



## **Kyrgyzstan: Power Generation and Transmission Sectors Overview**

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### **SUMMARY**

This report describes the power sector of the Kyrgyz Republic, including the infrastructure, potential developments and export possibilities. It also describes the government initiatives in the sector and outlines opportunities for US companies and provides valuable contacts.

### **POWER SECTOR OVERVIEW**

#### **Infrastructure**

Kyrgyzstan's power generation sector is 90% hydroelectric. Nevertheless only 10% of its potential has been developed. The total number of consumers is estimated at 1.08 million people where 95 % of them are residential consumers.

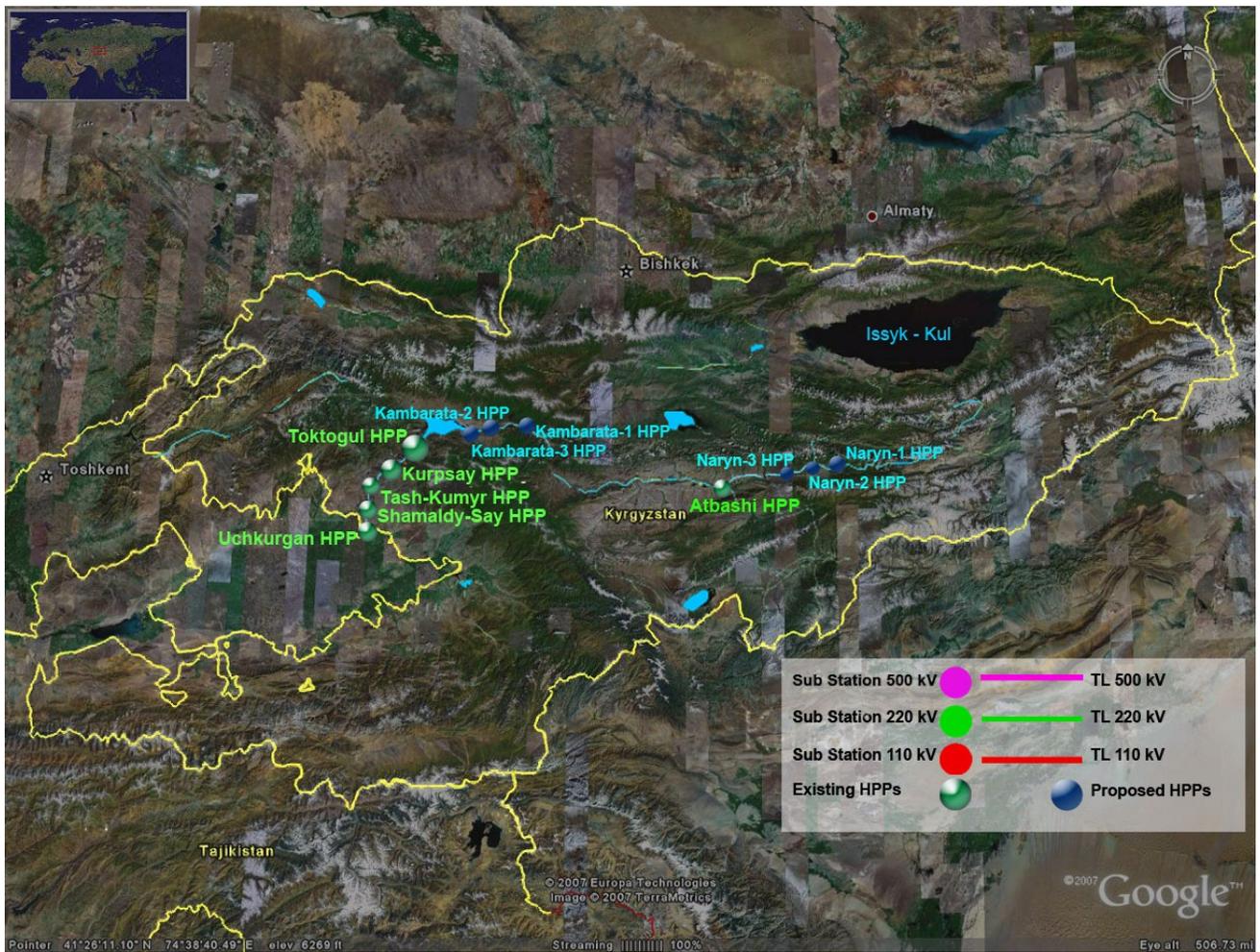
Kyrgyzstan has 18 power plants: 16 Hydroelectric and 2 thermal power plants. Total installed capacity is 3,713 MW, of which 2,950 MW (79.5%) is hydroelectric and 763MW (20.5%) is thermal. Hydropower units of the Totktogul reservoir and those in the downstream Naryn cascade account for 97% of the hydro capacity and 78% of the total installed power generation capacity in the country. They also account for over 90% of some 13 to 15 billion kW/h per year of the total electricity production in the country. The remaining 2 thermal power plants, fueled by gas, fuel oil and coal, generate only 1.1 to 1.2 billion kW/h per year, though their projected production capacity was 4.1 billion kW/h.

