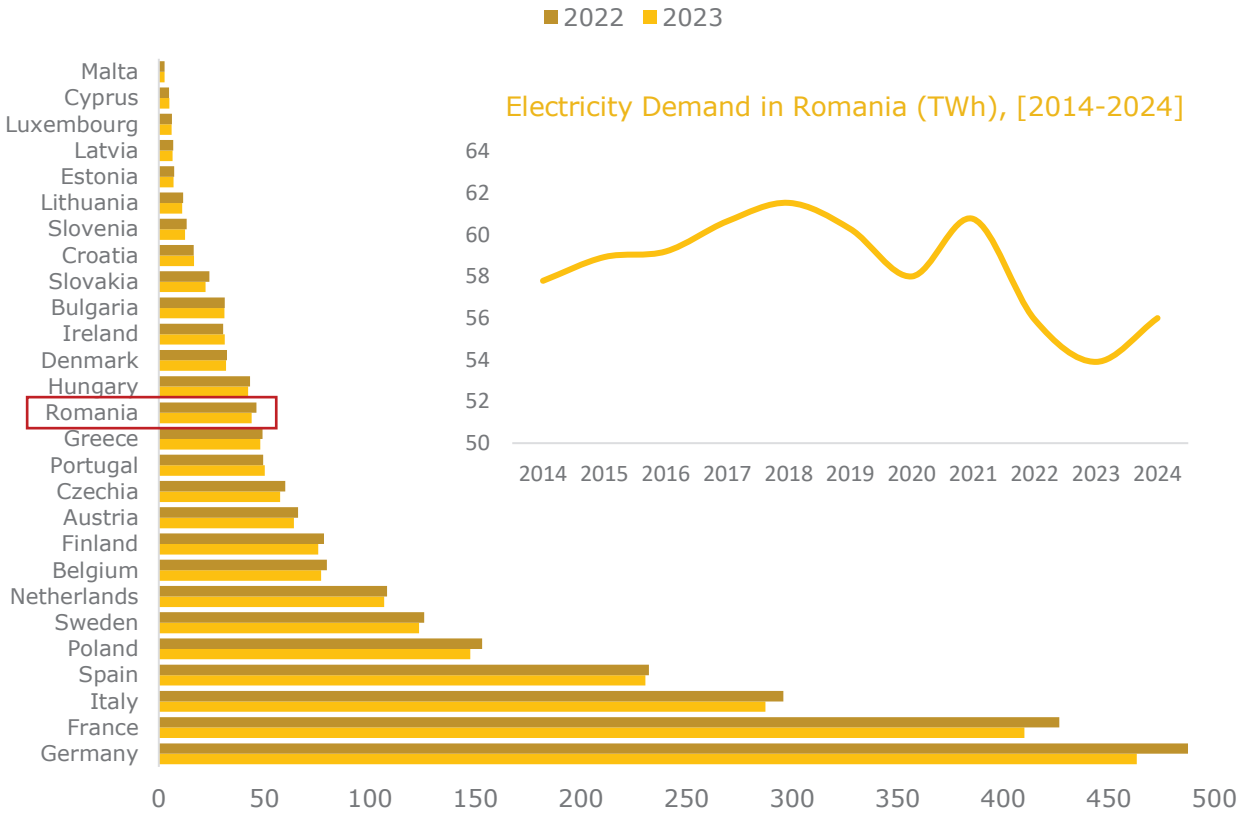
Source: ENTSOE

- Despite declines, coal and natural gas still account for a notable share, contributing to emissions intensity and potential exposure to carbon pricing.
- Compared to EU frontrunners, the penetration of wind and solar remains modest, highlighting a need for accelerated investment in variable renewables.

The electricity demand has declined in recent years, highlighting the impact of economic cycles, high energy prices, and efficiency measures.

- Romania's electricity demand is around 55–60 TWh annually, placing it in the middle tier of EU member states, well below major economies like Germany or France.
- Romania's demand shows fluctuations over the past decade, with peaks in 2017 and 2021, followed by a sharp drop in 2022–2023 linked to high prices and weaker industrial activity.

Electricity Demand in the EU (TWh), [2022-2023]



Electricity Demand in Romania (TWh), [2014-2024]

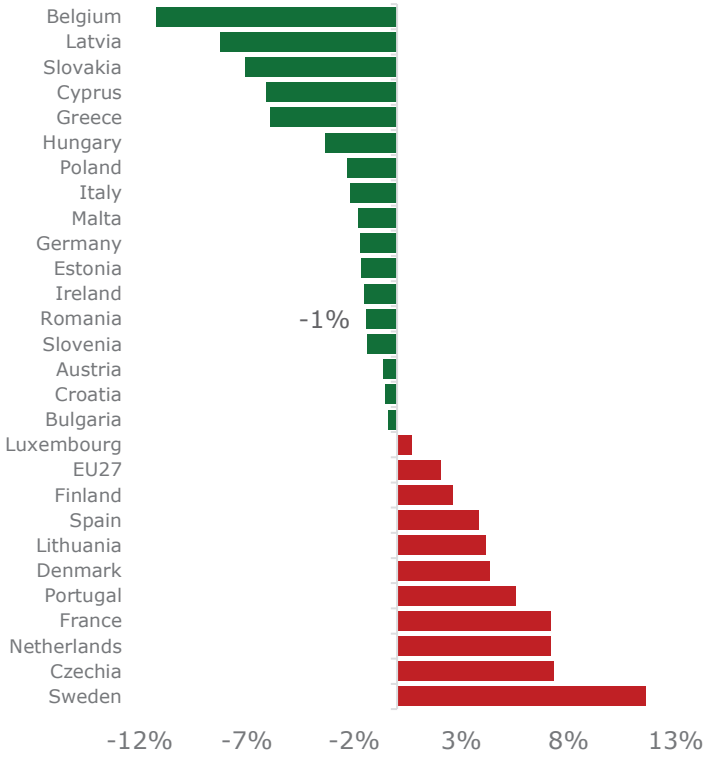
Source: EMBER

- The 2024 projection suggests partial stabilization, but demand remains below earlier peaks, reflecting structural efficiency improvements and subdued growth.
- Shifts in electricity use track closely with industrial output, underlining the exposure of Romania's demand to cyclical economic conditions and energy price shocks.

EU electricity prices remain high and uneven across countries, with households facing greater affordability pressures

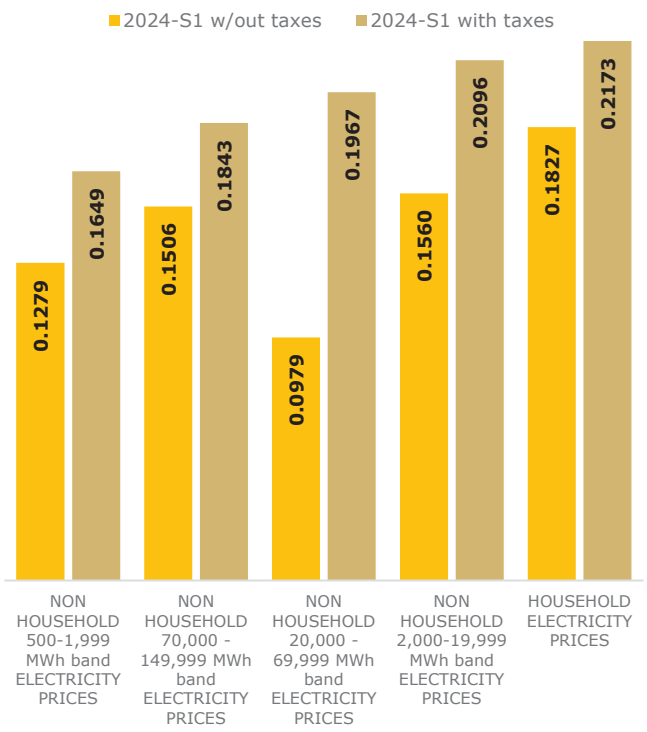
- Across the EU, household electricity prices show sharp differences in year-on-year changes, with countries like Latvia and Cyprus recording declines, while others such as Sweden and the Netherlands saw increases.

YoY change in Electricity Prices for Household Consumers (%), [2023 S2-2024 S1]



- Average EU household electricity prices in early 2024 stand at €0.217/kWh (incl. taxes), among the highest across consumer categories, underscoring the sensitivity of households to affordability risks.

Electricity Prices for Households and Industry band Consumers (€/kWh), [EU27-2024 S1]



Source: Eurostat

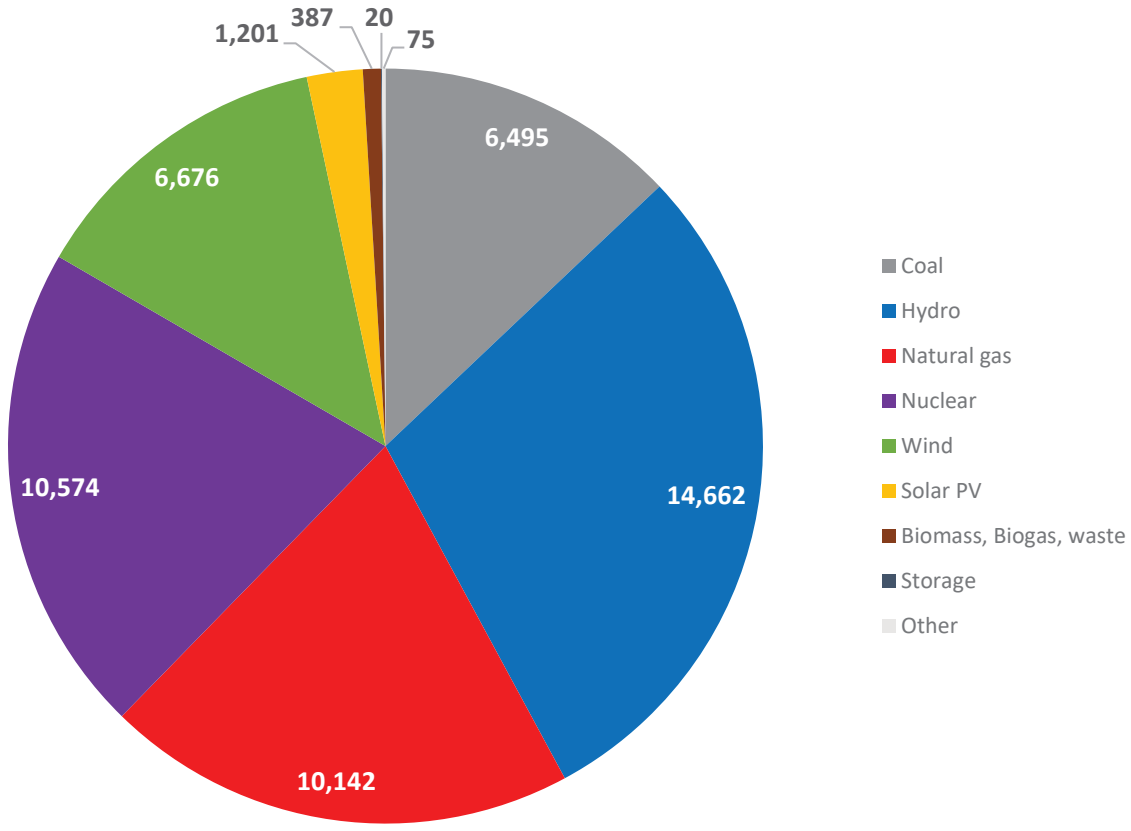
- Non-household consumers benefit from lower average rates, especially for high-volume users (~€0.098/kWh), reflecting preferential pricing structures to protect industrial competitiveness.

- Divergent national trajectories and persistently high end-user costs highlight the need for targeted consumer protection mechanisms and long-term reform of EU electricity pricing frameworks.

Romania’s generation mix combines strong hydro and nuclear capacity with persistent fossil fuel use, leaving room for faster expansion of RES

- Hydropower is the largest contributor with 14,662 GWh, underscoring Romania’s reliance on renewable but weather-dependent resources.
- Nuclear (10,574 GWh) and wind (6,676 GWh) provide strong low-carbon support, keeping Romania’s generation less emission-intensive than many EU peers.

Electricity Generation (GWh) by type of fuel in Romania, [2024]



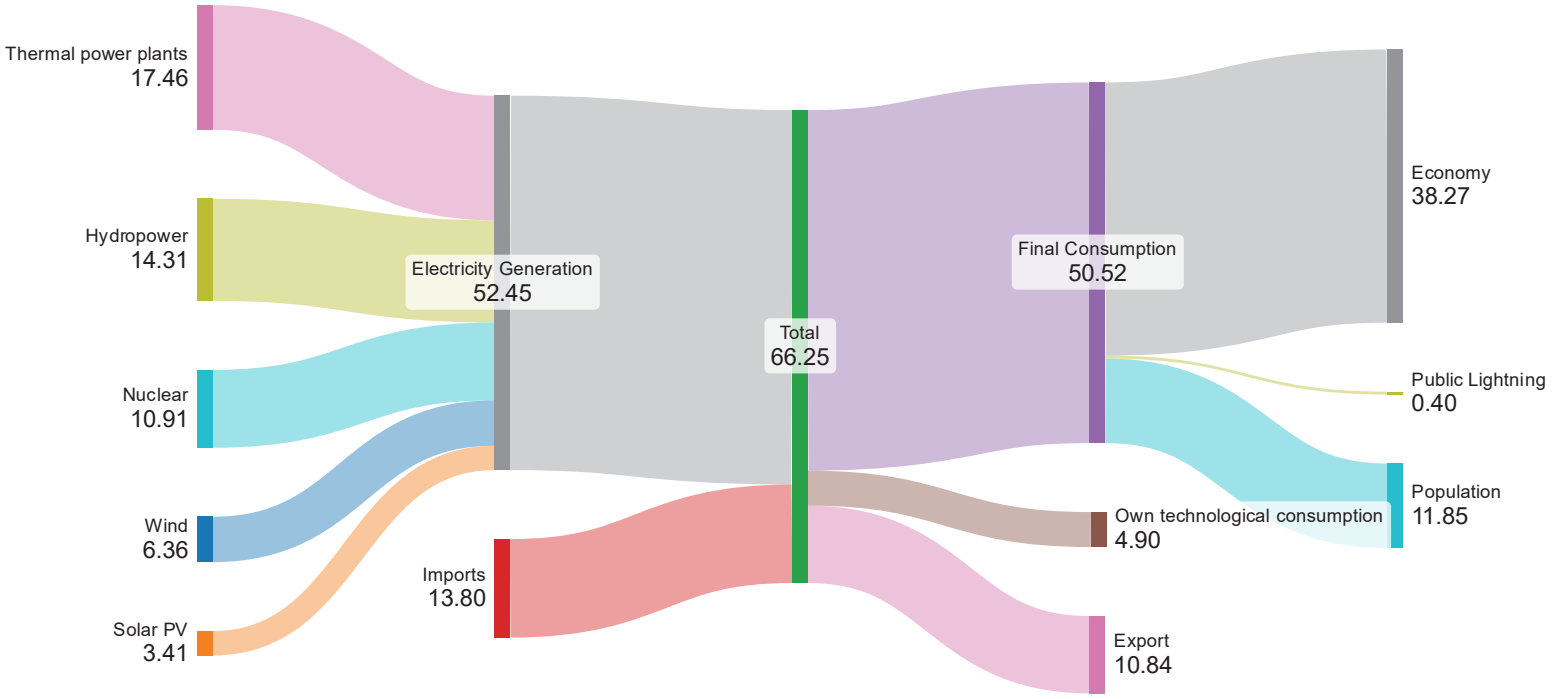
Source: ANRE

- Natural gas (10,142 GWh) and coal (6,495 GWh) remain substantial, signaling ongoing reliance on fossil generation despite gradual transition efforts.
- Solar PV (387 GWh) and biomass/biogas/waste (75 GWh) represent very small shares, highlighting the slow development of decentralized renewables.

Romania's electricity mix in 2024 heavily relies on Thermal and Hydro power accompanied by net imports, highlighting energy dependencies

- Thermal power plants are the largest single source, contributing 17.46TWh (about 33.3% of total domestic generation), making them the backbone of Romania's electricity production.
- Final Consumption is dominated by the Economy sector at 38.27 TWh, showing that industrial and commercial activities are by far the largest electricity users in the country.

Electricity Flows (TWh) in Romania, [2024]



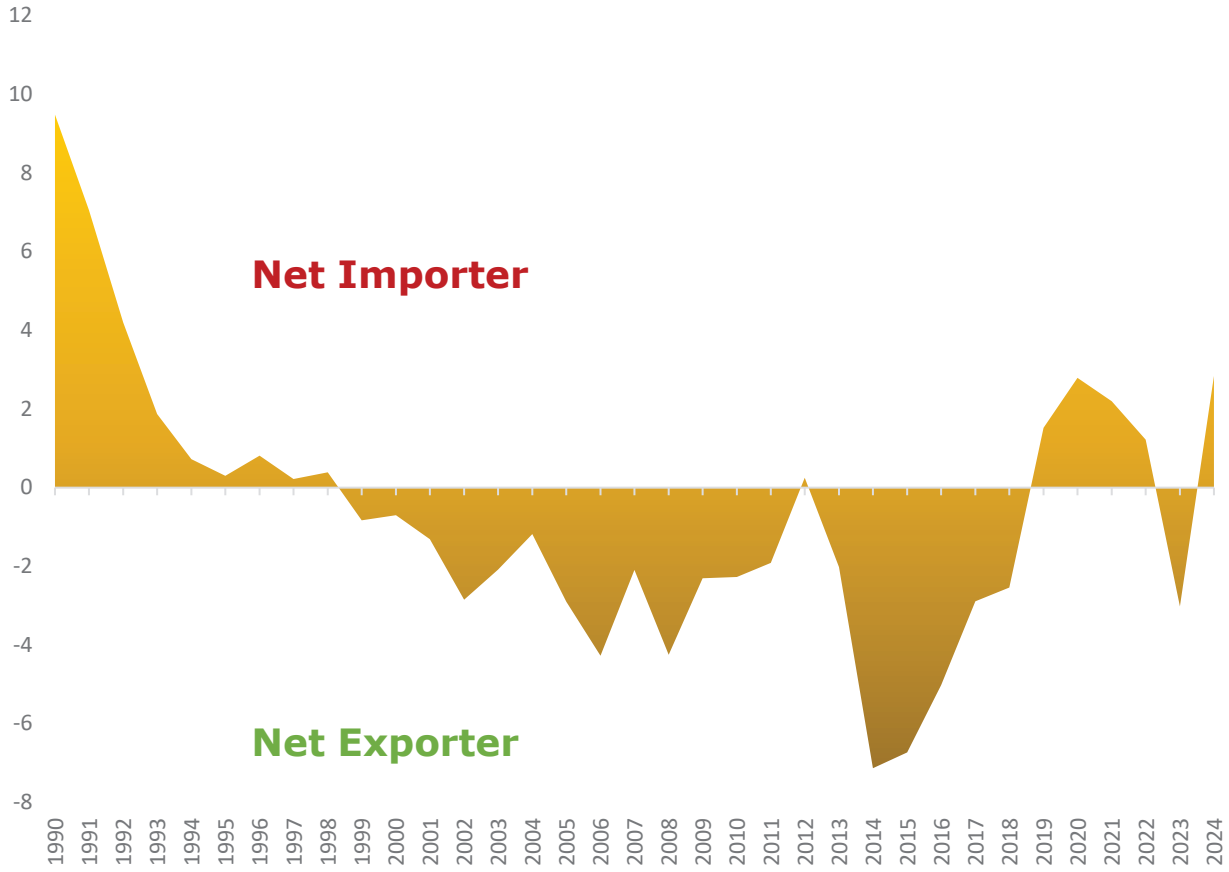
Source: INS

- Despite significant domestic generation (52.45 TWh), Romania imported a substantial 13.80 TWh, indicating that imports are crucial to meet the total energy supply of 66.25 TWh
- The total electricity supply (66.25 TWh) slightly exceeds total domestic consumption (59.52 TWh), allowing for an export of 10.84 TWh to neighboring systems.

Romania's shift from net exporter to net importer in recent years underscores the challenge of maintaining supply adequacy

- Romania moved from being a large net importer in the early 1990s to becoming a consistent net exporter through the 2000s and mid-2010s.
- The period 2014–2016 marked peak net exports (≈ –7 TWh), reflecting strong generation surplus relative to domestic demand.

Evolution of Net Electricity Imports (TWh) in Romania, [1990-2024]



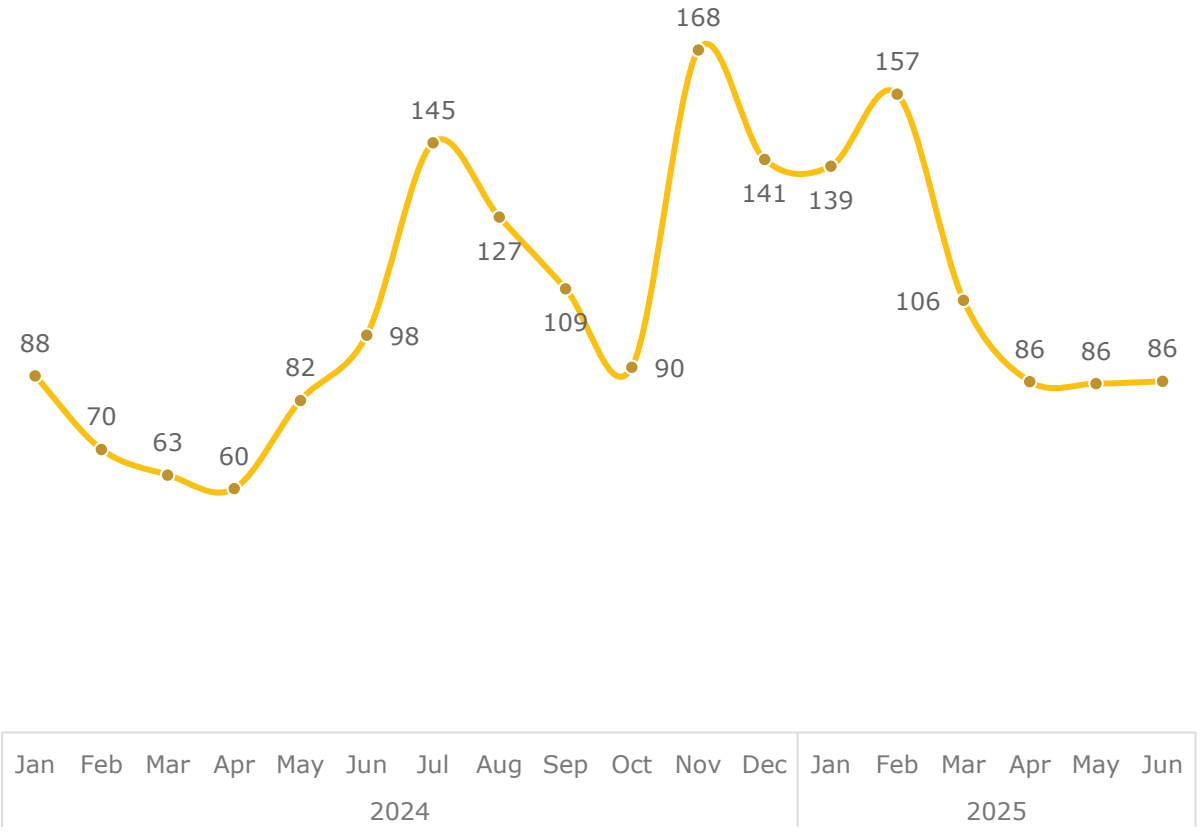
Source: Ember

- Since 2019, Romania has increasingly turned back into a net importer, reflecting both rising domestic demand and generation constraints.
- The latest data shows Romania back as a net importer, highlighting ongoing supply-demand imbalances and the need for system flexibility.

Romania’s wholesale power market remains highly seasonal, with sharp swings driven by demand, renewables, and imports

- Romania’s sharp Q1 2024 price drop reflects lower seasonal demand and stronger hydropower output stabilizing wholesale markets.
- The November 2024 spike highlights vulnerability to regional supply constraints, underscoring Romania’s need for enhanced interconnection capacity.

Monthly Average Electricity Wholesale Prices (€/MWh) in Romania, [Jan 2024 – Jun 2025]



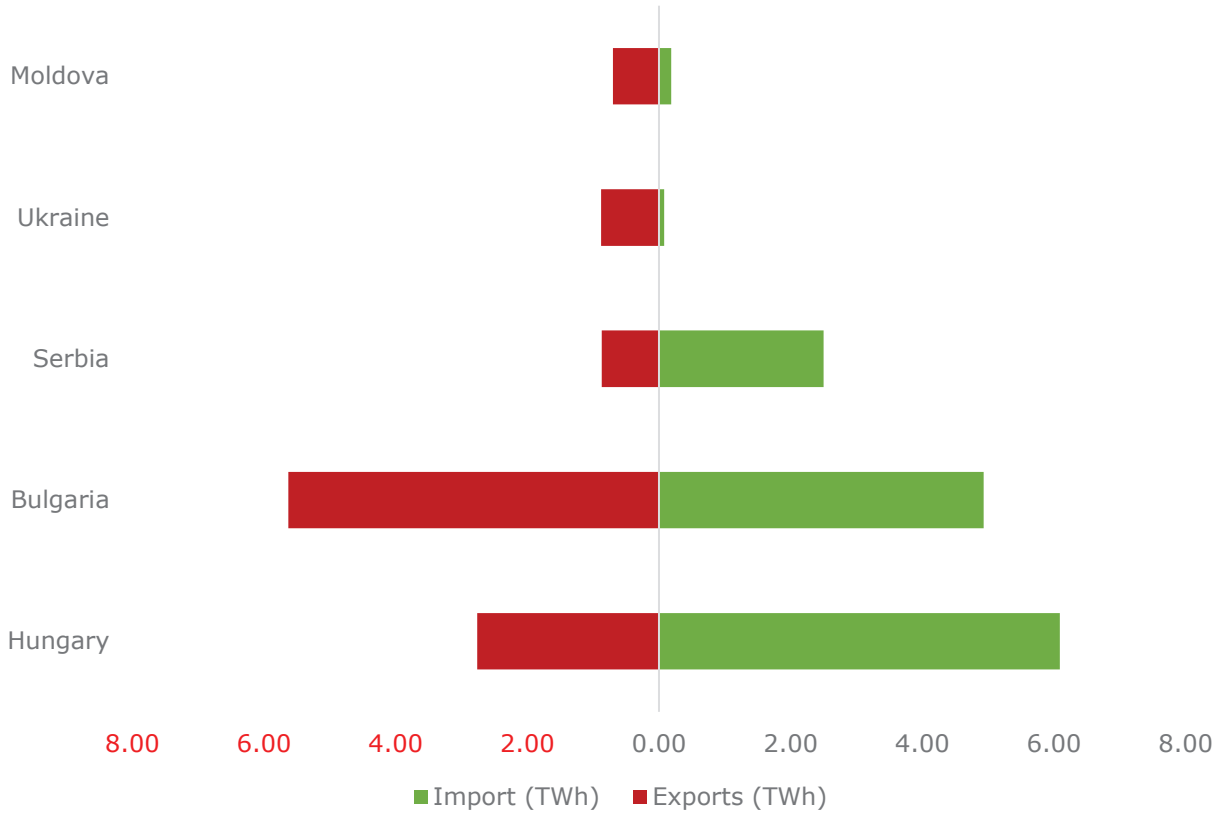
Source: ENTSOE

- Price volatility in early 2025 signals market exposure, suggesting Romania should diversify flexibility options through storage and demand response.
- Romania’s wholesale market shows pronounced seasonality, influenced by hydropower availability, weather-driven demand, and cross-border electricity trade dynamics.

Romania’s 2024 electricity trade reinforces its regional hub role but highlights interconnection limits and seasonal dependencies

- Romania exported significant volumes to Hungary and Bulgaria in 2024, reflecting its strong cross-border generation surplus and regional role.
- Imports from Bulgaria highlight seasonal reliance on neighbors, showing Romania’s continued exposure to regional price and supply fluctuations.

Electricity Imports-Exports (TWh) for Romania, [2024]



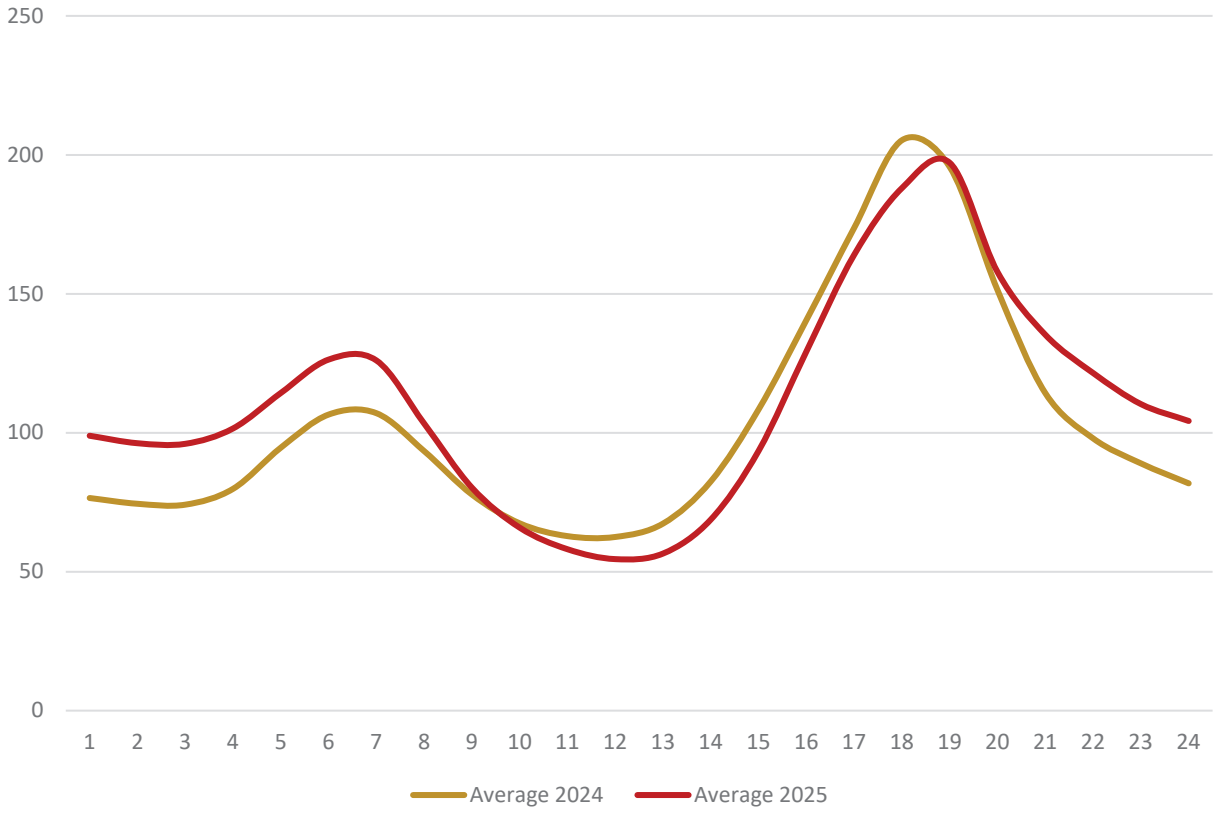
Source: Serbia-energy

- Limited trade with Moldova and Ukraine demonstrates constrained interconnections, signaling opportunities for future cross-border capacity expansion and integration.
- Strong exports to Serbia confirm Romania’s potential as a regional electricity hub, requiring continued grid reinforcement and market coordination.

Romania’s daily price peaks emphasize urgent need for storage, flexibility, and stronger regional market integration

- Romanian wholesale prices show morning and evening peaks, reflecting strong demand pressures and limited flexibility in daily generation mix.
- The 2025 daily curve indicates slightly higher evening peak prices, underlining Romania’s growing reliance on dispatchable generation sources.

Average Daily Wholesale Electricity Market Prices (€/MWh) in Romania, [2024-Jun 2025]

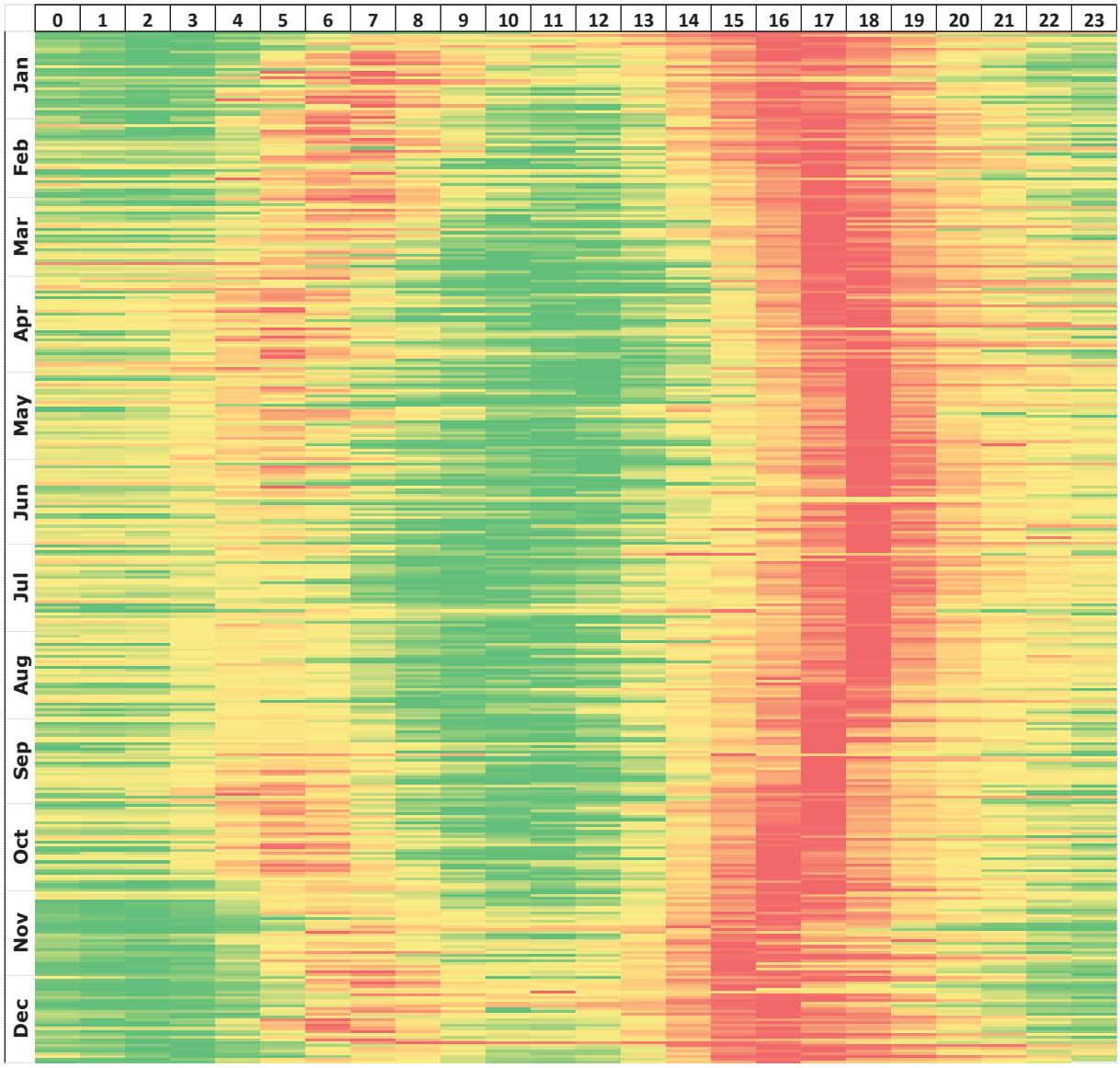


Source: ENTSOE

- Afternoon price dips highlight solar generation’s role, reinforcing the need for grid balancing and investments in energy storage.
- Evening peak stability depends on interconnections; strengthening cross-border capacity would reduce exposure to regional scarcity and price volatility.

Romania’s hourly price dynamics highlight flexibility gaps, making storage and demand response crucial policy priorities

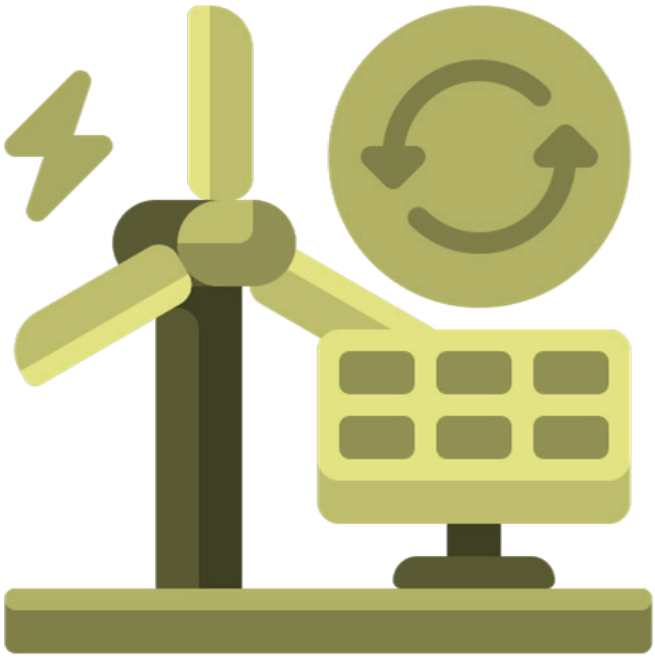
Hourly Wholesale Electricity Market Prices heatmap in Romania, [2024]



Source: ENTSOE

- Seasonal variations are evident, with summer heatwaves and winter demand peaks intensifying evening price surges across the year.
- Addressing volatility requires accelerated investment in storage, flexible demand programs, and improved cross-border flows to stabilize wholesale markets.

