

# The Unified Energy Systems of Russia (RAO-UES) in Central Asia and the Caucasus: Nets of Interdependence

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**Abstract:** Most Central Asian and Caucasus countries have, to some extent, transformed and privatized their electricity sectors using the World Bank's advice. In recent years, the Russian parastatal Unified Energy Systems of Russia (RAO-UES) has purchased much of the generation and transmission assets that were made available. This article examines the transformation of the post-Soviet electricity sector. The author explores how RAO-UES became the most important foreign investor, even in states that have problematic relations with Moscow, the advantages and disadvantages of RAO-UES participation for the successor states, and the energy security implications of the grid as it now exists for these southern states.

**Keywords:** Caucasus energy, Central Asia energy, electricity sector restructuring, politics of electricity, RAO-UES, Russian electricity grid

## Introduction

Although oil and gas have received the most attention from the international community, something remarkable has been happening in Russian electricity generation. In the fall of 2003, the former Soviet republics began operating on a parallel, integrated grid for the first time.<sup>1</sup> This long-dreamed-of goal of Soviet planners was finally accomplished under the corporate leadership of the Russian Joint-Stock Company—Unified Energy Systems of Russia (henceforth RAO-UES). Synchronization of the grid means that the electrical generators across the post-Soviet space are operating in coordination with each other and that shortfalls in one area can be made up with surpluses from another. The coordination has been maintained by the eleven states of the CIS Electric Energy Council but led by RAO-UES. Since coming under RAO-UES's leadership, the member states have seen an increase in the quality and reliability of their electricity. But in several states the energy

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security implications continue to raise concerns. The Russian idiom for an electricity network is “net” rather than the English “grid.” Are the successor states of the Soviet Union becoming caught up in a net of electricity dependency? This article examines the reasons for the ascendancy of RAO-UES in Central Asia and the Caucasus—regions where acquisitions have been recent and extensive. It will also examine the ways in which each of the concerned states has attempted to constrain RAO-UES or to allow the corporation to pursue acquisitions while safeguarding the state’s own interests.

### RAO-UES

RAO-UES has not merely synchronized the grid covering the former Soviet space. The corporation has reorganized and, in large measure, purchased it. With ownership of an installed capacity of 157.7 million kilowatts and 2,479,000 kilometers of transmission lines,<sup>2</sup> the RAO-UES Holding Company has an enormous footprint. By comparison, Électricité de France—the largest electricity company in Europe—has only 130.7 million kilowatts of installed capacity.<sup>3</sup>

RAO-UES is a parastatal corporation in which the Russian state holds controlling shares. According to its annual report, the Russian state owns 52.68 percent of the company’s shares, a figure that has remained constant for years.<sup>4</sup> RAO-UES owns 72 percent of the electricity generation capacity in the Russian Federation, and 96 percent of its transmission capacity.<sup>5</sup> RAO-UES is considered relatively transparent and commercially successful. Standard and Poor’s rating services gave RAO-UES a credit rating of ruA+ (highest ranking in Russia) in 2004 and an overall rating of B+, indicating that it is one of the most promising investments in Russia.

RAO-UES has been led by CEO Anatoly Chubais, a well-known and controversial oligarch in Moscow, since 1999. Often credited as the architect of the first wave of post-Soviet privatization, his portfolio includes having served as first deputy prime minister in the first Yeltsin administration, Yeltsin’s campaign manager in the 1996 campaign, and presidential chief of staff in the second Yeltsin administration. Chubais currently serves as both CEO and chairman of the CIS Electric Energy Council, a body that meets annually and includes eleven former Soviet republics. In his travels representing RAO-UES, Chubais is received and treated as a minister of the Russian Federation.<sup>6</sup> The corporation has been allocated significant resources from the stabilization fund (the oil fund set aside under the International Monetary Fund’s recommendation) to be spent on acquisitions in the former Soviet Union.

RAO-UES is an important and highly visible company in Russia, but Chubais’s relations with the Kremlin are not always positive: when portions of the Russian electricity grid failed in May 2005, President Putin blamed Chubais personally, accused him of focusing too much on international projects rather than day-to-day operations, and had prosecutors summon him for questioning.<sup>7</sup> It is an indication of how important a figure Chubais is in the international investment community that charges were not brought against him.

In July 2005, as part of a mandated restructuring of the electricity sector in Russia, RAO-UES transferred its international electricity contracts and holdings to a newly formed subsidiary, ZAO “Inter RAO-UES.” RAO-UES holds 60 percent of the company and Rosenergoatom holds the remainder.<sup>8</sup> Presumably, this subsidiary has been created so that foreign generation holdings of RAO-UES will not be affected by the electricity

reform currently under way in Russia. The domestic Russian electricity restructuring plan was initiated in March 2004 and began in 2007. Under this reform, RAO-UES will be required to spin off Russian generation and distribution incrementally, but will retain the transmission grid. The goal is to create a competitive wholesale market for generation by 2011.<sup>9</sup> To date, however, operations of Inter RAO-UES have not been substantially separated. Therefore, this article examines RAO-UES and Inter RAO-UES together as “RAO-UES.”

