

BEYOND ROGUN: THE TAJIK HYDROPOWER SECTOR

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Tajikistan has some of the greatest hydropower potential of any country in the world, although this potential is largely untapped. Tajikistan has tapped only approximately three percent of its hydropower capacity, which is estimated to be 527 billion kilowatt-hours (kWh) annually.¹ The potential lies in the Amudarya watershed with the Vakhsh River as its most important tributary. The Tajikistan government seeks to exploit this natural resources not only to support its own domestic economy but also as a major export to its neighbors in Central and South Asia. The map below shows the enormous hydropower potential of Tajikistan.

Tajikistan currently generates approximately 16.5 billion kWh of electricity per year. Most of that is generated by the huge Nurek Dam. Nurek was constructed from 1961-1980 and at 300 meters is one of the tallest dams in the world. It contains nine generating units each with a capacity of 300MW for a total capacity of 2,700MW. The reservoir behind the dam covers a surface area of 98 square kilometers.²

Despite the Nurek Dam and its enormous potential for hydropower production, Tajikistan experiences frequent electricity outages, which are especially problematic during the cold winter months when reservoirs are low. Last winter, for instance, was the coldest winter in over 25 years in Tajikistan, and there were numerous catastrophic power outages. In some cases, towns and villages only received electricity for a few hours a day in the early morning and evening hours. Some villagers who lived only 30 minutes from the capital told reporters that they had not had any electricity in three months.³

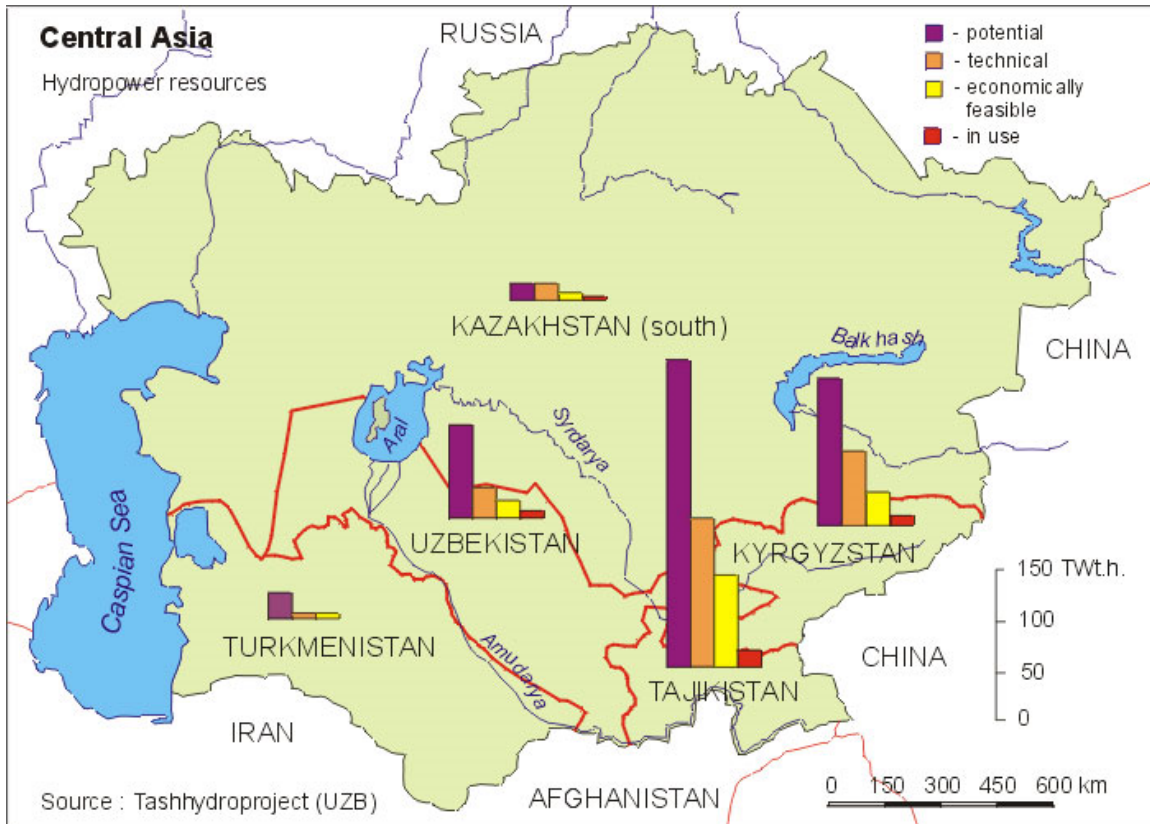
After a blackout in November 2009 caused by an accident on the Norak-Regar transmission line, Nozirjon Yodgori, spokesman for the state power company Barki Tojik announced, "For several days, Tajikistan's power system has been operating autonomously, out of the Central Asian power grid, and therefore the accident cause an electricity blackout practically across the whole country." Winter imports of electricity from Turkmenistan have been halted because of lack of an agreement on the use of Uzbekistan's power grid⁴.