3. Renewable Energy Sources



Contents

Key Facts

Hydro has the largest share of RES installed capacity with 6.6 GW, in 2024

Wind comes second in terms of RES installed capacity with 3 GW, in 2024

Solar witnessed the largest increase in installed capacity, doubling from 2021 to 2024

The share of RES in energy mix of Romania reached 25.8 % in 2023

Romania’s share of Solar and Wind in energy was 20% in 2023

Europe on average has reached 28% of Solar and Wind in the energy mix

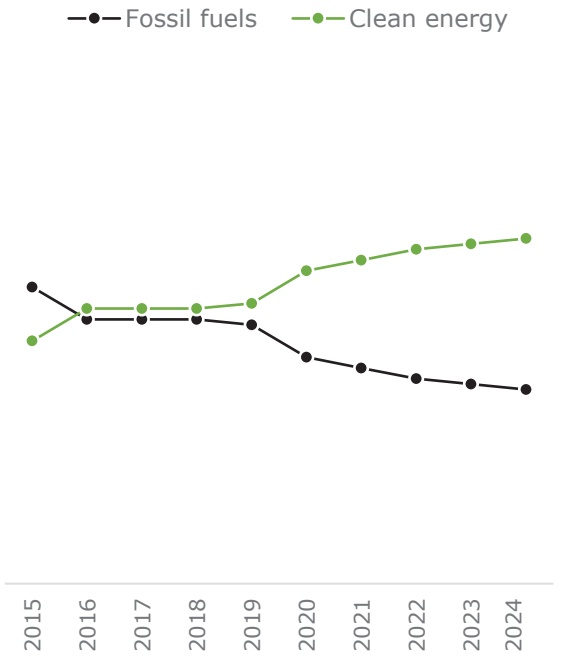
Hydropower remains the backbone of renewable energy generation in RO

PPAs have steadily grown, bringing stable contracts of green energy

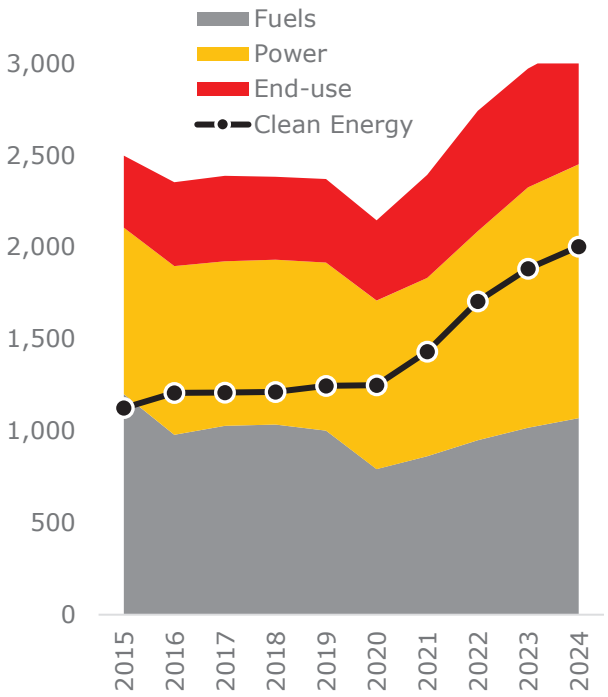
Global energy investment is increasingly dominated by clean energy, with power and end-use electrification driving growth

- Global energy investments grew from about $2.3 trillion in 2015 to nearly $3.0 trillion in 2024, with the strongest increase after 2020.
- The share of clean energy investment rose from 45% in 2015 to 64% in 2024, overtaking fossil fuels and consolidating its lead.

Global Fossil Fuel and Clean Energy Shares of Total Energy Sector Investment (%), [2015 – 2024]



Global Energy Investments per Type (billion $), [2015-2024]



Source: IEA

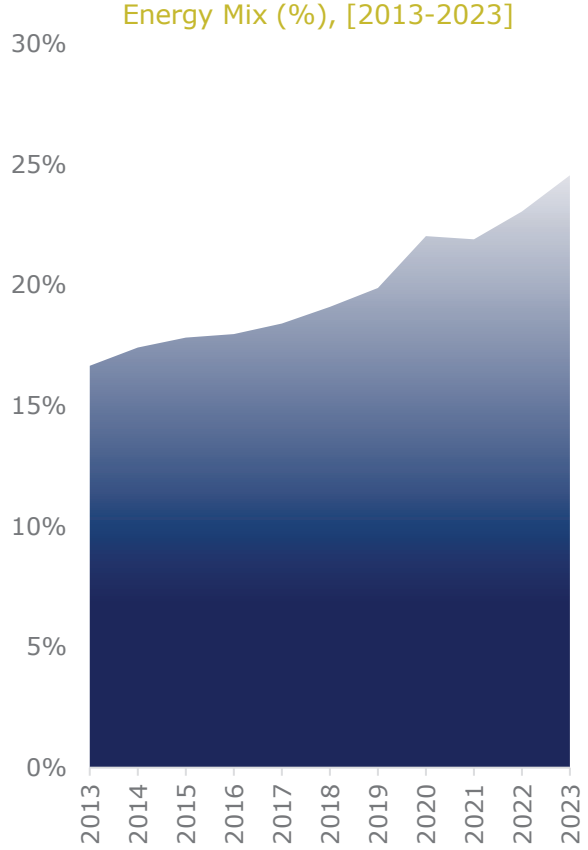
- Investments in power systems and end-use electrification (e.g., EVs, heat pumps) have accelerated, while fuel investments remain broadly flat.
- Fossil fuel investment fell from 55% in 2015 to 36% in 2024, signaling a structural reallocation of capital despite continued demand.

Romania's RES share is aligned with the EU average but remains heavily hydro-dependent, requiring stronger growth in wind and solar

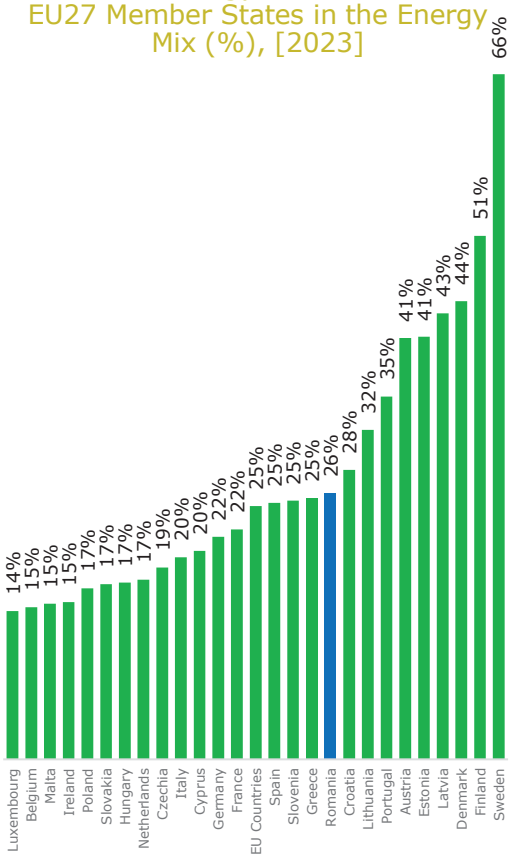
- The EU-27 renewable energy share rose from 17% in 2013 to 24.5% in 2023, showing consistent, though gradual, progress.

- With a 26% RES share, Romania is close to the EU mean, indicating alignment but not leadership in the European transition.

EU-27 RES Share Evolution in the Energy Mix (%), [2013-2023]



Share of Energy from RES in the EU27 Member States in the Energy Mix (%), [2023]



Source: Eurostat

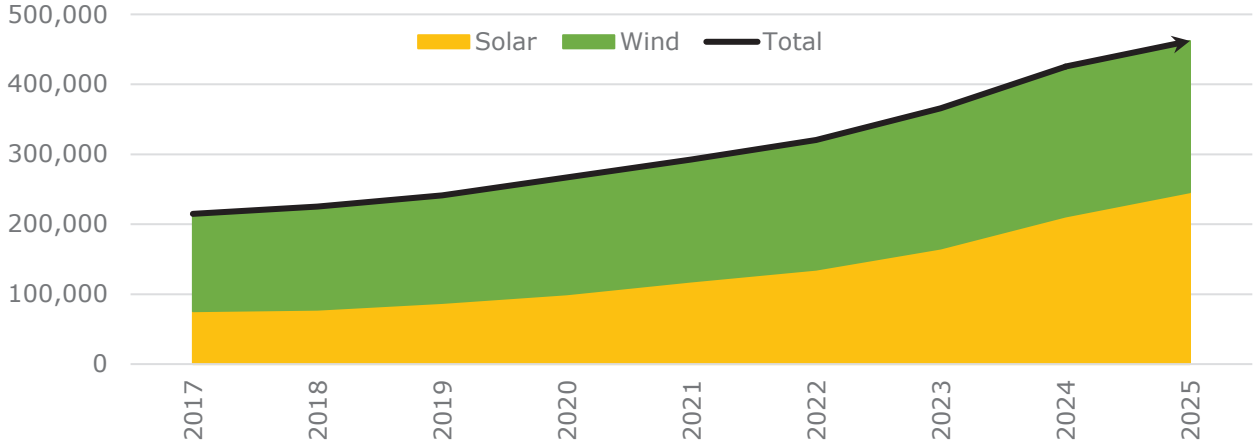
- Romania trails well behind high-RES countries such as Sweden (66%), Finland (55%), and Denmark (47%), reflecting untapped potential.

- Much of Romania's RES share comes from legacy hydro, while wind and solar play a smaller role, highlighting the need to diversify renewables.

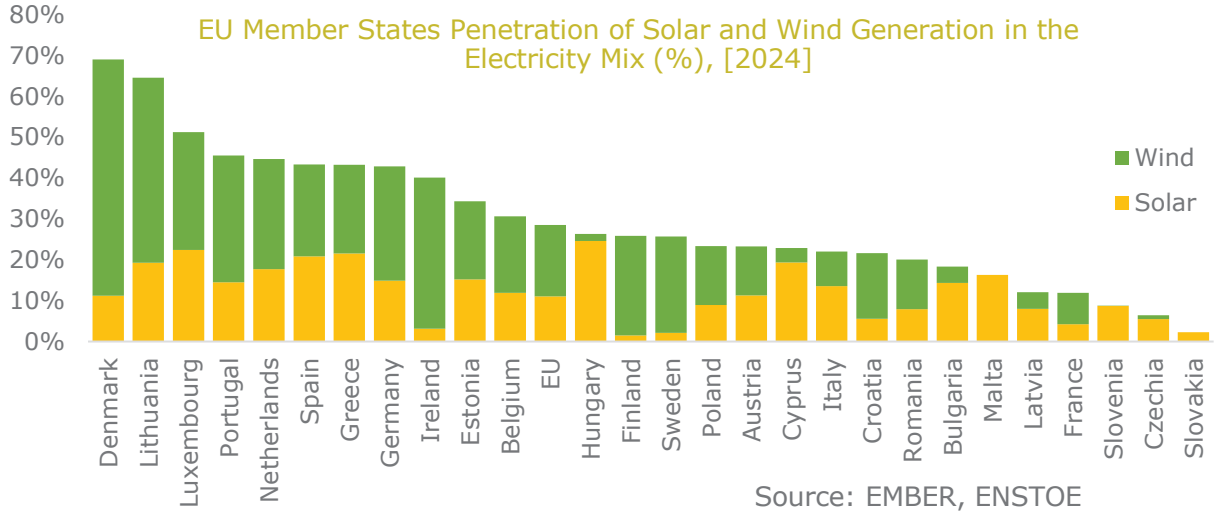
Romania is expanding wind and solar capacity but remains slow, highlighting the urgency of scaling solar and wind deployment to catch up with EU

- Combined solar and wind capacity in the EU rose from ~220 GW in 2017 to over 430 GW in 2024, showing a strong upward trajectory.
- Denmark (≈70%) and Lithuania (≈60%) lead in integrating solar and wind into their electricity mix, while Romania sits in the lower-middle range (~18%).

Solar and Wind Capacity evolution in EU (MW), [2017-2025]



EU Member States Penetration of Solar and Wind Generation in the Electricity Mix (%), [2024]



Source: EMBER, ENSTOE

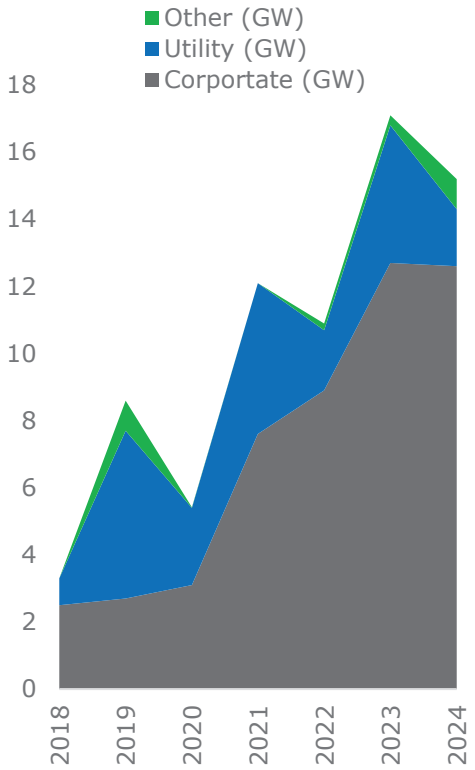
- Romania's penetration relies more on wind than solar, with solar still underdeveloped compared to peers such as Spain and the Netherlands.
- Despite EU-wide acceleration, Romania's share of variable renewables remains below the EU average, pointing to the need for faster expansion to meet 2030 RES targets.

Romania's PPA market is still young but fast developing, with prices varying between 65-85€/MWh

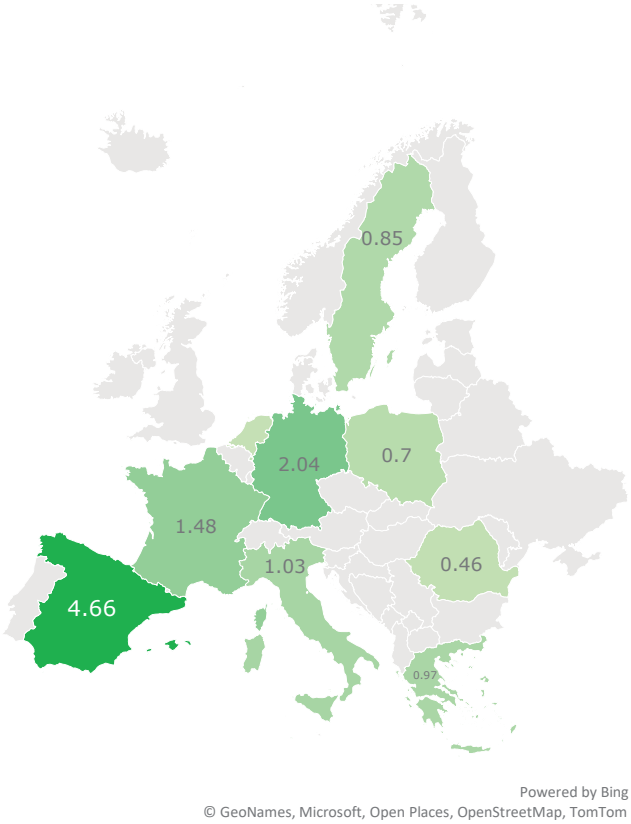
- Deal flows surged from ~4 GW in 2018 to nearly 17 GW in 2023, reflecting the rapid uptake of long-term renewable contracts across Europe.

- Corporate PPAs now dominate the market, underlining the growing role of private companies in driving renewable energy deployment and hedging price risks.

Deal Flows (GW) and Number of Disclosed PPAs (%), [2018-2024]



Traded Volumes in Power Purchase Agreements (PPAs) (GW), [2024]



Source: PEXAPARK

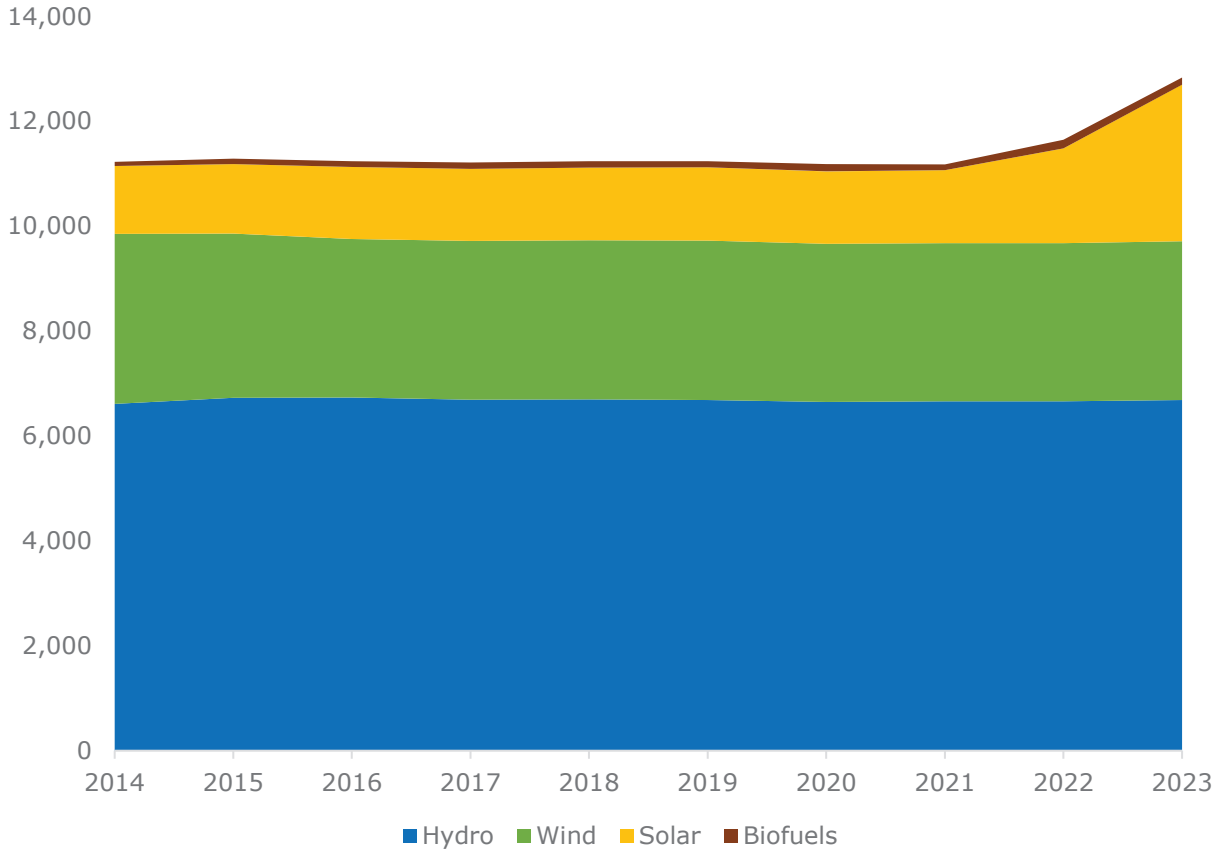
- Spain leads in traded volumes (4.66 GW in 2024), followed by Germany and Nordic countries, while Eastern Europe—including Romania—remains largely absent from the PPA market.

- PPAs are increasingly central to renewable project bankability, ensuring predictable revenues and reducing reliance on subsidies.

Romania's renewable growth now depends on accelerating wind and solar deployment while sustaining hydropower's backbone role

- Romania's renewable capacity remained stable for much of the past decade, with hydropower consistently dominating the mix.
- Solar capacity surged after 2021, reflecting cost declines, EU policy incentives, and Romania's efforts to diversify renewable generation.

RES Capacities (MW) evolution in Romania, [2014-2023]



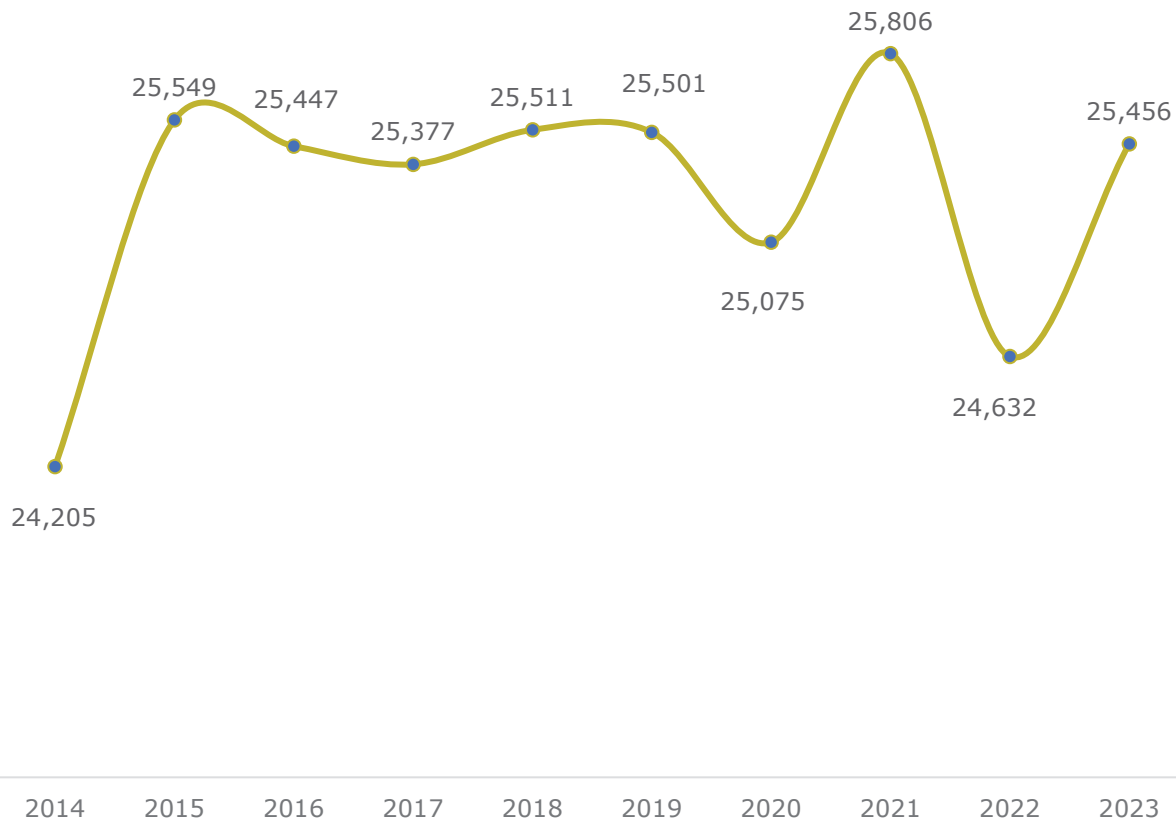
Source: Eurostat

- Wind growth plateaued, signaling regulatory and investment challenges, despite Romania's significant onshore and offshore wind potential.
- Biofuels remain marginal in the mix, highlighting missed opportunities for diversifying Romania's renewable portfolio beyond power generation.

Romania’s RES output stagnates near 25 TWh, highlighting weather risks and urgent need for diversification

- Renewable generation in Romania remained stable around 25 TWh annually, underlining hydropower’s dominant role in the mix.
- 2021 marked the strongest RES output at 25.8 TWh, supported by favorable hydrological conditions and strong wind generation.

RES Generation (GWh) in Romania, [2014-2023]



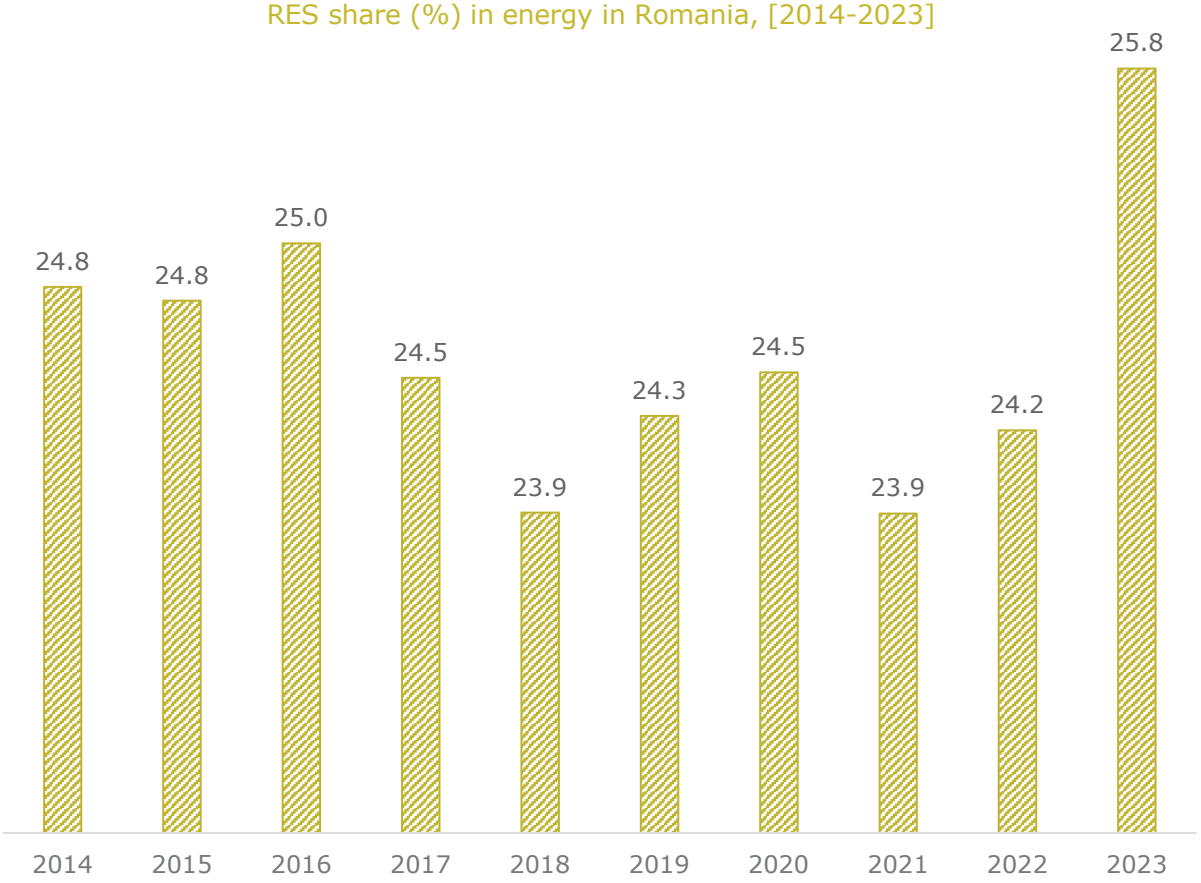
Source: Eurostat

- Declines in 2020 and 2022 highlight vulnerability to weather variability, stressing the importance of diversifying Romania’s renewable base.
- Flat RES generation despite added capacity signals integration bottlenecks, requiring improved grid infrastructure and investment in storage solutions.

Romania's RES share stagnates near 25%, requiring accelerated deployment to align with EU climate targets

- Romania's RES share remained broadly stable near 24–25% over the past decade, reflecting hydropower's steady contribution.
- Periodic declines, notably in 2018 and 2021, reveal vulnerability of RES share to weather and demand shifts.

RES share (%) in energy in Romania, [2014-2023]



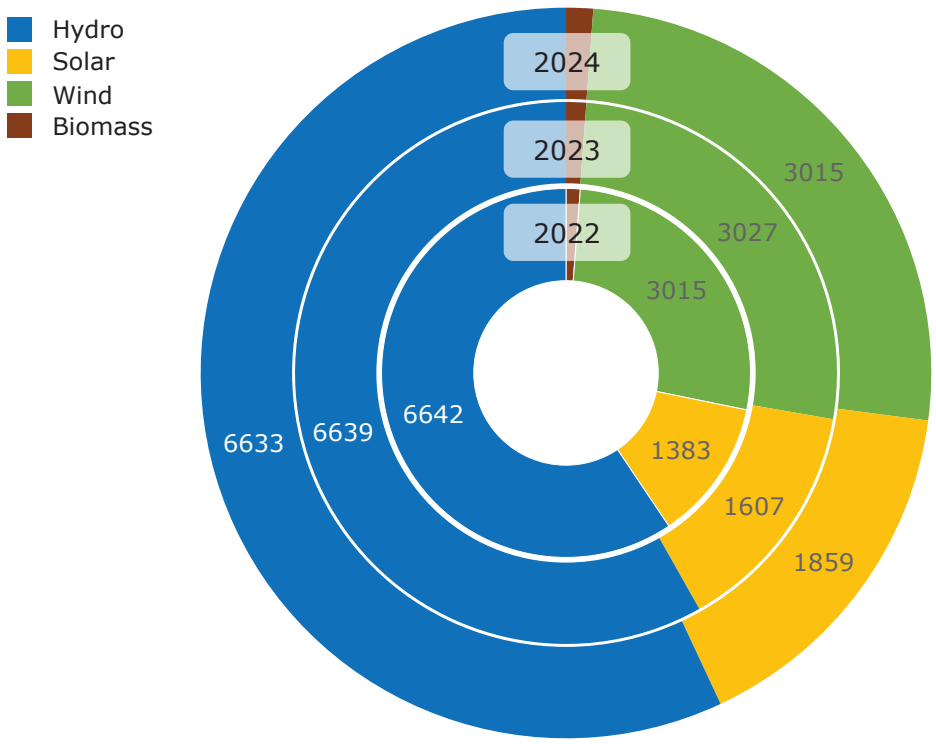
Source: Eurostat

- Meeting EU 2030 targets requires Romania to significantly increase renewable deployment beyond hydropower's historic baseline.
- 2023 recorded the highest share at 25.8%, driven by stronger solar additions and favorable hydrological conditions.

Romania’s renewable growth hinges on solar expansion, while wind and hydro stagnate without stronger policy support

- Hydropower remains Romania’s backbone, with over 6.6 GW capacity, though growth has been minimal between 2022–2024.
- Wind capacity stayed stable at ~3 GW, signaling policy and permitting barriers to scaling Romania’s wind potential further.

RES Capacities (MW) comparison by type in Romania, [2022-2024]



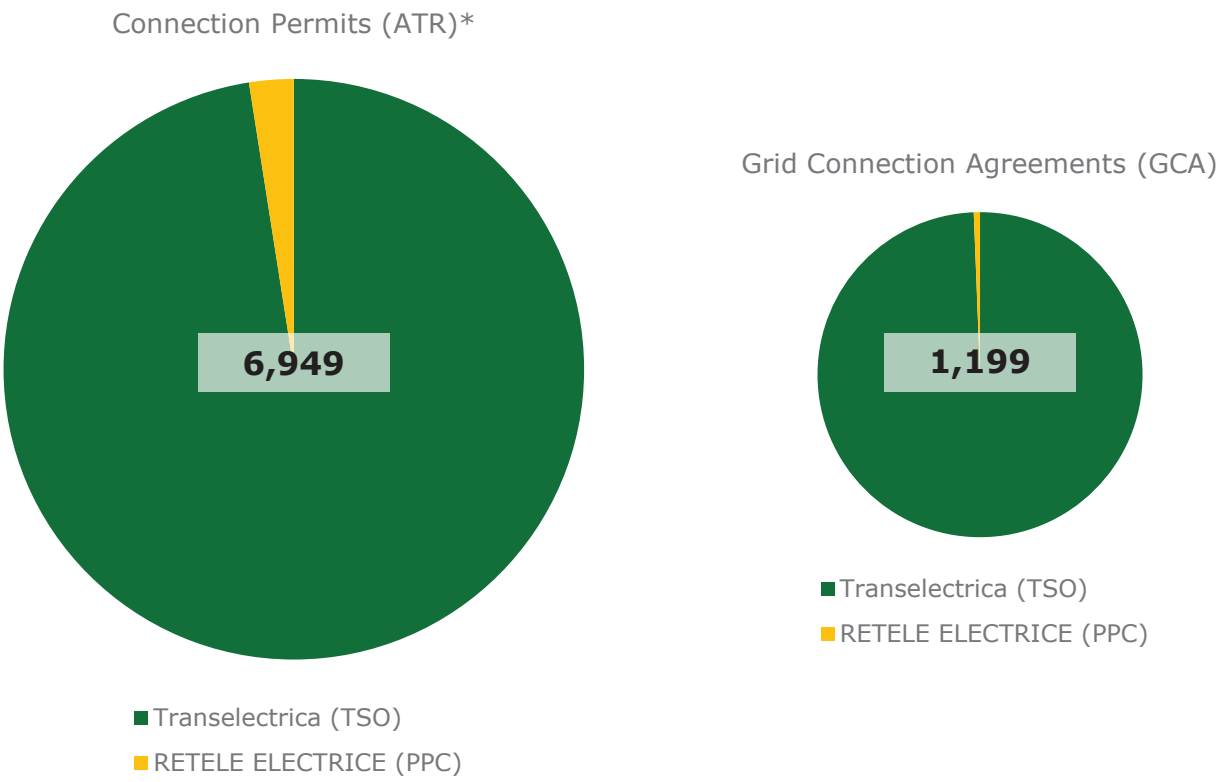
Source: Eurostat

- Solar capacity grew from 1.38 GW in 2022 to 1.86 GW in 2024, reflecting investment momentum.
- Biofuels contribute marginally, highlighting the underutilization of Romania’s biomass resources in supporting renewable diversification.

Romania’s battery storage market is expanding rapidly; there is an urgent need for accelerated network readiness

- Over 6,900 connection permits issued for BESS projects nationwide.
- Transelectrica dominates the permitting process across Romania.

Number of Permits by type and company for BESS projects in Romania, [Sep 2025]



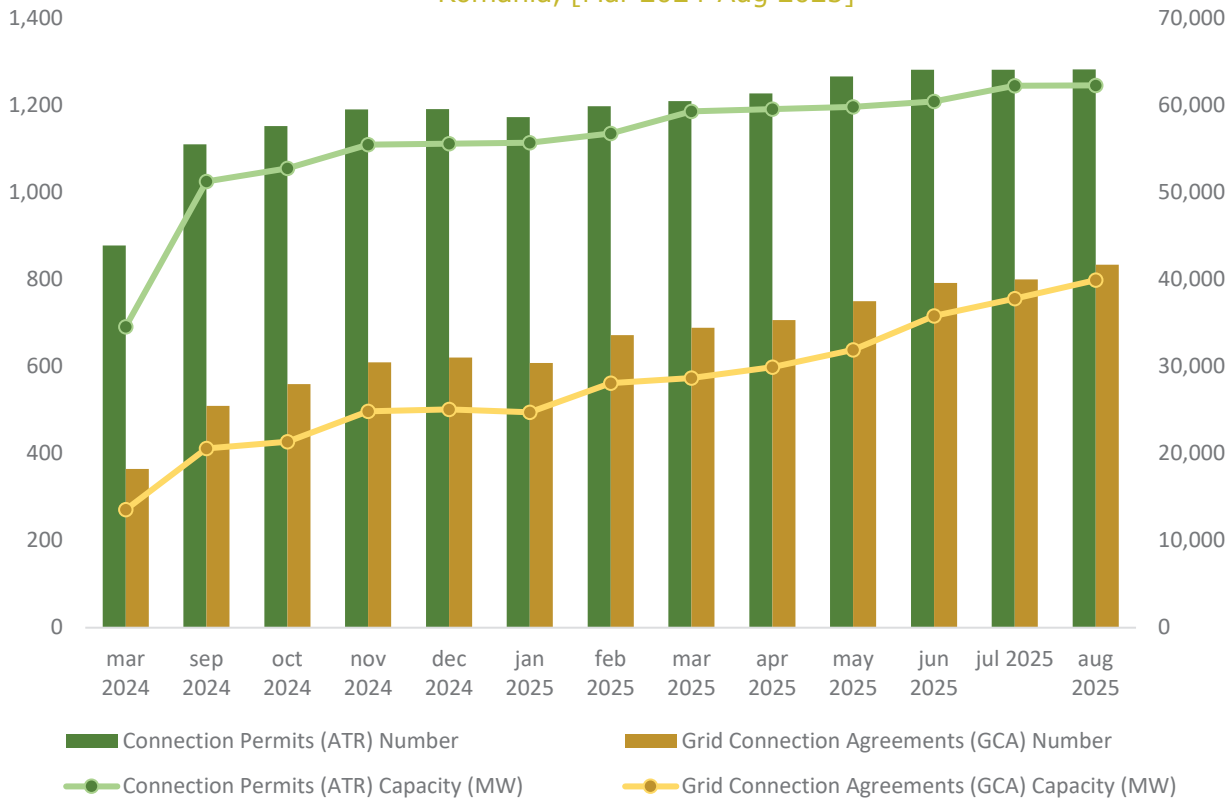
Source: Transelectrica

- Only 1,200 projects have secured full grid connection agreements.
- PPC’s Rețele Electrice holds a minor but significant share of activity.

Romania’s renewable permitting landscape is showing clear acceleration, with both application volume and connection capacity increasing

- Renewable permit activity in Romania rose steadily from March 2024 to August 2025.
- Connection permits (ATR) remain consistently higher than final grid connection agreements (GCA).

Number and Capacity (MW) of Permits for RES projects by type in Romania, [Mar 2024-Aug 2025]



Source: ANRE

- Total ATR capacity surpassed 60 GW, while GCA capacity exceeded 40 GW by mid-2025.
- The growing convergence between permits and agreements suggests improved grid integration processes.

