RE-THINKING CENTRAL ASIAN ENERGY SECURITY: PITFALLS OF EXPORT DIVERSIFICATION POLICIES

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INTRODUCTION

After the disintegration of the Soviet Union, Russia inherited the infrastructure that Central Asian states needed to transport energy out of the region creating excessive dependence on the Russian pipeline network and energy market. In the 1990s, the Central Asian states continued to barter energy with each other and Russia, in almost the same way as they did in the unified Soviet energy system. However, regional energy exporters' dissatisfaction with the conditions of the energy trade dictated by Russia and the willingness of other external customers to invest in the construction of alternative pipeline networks transformed the relationships among state actors within the Central Asian energy system (CAES), which consisted of Central Asian Power System (CAPS) and natural gas pipeline networks. Shifts in the regional gas trading dynamics also affected electricity export–import relations among Central Asian upstream and downstream countries. As a result, two interlinked levels of relationships emerged that affect energy security of the Central Asian states: first, energy supply relations within Central Asia; and second, energy export/import between Central Asian producers and external customers. The latter perfectly lines up with the energy export diversification policies, which are being prioritized, to different extents, by all Central Asian states. However, limited research has been conducted on possible pitfalls of those energy policies. In this regard, the paper aims to analyze the impact energy export diversification policies have on the governments' ability to ensure energy security in their respective countries.

Defining Energy Security

In this research work, energy security is defined as a condition that states enjoy when they have adequate (sufficient) and sustainable (clean and long–term) energy supplies for their population and economic needs for the foreseeable future. There are certain characteristics of the region, which determine key points of energy security politics in Central Asia, such as: unequal distribution of energy resources, infrastructural interdependence, aging energy systems, seasonal variations of power production and water–energy linkages. It is important to prioritize energy policies aiming at creating conditions at which all Central Asian states would enjoy energy security simultaneously.

Diversification to achieve energy security

There is no universal definition of energy security within the region. The measures needed to address those challenges also vary. While some scholars recommend the diversification of energy sources and suppliers, building strategic storage reserves, establishing a country/region-wide energy infrastructure and flexibility to shift fuels,[1] others expand the list and include high-quality and timely information sharing, collaboration among energy actors, investment flows, research, and development.[2] Within the landlocked Central Asian region, energy security is fragile due to the unreliability of suppliers. The diversification of export flows between energy actors is often perceived as the best way to ensure stability and reliability of energy supplies. Yet, by pursuing policies to increase energy export capacities, some Central Asian states – Kazakhstan and Turkmenistan – affect their own energy security, while others – Uzbekistan, Tajikistan and Kyrgyzstan – compromise regional energy interactions, which eventually leads to energy insecurity for all.

[1] Brenda Shaffer, *Energy Politics* (Philadelphia: University of Pennsylvania Press, 2009), 93.

[2] Gawdat Bahgat, *Energy Security: An Interdisciplinary Approach* (Chichester, West Sussex, U.K.: Wiley, 2011), 2.

ILLUSION OF ENERGY SELF–SUFFICIENCY AND EXPORT DIVERSIFICATION POLICIES OF UZBEKISTAN

Uzbek authorities believe that Uzbekistan is among the few countries in the world that have sufficient energy supplies to meet their energy demands. T. P. Salikhov from the Institute of Power Engineering and Automation in Tashkent argued that Uzbekistan achieved self-sufficiency in fuel in 1995 and became fully self-sufficient in energy resources in 1996–1997.[3] Guided, in part, by the belief of self-sufficiency, Uzbekistan withdrew from the CAES and signed a number of agreements on exporting natural gas and electricity to external markets. However, despite that claim, energy security challenges that Uzbekistan is currently facing prove that the operation of its energy system in isolation mode has its cost. Uzbekistan does not rely on energy imports, but the country has never reached energy self–sufficiency. On top of that, having prioritized export of energy resources, Uzbekistan is negatively affecting the level of its energy security.

Uzbekistan is a major fossil fuels producer in Central Asia. Uzbekneftgaz, a state-owned oil and gas company, estimates 60 percent of Uzbekistan's territory has a potential for oil and gas extraction.[4] Total primary energy production matches the consumption level in Uzbekistan. Natural gas constitutes the major part of primary energy production.

Uzbekistan is one of the largest natural gas producers, and consumes almost all the gas it produces, as 85% of its primary energy consumption comes to gas. Over 90 percent of all electricity in the country is generated on Thermal Power Plants (TPPs). The largest share of thermal electricity production is accounted by the gas-fired thermal power plants. So Uzbekistan consumes almost as much gas as it produces, which means that any initiative to increase gas or electricity export to external customers will come at the expense of domestic consumption. But why would Uzbek authorities pursue energy export oriented policies, when the country suffers from insufficiency of energy supplies for domestic needs?

[3] T. P. Salikhov, "Stages and Results of Energy Strategy Realization in Uzbekistan," *Journal of Economic Review*, October 2004, 49.

[4] Uzinfoinvest, "Oil and Gas Sector," (n.d), http://www.uzinfoinvest.uz/eng/investment_opportunities/by_industry/oil_and_gas_sector/.

Incentive to pursue energy export policies

Domestic gas consumers in Uzbekistan receive gas for discounted prices, which is 4 to 5 times lower than the price paid by importers. The country's gas sector alone is subsidized by almost US$10 billion annually.[5] Subsidies in the energy market are negatively affecting the economy, but Uzbek authorities will most likely preserve subsidies in the gas sector, as the price increase may cause social unrest among the population. And increasing gas export, to some extent, will continue to cover up the economic loss in the highly subsidized gas sector of Uzbekistan. However, it is not an issue of survival, but rather the question of sufficient gas and electricity supplies to meet economic needs and the population's needs in the foreseeable future that constitutes the core of energy security of the country. Electricity blackouts and gas supply shortages are indicators of energy security challenges that Uzbekistan has to deal with.

