MODERNIZATION AND ECONOMIC GROWTH

Central Asia is a region that stretches from the Caspian Sea in the west to China in the east, and from Afghanistan and Iran in the south to Russia in the north. The region consists of the republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan and counts a population of about 72 million people.

Since gaining independence from the Soviet Union in the early 1990s, the Central Asian republics have gradually been moving from a state-controlled economy to a market economy. All five countries are implementing structural reforms to improve competitiveness, modernizing the industrial sector and fostering the development of service industries through business-friendly fiscal policies and other measures.

In Tajikistan and Kyrgyzstan and, to a less extent, Uzbekistan, there are vast water resources that have been used for hydropower production since the early 20th century. Most of these power stations were constructed during the 1950s and 1960s and in recent years, modernization programs for large power stations were launched by the governments of these countries with the help of international development banks.

The countries of Tajikistan and Kyrgyzstan are participating in the "Central Asia-South Asia" power project (CASA-1000), a multibillion project that will allow for the

GENERAL FACTS

Population: **72 million**
Installed hydro capacity: **12,485 MW**
Hydropower under construction: **4,175 MW**
Technically feasible hydro generation potential per year: **632,567 GWh**

ANDRITZ Hydro:
Total installed / rehabilitated capacity: **3,710 MW**
Total installed / rehabilitated units: **25**
Location: **Almaty, Kazakhstan**
E-Mail: **contact-hydro.kz@andritz.com**
Location: **Dushanbe, Tajikistan**
E-Mail: **contact-hydro.tj@andritz.com**

Shardarinskaya, Syr-Darya River, Kazakhstan, 126 MW

intermittent export of 1,300 MW of surplus hydroelectricity from Kyrgyzstan and Tajikistan to Afghanistan (300 MW) and Pakistan (1,000 MW).

The "One Belt One Road" Initiative will further boost the economy of the Central Asian countries situated along the original Silk Road from China to East Europe. The initiative would create a cohesive economic area, increasing cultural exchanges and broadening trade by building both hard infrastructure, such as rail and road links, and soft infrastructure, such as trade agreements, as well as a common commercial legal structure with a court system to police the agreements.

KAZAKHSTAN

The economically dominant nation in Central Asia generates more than half of the region's GDP through its enormous oil and gas industry and vast mineral resources. Of its total installed generation capacity of 21,673 MW, only 10% is generated by hydropower (2,456 MW). Supply and distribution of electricity through Kazakhstan is problematic because most of the energy is produced far from demand centers and the bulk power grid is in significant need of modernization.

Although Kazakhstan has an estimated technically feasible annual hydropower potential of about 62,000 GWh, only 13% of this potential has been developed so far. To meet future demand and address ambitious targets to increase the share of renewables to about 50% by 2050, the country needs to increase investment in the sector. Measures regarding decentralized electricity, trading markets, and new

KAZAKHSTAN

Issyk 2, Issyk River, Kazakhstan, 5.26 MW

Issyk 1, Issyk River, Kazakhstan, 5.26 MW

tariffs are beginning to show results, but more energy market reforms are required.

TAJIKISTAN

Total installed capacity stands at some 6,000 MW of which hydropower is about 95%. From the impressive technical potential of more than 400 TWh, only 5% has been developed so far.

Tajikistan is pursuing efforts to harness its vast hydro resources to address electricity shortages in winter and ensure security of power supply in the long term. The government has now prioritized eight projects with a combined capacity of 6,045 MW, including the 3,600 MW Rogun hydro project, project, which is currently under construction.

The largest hydropower stations in operation are Nurek (3,000 MW), Baipaza (600 MW), Golovnaya (250 MW) and Qairokkum (126 MW), which are all part of big modernization programs financed by international financial institutions.

KYRGYZSTAN

As of the end of 2019, total installed capacity stands at 3,800 MW, of which hydropower is about 80% (11.5 TWh p.a., 10% of gross hydro potential). The government also launched a privatization program to develop the small and mini hydro sector projects up to 30 MW output.

