Azerbaijan energy storage research and development

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Azerbaijan has yet to tap into its significant renewable energy and energy efficiency potential, but in 2021 the Parliament approved several laws to this end. Higher ambitions and greater efforts to produce renewable energy and improve energy efficiency will also help the country conserve natural gas and oil for exports while meeting GHG commitments.

Azerbaijan joined the UNFCCC as a non-Annex I country in 1995 and ratified the Paris Agreement in 2016. The government has outlined climate change mitigation actions in a number of sectors, including energy, and the Ministry of Ecology and Natural Resources is preparing both a national strategy for climate change and a national low-carbon strategy.

Because securing energy independence in the long term is central to Azerbaijan"s energy policy, it has recognised the value of diversifying its economy, increasing energy efficiency and supporting GHG emission mitigation programmes. It therefore supports the development of renewable energy sources with the objectives of:

Azerbaijan has significant untapped renewable energy potential, as it is a relatively sunny and windy country, and it also has sizeable hydro, biomass and geothermal resources. Although its energy policy focused until recently on developing the country"s significant oil and gas resources, it has been transitioning in the past few years: in early 2020, major contracts to build wind and solar power capacity were signed, and in May 2021 the Parliament approved a Law on the Use of Renewable Energy Resources in Electricity Production.

This new law will allow Azerbaijan to exploit its renewable energy potential by establishing a legal basis for project development and by introducing competitive bidding processes and support mechanisms for active consumers (i.e. prosumers). It also covers the development of other legislative documents, including a draft PPA and a connection agreement. In addition, rules on auctions and on applying net-metering and net-billing schemes have been drafted, and draft laws on electricity and gas supplies are currently under review.

As Azerbaijan is relatively sunny, it has excellent solar power potential. According to the Ministry of Energy, technical potential is around 23 000 MW. The country"s 2400 to 3200 sunshine hours annually compare well internationally, as does its solar intensity, estimated at 1500 to 2000kWh/m2. The best resources are in the central river valleys and the north and northwest.

Azerbaijan is relatively windy, especially along the Caspian Sea coast. According to the Ministry of Energy, the country has roughly 3000 MW of technical and 800MW of economic wind power potential. This economic potential could generate around 2.4TWh and conserve approximately 1Mt of conventional fuel, avoiding the corresponding CO2 emissions.

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The Azerbaijan Scientific-Research and Design Institute of Power Engineering, in co-operation with the Japanese company Tomen, determined that Absheron"s average annual windspeed is 7.9 to 8.1metres per second (m/sec). The country"s overall average windspeed of 6m/sec further confirms its economic and technical potential for wind power.

Although hydropower is Azerbaijan"s largest source of renewable energy today, its potential has not been fully exploited. According to the Ministry of Energy, the country"s technical potential for small hydro is 520 MW, which could generate up to 3.2TWh annually.

Azerbaijan"s Renewable Energy Agency under the Ministry of Energy (formerly SAARES) states that the country has up to 800MW of geothermal energy potential. Initial studies indicate that the 11geothermal zones available in Azerbaijan hold water of 30 to 100?C that can generate either electrical or heat energy, depending on the type of thermal water. According to the Azerbaijan National Academy of Sciences, water in the Guba region is 36 to 85?C, and up to 95?C in the Kura-Aras lowland.

Rapid growth in industry, agriculture and social services in Azerbaijan is creating new opportunities for electricity generation from biomass derived from combustible industrial waste, forestry and food processing waste, agricultural waste, and other biological substances. The Ministry of Energy estimates technical potential of 380 MW.

More than 2Mt of solid domestic and production wastes are disposed of annually at Azerbaijan"s waste treatment sites. Processing solid domestic and production wastes could help resolve challenges in heating public buildings in Baku and other large industrial cities.