RAO-UES currently exports electricity to eight former republics (Azerbaijan, Belarus, Georgia, Kazakhstan, Latvia, Lithuania, Moldova, and Ukraine) and imports electricity from seven former republics (Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, and Ukraine).<sup>10</sup> The company owns holdings in generation and/or transmission in eight former republics, and has corporate offices in Astana, Kazakshtan, and Tbilisi, Georgia. Table 1 summarizes RAO-UES holdings in Central Asia and the Caucasus.

Despite the extensive business it conducts within the successor states, acquisitions in these states are a means rather than an end goal of RAO-UES’s corporate strategy. In its annual report, RAO-UES identifies its primary international goal: “synchronizing the energy systems of Russia, the CIS countries, and the Baltic Republics with the North and West European energy pools.”<sup>11</sup> In pursuit of this goal, RAO-UES in April 2005 signed an agreement to cooperate on a feasibility study for connecting western, central, and southern Europe with UES of Russia. The Union for the Coordination of Transmission of Electricity (which includes twenty European countries as members) is examining the technical and operational aspects of connecting with the Russian system. RAO-UES is also participating in the Baltrel program, which has been designed to create a ring of electricity companies in the Baltic states.<sup>12</sup> In addition, efforts are under way to increase electricity sales to China, Finland, and Turkey. RAO-UES currently exports 10.86 billion kWh to Finland annually, and envisions exporting as much as 5 billion kWh to China by 2008.<sup>13</sup> The goal of RAO-UES is to become a supplier of electricity to a series of grids that stretch far beyond the former Soviet Union.

RAO-UES corporate interests in the southern states are fairly clear and straightforward. Key interests appear to be (1) to export power to desirable markets, including Turkey and Iran (via the Caucasus), and to Iran, Afghanistan, Pakistan, and China (via Central Asia); (2) to better position itself for an eventual link to a larger European grid through Turkey, the Baltics, and other states; (3) to obtain some value for otherwise bad debt in the debt-for-equity swaps; (4) to reduce disputes over debt and theft of power (essential if Russian electricity is to transit intermediary states); and (5) to capture cheap hydroelectricity for the Russian market.

These are the evident goals of RAO-UES, but it is interesting to examine how the corporation reacquired the infrastructure and markets of the former Soviet grids. Subsequent sections will explore this history, with an eye toward the reasons for RAO-UES’s success and the economic and security implications for states that have become part of the RAO-UES system.

### **Technical Background: How Did This Happen?**

“Soviet power plus full electrification of the entire country equals Communism.”

—Leninist slogan

**TABLE 1. Overview of the Structure of RAO-UES Involvement in Central Asia and the Caucasus**

	Armenia	Azerbaijan	Georgia
Main type of generation	Nuclear	Therm	Hydro
RAO-UES synchronized	X	X	X
RAO-UES corporate offices	—	—	X
RAO-UES transmission	X	X	X
RAO-UES generation	X	—	X
Debt-for-equity	X	—	X

*Note.* RAO-UES = Russian Joint-Stock Company–Unified Energy Systems of Russia; \* partial parallel.

The design of electricity systems must be closely coordinated with the electricity needs of industrial and residential users. Because electric power cannot be readily stored, it must be produced and released into the grid as needed. This can be complex, as demand for electricity fluctuates not only across seasons but even during a single day—sometimes by more than 100 percent in a twenty-four-hour period.<sup>14</sup> Hence, a stable grid must use a mix of “baseload” generation capacity that produces constant electricity (such as nuclear or large thermal) together with a “peaking capacity” generation that can easily be varied in its output (such as hydroelectric) for use during those times of the day (or year) when demand is highest. In addition to baseload and peaking generation, larger grids make use of a mix of alternating current (AC) and direct current (DC), using direct current to transmit power efficiently over a long distance, with power-conversion facilities at the end of each high voltage (DC) line to convert that power into alternating current suitable for distribution.<sup>15</sup>

The successor states to the Soviet Union inherited a full network of generation, transmission, and distribution. But it was not a system that suited their post-Soviet needs. It was not even a system that served Soviet needs well. In the late perestroika era, the rate of growth in energy use equaled the rate of growth in GDP, with no evident gains in efficiency over a fifty-year period. Following the oil shocks of the 1970s, the West was able to adapt to rising prices by focusing on demand management (efficiency) rather than increase in energy supply. The Soviet Union, however, never experienced external price shocks or the adaptive technologies. The patterns of energy supply, processing, delivery, and consumption were deeply entrenched in the physical and economic structure of the nation and could not be changed quickly, so the Soviet Union was in a deep energy crisis well before its collapse.<sup>16</sup>

The urgency of electricity sector reform was clear to donors and to the states themselves, each with its inherited fragments of the Soviet electrical system. But even the donor community was unprepared for the problems these states faced. Much of the information used as the basis for restructuring advice came from experience gained in restructuring the Latin America electricity sector.<sup>17</sup> Although problems in the energy sectors of the successor states resembled Latin American experience in form, they differed greatly in severity.

