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CIGI PAPERS

NO. 103 — MAY 2016

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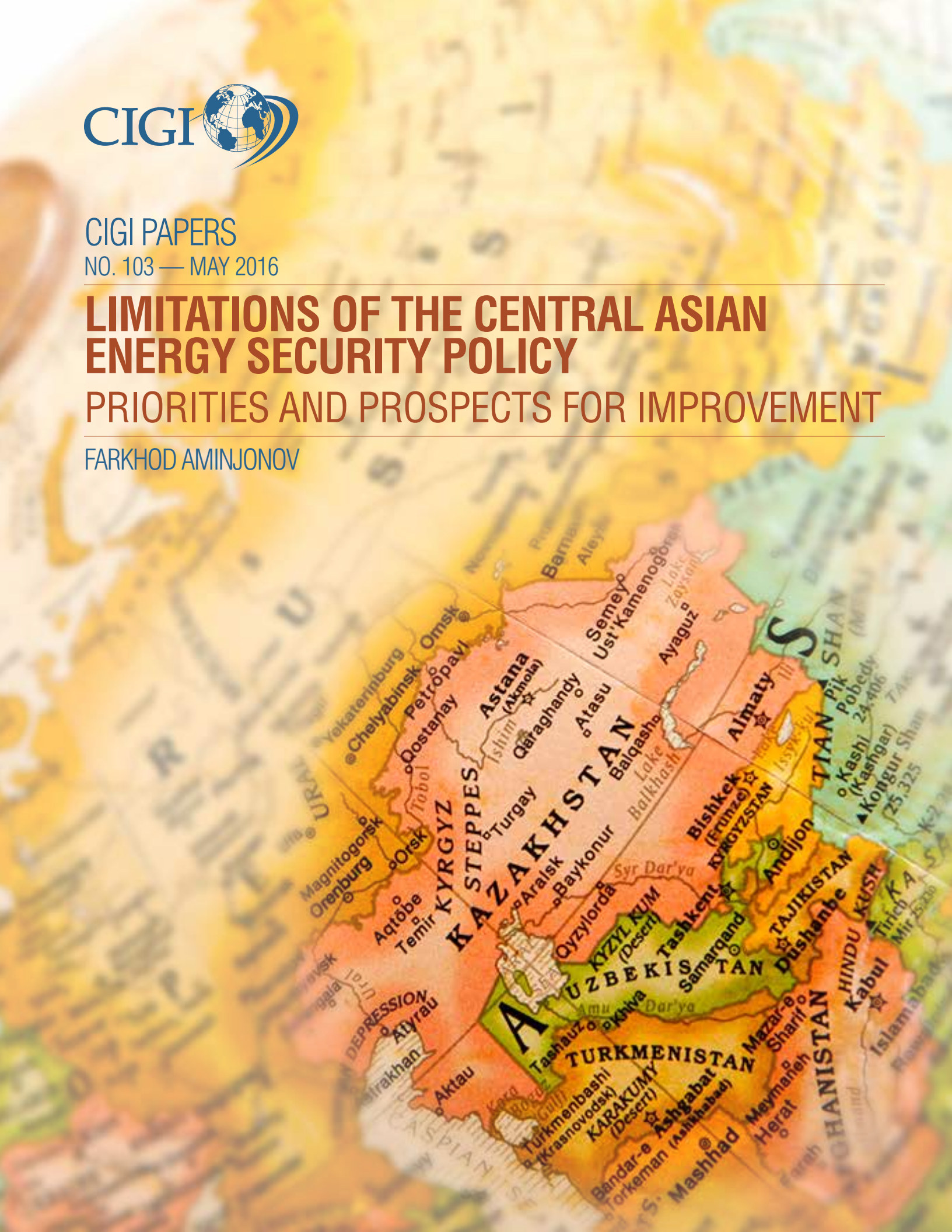

LIMITATIONS OF THE CENTRAL ASIAN ENERGY SECURITY POLICY: PRIORITIES AND PROSPECTS FOR IMPROVEMENT

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ABOUT THE CENTRAL ASIA SECURITY INNOVATION PROJECT

Project Leader: Margaret Skok, a CIGI Senior Fellow and former Canadian ambassador to Kazakhstan, Kyrgyzstan and Tajikistan.

Launched in spring 2015, this project explores regional security and governance in Central Asia, focusing on six major challenges: anti-terrorism, border management, human and narco-trafficking, energy and nuclear security, as well as transboundary water management. Employing a think-tank approach, a series of conferences, workshops, panels and supporting research papers will be used to explore ways to strengthen Central Asia's regional institutional and governance architecture in the security sphere. The project will be undertaken in close consultation with bilateral and multilateral partners, as well as with Canada's own security and defence experts and stakeholders — drawing on their legislative and policy expertise. This is a knowledge-sharing initiative that aims to examine how best to respond to the escalating security challenges in this region.

ABOUT THE AUTHOR

Farkhod Aminjonov is a senior research fellow at the Eurasian Research Institute of Akhmet Yassawi International Turkish-Kazakh University. In his position, he contributes to the Institute's work on energy, economics and security. He has experience conducting a number of collaborative research projects with Canadian, German, Norwegian and Turkish research institutes.

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ACRONYMS

CAES	Central Asian energy system
CAGP	Central Asia China gas pipeline
CAPS	Central Asian Power System
EE	energy efficiency
GHGs	greenhouse gases
GW	gigawatt
HPPs	hydro power plants
kWh	kilowatt hours
kV	kilovolt
m3	cubic metres
MW	megawatt
RES	renewable energy sources
TPPs	thermal power plants
UNDP	UN Development Programme

EXECUTIVE SUMMARY

The Central Asian energy system (CAES) represents a unique case in which — despite a long history of mutually beneficial cooperation — regional actors suddenly decided to pursue myopically self-interested energy policies. In the 1990s and early 2000s, coordinated operation of the national energy sectors ensured energy security for Central Asian states. However, isolationist energy policies focused on full self-reliance and self-control, without the establishment of self-sustaining independent energy systems, significantly compromised the security of the CAES. While most of the Central Asian states, since then, have succeeded in building a country-wide energy-transporting network, they still suffer, to differing extents, from excessive dependence on single sources of energy, lack of production capacity and seasonal variation of power generation.

For example, Uzbekistan's lack of a major gas field significantly limits the state's ability to meet a fast-growing internal demand for energy. Authorities in Tajikistan have failed to utilize its possession of four percent of the world's hydro power potential, because of water-energy nexus disagreements between upstream and downstream states in the region. The Government of Kyrgyzstan responded to energy insecurity by making a difficult decision to sell its strategic gas sector. In Kazakhstan, 80 percent of electricity is still generated by environmentally damaging coal-fired thermal power plants (TPPs). Turkmenistan may have to sell large quantities of gas to external markets at the expense of its domestic consumption.