¹ Moore, M. (2006, October 27). President: Tajikistan to complete giant hydropower project without foreign investment. *The America's Intelligence Wire*. Retrieved December 7, 2009 from http://www.accessmylibrary.com/coms2/summary_0286-22955169_ITM

² Nigel, Clive. (2007, June 29). Tajikistan: Glimpsing the power source. *EurasiaNet*. Retrieved December 13, 2009 from <http://www.eurasianet.org/departments/insight/articles/eav062907.shtml>

³ Trilling, David. (2009, March 13). Tajikistan: Rogun Dam a hot topic as Tajiks make it through another winter of shortages. *EurasiaNet*. Retrieved December 13, 2009 from <http://www.eurasianet.org/departments/insightb/articles/eav031309f.shtml>

⁴ "Central Asia's Electricity System Falls Apart". February 12, 2009. www.eurasiantransition.org



In Soviet times, Kyrgyzstan and Tajikistan supplied surplus hydroelectric power to the other Central Asian republics in the summer in exchange for supplies of natural gas and thermal-generated electricity in winter. After the Soviet breakup, the Central Asian Interconnected Power System was established as a means for continuing this cooperation in the electric power sector. However, lack of formal, long-term agreements and technical difficulties have forced the dissolution of the system. Turkmenistan withdrew in 2003. Kazakhstan withdrew in November 2009. It cited unbalanced operation of the Tajik power grid and the unauthorized flow of 100 million kW in October⁵.

Measuring Electricity

A kilowatt is equal to one thousand watts.

A megawatt (MW) is equal to one million watts.

Using 1,000 kilowatts for one hour is equal to one kilowatt hour (kWh).

The average annual electricity consumption of a US household is approximately 8,900 kWh.

Esso Sadullayev of Uzbekenergo criticized his country's partners who, "attempt to meet only their own selfish interest while not taking into account the negative effects they cause to others...a real threat to the stability and safe operation of Uzbekistan's power system." Uzbekistan has periodically cutoff gas supplies to Kyrgyzstan and Tajikistan because of unpaid bills. Uzbekistan is also at odds with its neighbors because it fears

⁵ "Central Asia's Electricity System Falls Apart". February 12, 2009. www.eurasiantransition.org

new hydropower developments upriver will eliminate water needed for irrigation within Uzbekistan⁶.

Uzbekistan and Kazakhstan have increased investment in their own power sectors to reduce reliance on imports from their neighbors. Uzbekistan plans \$3.5 billion of investments to increase its generating capacity by 2,700 MW. Kazakhstan recently commissioned a new transmission line to bring power from the coalfields in the north of the country to the population concentrated in the south. Financing for the transmission line came from the EBRD, World Bank and Kazakhstan Development Bank. Kyrgyzstan's good relations with Kazakhstan have kept electricity, coal and fuel oil flowing into Kyrgyzstan⁷.