Where the Latin American states faced high losses, the successor states faced extremely high losses from nonpayment, noncollection, frequent collapse of grids, and cutoffs from suppliers. Problems of the sector’s financial viability could not even be addressed until methods were devised to reconceptualize accounting methods and state budgets. Means for metering energy consumption did not exist in many industries and residences. Instead of

Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Therm	Hydro	Hydro	Therm	Therm
X	X	X	X*	X
X	—	—	—	—
X	X	X	—	X
X	X	X	—	—
X	X	X	—	—

simple political interference in management, operation, and pricing, the case states were confronted with the need to create managerial structures and to find a basis for pricing other than directives from Moscow. The lack of financing for rehabilitation and maintenance was complicated by the fact that, in the Soviet budget, energy pricing was based on recovery of average financial costs to the sector, but investment came from a separate, state-sponsored budget. The lack of commercial organization described not only the energy sector but also entire post-Soviet economies. Finally, the inability to meet basic electricity demand was made worse by the severity of the climate and the social expectation that it was the government's responsibility to meet the basic needs of the people.

Successor states tried, with varying degrees of success, to implement the Latin American best practices model. That model required raising prices to cost-recovery levels, including raising household prices above the prices paid by industrial customers, because household electricity is, on average, more expensive to supply. It also included enacting a base energy law that defined the rights, powers, and obligations of all actors in the energy sector to provide a basis for stable expectations. Following such a law, the next step was to commercialize the enterprises and promote autonomy of managers while ensuring debt obligations were met. Then, an effort was made to create a transparent commercial framework to include financial controls and economic regulation of the sector. Finally, privatization (for the states that chose to privatize) required that the sector be unbundled and that regulatory powers be passed to an independent body.<sup>18</sup>

Such was the plan, but the climate of overall instability created a host of challenges for which new solutions had to be devised. The instability of currencies, for example, made budgeting nearly impossible, and (combined with efforts at tax evasion) led to increasing patterns of barter exchange for all manner of goods and services, further complicating the task of establishing transparency. The combination of economic and energy crises led to many vicious circles in policymaking, where ministries of energy were pitted against parliaments in struggles over shutting off energy to nonpaying customers, winter emergency stores were consumed by local officials in the run-up to elections, and government officials were bribed to move all manner of industries onto lists that were protected from shut-off. The traditional problems associated with raising prices on a good such as electricity were complicated by the fact that the governments remained the largest consumers. Between ministries and enterprises still owned by the states, the governments in many successor states amassed substantial debt to the energy utilities, even at the highly subsidized prices.

It is therefore not surprising that the energy-poor states entered the current decade with high energy debts (invariably to Russia), whereas the energy-rich states continued to avoid substantial sectoral reform for as long as possible. The states regarded international development advisors' approach with some skepticism. Although state officials wanted enhanced capacity in the sector, they also exhibited a reluctance to privatize (because energy was considered strategic, and because many Western states successfully operate state-managed energy industries), and most states had a desire to pursue self-sufficiency in energy, although international advisors cautioned against it. Energy supplies had been frequently interrupted, negotiations on supplies and debt to suppliers were often harsh, and energy had the appearance in the region of an effective political weapon. Therefore, state officials naturally turned to the issue of state self-sufficiency in energy. As they did, their frail electricity sectors became more problematic.

### RAO-UES 2003 Purchases: Transmission and Generation in the Caucasus

RAO-UES gained substantial acquisitions in the Caucasus in 2003, much of which was obtained in debt-for-equity swaps (see table 2). All three of the Caucasus states' electricity sectors were still in crisis in 2003. None of the states had managed to rationalize their sectors, despite model programs in Armenia and Georgia. In part, the sector could not be

**TABLE 2. RAO-UES Investment/Involvement in the Caucasus**

	<i>Armenia</i>	<i>Azerbaijan</i>	<i>Georgia</i>
RAO-UES involvement	Operates parallel; RAO-UES owns portions of the grid and shares of generation	Operates parallel; framework agreement on transmission to Turkey	Operates parallel; RAO-UES owns portions of the grid and shares of generation
Debt-for-equity	Generating facilities include portions of Sevan-Hrazdan cascade (556 MW) and Hrazdan thermal plant (1100 MW)		RAO-UES purchased 75 percent of Tbilisi's electricity network
Main projects	RAO-UES holds a five-year license to operate the Medzamor-2 nuclear power plant (through 2008)	Turkish company Barmek owned portions of transmission (now in renegotiation); World Bank and European Bank for Reconstruction and Development providing resources for renovation of old and construction of new capacity	RAO-UES purchased generating facilities previously owned by AES

*Note.* RAO-UES = Russian Joint-Stock Company–Unified Energy Systems of Russia; MW = megawatt.  
*Sources.* EIA Country Reports: Azerbaijan, August 2006, and Caucasus Region, May 2006.

rationalized because the grid, designed to be a component of regional integration, could not be split effectively into three parts without extensive new construction. Located at the far end of the Soviet system, distant from the major Russian electricity centers, the Trans-Caucasian Interconnected Power System was built to meet the needs of the region as an integrated whole, not the needs of each constituent member republic. Hence, post-Soviet Armenia and Georgia inherited substantial generation capacity relative to their population size, but relatively limited indigenous energy resources, whereas Azerbaijan, with its considerable energy resources, inherited limited generation capacity relative to its size. In the integrated grid system, Armenia contributed nuclear power and Azerbaijan thermal power for the baseload, while Georgia contributed hydroelectricity, ideal for peaking capacity.