4. Natural Gas

Contents

Key Facts

Romania produces approximately 10 billion cubic meters of natural gas annually

Romania holds and operates 11 points of interconnection with neighboring countries

The share of imported gas in total domestic consumption is below 10%

Romania has and operates 7 natural gas storage locations

The EU pipeline flows reached 8,522 GWh/d in 2024

The natural gas consumption in Romania reached almost 100 TWh in 2024

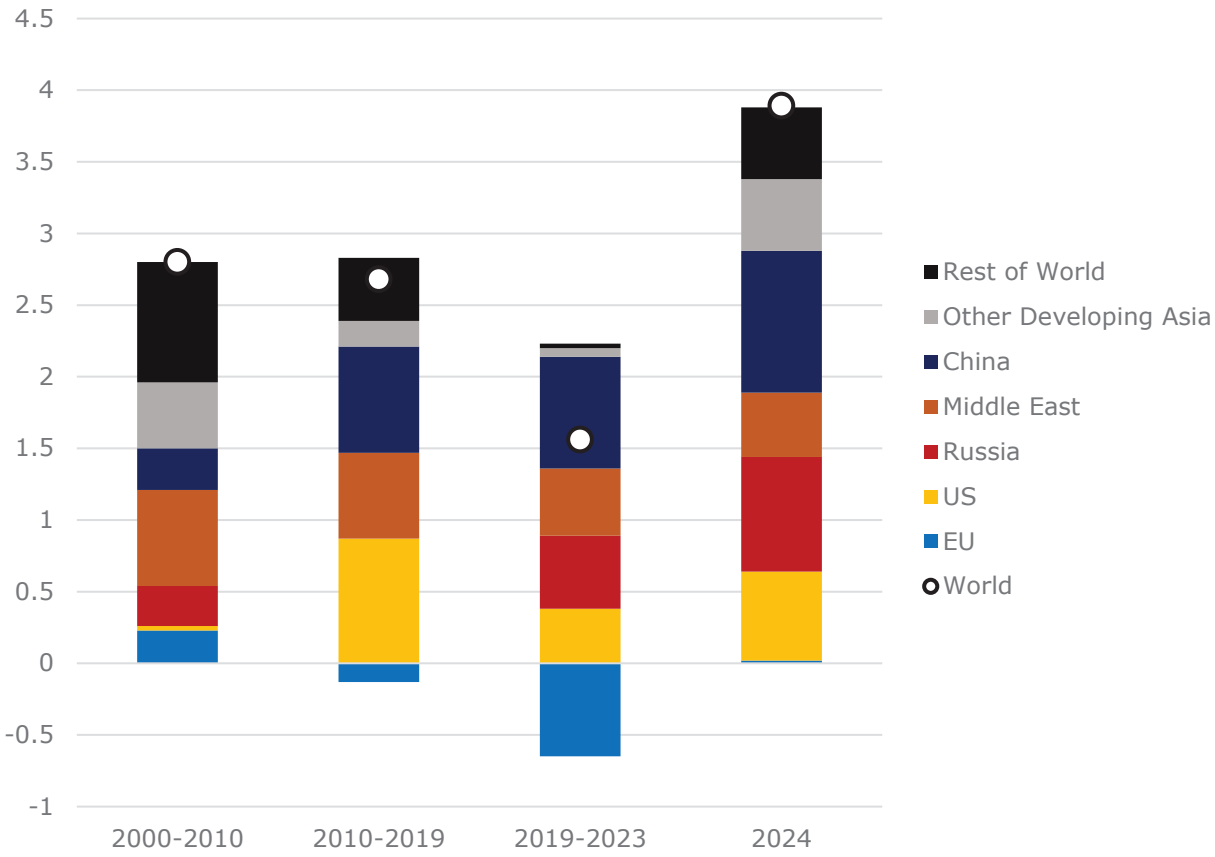
Dutch TTF falls to almost 35 euros/MWh

EU Natural gas imports from Russia continued to rise in 2024, averaging 635 mil m3/week

Global natural gas demand grows, while the EU is in structural decline, underscoring the region's role as a front-runner in gas-to-clean energy transition

- The largest increases in natural gas demand over the past two decades come from China and other developing Asia, making the region the primary driver of global gas consumption growth.
- The Middle East has shown consistent growth in gas demand, reflecting both power generation needs and industrial development.

Change in Natural Gas Demand (EJ) by Region, 2000-2024



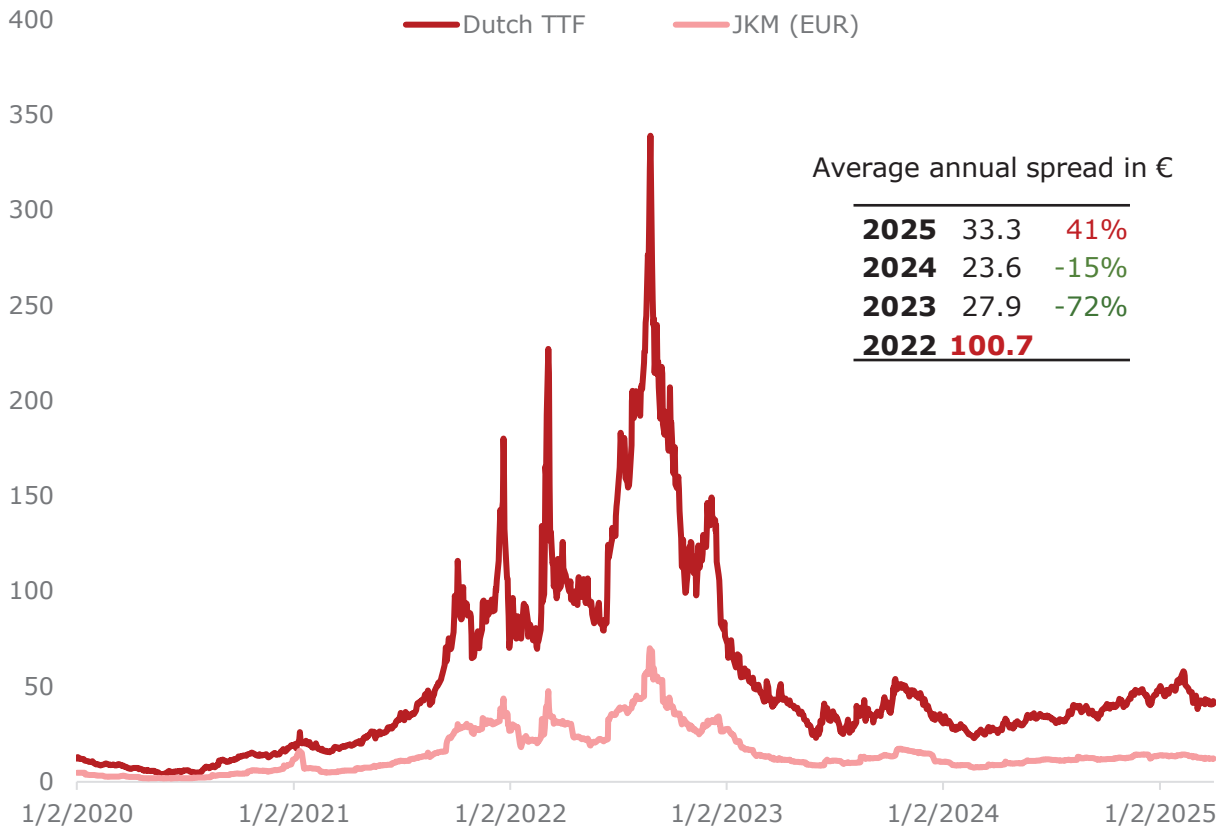
Source: IEA

- The EU stands out as the only region with negative growth in gas demand (2019–2023), reflecting efficiency gains, fuel switching, and accelerated renewables deployment.
- While both the US and Russia have added demand in certain periods, their trajectories are less stable, influenced by shale gas dynamics, geopolitical disruptions, and price shocks.

For Romania, the 2022 gas crisis underscored the vulnerability of its market to European price shocks, even with domestic reserves

- Both JKM and TTF saw extreme price spikes in 2021–2022, with TTF peaking above €300/MWh, reflecting the EU gas crisis following Russia's supply cuts.
- The JKM–TTF spread, which exceeded €100/MWh in 2022, narrowed sharply to under €30/MWh by 2023–2024, showing a return to market convergence.

JKM, Dutch TTF Indices (€/MWh) and Price Spread, [Jan 2020 - Mar 2025]



Average annual spread in €

2025	33.3	41%
2024	23.6	-15%
2023	27.9	-72%
2022	**100.7**	

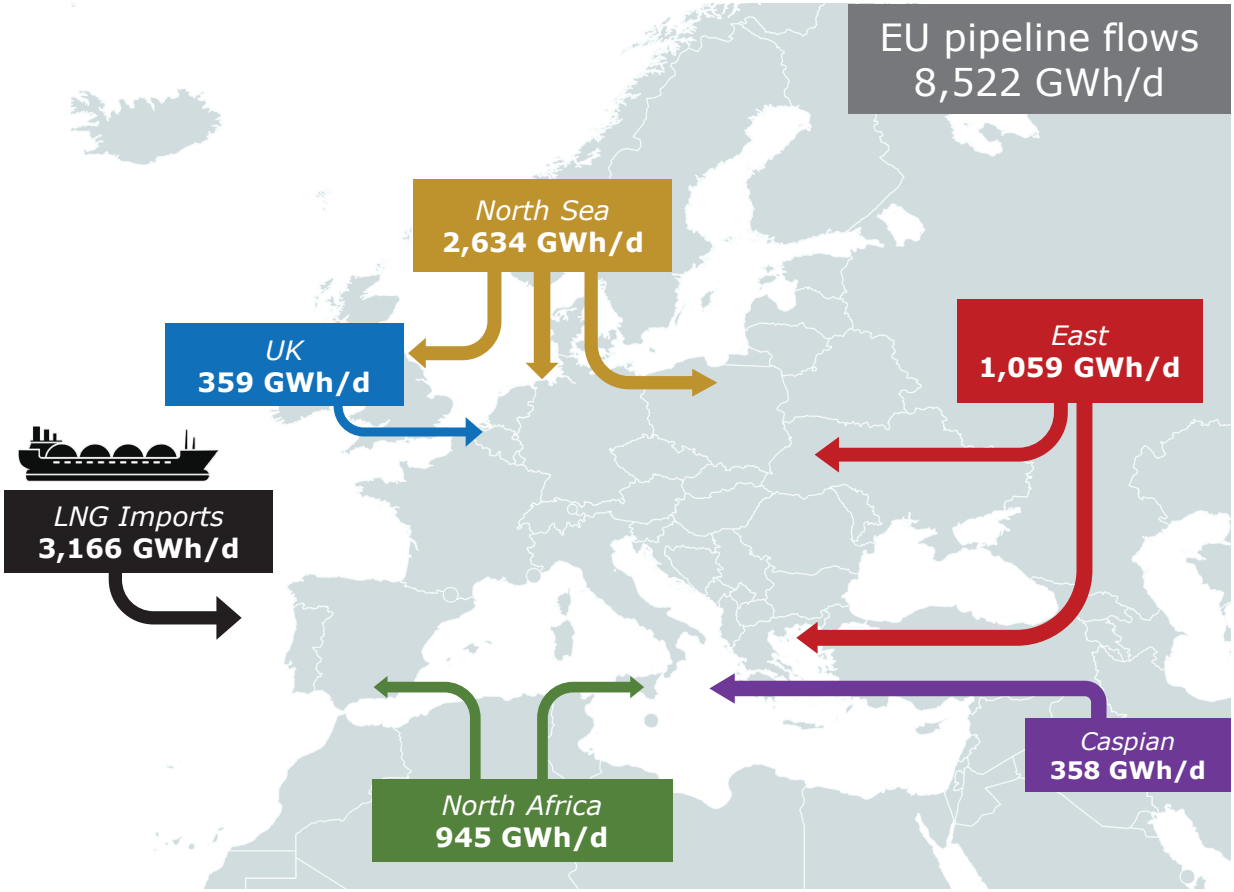
Source: Trading Economics

- Early 2025 shows the spread widening again (+41% YoY), suggesting renewed regional imbalances between European and Asian LNG markets.
- JKM continues to act as a global benchmark for LNG cargoes, with TTF increasingly reflecting both European fundamentals and global LNG arbitrage.

Europe's gas supply has been restructured, with LNG and North Sea flows now central, while eastern pipeline dependence has sharply fallen

- EU gas supply remains pipeline-heavy, with 8,522 GWh/d entering through North Sea, Eastern, North African, and Caspian routes.
- LNG imports averaged 3,166 GWh/d, making them the second-largest supply source, reflecting Europe's pivot to global LNG after the Russian cutbacks.

Average Physical Gas Flows to EU-27 (GWh/d), [2024]



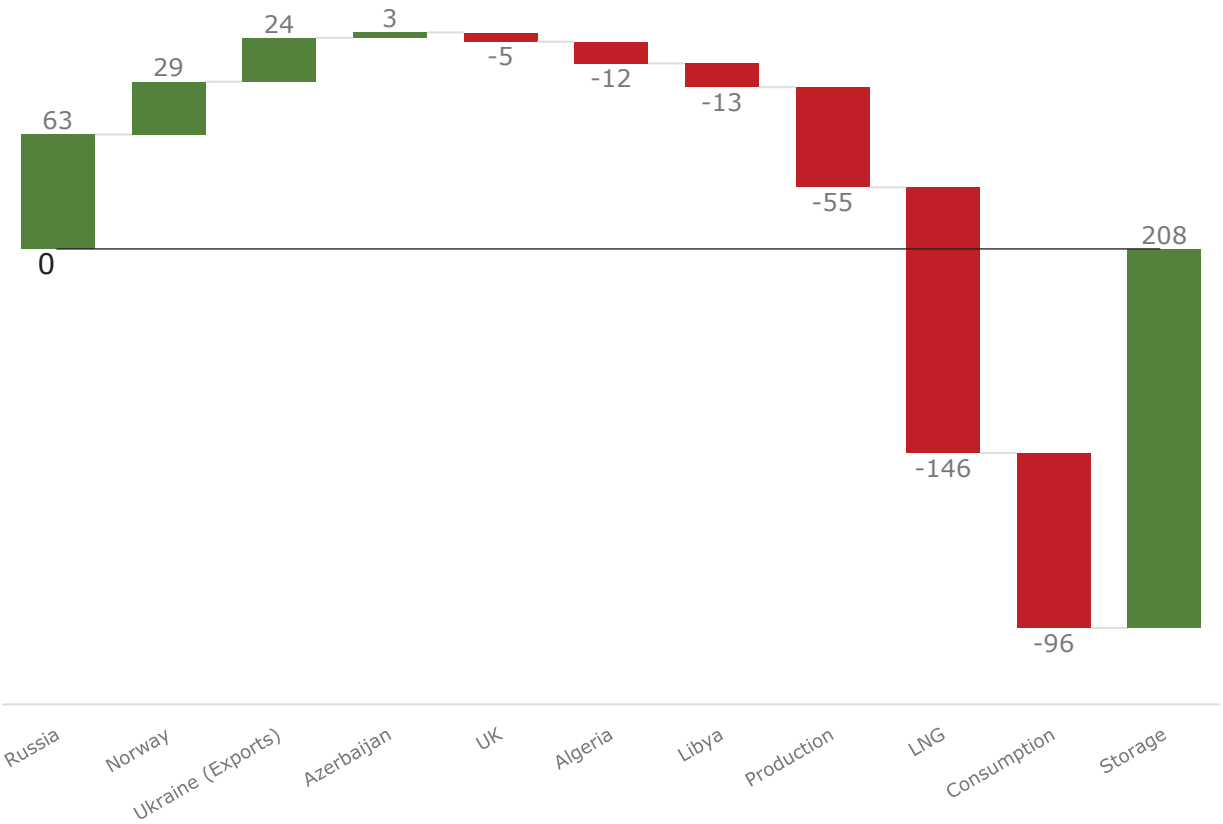
Source: Bruegel

- Imports from the East have fallen to 1,059 GWh/d, a fraction of pre-crisis levels, confirming the EU's structural move away from Russian gas.
- Moderate contributions from North Africa (945 GWh/d) and the Caspian (358 GWh/d) highlight diversification progress, though volumes remain relatively small compared to LNG and North Sea inflows.

Europe’s 2024 gas balance was defined by weaker consumption and higher storage injections, mitigating supply shortfalls

- Imports from Russia rose by 63 TWh, marking a slight recovery despite the long-term downtrend.
- Norway added 29 TWh, consolidating its role as the EU’s largest stable pipeline supplier.

Year-on-year changes for gas supply and demand (TWh) in the EU-27, [2024]



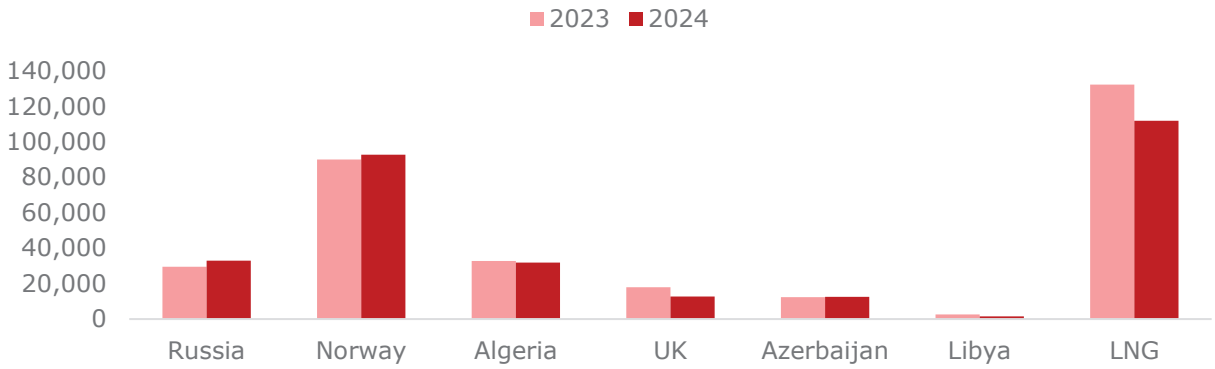
Source: ACER

- EU gas consumption dropped by 146 TWh, highlighting persistent demand-side weakness driven by efficiency, mild weather, and industrial contraction.
- Storage absorbed 208 TWh, the largest balancing factor in the system, compensating for falling LNG inflows (-96 TWh) and declining EU production (-55 TWh).

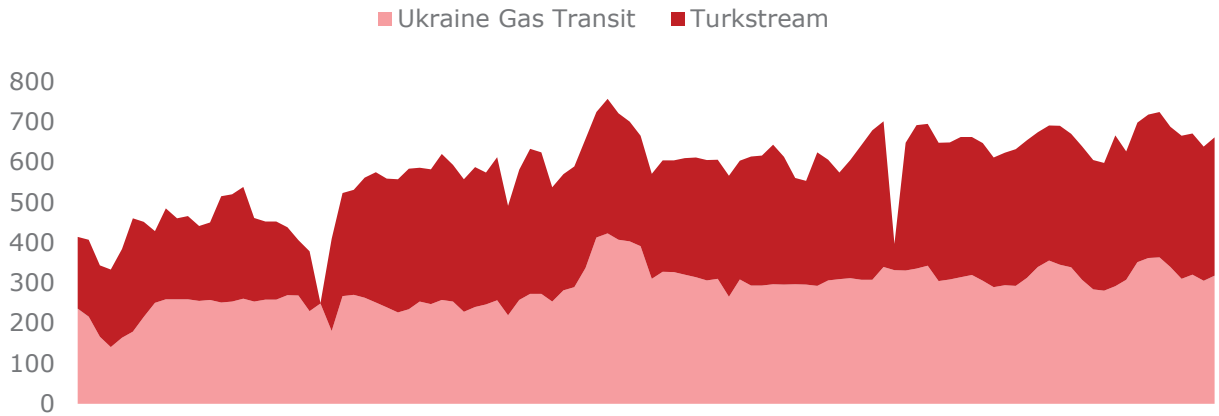
Russian gas still flows to the EU via Ukraine and TurkStream pathways, though reliance is steadily declining

- LNG imports dropped by nearly 20 bcm, reflecting softer demand and increased reliance on storage and pipeline inflows.
- Imports from Norway stayed stable at around 90 bcm, cementing its role as the EU's most reliable pipeline supplier.

Natural Gas Imports in EU 27 by Origin (mcm), [2023-2024]



EU27 Natural Gas Imports from Russia's Exporting Routes (mcm), [2023-2024]



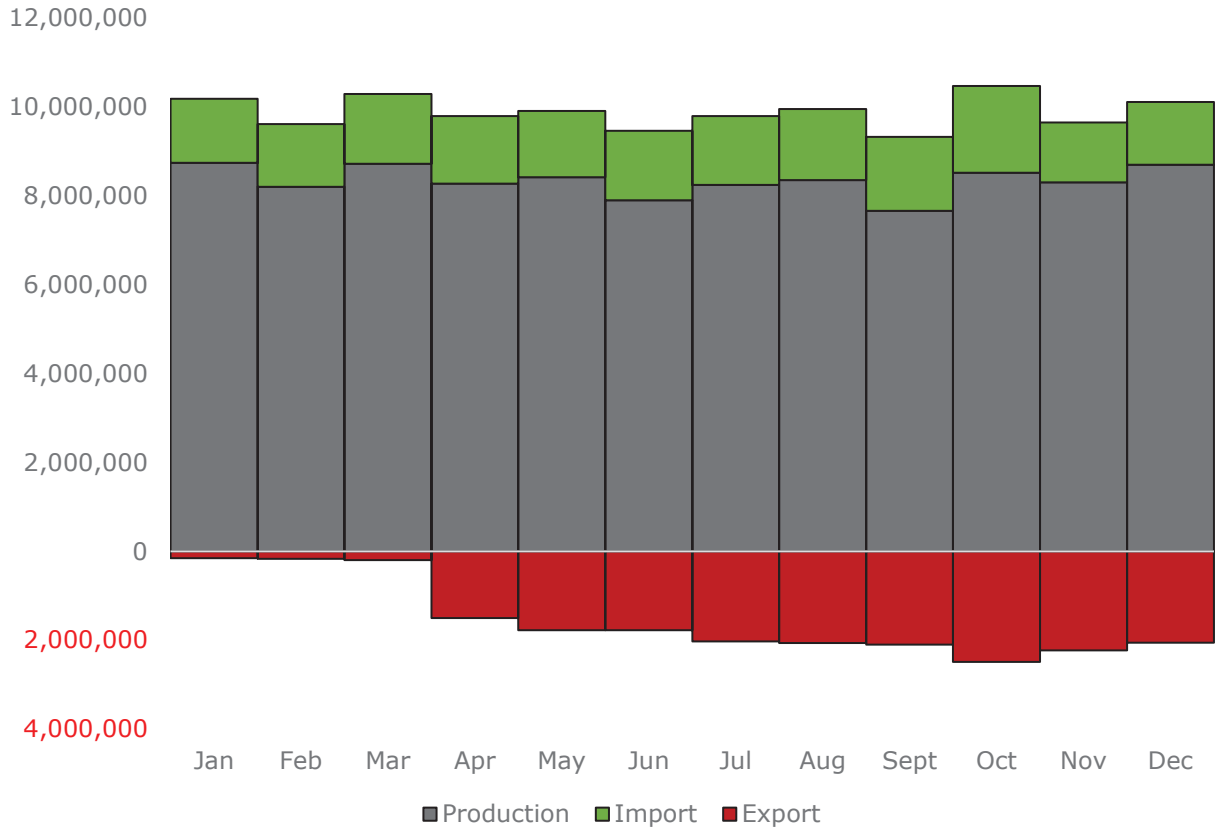
Source: Bruegel

- Russian gas continues to reach the EU primarily through the Ukraine transit system and TurkStream.
- Despite declining reliance, these flows still influence European price dynamics and supply security considerations.

Romania’s gas market remains import-dependent in winter, stressing supply diversification and regional infrastructure development

- Domestic gas production remained stable throughout 2024, consistently covering the bulk of Romania’s natural gas demand.
- Imports fluctuated seasonally, peaking in colder months, highlighting Romania’s ongoing reliance on external gas during high-demand periods.

Monthly Natural gas production, imports and exports (MWh) in Romania, [Jan 2024- Dec 2024]



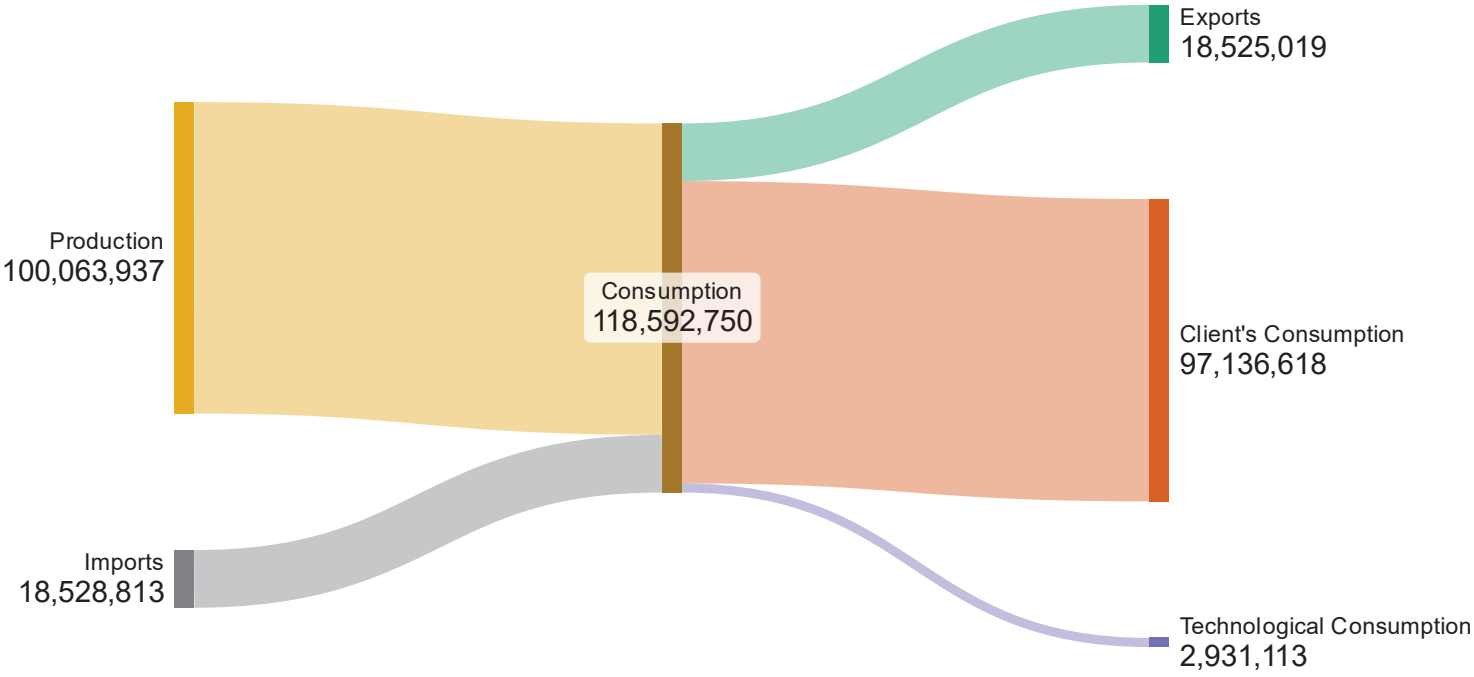
Source: ANRE

- Exports persisted year-round, but negative balances indicate domestic consumption pressures outweigh export opportunities in Romania’s gas market.
- Romania’s gas balance underscores the importance of Black Sea projects and interconnections to strengthen long-term supply security.

Romania balances gas self-sufficiency with imports, but efficiency and diversification remain critical policy priorities

- Domestic production covered about 84% of demand in 2024, reaffirming Romania's relatively strong gas self-sufficiency in the region.
- Imports of 18.5 TWh filled the remaining demand gap, underscoring Romania's continued exposure to external supply risks.

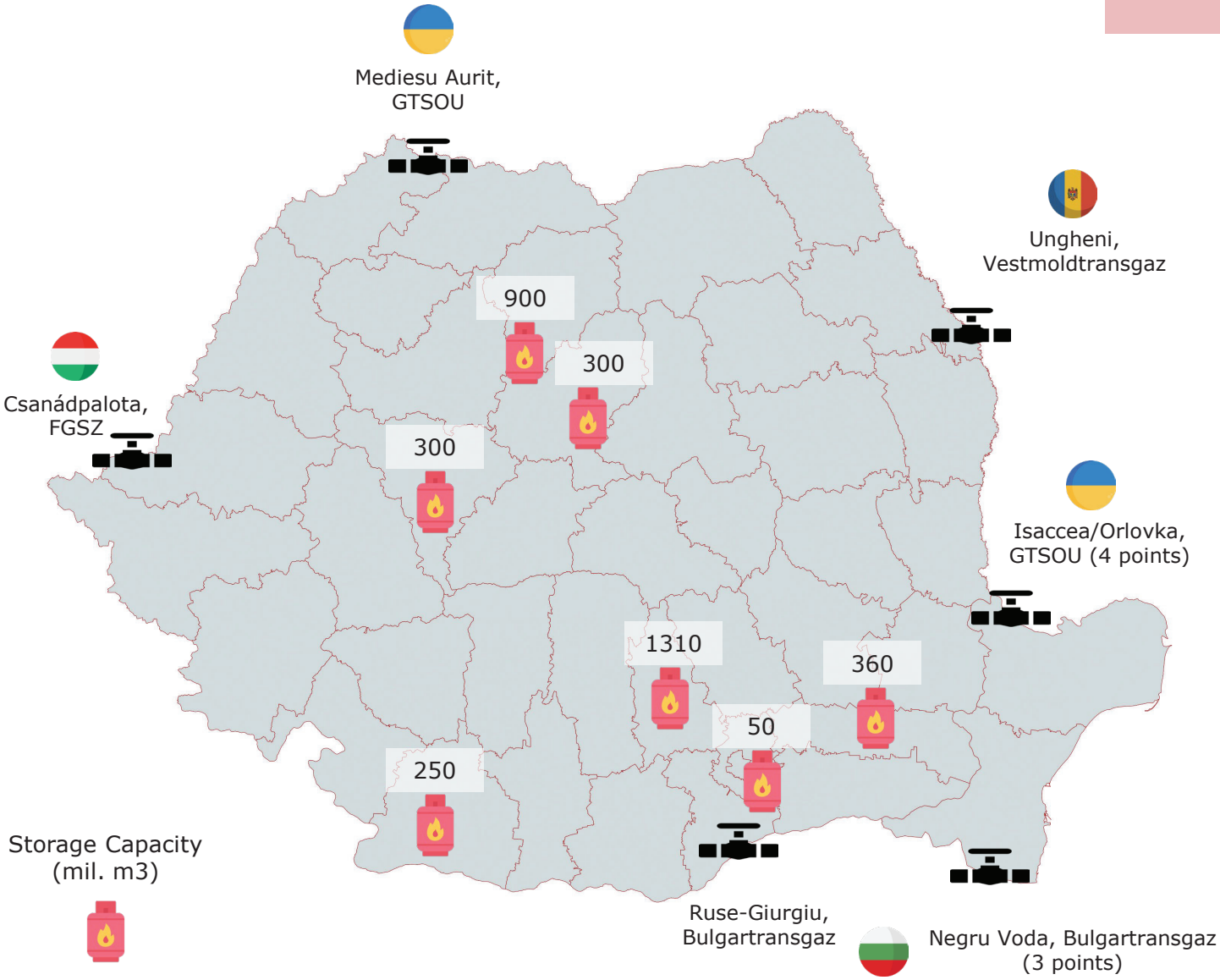
Natural gas flows (MWh) in Romania, [2024]



Source: ANRE

- Exports also reached 18.5 TWh, showing Romania's dual role as both a gas importer and regional supplier.
- Technological consumption accounted for 2.9 TWh, stressing the need for efficiency improvements in Romania's gas transmission and processing.

Natural Gas Infrastructure of Romania



Source: Transgaz

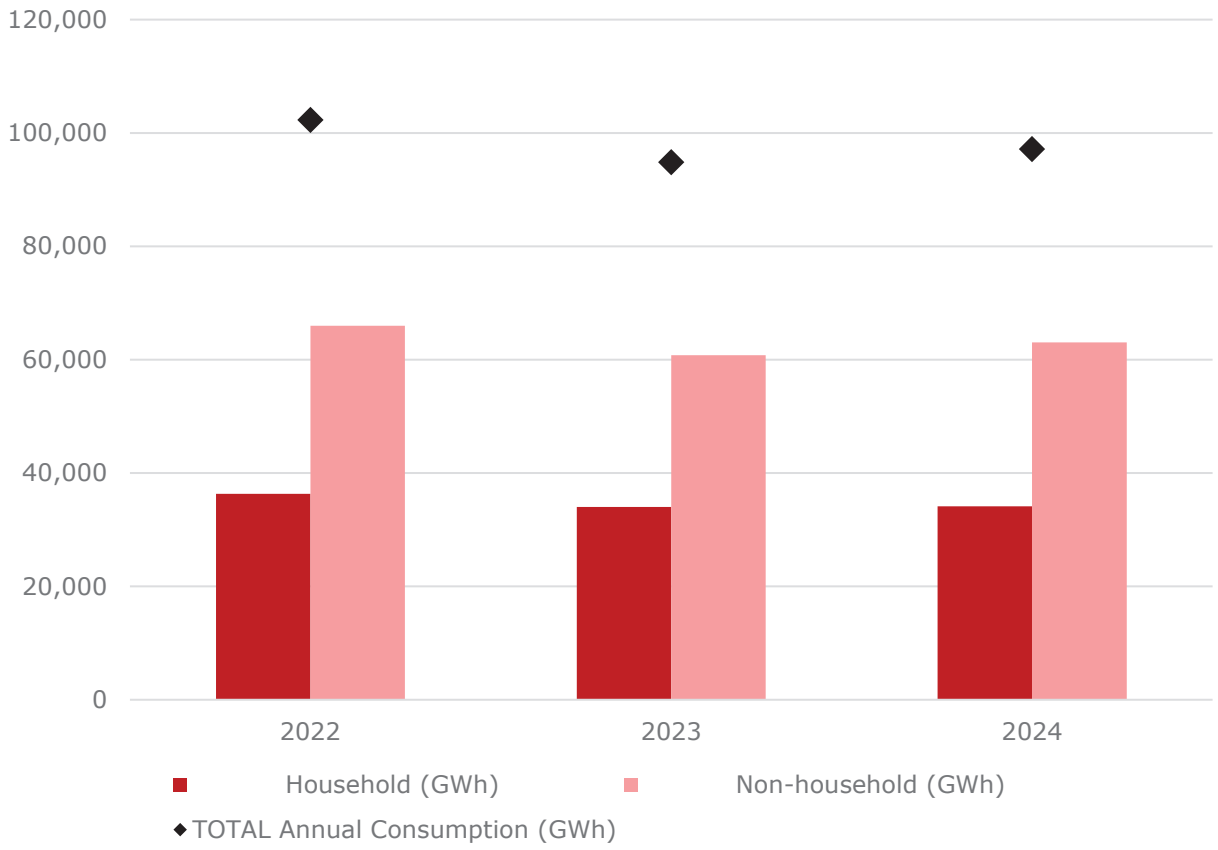
Key Metrics

Total Transmission Length	13,992 km (domestic + international)
Compression Stations	8 stations
Cross-Border Interconnections	11 points (HU, BG, MD, UA)
Storage Facilities	7 facilities
Production Entry Points	101 entry points
Distribution Exit Points	943 exit points / 29 operators
Direct Consumer Connections	240 outputs (20 power plants, 18 industrial, 177 commercial, 25 residential)

Romania’s gas demand remains industry-driven, with households stable, underscoring need for electrification and efficiency policies

- Total gas consumption in Romania declined slightly from 2022 to 2023, before partially rebounding in 2024.
- Non-household consumers, primarily industry and power generation, consistently accounted for the largest share of natural gas demand.

Natural Gas consumption by type of consumer in Romania, [2022-2024]



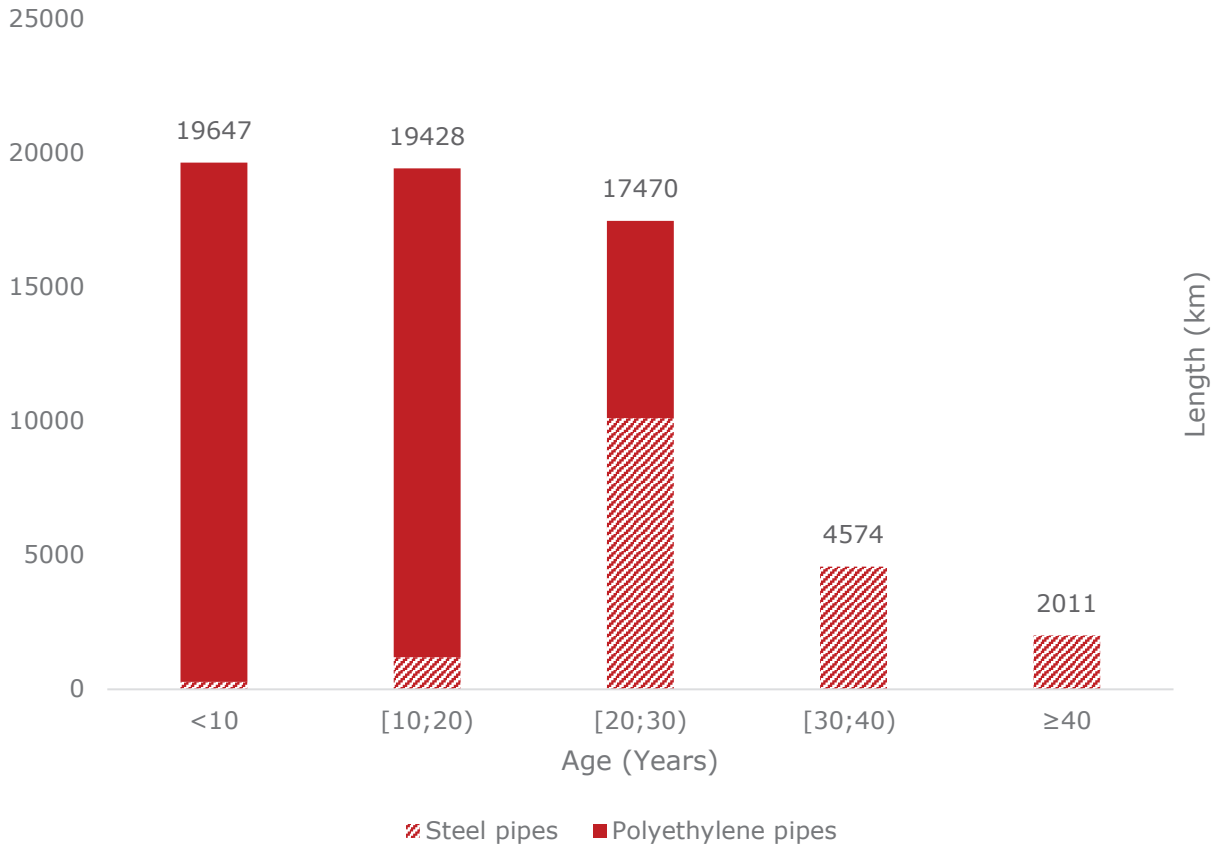
Source: ANRE

- Household consumption remained stable, reflecting Romania’s reliance on gas for heating and limited large-scale electrification in residential use.
- Balancing declining demand trends with decarbonization targets requires stronger electrification policies and efficiency programs in Romania’s residential and industrial sectors.