Limited Energy Export Capacity

Over the past decade Uzbekistan has been exporting approximately 10–15 billion m^3 of gas to Russia[6] and 4.5 billion m^3 to the Central Asian region.[7] The leaders of Uzbekistan and China also agreed to reach and maintain the annual export volume of 10 billion m^3 through the Line–C of the Central Asia China gas pipeline (CAGP), which was launched in 2015. However, outdated and inefficient natural gas transportation systems, growing internal energy demand, and the fact that no major natural gas reserves have recently been developed are indications of Uzbekistan's physical incapability to increase its gas export capacity. Because the power sector of Uzbekistan is also dependent on gas–fired TPPs, it would be naïve to rely on Uzbek electricity exports. In 2015, Uzbekistan produced 55.5 billion kWh of electricity and exported 1.3 billion kWh. Despite the extensive production volume, high technical losses do not allow Uzbek consumers to enjoy reliability and stability of electricity supplies. Export–oriented energy policies might even worsen energy insecurity in the country.

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[5] International Energy Agency, *Fossil Fuel Consumption Subsidy Rates as a Proportion of the Full Cost of Supply, 2013* (Paris: International Energy Agency, n.d), http://www.iea.org/subsidy/index.html.

[6] Farkhad Sharip, "Uzbekistan's Quest for Aral Sea Oil May Weaken Kazakhstan's Position in the Caspian," *Eurasia Daily Monitor* 9, no. 23 (2012), http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=38962.

[7] US EIA, *Kazakhstan—Analysis* (Washington, DC: US EIA, n.d), http://www.eia.gov/countries/cab.cfm?fips=KZ.

Losing energy leverage over upstream states

Within the unified energy system Uzbekistan enjoyed energy leverage over its upstream neighbors, which was compromised when parties decided to diversify energy export routes. Uzbekistan decreased the volume of gas supply to Kyrgyzstan from 800 million m^3 in 2000 to 270 million m^3 between 2013 and 2016.[8] Tajikistan is currently completely cut off the Uzbek gas supply chain. Due to disagreements over the price for gas with the neighboring Tajikistan and Kyrgyzstan, Uzbekistan decided to redirect its export to China. By depriving neighboring Kyrgyzstan from access to Uzbek gas, the government of Uzbekistan pushed Kyrgyz authorities to make a radical move, which, in its turn, weakened Uzbekistan's positions in the price bargaining and negotiations. In 2014, Kyrgyzstan sold its entire gas sector to the Russian Gazprom, hoping that Russia would serve as a mediator in the negotiations with Uzbekistan and gas imports would be restored. Uzbek gas supplies were indeed restored. However, for Uzbekistan it is more difficult to promote its interests vis–a–vis Russia than dealing with Kyrgyzstan directly. And, Kyrgyzstan basically lost control over its strategically important gas sector. In this regard, having enjoyed a strategic location on the crossroad of energy-transporting corridors within the region, Uzbekistan's decision to leave CAES severely affected the energy security of the most dependent on it, upstream Tajikistan and Kyrgyzstan. Being cut off stable Uzbek energy supplies, Central Asian upstream countries also started establishing independent energy systems and are launching export-oriented policies, which have led to water–energy nexus controversies among regional state actors.[9]

[8] Joormat Otorbaev, "Проблемы и потенциал развития электроэнергетики в Кыргызской Республики (Problems and Perspectives for the Development of Power Sector in Kyrgyzstan)," (Government of Kyrgyz Republic, 2014), http://www.gov.kg/?p=41665&lang=ru.

[9] Around 90 percent of water resources originate in the upstream Tajikistan and Kyrgyzstan, while downstream countries, particularly Uzbekistan, is consuming most of the water resources. Upstream countries use water primarily for generating hydropower by releasing it whenever the country experiences energy shortages (mostly winter months). Downstream countries, however, are highly dependent on the water from transboundary rivers for irrigation during vegetation periods (spring and autumn). In this regards, seasonal variation for water and energy needs cause water–energy nexus challenges for the Central Asian countries.

EXPORT OR LOSE: ELECTRICITY DIVERSIFICATION POLICIES OF TAJIKISTAN

Tajikistan possesses tremendous hydropower potential, which accounts for 4% of the world's total. Despite the fact that 98% of the power production in the country comes from HPPs, they (the HPPs) deliver only 17 billion kWh out of 527 billion kWh hypothetically possible.[10] Exploiting this potential could significantly contribute to the sustainability of the energy sector not only in Tajikistan, but also in other Central Asian states, by providing large quantities of relatively inexpensive and "green" electricity. Yet, the seasonal variation of power production, outdated electricity producing facilities and insufficient power production capacities pose major obstacles for securing reliable and adequate energy supplies for domestic needs all year round. At the same time, export–prioritized energy policies further threaten Tajikistan's energy security.

Energy security policies of the country imply ensuring energy independence by connecting hydropower rich regions (southern) with energy thirsty northern regions, which were previously connected to the CAPS. New energy policy of the country aims to meet energy needs of the population year–round to boost economic development and increase power export capacity.

Tajikistan annually generates around 17–18 billion kWh of electricity. The consumption volume, however, accounts for 22–24 billion kWh. Thus the overall deficit accounts for 5 billion kWh. Only in summer the country produces a surplus of 1.5 billion kWh.[11] Tajikistan exports electricity to Kyrgyzstan and Afghanistan. Currently, the largest electricity market for Tajikistan is Afghanistan.

Energy insecurity

There are a number of deficiencies in Tajikistan's electricity export diversification policies. Tajikistan itself suffers from a critical shortage of electricity supply in the

[10] Ministry of Foreign Affairs of the Republic of Tajikistan, *The Energy Sector of the Republic of Tajikistan*, (Dushanbe: Mfa.tj, n.d), http://mfa.tj/en/energy-sector/the-energy-sector-of-rt.html.