Apparently, without energy sector development innovations, securing sufficient energy supplies will be problematic. In terms of resource potential from fossil fuels and hydro power, as well as system-level energy governance, Central Asian states and Canada share similar characteristics. Canada has achieved remarkable progress in reducing energy loss through efficiency initiatives, engaging in mutually beneficial trade and developing a mechanism to coordinate provinces' energy sectors. This paper looks at what Canadian best practices in energy security can offer Central Asian states to improve their prospects for energy security.

INTRODUCTION

The CAES — a complex network of gas pipelines and electric power grids, as well as energy producing facilities — was designed and built during the Soviet period, when political borders and sovereignty issues were not obstacles to the coordinated operation of national energy sectors. The resource-sharing mechanism of the CAES ensured reliable and stable energy supplies to meet the demands of both the population and the economy, and continued to do so even after the disintegration of the Soviet Union. However, fundamental tensions between the region's need for water for irrigation and the use of water to generate electricity, along with disputes over the price for fossil fuels, have led to disagreements between upstream and downstream Central Asian states and consequently to the disintegration of an intra-Central Asian energy trade.

This paper highlights how Central Asian governments' current energy policies, which stress self-reliance and self-control without establishing self-sufficient energy systems, are negatively affecting the level of energy security in their respective countries. It points out that establishing self-sustaining national energy systems, attempting to build independent energy-transporting infrastructure and boosting energy production capacity entail complex measures of improving energy efficiency (EE) and increasing the share of renewable energy sources (RES) in the consumption balance. These initiatives, along with an effective regional energy–governance mechanism, can potentially secure sufficient and sustainable energy supplies in the medium to long term. In the short term, however, reinstating intra-Central Asian energy trade can contribute to improving energy security in the region.

Achieving these goals requires an innovative approach to governing Central Asian energy sectors. The paper looks to the Canadian energy governance model, since Canada has achieved remarkable progress in meeting objectives and could provide prospects for innovation that would enable Central Asian states to enjoy sufficiency and sustainability of energy supplies. The CAES, as an entity of independent

states which still have a high level of interdependence, shares a number of similarities with the Canadian system of autonomous provincial-level energy governance within one country. Through a discussion of the similarities and differences between these two systems, the paper attempts to lay the groundwork for future detailed research on the suitability of the Canadian practices as models that would improve energy security in Central Asia.

SECURITY OF THE CAES

Central Asian countries' energy sectors were initially designed to operate within a unified energy system. The system was based on a rational use of energy, with each state contributing different resources to the energy consumption balance of the CAES: Kyrgyzstan and Tajikistan contributed hydro power; Kazakhstan brought oil and coal; Turkmenistan, gas; and Uzbekistan, oil and gas. In this way, energy sectors together formed a complete system in which all Central Asian states enjoyed sufficiency and sustainability of energy supplies for both household consumption and industrial needs, all within the security of the CAES. Also within this resource-sharing mechanism, hydrocarbons-producing Kazakhstan, Turkmenistan and Uzbekistan provided a continuous supply of oil products, natural gas and thermal electricity to the upstream Tajikistan and Kyrgyzstan. In return, Tajikistan and Kyrgyzstan released the required amount of water for irrigation and hydroelectricity to downstream states in the summer.

The Central Asian energy sectors were controlled by Moscow and, during and directly following the disintegration of the Soviet Union, were regulated from Tashkent, the capital city of Uzbekistan. In the 1990s, mutual trust among the Central Asian states in their intergovernmental relations ensured coordinated operation of energy sectors. The system operated on the basis of three closely interlinked pillars, which could become mutually exclusive if member countries' energy sectors were managed without taking into account the interests of others:

- energy security — availability and affordability of sufficient energy supply for the needs of both the population and the economy;
- energy export — moving energy to external markets to generate revenues; and
- water-energy nexus — stability of water supplies for irrigation purposes in exchange for energy resources.

The CAES is a complex system within which various state actors interact. The system entails balancing the energy interests of all states involved. This can make reaching a consensus difficult, but it is necessary if the end goal is to make sure that everyone enjoys energy security. However, new geopolitical and economic challenges — for instance, the successful monetization of the energy trade (i.e., oil products, gas and electricity) while still preserving water-sharing interactions, increasing energy export capacity to external markets at the expense of domestic and intra-Central Asian consumption and attempting to shift from water to energy operation mode of the hydro power sector — have begun to strain the mechanism.

Geographical location and an inherited energy infrastructure have turned Uzbekistan into an extremely important actor, without which any initiative to improve Central Asian energy cooperation would most likely fail (Asian Development Bank 2000). Yet, over the course of the past decade, Uzbekistan has been using its infrastructural, as well as its geographical, advantages for purposes other than to ensure the reliability of energy supplies within the region. Uzbek authorities use their advantages to block electricity and energy supplies to other states to influence foreign policies of the latter.

Uzbekistan was not happy with existing terms of electricity and energy trade, according to which upstream states received the supplies for discounted prices. So it decided to redirect electricity and energy supplies to external markets, which pay higher prices. This has led to the disintegration of the Central Asian Power System (CAPS), which was part of the CAES and consisted of electric power grids only. The disintegration of the CAPS affected the short- and medium-term availability of gas and thermal electricity to upstream states and hydroelectricity supplies to downstream states. The CAPS was designed as a complex network of interdependent entities (country energy sectors) to generate and transmit electricity in the most efficient way. Hydro power produced in northern Kyrgyzstan could not avoid Uzbekistan in reaching southern regions. It was cost-efficient for Kyrgyzstan to use Uzbek power grids to supply electricity to southern regions. Similarly, hydroelectricity generated in the southern parts of Tajikistan could not reach northern territories without bypassing Uzbek territory. Tajikistan also supplied electricity to the very south of Uzbekistan. Turkmenistan was initially an importer of Uzbek electricity, but then turned into an exporter of its own electricity. Kazakhstan both imported and exported power to and from Kyrgyzstan and received supplies from Uzbekistan.

UZBEKISTAN'S ENERGY SYSTEM: NO LONGER SELF-SUFFICIENT

Uzbek authorities believe that Uzbekistan is among the few countries in the world that have sufficient energy supplies to entirely meet their energy needs. Islam Karimov, the president of the Republic of Uzbekistan, speaking on the importance of energy sector development, stated, "the Republic will be fully independent when it gains the energetic [energy] independence" (Omorov

and Lynch 2010, 24). Guided, in part, by this belief in its self-sufficiency, Uzbekistan withdrew from the CAPS in 2009 and, by doing so, compromised reliable gas supply relations within the region. Uzbekistan was the hub of the Central Asian energy infrastructure, and its isolationist energy policy has led to the ongoing breakdown of the entire system, and has affected the energy security in all countries involved. In designing new energy policies, Uzbek authorities have to seriously consider emerging energy security challenges, such as intensifying electricity and gas supply shortages, including in Uzbekistan itself.