The largest hydropower stations in the country are Toktogul (1,440 MW), currently under modernization, and Kurpskaya (800 MW). In addition, the government plans several new hydropower stations, i.e. Upper Naryn Cascade (237 MW), Kambarata 1 (1,860 MW) and the Kazarman Cascade (1,160 MW). For all these new facilities, international investors are presently being sought.

UZBEKISTAN

Total installed capacity stands at around 12,500 MW, of which hydropower contributes about 1,900 MW. Currently, there are 21 plants with a capacity of 10 MW or larger in operation, and 75% of the capacity is more than 40 years old. In May 2017, a new state-owned hydropower producer and developer, UzbekHydroEnergo, was formed and entrusted with implementing a five-year program for the development of the hydropower sector. The program envisages the construction of 42 new plants and the modernization of 32 operating plants. In addition, the importance of pump storage power plants is growing.

TURKMENISTAN

There are only three small hydro plants in operation, totaling 5 MW of capacity. It is estimated that about 57 MW of hydropower could be developed, mainly by retrofitting existing water infrastructure.

ANDRITZ HYDRO IN CENTRAL ASIA

ANDRITZ has been active in this region for more than a decade and has so far booked a number of contracts for large rehabilitation and service projects, as well for small hydro projects.

A representative office was established in 2017 in Almaty, Kazakhstan, as a regional hub to support better access to local markets and to explore the excellent business opportunities across the entire region.

To date, ANDRITZ has contracts completed or under execution for 10 hydropower stations with 25 units totalling 3,710 MW across the region. Besides projects such as Nurek in Tajikistan, Shardarinskaya, Moinak, Issyk 1 and 2 in Kazakhstan, orders for turbine governors for Rogun in Tajikistan and Gissarak in Uzbekistan, as well as the small hydro projects Kok Say and Konur Olon in Kyrgyzstan, highlight the competences of ANDRITZ in the region.

KYRGYSTAN

Surrounding area Kok Say 3.3 MW and Konur Olon 3.3. MW, Yssykköl, Kyrgystan

UZBEKISTAN

Kamolot, Chirchik Bozsu Canal, Uzbekistan, 8.8 MW

Additionally, 23 turbo generator units with a total capacity of 3,270 MVA have been supplied for gas-fired power plants in Kazakhstan, Uzbekistan and Turkmenistan.

Nurek, Tajikistan: In 2018, ANDRITZ received a contract for the rehabilitation and modernization of the entire electro-mechanical equipment for the largest hydropower plant in Central Asia, including inspection and repair of the penstocks. The scope of supply comprises comprehensive modernization of the existing nine generating units by supplying and installing new 380 MW Francis turbines and generators, new transformers, and electrical and mechanical auxiliary equipment. The capacity of the power generation station will be boosted by about 700 MW. The completion of the project is scheduled for 2028.

Shardarinskaya, Kazakhstan: In 2013, ANDRITZ replaced four Kaplan turbines with new runners, new generators, automation, and auxiliary systems. The power output was increased by about 20% – from 26 MW to 31.5 MW per unit. All units are in commercial operation.

Kamolot, Uzbekistan: In 2018, ANDRITZ received a contract for the complete electro-mechanical equipment for the Kamolot hydropower plant, using the significant hydropower potential of a wide network of irrigation canals. The scope of supply for ANDRITZ comprises four identical Bevel Gear Bulb turbines with a power output of 2.13 MW each, including auxiliary equipment and a package of controls, automation, and supervision works.

AUTHOR
Norbert Schwarz

With 3,420 MW, Nurek is the largest hydropower plant in Central Asia and has the second highest earth-filled dam in the world. It covers 70% of the national electricity demand.

TAJIKISTAN

Nurek, Vakhsh River, Tajikistan, 3,420 MW

Nurek, Vakhsh River, Tajikistan, 3,420 MW
Grand official ceremony for the start of the rehabilitation program