[11] Zamir Karajanov, "Геополитические проекты в Центральной Азии зависят от энергетических возможностей стран региона," August 20, 2016, http://www.ritmeurasia.org/news--2016-08-20--geopoliticheskie-proekty-v-centralnoj-azii-zavisjat-ot-energeticheskih-vozmozhnostej-stran-regiona-25297.

winter period, during which the electricity demand exceeds the supply capacity by around 25%. According to the United Nations Development Programme report, more than 1 million people suffer from frequent and prolonged blackouts each winter in Tajikistan.[12] The World Bank highlights that 70 percent of the population that suffers from electricity shortage during winter.[13] Within the CAES Tajikistan exported power in summer in return for Uzbek electricity and gas imports in winter. Currently, however, Tajik authorities supply electricity to external markets without the possibility to compensate domestic winter shortages with imports.

Aging power generation facilities are no longer capable of generating electricity to the extent that they were initially designed to. Regardless of decreasing power generating capacities, Tajikistan increases the export of electricity to external markets, thus further threatening energy security of the country.

Operating Electric Power Generating Plants in Tajikistan (January 1, 2012)[14]

Name	Technical capacity, megawatt		
	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

[12] World Bank Group, "Tajikistan's Winter Energy Crisis: Electricity Supply and Demand Alternatives," World Bank, 2013 http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:23319658~pagePK:64257043~piPK:437376~theSitePK:4607,00.html.

[13] "Study Shows TALCO's Potential to Save Energy," World Bank Feature Story, 2013

http://www.worldbank.org/en/news/feature/2013/01/28/study-shows-talco-potential-save-energy.

[14] United Nations Development Program, *Sustainable Energy for All: Tajikistan: Rapid Assessment and Gap Analysis*, (UNDP, 2013), 12, http://www.undp.org/content/dam/tajikistan/docs/library/UNDP_TJK_SE4ALL_Rapid_Assessment_and_gap_analysis_Eng.pdf.

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 Energy	42	39	37
MGES	13	11	10
Sangtuda HPP–1	670	670	440
Sangtuda HPP–2	110	110	40
Total	5,190	4,088	2,661.21

Serving major investors' interests

The Rogun HPP in Tadjikistan, located 110 km from the capital, will consist of 6 aggregates of 600 MW capacity each. Authorities plan to commence the first aggregate already by 2018 and the second one in 2019.[15] July 1 2016, Tajikistan signed an agreement with the Italian company Salini Impregilo on the construction of Rogun for US$3.9 billion[16]. The Vaksh River was blocked to accelerate the construction process on October 29, 2016. Rogun is expected to be fully constructed in 14 years.[17] The Tajik government expects the Rogun HPP to serve three major purposes: produce electricity in wintertime; increase electricity export capacities; and improve water management. Tajikistan, like any other country in the region, has a right to increase electricity exports to generate revenue. Moreover, improved water management is in the interests of both upstream and downstream countries. However, only increased electricity production in winter can improve energy security in the country. Rogun can increase summer and to some extent winter electricity production. Electricity that is generated in winter is intended for export mainly. However, exports cannot guarantee wintertime gas and thermal electricity imports from the neighboring states. Also, money has always been a major obstacle for the

[15] "Таджикистан начал строительство плотины Рогунской ГЭС," *Gazeta.uz*, October 31, 2016, https://www.gazeta.uz/ru/2016/10/31/tj/.
[16] "Финансирование проекта Рогунской ГЭС в 2017 году будет сокращено," *Avesto.tj,* July 29, 2016, http://avesta.tj/2016/07/29/finansirovanie-proekta-rogunskoj-ges-v-2017-godu-budet-sokrashheno/.

[17] "Время покажет, как Узбекистан отреагирует на строительство Рогунской ГЭС," *Liter.kz,* November 2, 2016, https://liter.kz/ru/news/show/25276-vremya_pokazhet_kak_uzbekistan_otreagiruet_na_stroitelstvo_rogunskoi_ges_-_ekspert

Rogun project. Tajik authorities already declined investment offers that were not serving the country's national interests. Tajikistan attracted the new Italian contractor for the construction of the dam, but its financial aspect has not been entirely resolved yet.

TRADE–OFFS BETWEEN ENERGY SECURITY AND BROADER ENERGY INTERESTS IN KYRGYZSTAN

Kyrgyzstan also enjoys extensive potential for hydroelectricity production. The production capacity, however, is limited because of the aged energy infrastructure and inability of the government to introduce additional production capacities on the transboundary Syrdarya River without the consent of littoral states.

Energy policy priorities, which are linked to Kyrgyzstan's electricity export–diversification interests primarily focus on:

- Increase power production capacity by further developing hydropower potential – Upper Naryn cascade could increase production capacities up to 942.4 million kWh.
- Generate more electricity in the summer period, which would allow Kyrgyzstan to export electricity to Kazakhstan, Uzbekistan, and South Asian countries.
- Introduce major power generating capacities, particularly in the winter period, build large HPPs (Kambarata–1) and/or build coal–fired Kara–Keche TPP, for both domestic and external needs.

Unstable power export capacity

Kyrgyzstan has the potential to annually produce up to 142.5 billion kWh of hydroelectricity. [18] Power production facilities of Kyrgyzstan, however, are outdated and the electricity generation is insufficient to meet both domestic and external demands. Currently, the largest amount of electricity production is realized at the HPP cascade in the Toktogul reservoir. Toktogul HPP has a capacity of 1200 MW and covers one-third of the total installed power capacity of 3786 MW.[19] Despite the fact that 19.5 billion m^3 capacity of the Toktogul

[18] Regional Economic Cooperation in Central Asia, "Electric Energy," *Final Report RETA 5818* (2000): 14, http://www.docstoc.com/docs/19688087/Electric-Energy#top.

[19] Vladimir V. Kouzmitch, "Strengthening Cooperation of Central-Asian Countries in Using Advanced Technologies in Energy Efficiency and Renewable Energy Sources," *Project of the United Nations Economic*

water reservoir allows Kyrgyzstan to export a significant volume of electricity, it rarely accumulates enough water to produce electricity in winter, because in summer most of the water is being released to meet the power needs.