In the early post-Soviet period, conflicts between the Caucasus states and with Russia (especially in Nagorno-Karabakh and Abkhazia) compelled each of the three states to attempt to function independently, but this proved costly and unstable. Armenia dropped grid links to Georgia because instability of the hertz in Georgia threatened stable operation of the Armenian nuclear power plant once it reopened in 1996. This, in turn, created a nighttime surplus of electricity in Armenia—and another set of instabilities that were resolved by Armenia exporting nighttime electricity to Iran at no cost to Iran. Imbalances in the grids were internal as well as external. In Georgia, for example, generation was concentrated in the west while demand was concentrated in the east. Only one east-west transmission link existed, and in the absence of a functioning trans-Caucasian interconnected power system, it tended to become unstable due to overloading.<sup>19</sup>

In addition to a power grid design that did not lend itself to being broken into three parts, each state was plagued by high levels of debt, poor transmission capability, gross inefficiencies in generation and transmission, and an inability to raise electricity prices high enough to meet costs. These challenges made it impossible for the states to redesign their electricity sectors successfully along more autarkic lines. Foreign advisors were aware of the large regional overcapacity and the collapse in demand, and so they tried to discourage the states from investing too much in the pursuit of energy self-sufficiency. Energy experts raised the idea of reintegrating the regional utility network in more than one forum before 2003, but regional tensions could not be overcome. By the time RAO-UES stepped in, smaller private investors had failed and abandoned their projects in the region. The sector was badly in need of repair and deeply mired in debt and disarray, making the assets available cheaply.

RAO-UES's penetration has been quite different across the three Caucasus states. In Azerbaijan RAO-UES does not own any infrastructure although it was involved in the restoration and commissioning of a 330 kV high-voltage line that connects Russia, Dagestan, and Azerbaijan. The work for this was completed in 2003 and was part of RAO-UES's securing of a contract for transmission of Azerbaijan's electricity to Turkey.<sup>20</sup> In Armenia, where debts related to nuclear fuel were especially high and where a western company (Midland) abandoned power plants and the portion of the grid it had purchased in 2002, RAO-UES took ownership of electric-generating facilities amounting to 50 percent of Armenia's installed capacity. RAO-UES also acquired a five-year license to operate the Armenian nuclear power plant Medzamor-2 (The Armenian government remains the titular owner).<sup>21</sup> In Georgia, after an American company (AES) abandoned its efforts to make privatized generation profitable, RAO-UES purchased 75 percent of the capital city's electricity network.<sup>22</sup>

RAO-UES enjoyed significant commercial success within a year, reportedly improving payments in Georgia by 40 percent in the first year.<sup>23</sup> It has also enjoyed some success in

making the Caucasus into an electricity transit corridor connecting Russia with western and southern markets. Since 2001, the company has held contracts to supply Turkey with 2–2.5 million kWh daily. The plan was for this supply to come across Georgia, with Georgia receiving as payment 33 percent of all the electricity that transits its territory. These exports began in March 2001.<sup>24</sup> Even at that early date (note that it was well prior to the purchases in the Caucasus) RAO-UES expressed a hope that supply would reach 100–110 million kWh per month in the future. Now that RAO-UES owns much of the grid, this supply is to come in part from Armenia, transiting across Georgia (Turkey would not be willing to purchase electricity directly from Armenia), and in part from Azerbaijan.

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***“In Georgia, after an American company (AES) abandoned its efforts to make privatized generation profitable, RAO-UES purchased 75 percent of the capital city’s electricity network.”***

Armenia had fewer concerns about the RAO-UES purchases there than did Georgia. For Armenia, the advantages of Russia’s presence included a more secure energy supply and assistance from Russia in both managing the Medzamor-2 nuclear plant and in resisting international pressure to close it early. In Georgia, however, there was concern that control of the electricity grid could enable Russia to strengthen the breakaway republics of Abkhazia and South Ossetia, particularly because much of the debt to Russia was a result

of the plant located in Abkhazia. The Saakashvili government came to power vowing to reexamine the RAO-UES deal, but by the spring of 2004, Georgian Premier Zurab Zhvania was asserting that the working relationship with RAO-UES was mutually beneficial,<sup>25</sup> and 87 percent of Tbilisi residents noted significant improvements in the quality of services.<sup>26</sup>

### **RAO-UES 2004–5 Purchases: Generation and Transmission in Central Asia**

The Central Asian electricity sector was also in considerable disarray a decade after independence. The United Central Asia Power System grid continued to connect the five states, but the states’ pricing systems were incompatible and the grid suffered from surplus in the spring and summer coupled with shortfalls in the winter and fall. Parallel operations with RAO-UES have been in place since July 20, 2000,<sup>27</sup> but in 2004 RAO-UES began actively seeking to capture cheap Central Asian hydroelectricity, an effort that continues today. Once again taking advantage of debt-for-equity opportunities, RAO-UES in Central Asia has focused on dams that were not completed in the Soviet era. Debt-for-equity mechanisms have been supplemented by a portion of Russia’s extensive stabilization fund. The Industry and Energy Ministry authorized RAO-UES to use stabilization funds for the acquisition of energy assets in Kyrgyzstan and Tajikistan.<sup>28</sup> This fulfills the IMF’s recommendation that the oil fund resources be (1) invested outside the Russian Federation so as not to contribute to hyperinflation; and (2) invested in a nonoil sector.