In their attempts to establish a maximally secure independent energy system, Uzbek authorities have prioritized meeting the country's energy needs entirely from its own resources, keeping prices affordable for domestic consumers, and increasing the volume of gas and electricity exports. The following circumstances, however, affect the contribution of the above-mentioned policy priorities to improving Uzbekistan's energy security:

- Uzbekistan's energy sector and, consequently, its energy security are highly dependent on a single source of energy — natural gas. Most of the gas produced in the country, however, is consumed domestically. Thus, any attempt to increase gas export to external markets is coming at the expense of domestic consumption.

- The government of Uzbekistan is subsidizing its gas sector in order to keep prices affordable. Low domestic prices make it impossible to generate high revenues and reallocate sufficient funds for the development of any RES that will secure long-term energy supplies. Moreover, a subsidized gas market makes the relatively expensive RES unattractive for private investors.

- The country's energy infrastructure is outdated and existing energy resources are inefficiently used, affecting its ability to ensure sufficiency of energy supplies for the population and to meet its economic needs.

Uzbekistan has a long history of gas sector development. In 2013, Uzbekistan celebrated the sixtieth anniversary of its gas industry, and its current natural gas reserves are estimated to be 1.1 trillion cubic metres (m^3), placing it third in Central Asia after Kazakhstan (1.5 trillion m^3) and Turkmenistan (17.5 trillion m^3) (British Petroleum Company 2015, 20). According to the estimates of Uzbekneftegaz, a state-owned oil and gas company, 60 percent of Uzbekistan's territory has the potential for oil and gas extraction. Around 50 percent of 108 gas fields are currently being exploited in full and 35 percent are newly introduced or being developed for use in the near future in the country (Uzbekneftegaz 2014). Taking into account the fact that Uzbekistan has been extensively using its gas potential, no production boom of gas can be expected in the future. As the single source of energy, natural gas already accounts for approximately 85 percent of the primary energy consumption, thus limitng Uzbekistan's physical ability to significantly increase its gas export capacity (US Energy Information Administration n.d.).

Uzbekneftegaz supplied 48.8 billion m^3 of gas out of a production of 57.3 billion m^3 to domestic consumers in 2014 (British Petroleum Company 2015). A high rate of gas consumption can come from an excessive reliance on gas for electricity generation, heating and fuel supply. As well, outdated — and therefore inefficient — gas production, distribution and consumption facilities, in combination with a large population (around 30 million, nearly half that of Central Asia), are key factors. For instance, installed capacity of all electric power plants in Uzbekistan exceeds 12.3 gigawatts (GW), which equals 50 percent of all generating capacities of the interconnected CAPS, with TPPs contributing more than 11 GW and hydro power plants (HPPs) around 1.3 GW (Asian Development Bank 2014). Eighty-seven percent of all electricity is produced in mostly gas-fired TPPs. Substantial consumption with limited production capacity implies that any initiative to increase gas export to external customers will negatively impact gas supplies for domestic consumers.

Between 2007 and 2011, Uzbekistan had been annually supplying approximately 10–15 billion m^3 of gas to Russia (Sharip 2012). Gas supplies of 3.5–4.5 billion m^3 within the Central Asian region have been slowly decreasing since 2010 (Bisenov 2013). Uzbek authorities have recently agreed to reach an annual export volume of 10 billion m^3 through Line C of the Central Asia China gas pipeline (CAGP) (Chinese National Petroleum Corporation n.d.). However, inefficiencies due to the outdated natural gas infrastructure, growing demand for energy domestically and the absence of development in major natural gas reserves are indications of Uzbekistan's physical incapability to increase its gas export capacity without compromising domestic consumption. In an environment of a highly subsidized domestic energy market, however, Uzbek authorities will remain interested in increasing gas exports to external markets. Currently, Uzbek authorities are increasing gas export to China by reducing exports in all other directions, including Russia (Mamadova 2015).

As mentioned before, the Uzbek government subsidizes its gas sector. Uzbek household consumers paid around US$50 per 1,000 m^3 of gas in 2014-2015, while the country has recently been exporting gas to external markets for five to eight times that price. The governmental gas subsidies cost the country's budget almost US$10 billion annually (International Energy Agency n.d.). These subsidies make the gas supplies relatively affordable for the population, but they also have a number of negative effects on the sustainability of energy supplies. First, the government's

interest in increasing the volume of gas export is at the expense of domestic consumption because external customers pay more. Second, a subsidized domestic gas market discourages private actors from active engagement in gas sales and distribution. Third, subsidies are considered one of the major challenges to attracting investments in the development of RES in Uzbekistan. While the technical potential for renewable electricity generation is significant,[1] it is currently extremely underdeveloped since its share does not exceed two percent (excluding hydro power) of overall electricity production (UNDP n.d.).

Inefficient energy processing and delivery facilities, which account for 60 percent of primary energy loss (World Bank 2013b), are the biggest challenges for Uzbekistan in establishing a self-sufficient energy system. Losses caused by outdated and inefficient gas production and transportation infrastructure cost Uzbekistan approximately 4.5 percent of its GDP every year. Gas flaring alone accounts for 1.8 billion m^3 of gas loss in the country. Uzbekistan is rated among the top 20 gas-flaring countries in the world (Kochnakyan et al. 2013, 25). In this regard, larger-scale EE initiatives can significantly contribute to improving the level of energy security in Uzbekistan.

Uzbekistan, with its considerable gas production capacity, has avoided severe and prolonged electricity and fuel supply crises. However, the country's energy security should not be an issue of survival, where the majority of the population receives electricity for lighting but without even the possibility of running heaters or air conditioners; rather, energy security should be a matter of sufficient gas and electricity supplies to meet both economic and population needs for the foreseeable future. Thus, introducing market mechanisms into the gas sales and distribution sector, developing RES and investing in EE initiatives also require immediate policy priority by the authorities. Alternatively, Uzbekistan can benefit from reinstating intra-Central Asian electricity trade and importing hydroelectricity from neighbouring countries upstream.

TAJIKISTAN'S INDEPENDENT ENERGY SYSTEM: INSUFFICIENT POWER PRODUCTION

Tajikistan's huge potential for hydroelectricity production accounts for more than 527 billion kilowatt hours (kWh) annually — four percent of the worldwide hydro-power potential. By considerably increasing its hydroelectricity production, Tajikistan is not only capable of improving its level of energy security, but also of providing large quantities of relatively inexpensive and green electricity supplies for the whole of Central Asia. However, Tajikistan currently produces only 16.5 billion kWh per year (four to five percent of the potential reserves) using just half of its installed 5,190 MW generation capacity (Ministry of Foreign Affairs of the Republic of Tajikistan n.d.). Tajikistan continually experiences severe energy shortages in the winter months because of seasonal variations in hydroelectricity production. Complete isolation from the CAES with no other means of importing energy/electricity has forced the government of Tajikistan to pursue establishing an independent national energy system.

To free itself from high dependence on neighbouring Uzbekistan, the government of Tajikistan has decided to prioritize the following tactics: establishing countrywide (north-south) electricity transmission lines (since within the CAPS, some areas of the country were only connected to the electric power grids of Uzbekistan), and increasing electricity production by attracting investments to share the construction costs of the world's highest Rogun dam and HPP. The analysis shows, however, that the overall contribution of these initiatives along the short to medium term is rather limited.