In 1990, Kyrgyzstan exported 4 billion kWh to Kazakhstan and Uzbekistan in summer and, in return, imported 3.2 billion kWh of electricity from Uzbekistan (2.2 billion kWh), Kazakhstan (650 million kWh), Tajikistan (245 million kWh), and Turkmenistan (250 million kWh) in winter. However, later Kyrgyzstan's power production capability has been altered. During dry years Kyrgyzstan is not capable of producing and, as a result, exporting electricity. The inability to export electricity during the dry years of 2008-2009 and 2014-2015 to Kazakhstan and Uzbekistan compromised the energy security of the country. The country lacked revenues that were meant for fuel needed to run TPPs.[20]

Export ambitions in a fast changing climate

On October 1 2014, the water volume in Toktogul accounted for only 11.9 billion m^3, which was 4 billion m^3 less compared to the same period of the previous year. Kyrgyzstan was forced to import 400 million kWh of electricity from Kazakhstan in 2015. In July 16 2016, the water volume in Toktogul increased up to 15 billion m^3, which was 4 billion m^3 more compared to the same period of the previous year, allowing Kyrgyzstan to export electricity to Kazakhstan.[21] The power export of the country is highly dependent on a single major source of water supplies—the Syrdarya River. The stream stage in the river, according to different scenarios, is expected to drop by 10 – 30% already in 2030.[22] With the declining water availability, Kyrgyzstan's export capacity will also decrease. Prioritizing electricity export may result in insufficient power supplies for population needs, which account for 63 percent of the overall consumption, both in summer and wintertime.

Commission for Europe, 2013, 31, http://www.unece.org/fileadmin/DAM/energy/se/pdfs/gee21/projects/AdvTech_IncreasingCooperation.pdf.

[20] Valentina Kasymova, "Достигла ли энергетической независимости Кыргызская Республика?" *Akipress.kg*, September 6, 2016, http://polpred.com/news/?cnt=76&sector=19.

[21] Elena Rodina, "Проблемы и возможности малой гидроэнергетики в Кыргызской Республике," March 3, 2016, http://www.kg.undp.org/content/kyrgyzstan/ru/home/presscenter/articles/2016/03/challenges-and-ways-of-development-of-the-small-hydropower-in-the-kyrgyz-republic.html.

[22] Шиварёва С.П., Долгих С.А., Голубцов В.В. и др., "Влияние изменения климата на водные ресурсы бассейнов озера Балкаш и Аральского моря," Гидрометеорология и экология, №3, 2009, 32- 50.

Export–oriented hydropower or energy security–focused thermal power Kyrgyzstan's electric power sector consists almost completely of water run-of-river type HPPs,[23] which can generate electricity mostly in summertime. The only HPP capable of generating electricity in winter is Toktogul and the projected Kambarata–1. Yet to produce electricity, Kambarata–1 would require accumulating a large volume of water, which could lead to water supply shortages for downstream countries. Political pressure from the downstream countries forces Kyrgyz authorities to release water during the vegetation period and to produce more electricity in summer turning the country into a major exporter, yet the one incapable of meeting its winter energy demands.

To meet its winter electricity needs, the Kyrgyz government has to either develop its own limited fossil fuel potential and build TPPs or to secure stable thermal electricity import from the neighboring states. The Kara–Keche coal-fired TPP is considered to be one of the most promising projects to ensure electricity supplies in the northern parts of the country. Kara–Keche TPP's technical and economic feasibility was studied back in 1979–1983 and, according to some estimates, has a higher electricity production coefficient than any other hydropower generating facility, including Kambarata–1.[24]

Kara-Keche project is cheaper than large HPPs and thus should be more attractive. Adding 1 kW of new power capacity costs around US$ 1,500 in TPPs. The cost of 1 kW of hydropower is approximately US$ 2,000. The construction of Kamabarata–1 will cost Kyrgyzstan US$ 5.2 billion. With a capacity of 1900 MW, 1 kW will cost US $2,700 to the government of Kyrgyzstan. Ernest Karibekov, former head of the Research Institute for the Central Asian Water and Water-Energy Resources Problem Studies, believes that financial concerns will push the construction of Kambarata–1 for another two decades. To return US$ 5.2 billion in investments, this plant will have to operate fully, selling electricity for 8 cents per kWh. Kyrgyzstan now exports electricity for around 4 cent per kWh along with the water supply.[25]

[23] Water run-of-river type HPP does not require the use of a dam and generates electricity by channeling a portion of a river through a canal or penstock. See "Types of Hydropower Plants," *Energy.gov,* http://energy.gov/eere/water/types-hydropower-plants.

[24] Joormat Otorbaev, "Проблемы и потенциал," (Government of Kyrgyz Republic, 2014), http://www.gov.kg/?p=41665&lang=ru.

[25] Ernest Karibekov, "Есть ли Рынок электроэнергии в Кыргызстане, Часть 1 (Is There an Energy Market in Kyrgyzstan, Part 1)," *Analitika*, January 17, 2014, http://analitika.akipress.org/news:4952.

Currently, energy policy priorities of Kyrgyzstan focus on mitigating the energy crisis and increasing the production capacity to the point when the country stops being dependent on power imports from the neighboring states. For the construction of a large HPP, Kyrgyzstan has to rely on external funding. The Russian company RusHydro was supposed to build 4 HPPs in the Upper Naryn cascade to increase production capacity up to 942.4 million kWh, but the agreement was denounced on August 10, 2016.[26] In this regard, Kyrgyzstan has to focus, to a large extent, on energy security projects and concentrate less on initiatives designed to diversify export routes.

[26] Zamir Karajanov, "Геополитические проекты в Центральной Азии."

EXPORT DIVERSIFICATION INITIATIVES CAUSING REGIONAL CONTROVERSIES

Guided partially by the belief of self-sufficiency, Uzbekistan decided to withdraw from the CAES and to redirect gas and electricity exports to external markets. Due to its strategic location on the crossroad of energy-transporting corridors within the region, this decision affected the overall security of the CAES. Energy supply cuts, in combination with highly subsidized and inefficient energy sectors, the underdeveloped renewable energy sector, a lack of countrywide electricity transmission and gas supply networks, as well as disagreements over the water withdrawal balance have severely affected the availability and affordability of energy supplies in Central Asian upstream countries and sustainability and efficiency in downstream states.