RAO-UES is frank about their interest in the hydropower plants of Central Asia. According to a company press release, “. . . cheap electricity generated at Tajikistan and Kyrgyzstan’s HPPs and imported into Russia will help improve the cost balance of the Federal Wholesale Electricity market.”<sup>29</sup> RAO-UES expects Central Asia to have a future in

electricity export both to Russia and to the south. This expectation is shared by the states of the region and the international financial institutions. Central Asian demand will probably not grow beyond existing capacity before 2020,<sup>30</sup> thus Central Asia has the potential to become a significant exporter of electricity to Pakistan, Afghanistan, Iran, China, and Russia. The World Bank 2004 assessment of export potential noted that regional cooperation and investment were key concerns, coupled with worries about political stability and economic transparency. Taking these concerns into account, as well as considering technical difficulty, political risk, transit requirements, and the questionable ability of recipient states to pay for electricity, the World Bank produced a ranked list of nine potential investments in new generation in the region. Of these nine projects, eight had begun in the Soviet era, but then abandoned.<sup>31</sup> RAO-UES has had some success with pursuing three of these projects, two in Kyrgyzstan and one in Tajikistan (see table 3).

Kyrgyzstan and Tajikistan are enthusiastic about the prospect of generating more hydro-electricity and thereby reducing their payments to neighboring states for fossil fuels. Electricity exports to Russia from Kyrgyzstan have already generated much-needed revenue

**TABLE 3. RAO-UES Investment/Involvement in Central Asia**

	<i>Kazakhstan</i>	<i>Kyrgyzstan</i>	<i>Tajikistan</i>
RAO-UES involvement	Operates parallel with RAO-UES system; owns shares of generation	Operates parallel with RAO-UES via Kazakhstan; owns shares of generation under construction	Operates parallel with RAO-UES via Kazakhstan; owns shares of generation under construction
Debt-for-equity	UES part ownership of Ekibastuz established in 2004 on a debt-for-equity basis (electricity-related debt incurred in 1992–97)	Debt-for-equity stakes in completing Kambar-Ata stations I and II, with 33 percent ownership for RAO-UES, 33 percent ownership for Kazakhstan, and 34 percent ownership for Kyrgyzstan	Debt-for-equity stakes in completing Sangtuda I Dam, with 75 percent ownership for RAO-UES; possible additional role under consideration for Rogun I following the failure of an existing agreement with RusAl
Main projects	UES-Kazakhstan joint venture: plant operate the management at Ekibastuz TPP2; also to manage Severny open-cast mine	Goal is to increase supply from Kyrgyzstan to Russia, transiting Kazakhstan since hydro is inexpensive. For 2004, 1 BkWh was imported in the first three quarters.	Construction of Sangtuda HPP I resumed in April 2005 (project begun in Soviet era), scheduled for completion in 2009

*Note.* RAO-UES = Russian Joint-Stock Company–Unified Energy Systems of Russia; BkWh = billion kilowatt hours; MW = megawatt.

*Sources.* RAO-UES press release, September 2003; RAO-UES press release, April 2005; RAO-UES Annual Report, 2004; and Gregory Gleason, "Russian Companies Propose Debt-equity Swaps in Central Asia," *Eurasia Monitor* 1, no. 103 (October 2004).

and have helped resolve regional tensions associated with the water-for-electricity swaps of previous years. However, RAO-UES is finding the cost of doing business higher than originally anticipated. Their offer for Sangtuda I increased substantially when Tajikistan was able to attract Iranian investment in Sangtuda II,<sup>32</sup> and their efforts to purchase Kambar-Ata I and II were repeatedly delayed.