Romania's gas grid modernization advances, yet ageing steel pipelines demand accelerated replacement to ensure reliability

- Romania's pipeline network shows modernization, with the largest share under 10 years old, mostly polyethylene installations.
- Older steel pipelines above 30 years total over 6,500 km, posing efficiency and safety risks if not upgraded.

Length (km) of natural gas pipelines by age and material in Romania, [2024]



Source: ANRE

- Mid-aged networks (20–30 years) remain significant, highlighting transitional infrastructure requiring targeted maintenance investment.
- Continued polyethylene deployment strengthens resilience, but balanced replacement of ageing steel lines remains a key infrastructure priority.

5. Oil & Refining

Contents

Key Facts

In 2023, total production reached 3.1 million tonnes of oil

While total consumption: 11.1 million tonnes of oil

Oil reserves of approximately 600 million barrels

Total refining capacity of 240 thousand barrels per day

The oil industry plays a strategic role in Romania’s economy

OMV Petrom Rompetrol, and Lukoil hold 80% of the market

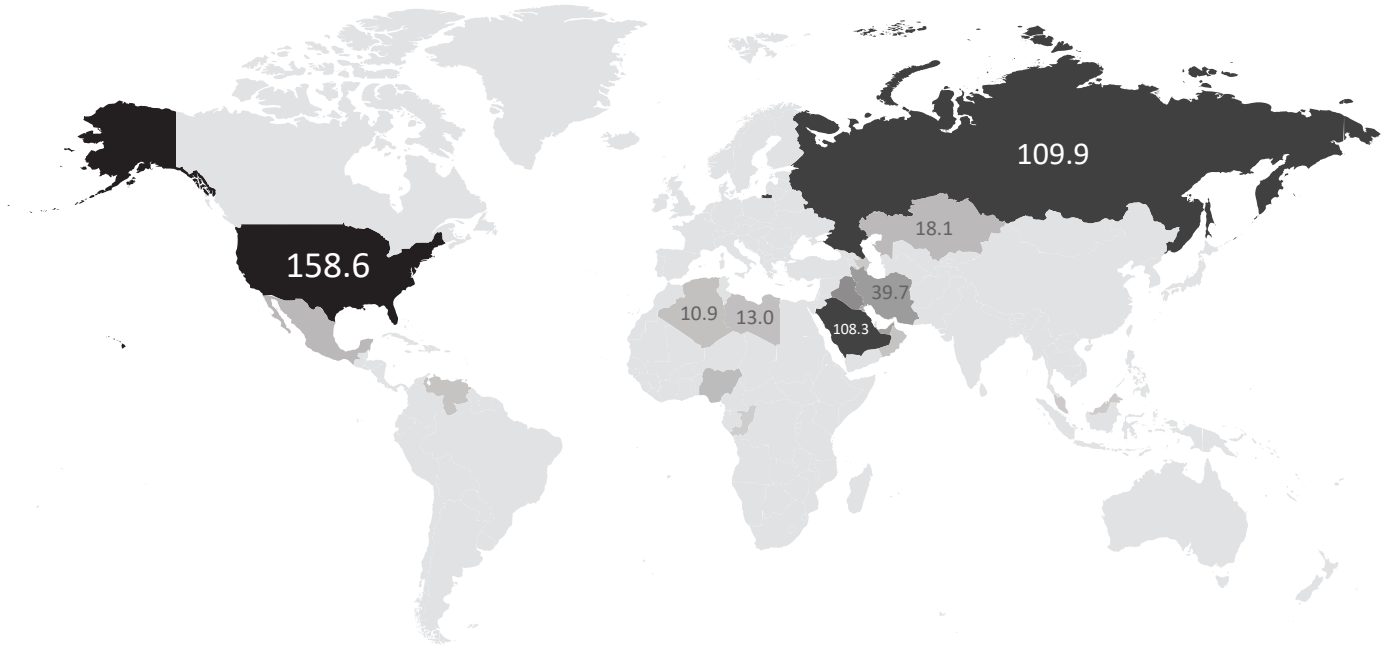
In 2023, the dependency rate of oil imports reached 73%

Oil product output rebounded by 7% in 2024 to 12 Mt

Global oil supply remains highly concentrated, with the U.S., Russia, and the Middle East shaping market dynamics in 2024

- With nearly 159 mb/d, the U.S. maintains its position as the world's leading crude oil producer.
- Despite sanctions and geopolitical constraints, Russia remains a central supplier, producing over 109 mb/d.

Word Crude Oil Production, (mb/d) [2024]

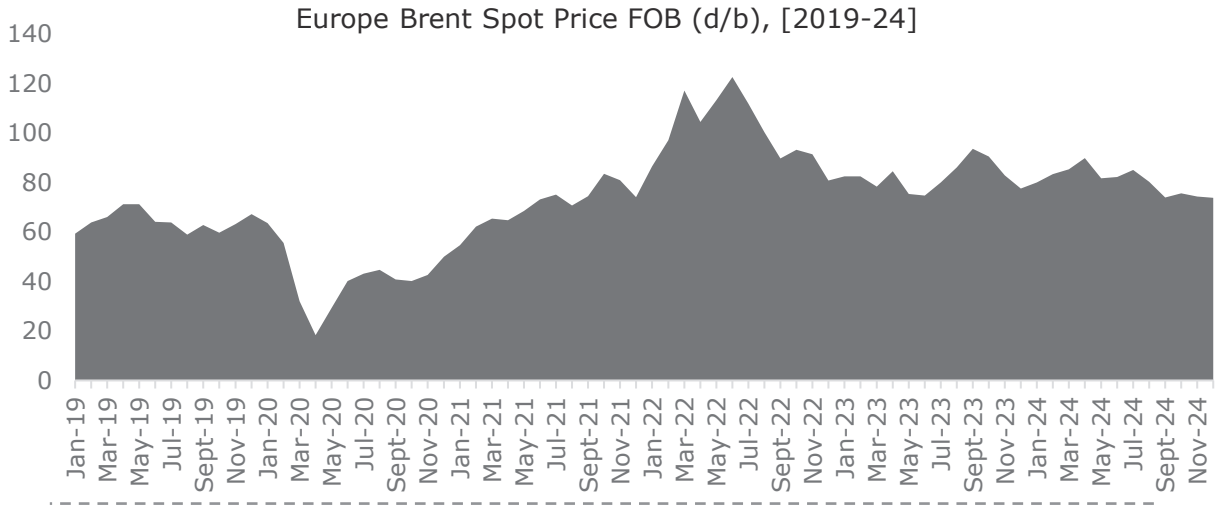


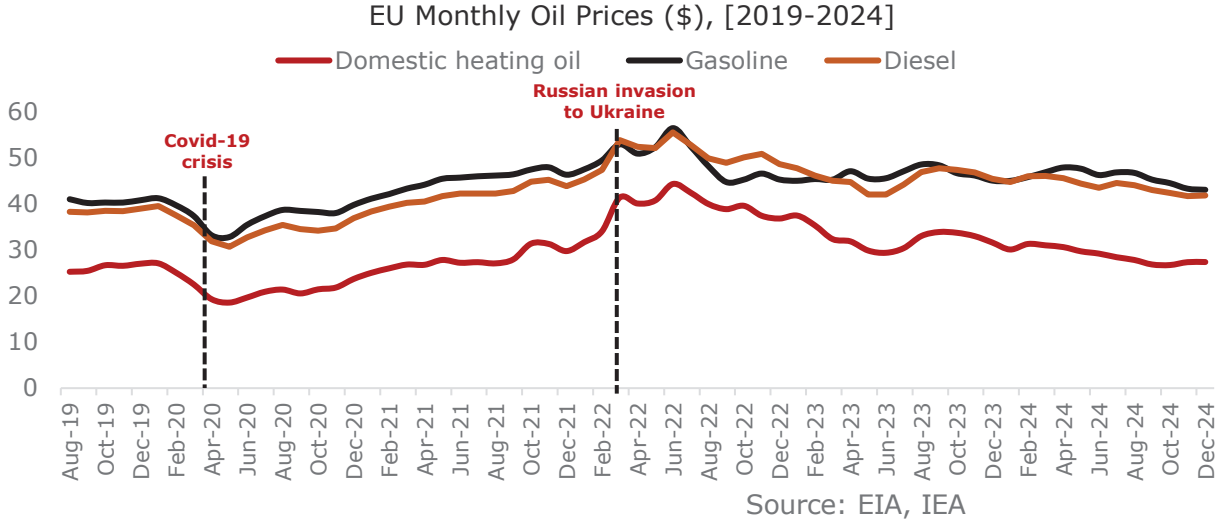
Source: EIA

- Key producers like Saudi Arabia (39.7 mb/d) and Iraq (10.3 mb/d) illustrate the region's enduring influence.
- The geographic spread of production underpins global oil market stability but also highlights vulnerability to regional disruptions.

Oil markets show high sensitivity to global crises, with prices stabilising post-2022 but consumer costs still elevated

- The Russian invasion of Ukraine in 2022 triggered an unprecedented oil price surge above $120/b.
- Since mid-2023, prices have settled in the $70–90/b range, with refined product prices following.





Source: EIA, IEA

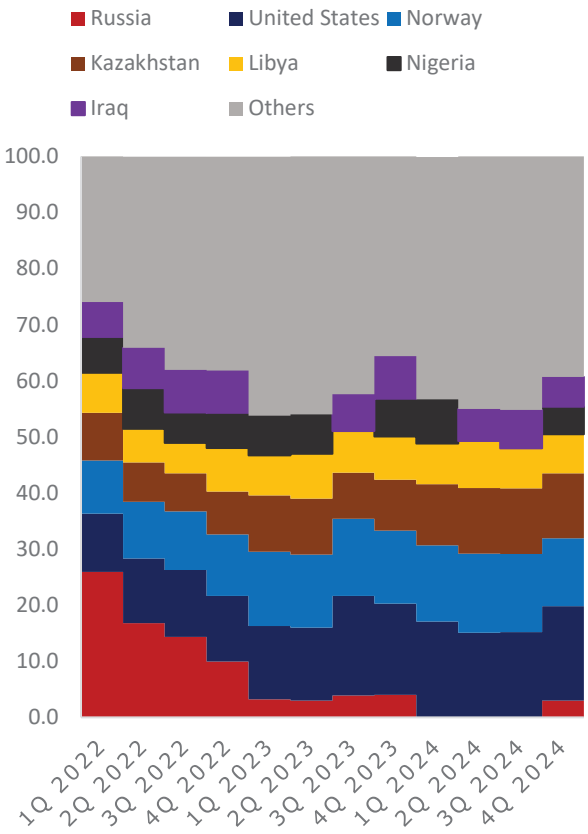
Brent crude prices collapsed in early 2020, reflecting demand destruction from Covid-19 lockdowns.

Gasoline and diesel prices remain structurally higher than domestic heating oil, reflecting transport demand resilience.

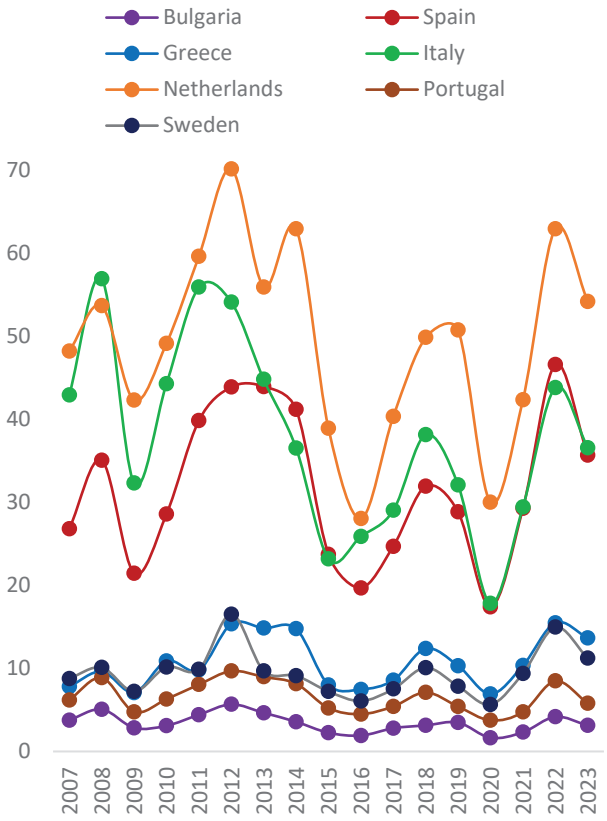
EU oil imports have diversified away from Russia, with U.S., Norway, and Middle East producers reshaping Romania's supply security

- By 2024, Russia's share of EU petroleum imports has nearly vanished, replaced by U.S., Norway, and Middle East supplies.
- The U.S. emerged as the largest single supplier, reflecting EU's push for Atlantic Basin crude security.

Extra-EU Imports of Petroleum Oil, Shares (%) of Main Trading Partners, [2022 – 2024]



Top EU Importers of Petroleum Oils, Crude by Percentage of Total Imports, (Trade Value ($Bn), [2007-2023]

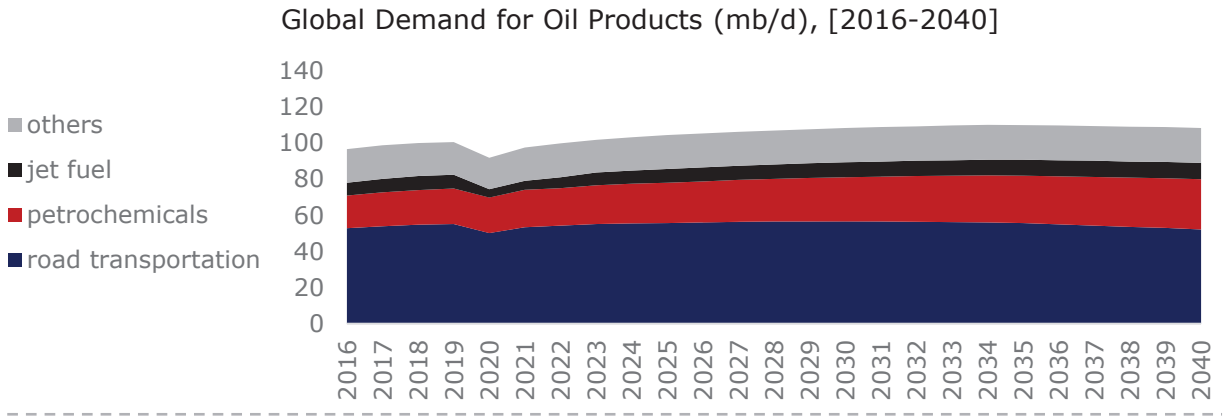


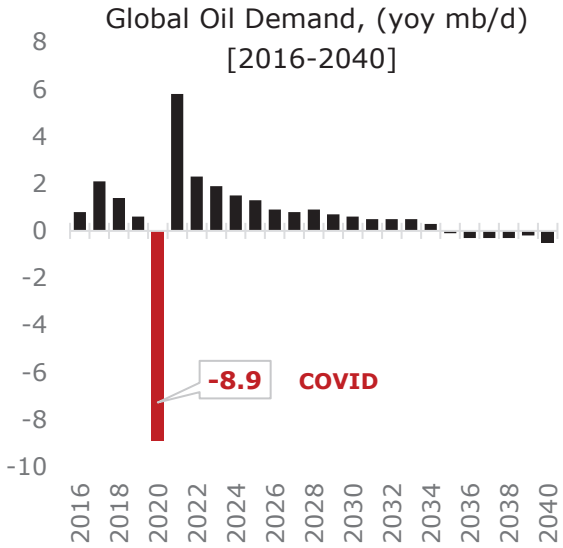
Source: Eurostat, OEC

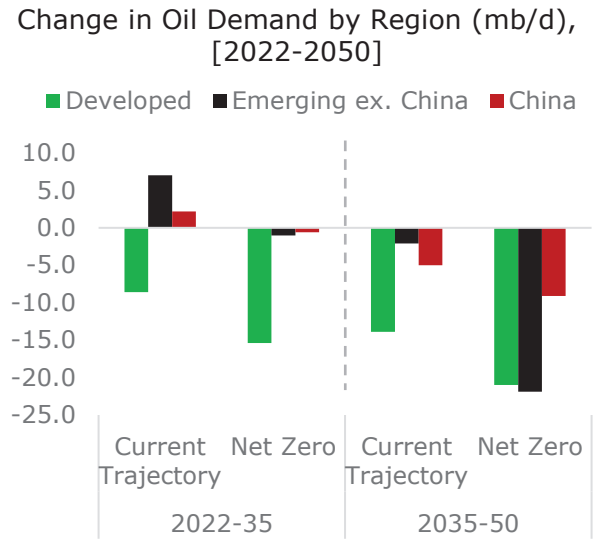
- Romania imports crude primarily to feed its domestic refining sector, which remains strategically important in Southeastern Europe.
- Despite some domestic oil production, Romania still relies heavily on external suppliers, leaving it exposed to EU-wide market shifts.

Oil demand growth slows and plateaus, with petrochemicals driving resilience, but long-term net zero pathways imply sharp declines

- Oil demand surged in 2021–2022 but is projected to flatten from the late ∠020s onward.
- Developed economies see demand decline, while emerging markets sustain growth until the mid-2030s.







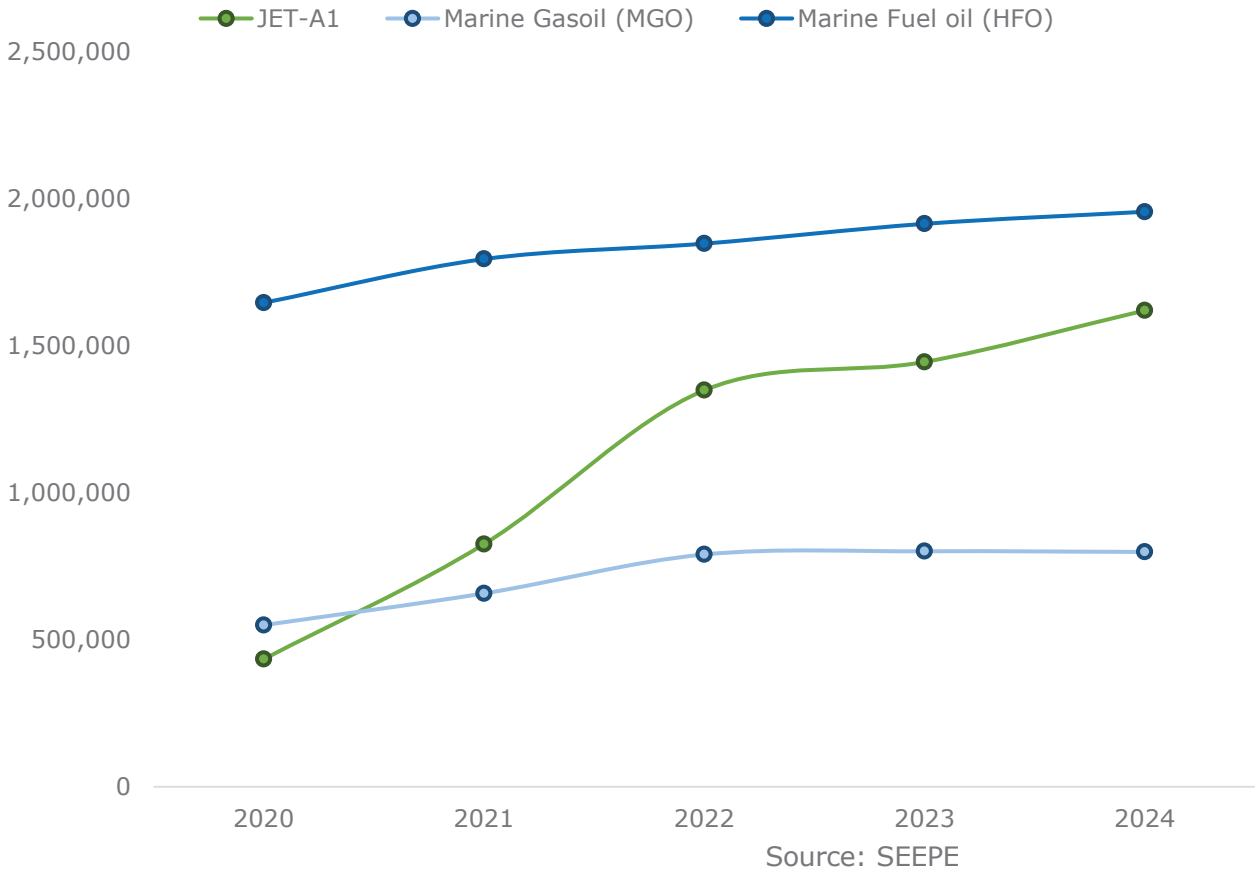
Source: BP, Goldman Sachs

- Under ambitious climate scenarios, oil demand falls sharply after 2035, particularly in emerging economies.
- Petrochemicals remain the strongest growth driver, while road transport stabilizes and jet fuel fluctuates.

Global petroleum product demand is rebounding, driven by shipping and aviation, highlighting the continued reliance on liquid fuels these sectors

- Marine Fuel Oil (HFO) continues to account for the largest share of global petroleum product demand, reflecting the central role of shipping in global trade.
- JET-A1 consumption has been steadily recovering post-pandemic, in line with the aviation sector's gradual return to pre-COVID traffic levels.

Petroleum Product Consumption (metric tonnes) Globally [2020-2024]



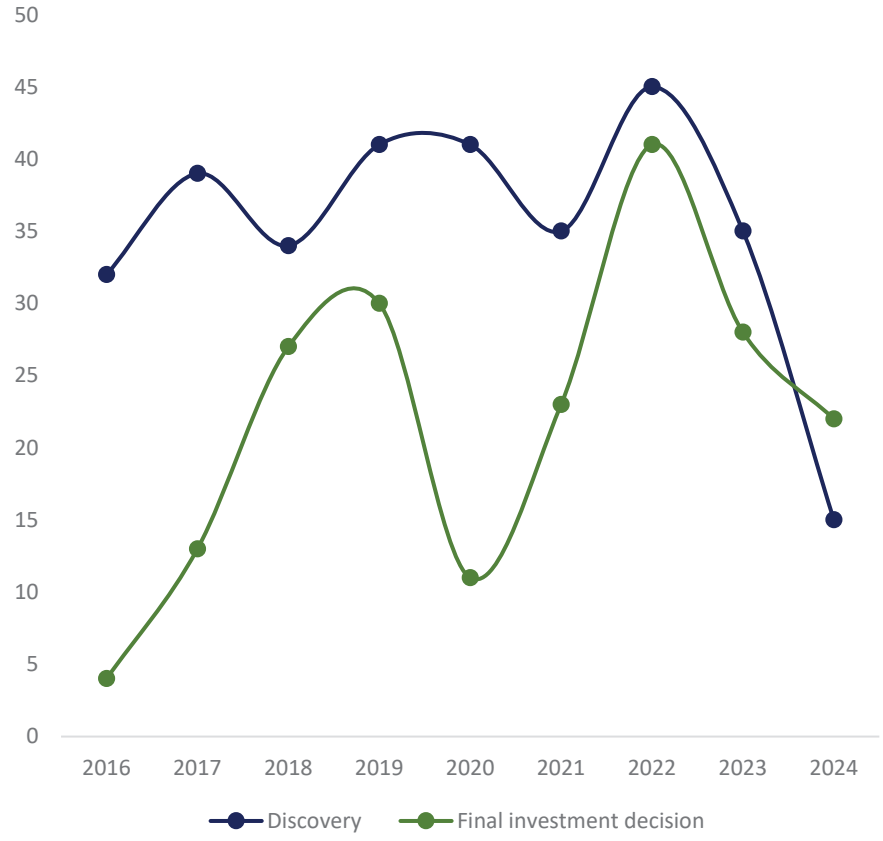
Source: SEEPE

- MGO demand remains relatively stable, reflecting compliance with IMO sulfur regulations and the transition to cleaner marine fuels.
- Total petroleum product demand has risen since 2020, underscoring a resilient dependence on liquid fuels despite the ongoing global energy transition.

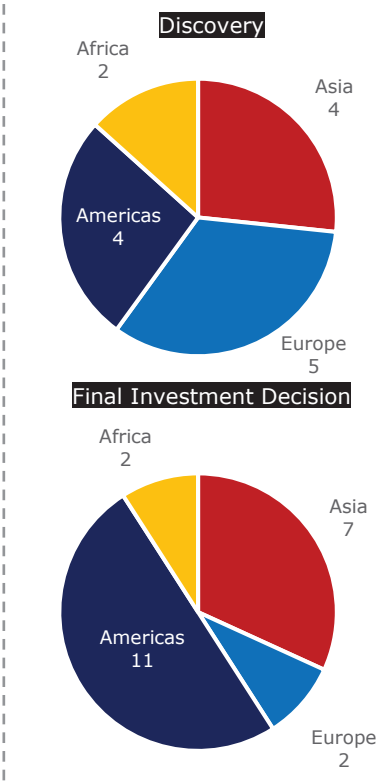
Oil and gas project activity is declining globally, with Europe playing a marginal role, signaling strategic pivot toward cleaner energy

- Global discoveries of oil and gas fields were relatively high between 2017–2021 but have declined sharply since 2022, reflecting both market uncertainty and energy transition pressures.
- Europe accounts for only a small share of new discoveries and FIDs, highlighting the region's mature resource base and the EU's focus on decarbonization over new fossil fuel investment.

Number of Extraction Projects Globally, [2016-2024]



Number of Extraction Projects by Region, [2024]



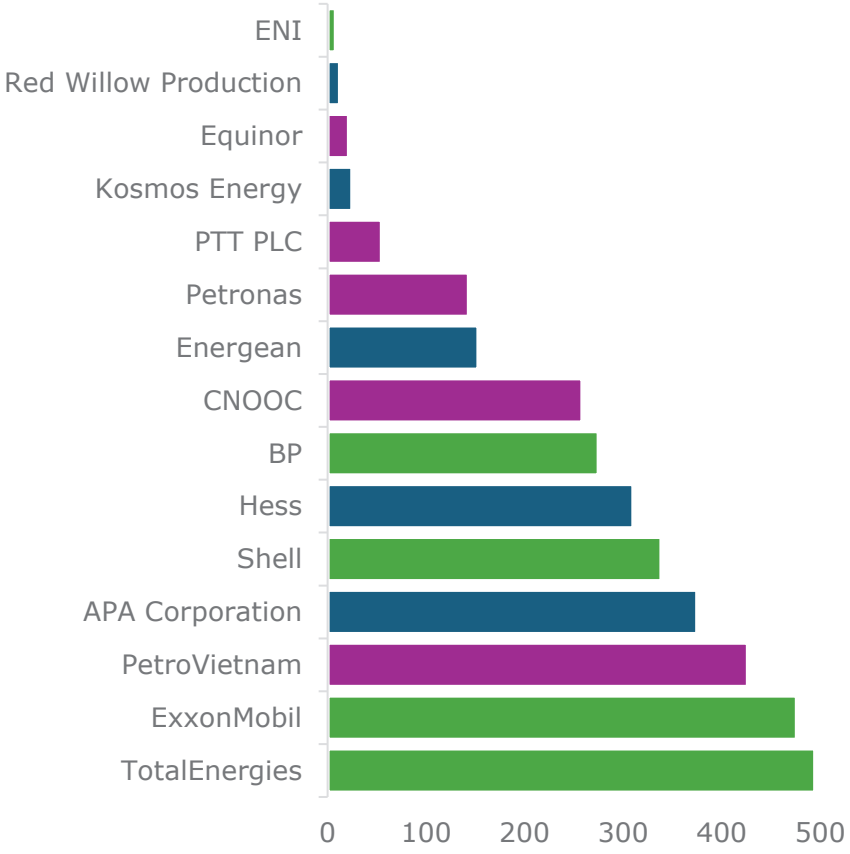
Source: Global Energy Monitor

- Final Investment Decisions (FIDs) show volatility, with spikes in 2018 and 2022, but an overall downward trend suggests growing caution among investors.
- Both in discoveries and FIDs, Asia and the Americas lead activity, underlining their central role in sustaining future oil and gas supply.

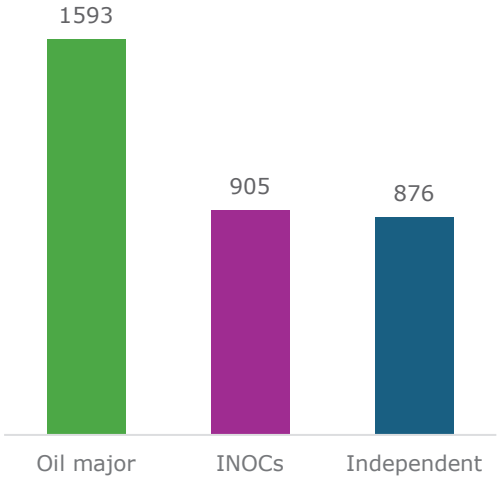
Oil majors retain dominance in sanctioned reserves, but independents and state-backed companies are increasingly shaping regional dynamics

- With 1,593 Mboe sanctioned, oil majors (TotalEnergies, ExxonMobil, Shell, BP, ENI) remain the backbone of global reserves.
- INOCs (e.g., PetroVietnam, CNOOC, Petronas) collectively hold 905 Mboe, reflecting state-backed investment focus.

Oil and Gas Reserves (Mboe) Sanctioned by Company [2024]



Oil and gas reserves (Mboe) by type of company



Oil major
TotalEnergies, ExxonMobil, Shell, BP, ENI

INOCs
PetroVietnam, CNOOC, Petronas, PTT PLC, Equinor

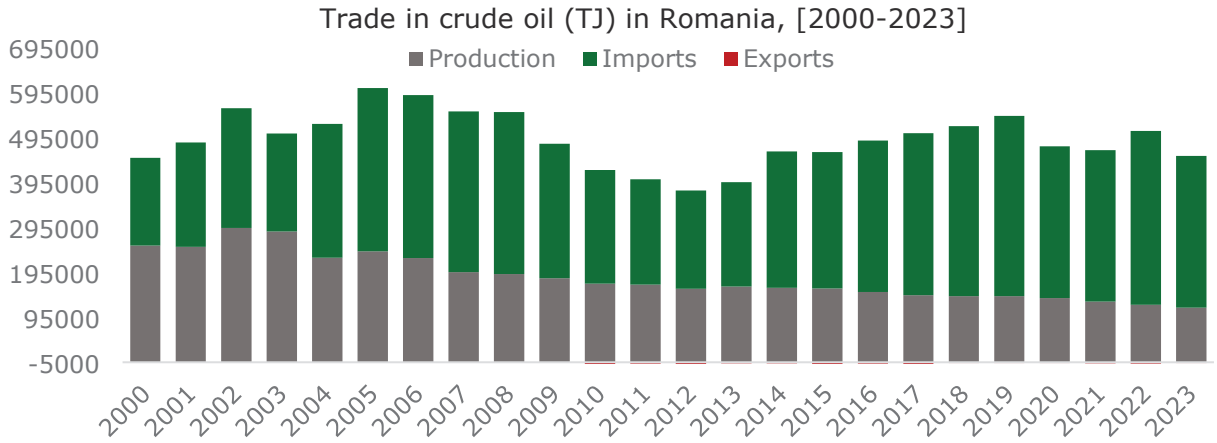
Independent
APA Corporation, Hess, Energean, Kosmos Energy, Red Willow Production

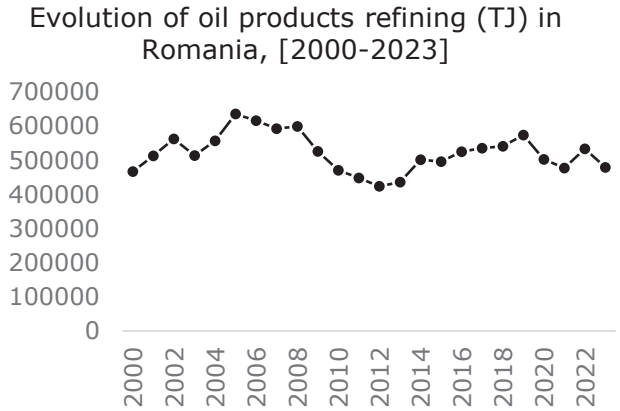
Source: Global Energy Monitor

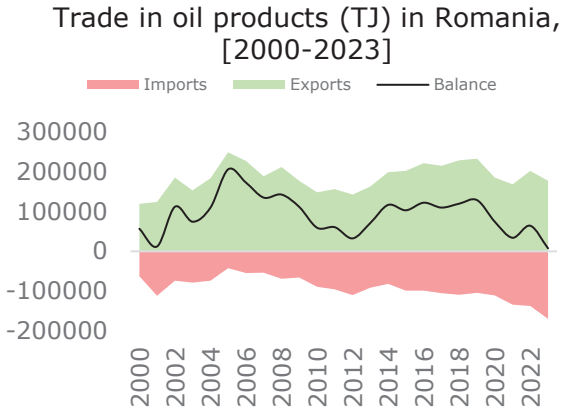
- Independents like APA, Hess, and Energean together account for 876 Mboe, showing rising influence in regional plays.
- With 153 Mboe sanctioned, Energean strengthens its role in the Eastern Mediterranean, linking to regional energy security debates.

Romania is a net oil products exporter, but declining crude output raises long-term energy security concerns

- Romania's crude oil production has steadily declined since 2000, increasing reliance on imports to cover domestic demand.
- Refining volumes fluctuated, peaking mid-2000s, but recently stabilized around 450–500 TJ, reflecting limited modernization of Romania's refining sector.







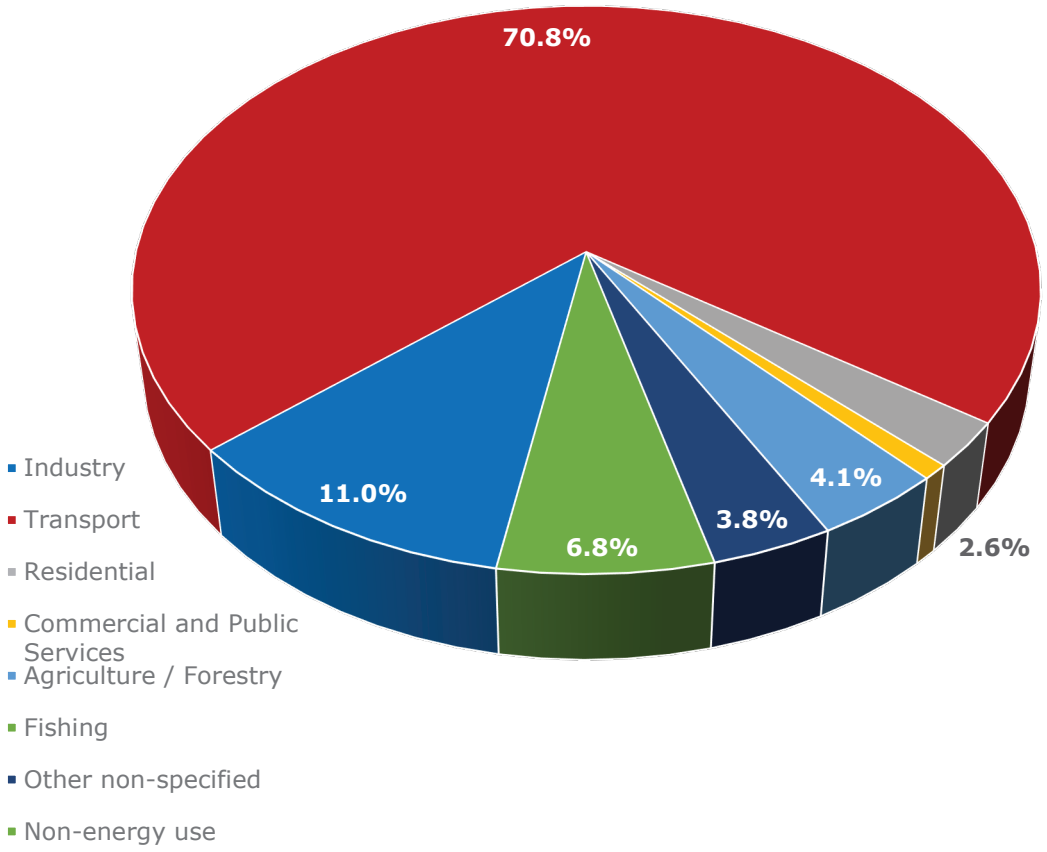
Source: IEA

- Oil product exports exceeded imports consistently since 2010, making Romania a regional net exporter of refined products.
- Maintaining refining competitiveness requires modernization, efficiency upgrades, and alignment with EU decarbonization and fuel quality standards.

Romania’s oil demand is transport-driven, making decarbonizing mobility central to reducing fossil fuel dependence

- Transport dominates oil product consumption in Romania, accounting for over 70% of total demand in 2023.
- Industry is the second-largest consumer at 11%, reflecting Romania’s reliance on oil for industrial energy needs.

Oil products final consumption by sector in Romania, [2023]



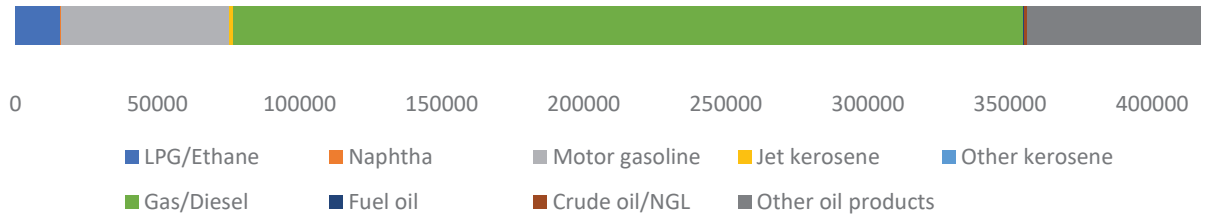
Source: IEA

- Residential use remains limited at 6.8%, highlighting natural gas dominance and electrification in household energy consumption.
- Agriculture and services account for small shares, yet decarbonization policies could accelerate fuel switching in these sectors.