South Asian electricity market is an alternative?

Designed to ensure electricity supply to meet peak demand in winter, there is no guarantee that the Rogun and Kambarata–1 HPPs will not be extensively used for export purposes. Currently, there is a surplus of electricity production in Tajikistan and Kyrgyzstan and it is argued that CASA–1000 is supposed to transport it to southern neighbors. Afghanistan and Pakistan are mostly in need of electricity import in winter and both Rogun and Kambarata–1 can provide it.[27] In this sense, Kyrgyzstan and Tajikistan may decide to increase export of electricity even at the expense of domestic consumption. The possibility of exporting electricity in wintertime will make Rogun and Kambarata–1 economically attractive projects, but with a limited contribution to energy security. This does not mean that Tajik and Kyrgyz authorities should give up trying to implement these projects. Given their interest in generating extra revenue, they most likely will not do so in any case. What it means, though, is that the contribution of these projects to each country's energy security might be limited and even damaging for Central Asian states.

[27] President of the Republic of Tajikistan, *The Annual Message to the Majlisi Oli of the Republic of Tajikistan* (Dushanbe: President of the Republic of Tajikistan, 2011), http://www.prezident.tj/en/node/2189.

Energy projects impact on controversies with respect to water management

General schemes of Rogun and Kambarata dams were designed in Tashkent (Uzbekistan). Working in the water mode to primarily release water for irrigation purposes in the downstream countries, Nurek, the largest HPP in Tajikistan, was never capable of accumulating enough water to produce a significant volume of electricity in winter. Toktogul HPP, with the capacity to potentially accumulate enough water to produce electricity any time of the year, mostly generated electricity in the summertime.[28] In the 1990s, to keep the water mode functioning, Central Asian countries signed a number of agreements, according to which downstream states were ensured stable water supply for irrigation purposes. In exchange, Central Asian upstream countries received natural gas, oil products, and thermal electricity in wintertime to meet their energy demands. However, when Uzbekistan withdrew from the CAPS and it was no longer possible to ensure coordinated operation of the unified electric power system, Tajikistan and Kyrgyzstan decided to turn the water mode of operating HPPs into the energy mode focused on producing as much electricity as possible whenever there was a need.[29] Both Tajikistan and Kyrgyzstan, having experienced the deficiency of gas and winter electricity supplies, transformed their energy sectors first to meet their needs and second to significantly increase electricity export capacity. Currently, Tajikistan and Kyrgyzstan are physically incapable of accumulating a large amount of water to produce electricity both in summer and winter. When Uzbekistan withdrew from the CAES, Tajikistan was left in complete isolation. With no possibility to export electricity, both Tajikistan and Kyrgyzstan had to spill water. Tajikistan, for instance, consumes 10-11% of water from Amudarya, when it is entitled to over 15%. The governments of the Central Asian upstream countries are counting on the Rogun and Kambarata–1 dams to increase their ability to accumulate more water and generate more electricity for both domestic consumption and export purposes. Operating those facilities in the energy mode prioritizing energy production, in an attempt to increase power production to further increase the export capacity, will most likely escalate existing tensions over management of water resources.

[28] Asian Development Bank, Technical Assistance Consultant, *Central Asia Regional Economic Cooperation: Power Sector Regional Master Plan* (Metro Manila: Asian Development Bank, Report no. 43549, 2012), http://adb.org/sites/default/files/projdocs/2010/43549-01-reg-tar.pdf.

[29] Ernest Karibekov, "Плюс электрификации всей страны. Странам Центральной Азии нужна новая модель единой энергосистемы. (Countrywide Electrification Pluses. Central Asian Countries Need New Model of the Unified Energy System)," *Centralasia.ru*, June 3, 2012, http://www.centrasia.ru/newsA.php?st=1338670560.

EXCESSIVE ENERGY DEPENDENCE WITHIN KAZAKHSTAN'S MULTI–VECTOR FOREIGN POLICY

In the long term, Kazakhstan aims to diversify energy sources in the consumption balance. The country's short-term goal, however, is to diversify its energy export routes, primarily for oil and gas. This lines up with the Multi-vector Foreign Policy adopted by the government. Yet, moving energy resources out does not directly contribute to the energy security of the country and as the analysis shows, to a certain extent, negatively affects stability and reliability of energy supplies for domestic consumers.

There are a number of key energy policy priorities for Kazakhstan identified by the government. Kazakhstan's current energy policy priority is to secure external demand and to draw profit from energy export. Second, to reduce its dependence on unreliable neighboring Uzbekistan and Kyrgyzstan, Kazakh authorities have been strengthening its independent and self-sustaining energy system. Third, newly adopted programs aim at introducing large–scale renewable energy generating capacities. Fourth, while Kazakhstan attempts to limit the extent of energy cooperation with the neighboring Central Asian states, in which the former is more vulnerable, recent events highlight that such dependency is largely unavoidable in the short to medium term perspective.

Dependent in a diversified energy system

Kazakhstan has an export-oriented economy and is highly dependent on shipments of oil and related products (73 percent of total exports).[30] At the same time, Kazakhstan has very limited options for its oil export diversification policies. Despite the fact that Kazakhstan has access to the Caspian Sea lanes, oil export is largely covered by pipeline networks. Around 85% of Kazakh oil reaches the highest paying European customers.[31] Kazakhstan exported over 64 million tons of oil through the Atyrau–Samara pipeline, Caspian Pipeline Consortium, Atasu–Alashankou pipeline, and Aktau sea port in 2014[32] and

[30] "Kazakhstan Exports," *Trading Economics,* 2016, http://www.tradingeconomics.com/kazakhstan/exports.

[31] "Более 85 процентов экспорта нефти Казахстана на внешние рынки проходит через территорию России (Over 85 percent of oil exports from Kazakhstan to external markets pass Russian territory)," *Kursiv,* April 22, 2015, http://www.kursiv.kz/news/retail/bolee_85_eksporta_nefti_kazakhstana_na_....