Like all other Central Asian states, Tajikistan's energy sector was designed to operate within the CAES, thus, the cutting off of the Uzbek gas and thermal electricity supply left Tajikistan in complete isolation and severely affected the level of its energy security, in particular in the winter months (December to March). According to one of the UNDP reports, more than one million people currently suffer from frequent and prolonged blackouts in Tajikistan (World Bank n.da). Despite the fact that households in Tajikistan spend around 50 percent of their total income on energy in the winter (UNDP 2013, 10), 70 percent of the population suffers from electricity and gas supply shortages during the cold months (World Bank 2013a).

Tajikistan was completely cut off the electric power grid of Uzbekistan in 2011. In an attempt to establish a countrywide power transmission network, the government has decided to build (with the support of outside investment) several 500 and 220 kilovolt (kV) south-to-north electricity transmission lines (President of the Republic of Tajikistan 2008). These transmission lines, however, cannot solve the problem of winter electricity shortages, as they only transport electricity and do not add power production capacity. Therefore, the Tajik authorities have placed much hope on the construction of the Rogun dam and HPP, which would not only double the current electricity production volume, but also solve the problem of seasonal (winter) variation of hydroelectricity generation.

There are around 300 mini (less than 1 MW) and small (1–3 MW) HPPs in Tajikistan; however, it is only the currently operating 11 medium and large HPPs that

1 The United Nations Development Program (UNDP) (n.d.) estimates that biomass energy could provide 800 megawatts (MW) of electricity, solar power (photovoltaic system) could provide 593,000 MW and wind power could provide 1,600 MW. Uzbek authorities, however, cannot afford a large-scale expansion of the RES, which requires additional investments, qualified personnel and technologies.

can considerably increase the power production. While hydroelectricity accounts for 98 percent of the total power production in the country, large and medium HPPs generate 97 percent of that electricity (UNDP 2013, 6). At 300 m high, Nurek HPP is the largest plant (3,000 MW) in Central Asia, and sits in the west of Tajikistan. Tajik authorities are rushing to complete the construction of the 335 m high Rogun dam and HPP, with a capacity of 3,600 MW, to produce an additional 13 billion kWh annually (World Bank 2014). This project, however, has turned into a major source of conflict in Central Asia.

Around 80 percent of water in Central Asia is generated in upstream Tajikistan and Kyrgyzstan, and more than 85 percent of it is consumed by downstream Kazakhstan, Turkmenistan and, in particular, Uzbekistan. Such distribution of water perfectly suits downstream countries' interests, but the authorities of Tajikistan and Kyrgyzstan believe it is unfair and advocate for non-interference in their energy/water policy. To solve the seasonal power production variation problem, upstream states have to accumulate water in the newly built dams in the summer to be able to release it in the winter. To fill up the new dams, Tajikistan will take more water from the river and thus may affect the water distribution balance for downstream countries. The Government of Tajikistan argues that the construction of large HPP facilities is the sovereign right of the state, and will be in full compliance with international law (Klimenko 2011). Uzbekistan, however, which receives around 50 percent of the total water withdrawal from transboundary rivers in the region, strongly opposes any progress in the construction of large HPPs in upstream Tajikistan and Kyrgyzstan (Sehring 2009, 71).

While the Rogun HPP can solve the problem of seasonal variation and deficiency of electricity production, disagreement between Central Asian upstream and downstream countries over this project affects the majority of investment proposals that suggest sharing the construction costs with outside investors. In a 2014 speech, Deputy Prime Minister of the Republic of Uzbekistan Rustam Azimov highlighted that "Uzbekistan will never and under no circumstances give its support to this [Rogun] project" (Daly 2015). Uzbekistan fears that the proposed high dam could lead to undue interruptions of water release and jeopardized safety of the dam that could easily result in massive flooding of countries along the stream (Ministry of Foreign Affairs of the Republic of Uzbekistan 2015).

Construction of the Rogun dam and HPP started in the late 1970s and today requires US$3–6 billion in additional investments to be completed, a sum that the Tajik government can hardly afford to cover on its own. Tensions between Uzbekistan and Tajikistan have caused escalated security risks and, as a result, foreign investors are not rushing to take part in the project (International Crisis Group 2011, 42). The few investors who are willing to provide funding insist on terms that do not serve Tajikistan's best interests. Tajikistan has already refused to agree on investment terms offered by Russian companies, which demanded a higher stake — up to 75 percent — in profit distribution until investments are returned. Tajik authorities were counting on the Techno–Economic Assessment Studies and the Final Report of the Environmental and Social Panel of Experts of the Rogun dam — assessments that were conducted by the World Bank–supported group of independent experts from Coyne et Bellier, Electroconsult and IPA — to resolve the uncertainties over the potential security threats of the dam. According to the assessments, the 335 m high Rogun dam would be the most economically efficient dam with no major impact on the surrounding ecosystem (World Bank 2014). Even so, Uzbekistan is still opposing the structure, arguing that the assessment reports did not fully reflect the negative effects of the dam for downstream Central Asian countries, in particular Uzbekistan. Thus, despite the fact that Tajikistan possesses countrywide power transmission lines, the country's energy security is still compromised, due to a lack of electricity production. Moreover, until the water-energy nexus problems in the region are solved, Central Asian states may not expect large HPPs to contribute to the sustainability of energy supplies in the near future.

A short-term perspective shows that investment in the updating of outdated hydroelectricity-producing facilities in Tajikistan would contribute to improving the energy security of the country. According to some estimates, modernization of these facilities can potentially reduce the production and distribution losses by 30 percent (UNDP 2013, 1). Tajikistan only uses half of its total installed power generation capacity due to inefficient energy infrastructure and irrational use of HPPs (see Table 1).

Table 1: Operating Electric-Power-Generating Plants in Tajikistan – January 1, 2012

Name	Technical Capacity (MW)		
	Designed	Available	Operating
Nurek HPP	3,000	2,385	1,625.3
Baipaza HPP	600	450	273.5
Dushanbe thermal electric plant	198	100	4.9
Yavan thermal electric plant	120	–	–
Kairakkum HPP	126	104	83.8
The Vakhsh cascade of HPPs	285	211	139.61
The Varzob cascade of HPPs	25.36	8	7.1
Pamir–1 and –2 HPPs	42	39	37
Malaya Gidroelektrostanciya	13	11	10
Sangtuda 1 HPP	670	670	440
Sangtuda 2 HPP	110	110	40
Total	**5,190**	**4,088**	**2,661.21**

Data source: UNDP (2013, 12).

Not only has the aging infrastructure reduced the power production capacity, but being largely isolated from international transmission grids has forced Tajikistan to discharge water in the water run-of-river-type HPPs without producing electricity in the summer. Tajikistan is only connected to Afghanistan via newly introduced 110 and 220 kV power transmission lines and can potentially export electricity to its South Asian neighbours via a planned Central Asia South Asia (CASA-1000) power transmission line — a project that has not yet been started because of lack of financing, security concerns in Afghanistan and no serious commitment from the participating states of Kyrgyzstan, Tajikistan, Afghanistan and Pakistan (World Bank n.db). In this regard, by reinstating intra-Central Asian trade and improving efficiency of power-producing facilities, Tajik authorities can improve the level of energy security in the country.