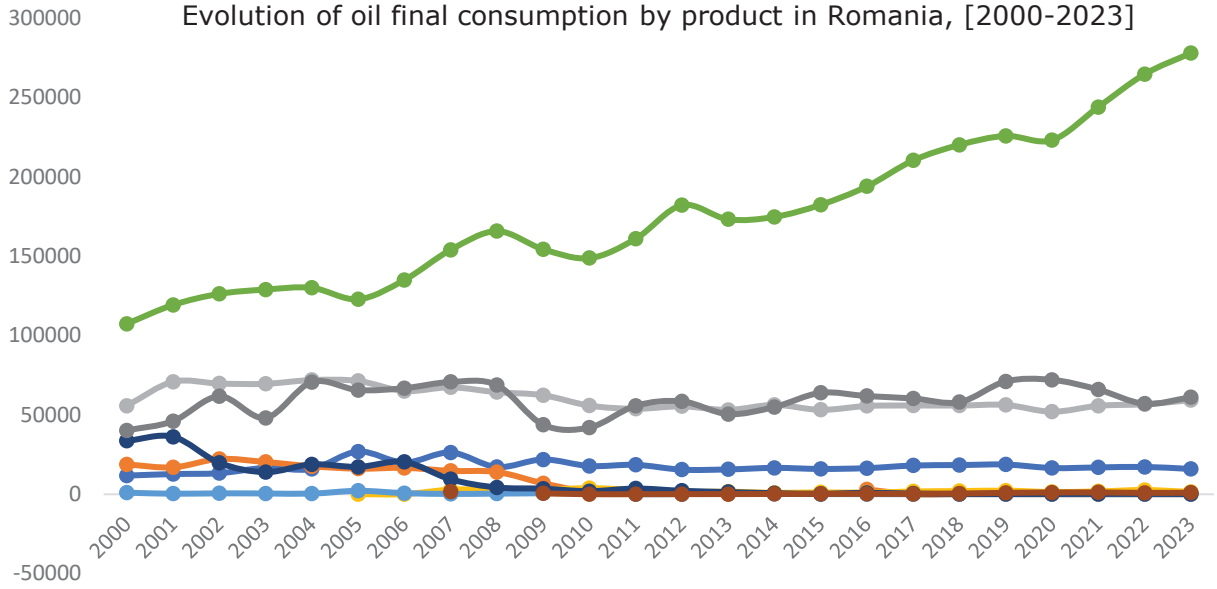
Romania's oil demand is diesel-driven, underscoring urgent need for transport decarbonization and alternative fuel adoption

- Gas/diesel dominates Romania's oil consumption, exceeding 250,000 TJ in 2023, reflecting transport sector dependence on conventional fuels.
- Motor gasoline consumption has remained steady, showing limited progress in shifting passenger transport away from petroleum-based fuels.

Oil final consumption by product in Romania, [2023]



Evolution of oil final consumption by product in Romania, [2000-2023]



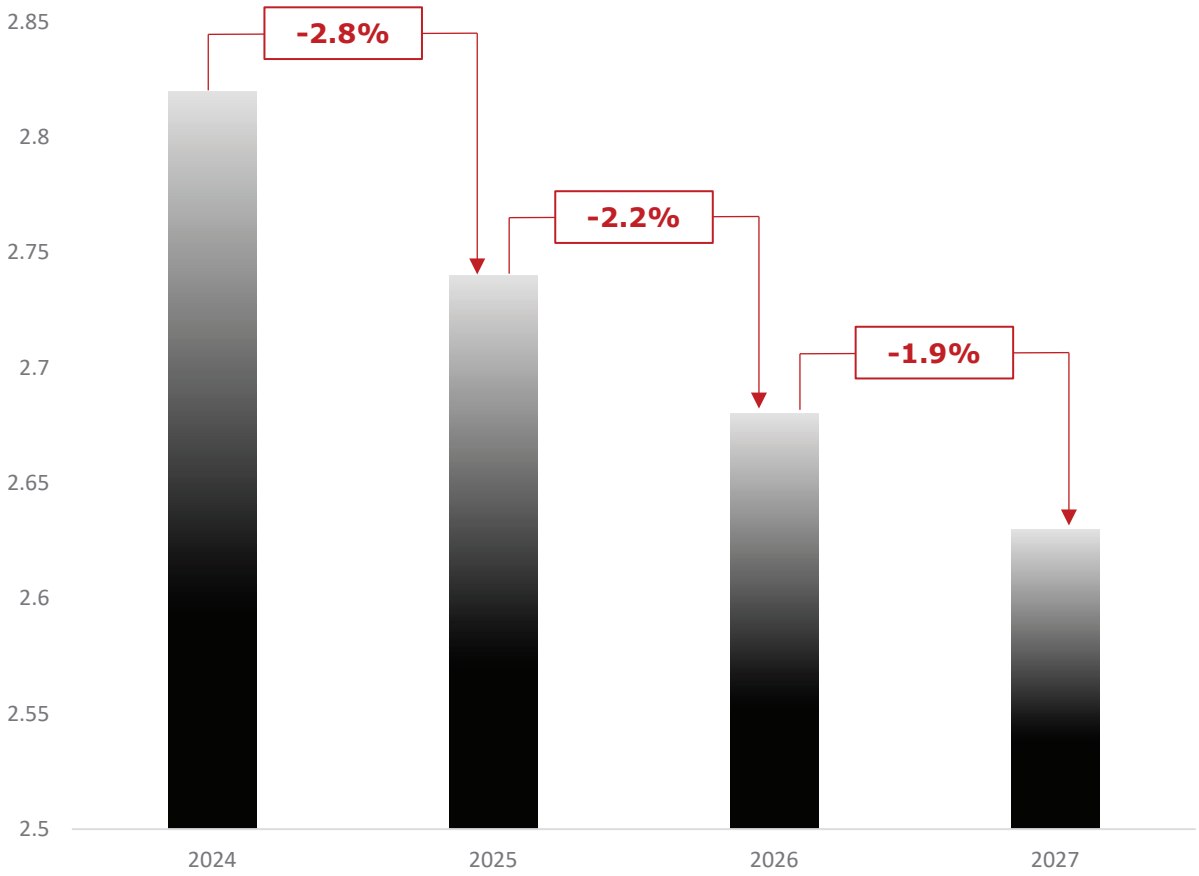
Source: IEA

- LPG and kerosene play minor roles, though LPG remains relevant in rural households and certain vehicle fleets.
- Rising diesel use contrasts with EU decarbonization trends, highlighting Romania's need to accelerate electrification and alternative fuels deployment.

Romania’s oil output is set for a gradual decline, underscoring the urgency of diversifying energy supply and boosting renewable investments

- Romania’s oil production is projected to decline steadily, falling by nearly 7% between 2024 and 2027.
- Output reduction reflects the depletion of mature fields, as domestic extraction struggles to keep pace with consumption.

Oil production (mtoe) forecast in Romania, [2024-2027]



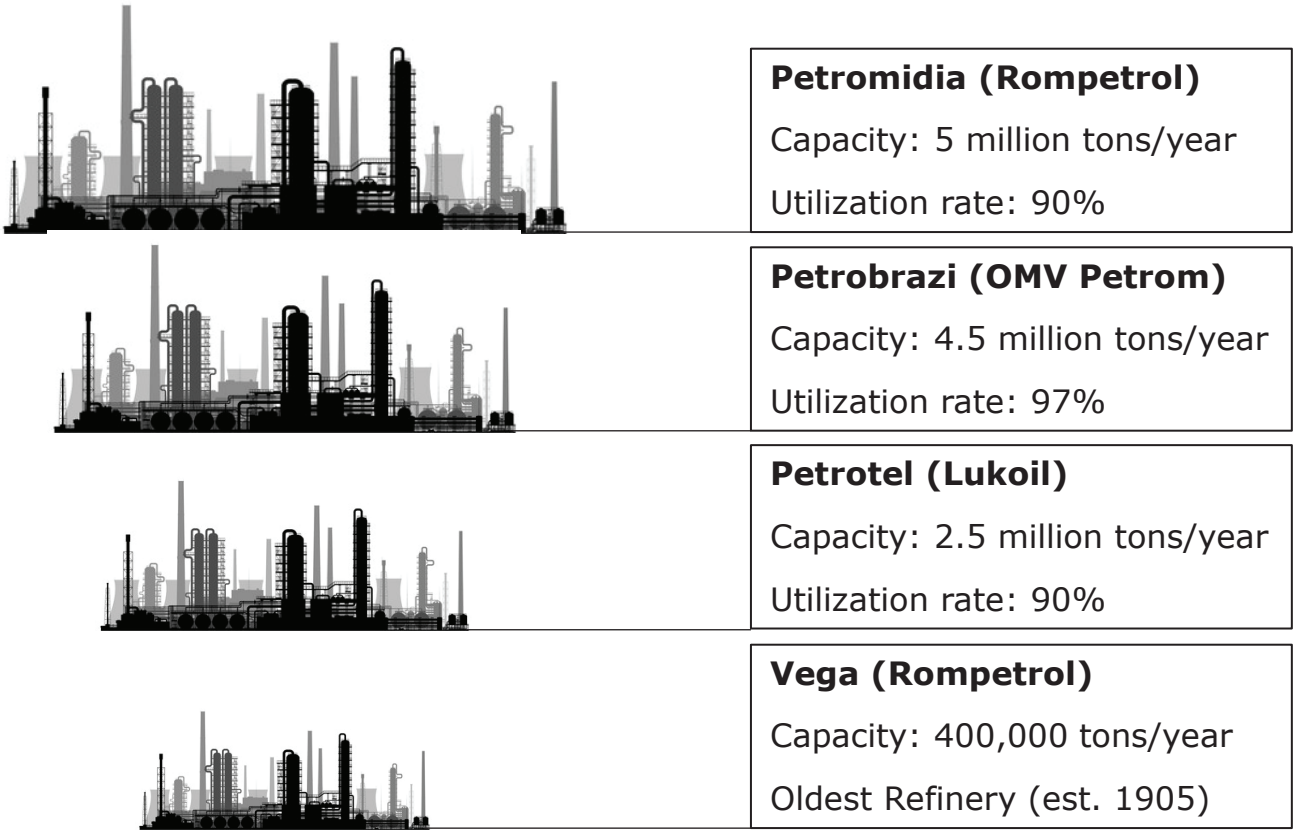
Source: Xinhua

- Limited new upstream investments and slow adoption of enhanced recovery technologies constrain supply growth.
- Energy transition pressures and carbon policies further discourage long-term oil sector expansion in favor of renewables.

Romania’s refining sector is efficient and consolidated, but modernization and diversification will be vital for long-term competitiveness

- Romania’s refining capacity is concentrated in four plants, led by Petromidia (Rompetrol) and Petrobrazi (OMV Petrom).
- Utilization rates remain high, averaging above 90% above the EU average of 83%, showing strong operational performance.

Oil Refineries in Romania, [2023]



Petromidia (Rompetrol)

Capacity: 5 million tons/year

Utilization rate: 90%

Petrobrazi (OMV Petrom)

Capacity: 4.5 million tons/year

Utilization rate: 97%

Petrotel (Lukoil)

Capacity: 2.5 million tons/year

Utilization rate: 90%

Vega (Rompetrol)

Capacity: 400,000 tons/year

Oldest Refinery (est. 1905)

Source: ROEC

- Foreign ownership plays a key role, with Rompetrol, OMV Petrom, and Lukoil dominating the refining sector.
- Vega refinery stands as Romania’s oldest, symbolizing the country’s long industrial legacy in oil processing.

6. Energy Transition

Contents

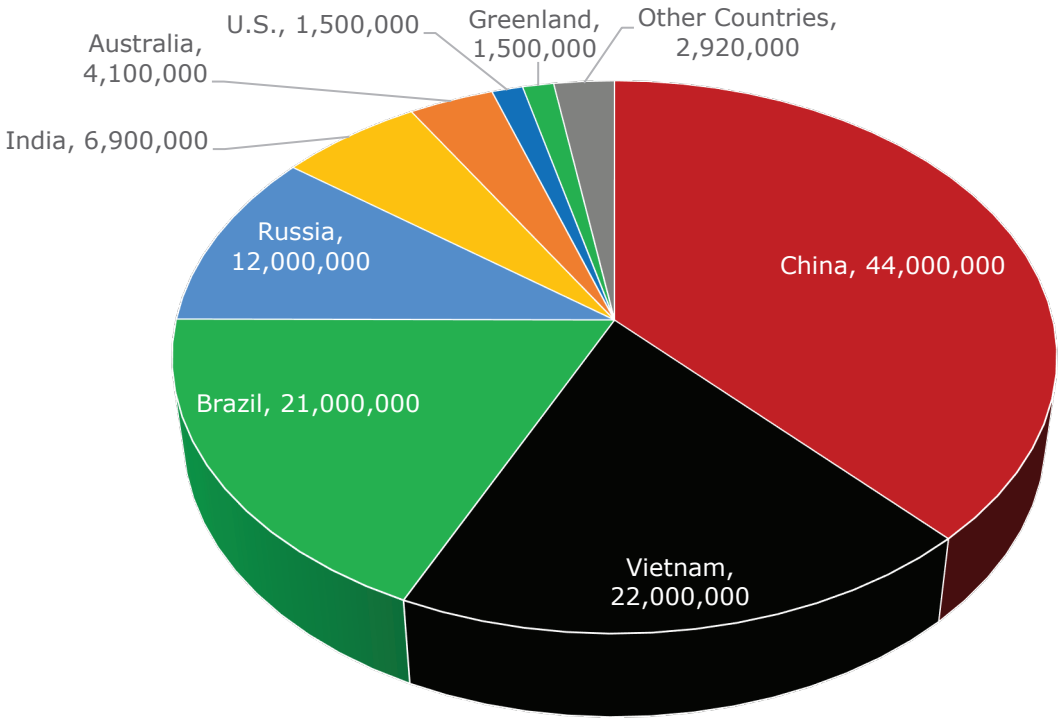
Key Facts

- Clean Energy share in electricity reached 68% for 2024
- The biggest activity contributing to GHG emissions is the transport sector
- Transport and Households are driving Romanian Final Energy Consumption
- Romania plans new nuclear and SMR units for the 2030s
- EV adoption is rising but still below 1% of total vehicles
- Romania’s carbon intensity stands near 260 gCO_2/kWh
- EU carbon prices stabilized near €70 /tCO_2 in 2025
- Data centers are emerging as a new source of energy demand in Europe.

Critical raw material reserves are heavily concentrated in Asia, with China at the forefront, posing major strategic challenges for the West

- With 44 million tonnes of reserves, China holds nearly half of the world's critical raw materials, consolidating supply chain power.
- Vietnam (22 Mt) and Brazil (21 Mt) follow, together holding more than China's competitors combined.

Reserves (t) of Critical Raw Materials by Country, [2022]



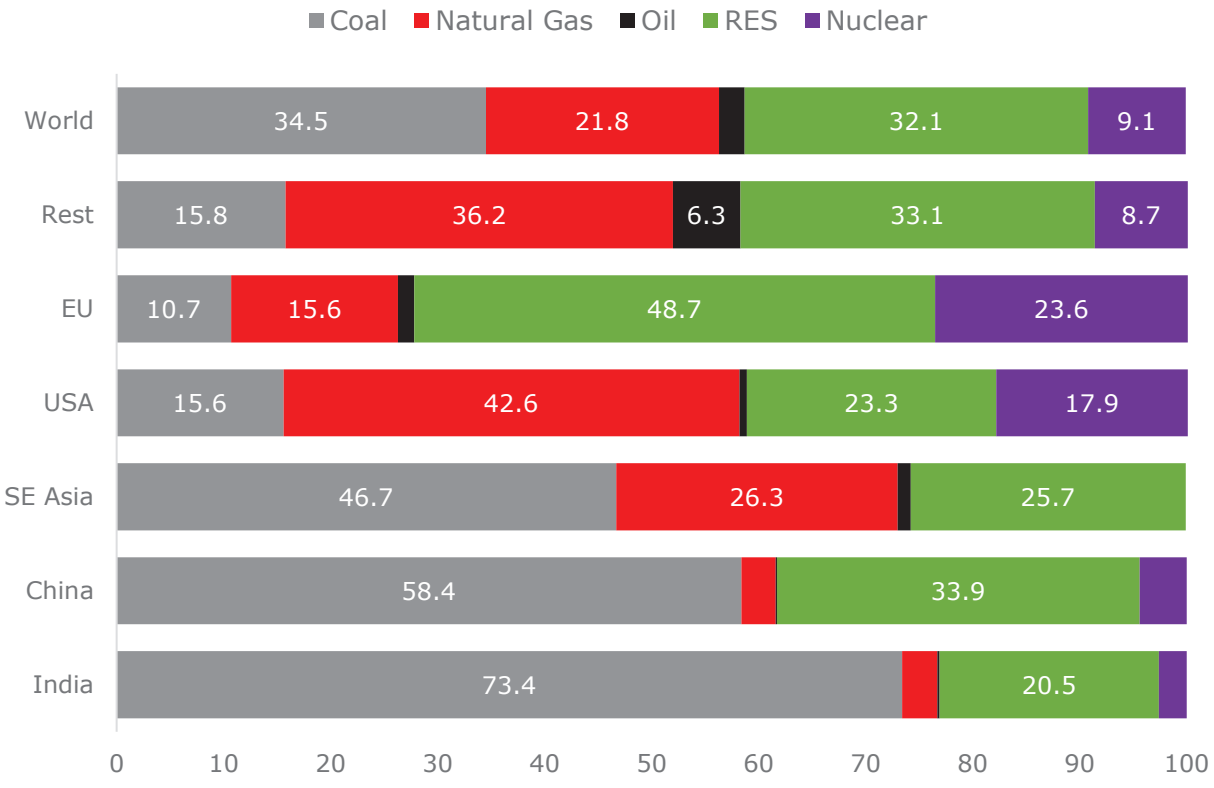
Source: Visual Capitalist

- Russia (12 Mt) and India (6.9 Mt) provide significant reserves, though far smaller than Asia-Pacific leaders.
- The U.S., Greenland, and Australia combined account for less than 10% of global reserves, highlighting dependency risks for the EU and U.S.

The EU leads the global shift to renewables and nuclear, contrasting with Asia's coal reliance and the U.S.'s gas-heavy generation mix

- Nearly half (48.7%) of EU electricity comes from RES, the highest share globally.
- With 23.6% of electricity from nuclear, the EU combines RES and nuclear for low-carbon stability.

Electricity Generation Mix (%) for Selected Regions, [2024]



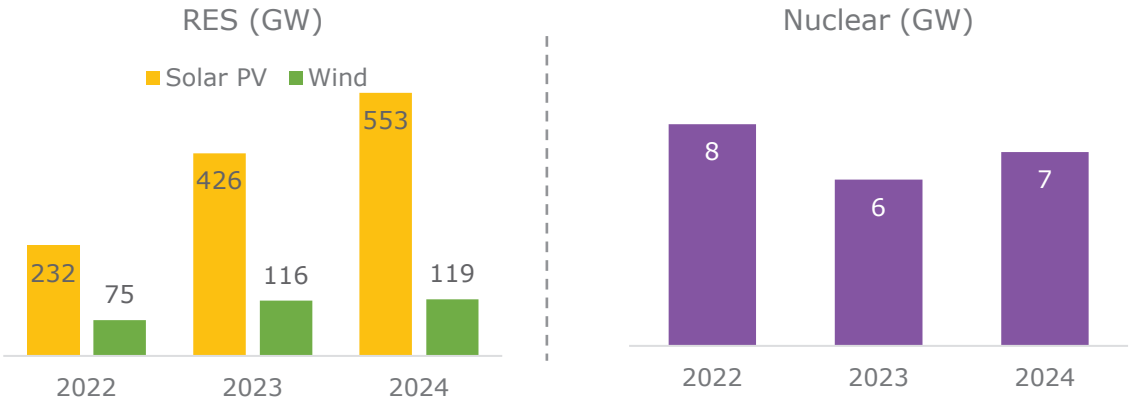
Source: IEA

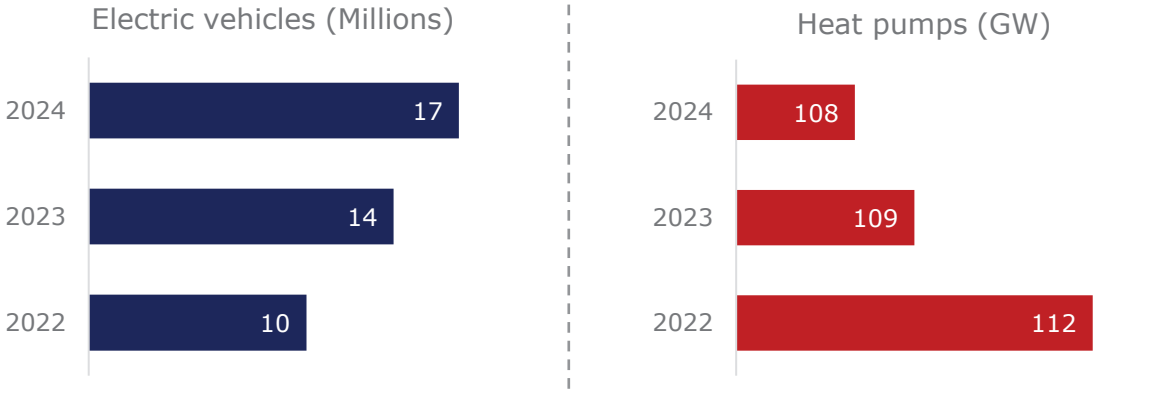
- India (73.4%), China (58.4%), and SE Asia (46.7%) remain heavily coal-dependent, highlighting regional disparities.
- The U.S. relies on gas (42.6%) and coal (15.6%), leaving RES at only 23.3%, far behind the EU.

Clean energy deployment is accelerating, with solar PV and EVs leading global growth, while wind progresses steadily

- Solar PV leads global capacity additions, jumping from 232 GW in 2022 to 553 GW in 2024.
- Wind grows steadily, reaching 119 GW by 2024, but far behind solar PV's rapid acceleration.

Clean Technologies Deployment Globally, [2022-2024]





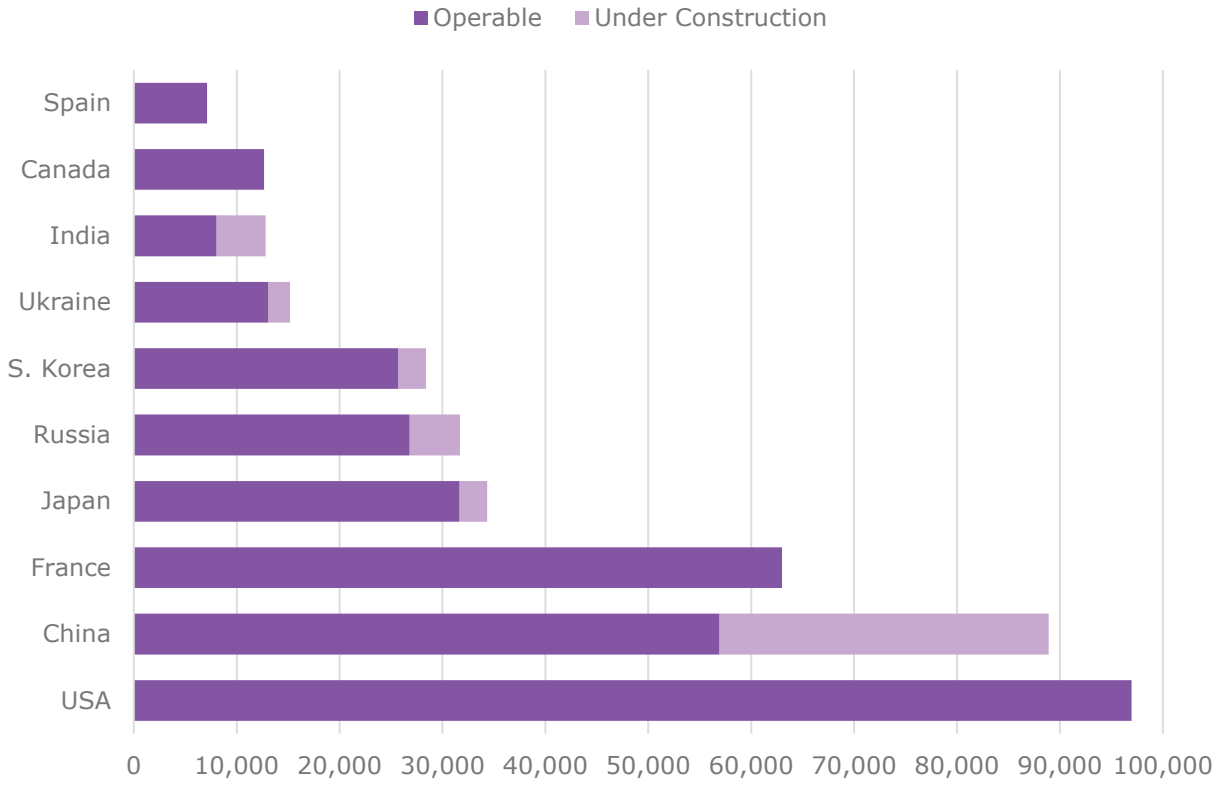
Source: IEA

- Electric vehicle sales continue scaling up, from 10 million in 2022 to 17 million in 2024.
- Heat pump deployment declines slightly (112 GW in 2022 → 108 GW in 2024), signaling slowed momentum compared to other clean technologies

While the United States and China dominate global nuclear capacity, Europe remains a critical player through France and other established fleets

- The United States operates the largest nuclear fleet globally, with nearly 100 GW operable capacity, far ahead of other countries.
- China's operable capacity is second only to the US, while also leading in new construction, consolidating its role as the main growth driver.

Operable and Under Construction Nuclear Powerplants (MWe) in Various Countries, [2024]



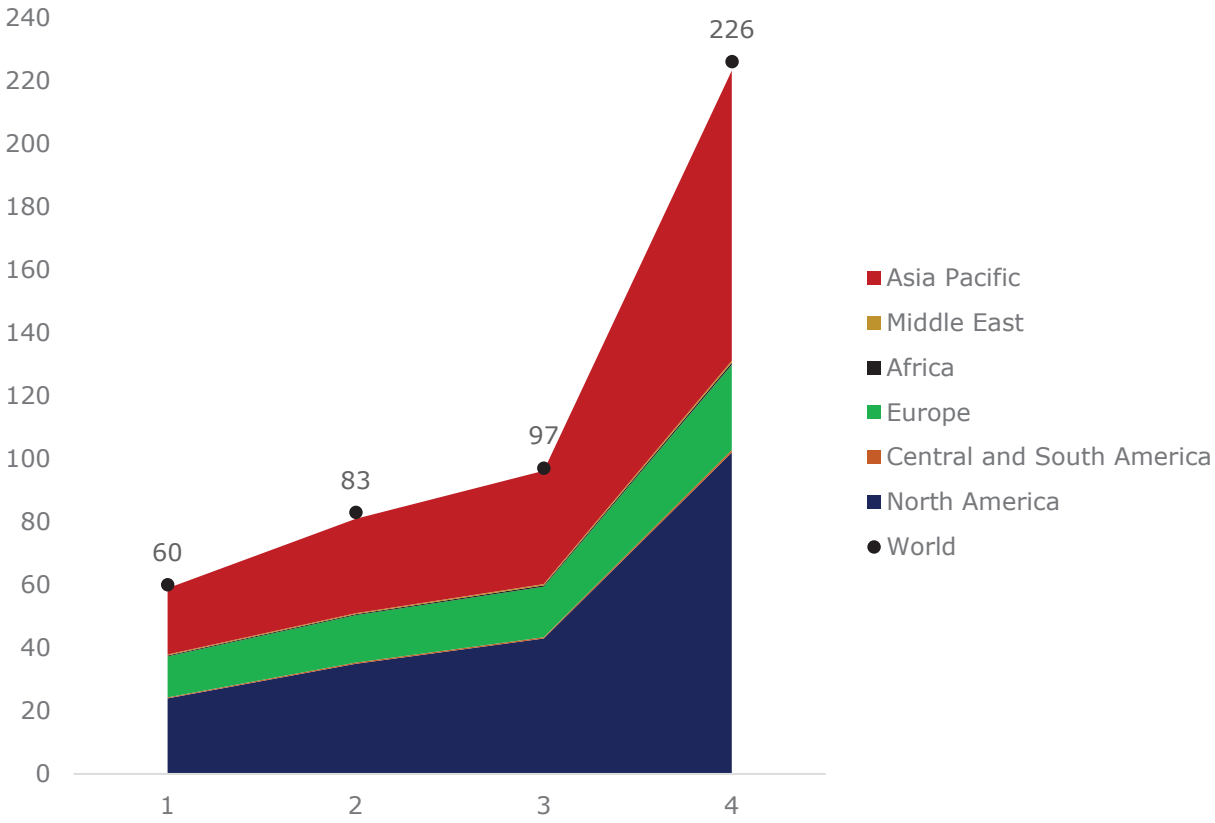
Source: World Nuclear Association

- France maintains the largest nuclear fleet in Europe (~61 GW), while Ukraine, Spain, and others continue to rely significantly on nuclear energy.
- Romania plays a key regional role with the and plans to expand capacity through new units and small modular reactors (SMRs), positioning itself as a regional pioneer in nuclear innovation.

By 2030, data centers will become a major global energy consumer, with Europe gaining ground through sustainable infrastructure

- Data center installed capacity is set to more than triple between 2020 and 2030.
- The US-led North American market continues as the largest hub, exceeding 100 GW by 2030.

Data Centers Installed Capacity (GW) by Region, [2020-2030]



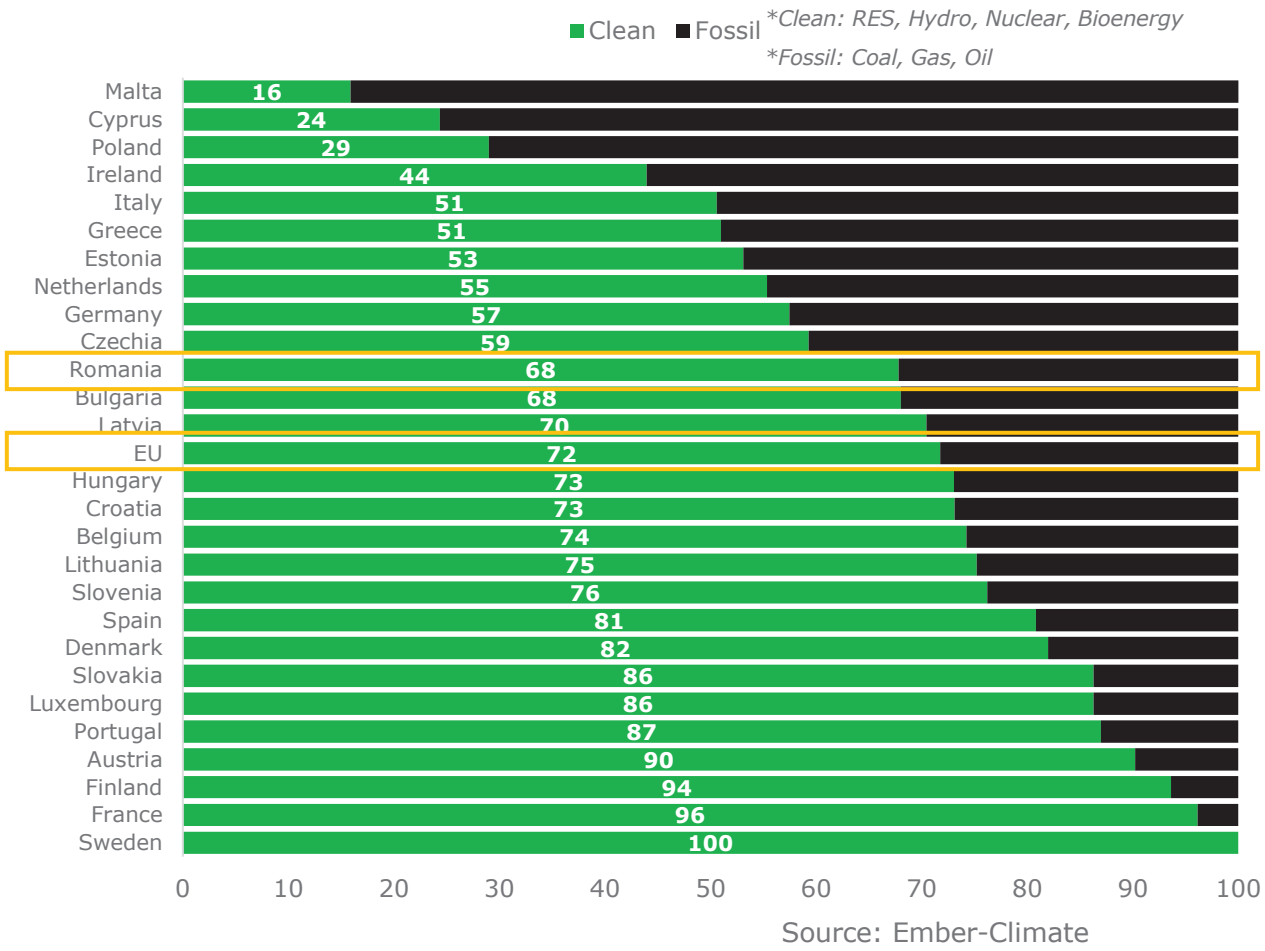
Source: IEA

- Asia Pacific records the fastest growth trajectory, closing the gap with North America by the end of the decade.
- Europe, while smaller in absolute capacity, expands steadily, driven by cloud adoption, digital services, and green data center policies.

Clean electricity performance is highly uneven across EU. Romania illustrates the role of hydro and nuclear in bridging toward higher RES integration

- The EU generates around 72% of electricity from clean sources, a strong performance but masking large national differences.
- Romania stands at 68% clean electricity, relying mainly on hydro and nuclear, with growing potential for solar and wind expansion.

Clean Energy* vs Fossil Fuel** Share of Total Electricity Generation (%) in EU countries, [2024]



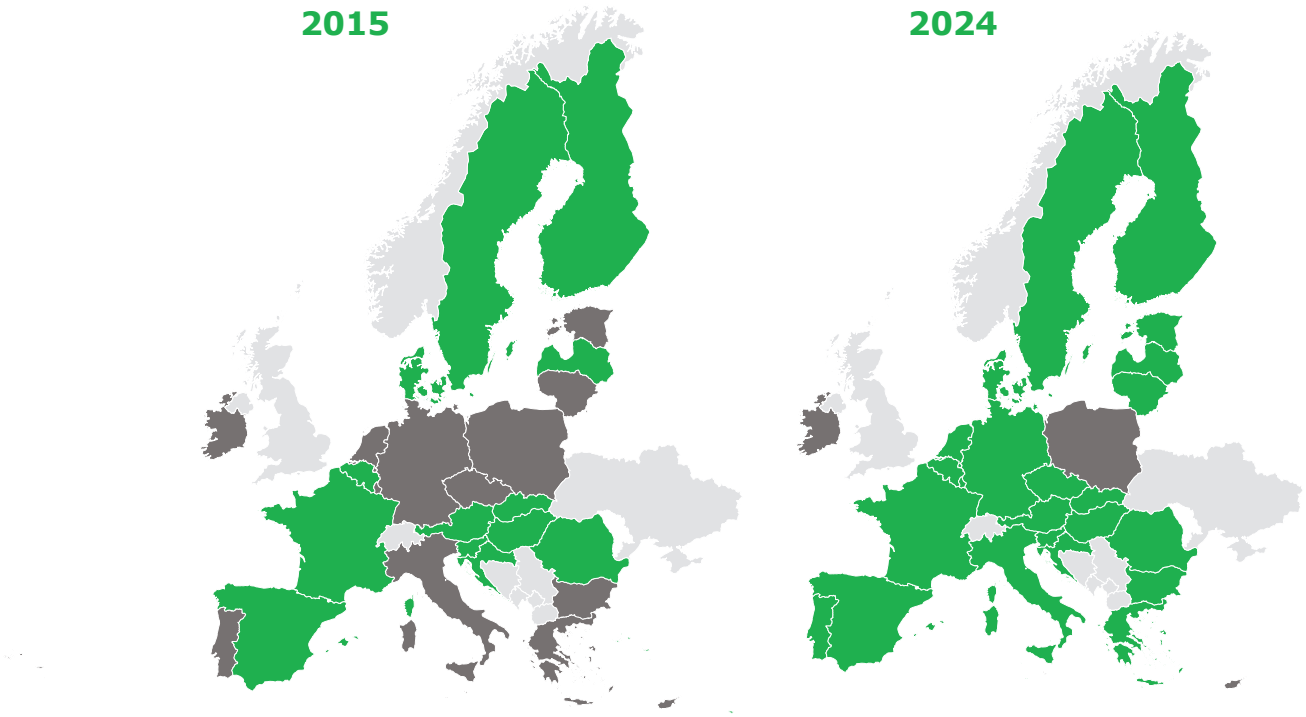
Source: Ember-Climate

- Sweden is the only EU country fully powered by clean energy, showing how a diversified mix of hydro, nuclear, and bioenergy can eliminate fossil fuels.
- Italy, Cyprus, and Malta remain well below the EU average, highlighting uneven progress in the bloc's energy transition.

Between 2015 and 2024, the number of EU countries generating more than half of their electricity from clean sources has expanded

- In 2015, only a small group of EU countries managed to generate over half of their electricity from clean sources, showing how uneven the transition was across the Union.
- By 2024, the picture had changed significantly, with most EU countries surpassing the 50% clean electricity share, highlighting rapid progress within less than a decade.

