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CENTRAL ASIAN SECURITY AND WATER/ ENERGY RELATIONS BETWEEN UZBEKISTAN AND TAJIKISTAN

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Currently, Uzbekistan is the largest electricity producer among the Central Asian republics and a net exporter of electricity. The country has a total installed generation capacity of 12,300 MW. Uzbekistan achieved self-sufficiency in energy after gaining independence in 1991. Today, about 50% of power generating facilities of the Central Asia Integrated Power Grid is located in Uzbekistan. This power grid also incorporates the power systems of Turkmenistan, Tajikistan, Kyrgyzstan and southern Kazakhstan.

However, maintenance of Uzbekistan's power systems has deteriorated over the past years. Much of the equipment in generation, transmission and distribution systems is outdated and inefficient. At present it needs serious renovation and upgrading to meet the growing demand of the economy. The facilities require rehabilitation by introducing more efficient and environment friendly equipment, so that they can operate at their design capacities.

The Tajikistan Energy System's installed capacity is 4,354.5 MW. The annual average power generation of the hydropower plants is 15-17,000 GWh. The Nurek hydropower plant of 3,000 MW installed capacity is the biggest in Central Asia. It has the seasonal-storage reservoir of 10.5 billion m³, and it regulates the Vakhsh flow for the irrigation needs in the Amu Darya basin countries. The Nurek hydro structure operates in the irrigation regime at the beginning and in the middle of the growing season (June - July) to meet the interests of the Republic of Kazakhstan and Uzbekistan, which results in significant direct winter electricity losses for Tajikistan.

Therefore, Tajikistan has to buy power in Uzbekistan, Turkmenistan and Kyrgyzstan, and pay for it hard currency. The power system of Tajikistan experiences shortages in winter and surpluses in summer within the range of 1 to 1.5 kWh. The Soviet period electricity transfer system was destroyed. During the Soviet period, the republics sharing the Amu Darya were also involved in water-energy transfers directed from Moscow. Tajikistan received Turkmen and Uzbek gas in return for electricity produced to power irrigation pumps in summer. Tajikistan also received electricity from Uzbekistan during winter. After the Soviet collapse, bilateral trade replaced this arrangement. Tajikistan, for instance, unable to cover domestic energy demand through hydropower production, continues to import Uzbek electricity and gas. The latter is used in Tajikistan's thermal power plants. The UNDP (2005) notes that given the diverse national interests, the post-independence years have seen a serious weakening of the longstanding Soviet water and energy exchange arrangement among the republics. Kyrgyzstan and Tajikistan, the upstream countries along the two main rivers of the region—the Amu Darya and the Syr Darya—prefer to maximize the use of the water for generating electricity for export and to meet domestic energy demand, especially in the winter. The downstream countries, Kazakhstan, Turkmenistan and Uzbekistan, prefer to have maximum access to water for irrigation during the summer months, while also avoiding the floods caused by winter water releases. To cope with these interrelationships in regional trade, the Central Asian governments have resorted to bilateral and multilateral agreements that determine the quantities of water and energy (coal, electricity, and gas) that are exchanged between the countries and the values at which they are exchanged. The ADB report (2002) notes that pricing is the key to providing incentives for power trade. Regional approaches to the water-energy nexus in Central Asia would bring large benefits in terms of more efficient management of these scarce resources, a greater potential for exports of electricity, more reliable availability for communities and a reduction in the potential for conflict. However, such regional solutions would require compromises involving each

country's interests and principles, and a fundamental trust that agreements once entered would actually be implemented.

In 2008 Uzbekistan generated 50.1 billion kW/h of electric power, which was 2.3% more compared with 2007.ⁱ Uzbekistan decreased electricity production by 1.8% in the first 6 months of 2009 to 25.2 billion kilowatt-hours.ⁱⁱ Renovation of the energy sector is a priority for the government of Uzbekistan. The growing demand for electricity and the wear and tear of the existing power generating facilities in the country has motivated the government to develop a long term program for the reconstruction and development of the sector during 2001-2010. In December 2001, the Government of Uzbekistan approved a Generating Capacity Development and Rehabilitation Programme for the Energy Sector until 2010 envisaging an increase in the installed capacity of national power stations by 15% by 2010, which requires investments to the tune of \$1 billion.