KYRGYZSTAN: EXCESSIVE RELIANCE ON EXTERNAL STATE ACTORS

Kyrgyzstan has the potential to produce up to 142.5 billion kWh of hydroelectricity annually, which places it third among post-Soviet countries, after Russia and Tajikistan (Asian Development Bank 2000). The share of hydroelectricity in the overall electricity production of Kyrgyzstan was 60–65 percent in 1990 and reached 90 percent in 1998 (Mateev and Anderson 1999). It remains above the level of 90 percent with only a limited amount of electricity being generated by TPPs, mainly in the Osh region (southern Kyrgyzstan) (Karibekov 2014). However, the fact that Kyrgyzstan has become extremely dependent on hydro power over the last two decades, with still limited hydroelectricity production capacity, negatively affects the level of energy security of the country. In an attempt to avoid an energy crisis, the Kyrgyz government has prioritized several measures, including equal distribution of the available electricity through the establishment of countrywide electric power transmission lines, increasing energy production capacity and reliance on Kazakhstan and Russia to help meet its peak winter energy demands. Each of these prioritized measures, however, has serious deficiencies.

The largest hydroelectricity-producing facility in the country is Toktogul (central). Toktogul HPP covers one-third (1,200 MW) of the total installed power production capacity of 3,786 MW in Kyrgyzstan (Kouzmitch 2013, 31). Toktogul may not be the largest HPP in terms of power generation capacity in Central Asia, but it is the only reservoir capable of accumulating enough water (19.5 km^3) to produce electricity in both the summer and winter months (Food and Agriculture Organization of the United Nations 2012, 11). However, overuse of water in Toktogul and other reservoirs on the Upper Naryn cascade in recent years has negatively affected their ability to keep up with domestic demand. Kyrgyzstan produced 14 billion kWh in 2014, consumed it all and still experienced electricity shortages. It was expected that the country would only produce 11.6 billion kWh in 2015, while the consumption needs would amount to 15.8 billion kWh (Otorbaev 2014). In 2015, however, the winter was warm and glaciers melted faster comparing to previous years, which resulted in a larger quantity of river water flow into the reservoirs. By taking full advantage of this extra water, the Kyrgyz government produced more electricity to meet both domestic and external demand. Yet glaciers are rapidly receding and the water stock may reach its critical (low) level in the near future thus negatively affecting the country's ability to generate hydroelectricity (Plekhanov 2016).

The largest hydro-power-producing facilities are located in the north of the country. To overcome the consequences of uneven distribution of electricity production, the Kyrgyz government, with the support of international donors, has recently put into force the 500 kV Datka–Kemin electric power transmission line, which connects the southern and northern parts of the country (Karimova 2015). However, since the overall electric power production capacity does not fully meet the country's needs, this transmission line will not entirely solve the problem of energy shortages.

Construction of large HPPs can significantly increase availability of electricity in the country. One of the most promising projects considered by the government is Kambarata-1 HPP, with a power production capacity of 1,900 MW (Electric Power Stations 2014). Despite the fact that Kambarata-1 was designed by Tashhydroproject

Institute (Uzbekistan) back in the 1980s, Uzbek authorities now oppose the construction of the dam because they fear that the initial filling of the reservoir would reduce the availability of water for irrigation in Uzbekistan. In addition, the power production coefficient of Kambarata-1 is low (31.5 percent) (Otorbaev 2014) and it is too expensive for the Kyrgyz budget (US$5.2 billion) (Karibekov 2014); therefore, there is little chance of implementation in the near future. Moreover, the Kyrgyz government has recently denounced agreements with the Russian Inter RAO and RusHydro companies due to their constant delays in complying with their obligations on the construction and exploitation of the Kambarata-1 HPP and Upper Naryn cascades. So far, no one has financially committed to the construction of the two largest hydro-power complexes in the country.

Kyrgyzstan's electric power sector consists almost entirely of water run-of-river-type HPPs, which can generate electricity mostly in the summer. To meet its winter electricity needs, the Kyrgyz government has to either develop its own limited fossil fuel potential and build new TPPs or secure stable thermal electricity imports from Kazakhstan and Uzbekistan. Although it possesses around 10 billion m^3 of proven gas reserves, due to geographical constraints for extraction and transportation, Kyrgyzstan produces only 30 million m^3 of gas and imports the remaining 270 million m^3 annually (Eni 2014). Gas supply infrastructure in the region is constructed in such a way that only Uzbek gas can reach Kyrgyzstan. Kyrgyzstan imports 90 percent of its domestically consumed gas from Uzbekistan (*The Times of Central Asia* 2014). Thus, when Uzbekistan cut off gas supply to Kyrgyzstan in 2013, the country experienced severe energy shortages. In an attempt to restore the supplies, the Kyrgyz government has taken what some politicians consider an extreme measure. Kyrgyzstan ratified an agreement with Russia, according to which the entire gas sector of Kyrgyzstan (including the national company Kyrgyzgaz, gas pipelines, gas-distributing stations and underground gas storage facilities) was sold to Gazprom for US$1 in return for forgiveness of Kyrgyzgaz's debts (Kazenergy 2013). It is expected that Russia will now be able to secure reliable supplies of Uzbek gas to Kyrgyzstan. Critics of the deal fear that selling Kyrgyzgaz gives Russia excessive political leverage over Kyrgyzstan. A spokesman for then Prime Minister Zhantoro Satybaldiyev, Melis Erzhigitov, replied to criticism with, "Kyrgyzstan needs gas, not Kyrgyzgaz" (Kalybekova 2013). By saying this he highlighted the necessity to reform the gas sector, which is not capable of meeting domestic energy needs.

The best way to improve the level of energy security in Kyrgyzstan in the short term is to deal with the problem of energy inefficiency. Fifty-three percent of electric power generation facilities in the country are over 40 years old, while another 37 percent are over 30 years old (Otorbaev 2014). Electric power transmission and distribution losses in Kyrgyzstan accounted for 22 percent in 2012 (World Bank 2014). Even though electricity losses have been slowly decreasing over the past several years (2008-2009 losses had reached 50 percent of the total electricity generated in the country), they are still unreasonably high (Abdurasulova, Krasov and Sulaimanova 2013, 21).

KAZAKHSTAN'S ENERGY SECTOR: NOT YET FULLY DIVERSIFIED

Not only does Kazakhstan enjoy an abundance of hydrocarbon reserves, but it is also the largest producer of oil and coal in Central Asia. To exploit the country's potential, the government is interested in increasing its oil and gas production, as well as its export capacity. Despite the fact that over the past two decades the level of energy production has increased significantly, several major obstacles prevent Kazakhstan from fully enjoying energy security. The issue of uneven distribution of energy and power-producing capacities is being addressed through the establishment of a countrywide energy-transporting infrastructure (north-south power transmission lines and the Beineu-Bozoi-Shymkent gas pipeline). Energy security in Kazakhstan, however, is still at risk, with excessive reliance on an environmentally damaging energy source (coal) for electricity production, and highly inefficient energy-consuming facilities.