EU Countries with Clean Share in Electricity Generation above 50% (Green), [2015 & 2024]



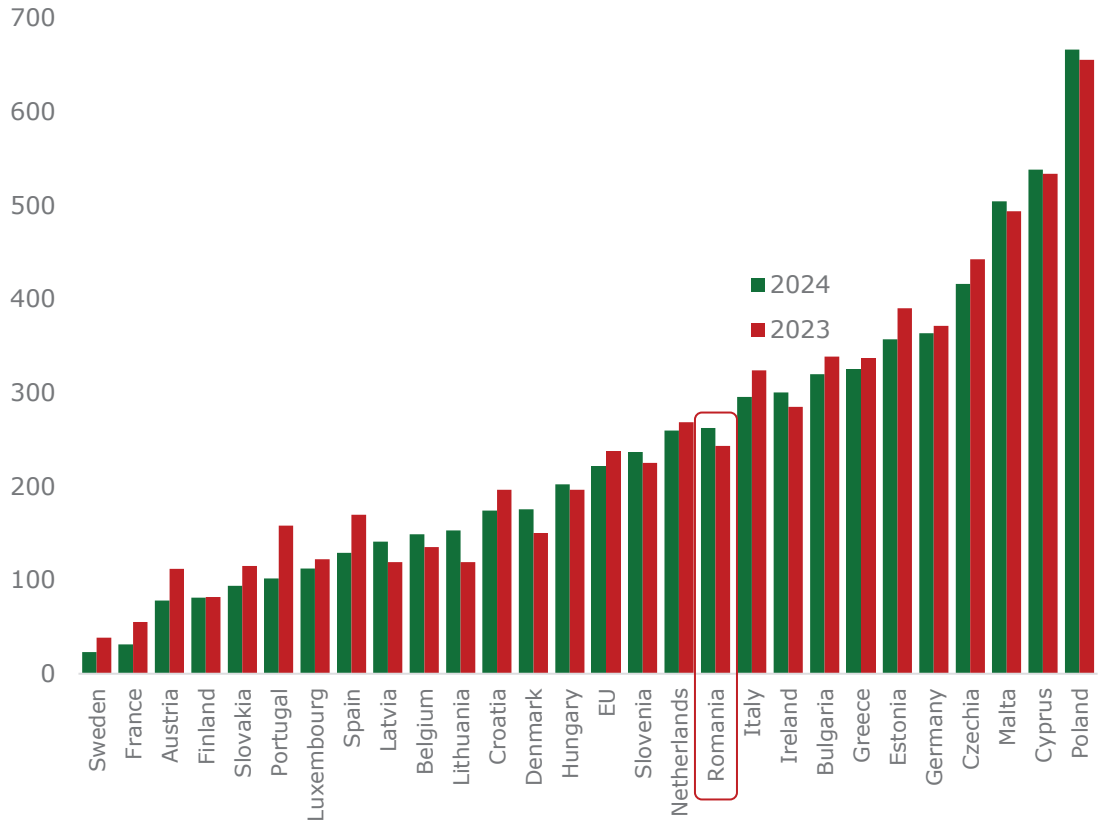
Source: Ember-Climate

- Central and Eastern European countries in particular have made notable advances, reducing their reliance on fossil fuels and moving closer to EU climate objectives.
- The overall shift illustrates the EU's strong momentum towards decarbonization, gradually closing the gap between early frontrunners and those that were initially behind.

Carbon intensity in Europe is falling overall, and Romania continues its efforts to significantly decarbonize its power mix

- The EU average falls just below 250 gCO_2/kWh, showing gradual decarbonization across member states.
- Romania shows a carbon intensity around 250–270 gCO_2/kWh, indicating challenges despite nuclear and renewable contributions.

Carbon intensity (gCO2/kWh) in Europe, [2023-2024]



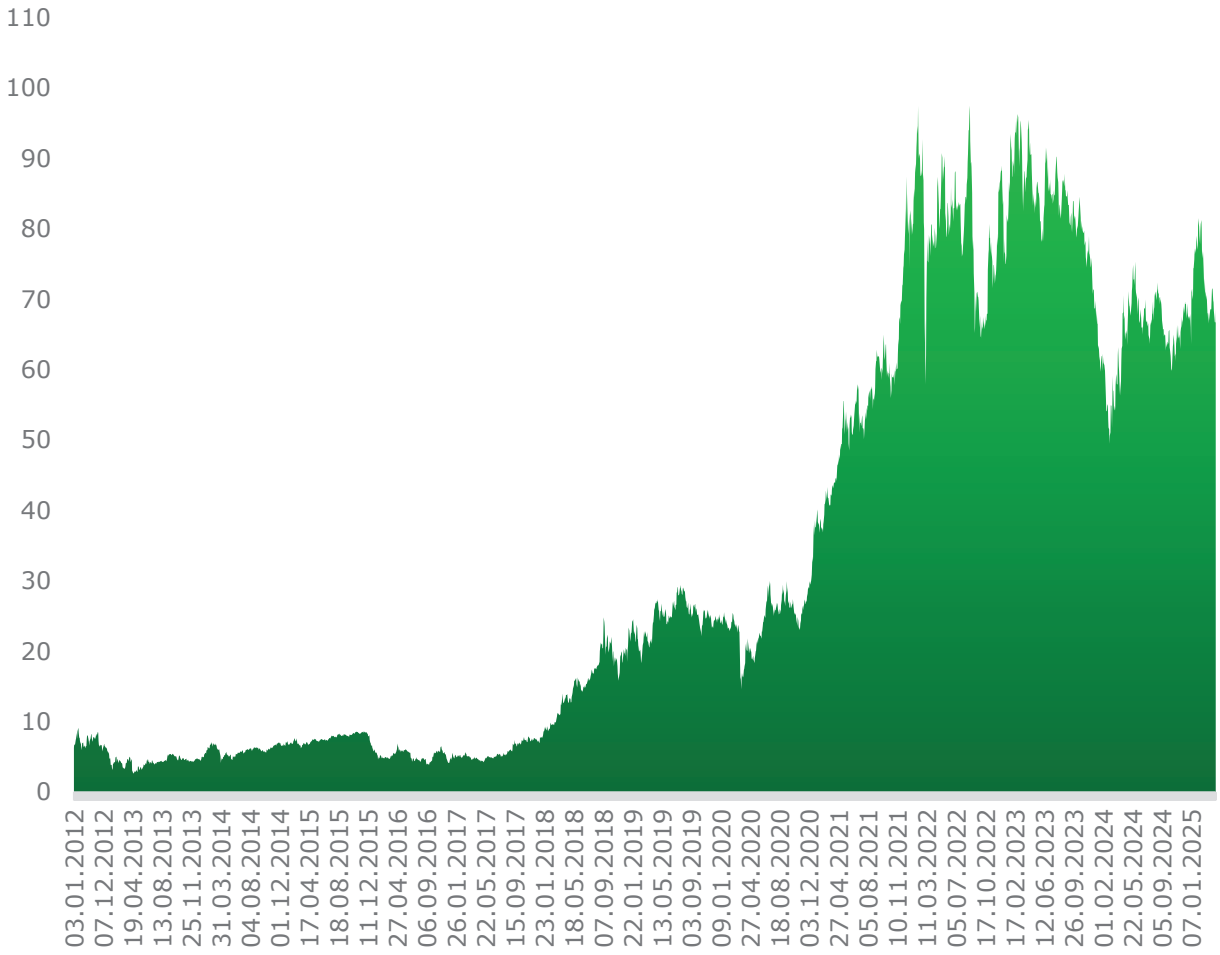
Source: Ember-Climate

- Poland continues to hold the highest carbon intensity in Europe, exceeding 700 gCO_2/kWh in both 2023 and 2024.
- Nordic countries like Sweden and France remain at the lowest end, reflecting cleaner generation mixes and strong nuclear/hydro reliance.

EU ETS prices surged post-2018 reforms, stabilizing above €65/tCO₂, embedding strong decarbonization signals in Europe's energy mix

- The EU ETS carbon price remained below €10/tCO₂ for years until reforms began tightening the market in 2018.
- Prices surged past €90/tCO₂ in 2022, driven by stricter caps, energy crisis dynamics, and higher fossil dependency.

EU ETS Price Index (€/t CO2), [Jan 2012 - Mar 2025]



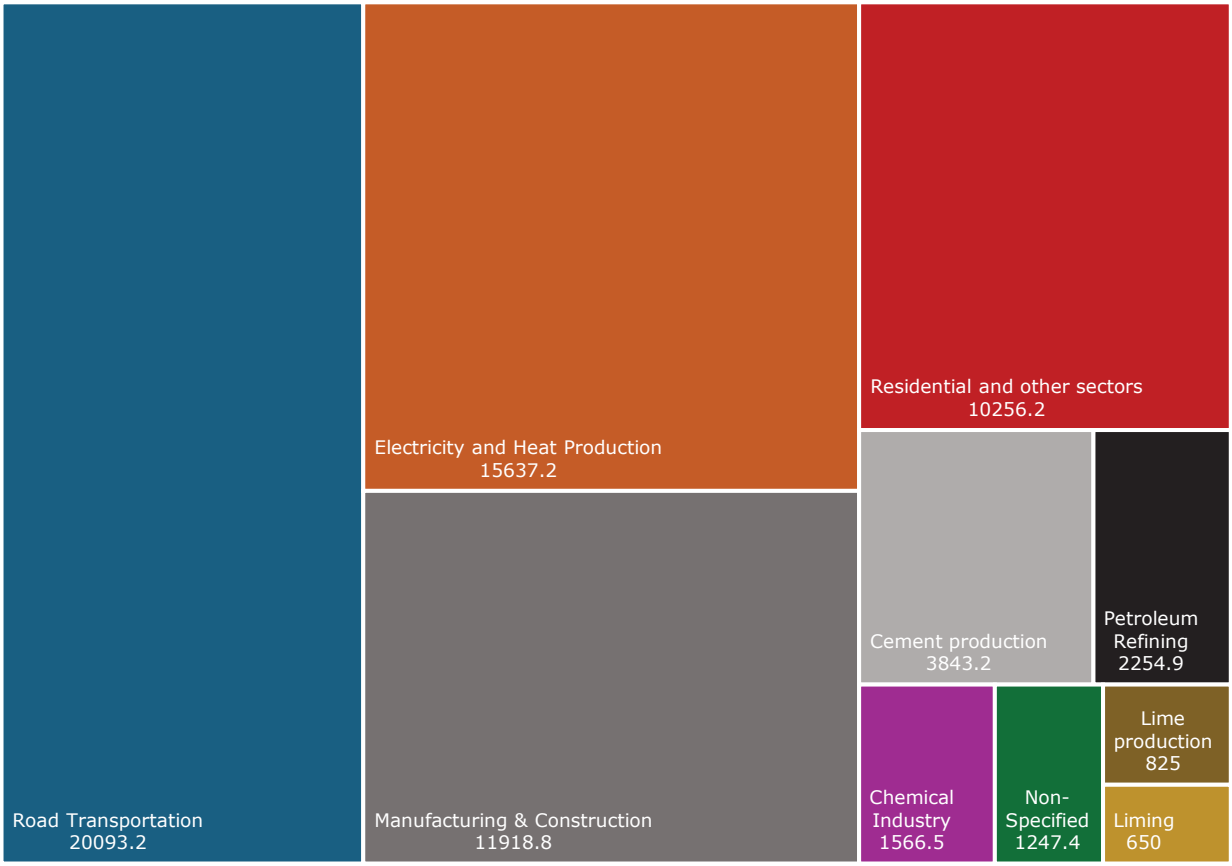
Source: energy instrat

- Volatility since 2022 reflects both energy market shocks and regulatory adjustments in the emissions trading system.
- By early 2025, prices stabilized between €65–75/tCO₂, signaling a new baseline for carbon cost expectations in Europe.

Romania's emissions are dominated by transport, power generation, and industry, underscoring decarbonization challenges ahead

- Road transportation is the single largest source of Romania's GHG emissions, exceeding 20,000 gCO_2 in 2023.
- Electricity and heat production is the second-largest contributor, highlighting the continued reliance on fossil fuels.

Top 10 Activities by GHG Emissions (gCO2) in Romania, [2023]



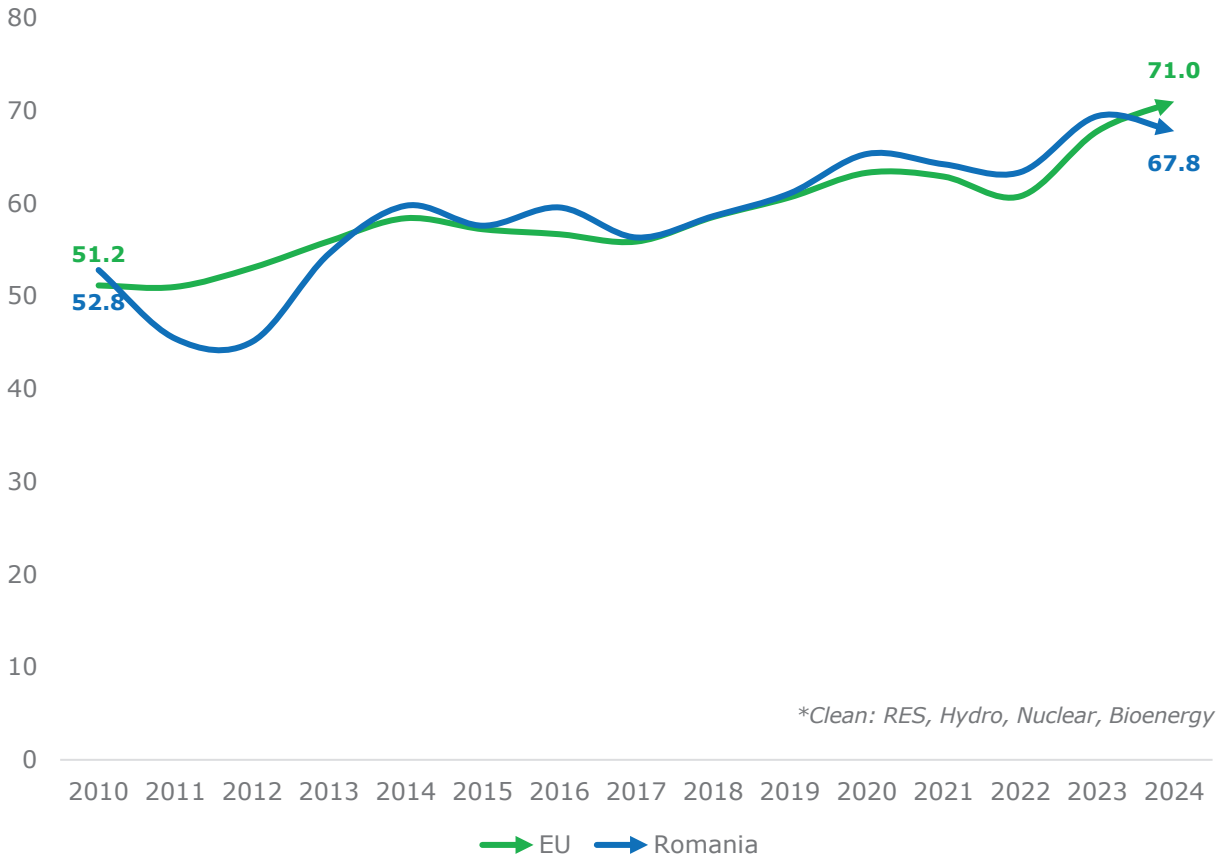
Source: EDGAR

- Manufacturing and construction also play a significant role, contributing nearly 12,000 gCO_2 annually.
- Smaller but important shares come from petroleum refining, civil aviation, and residential consumption.

Romania achieved major clean energy gains but now lags slightly behind the EU's overall pace of progress

- Romania's clean energy share reached 67.8% in 2024, just below the EU average of 71.0%, showing strong progress.
- Both Romania and the EU steadily expanded clean energy use since 2010, reflecting consistent transition policies.

Clean Energy* Share of Total Electricity Generation in EU and Romania, [2010-2024]



*Clean: RES, Hydro, Nuclear, Bioenergy

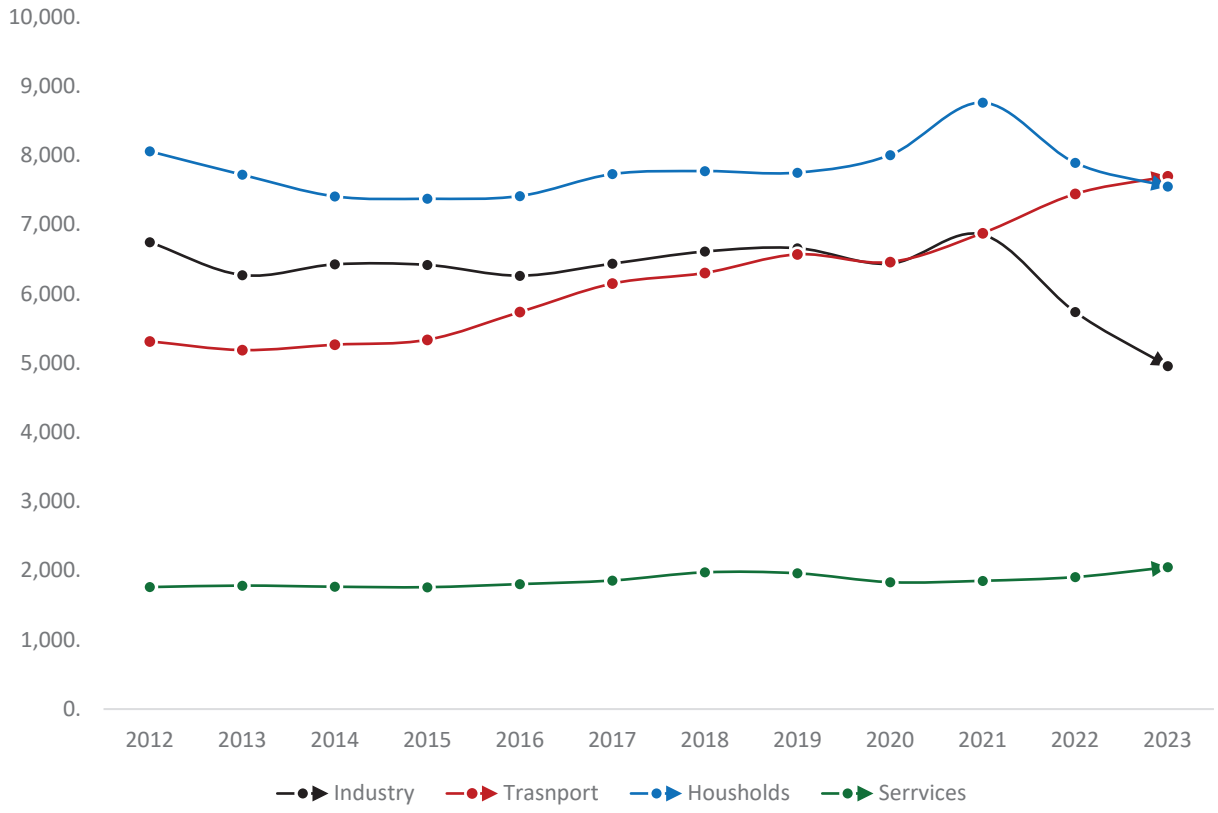
Source: Ember-Climate

- Romania led the EU average in earlier years but recently slipped slightly behind in clean generation share.
- Hydropower and bioenergy continue to play a central role in Romania's electricity mix and clean growth.

Romania’s energy use shifted from industry toward households and transport, with services showing steady but limited growth

- Romania’s household energy consumption remained the largest sector, showing fluctuations but overall stability across 2012–2023.
- Transport sector energy use steadily increased, surpassing industry consumption in recent years as mobility demand grew.

Final Energy Consumption (ktoe) by sector in Romania, [2012-2023]



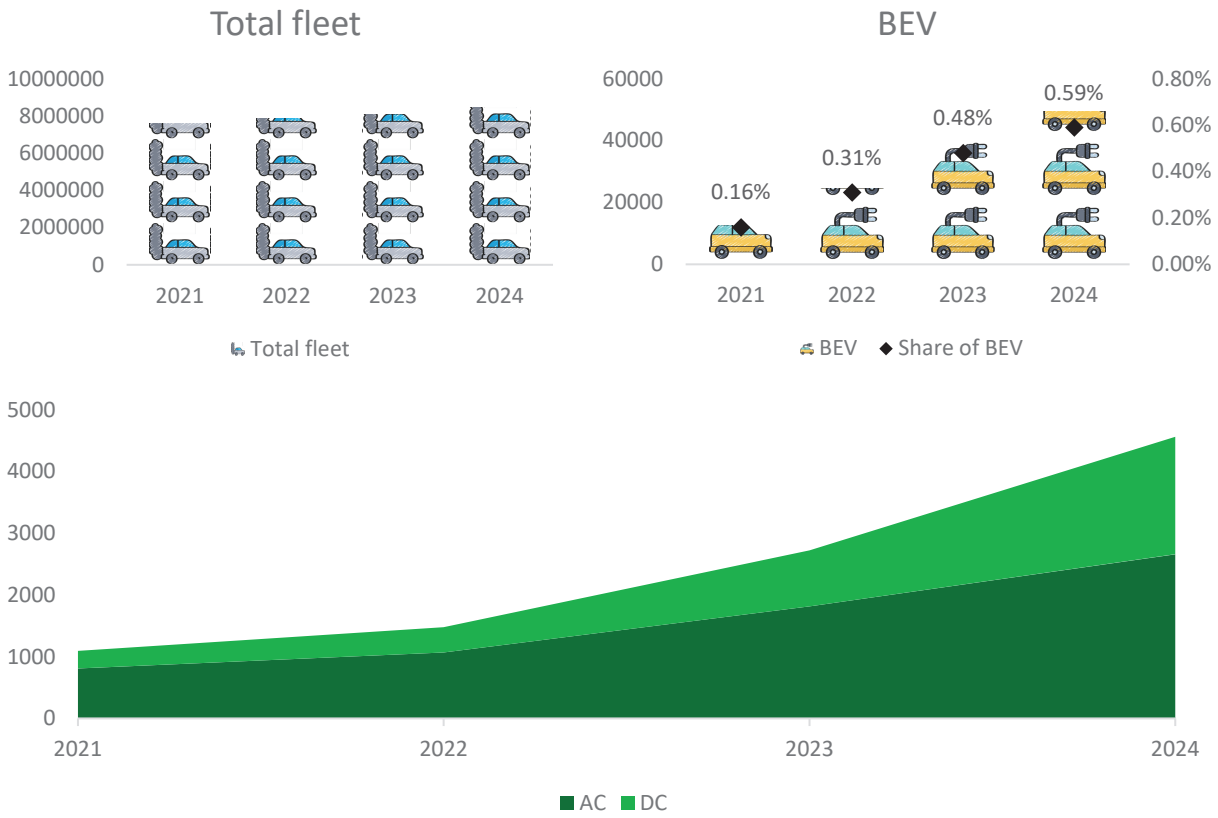
Source: Eurostat

- Industrial energy consumption declined sharply after 2021, reflecting structural changes and possible efficiency improvements.
- Services sector consumption stayed modest but showed slight upward growth toward 2023, indicating gradual expansion.

Romania’s EV market is accelerating but remains nascent, requiring stronger infrastructure and policy support to scale up adoption

- Romania’s EV fleet has grown fivefold since 2021, reaching 0.8% of total vehicle registrations in 2024.
- Fossil-fueled vehicles still dominate the national fleet, exceeding nine million cars, though growth has plateaued.

Evolution of fossil-fueled and EV registrations and EV chargers in Romania, [2021-2024]



Source: DRPCIV

- Charging infrastructure expansion has accelerated, with both AC and DC chargers tripling between 2021 and 2024.
- Government subsidies and urban policies are driving the adoption of EVs, especially in major cities like Bucharest and Cluj-Napoca.

Key Emission Reduction Policies

Policy/Measure	Description & Mechanism	Expected Market Impact
EU Carbon Border Adjustment Mechanism (CBAM)	Transitional phase began 1 Oct 2023 with reporting obligations for imports of cement, steel, aluminium, fertilizers, electricity, hydrogen	Increases costs for high-carbon imports; motivates domestic decarbonisation and emissions monitoring.
Law No. 121 – Offshore Wind Energy	Enacted 30 Apr 2024 and published 8 May 2024 to establish a framework for offshore wind projects in the Black Sea	Opens investment in offshore wind farms; boosts renewables industry and marine services.
Contracts-for-Difference (CfD) Framework	Ministry of Energy regulated CfD scheme in April 2024 with competitive bidding and strike-price mechanisms	Encourages stable financing of renewables; attracts investment in solar and wind.
Battery Storage Incentive (GEO 134/2024)	Eliminates double-charging for stored energy via GEO approved Nov 2024 to support storage deployment	Stimulates energy storage investments; improves grid flexibility and renewables uptake.
Green Bond – Sovereign Green Eurobond (€2 bn)	Issued Feb 2024 to finance infrastructure in renewable energy, transport, climate resilience	Mobilizes capital to green projects; catalyzes private ESG markets.
Waste Sector Emissions Reduction	Targets 20% CO_2-reduction from waste by 2025 vs. 2019; increases recycling/incineration energy use	Drives growth in waste-to-energy facilities, advanced recycling infrastructure, and methane capture projects.
Net-Zero Industry Act (NZIA) – CO_2 Storage Obligation	Romania announced the development of ~9 Mtpa storage capacity by 2030, with mapping by 2024	Spurs CCS investments; opens opportunities for oil/gas producers to diversify; stimulates geotechnical and infrastructure services.

7. Green Finance

Contents

Key Facts

Romania has issued 7 Green Bonds in 2024, totaling over 10 bill. $

Investments in RES technologies for Romania amount to 310.7 mi. €

The biggest share of investments are allocated towards solar technologies, reaching 269 mil. €

Romania's ESG score averages to 66.5, but with a small number of companies

Romania's credit score has a relatively unstable outlook

Romania has already accessed 28.5 bil. € of EU funding

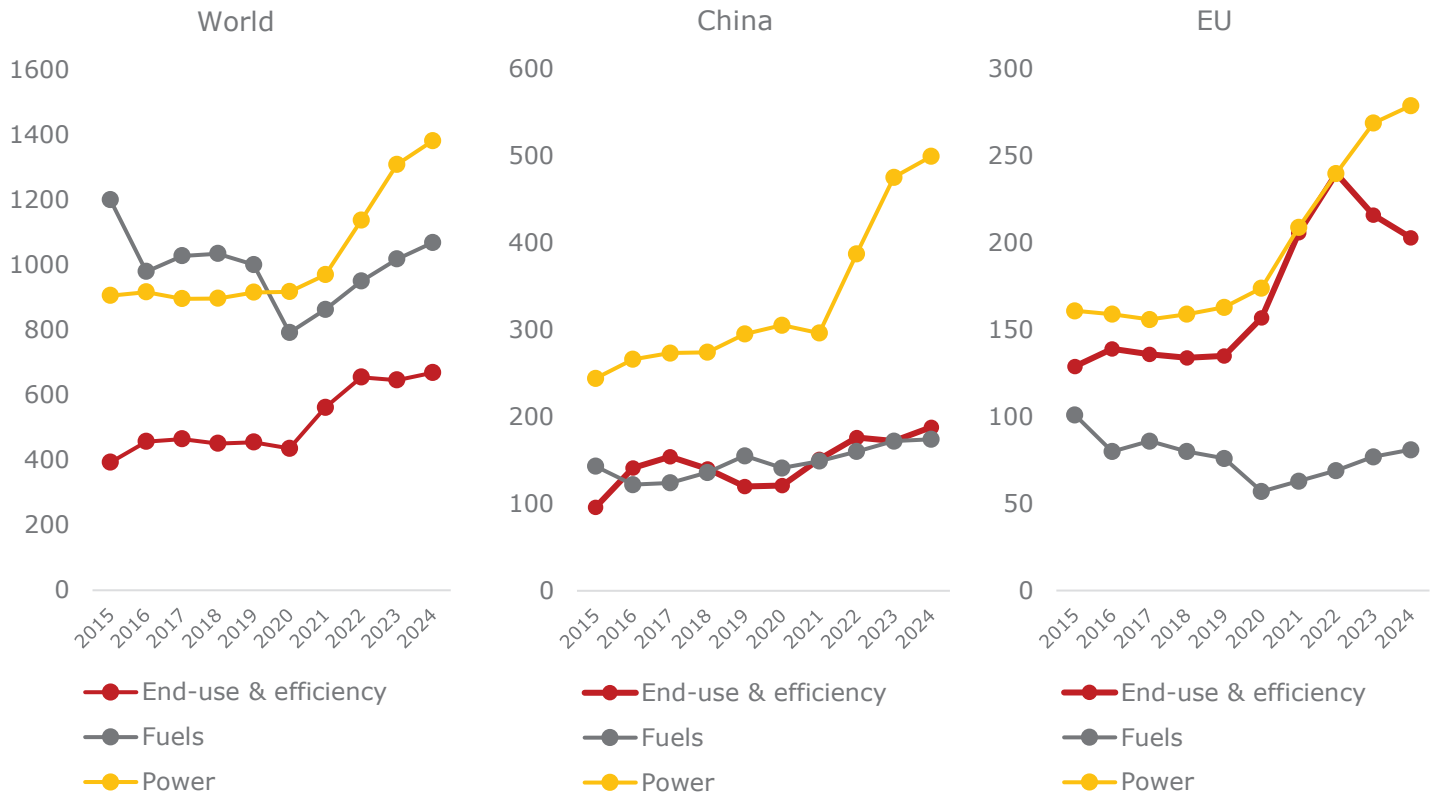
Over 40% of Romania's recovery funds target green transition.

Romania ranks mid-tier in EU ESG performance.

Global investment momentum is driven by power and efficiency, with China and the EU showing diverging priorities

- Global energy investment rose strongly after 2020, with power leading the growth in recent years
- The EU sharply increased efficiency and end-use investment, surpassing China in this segment by 2024.

Global Energy Investment Vs Chinese and European Energy Investment (billion $), [2015-2024]

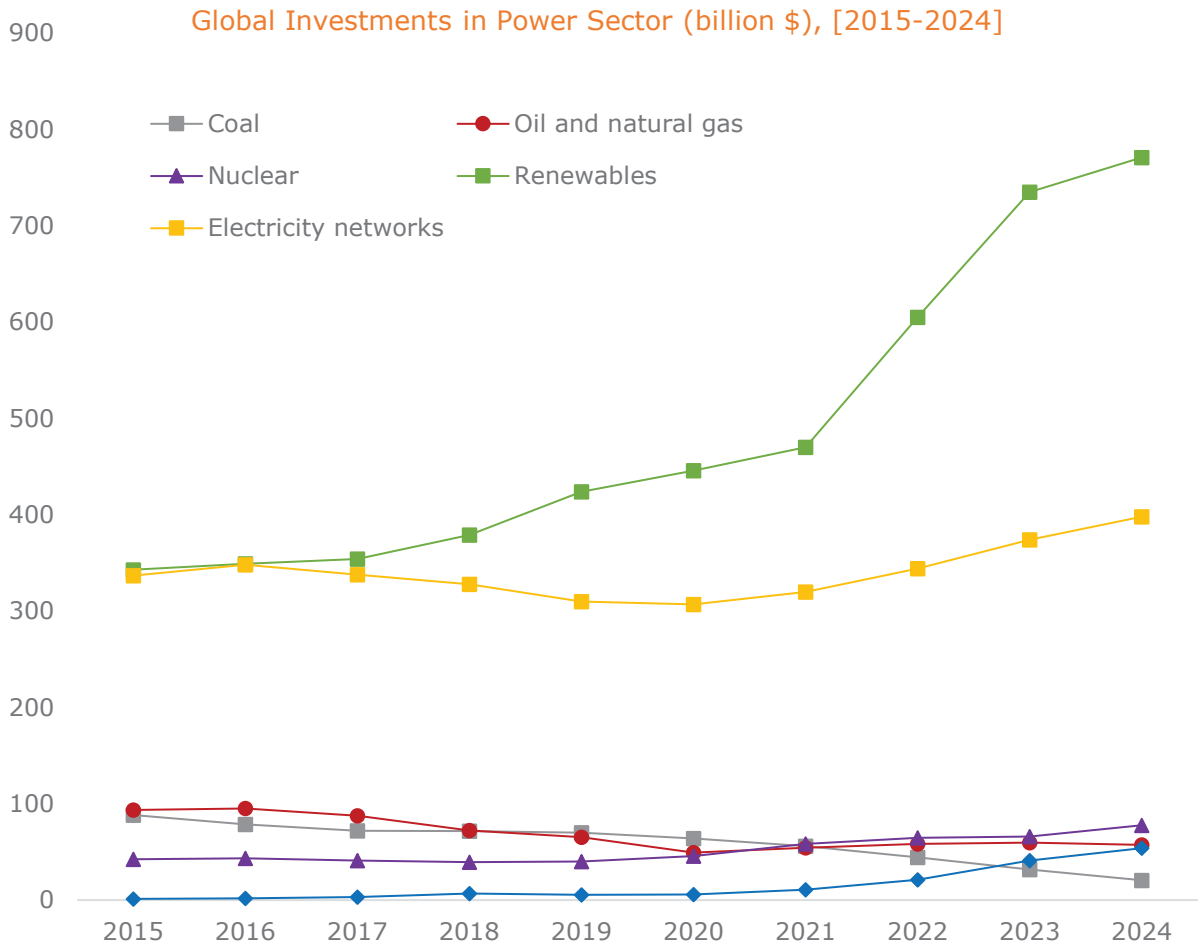


Source: IEA

- China's power sector investment accelerated steeply, far outpacing EU levels in the past three years.
- Fuel investment showed volatility but has recently trended upward, reflecting ongoing demand pressures.

Global power sector investments are rapidly shifting toward renewables and networks, while fossil fuels steadily decline

- Renewable energy investments more than doubled since 2020, reaching nearly $800 billion in 2024.
- Electricity network spending recovered after 2020, rising steadily back toward the $400 billion mark.

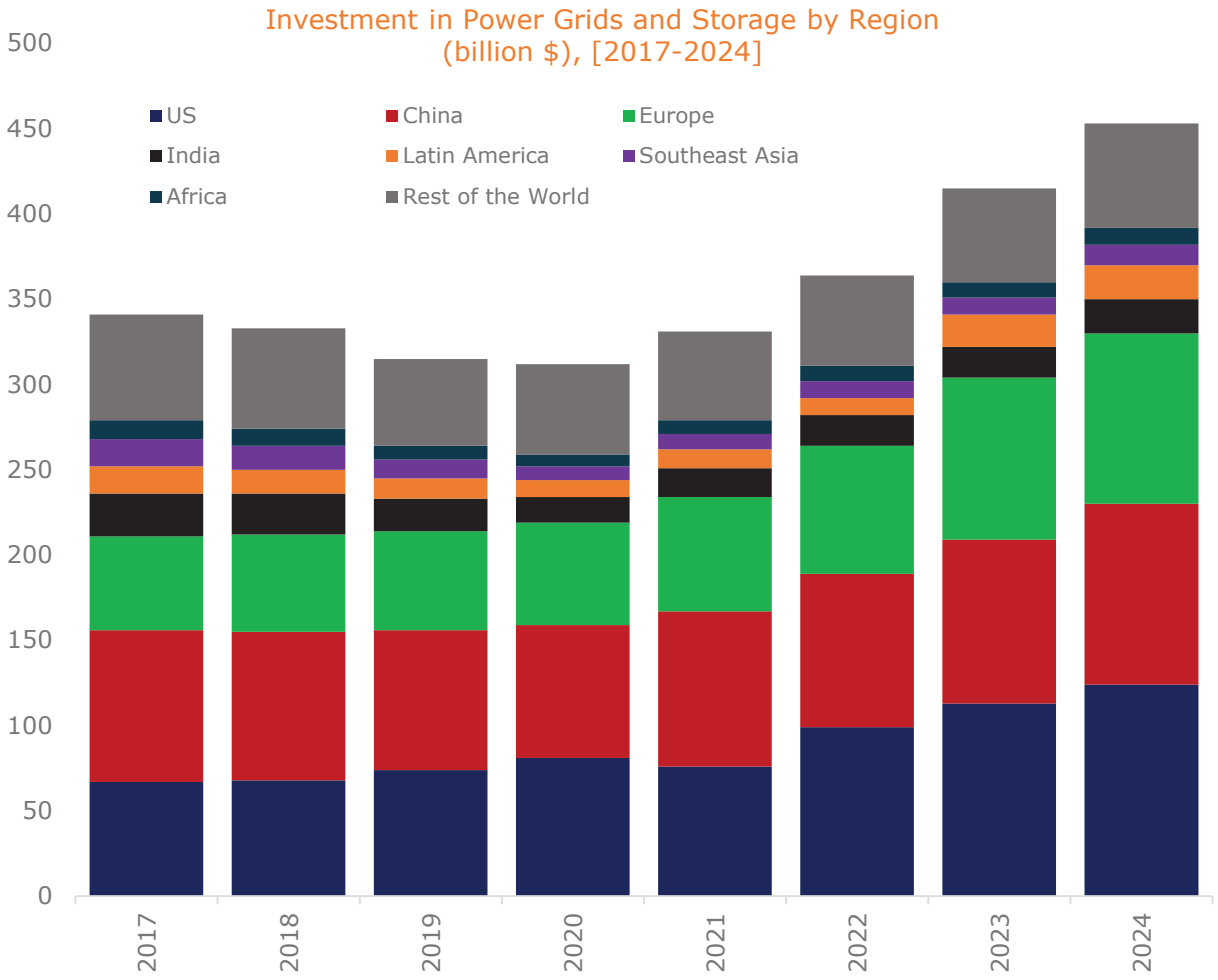


Source: IEA

- Oil and gas investments fell consistently, dropping below $50 billion by 2024.
- Nuclear investments showed a gradual rise, surpassing coal for the first time in 2023–2024.

Investments in grids and storage are accelerating globally, with Europe, the US, and China leading the momentum

- Global power grid and storage investments rose strongly, reaching about $450 billion in 2024.
- Europe's share expanded steadily, now contributing nearly one quarter of total global investments.