Exports of electricity from Uzbekistan reached \$16.9 million in 2005. Electricity mainly exported to the neighboring countries (Tajikistan and Kyrgyzstan during winter period) and Afghanistan. Tajikistan imports around 600 million kWt/h of electric power and 700 million cubic meters of natural gas from Uzbekistan during winter season and exports around 900 million kWt/h during the summer period. Natural gas is supplied to Tajikistan from January 1, 2007 at \$100 per 1,000 cubic meters.ⁱⁱⁱ According to the State Statistics Committee of Tajikistan, the import of electric power made up 4.6 billion kWt/h in the first 11 months of 2006. This cost the country US\$63.1 million. The export of electric power (Tajikistan currently exports its electric power to Afghanistan only) made up 4.02 billion kWt/h (US\$46.8 million).

Bilateral trade is not without its problems, though. Uzbekistan has several times cut gas supplies to Tajikistan due to the latter's inability to pay in cash, and Uzbek gas supplies are often unreliable due to low pipeline pressure. Only at the beginning of 2007, did Tajikistan and Uzbekistan at last resolve the issue of Uzbekistan's debt of 5 million dollars to the Barq-I Tojik [Tajik electricity] energy company. Tajikistan obtained an opportunity to import and export the necessary volume of electricity via Uzbek power grids in exchange for the debt.^{iv}

The World Bank (2004a and 2004b) and the International Crisis Group (2002) note that the Amu Darya shares a number of features with the Syr Darya, notably its trans-boundary nature and its division into upstream hydropower use and downstream irrigation use. One major difference between the two is the extent to which they can be regulated. While up to 70 per cent of the annual flow on the Syr Darya can be stored, the equivalent figure for Amu Darya is merely 30 per cent. This lack of storage capacity reduces the Amu Darya's potential for the kind of upstream/downstream dispute over hydropower and irrigation that characterizes the use of the Syr Darya.

However, there are other, potential and developing sources of actual or potential conflicts involving the waters of the Amu Darya. For instance, Tajikistan's plans for expanding upstream hydropower capacity by completing a number of dams unfinished from Soviet days have roused concern in Uzbekistan.

In an attempt to reduce its energy dependence on Uzbekistan, Tajikistan is currently contemplating how it can exploit its huge hydropower potential—only 10 per cent of which has been developed. Tajikistan is actively pursuing the completion of two hydropower schemes initiated during the Soviet period. According to the former minister of energy of Tajikistan Nurmakhmatov, capital investments to the tune of \$2 billion into the Rogun and Sangruda in the course of 5-7 years, the country may generate electricity for exports minimum 10 billion kWt/h a year. When these stations become operational power generation in Tajikistan will reach 31-33

billion kWt/h a year. It is estimated that domestic demand for electricity in Tajikistan will reach about 23-25 billion kWt/h a year in 5-7 years.

Sangtuda I+II, involves two run-of-river schemes (670 MW and 220 MW) at the incremental cost of \$560 million. These could produce electricity at the low cost of 0.0197 \$/kWh.^v The Chinese Ambassador in Tajikistan recently confirmed that the project to construct a Zeravshan hydropower station (block I of Sangtuda) is under consideration in China.^{vi} Tajikistan intends to construct this station within 36 months with the assistance of a soft loan from China to the tune of \$269 million (with maturity of 25 years and interest rate of 1%). Uzbekistan strongly opposes this project as this may jeopardize irrigation water flow and the future of agriculture in Bukhara, Samarkand and Navoi provinces of Uzbekistan and point to other projects in Tajikistan such as Dashtidjumskiy, Kokchinskiy, and Djumarskiy as more acceptable and expedient. Uzbekistan also considers this project as violation of international agreements on the use of trans-border water objects and proposes the creation of an authorized committee to evaluate the potential damage with the right to veto projects in the power sector.^{vii} The Uzbek authorities have used punitive measures to express their displeasure with existing Tajik policies, as well as future plans. For example, Uzbekistan has disrupted the delivery of Kyrgyz electricity to one of Tajikistan's major industrial concerns, the Tajik Aluminum Plant, located in the southwestern city of Tursunzade. The fact that, Tajikistan and Uzbekistan have had a contentious relationship for years, driven in large measure by perceptions in Tashkent that Tajik President Imomali Rahmonov's administration was not strong enough to deal adequately with Islamic radicalism, which emerged as a regional threat in the late 1990s, doesn't help in finding solutions to problems of cooperation between the two countries in power sector.^{viii} The Tajik government argues that construction of this power station will not affect water supply in Uzbekistan. This project may receive Iranian and Russian financial support. However, considering Tajikistan's limited financial capacity and the uncertain market outlook for incremental electricity capacity in the country and beyond, the prospects for mobilizing the required funding remains uncertain.