Electricity grid of Kyrgyzstan combines more than 10,000 km of power transmission lines of 35kV or greater and over 58,000 km of 0.4-10kV lines. There are over 500 working substations of 35-500kV capacity.

All 16 of existing Hydro Power Plants (HPPs) are heritage from the Soviet times. They are in poor condition and in need of repair because of lack of maintenance in previous years. Around \$180 million may be required for these upgrades. In 2007 the Government of the Kyrgyz Republic has allocation around \$13 million for rehabilitation of both thermal and hydro power plants. This is by 10% more than in previous years. The description and location of main hydro power plants is depicted below:

	Existing HPPs	Capacity (MW)	Guaranteed Capacity (MW)	Average Annual Electricity Production (Millions KWh per year)
1	Toktogul	1200	260	4,400
2	Kurpsay	800	164	2,630
3	Tash-Kumyr	450	150	1,555
4	Shamaldy-Say	240	80	900
5	Uch-Kurgan	180	45	820
6	At-Bashy	40	12	160
	<b>Total</b>	2910	711	10,465
	<b>Hydro Potential</b>			163,000

**Table 1. Existing Hydro Power Plants (HPPs)**



**Figure 1. Existing and Proposed HPPs**

### **Production, Demand and Export Potential:**

Based on previous years Kyrgyzstan has produced about 12.9 billion kWh per year – of which more than 90% was hydroelectric. Around 15.6% of the total generation was exported mainly to Uzbekistan and south Kazakhstan in terms of the annual Inter-Governmental Irrigation Agreements (IGIAs) relating to Toktogul reservoir operation; and partly to Tajikistan. Imports are incremental and are mainly needed for system stability and balancing purposes.

Net supply to the domestic market amounted to about 11.2 billion kWh, but domestic sales amount to only 7 billion kWh, implying a system loss level of about 37% of the net supply. Since the Toktogul reservoir provides multi year storage facility for irrigation and agriculture in the downstream countries, water releases from it are subject to annual IGIA. This leads to substation release of water and export of electricity in summer and limited release of water and import of fuels in winter. Thus to a large extent, trade in electricity is a byproduct of water release agreements. Kyrgyz Government is working extensively to change this practice and turn the generated electricity to export.

On the demand side, the structure of consumption has changed substantially comparing with 1990. Industrial consumption declined sharply and the share of the residential consumers rose from 15% to about 60% of the total consumption.

Such increase of residential consumption happened because Kyrgyzstan lacks indigenous fossil fuels and the price of imported fossil fuels became very high, consequent behavior of residential consumers in switching from fossil fuels to electricity for space heating, cooking and hot water, encouraged by the continued low and highly subsidized price of electricity of around 1.1 – 1.8 US cents per kWh. Around 2/3 of the annual electricity consumption takes place in the first and the fourth quarters of the year (winter and fall) as a result of the increased heat demand.

Despite the age and need of rehabilitation of existing power plants, they fully cover the domestic demand for electricity and even have surplus electricity for export in the summer months. Energy-hungry South Asia has peaks of electricity consumption during summer time. This creates a good export opportunity for Kyrgyzstan.