### **Constraining RAO-UES Presence**

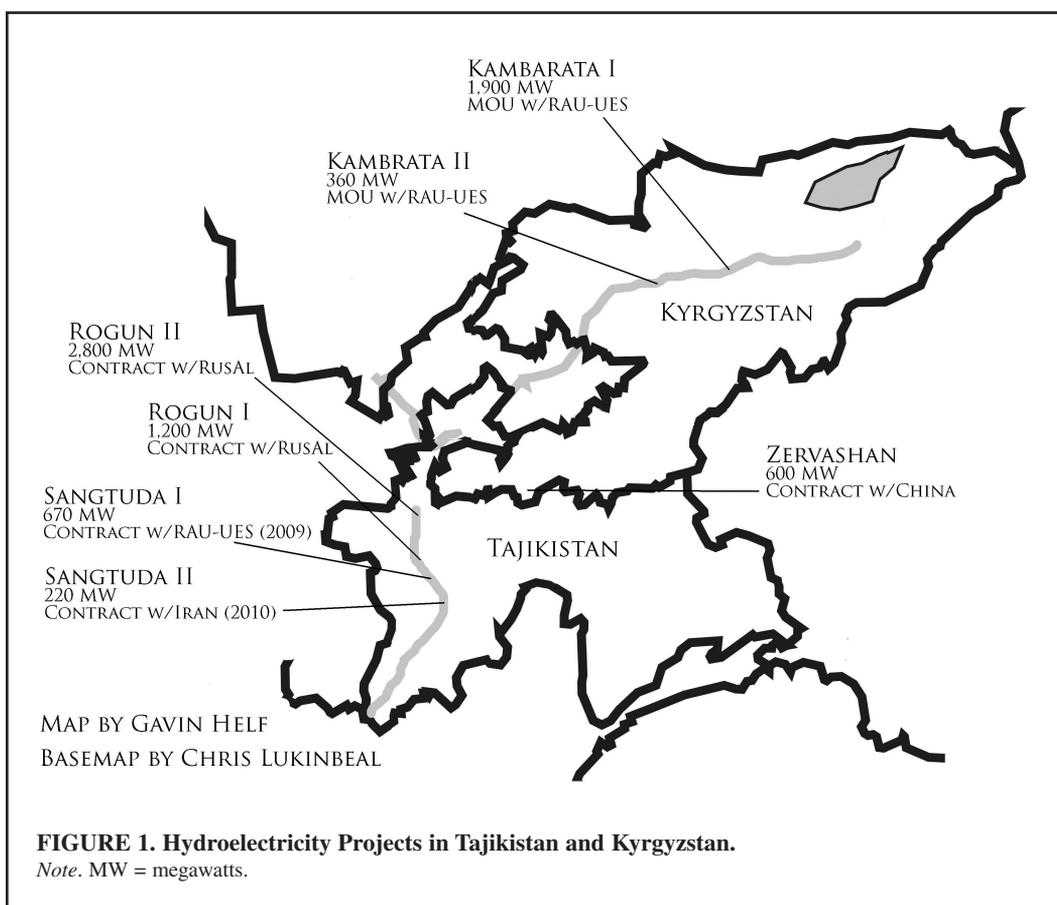
The choice to allow RAO-UES to own portions of a country's grid and/or generation does not mean that the state can no longer pursue its own interests in electricity. Several of the states that have accepted RAO-UES ownership in their electricity sector have made strategic choices to constrain the company's behavior on their territory (and presumably thereby to limit the influence of the Russian state in the sector). The experiences of Kazakhstan, Kyrgyzstan, and Tajikistan are illustrative.

By World Bank standards, Kazakhstan has the most reformed electricity sector in the region, with privatization of 85 percent of its large generation capacity and good regulation of distribution.<sup>33</sup> Kazakhstan is also a net exporter of electricity to Russia (although it both imports and exports), with a northern grid that is more closely connected to Russia than to its southern grid.<sup>34</sup> Despite reforms and exports, Kazakhstanenergo accumulated an energy debt to Russia in the mid-1990s of approximately \$239 million. This made Kazakhstan vulnerable to the debt-for-equity swap in which RAO-UES took more than a 50 percent share in the Ekibastuz-2 power plant.<sup>35</sup> Although Kazakhstan was willing to give up Ekibastuz-2, RAO-UES was unsuccessful in its efforts to also acquire a share of the 500 kV Ekibastuz-Omsk overhead power transmission line. Rationalizing transmission by connecting the northern and southern grids with a high-voltage line was the Kazakhstan government's highest priority in the electricity sector. Successful completion of such a line would enable the southern portion of Kazakhstan to stop importing electricity from neighboring states.<sup>36</sup> RAO-UES was particularly interested in this plan, as completion of the line was critical to the successful import of electricity from Kyrgyzstan and Tajikistan. Kazakhstan repeatedly delayed agreement on the high-voltage line despite its importance and even though several of northern Kazakhstan's high voltage lines are already jointly managed with Russia. Instead, it successfully secured support from the European Bank for Reconstruction and Development, the World Bank, and its own government's assets, ensuring that it will retain control over the transit of electricity on its territory, and that the southern states will be compelled to negotiate with Kazakhstan for transit of their electricity to Russia.