The other project, Rogun I+II is a 3,600 MW storage scheme at an incremental cost of \$2,455 million that could start producing electricity in 2014. Rogun I+II is even more controversial than Sangtuda I+II, basically because it enables Tajikistan to control the flow of water to Uzbekistan's Surkhandarya and Kashkadarya provinces, while potentially expanding irrigation at home. Uzbekistan is strongly opposed to the completion of Rogun I+II as well. The project has a favorable economic cost of 0.0283 \$/kWh, but if pursued it could create upstream/downstream irrigation/hydropower conflict. On April 26, Tajik officials announced the collapse of a \$1-billion deal, under which the Russian aluminum concern OAO Rusal was supposed to construct a hydropower plant, known as the Rogun Dam. Rusal is also embroiled in a dispute with Tajik officials over efforts to modernize the same aluminum plant in Tursunzade. Tajik authorities suspect that Uzbek political pressure prompted Rusal to scale back plans for Rogun construction and aluminum plant modernization at Tursunzade.^{ix} Some other "outcomes" of this tension between the two countries are difficulties in obtaining visas to visit both countries for travelers from both countries and the blockade of railway passages.

Tajikistan's growing energy needs require these investments. Otherwise, the country faces power collapse and this shouldn't be ignored by the neighbors. In this light, increased intra-regional trade could provide significant benefits by allowing individual countries to meet future demand at a lower cost than if they were to rely solely on their domestic resources. For example, Kazakhstan and Uzbekistan could both benefit from importing hydroelectricity from existing hydropower stations in Kyrgyzstan and Tajikistan during the summer, rather than generating power in their own thermal power stations. The exploitation of differences in the marginal cost of production across countries and seasons, however, requires a much greater level of transparency in the electricity sectors of the various countries.

Central Asia has considerable electricity export potential. Possible markets such as Pakistan and Iran have the added attraction of experiencing their peak demand in the summer, when the largest electricity surpluses exist in Central Asia. Access to these markets will particularly benefit Kyrgyzstan and Tajikistan, since they could develop the capacity to export significant quantities of electricity. Uzbekistan and to some extent Kazakhstan could export thermal power in the winter, and also serve as transit countries and power traders. According to World Bank (2004a), the Central Asian Republics will need to get an intra-regional agreement on electricity transit in place for having access to export markets including Pakistan, Iran and some other countries. Major new power generation projects in Central Asia will only be feasible if there is assured access to export markets outside the region. Western investors currently view the new generation projects as high-risk ventures. Pakistan and Iran have the added attraction of experiencing their peak demand in the summer when the largest potential electricity surpluses exist in Central Asia. Once agreements are in place they will then have to be carefully managed to ensure the benefits from intra-regional trade are optimized. Access to these markets like Afghanistan, Pakistan, Iran, China and Russia will particularly benefit the Kyrgyz Republic and Tajikistan since they are the countries with the potential to export significant quantities of electricity. Uzbekistan (and to some extent Kazakhstan), have the potential to export thermal power in the winter and also benefit in their role as prospective transit countries and as potential power traders.

In order to promote regional cooperation in the power sector the ADB allocated a loan for a Regional Power Transmission Modernization project. In doing so ADB was aware of the fact that a prime obstacle to energy trade is that governments in the region have had self-sufficiency as a policy goal. The effect is that some republics are generating electricity using high-value fossil fuels rather than importing electricity from neighboring countries with surplus electricity generated from renewable, lower-cost resources. There has also been a tendency in some countries to limit access to their transmission lines to countries wishing to trade with third countries.