Kazakhstan's gas reserves total 1.5 trillion m^3 (British Petroleum Company 2015). However, it consumes only one-quarter of its overall gas production because the country lacks extensive internal pipeline networks that could transport gas from resource-rich regions to distant population centres. Kazakhstan produced 42.3 billion m^3 of gas in 2013; 22.8 billion m^3 were supplied for domestic consumption and exported to external markets, while the rest was pumped back into oil wells to enhance oil production (Agency on Statistics of the Republic of Kazakhstan 2013). Almost all gas fields in Kazakhstan are located in the western part of the country, far from major population centres (i.e., Almaty, Astana, Shymkent). Twenty-seven percent of gas and condensate resources are in Atyrau (west), eight percent in Aktyubinsk (north-west), 50 percent in West Kazakhstan and 10 percent in Mangistau (south-west) regions (Konirova 2013). However, the lack of extended gas supply networks did not have a dramatic impact on the overall gas consumption in Kazakhstan, because gas shortages in some regions are compensated by gas imports from and swap deals with neighbouring Uzbekistan and Russia (Bisenov 2013). Currently, Kazakhstan has reached the final stage of construction of the Beineu–Bozoi–Shymkent pipeline, which is designed to connect the gas-producing Kyzylorda region (south) with the major gas-consuming regions of Shymkent and Almaty (Sat Oil 2015). This pipeline is being

constructed with considerable Chinese investment, and is expected to fill the CAGP with Kazakh gas. Given Central Asian producers' hunger for generating revenues by increasing energy export to external markets, there is no guarantee that the export via the Beineu–Bozoi–Shymkent pipeline would not be prioritized over the gas supply to Kazakhstan's southern regions.

The electric power system of Kazakhstan, also designed in the Soviet era, was initially divided into three zones: northern, southern and western. While the northern zone is largely connected to the Russian electric power grids, the southern zone operates in parallel with Uzbek and Kyrgyz power systems. Most of the country's electricity (72.7 percent) is produced in the northern zone, mainly in inexpensive coal-fired TPPs in the town of Ekibastus. To solve the problem of uneven distribution of electricity production and also to cover the peak electricity needs of the southern regions, in 1998 authorities initiated the construction of the north-south 500 kV transmission line, as well as new TPPs in the city of Balkhash and the region of Zhambyl (Adilet 2010). However, overall electricity production in Kazakhstan is still highly dependent on environmentally damaging coal and can hardly be considered sustainable.

The government of Kazakhstan acknowledges, at least officially, that the country has to move beyond the brown economy, which is dependent on electricity produced in coal-fired TPPs. To achieve this objective, the government has adopted a strategy — Kazakhstan Strategy 2050 — that has made diversification of energy sources in the overall consumption balance a priority. According to the strategy, it is expected that the RES will meet up to 50 percent of Kazakhstan's total electricity needs by 2050 (Government of the Republic of Kazakhstan n.d.). However, very few experts dare to predict how Kazakhstan's energy sector will look in 35 years. Unless the government promotes wide-scale RES development initiatives by attracting investments and introducing new technologies, the country may not be able to meet the 50 percent benchmark. Currently, 80 percent of electricity is generated by environmentally damaging coal-fired TPPs, while the share of RES is still less than one percent (International Renewable Energy Agency n.d).

In the short run, contributions to the sustainability of Kazakhstan's energy sector may come from the EE initiatives by reducing energy consumption and inefficient use of energy resources. President Nursultan Nazarbayev has remarked that "in Kazakhstan nobody saves anything, because electricity, heat and gas flow cheaply" (International Crisis Group 2011, 34). He also said that "the price of electricity will continue to increase, whether you want it or not; the price of gas will be getting close to world prices as well; [so he recommends that industries and people] employ energy efficient technologies" (Jakeev 2014). Currently, 50 industrial enterprises consume 40 percent of all energy. Since there is a potential to decrease energy consumption by these enterprises by 30–40 percent, Kazakh authorities can improve sustainability of the energy sector by promoting EE initiatives, such as the use of energy-efficient equipment and materials and voluntary agreements on energy saving with the large industrial enterprises.

TURKMENISTAN: PITFALLS OF ENERGY EXPORT DIVERSIFICATION

Since the end of the Soviet era, Turkmenistan has, to some extent, successfully established an independent energy system by extending gas transportation networks and increasing gas-fired thermal power generation capacity. Currently, the main energy policy priority for the government is to significantly increase gas production/export capacity and to get access to diversified external markets. Turkmenistan's energy sector, however, is almost completely dependent on gas supplies for both internal and external markets. With the current level of gas production, it might be quite challenging for Turkmenistan to supply gas in all directions, including to domestic consumers.

Turkmenistan enjoys the fourth-largest reserve of natural gas (17.5 trillion m^3), after Russia, Iran and Kuwait (British Petroleum Company 2015). The Turkmen government has an even more optimistic estimate, suggesting reserves of 24 trillion m^3 (Ministry of Foreign Affairs of Turkmenistan n.d.). The first gas-producing facility was put in place in the 1970s (Institute of Strategic Studies and Analysis 2010, 50) and the country is currently developing around 30 gas deposits in 1,000 wells, including the second largest in the world, Galkynysh gas field (Yaziev n.d.). However, the energy sector of Turkmenistan is extremely dependent on gas. Gas is used to provide heating services and fuel supplies. The electricity generation in the country comes almost entirely from gas-fired TPPs, with hydro power contributing only 0.02 percent (Zhang 2013). Currently, there are nine state-owned TPPs with a capacity of 3,984.2 MW producing electricity in Turkmenistan (Ministry of Oil Industry and Mineral Resources of Turkmenistan n.d.). Electricity production in the country is constantly increasing through the burning of more gas, thus making the country more and more dependent on gas consumption.

Having experienced the negative consequences of almost complete dependence on the Russian pipelines to move gas to external markets, Turkmenistan has prioritized diversifying gas export routes in all possible directions. Turkmenistan's landlocked position, however, not only limits its access to global energy markets, but also makes pipelines the only economically efficient way to transport resources. Building pipelines requires significant upfront investments, most of which are often covered by external customers. Because new international gas pipelines need

to operate for at least 15 to 20 years before investments can be recouped, Turkmenistan would have to comply with long-term gas supply obligations (Shaffer 2009, 38). The deputy minister of oil and gas industry and mineral resources, Kurganguly Yaziev (n.d.), highlighted gas export diversification roots currently prioritized by the government:

- Turkmenistan-China: 65 billion m^3;
- Turkmenistan-Russia: 10 billion m^3, but the existing pipeline capacities could allow exporting much more (up to 45 billion m^3);
- Turkmenistan-Iran: 20 billion m^3;
- Turkmenistan-Afghanistan-Pakistan-India pipeline: 33 billion m^3 (projected);
- Turkmenistan-Europe: 30 billion m^3 through the Trans-Caspian Gas pipeline (projected).