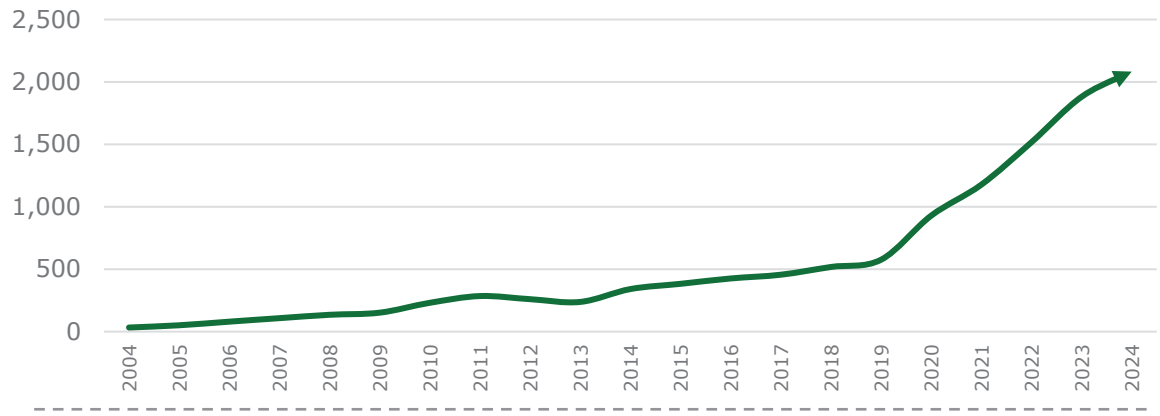
Source: IEA

- The US and China remain the largest contributors, together accounting for almost half of the total.
- Emerging regions like Southeast Asia and Africa show gradual but consistent growth in grid spending.

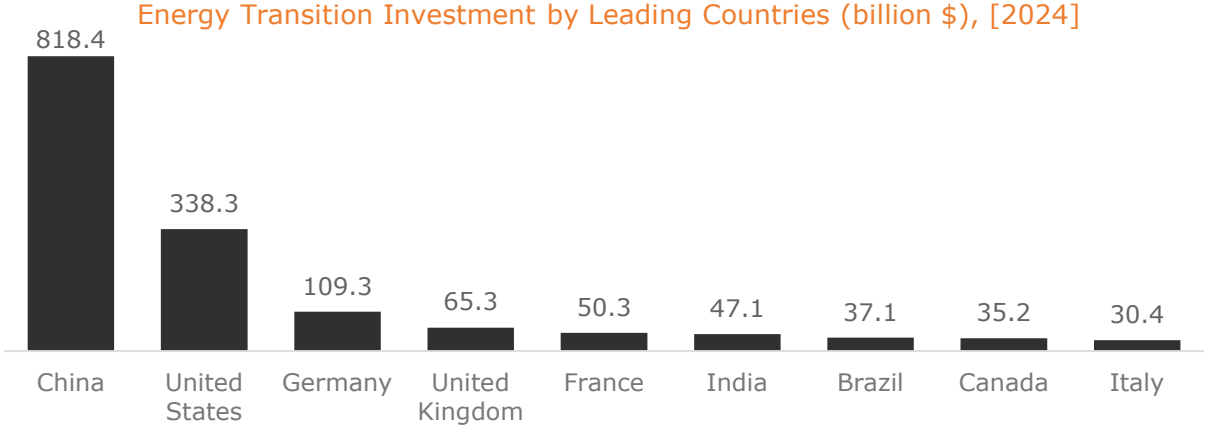
Energy transition investments are at historic highs, but regional disparities remain sharp, with China and advanced economies as the main drivers

- Global investment in energy transition technologies surged past $2 trillion in 2024, showing a steep acceleration after 2020.
- China leads decisively with over $800 billion in 2024, far surpassing the United States and Europe's leading economies.

Global Investments in Energy Transition Technologies (billion $), [2004-2024]



Energy Transition Investment by Leading Countries (billion $), [2024]



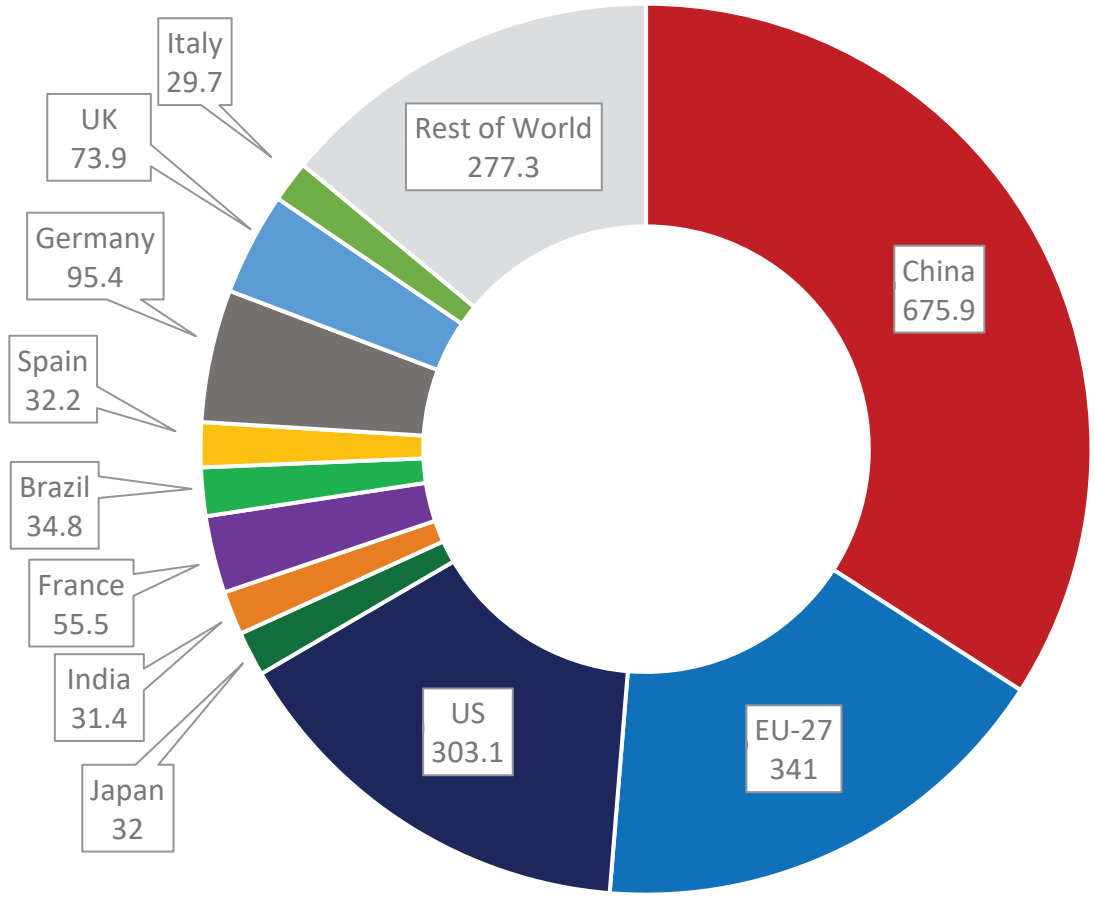
Source: IEA

- European countries like Germany, the UK, and France collectively contribute significant but smaller shares compared to Asia.
- Despite rapid growth, emerging economies such as India and Brazil still trail far behind advanced economies in energy transition funding.

Global energy transition investment is still highly concentrated, with China, the EU, and the US dominating

- China remains the global leader, capturing over one-third (34.1%) of all global energy transition investment in 2023.
- The European Union follows with 17.2%, while the United States closely trails at 15.3% of total investment.

Top 10 Economies for 2023 Energy Transition Investment (billion $),[2023]



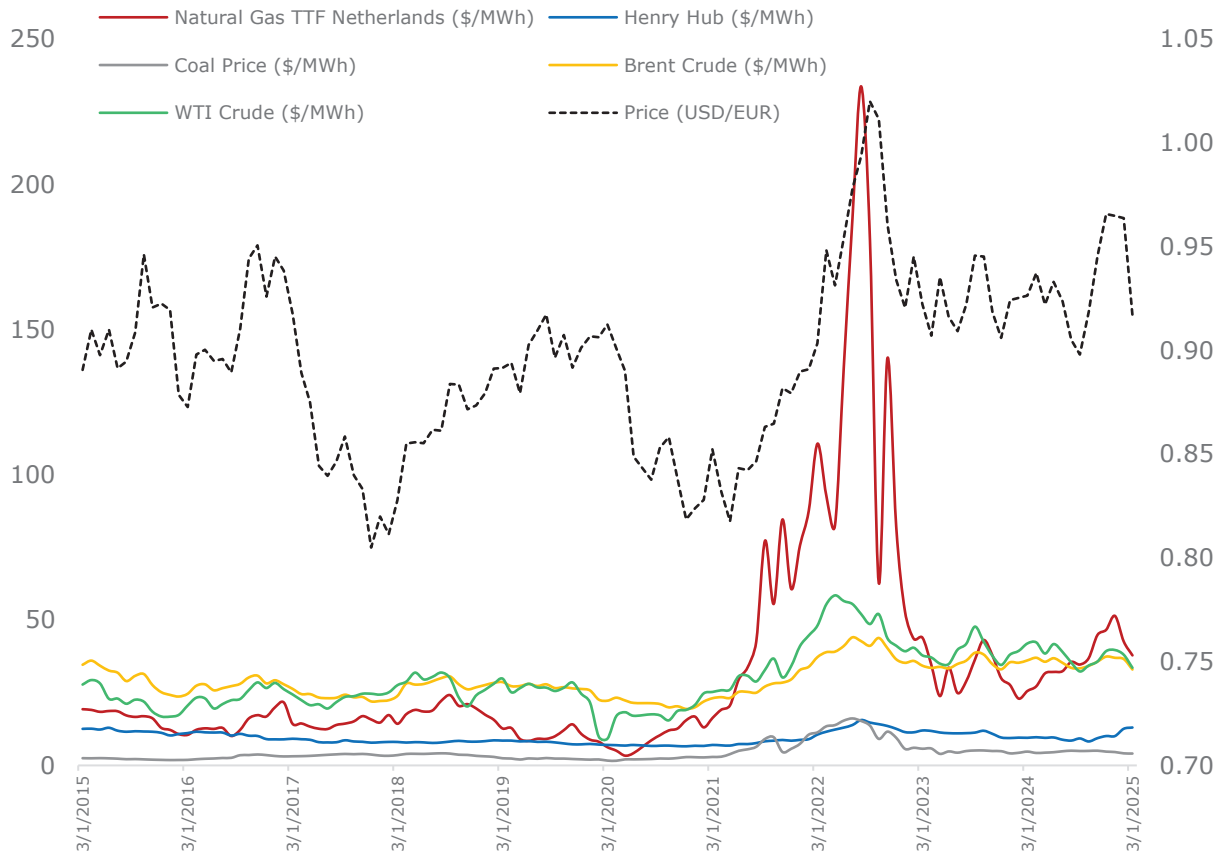
Source: IEA, BNEF

- Germany, the UK, and France together account for less than 10%, showing a fragmented European contribution.
- Emerging economies like India, Brazil, and Italy remain under 2% each, underscoring the uneven global distribution.

The 2022 energy crisis revealed stark differences in regional energy price dynamics, with Europe bearing the brunt of gas price shocks

- Natural gas prices in Europe (TTF) spiked dramatically in 2022, reaching record levels far above oil and coal benchmarks.
- US Henry Hub prices remained relatively stable, underscoring transatlantic price divergence in gas markets.

Energy Commodities Historical prices & USD/EUR Exchange Rate, [2015–2025]



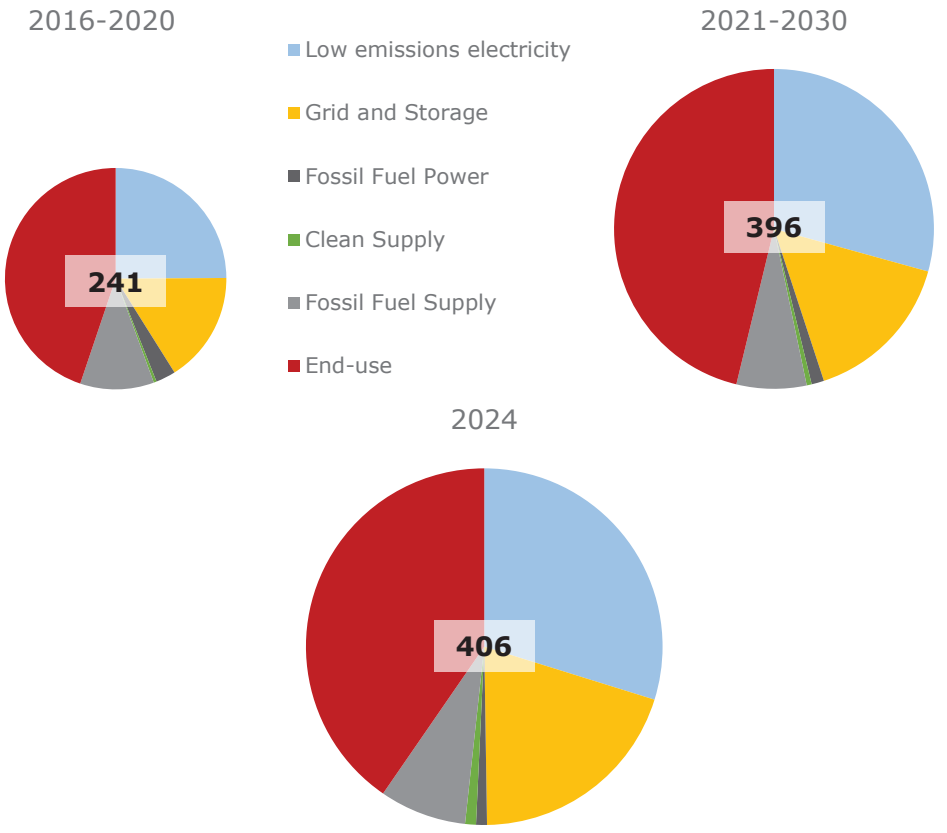
Source: IEA, IRENA, BNEF

- Oil prices (Brent and WTI) rose sharply in 2021–2022 but normalized faster compared to natural gas.
- The USD/EUR exchange rate followed an appreciating dollar trend, amplifying volatility in European energy costs.

The EU energy investment landscape is being reshaped, with capital strongly directed toward low-emission electricity, grids, and end-use efficiency

- EU energy investment is increasingly shifting towards low-emissions electricity and clean supply technologies.
- End-use and efficiency investments remain the largest component, sustaining strong growth into 2024.

Energy Investment in the European Union by Sector (billion $), [2004-2022]



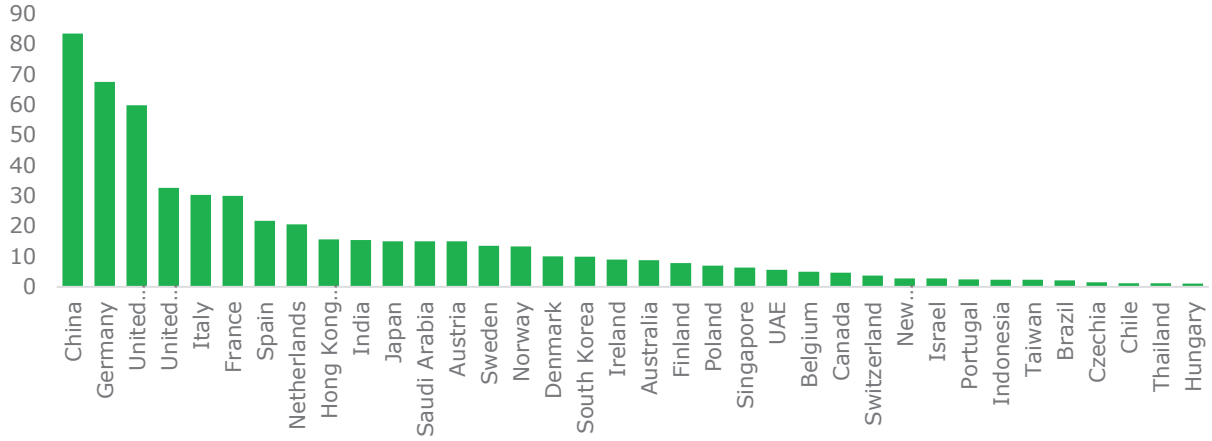
Source: BNEF

- Grid and storage spending is expanding steadily, reflecting the need for integration of renewables.
- Fossil fuel power and supply hold only a minor share, highlighting Europe's transition focus.

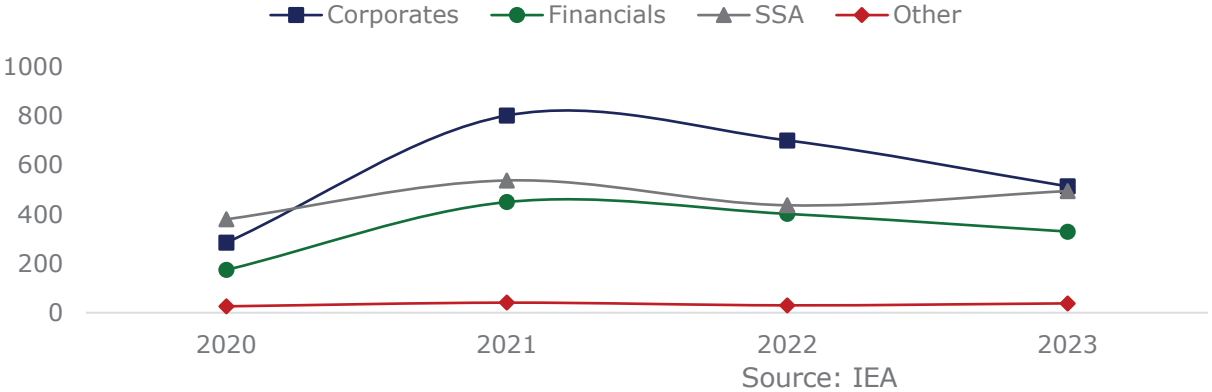
Sustainable finance is consolidating its role in global capital markets, with green bonds and sustainable debt issuance on an upward trajectory

- China, Germany, and the U.S. dominate the green bond market, together accounting for the majority of issuances in 2023.
- Europe leads globally with several countries—including France, Spain, and the Netherlands—ranking among the top issuers.

Global Green Bond Market Value by Top Country, [2023]



Sustainable Debt Issuances (billion $), [2020-2023]

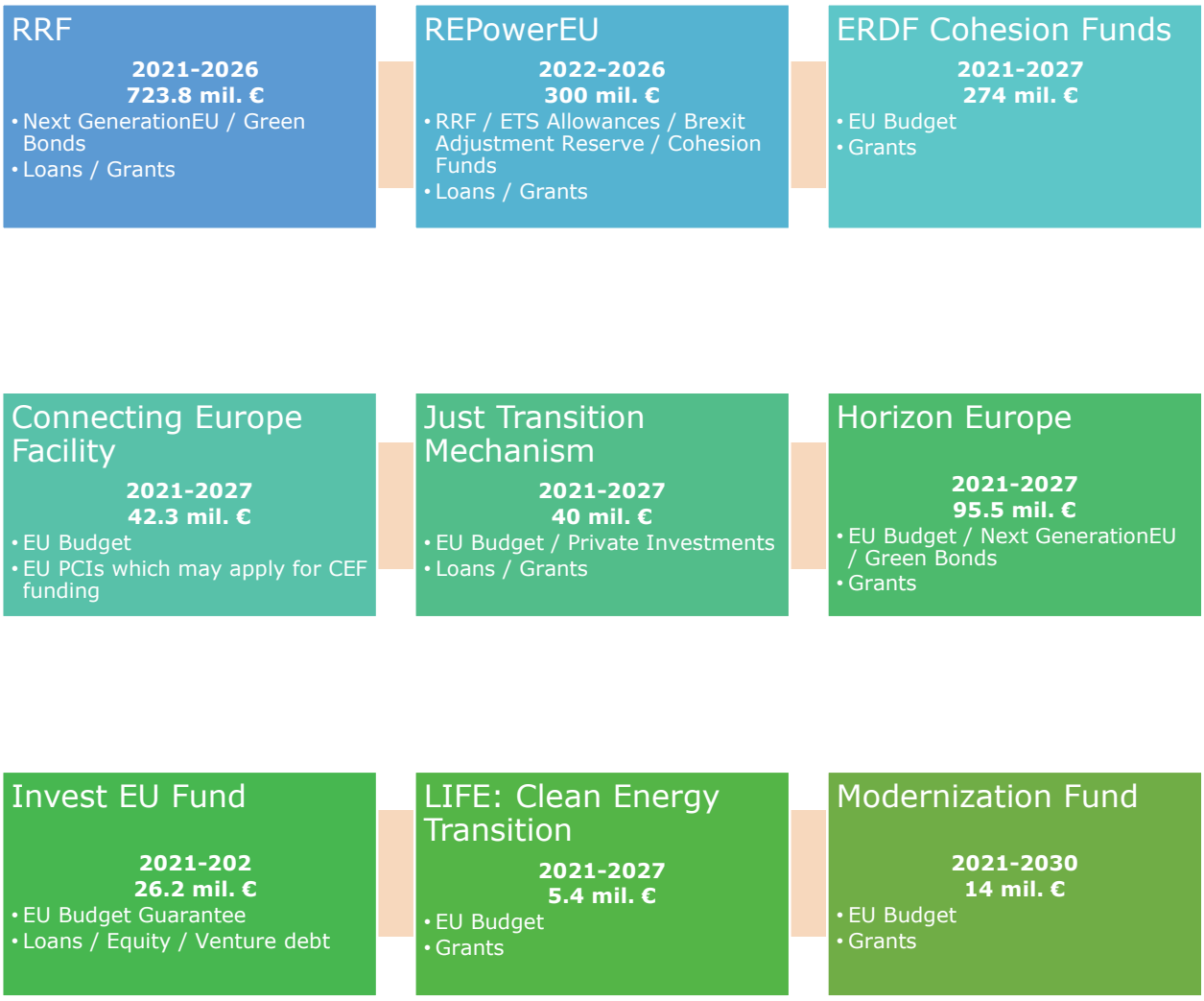


Source: IEA

- Sustainable debt issuance peaked in 2021, driven by corporates and sovereign borrowers, before slightly moderating.
- Corporates and financial institutions remain the backbone of sustainable finance, while sovereign and supranational activity provides stability.

The EU's energy transition funding is broad, multi-layered, and time-phased, combining short-term stimulus with long-term investment pathways

EU Funding Mechanisms and Expected Timeline, [2024]



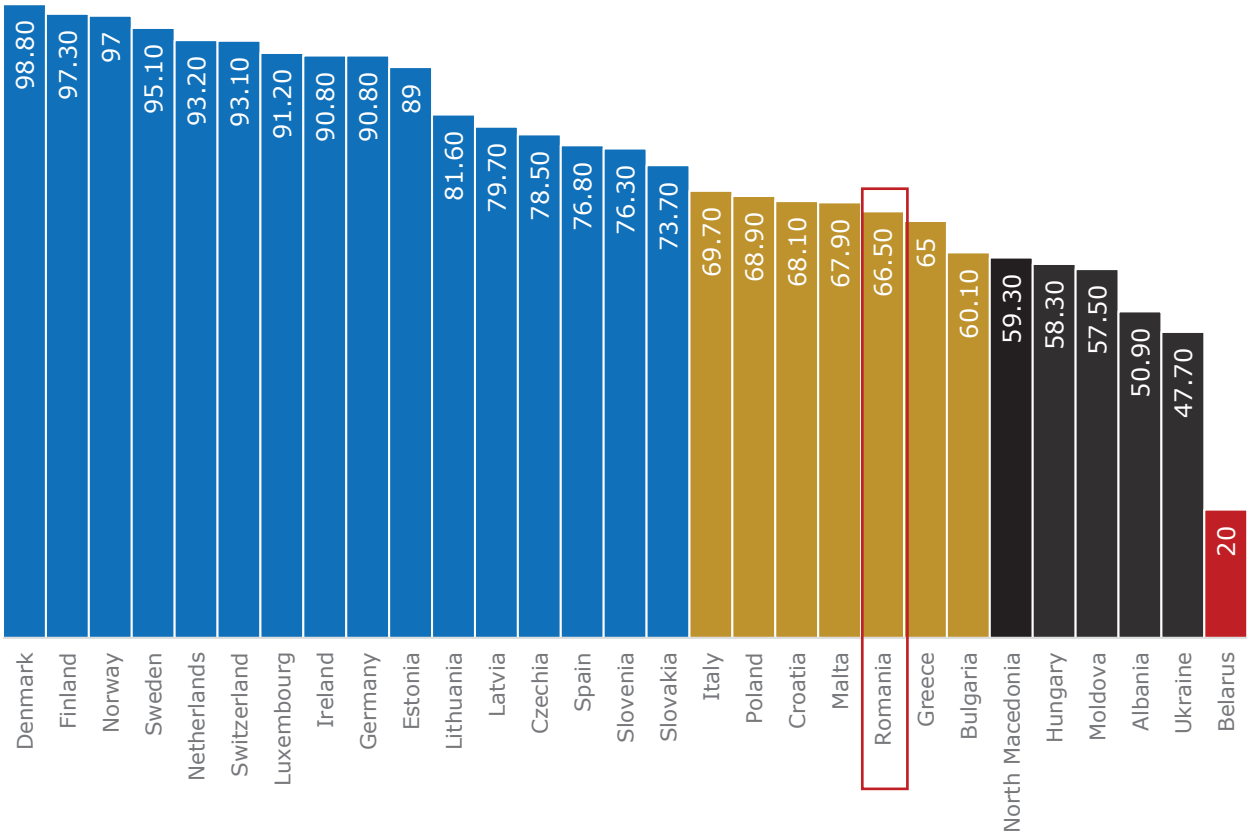
Source: European Commission, BRUEGEL

- A diverse mix of instruments ensures flexibility, ranging from grants and loans to venture debt, supporting both large-scale and niche projects.
- Long-term mechanisms like Horizon Europe and LIFE provide continuity and stability, sustaining innovation, research, and the clean energy transition.

Europe shows a sharp ESG divide, Nordics and Western states lead, while SE Europe countries lag, highlighting the need for stronger reforms

- Nordics lead ESG performance in Europe, with Denmark, Finland, and Norway consistently achieving near-perfect scores above 95.
- Western Europe dominates the upper tier, with Switzerland, the Netherlands, Germany, and Luxembourg maintaining strong governance and sustainability standards.

Countries by Overall ESG Ranking in Europe [2024]



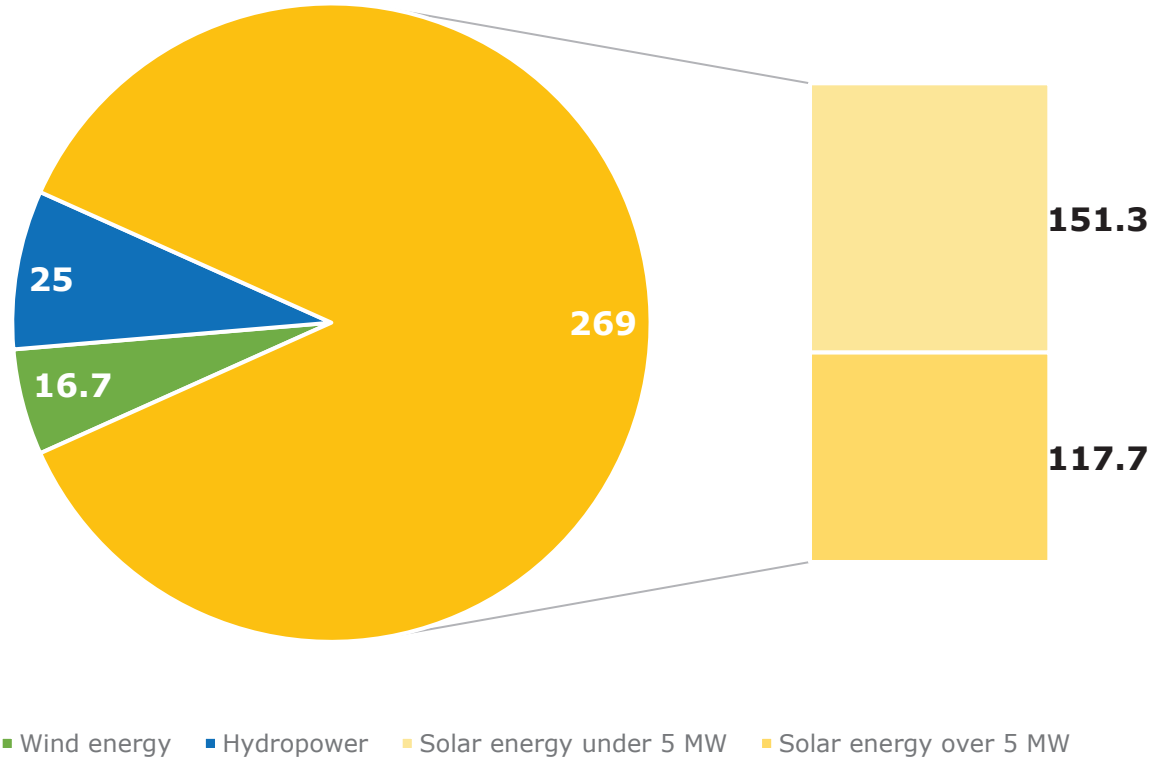
Source: Refinitiv

- Southern and Eastern Europe face mixed results, with countries like Italy and Poland in the mid-range, while Greece ranks lower at 65.0.
- Eastern periphery lags significantly, with Moldova, Albania, Ukraine, and Belarus struggling to align with ESG benchmarks, highlighting persistent structural gaps.

Romania's RES investments are solar-driven, while wind and hydro are more modest due to regulatory and maturity constraints.

- Solar energy dominates investments, with €269 million allocated to projects above 5 MW, showing investor confidence.
- Smaller-scale solar projects attract €117.7 million, signaling rising interest in distributed generation and prosumer-driven capacity growth.

Investments (mil. €) in RES technologies in Romania, [2024]



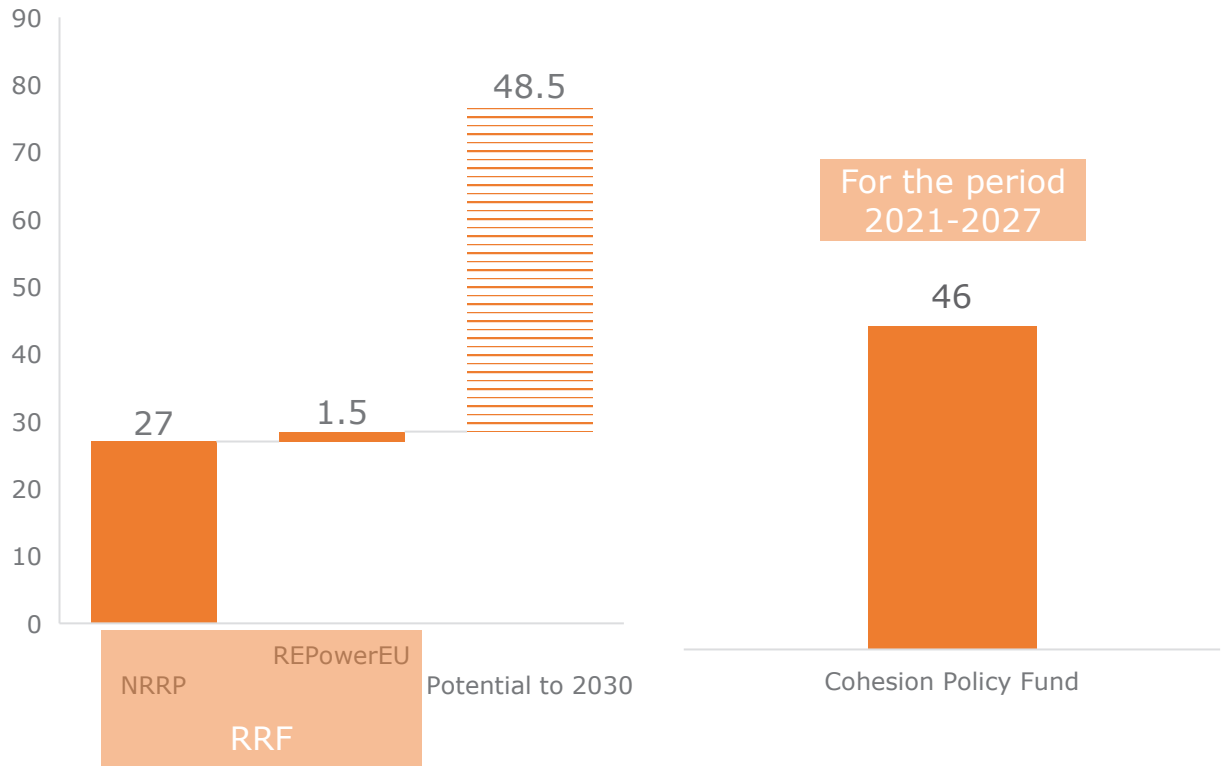
Source: Romanian Ministry of Energy

- Wind investments remains modest at €16.7 million, highlighting ongoing regulatory and permitting challenges for large-scale wind expansion.
- Hydropower modernization drew €25 million, reflecting limited upgrades rather than significant capacity expansion in Romania's mature hydro fleet.

EU funding offers Romania a historic opportunity to accelerate energy transition if absorption capacity improves

- Romania secured €27 billion through its National Recovery and Resilience Plan, central to supporting green transition investments.
- REPowerEU allocations remain modest at €1.5 billion, underscoring the need for efficient targeting of critical energy projects.

EU funding (bil. €) for Romania, [2024]



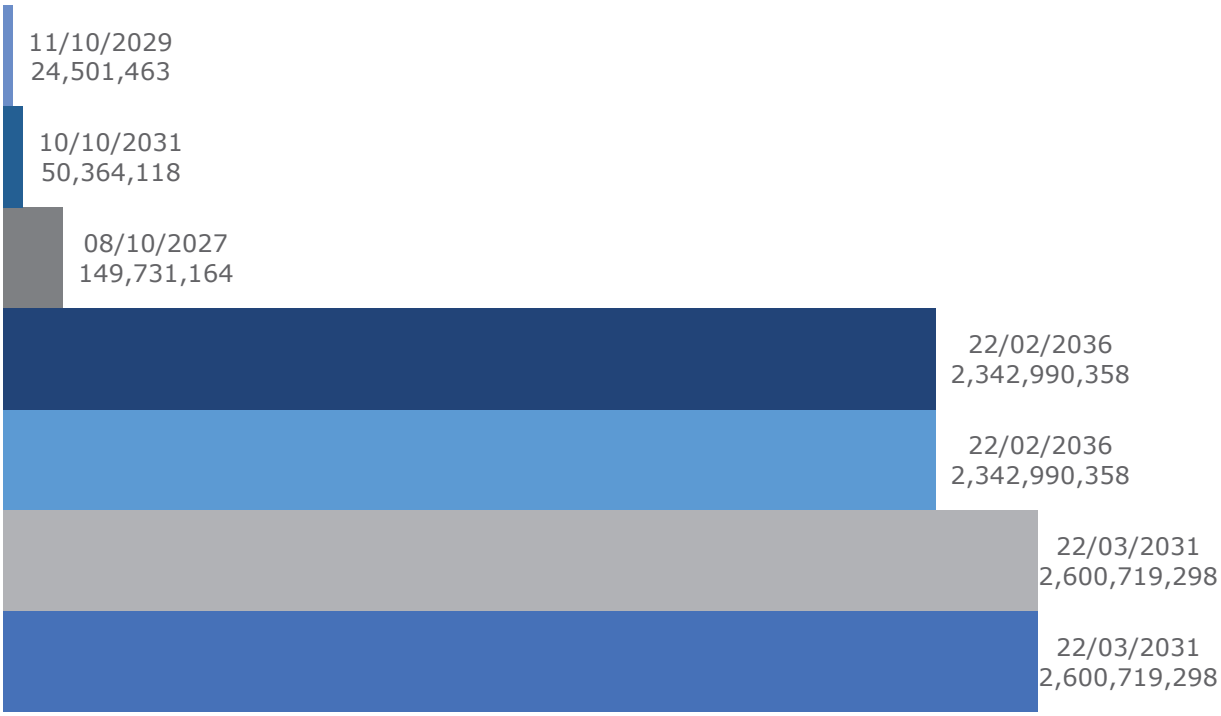
Source: EU Commission

- Cohesion Policy Fund provides €46 billion for 2021–2027, a major resource to accelerate regional decarbonization and infrastructure upgrades.
- Long-term funding potential of €48.5 billion to 2030 highlights Romania's opportunity to transform its energy system comprehensively.

Romania's green bond issuances in 2024 confirm strong investor support for its sustainable transition agenda

- Romania issued multiple green bonds in 2024, with maturities extending up to 2036, strengthening sustainable financing channels.
- The largest issuances exceeded $2.6 billion each, reflecting strong investor appetite for long-term Romanian green debt instruments.

Green Bonds Issued ($) by the Romanian government for Romania and the Maturity Date, [2024]



Source: Refinitiv

- Smaller issuances in 2027–2031 demonstrate diversification of maturity profiles, improving Romania's flexibility in managing repayment schedules.
- Green bond proceeds are expected to fund renewable energy, transport decarbonization, and efficiency, aligning with EU climate objectives.

Romania’s fragile credit outlook risks higher financing costs, challenging investment needs for energy transition and infrastructure

- Romania’s sovereign ratings remain at the lowest investment-grade threshold, reflecting market concerns about fiscal stability and reforms.
- DBRS maintained a stable outlook, but its BB (high) rating places Romania outside mainstream investment-grade benchmarks.

Romania’s credit scores, [2025]

Agency	*Rating*	*Outlook*	*Date*
DBRS	BB (high)	Stable	Jul 11 2025
Moody's	Baa3	Negative	Mar 14 2025
S&P	BBB-	Negative	Jan 25 2025
Fitch	BBB-	Negative	Aug 15 2025

Source: Trading Economics, Fitch Ratings

- Moody’s, S&P, and Fitch all issued negative outlooks, signaling risks of downgrade if fiscal consolidation fails.
- Credit pressures may increase borrowing costs, complicating Romania’s ability to finance its energy transition and infrastructure investments.

8. Special Focus

Contents

Key Facts

Forecasts suggest that inflation outpaces power prices post-2030.

Day-Ahead Market (DAM) prices are projected to decline through 2050.

Balancing Market (BM) prices are expected to decline after 2030.

Solar capacity can dominate additions, peaking near 1 GW annually

Wind capacity stabilizes at 550–600 MW annually after 2026.