The ADB (2002) points out that a distorted system of energy prices is a significant barrier for greater regional cooperation between Uzbekistan and Tajikistan. Primary energy sources for thermal power generation are frequently and grossly undervalued (e.g., in Uzbekistan the gas price for power generation is about one fifth of the export or border price). Also, there is no value attributed to water regulation for irrigation. For power trade to work it is necessary for both buyer and seller to receive an economic advantage. This is possible only in an environment of undistorted prices of electricity and primary fuels for power generation. Hydropower plants are able to quickly increase or decrease output compared to thermal plants, which allows them to be used to follow changes in demand. Hydropower plants are also able to restart or blackstart the whole power system in the event of a system-wide collapse. Finally, as power tariffs are below long-run marginal costs, power utilities cannot create the revenues that are required to sustain power system operation, let alone trade.

As noted above, currently, exchange of power is governed by agreements under which government officials of the various countries decide in regular meetings on the quantities to be imported and exported within a given time period. This exchange of power is often linked to the exchange of fossil fuels and water allocations for irrigation. The ADB (2002) suggests that an electricity market to work it will be essential to decouple the electricity trade from water and the trade in fuels. Barter and political allocation of commodities need to be transformed into traded energy and traded feedstocks (such as coal and gas) with separate markets for each. Water allocation must be on a fair and equitable basis and costs of water storage and regulation must be adequately compensated.

With this in mind the ADB made signing of power trade agreement between Uzbekistan and Tajikistan as a condition precedent for loan disbursement. According to this agreement power trade between Uzbekistan and Tajikistan should have been direct between legal entities on both sides and based on market prices for power. The agreement envisaged voluntary cross-border trade on the basis of genuinely independent electricity utilities that are managed according to economic principles, with no political interference. Barter trade would decline over the transition period. This ADB project would provide three key building blocks: rehabilitation of substations, augmentation of the control systems, and enhanced metering. The other key elements of the project were legal/regulatory compatibility, transmission ownership, open access transmission, more comprehensive sales contracts, transmission pricing, voluntary trading, a grid code, a metering code, ancillary services pricing, and hard currency contracts and settlement. The trading envisaged would have been a mixture of long- and short term contracts between the respective utilities on the basis of mutual economic advantage. In other words, the power relations between the legal entities of both countries would have taken place in a regulated market and should have lead to more efficient and fair allocation of resources. Uzbekistan's and Tajikistan's energy companies even signed the agreement, which was supposed to be approved by the governments of both countries. However, this agreement was not approved and the loan was cancelled.

The main reasons for not signing the power trade agreement and abandoning this loan which would definitely contribute to regional cooperation between Uzbekistan and Tajikistan in power sector were the following:

- The financial framework didn't not exist that would allow an efficient settlement of transactions in those cases where they are not barter-based and are dollarized.
- Potential problems of currency convertibility and absence of bank guarantees easily available, if at all, for such transactions.
- Potential nonpayment across borders.
- The desire to preserve energy security on both sides.

It is regretful that such a project so useful for regional cooperation was not realized. Given that peak electricity usage is time sensitive and the major population centers of the region are spread over different time zones, economizing on peak generation capacity alone would provide a strong rationale for energy trade. Trading also would allow substantial economizing on reserve capacity. Lower overall generation costs would result from increased trade. Since there are huge hydropower resources available in Tajikistan, while Uzbekistan has significant reserves of fossil fuels, these two would complement each other to achieve least-cost generation. Also, by working as one large integrated system, operating costs could have been reduced as a consequence of reduced individual spinning reserve requirements, the joint provision of and exchange of ancillary services, the possibility to support and better supply loads at the periphery of an individual system, and generally an increased service quality and reliability standards of power supply. The feasibility study of the ADB consultants estimated that if the project were to begin in 2002/2003, these benefits would be in the order of \$25–30 million per year by 2011, assuming that power would be supplied from the low-cost generation (hydropower) countries to the other countries. Reduced capacity requirements result, since reserve capacities can be used jointly and thus the total installed reserve capacity can be lower. Pooling of reserve capacities makes it possible to reduce future expansion of power system generation and reduce total capital required for new power stations. Moreover, for future expansion planning it would have been possible to coordinate power system expansion planning and take advantage of economies of scale through the installation of large generation units that would not be viable in the individual systems. Finally, lower capacity requirements could have also result from the fact that peak load hours