An attempt to keep up with growing external demand, however, can limit the availability of sufficient gas to domestic consumers. On the XVII People's Council in 2006, the government adopted the "Oil and Gas Industry Development Programme of Turkmenistan for the period till 2030," according to which it outlines its goal to reach the level of 230 billion m^3 annual gas production by 2030 (Ministry of Oil Industry and Mineral Resources of Turkmenistan 2015). Many experts, however, doubt that Turkmenistan can reach the targeted production level due to the often-unreliable flow of investments and technological constraints.

Turkmenistan is increasing the volume of gas exported to China only by significantly dropping gas supply in all other directions. In 2014, Turkmenistan produced 76 billion m^3, of which 45 billion m^3 was exported (Yaziev n.d.). Thirty-five billion m^3 (out of 45 billion m^3 total exported) went to China. At the same time, Turkmenistan decreased the volume of export to Russia from over 40 billion m^3 in 2007 to 10 billion m^3 in 2014. In 2015, gas export was again reduced, to 4.5 billion m^3, and supplies were completely stopped in January 2016. When there are no options left to decrease gas exports in other directions, Turkmenistan will most likely dare to lower gas supply for domestic consumers. Thus, an attempt by the Turkmen government to take full advantage of the country's existing gas-exporting capacity may negatively affect domestic energy consumption.

CANADIAN BEST PRACTICES IN GOVERNING THE ENERGY SECTOR

The analysis of Central Asian energy security policies clearly shows that the governments prioritize the establishment of independent energy systems and want to considerably increase energy as well as power-production capacity in their respective countries. It also highlights that there are other pressing issues for the governments to ensure sufficiency and sustainability of energy supplies; these include diversification of primary energy consumption by source (fossil fuels, hydro power, renewables) and improving EE. Most importantly, the analysis points to the fact that short-term availability of energy supplies is highly dependent on reinstating intra-Central Asian energy trade within the framework of a regional energy-governing mechanism. Implementing market-based mechanisms, developing a balanced energy portfolio and establishing system-level energy governance (with federal government monitoring and to some extent controlling energy sectors of the provinces), however, may require innovative approaches. The experiences of countries that have achieved notable progress in these directions would be quite useful. In this regard, the Canadian best practices in energy governance stand out.

The Canadian authorities have established a system-level energy-governance mechanism, which encourages provincial governments to coordinate energy policies to ensure stability and reliability of energy supplies as well as the development of resources in the most efficient and rational way. Provincial governments are granted the power, by the Constitution Act of 1867, to own and manage directly most of their ground resources (International Energy Agency 2010, 9). While each province enjoys almost complete autonomy over the development of its energy resources, the federal government is responsible for the construction and operation of international power transmission lines and oil and gas pipelines, as well as the international energy trade. To ensure coordination among autonomous entities of the system, Canadian authorities have established several platforms for negotiations and agencies with enforcement mechanisms to implement regional energy projects, including Natural Resources Canada, the National Energy Board, Environment Canada, the Canadian Nuclear Safety Commission, Council of Energy Ministers and so on (ibid., 27–30). These institutions promote energy policies based on three fundamental principles: market orientation; respect for the authority of the provinces; and, where necessary, intervention in markets to achieve specific policy objectives (ibid., 31-32).

Quite similar to Central Asian countries, Canada enjoys a variety of both conventional and alternative energy sources. Canada is placed third in the world for its proven crude oil reserves, nineteenth for natural gas and fifteenth for coal reserves. It is also one of the largest producers of energy resources overall. It is the fifth-largest oil producer, the fifth-largest gas producer and the twelfth-largest producer of coal (Ministry of Natural Resources 2014, 3). Despite a number of similarities with Central Asian countries in terms of energy potential and production capacity, Canada differs in its successful development of a diverse and balanced portfolio of energy resources. In

this regard, Central Asian states can potentially benefit from Canada's experience in: balancing its energy export-import, so that the energy supplies to meet domestic needs are not compromised; diversifying primary energy supplies by source (oil, gas, coal, hydro, renewables and nuclear); generating electricity from sources that do not emit greenhouse gases (GHGs); improving EE by introducing innovative technologies; and establishing an energy governance mechanism to promote cooperative dynamics among entities with a high level of autonomy over the development of their energy sectors.

For a fossil-fuels-rich country, Canada has developed quite a diversified energy portfolio. Non-GHG-emitting sources of energy constituted only 28 percent of the total energy consumption balance in Canada in 2013 (ibid. 2014, 16). That same study showed that as the sixth-largest electricity producer (Ministry of Natural Resources 2014, 3), 62.6 percent of all produced electricity in the country was generated from hydro power, 13.3 percent from nuclear energy, 3.4 percent from other RES and only 20.7 percent from environmentally damaging oil, gas and coal in 2013 (Ministry of Natural Resources 2015). Canada has a long history of hydro-power sector development, which could be of importance for Central Asian upstream states seeking to exploit their huge hydro-power potential.

The Canadian government pays a great deal of attention to EE. As a result of EE initiatives (for example, introducing new technologies to reduce energy losses during the production, transportation and consumption stages), Canadians succeeded in improving efficiency indicators by 24.2 percent (saving CDN$37.4 billion) in 2012 compared to 1990 (ibid. 2015). In this regard, Central Asian states can benefit from the Canadian experience in research and development and in introducing innovative technologies to improve sufficiency of energy supplies in the region.

The underlying principle of rationality — missing in the Central Asian context — determines energy export-import interactions within Canada and externally. Possessing large quantities of energy and considerable production capacity, Canada is also one of the major suppliers of resources to external markets. The country exports 74 percent of its oil, 57 percent of its gas, 57 percent of its coal and 85 percent of its uranium production. At the same time, 35 percent of oil, 32 percent of gas and five percent of coal is imported for domestic energy consumption, thus maintaining stability of energy supplies for both the population and the economic/industrial needs of the country (Ministry of Natural Resources 2014, 5).

The analysis of Central Asian energy security has shown that, to a different extent, regional producers fail to balance meeting domestic needs with increasing energy export capacity. On the one hand, there are external actors that enjoy political and economic leverage over regional producers, and that influence foreign as well as domestic energy policies of the Central Asian countries. The Russian government has effectively used Central Asian exporters' dependence on the Russian energy-transporting infrastructure to apply discriminatory pricing policies against them and ensure stability of energy supply flows to and through Russia. Steering away from the dependence on Russia, as seen above, Central Asian exporters are now falling into the same trap of excessive dependence on China. Loan debts and contractual obligations to increase gas exports to China force regional producers to boost the volume of gas supply by decreasing exports in all other directions, including Russia, Iran and even domestic markets. On the other hand, and perhaps most importantly, the Central Asian ruling elites, having retained control over energy production and transportation industries with quite limited accountability to the people, try to take maximum profits out of mismanaging energy sectors while remaining in power. Since the contribution of highly subsidized domestic energy markets to the state budget and apparently to elites' personal well-being is limited, these elites will remain interested in selling energy out to external markets to obtain revenues in hard currencies.