[32] "Транспортировка нефти" (Transportation of oil)," *Kazmunaigaz official website,* www.kmg.kz/manufacturing/oil/.

almost the same volume of oil in 2015.[33] And, most of that oil is being delivered via pipeline systems, which are controlled by Russia. Kazakhstan, to some extent, reduced its dependence on the Russian corridor by engaging in the trade of oil with China through the Kazakhstan–China oil pipeline. This pipeline allows Kazakhstan to supply 20 million tons of oil to China annually.[34] However, Kazakhstan–China oil trade never required the pipeline's full capacities. In case the demand for Kazakh oil decreases in the European market, Kazakhstan will be able to redirect it to China.[35] Meanwhile, due to commitments to supply an agreed volume of oil to the European consumers, Kazakhstan fails to reduce its dependence on the Russian pipeline networks.

Failed gasification initiatives

The Development of the domestic gas sector in Kazakhstan is linked to the oil sector development, which is very much export–oriented. The government prioritizes oil exports over developing the gas sector, which would increase the production capacities significantly. Kazakhstan has 1.5 trillion m^3 of natural gas reserves.[36] Yet the production capacity of the marketed gas in the country is limited. Half of the produced gas (around 20 billion m^3) is pumped back into the oil wells to enhance oil production. Heavily populated south and south–eastern regions of Kazakhstan have limited access to indigenous gas and the country is highly dependent on gas imports from rather unreliable Uzbekistan. Acknowledging the importance of domestic gas in the overall consumption balance, the government has adopted the "Gasification Scheme 2015–2030". Prioritizing oil exports in Kazakhstan's energy sector and the construction of a gas pipeline connecting Kazakh gas fields with the Chinese market may negatively affect the domestic consumption balance and the energy security of the most vulnerable South Kazakhstan Region, which constitutes around one–fifth of Kazakhstan's total population. However, according to the General Scheme of gasification, the government is planning to boost the number of

[33] "КазТрансНефть снизил транспортировку нефти и нефтепродуктов на 4.7 процентов ("KazTransOil" decreased oil and oil products export by 4.7 percent)," *AtamekenInfo,* 2015, http://atameken.info/articles/KazTransOyl-snizil-transportirovku-nefti-i....

[34] "Kazakhstan-China Oil Pipeline," *Kazmunaigaz official website, n.d.* http://www.kmg.kz/en/manufacturing/oil/kazakhstan_china/

[35] Farkhod Aminjonov, "Competing Interests of Iran and Kazakhstan in the Oil Market?" May 6, 2016, *http://eurasian-research.org/en/research/comments/energy/competing-interests-iran-and-kazakhstan-oil-market*

[36] British Petroleum Company, *BP Statistical Review of World Energy June 2015* (London: British Petroleum Co., 2015), http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf.

people connected to the gas supply system from currently 7 million in 1150 localities to 10 million people in 1600 localities by increasing the consumption of domestic gas from 10.9 up to 18 billion m^3 by 2030.[37]

The level of gasification of the Republic of Kazakhstan regions

Regions	2014	The level of gasification, %
		2030
Astana	–	100
Almaty region	20	41
Almaty city	90	98
South Kazakhstan region	43	53
Zhambyl region	65.4	74
Aktobe region	84	96
Kyzylorda region	36.4	75
Kostanay region	59	61
West Kazakhstan region	86.3	87
Atyrau region	82	92
East Kazakhstan region	0.8	2
Mangystau region	99	99.9

[37] Government of the Republic of Kazakhstan, "Kazakh Vice Minister of Energy Magzum Mirzagaliyev speaks at press conference in the CCS," *Government.kz,* December 7, 2015, http://www.government.kz/en/novosti/29785-gas-pipeline-beineu-bozoi-shym...

Investors say "export"

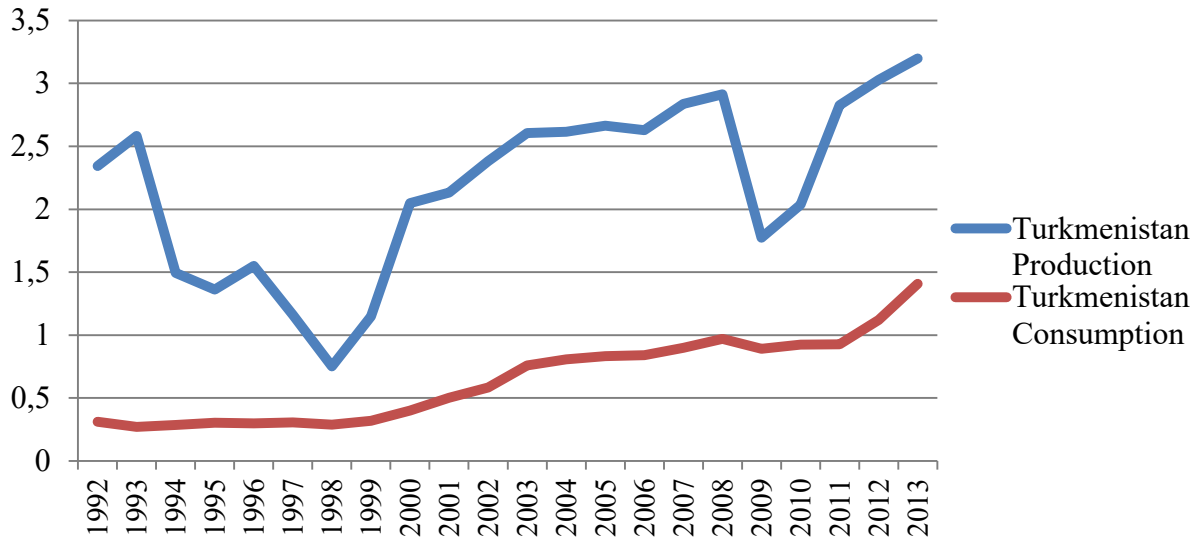
Within the gasification scheme authorities aim at: a) achieving sufficiency of gas supplies by boosting production capacities; b) extending connections from the "Beneu–Bozi–Shymkent," "Gazli–Shymkent" and "Kazakhstan–China" gas pipelines to the population centers along the routes; c) promoting reconstruction and modernization of gas distribution networks. The Beineu–Bozoy–Shymkent gas pipeline, capable of supplying its gas to southern regions, is also expected to fill the CAGP, in which China has not only taken part, but also covered most of the construction expenses – $3.6 billion.[38] The landlocked geographical location not only limits Kazakhstan's access to global energy markets, but also makes pipeline networks the only economically efficient way to transport oil and gas from Central Asia. Building pipelines requires significant upfront investments that Kazakhstan, due to its current financial constraints, cannot cover. Taking loans forces regional producers to agree upon the control over resources within Production Sharing Agreements, which often does not serve their best interest. Due to asymmetrical interdependence among actors and strategic interests, energy has sometimes been used for purposes other than to ensure energy security, causing supply disruptions in Central Asia, especially when it is needed the most (during winter period). Chinese interests in moving gas out of the region may overshadow Kazakhstan's desire to supply a sufficient amount of gas to its southern regions.