Uzbekistan has gone further than serving its domestic market and has taken the lead in exporting electricity to the region's southern neighbor, Afghanistan. One transmission line from Uzbekistan to Afghanistan has already been completed with financing from the ADB. The line exports 1500MW to Afghanistan. An additional transmission line financed by the Islamic Development Bank and other supportive infrastructure funded by USAID is expected to open in 2010⁸.

Tajikistan is now struggling to increase investment in its power sector to satisfy its own domestic demand and capture the regional export market. China is financing a north-south 500 kV transmission line from Khodjent to Regar in Tajikistan. The line will allow power generated in the south to be delivered to the north and will allow the transit of Kyrgyz and Kazakh power through Tajikistan to Afghanistan and Pakistan. Rehabilitation of the Nurek 3,000MW plant with ADB financing is due in 2013⁹.

The 670 MW Sangtuda 1 hydropower plant was commissioned in July 2009. Construction began on the Sangtuda-1 power plant in the 1980s. Construction was halted in the mid-1990s, however, due to lack of funds. The Russian government provided about half of the financing for Sangtuda-1, and four units went into operation in 2008 and 2009. The power plant was officially commissioned in July 2009, projecting that when the reservoir is completely filled the plant will provide approximately 12 percent of Tajikistan's electricity output.¹⁰ However, just four months after the plant was commissioned, administrators of the Sangtuda-1 plant announced that beginning in December 2009, due to business issues, only one unit would be operational and

⁶ "Central Asia's Electricity System Falls Apart". February 12, 2009. www.eurasiantransition.org

⁷ "Central Asia's Electricity System Falls Apart". February 12, 2009. www.eurasiantransition.org

⁸ CAREC Institute. "Energy Sector Progress Report". November 2008-October 2009. <http://www.carecinstitute.org/index.php?page=energy>

⁹ CAREC Institute. "Energy Sector Progress Report". November 2008-October 2009. <http://www.carecinstitute.org/index.php?page=energy>

¹⁰ Radio Free Europe Radio Liberty. (2009, July 31). *Russian, Tajik presidents unveil joint-venture power plant*. Retrieved December 13, 2009 from http://www.rferl.org/content/Russian_Tajik_Presidents_Unveil_Joint_Venture_Power_Plant/1789915.html

electricity output would be reduced to 2.7 million kWh per day.¹¹ The plant is operated by RAO-UES, Russia's state-controlled energy agency, and Russia owns a 75 percent share in the plant.

Tajikistan and Iran signed an agreement for Iran to build the \$260 million Sangtuda 2 power plant on the Vaksh River. The Iranian government provided the majority of the financing. Construction of Sangtuda-2 initially began in 2006, and in November 2009 the Iranian Ambassador announced that construction is 55 percent complete. The 220MW plant was initially scheduled to be completed in 2012, but Tajik authorities wanted it to become operational sooner than that; it is expected to be operational in 2010.¹²

Rogun Dam

Tajikistan's hydropower industry has recently been thrust into the spotlight by the excitement and controversy over the Rogun Dam. Construction on the Rogun Dam began back in 1976, and continued in starts and stops for the past 30 years. In 2004, the Tajik government formed a partnership with Russia's Rusal to complete the project. However, despite Rusal's \$2 billion commitment to the project, the government of Tajikistan announced in 2007 that they had cancelled their contract with Rusal. Tajikistan and Russia disagreed on multiple regional considerations, as well as components of the dam's design, notably the appropriate height. Russia had argued that the dam should be shorter than originally planned, due to seismic activity in the region, but Tajikistan insisted that the dam should reach a height of 1,099 feet (335 meters), exceeding even the massive Nurek Dam. Since the cancellation of the contract, Tajikistan's government has been struggling to find investors to complete financing for the \$3.2 billion project. Meanwhile, it has pressed ahead with the project through the joint stock company Nirugohi Barqi Obi (NBO) Rogun.