The above-mentioned characteristics of energy governance in Central Asia are major obstacles for the government to introduce the Canadian model, which might fail to properly function in the region, given the extremely low level of government accountability and the high vulnerability to external influence. Energy insecurity in some Central Asian countries, however, has been escalating over the past several years. Such insecurity might lead to political and social instability, which would compromise elites' authority — something they do not want to happen. But, to achieve greater energy security in their respective countries, governments have to reconsider energy policy priorities, which are currently short-term oriented and only promote the interests of particular groups. This might be a difficult task to accomplish, but is a necessary one if the end goal is to make sure that everyone enjoys energy security for the long term. Once the understanding of the necessity for long-term energy security objectives is achieved, Central Asian governments would be able to establish a well-functioning regional energy governance mechanism to sustain cooperative dynamics among Central Asian countries and balance energy export-import relations.

CONCLUSION

Unlike the Canadian government, which can, to a considerable extent, impose its will on the provinces or at least on the management of interprovincial energy trade, Central Asia no longer has a supranational governance body. In addition, Central Asian energy sectors can hardly be considered market oriented; however, worsening energy insecurity might force state actors to reconsider their policy priorities, thus creating the opportunity for

Central Asian energy governments to use the Canadian model to improve coordination among energy actors and ensure parallel operation of now isolated but still interdependent national energy systems. This would require more detailed and extended research comparing the two systems within specifically designed criteria and analyzing the compatibility of the Canadian model for the Central Asian context and, perhaps, the urgent necessity for major reforms in the latter.

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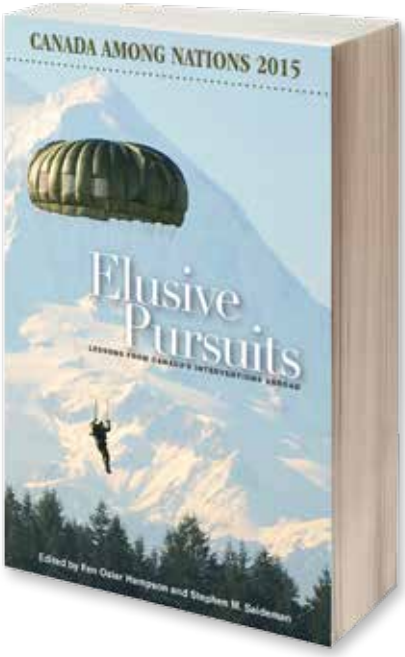

Canada Among Nations 2015

Elusive Pursuits

LESSONS FROM CANADA'S INTERVENTIONS ABROAD

Edited by Fen Osler Hampson and Stephen M. Saideman

Canada has participated in major international peace and security enforcement operations since the early 1990s, as part of multilateral efforts to stop wars, monitor peace, avert genocide, promote development or, occasionally, to topple dictators and even win wars. It has deployed anywhere from 1,000 to 4,000 personnel overseas annually since the Gulf War, and participated in missions in Afghanistan, Somalia, Bosnia, Haiti, Libya, East Timor, Iraq and Syria. This volume looks at Canada's role as interventionist within three broad themes: the lessons learned from interventions in Libya, Afghanistan, Somalia and Haiti; the domestic side of intervention, including Canadian foreign aid and the gender equation in military interventions; and the responsibility to protect, addressing the larger principles and patterns that influence Canada's engagements.

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MUTUAL SECURITY
IN THE ASIA-PACIFIC
Roles for Australia, Canada and South Korea

Edited by Kang Choi, James Manicom and Simon Palamar

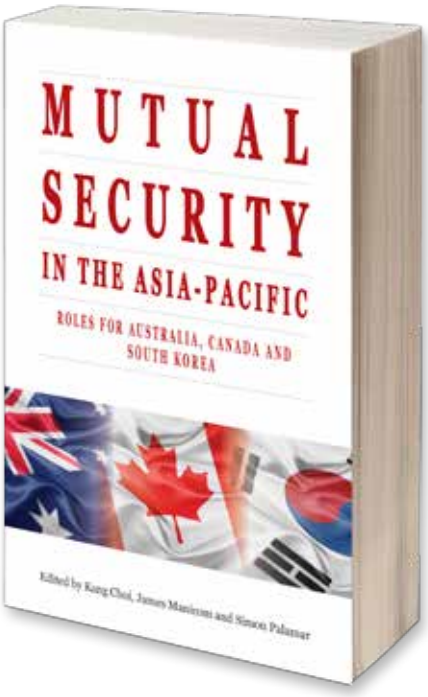
If the twenty-first century is to be "Asia's century," what are the roadblocks that Asia-Pacific nations must overcome? And what role can countries such as Australia, Canada and South Korea play in the region's rise?

Myriad challenges to regional stability and security threaten East Asia's burgeoning growth and prosperity: territorial and maritime boundary disputes, political relations strained by unresolved historical legacies and seemingly intractable disagreements about national sovereignty. Some security threats cannot be mitigated or solved by military force. Climate change-driven natural disasters, declining fish stocks, volatile crop yields and food prices, and the rapid pace of urbanization could each slow the region's remarkable upward trajectory.

Canada, Australia and South Korea are united by a shared awareness that their futures are intimately tied to East Asia's. How will these "constructive powers" address the economic and security challenges that loom in the Asia-Pacific? Which parts of the governance system that has served so well since World War II should be preserved, and which changed to ensure a stable, predictable political environment?

Mutual Security in the Asia-Pacific offers responses to these questions, presenting a number of policy-relevant ideas, with a particular emphasis on the potential for Australia, Canada and South Korea to take an active role in the region.

ISBN 978-1-928096-13-9
CDN $25 + shipping



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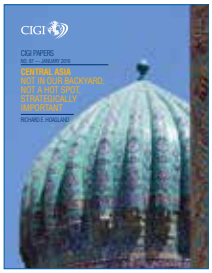

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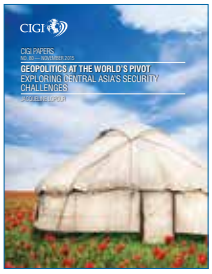

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CIGI was founded in 2001 by Jim Balsillie, then co-CEO of Research In Motion (BlackBerry), and collaborates with and gratefully acknowledges support from a number of strategic partners, in particular the Government of Canada and the Government of Ontario.

Le CIGI a été fondé en 2001 par Jim Balsillie, qui était alors co-chef de la direction de Research In Motion (BlackBerry). Il collabore avec de nombreux partenaires stratégiques et exprime sa reconnaissance du soutien reçu de ceux-ci, notamment de l'appui reçu du gouvernement du Canada et de celui du gouvernement de l'Ontario.

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