Kyrgyzstan's export of hydroelectricity to Russia in 2005 was approximately 2 billion kWh,<sup>37</sup> placing the country among the top four exporters of electricity to Russia.<sup>38</sup> Although Russia is Kyrgyzstan's primary market, the path to RAO-UES participation in the completion of the Kambar-Ata I and II hydropower plants was not straightforward. The first memorandum of understanding between RAO-UES and the government was signed in August 2004, but Kyrgyzstan's parliament went on to question the agreement for more than a year, suspicious that RAO-UES was obtaining strategic assets cheaply. By September 2005, Russia was accusing Kyrgyzstan of losing interest in the project, saying that the government of Kyrgyzstan had failed to fulfill its obligations under the memorandum.<sup>39</sup> Meanwhile, Kyrgyzstan sought additional investors, unsuccessfully approaching China at the 2004 Shanghai Cooperation Organization meeting. In an effort to restart negotiations

with the post-Akayev government, RAO-UES agreed to conduct a new feasibility study for completion of the dams in December 2006.<sup>40</sup> In the end, Kyrgyzstan's security concerns were allayed by the agreement signed in March 2007, which stated that Kazakhstan, Kyrgyzstan, and Russia would establish a joint venture to complete the power stations, with Kyrgyzstan owning 34 percent and Kazakhstan and Russia each holding 33 percent (see figure 1).<sup>41</sup> Kazakhstan's part ownership in the project will presumably make the negotiations with Kazakhstan for transit of its electricity to Russia easier.

Tajikistan has witnessed an explosion of investment in its hydroelectric capacity (see figure 1). Four projects—Sangtuda I and II and Rogun I and II—are under way, representing an unusual configuration of actors. RAO-UES, the government of Iran, the company Russian Aluminum (Rusal), and now a U.S. corporation supported by U.S. development assistance are all involved. RAO-UES has the contract to complete Sangtuda I jointly with Tajikistan by 2009 and owns a 75 percent stake in that plant, which was partly acquired in a debt-for-equity swap. Iran is contracted to complete Sangtuda II jointly with Tajikistan by 2010 and will hold 98 percent ownership for ten years after which ownership will revert to Tajikistan. The government of Tajikistan was effective in its efforts to use Iran to leverage a better deal with RAO-UES: the initial RAO-UES offer on Sangtuda I was significantly lower than the final offer. However, Sangtuda I is progressing ahead of schedule, while Sangtuda II has progressed little if at all since the deals were signed.<sup>42</sup> Similarly, the Rogun



agreement with RusAl has been a great disappointment, with Tajikistan's government vowing in the fall of 2006 to complete the dam itself, because RusAl was not moving forward with the project.<sup>43</sup> The Tajik government is now said to be approaching RAO-UES to seek its involvement in the project.

### **Blocking RAO-UES Purchase: Azerbaijan, Turkmenistan, and Uzbekistan**

Not impressed with RAO-UES's success in the southern states, the energy-rich states of Azerbaijan, Turkmenistan, and Uzbekistan have sought to keep the Russian company out of their electricity sectors. In part because they have much experience relying on Russia for transport of other forms of energy, and therefore do not wish to increase that reliance, and in part because these states have energy resources and therefore low amounts of debt, they have moved more slowly toward privatization and have limited the opportunities available for outside actors.

Uzbekistan and Turkmenistan, like the rest of Central Asia, see the potential to export electricity in addition to meeting domestic needs. Both states have domestic resources of natural gas that can be converted to improved electricity capacity. Uzbekistan has increased its electricity generation capacity by 800 megawatts in recent years, opening the Talimarjan I thermal power plant, fueled by natural gas. Although Uzbekistan plans to offer 49 percent of its shares of electricity generation and distribution for sale, this has not yet taken place. Uzbekistan is, however, putting in place an ambitious program to increase tariffs to cover cost recovery in the sector,<sup>44</sup> which will considerably enhance the attractiveness of the sector. Turkmenistan has instituted an even more ambitious policy of electricity autonomy. In August 2000, Turkmenistan completed construction of two transmission lines that enabled it to supply the Gaurdak, Khodzhabass, Niyazov, and Koytendag districts. These districts had previously been supplied by Uzbekistan.<sup>45</sup> The government of Turkmenistan subsequently signed a contract with General Electric in June 2003 for completion of two new gas-fired stations by 2011 to increase capacity at all five existing power plants and to improve transmission efficiencies.<sup>46</sup>

Alone among former Soviet states, Turkmenistan continues to pursue a very high degree of electricity autarky: the country operates its grid on "island mode," synchronized with Iran but delinked from the RAO-UES grid. Relinking with the Central Asian power system can be done at any time, so the Turkmen government perceives no risk in remaining delinked as long as possible.<sup>47</sup> Although the new administration may see fit to change the policy, to date Turkmenistan has not adopted any international financial institutions' advice on restructuring its electricity sector.

In spite of its wealth of oil and emerging gas resources, Azerbaijan cannot currently meet its domestic electricity needs. After stalling on electricity sector reforms for a decade, Azerbaijan made the decision to privatize transmission in 2002 but blocked Russia from participation. The Turkish energy company Barmek signed a twenty-five-year contract with the government of Azerbaijan to operate the electricity networks of Baku. Four years later, however, Barmek shut down operations, echoing the experience of western companies in Armenia and Georgia. Barmek and the government, still in negotiations as of February 2007, each accuse the other of failure to honor contract obligations.<sup>48</sup> Azerbaijan continues to import electricity from Russia via RAO-UES (even though disputes over price increases in the winter of 2006–7 strained relations).<sup>49</sup> Azerbaijan also imports electricity from Iran and from Turkey,<sup>50</sup> and is pursuing two new, small hydroelectric power stations

together with Iran on the Aras River, which borders both countries. As a part of the agreement, reached in the summer of 2006, Azerbaijan will provide electricity to the Iranian cities of Astara and Talesh in the summer in exchange for an Iranian supply of electricity to Azerbaijan in the winter.<sup>51</sup>

