Uzbekistan energy storage for grid stability

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Uzbekistan"s ambitious plans to secure energy independence and provide its industries and population with sustainable and reliable access to modern, clean, and affordable energy are attainable. To ensure success, policymakers and the utility should invest in strengthening the nation"s power grid to be reliant and resilient against the challenges of renewable energy integration.

Fortunately, there are technical and administrative solutions that the Government of Uzbekistan and the National Electric Grid of Uzbekistan (NEGU), the country"s transmission system operator (TSO), can implement to mitigate these potential issues and preserve the stability of the national power grid.

System steady-state calculations results show that many network facilities in 2026 will be on the edge of overloading due to a significant growth in load demand and the integration of renewable energy sources (RES). This can be avoided by increasing the rated transfer capacity of the overloaded transmission lines and adding parallel transformers at overloaded substations. It is also recommended to implement Special Integrity Protection Schemes (SIPS) to control the output of power at certain Hydro Power Plants (HPPs).

Every second, a power system goes through many disturbances and structural changes due to forced and planned outages, optimization actions, operation of control equipment, switching operations, and dispatcher interventions. Introducing new generating facilities in the already constantly changing environment requires system operators to re-engineer many processes to control the grid, including re-tuning the controls at power plants, checking the logic and accuracy of protection systems and SIPSs settings, and many others.

In Uzbekistan, NEGU should review the settings and operational logic of the existing emergency automatic load shedding scheme, as well as breaker failure protection settings, to reduce the short-circuit clearing times and increase the transfer capacity of the most important grid interfaces.

NEGU should also conduct a power balance study with hourly time resolution, stochastic analysis, and market studies. Larger volumes of renewable generation in the Uzbekistan power system will require NEGU to manage RES variability with great precision, and stochastic studies, as the cutting-edge approach, will enable it to do so.

The last, but perhaps the most important recommendation is to build capacity within all Central Asia"s system operators, including NEGU. All Central Asian countries have committed to considerable renewable energy goals and emission reduction targets. However, without the in-house capacity to manage grids with a large penetration of renewables and to model power systems and conduct studies using modern tools and emerging methodologies, their efforts to achieve these goals might fail against the highly variable and unpredictable nature of renewable generation.

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UAE-based renewable energy company Masdar has expanded the scale of an agreement with the government of Uzbekistan to develop battery energy storage systems (BESS).

A joint development agreement (JDA) was signed between the pair in May 2023 for 2GW of wind energy and 500MWh of battery storage, as reported by Energy-Storage.news at the time.

Under the terms of the latest update, the BESS development portfolio has been more than doubled to 1,150MWh. The systems would be deployed at five separate Masdar-developed large-scale renewable energy projects around the Central Asian Republic state: four solar PV plants and one wind plant.

The announcement made by Masdar on 28 December followed Uzbekistan"s president Shavkat Mirziyoyev"s attendance at a ceremony held the day before (pictured above) to connect 1.4GW of Masdar-developed solar PV and wind energy projects to the country"s grid.