

System Integration of Renewables in Moldova: A Roadmap



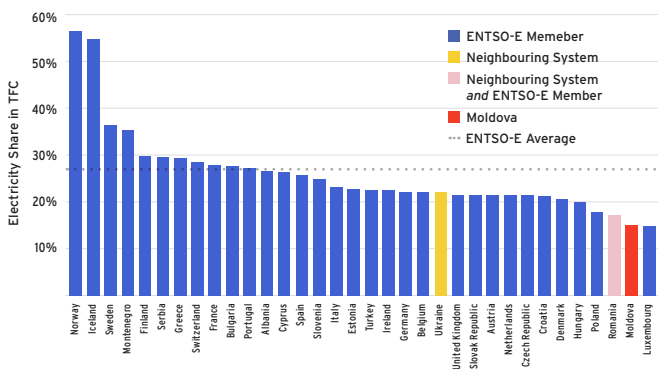
Discover Moldova's potential to increase domestic renewable electricity generation and establish a flexible power system.

Experience the full roadmap at
[iea.org/programmes/eu4energy](https://www.iea.org/programmes/eu4energy)

Moldova's Energy Mix and Goals

Moldova relies heavily on either **gas or electricity imports**, with its share of electricity in the total final energy consumption (TFEC) at 14.6% in 2019, the lowest amongst its immediate neighbours and nearly all other European Network of Transmission Operators (ENTSO-E) members.

Share of Electricity in the TFEC for Moldova, Neighbouring Systems or ENTSO-E Members, 2019



Source: IEA (2021), World Energy Balances 2021 (database), www.iea.org/statistics.

To increase the level of **clean and domestically-derived energy**, Moldova established its **National Energy Strategy (NES)** for 2030, with three key objectives:

- ▶ Ensuring the **security** of supply of energy;
- ▶ Developing **competitive markets** and their **regional and European integration**; and
- ▶ Ensuring **sustainability** of the energy sector and **climate change mitigation**.

Renewable Electricity's Role

The development of renewable electricity would not only help Moldova achieve its NES, but would also have socioeconomic and environmental benefits, including:

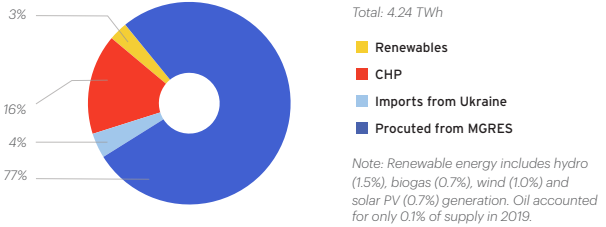
- ▶ Maximising the consumption of **domestic energy resources**;
- ▶ Reducing **reliance on imports** of natural gas or other fossil fuels
- ▶ Increasing **employment** in the renewable sector, especially in **rural areas**; and
- ▶ Reducing the **health impacts** from pollution.

Energy Trends

Electricity Supply and Demand

The electricity system in Moldova is characterised by its **reliance on imports**, which supplied 81% of demand in 2020 and made up 100% of Moldova's natural gas and oil supply. It also experiences **winter peak demand**, with **residential consumption** accounting for the majority (43%) of total consumption.

Share of Generation Sources for Electricity Supply, 2019

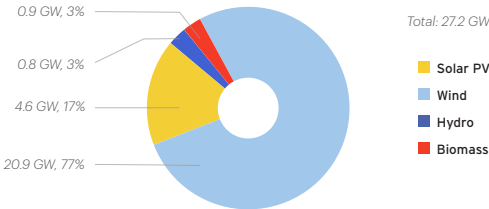


Source: IEA (2021), World Energy Balances 2021 (database), www.iea.org/statistics.

Trading Options in Neighbouring Countries

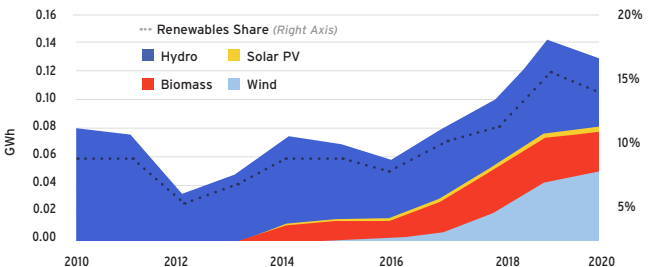
In 2020, renewable electricity accounted for just over **13% of domestic generation** in Moldova. Moldova's deployment of wind and solar power has been modest, though, and there remains over **27 GW of potential renewable generation capacity** via wind, solar, biomass and hydro.

Technical Potential of Renewable Electric Generation, by Technology



Source: IRENA (2019), Renewables Readiness Assessment: Republic of Moldova.