In June 2009, authorities began the mandatory resettlement of families living in the flood zone. Similar action by the government was a factor in the eruption of civil war in the 1990s, and some commentators fear that continued resettlement, and inadequate support for resettled individuals, could inflame further conflict in the region.¹³ More recently, at the beginning of December 2009, the Tajik government ordered that every family in Tajikistan would be required to pay \$690 to finance the completion of Rogun Dam, a controversial move in this impoverished nation.¹⁴

¹¹ Naumova, Victoria. (2009, December 1). Sangtuda-1 HPP administration announces reduction in electricity generation. *Asia Plus*. Retrieved December 14, 2009 from http://tajikwater.net/docs/091201_AsiaPlus.htm

¹² Hasasnova, Mavjouda. (2009, November 18). Some 55 percent of construction and assembling operations at Sangtuda-2 site completed, says Iranian ambassador. *Asia Plus*. Retrieved December 14, 2009 from http://tajikwater.net/docs/091119_AsiaPlus55.htm

¹³ Sodiqov, Alexander. (2009, June 3). *Resettlement for the Rogun Dam reservoir begins in Tajikistan*. Central Asia-Caucasus Institute. Retrieved December 13, 2009 from <http://www.cacianalyst.org/?q=node/5124/print>

¹⁴ Midwest AGNet. (2009, December 2). *Impoverished Tajiks told to give money for dam*. Retrieved December 14, 2009 from <http://www.midwestagnet.com/global/story.asp?s=11607284>

Shares in the project went on sale January 6, 2010 and the Ministry of Finance boasted that more than \$90 million in shares was sold on opening day. The government hopes to raise at least \$1.4 billion of the \$3.0 billion required for the project. President Rahmon has personally pleaded for the wider public to support the project:

“It is necessary that writers, scientists and the intelligentsia as a whole, experienced elderly people, brave youth, clever and wise men, generous women and mothers of our motherland, political parties, public associations, and religious workers be active in inviting people to this goodwill action, and should set an example to others by making their contribution.”

There have been numerous reports of coercion and forced purchases of sales. Some employees claim their employers are buying shares on their behalf, in some cases using half of their wages. The average Tajik salary is only \$60 per month. Citizens are also suspicious after their experience with shares in the Sangtuda 1 project. In 1996, the government sold shares in the project to its citizens only to later give 75 percent of the project to Russia without consulting shareholders. This time, President Rahmon says the shares come with a state guarantee.

Uzbekistan, for one, has expressed concern that Rogun will result in water shortages downstream. Uzbekistan’s fears about water shortages were part of the conflict that led to the cancellation of the Russian Rogun Dam contract, and they also contributed to the collapse of Tajikistan’s alliance with SinoHydro, a Chinese company that was planning to invest in another hydropower station. Water-use issues are an ongoing point of contention in the region, and will likely influence future projects as well.