[38] "Presidents of Kazakhstan and China gave start to Bozoi-Shymkent gas pipeline spur." Interfax-Kazakhstan, n.d. https://www.interfax.kz/?lang=eng&int_id=10&news_id=6143.

ENERGY INDEPENDENT AND VULNERABLE TURKMENISTAN

Turkmenistan is the only Central Asian state, which succeeded to establish a truly independent energy system since the collapse of the Soviet Union. Turkmenistan has not only restored its natural gas production and export capacities, but also considerably increased thermal power generation and electricity exports to external markets. Turkmen authorities are quite ambitious in their energy strategies, as they plan not only to retain the leading role of a major gas exporter, but also to become one of the largest exporters of electricity. Tremendous gas reserves in the amount of 17.5 trillion m^3, which places Turkmenistan fourth after Russia, Iran and Kuwait, and its entire thermal power sector relying on gas fired TPPs imply that Turkmenistan may always enjoy physical capacity to produce the sufficient amount of gas to meet its energy needs.[39] The Turkmen government is even more optimistic, suggesting reserves of 24 trillion m^3.[40] There are, however, geopolitical factors, that raise concerns regarding the resistance of the energy system to external shocks and its capacities to meet both domestic and external demand: the dependence on single energy markets – China for gas and Afghanistan for electricity export; and the country's reliance on Chinese loans for the development of its gas potential.

Primary Energy Production and Consumption (quadrillion BTU) of Turkmenistan[41]



http://www.mfa.gov.tm/en/turkmenistan/economy.

[41] US EIA, *International Energy Statistics—Turkmenistan*, (Washington, DC: US EIA, n.d), http://www.eia.gov/beta/international/country.cfm?iso=TKM.

According to the government adopted "Oil and Gas Industry Development Programme of Turkmenistan for the period till 2030", authorities target reaching an annual amount of 230 billion m^3 in gas production by 2030.[42] While Turkmenistan is potentially capable of significantly increasing gas production up to that projected level from 72.4 billion m^3 in 2015[43], financial, technological and geopolitical factors might pose obstacles to boost production capacity further.

Export versus domestic consumption

The government has made certain progress in supplying the majority of its population with gas. In order to increase the availability of natural gas to some distant parts of the country, as well as to raise its export capacity, the Turkmen government initiated the construction of the "East–West" gas pipeline which is capable of transporting 30 billion m^3 per year. However, a 770 km long pipeline can only be justified if extensive gas extraction starts in the giant Galkynysh gas field with total reserves estimated at around 13.1 to 21.2 trillion m^3.[44] This pipeline is designed to transport natural gas from Galkynysh field to the western regions.[45] Turkmenistan is counting on the recently explored (2006) giant Galkynysh gas field, which was put online in 2013, to significantly increase its gas production capacity.[46] The "West–East" gas pipeline has integrated energy facilities into a single system and made it physically possible to increase export volume in any direction.[47]

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[42] "Obespechenie Globalnoy Energobezopasnosti – Faktor Ustoychivogo Razvitiya (Global Energy Security is a Guarantor of Sustainable Development)," *Ministry of Oil and Gas Industry and Mineral Resources Journal*, May 28, 2015, http://www.oilgas.gov.tm/publikatsii/item/435.

[43] BP Statistical Review 2016.

[44] Economist Intelligence Unit, "Turkmenistan Gas: Galkynysh Gas Output will Boost Growth in 2014," September 24, 2013, http://performance.ey.com/wp-content/uploads/downloads/2013/10/EY-Performance-Turkmen-gas-and-growth.pdf.

[45] "Global Energy Security is a Guarantor of Sustainable Development," *Ministry of Oil and Gas Industry.*

[46] "Galkynysh Gas Field, Turkmenistan," *Hydrocarbons-technologies,* n.d., http://www.hydrocarbons-technology.com/projects/-galkynysh-gas-field-turkmenistan/.

[47] "International Cooperation in the Turkmenistan's Oil and Gas Sector: Achievements and Prospects," *State News Agency,* November 20, 2014, http://tdh.gov.tm/en/official-news-2/12015-2014-11-20-16-17-00.

Diversified by still highly dependent gas export

Almost complete dependence on Russian pipelines in its gas export had negative affected Turkmenistan, and the authorities wanted to diversify export routes in all possible directions (China, South Asia, and Europe) with long-term commitments. For many years the dominant discourse was that Turkmenistan's dependence on Russia was dictated by infrastructural dependence. Over the years, Turkmenistan has succeeded to reduce the dependence by gaining access to Iran and China. Turkmen authorities also plan to extend the pipeline infrastructure to South Asia and Europe. Yet, so far it has only succeeded in swapping Russian patronage for Chinese. Apparently, dependence has now become not only infrastructural, but also financial and geopolitical.