Moldova Electricity Generation From Renewable Resources

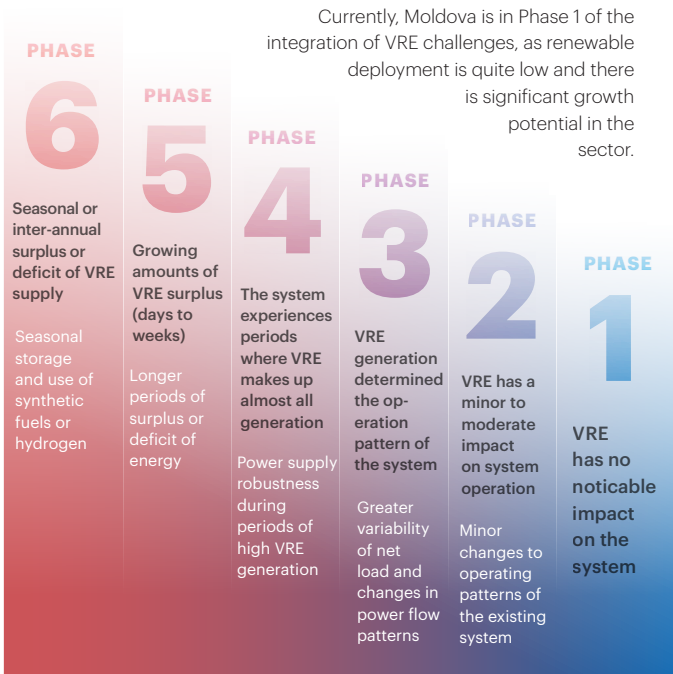


Source: IEA (2021), World Energy Balances 2021 (database), www.iea.org/statistics.

Power System Enhancement

The transition of Moldova's power system from one that depends on imports and fossil fuels to one that is more self-reliant on domestic renewable resources requires actions in two main areas: removal of barriers and increased flexibility.

Key Characteristics and Challenges in Various Phases of System Integration



Source: IEA (2019), Status of Power System Transformation 2019.

Remove Barriers, Stimulate Investment

There is a **lack of clear and consistent policies** addressing the development of renewables. The **removal of regulatory and fiscal barriers is vital for stimulating investment** in the sector, from both public and private financing.

Flexible Electricity Markets and Technology

By establishing flexible electricity markets and enhancing regional co-ordination, Moldova would **more reliably** and **cost-effectively manage the variability of supply and demand**. Improving the power system's technical flexibility would also result in **higher shares of VRE** and make the electricity sector **cleaner**, more **sustainable** and more **secure**.

Key Policy Principles

Encourage Investment

- + Ensure **economic attractiveness** of renewable projects by removing unnecessary administrative burdens and taxation.
- + Improve the **capacity of local banks** to facilitate financing of clean energy projects.
- + Implement **integrated planning** to allow adequate investment in infrastructure and identification of bottlenecks.
- + Develop well-designed, fair, competitive and transparent **auctions**.

Establish & Incentivise Market Flexibility

- + Design new market and rules to foster **closer regional co-ordination** to provide better liquidity and stability, increase diversity of trade partners and highlight opportunities for trade of VRE amongst neighbouring systems.
- + Update system operation protocols as shares of VRE increase to **shorten dispatch intervals** in order to reduce balancing requirements.
- + Ensure that markets appropriately **value** and **incentivise flexibility** at all timescales and from all technologies.

Enhance & Incentivise Technological Flexibility

- + Make changes to market, regulatory and operational frameworks that lend additional flexibility to **existing infrastructure** and enable the participation of **distributed energy resources**.
- + Aid the integration of renewables by **decoupling electricity and heat generation** and **replacing fossil fuels with biomass**.
- + Procure new firm capacity and system services that are **competitive** and allow **equal participation** of all technologies.



The Vision for Moldova's Electricity System

POLICY AND STRATEGY

Short
Term

Mid
Term

Long
Term

Remove Regulatory Barriers, Increase Attractiveness to Investors

Formal government recognition of clean electricity as a priority for energy security



Public-private consultations to better understand barriers to entry



Development of the capacity for local banks to finance wind and solar projects, and reduction of investment risks for private financing



Development of RE roadmap and its integration into a national energy plan to better mobilise funds



Establish Flexible Electricity Markets, Enhance Regional Co-ordination

Implementation of unbundling and establishment of a new wholesale market to enable and incentivize flexibility



Enhance cross-border trade and co-ordination with Romania and Ukraine, and strategise around interconnection with Continental Europe



Enhance Technical Flexibility of Power System

Roll-out advanced forecasting tools within the system operator that allow better representation of VRE in the operation of the electricity market and the minimisation of balancing requirements



Continued assessment of system flexibility requirements



Ensure infrastructure, policies and regulation allow for flexibility from new demand-side resources



Invest in upgrading the grid and existing power plants to comply with ENTSO-E standards with the aim towards synchronisation with the Continental Europe system



An extended set of policy recommendations is included in the full roadmap



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