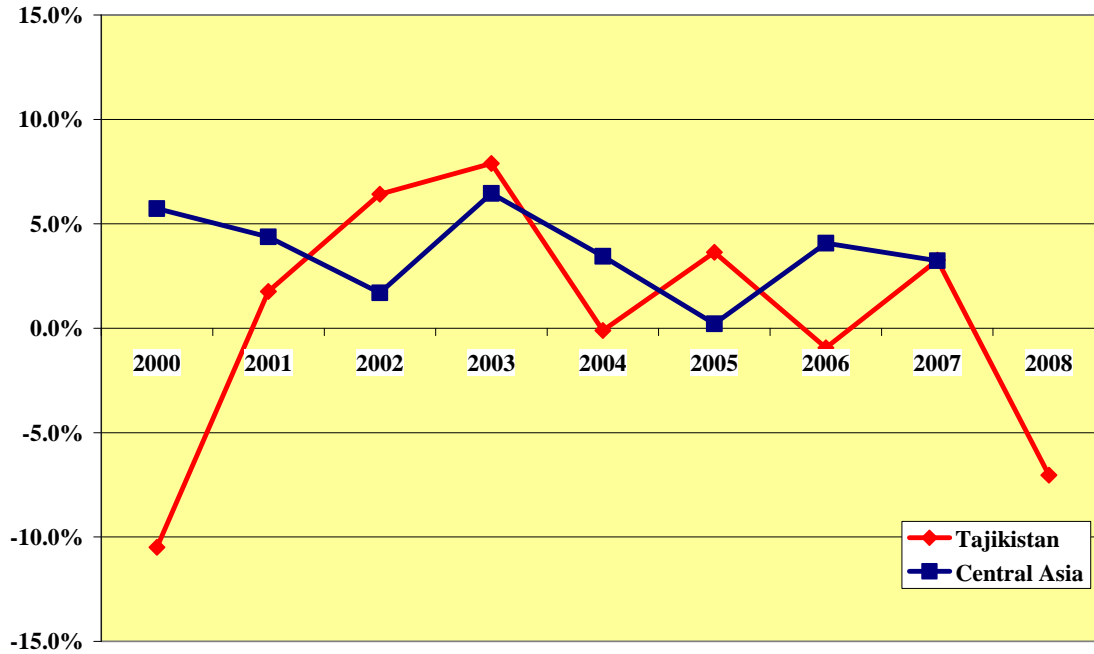
If Tajikistan can improve the management of its power system, settle its differences with its neighbors and increase its generating capacity, it stands to benefit tremendously from exporting electricity to its southern neighbors in South Asia. Afghanistan, Kyrgyzstan, Pakistan and Tajikistan have agreed to form the Central Asia South Asia Regional Electricity Market (CASAREM). The group’s main project is the CASA 1000 transmission project which aims to transmit 1,300MW of electricity from Kyrgyzstan and Tajikistan to Afghanistan (300MW) and Pakistan (1,000MW). This requires the construction of a 750km transmission system between Tajikistan and Pakistan through Afghanistan and another connection between Kyrgyzstan and Tajikistan¹⁵.

Afghanistan and Tajikistan signed a 20-year Power Purchase Agreement in September 2008 for exports of up to 500 GWh per year to Afghanistan. The 220kV, 274km transmission line financed by the ADB is due to be completed in 2010. The Korean company KPI is constructing a 500kV substation at Datka in Kyrgyzstan to support the export of power from Kambarata 1 and 2 hydropower plants through Tajikistan to South Asia. Construction of the 240MW Kambarata 2 hydro plant is expected to be finished in

¹⁵ CAREC Institute. “Energy Sector Progress Report”. April 24-25, 2008.
<http://www.carecinstitute.org/index.php?page=energy>

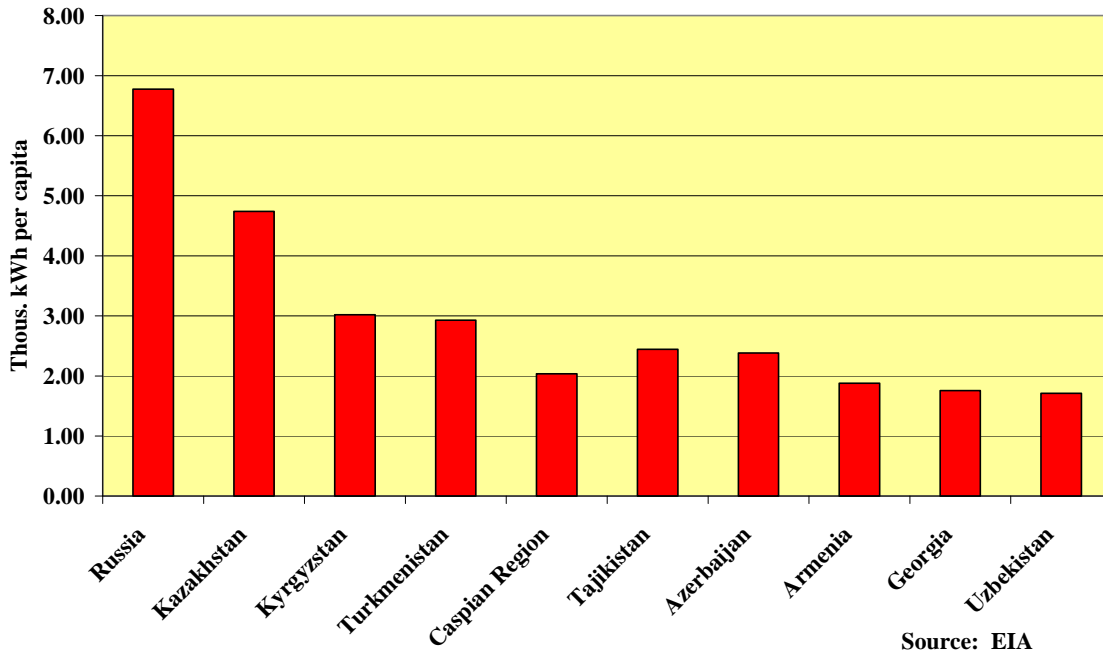
early 2010 for the first unit. Russian company RAO-UES, JSC Power Plants and Kazakh company Kazkumat are funding the pre-feasibility work for the Kambarata 1 1,900MW hydro plant¹⁶.