slightly differ amongst the Central Asian countries. It is thus possible to improve the overall system load factor and equalize the daily load curve. ADB consultants estimated that with trade, 900 MW of additional capacity could be avoided, the fixed cost savings of which would be about \$40 million per year. Both Tajikistan and Uzbekistan would enjoy a share of the above benefits. In the short term the benefits of enhanced trade were estimated on the basis that agreement is reached for Uzbekistan to import the surplus summer energy available from the Nurek power station in Tajikistan, on average 1,000 GWh per year as envisaged in the bilateral Power Trade Relations Agreement. Instead of spilling and wasting this water, as at present, the net economic benefit that could have been shared by both countries was estimated at \$12 million based on 1.2 c/kWh. The benefit is calculated as avoided generation costs (fuel and variable cost) to Uzbekistan of 1.9 c/kWh less transmission cost of 0.5 c/kWh and the negligible Tajik generation cost of 0.2 c/kWh. The share of the benefit would have been based on the price agreed. The upper bound price that Uzbekistan could pay is 1.65 c/kWh and the lower bound price that Tajikistan could accept is 0.45 c/kWh, assuming transmission costs are equally shared. This gives a clear demonstration of the potential benefits of trade and would, if included in the foregoing viability analysis, significantly enhance returns. However, since there is no direct trade now, each country has to provide its own reserve capacity, the sum of which is much higher than the reserve capacity of an integrated system. Thus no direct trade option was attained at a very high cost.

The present power trade situation is characterized by barter deals and technical dispatch. It is not based on economic considerations. Southern Kazakhstan imports power from Turkmenistan (wheeled through Uzbekistan) and the Kyrgyz Republic receives power from north Kazakhstan as well. The Kyrgyz Republic imports power from Uzbekistan and Tajikistan and exports power to Kazakhstan, Uzbekistan, and Tajikistan (at different times of the year). Tajikistan imports power from the Kyrgyz Republic, Turkmenistan, and Uzbekistan and exports power to the Kyrgyz Republic and Uzbekistan. Turkmenistan exports power mainly to Tajikistan but also small amounts to Kazakhstan and Uzbekistan. The energy trade picture is further complicated by exports and imports of gas for power production and by the inclusion of water for irrigation in the present exchange agreements.

In sum, both Uzbekistan's and Tajikistan's losses from non cooperation in the power sector are huge. Multilateral agencies have been trying to engage both countries in cooperation in this sector for many years without significant success. The relations between the countries were aggravated by past disagreements on other issues that provoked mutual distrust. One possible solution to this dilemma is to engage third parties to act as independent negotiating brokers. Since Russia is already a significant player in the energy sector of both countries, this role could potentially be fulfilled by Russia, if Russia can prove their independence and objectivity to both sides. It is also in the interests of Russia because this will allow them to preserve their influence in both countries in a situation when both countries are looking for additional geopolitical partners.

V Conclusion

The UNDP (2005) argues that developing a consensus and implementing follow-up action for regional cooperation and integration cannot happen overnight. In view of the many obstacles of history, current politics and institutional weaknesses, and bearing in mind the slow progress with similar efforts elsewhere in the world, one must realistically expect that serious progress with regional cooperation and integration will take years, and even decades.

The efforts to improve regional cooperation in Central Asia in the area of trade should focus on improving trade regimes in the countries in coordination with the WTO entry process, developing market economy and democratic institutions, harmonization of trade and customs policies, removing significant trade barriers such as taxes on imports that are not levied on domestically produced goods or that have higher rates for imported than domestically produced goods, foreign currency conversion problems, export bans on some products, and crack downs on shuttle traders.

In the power sector between Uzbekistan and Tajikistan there is a need for strong negotiator/broker to mediate the negotiation process inductive to greater cooperation in this important sector. Russia might be suitable for this role provided they prove to be fair to both sides. Cooperation between Uzbekistan and Tajikistan could bring sizeable gains for both countries but this also means that the governments should curtail energy self-sufficiency as a policy goal, tackle a distorted system of energy prices, and deal with potential nonpayment problems across borders.

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ⁱⁱⁱ According to RIA Novosty, December 28, 2006

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^v World Bank (2004)

^{vi} IA Regnum, June 6, 2007

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^{ix} “Russia’s Central Asia Energy Strategy Experiences a Few Setbacks” Posted May 11, 2007 at <http://www.eurasianet.org>