	2004	2006
<b>Exports (Billion kWh)</b>	3.00	2.44
<b>Price (US cents/kWh)</b>	0.68	1.00
<b>Country of Export</b>	Russia	Kazakhstan Tajikistan

**Table 2. Electricity Exports from Kyrgyzstan.**

Table 2 shows that Kyrgyzstan has experienced progress in export of electricity, switching from Russia with lower prices to Kazakhstan and Tajikistan that offer higher purchasing prices for Kyrgyz electricity. In 2007 Kyrgyzstan is exporting electricity to Kazakhstan at a price of 1.52 US cents per 1 kWh. This price is 50% higher than in 2006. Comparably, Afghanistan imports electricity for at least 2 US cents per 1 kWh.

In terms of the development of unexploited potential, Kyrgyzstan inherited multiply unfinished projects from the Soviet Union. These projects can be developed at less than full cost. These unexploited resources represent significant opportunities for export of electricity in the future.

To enable the export of electricity to South Asia, investments in the rehabilitation of the existing transmission system are needed, as is the construction of new transmission lines is required. Two projects that are of material importance to this are the construction of the Datka-Kemin 500kV Transmission Line that will connect the northern region to the Datka Substation in the South, and

the Southern Kyrgyzstan Transmission Upgrade Project. These projects will decongest loaded unbalanced lines, enhance self sufficiency and allow electricity trade with South Asia.

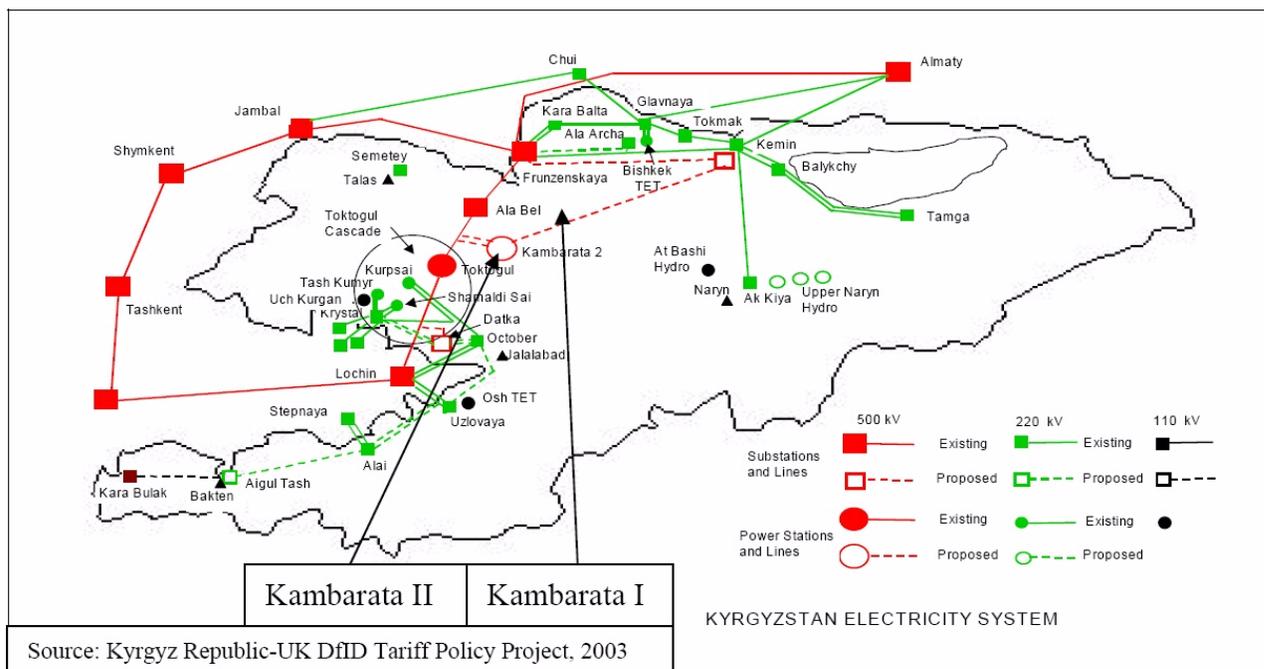


Figure 2. Electrical Grid and potential transmission lines.

### Sector Structure and Private Sector Participation

The Prime Minister has responsibility for energy sector policy. The Newly created Ministry of Energy oversees day-to-day operations.