Growth in Net Electricity Generation

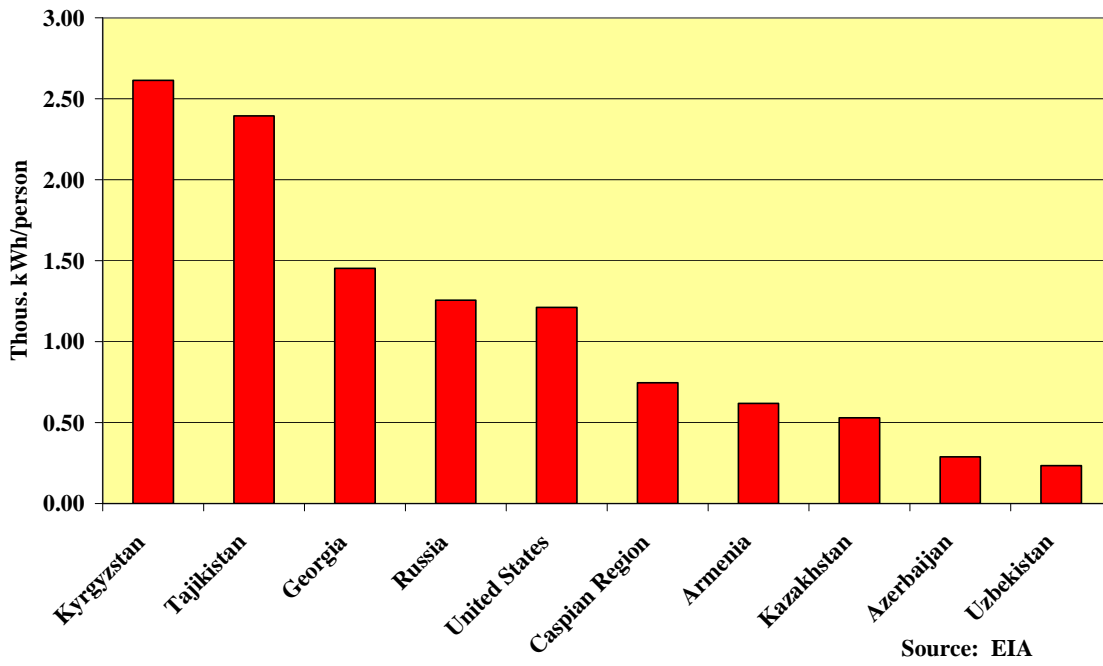


¹⁶ CAREC Institute. "Energy Sector Progress Report". November 2008-October 2009.
<http://www.carecinstitute.org/index.php?page=energy>

Per Capita Electricity Generation



Per Capita Renewable Electricity Generation



Total Electricity Net Imports