Post-2030 shifts focus to integration and flexibility

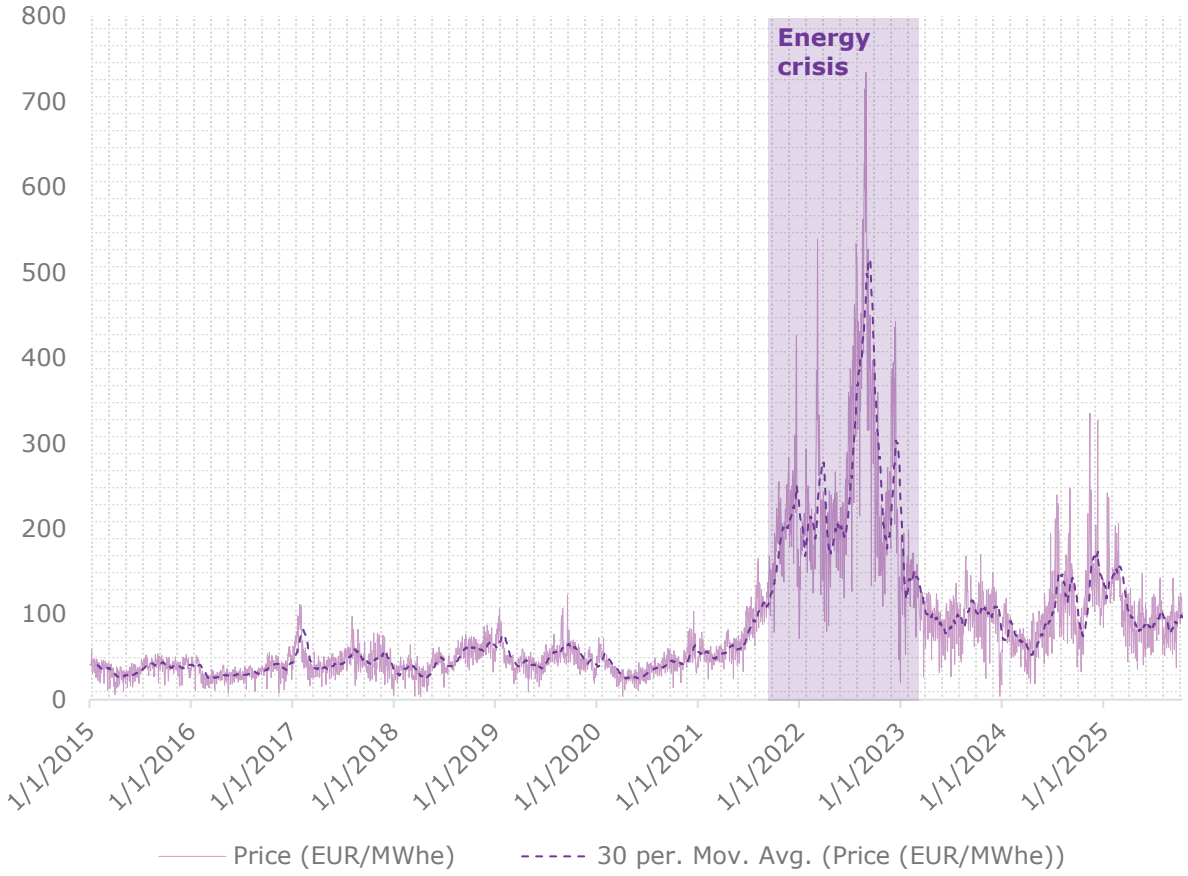
Activation fees for frequency reserves will stabilize after 2035.

Installed distributed generation capacity is projected to reach nearly 3 GW by mid-2025.

Electricity prices in Romania have stabilized after the 2022 crisis, but long-term stability hinges on deeper renewable integration and grid flexibility

- Electricity prices in Romania peaked during the 2022–2023 energy crisis, surpassing €700/MWh at their height.
- Post-crisis stabilization remains incomplete, with prices still above pre-2021 averages due to fuel and capacity constraints.

Daily wholesale electricity price (€/MWh) and 30-day moving average in Romania, [2015-2025]



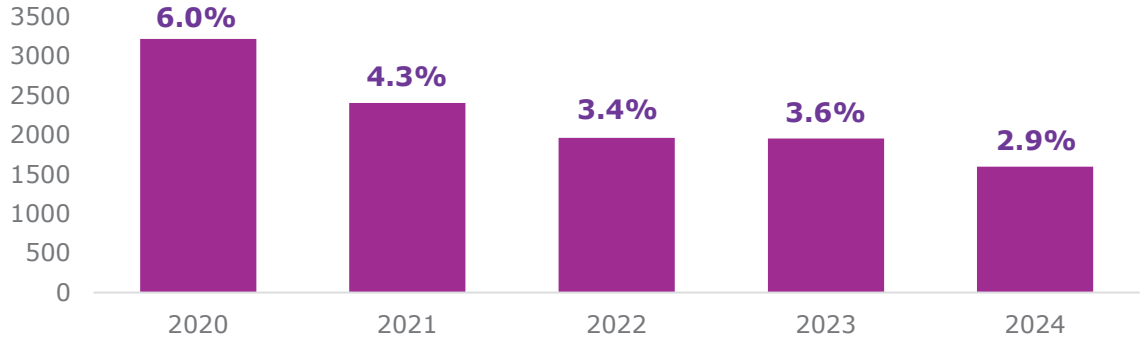
Source: Ember-Climate

- Market volatility is moderating, aided by renewable integration and cross-border trading within the SEE region.
- Energy price resilience depends on grid modernization, flexible generation, and storage expansion.

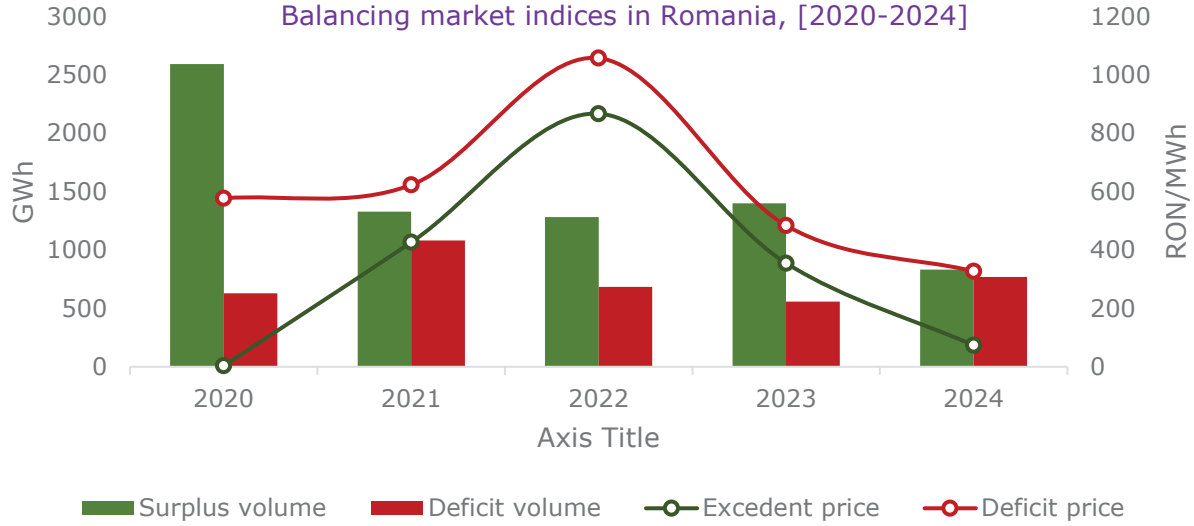
Romania's balancing market has become more efficient and less volatile, driven by better system planning and renewable integration

- Balancing energy volumes in Romania have steadily declined, from 6.0% of internal consumption in 2020 to just 2.9% in 2024.
- Deficit prices peaked in 2022, reflecting grid stress during the regional energy crisis.

Total traded balancing energy (GWh) and Share of internal consumption in Romania, [2020-2024]



Balancing market indices in Romania, [2020-2024]



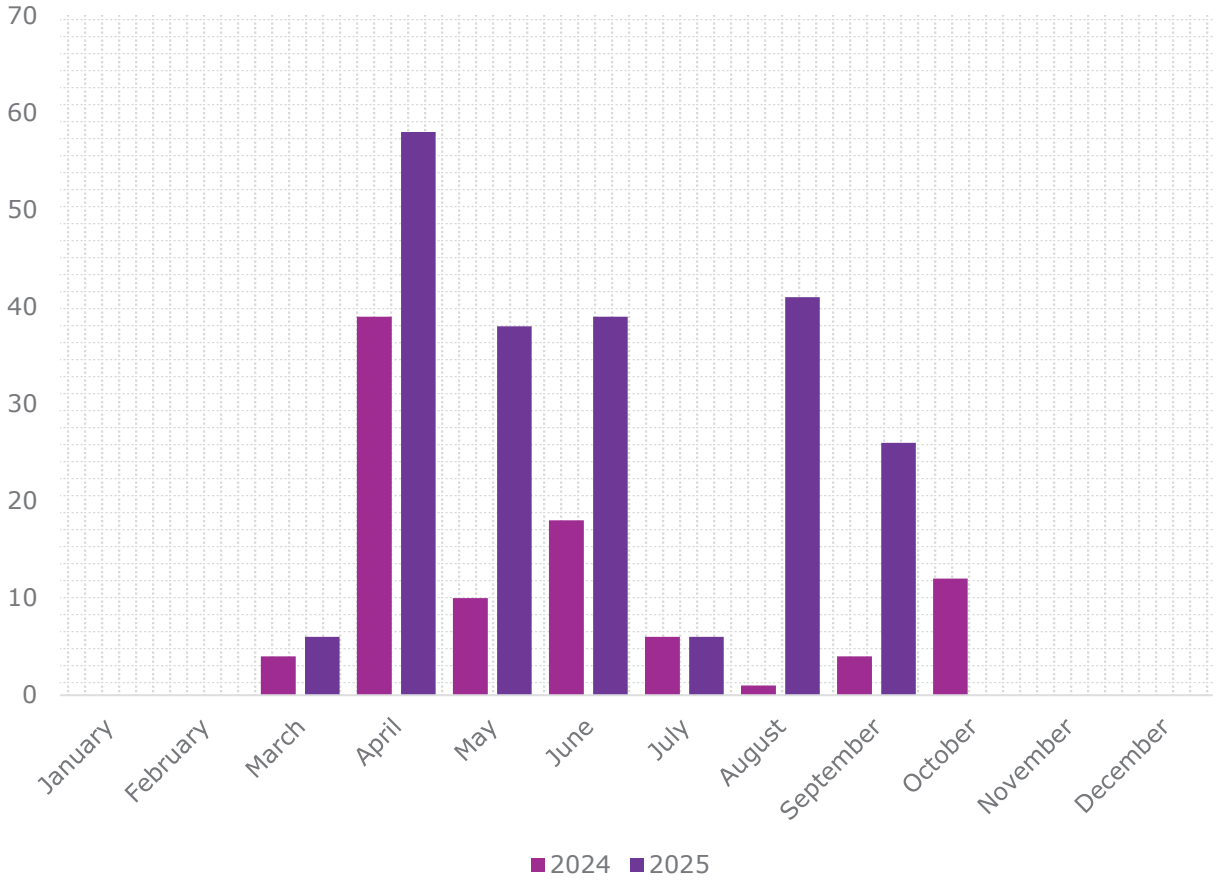
Source: ANRE

- Improved forecasting and renewable integration have enhanced system stability and reduced balancing needs.
- Price convergence between surplus and deficit markets signals a maturing balancing market and operational efficiency gains.

Romania’s increasing renewable penetration is driving more frequent negative DAM prices, highlighting the urgency for a flexible system

- Negative DAM prices surged in spring 2024, peaking in April with nearly 60 hours below zero due to high renewable output.
- Solar and wind overgeneration during mild-demand months continues to pressure wholesale prices downward.

Monthly Number of hours with negative DAM prices in Romania, [2024-2025]



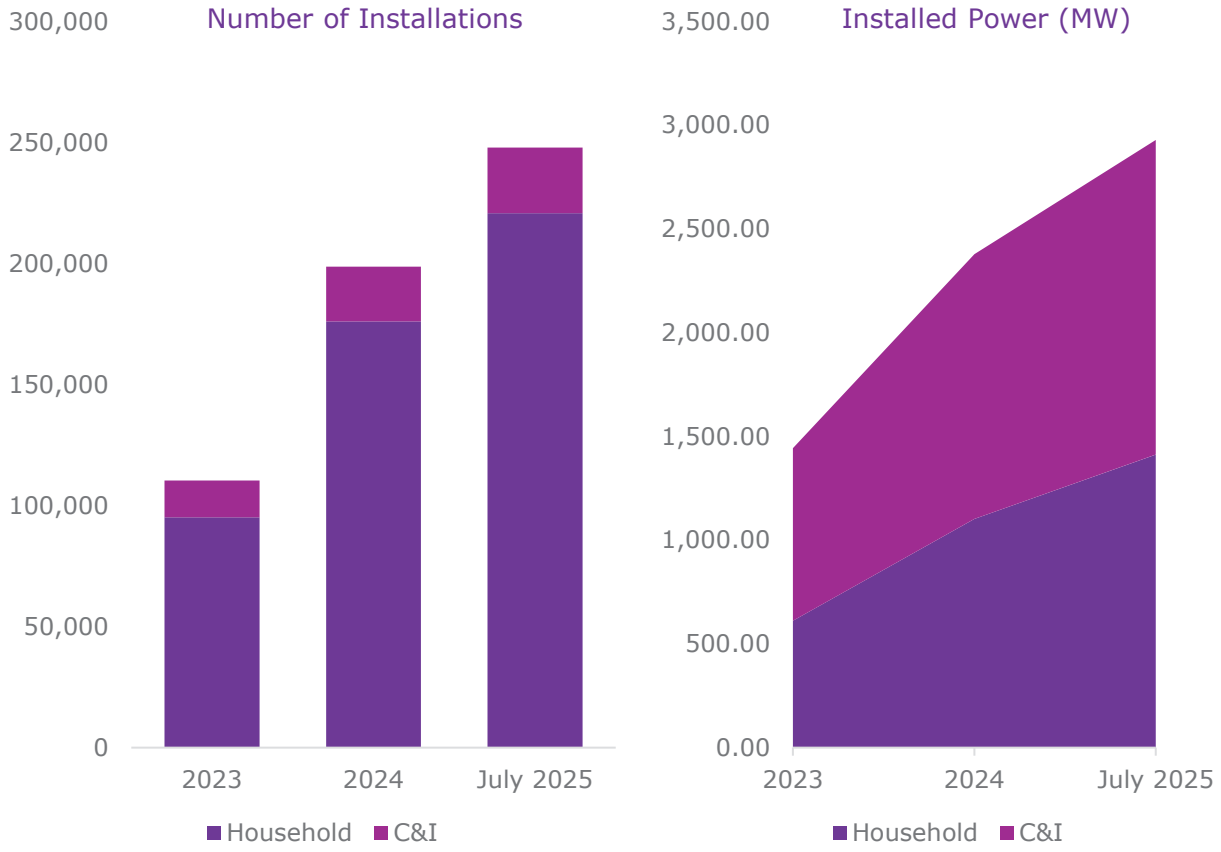
Source: OPCOM

- Grid flexibility and storage limitations exacerbate negative pricing episodes, revealing system imbalance challenges.
- Seasonal price volatility underscores the need for flexible demand response and interconnection reinforcement.

Romania’s prosumer boom is reshaping its power system, accelerating decentralized generation and citizen participation in the energy transition

- Romania’s prosumer installations have surged, exceeding 240,000 by mid-2025, a tenfold increase since 2020.
- Installed distributed generation capacity reached nearly 3 GW, driven by residential rooftop PV adoption.

Evolution of distributed generation by type of prosumer in Romania, [2023-July 2025]



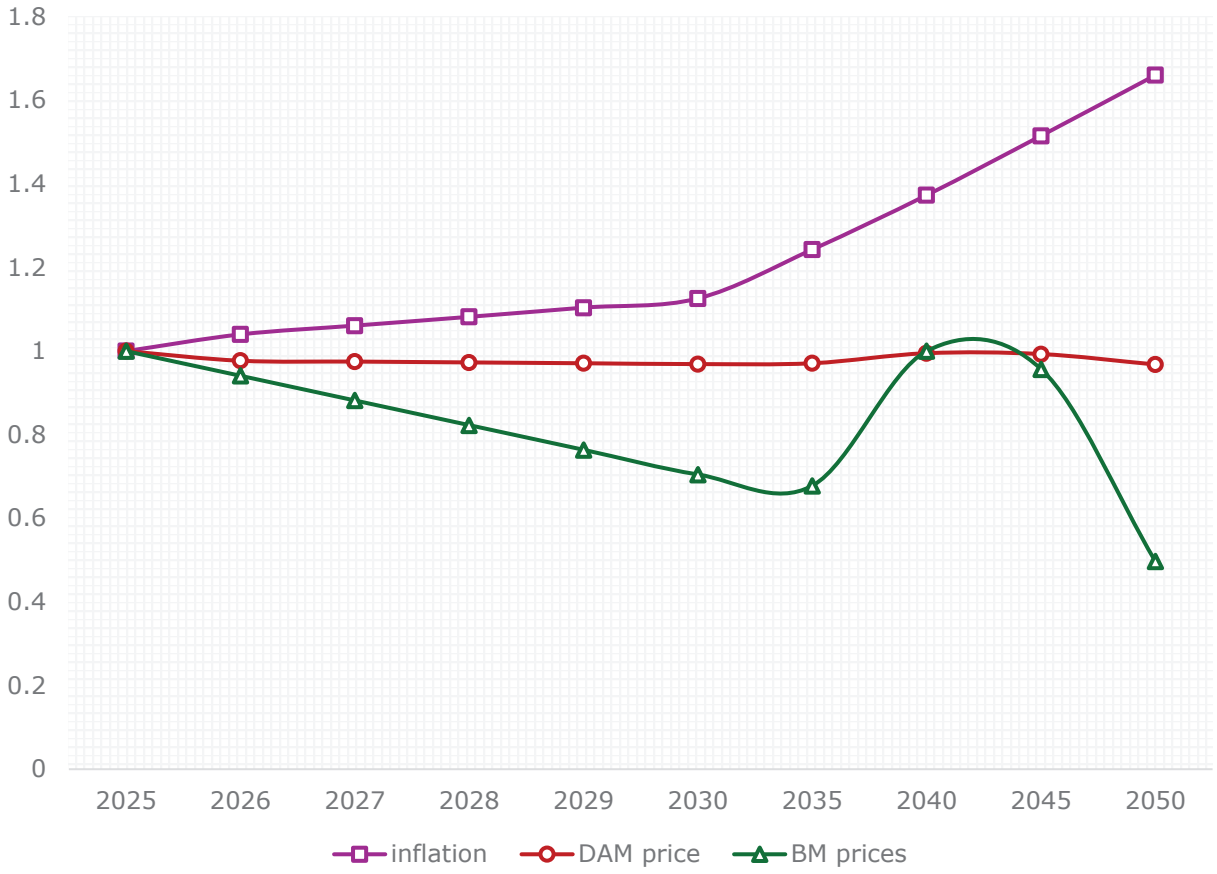
Source: ANRE

- Commercial and industrial (C&I) prosumers now represent over one-third of total installed power, showing growing corporate engagement.
- Policy incentives and net metering reforms continue to fuel strong prosumer momentum across all consumer groups.

Romania's electricity market is projected to stabilize long-term, with inflation rising faster than power prices amid growing system efficiency

- Inflation outpaces electricity price growth post-2030, suggesting relative price stability in the power market.
- Day-Ahead Market (DAM) prices remain steady through 2050, reflecting gradual decarbonization and market maturity.

Forecast of electricity market indices in Romania, [2025-2050]



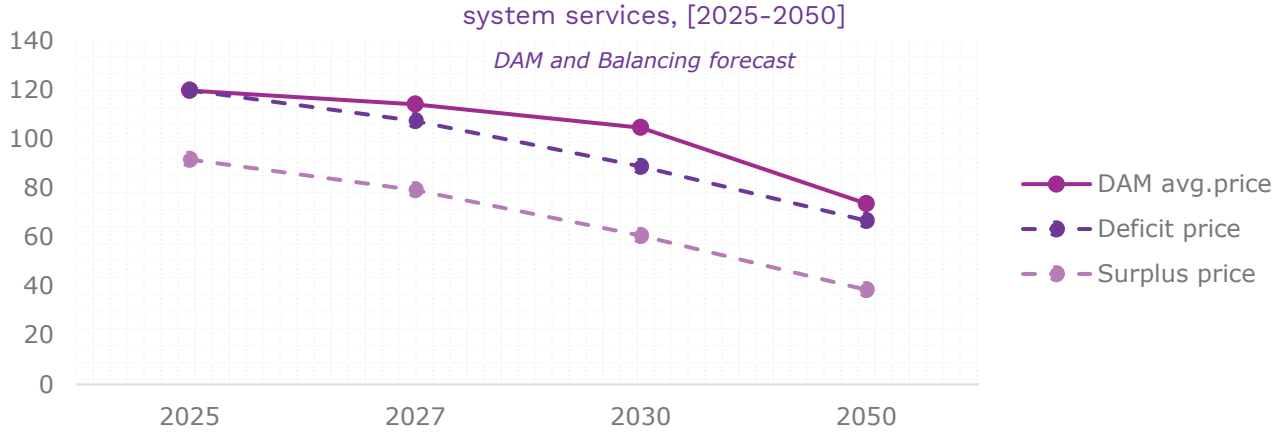
Source: evolve-energy

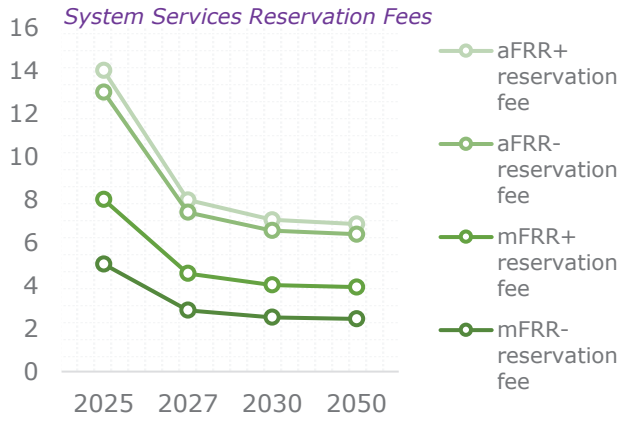
- Balancing Market (BM) prices decline after 2030, driven by improved system flexibility and renewable integration.
- Post-2040 recovery in BM prices may indicate increased grid constraints or investment gaps in flexibility assets.

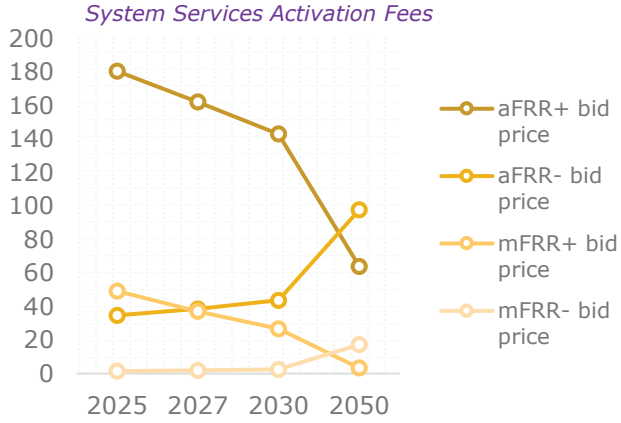
Wholesale electricity and balancing markets are expected to mature by 2050, with lower service costs and increased operational stability

- Day-Ahead Market (DAM) prices are projected to gradually decline from 2025 to 2050, reflecting stronger renewable integration.
- Balancing market deficit and surplus prices converge over time, indicating improved system predictability and flexibility.

Price (lei/MWh) forecast for all Romanian major wholesale markets: day-ahead, balancing, system services, [2025-2050]







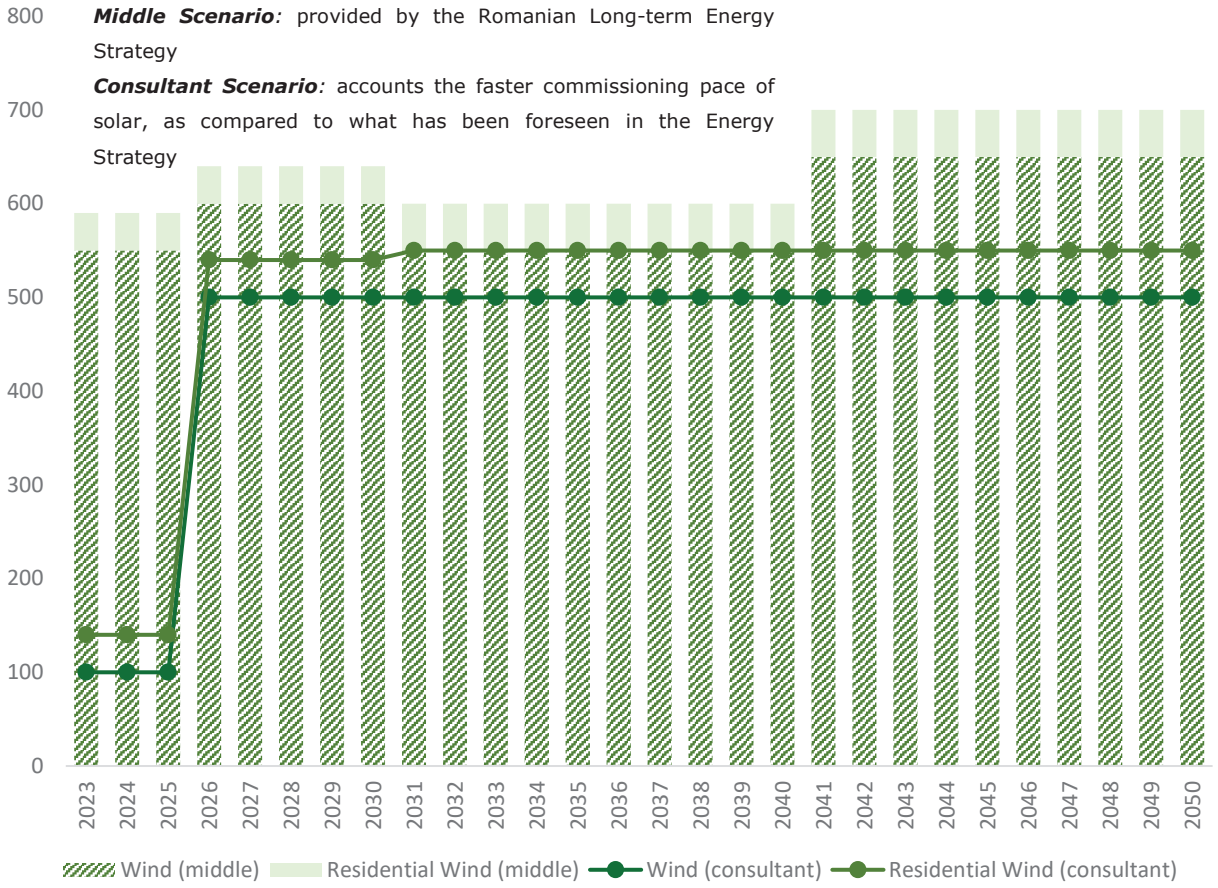
Source: evolve-energy

- System services reservation fees for both aFRR and mFRR drop by more than 50%, suggesting growing market competition.
- Activation fees for frequency reserves stabilize after 2035, showing a more efficient balancing market design in Romania.

Romania's wind sector is entering a steady expansion phase, consolidating its role alongside solar as a core pillar of long-term strategy

- Wind capacity additions in Romania are projected to stabilize around 550–600 MW annually after 2026 under both scenarios.
- The non-LES scenario anticipates slightly faster early growth, aligning with Romania's accelerated solar deployment trends.

Forecast of annual capacity installations (MW) for wind power in Romania, [2023-2050]



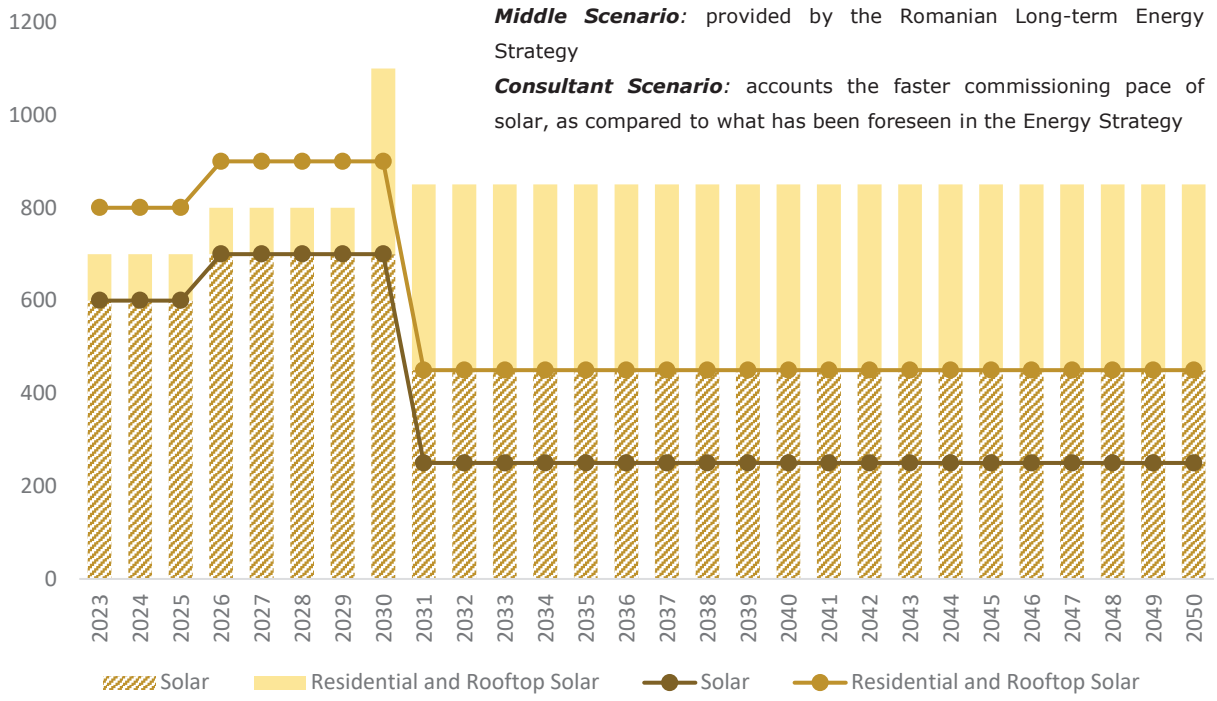
Source: evolve-energy

- Residential-scale wind projects remain marginal but show gradual inclusion in long-term energy planning.
- Post-2030 trends suggest a steady buildout rather than explosive growth, focusing on grid balance and regional integration.

Romania's solar power growth will dominate new renewable capacity through 2030, setting a strong foundation for the future energy system

- Solar capacity additions remain robust through 2030, with annual installations reaching nearly 1 GW at their peak.
- Residential and rooftop solar play an increasingly central role post-2030, maintaining steady growth even as utility-scale projects plateau.

Forecast of annual capacity installations (MW) for solar power in Romania, [2023-2050]



Source: evolve-energy

- The post-2030 slowdown signals grid saturation and policy maturity, as Romania shifts focus from expansion to integration and flexibility.
- The non-LES scenario anticipates faster deployment of both utility-scale and rooftop PV systems compared to national forecasts.

Data Sources

https://anre.ro/

https://www.transelectrica.ro/en/web/tel/home

http://www.bruegel.org/

https://www.bp.com

https://www.transgaz.ro/en

https://eikon.refinitiv.com/

https://www.worldgovernmentbonds.com/

https://roec.biz/

https://evolve-energy.ro/

https://www.opcom.ro/acasa/ro

http://ember-climate.org/

https://www.eia.gov/

https://energie.gov.ro/

https://www.fitchratings.com/

http://ec.Europa.eu/eurostat

https://www.acer.europa.eu

https://www.seepe.gr/?lang=en

https://oec.world/en

Data Sources

https://www.iea.org/	https://dgpci.mai.gov.ro/	https://www.visualcapitalist.com/
http://www.irena.org/	https://world-nuclear.org/	https://english.news.cn/home.htm
http://pexapark.com	https://serbia-energy.eu/	https://www.eea.europa.eu/en
https://www.entsoe.eu/	http://www.un.org	https://energy.instrat.pl/
joint-research-centre.ec.europa.eu/index_en	https://tradingeconomics.com/	https://www.opec.org/opec_web/en/
https://about.bnef.com/	https://globalenergymonitor.org/	https://www.goldmansachs.com/

Acronyms and abbreviations

AC	Alternative Current
BEV	Battery Electric Vehicle
CAGR	Compound Annual Growth Rate
CCS	Carbon Capture and Sequestration/Storage CRES
CCUS	Carbon Capture, Utilisation & Storage
CNG	Compressed natural gas
CfD	Contracts for differences
DAM	Day-Ahead Market
DC	Direct Current
ESG	Environmental, Social and Governance
EV	Electric Vehicle
EU	European Union
FEC	Final Energy Consumption
FSRU	Floating Storage and Regasification Unit
FSU	Floating Storage Unit
GDP	Gross Domestic Product
GHG	Greenhouse gases
ICE	Internal Combustion Engine
IDR	Issuer Default Rating
LCOE	Levelized Cost of Electricity
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MCP	Market Clearing Price
NECP	National and Climate Energy Plan
NG	Natural Gas
NII	Non-Interconnected Islands
NIR	National Inventory Report
NNGS	National Natural Gas System
NPEs	Non-Performing Exposures
OECD	Organisation for Economic Co-operation and Development
PEC	Primary Energy Consumption
PPA	Power Purchase Agreement
PV	Photovoltaic
RECAI	Renewable Energy Country Attractiveness Index
RES	Renewable Energy Sources
RRF	Recovery and Resilience Facility
RU	Russia
R&D	Research and Development
SE	Southeastern
SMP	System Marginal Price
SSLNG	Small Scale LNG
TAP	Trans Adriatic Pipeline
Y-o-Y	Year-over-Year

Units of measurement

bcm	billion cubic meters
bpd	barrels per day
bn	billion
CO2	carbon dioxide
EJ	exajoule
gr	grams
GJ	gigajoule
GW	gigawatt
GWh	gigawatt hour
ktoe	thousand tonnes of oil equivalent
kW	kilowatt
kWh	kilowatt hour
m3	cubic meter
mcum	million cubic metres
Mt	million tonnes
MtCO2	million tonnes of carbon dioxide
MtCO2-eq	million tonnes of carbon dioxide equivalent
Mtoe	million tonnes of oil equivalent
MW	megawatt
MWh	megawatt hour
m/s	meter pes second
pp	percentage points
sqm	square meter
tCO_2	tonne of carbon dioxide
toe	tonne of oil equivalent
tn	tonne
TWh	terawatt hour

Conversion of units

Natural and LNG	**To convert**						
	Billion cubic metres NG	Billion cubic feet NG	Petajoules NG	Million Tonnes oil equivalent	Million Tonnes LNG	Trillion British thermal units	Million barrels oil equivalent
From	Multiply by						
1 billion cubic metres NG	1.000	35.315	36.000	0.860	0.735	34.121	5.883
1 billion cubic feet NG	0.028	1.000	1.019	0.024	0.021	0.966	0.167
1 petajoue NG	0.028	0.981	1.000	0.024	0.021	0.952	0.164
1 million tonnes oil equivalent	1.163	41.071	41.868	1.000	0.855	39.683	6.842
1 million tonnes LNG	1.360	48.028	48.747	1.169	1.000	46.405	8.001
1 trillion British thermal units	0.029	1.035	1.050	0.025	0.022	1.000	0.017
1 million barrels oil equivalent	0.170	6.003	6.093	0.146	0.125	5.800	1.000
Units							
1 metric tonne	= 2204.62 lb		= 1.1023 short tons				
1 kilolitre	= 6.2898 barrels						
1 kilolitre	= 1 cubic meter						
1 kilocalorie (kcal)	= 4.1868 kJ		= 3.968 Btu				
1 kilojoule (kJ)	= 0.239 kcal		= 0.948 Btu				
1 petajoule (Pj)	= 1 quadrillion joules (1x10^15)						

Crude Oil	**To convert**					
	Tonnes (metric)	Kilolitres	Barrels	US gallons	Tonnes/year	
From	Multiply by					
Tonnes (metric)	1	1.165	7.33	307.86	-	
Kilolitres	0.8581	1	6.2898	264.17	-	
Barrels	0.1364	0.159	1	42	-	
US gallons	0.00325	0.0038	0.0238	1	-	
Barrels/day	-	-	-	-	49.8	
	To convert					
Products	Barrels to tonnes	Tonnes to barrels	Kilolitres to tonnes	Tonnes to Kilolitres	Tonnes to gigajoules	Tonnes to barrels of oil equivalent
From	Multiply by					
Ethane	0.059	16.850	0.373	2.679	49.400	8.073
LPG	0.086	11.600	0.541	1.849	46.150	7.542
Gasoline	0.120	8.350	0.753	1.328	44.750	7.313
Kerosene	0.127	7.880	0.798	1.252	43.920	7.177
Gas oil/diesel	0.134	7.460	0.843	1.286	43.380	7.089
Residual fuel oil	0.157	6.350	0.991	1.010	41.570	6.793
Product basket	0.124	8.058	0.781	1.281	43.076	7.039
Units						
1 exajoule (EJ)	= 1 quintillion joules (1x10^18)					
1 Briitish thermal unit (Btu)	= 0.252 kcal			= 1.055kJ		
1 tonne of oil equivalent (toe)	= 39.683 million Btu			= 41.868 million kJ		
1 barrel of oil equivalent (boe)	= 5.8 million Btu			= 6.119 million kJ		
1 kilowatt-hour (kWh)	= 860 kcal		= 3412 Btu		= 3600 kJ	

Source: BP Approximate conversion factors – Statistical Review of World Energy – updated July 2021

RCI Holding

EMPOWERING COMMUNITIES FOR A SUSTAINABLE FUTURE

RCI Holding is a conglomerate of 18 companies founded in 2000 and based in Bucharest, Romania, operating as a multidisciplinary consulting and engineering group, combining technical expertise, strategic insight, and financial acumen to deliver integrated solutions across the energy, infrastructure, and technology sectors.

The group's activities span the entire project lifecycle, from concept and feasibility to design, management, and supervision, supporting both private and public sector clients in achieving sustainable growth and operational excellence.

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