Operational responsibilities are carried out by the following companies:

- “Power Plants” JSC holds all power plants,
- “National Electrical Grid of Kyrgyzstan” JSC controls the transmission system
- Four distribution companies: Severelectro JSC, Vostokelectro JSC, Oshelectro JSC and Jalalabadelectro JSC, and
- One District Heating Network company for Bishkek, Bishkekteploset JSC.

Private sector participation in the Power industry is still marginal despite pronounced Government support in electricity distribution and in hydro schemes. Two small hydro schemes, Chakan and Kalinin, have been handed over to private investors.

### Electricity Tariffs

According to Electric Energy Law of Kyrgyzstan, it is specifically stated that power price should cover the cost of electric generation, transmission and distribution and should not allow one group of consumers to be subsidized at the expense of another. Despite this provision, Government has highly subsidized the power sector, and consequently the tariffs for electricity in Kyrgyzstan are substantially lower than the cost recovery level. Due to a combination of low tariffs and high levels of commercial losses, the distribution companies have insufficient funding to undertake anything except emergency repairs, and therefore, none of the needed capital expenditure has taken place.

This is leading to a steady decline in the integrity and reliability of the network together with a corresponding increase in technical losses.

Figure 3 depicts the difference between the tariff and the cost recovery level in Kyrgyzstan and other countries.

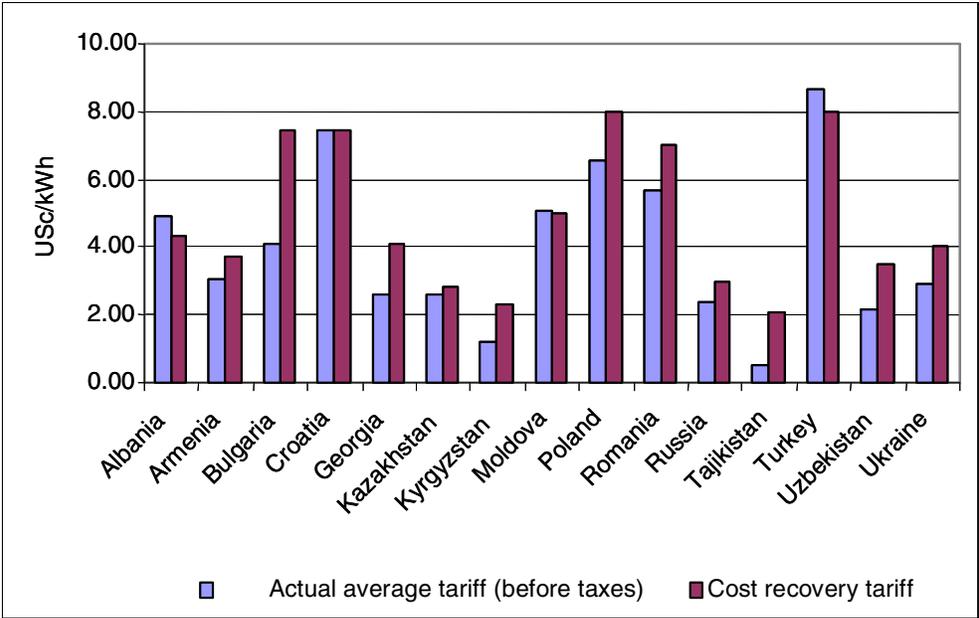


Figure 3. Tariff comparisons by country

The principles of the tariff policy for electricity and heat were first adopted by the government in 1998. Since then, the government has changed the tariff policy twice, with a gradual switch from the principle of socially-protected costs to the principle of profitability and efficiency. The basic principles of the tariff policy are presently aimed at preparing the ground for further reforms in the power sector.

Tariff structure by Function (US cents/kWh)		
Function	International	Kyrgyzstan
Generation	3.5	0.5
Transmission	0.5	0.2
Distribution	2	1.8
<b>Total</b>	<b>6</b>	<b>2.5</b>

Table 3. Tariff structure

Current electricity tariffs in Kyrgyzstan are at a level of 1.5 US cents/kWh. It is still far from the cost recovery level of 2.5 US cents/kWh.

**Government Initiative**

Kyrgyzstan is a very dynamic and the most democratic state among all Central Asian countries. Kyrgyzstan has been the leader in nineties to transform to the market economy.

