# Moldova energy storage for renewable energy

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A traditional energy system is composed of power plants that generate electricity, a transmission system, distribution system and consumers--industrial, commercial and residential. In a traditional system, energy flows only from the producer to the consumer, who does not know what is happening behind the socket. Such a system can only work with alternative energy, energy which cannot be stored in big quantities and the production must constantly follow consumption.

With the development of renewable energy and information technologies, consumers generate more and more energy by their own means, using renewable sources, especially solar energy. Thus, energy flows change direction and managing the energy generation process becomes more difficult, especially since renewable energy is intermittent, that is, it depends on whether there is sun and wind.

Such an energy system contains: generation, for example from thermal or nuclear power plants, variable renewable energy sources, intermittent natural gas sources, transport, distribution, consumers and prosumers, as well as energy storage systems.

The Republic of Moldova consumes approximately 4 million MWh of electricity annually. Of this, almost 45% is consumed in households and only 15% in industry. This consumption structure generates consumption peaks of about 700 MW in the morning and evening, when everyone is getting ready for a working day or is returning home. At night, the consumption drops to 180 MW.

So, Moldova cannot integrate into the energy system more wind energy than the minimum consumption at night and more solar energy than the maximum consumption during the day. If we produce more green energy than it can consume, it will flow into the Romanian or Ukrainian grid either for free, or Moldova will have to pay to balance the system. If less energy is generated than consumed, it will flow from neighboring countries, but at an "unplanned exchange price", meaning more expensive.

As we have more renewables, a smaller quantity of conventional energy is needed. Accordingly, the cheapest conventional energy remains on the market, and the market price decreases. When there is high consumption but not enough renewable energy, the price will increase because the deficit will be compensated with more expensive energy for balancing, coming from natural gas plants or from storage.

If previously the emphasis was placed on power plants to balance the system, in an intelligent system, consumption dispatching--i.e. managing consumer behavior, especially of those who are also prosumers --plays an increasingly important role. The better the consumption is regulated and energy exchanges with the public power grid, including storing the cheap energy in high-capacity batteries and consuming it when the price is high, the more renewable energy can be integrated into the grid.

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On 1 June 2022, the Republic of Moldova introduced European market rules that introduce balancing of energy--a mechanism which balances unplanned fluctuations in the production of electricity or electricity consumption. Given that Republic of Moldova does not have other producers capable of quickly changing their production and thus compensating for variations in production from renewable sources, this compensation is achieved through unplanned energy exchanges with neighboring countries, at relatively high costs.

These issues are addressed in the new law on renewable energy sources, developed by the Ministry of Energy. The new law is developed with the support of the Energy Community and transposes the legislation of the European Union into the Republic of Moldova.

Photovoltaic panels deliver more energy to the grid in the summer, when there is more sun, then in winter, when less is generated, it consumes the required amount from the universal service provider with which it has a contract, for example Premier Energy. Similarly, they produce more electricity than consume during the day, and in the evening and at night they consume from the grid. Thus, they use the network as a battery, but the network costs, for the operation and maintenance of the so-called battery, are paid by all other consumers.

The state has three support mechanisms for green energy producers, guaranteeing the purchase of surplus energy delivered to the grid and so helping them recover their investments:

Due to limitations related to the structure of consumption, renewable energy generation capacities are capped in the Republic of Moldova. So, in the Republic of Moldova, 105 MW are allocated for wind energy and 60 MW for photovoltaics parks that would be commissioned by 2025.

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