

Belarus energy storage for demand response

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The Law on Renewable Energy Sources regulates relations among all entities involved in the use of RESs for electricity production and consumption, as well as production of renewables for use by renewable energy plants. The creation of new facilities, and modernisation and reconstruction of existing facilities for renewable energy activities, is defined by the Decree on the Use of Renewable Sources of Energy and the Resolution on Setting and Allocating Quotas for the Construction of Renewable Energy Facilities.

Tariffs for electricity produced from RESs by individual entrepreneurs and legal entities not part of Belenergo were established under the Resolution on Tariffs for Electricity Produced from Renewable Energy Sources (2018).

The main emphasis in Belarus is on increasing the use of wood fuel, as it requires less capital investment than other types of renewable energy. Fuel from woody biomass (i.e. rough wood, pellets, chips and briquettes) is produced locally using modern harvesting and wood-chipping equipment.

Hydropower resources in Belarus are deemed scarce, though there are opportunities for small hydro in the northern and central parts of the country. Total hydropower potential is estimated at 850MW, including technically available potential of 520MW and economically viable potential of 250MW (0.44Mtoe/year).

Solar power potential is significant, mainly in the south and southeast of the country. In terms of global horizontal irradiation (GHI) and direct normal irradiation (DNI), most of Belarus receives only 1100kilowatt hours per square metre (kWh/m²) to 1400kWh/m² of GHI, and around 1000kWh/m² of DNI. This means that concentrated solar power (CSP) generation is impractical, but production by means of solar PV is possible. Solar energy could also be used in solar water heaters and other systems for water heating and drying in agriculture, water and space heating in buildings, and low-temperature process heat in industry and services. Total solar potential is therefore estimated at 49.7Mtoe/year.

Wind energy potential is estimated at up to 1600MW (0.47Mtoe/year based on average wind speeds and plants with 2.5MW capacity at an altitude of 100metres), with 1840wind farms possible in three regions: Hrodna, Minsk and Mogilev. This is not a high-quality resource, but still acceptable in certain places owing to the recent development of low-wind-speed turbines. These estimates seem conservative, however, as modern wind technology has increased the scale of turbines (now with an average size of over 2MW per turbine) and raised the energy yield, particularly at lower wind speeds. It is therefore recommended that estimates of wind potential be updated to take these developments and modern best practices in spacing and siting of turbines into account.

Belarus's geothermal potential is relatively undiscovered, with only a few regions having been tested. Of the tested regions, the most promising geothermal energy potential lies in the Pripyat Trough (Gomel region) and the Podlasie-Brest Depression (Brest region), in dozens of abandoned deep wells. Other areas studied include the shallow sedimentary horizons in the western part of the country, while potential for low-enthalpy geothermal energy is believed to exist over the entire territory.

Biogas potential is also considerable owing to the many professionally operated large-scale animal farms (cattle, pig and poultry) as well as significant waste from households, crops and sewage treatment plants, and municipal and food industry waste.

With 7.7Mt of manure output per year, around 3.5bcm (2.3Mtoe) of biogas could be generated. Preliminary government studies of potential energy from wastewater treatment plants indicate that around 9.2MW of heat is possible from sites across the country, and solid municipal waste energy potential is estimated at 0.3Mtoe/year.

Potential for biofuel production (ethanol and biodiesel) is high because of the country's large agricultural land area and activity, with most opportunities coming from sugar production, starch and the cellulose industry.

The National Energy Saving Programme 2011-2015 (Resolution No. 1882) set ambitious targets of reducing energy intensity of GDP by 29-32% by 2015 compared with 2010 and increasing the share of local energy resources in the fuel balance to 28% by 2015. Growth in both real GDP and energy demand was assumed, and a wide range of measures was envisioned to achieve these objectives. Energy intensity in 2012 was 0.21toe per USD1000 GDP PPP, which was 39% lower than in 2002, or the fifth lowest among Eastern Europe, Caucasus and Central Asia (EECCA) countries.

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Web: <https://kary.com.pl/contact-us/>

Email: energystorage2000@gmail.com

WhatsApp: 8613816583346