In February, 2007 Kyrgyz Government has established a new Ministry of Energy, which would overview and develop the energy sector of Kyrgyzstan. Creation of this Ministry has already had some positive outcomes. Instead of sticking to barter deals on electricity-coal with Kazakhstan and

electricity-gas with Uzbekistan, Kyrgyzstan has transformed to purely market relations. An open tender/auction was held on purchasing Kyrgyz electricity with a starting price of 1.5 US cents per kWh. Kazakhstan has offered the highest price of 1.52 US cents per kWh and is now importing 200 million kWh. Kyrgyzstan is planning to announce another tender in June, 2007. Coal, on the other hand has also been purchased through an open tender by Kyrgyzstan.

Kyrgyz Parliament is in the process of considering the adoption of a law on privatization of Kambarata HPPs cascade. Right now the cascade of Kambarata HPPs on Naryn river are in need of foreign investment, but cannot be privatized yet. Kyrgyz Government is working extensively to issue this law.

Kyrgyzstan Government sets hydropower development to the top priority right now. Close proximity to energy-hungry markets of South Asia enable Kyrgyzstan to foster faster development. Tajikistan, being as a competitor to Kyrgyzstan in terms of hydropower potential creates even a greater stimulus for Kyrgyz Government to create more favorable conditions for foreign investors to develop the sector.

Recently Kyrgyz Government has refused to join HIPC (Highly Indebted Poor Countries) Initiative – an external debt relief program. One of the major disagreements of Kyrgyz Government with World Bank's requirements on joining this program was the issue of tariff increase by 30%. Kyrgyz Government stressed that this tariff increase would make locally produced products less competitive and hence put the local manufacturers in an even worse position.

## **OPPORTUNITIES FOR US COMPANIES**

There are multiple opportunities for US companies in the power sector of Kyrgyzstan. Some of the major potential projects are listed below.

### **1. 500kV Datka-Kemin Transmission Line and Substations.**

**Project Cost:** USD 190 million

**US Export Potential:** USD 103 million

US companies can potentially export the equipment (from automatic circuit breakers to power transformers) and services (from electrical designs to environmental assessments).

**Description:** This project incorporates construction of 500kV Datka – Kemin Transmission Line, 400 km with 500kV / 220kV Kemin Substation (Figure 2.) Government of Kyrgyzstan defined this project to connect generation in the south to demand in the north of the country. Additionally this project includes construction of a substation that will integrate the planned Kambarata Hydropower Plant to the 500kV electrical grid.

### **2. Upgrading of Uch-Kurgan Hydropower Plant**

**Project Cost:** USD 35 Million

**US Export Potential:** USD 30 million

US Companies can potentially export equipment (from turbines to generator) and services (from environmental assessments to construction management).

**Description:** Uch-Kurgan HPP was built in 1962 and is in need of modernization of equipment. Lack of action will result in further decrease of installed capacity, and consequently to shutdown of HPP. The project envisages improving downstream water quality by replacing the existing Kaplan turbines that are leaking oil into the river and

increasing the installed capacity by 40MW by installing more efficient turbine generating units.

### **3. Southern Kyrgyzstan Transmission Upgrade Project**

**Project Cost:** USD 55 million

**US Export Potential:** USD 40 million

US companies can potentially export the equipment (from automatic circuit breakers to power transformers) and services (from electrical designs to environmental assessments).

**Description:** The project incorporates the construction of a 500/220kV substation at Datka with interconnection to the existing 500kV O/H Transmission Line and the construction and replacement of several 220kV transmission lines old and in need of rehabilitation. Benefits of this project include relief of current overloading (25-30% during winter high demand), self-sufficiency of supply and control of the Southern Transmission system. Additionally there would be a better and more efficient transmission and increased reliability of service to many southern towns which are often left without electricity during winter.

### **4. Greenfield Hydropower Plants on Naryn Cascade**

**Project Cost:** USD 350 million to USD 420 million

**US Export Potential:** USD 210 million to USD 250 million

**Description:** The project envisages design and construction of 5 or more hydroelectric plants with a total generating capacity of approx. 350MW. The project's goal is to stimulate new export-based power generation projects and foster private sector participation in Kyrgyz power generation on a concession basis.

## **USEFUL CONTACTS**

### **USG Resources**

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