### **Energy Security Implications**

RAO-UES is an undeniable force in the southern states and will likely continue to grow. Although some commentators have expressed alarm at its expansion both the company's performance and its ability to provide key public goods suggest that the host states have some evidence that RAO-UES is not spreading Russian state influence at the expense of their national interests in electricity.<sup>52</sup> As an electricity giant, RAO-UES can do something the sovereign states of the south cannot do without it: rationalize the grids, so that hydro, thermal, and nuclear powers are more optimally balanced, seasonal surplus is managed and finds a market, peak power loads are met, and the frequency of the grid remains stable. Reintegration has improved the quality of power dramatically. Many leaders of the electricity sectors in these states—veterans of the all-Soviet grids—have been key proponents of RAO-UES's reunification of the sector. In addition, RAO-UES has established some managerial experience and best practices that enable it to succeed in places where other private companies have failed.

It would be a mistake to conflate Russian state interests with RAO-UES's corporate interests, but in most instances, RAO-UES's interests can be complementary to Russian state interests. For example, the link to European, southern, or Asian grids serve the Russian state interests of increasing the importance of Russia to these markets and diversifying and increasing the proportion of value-added energy exports. RAO-UES's electricity success in the southern states may also make it possible to continue to subsidize electricity consumption in Russia, where energy reforms are needed but politically very costly. The European Union has agreed to drop objections to Russia's membership in the WTO when Russian domestic energy fees are high enough to pay the actual cost of the service.<sup>53</sup> The difficult task of domestic price reform in Russia will be made substantially easier if RAO-UES can attract more hydropower (the lowest-cost source for electricity) into its electricity supply. Finally, having Russian companies on the ground—even companies not historically close to the Kremlin—may provide some opportunity for the Kremlin to project power. Iran's ownership of Tajikistan's hydroelectricity demonstrates that other states have an interest in the same markets and the influence that may come with them.

In some ways, however, RAO-UES's goals for the region may be at odds with Russian state goals. By converting nonperforming markets to commercially successful ones, RAO-UES reduces the extent to which Russia can leverage energy debt for cooperation in other areas such as troop placements. By transforming the status of these states from end-of-the-grid to strategically significant transit states, RAO-UES gives them a measure of influence over Russia's profits and increases their leverage significantly. Successful, functioning electricity transmission in the Caucasus and Central Asia is now essential for Russian electricity imports and exports. Finally, RAO-UES is perfecting mechanisms in the Caucasus and Central Asia that increase transparency, rationalize electricity consumption, and push governments out of the sector. Many of these potentially politically costly reforms have yet to take place in Russia, and Russia itself has not yet resolved the optimal relationship between electricity and the state.

The states of Central Asia and the Caucasus will, however, keep a worried eye on RAO-UES's troubled relationship with the Kremlin. As the sector becomes unbundled in Russia, RAO-UES will lose some of the Russian domestic influence it currently enjoys. Rosenergoatom (the parastatal nuclear energy company) is already a part owner in Inter RAO-UES, as mentioned earlier. Gazprom has also expressed an interest in taking over a more important role in the electricity sector.<sup>54</sup> As parastatals with reputations for less transparency and independence begin to play a role in RAO-UES, the company's work—and work style—could be affected. A key constraint on Russian energy company behavior may well be Europe's tolerance (or lack thereof) of nontransparency in the electricity sector. Russia is unlikely to make changes in electricity that will reduce its chances of linking to the European grids. For the southern states, a key constraint on RAO-UES and Russian behavior may continue to be their success in attracting additional energy companies and securing competitive supply, as Tajikistan has sought to do. The other constraint on Russian adventurism will be the dramatic improvements in the sectors themselves. By improving the sector for its client states while simultaneously making the sector profitable, RAO-UES has already contributed irrevocably to the security of these states. In the early transition years, the World Bank tried to convince the post-Soviet states that the way to achieve "energy security" was to pay their bills on time, rather than to pursue autarkic energy policies. It will most likely continue to be true that the health of the sector, more than the nationhood of the majority shareholder, determines energy security of the state. So far, the nets of interdependence reinforced by RAO-UES have served the states well.

Simply blocking RAO-UES from participating, therefore, may do more harm to the southern states than good. The states in which electricity continues to be a poorly performing sector are precisely those that have succeeded in keeping RAO-UES out: Azerbaijan, Turkmenistan, and Uzbekistan. Each lacks the modernizing technologies that could make their electricity sectors more efficient and the market restructuring that could make their sector more rational. It is possible that the states most at risk of Russian "nets of electricity dependence" in the future may be those whose autarkic approach has caused them to remain at the end of extensive grids rather than in the middle. Energy security for southern states lies not only in monitoring Russian energy behavior but in their ability to constrain the operations of their own states within the electricity sector, allowing best practices to be incorporated into electricity development.

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