Russia remains an important potential customer for Turkmen gas because of its extensive pipeline infrastructure – Central Asia Center pipeline with the capacity to transport 45 billion m^3 per year.[48] There are two pipelines connecting Turkmenistan with Iran: a) Korpedzhe–Kurt–Kai pipeline (6–8 billion m^3)[49] built in 1997; and, b) Dauletabad–Sarakhs–Khangiran pipeline (12 billion m^3) constructed in 2010.[50] The third out of four Central Asia–China pipelines, delivering mostly Turkmen gas to the Chinese market, was recently opened and will have an export capacity of up to 55 billion m^3. When the fourth line is built as much as 65 billion m^3 of Turkmen gas will be heading to China alone.[51] Turkmen authorities will have to significantly boost gas export capacities from the current level of less than 40 billion m^3.

The inability to generate high revenues from gas export, which used to make up almost half of the national budget, directly affects economic development and social welfare of the country. The exact gas price paid by the Chinese customers for the Turkmen gas is not openly revealed. However, since China

[48] International Energy Agency, *Optimizing Russian Natural Gas. Reform and Climate Policy*, (Paris: International Energy Agency, 2006), http://www.iea.org/publications/freepublications/publication/russiangas2006.pdf.

[49] "Saparmurat Niyazov Inaugurates Gas Compressor Station at Korpeje Natural Gas Field," *Turkmenistan.ru,* September 14, 2005, http://www.turkmenistan.ru/?page_id=3&lang_id=en&elem_id=7108&type=event&sort=date_desc.

[50] "Turkmenistan, Iran Launch Gas Pipeline," *Pipeline and Gas Journal* 238, no. 1 (2011), http://www.pipelineandgasjournal.com/turkmenistan-iran-launch-gas-pipeline.

[51] Vladimir Socor, "China to Increase Central Asian Gas Imports Through Multiple Pipelines," *Eurasia Daily Monitor* 9, no. 152 (August 2012), http://www.jamestown.org/single/?no_cache=1&tx_ttnews%5Btt_news%5D=3975.1.

covered the lion's share of the pipeline network construction, a part of the gas is being exported as a payment for the financial support provided. This implies that the contribution to the Turkmen budget from gas exports to China will be limited until Chinese investments are recovered. The terms of gas trading arrangements were supposed to be attractive for the Central Asian exporters as long as the volume of trade with China constituted only a part of the total export, which additionally consists of: (a) certain amounts of Turkmen gas exported to Russia/ Europe thus generating high revenues; and, (b) the rest to be supplied to alternative markets thus enhancing Turkmenistan's bargaining power vis-à-vis Russia. Major pipelines transporting natural gas to international consumers need to operate for at least fifteen to twenty years before investments are recovered. Taking into account the growing demand for gas in China and the fact that China is building all new major pipelines, an extensive dependence on the single Chinese market can be quite damaging to the economy during this period. Given lower prices, Turkmenistan will have to export larger quantities of gas to China in order to recover investments. Prolonging unprofitable gas trading arrangements will force Turkmenistan again to search for alternative markets.

Competition for electricity markets

A heavy burden for the gas production will also occur from the rapidly growing thermal power sector development. At the moment, Turkmenistan has 11 active power plants and a total of 40 turbines. Currently, around 15 percent – 2.8 billion kWh annually – of its overall electricity production is being exported.[52] Recently introduced new power generation capacities ensured sufficiency to meet domestic needs and to export to Iran and Afghanistan. Counting on Turkmenistan's rapidly growing power production capacity, Afghanistan and Turkmenistan signed a power purchase and sales agreement for the period of 2015–2028 with the initial power supply of 300 MW on November 6, 2015.[53]

Between 2007 and 2009, Turkmenistan exported electricity to Tajikistan in the amount of 1 billion kWh annually, but stopped due to Uzbekistan's withdrawal from the CAPS. Currently, there are four main transboundary electricity

[52] "Turkmenistan to increase electricity export," *Gas and Oil Connections*, August 3, 2015 http://www.gasandoil.com/oilaround/energy/04774b29a56227b616212d9d5995bff7

[53] Asian Development Bank, "Proposed Multitranche Financing Facility □Islamic Republic of Afghanistan:□Energy Supply Improvement Investment Program," November 2015, 2, http://www.adb.org/sites/default/files/project-document/176563/47282-001-rrp.pdf.

transmission lines connecting Turkmen TPPs with Uzbekistan and Iran and there is a potential to reinstate electricity trade with other Central Asian countries. The government of Turkmenistan is also planning to construct the 500 kV "Mary–Atamurad–Andxoy" transmission line connecting its largest (Mary) TPP with Afghanistan and to increase the capacity of the "Mary–Seraxs" transmission lines.[54] However, Hashim Alimi, project coordinator at the Inter-Ministerial Commission for Energy, in a personal conversation on February 25 2016, highlighted that the agreement needed to be revised, as a 500 kV transmission line would be able to supply up to 1000 MW of power, a significantly greater amount than the agreed upon 300 MW. In this case, Turkmenistan would be able to take over Uzbekistan's position as a major supplier of electricity to Afghanistan during the winter months. Because Uzbekistan generates high revenues from exporting electricity to Afghanistan, as the latter pays the highest prices (10 cents per kWh), Turkmen power projects, which offer cheaper electricity (4–6 cents per kWh), might threaten Uzbek authorities' interests in the regional electricity trade. Conflicts of interest may lead to tensions between electricity suppliers and have a spill–over affect on to other sectors. For instance, almost all gas, which is now heading to China, passes through the territory of Uzbekistan. It is quite a strong leverage in the possession of the Uzbek authorities, which can be used to force Turkmen counterparts to refrain from challenging the interests of Uzbekistan as a major supplier of thermal power to Afghanistan.

[54] Ministry of Oil Industry and Mineral Resources of Turkmenistan, *Ministry* (Ashgabat: Minenergo.gov.tm, n.d), http://www.minenergo.gov.tm/index.php/7-news/188-ministerstvo.

STATUS QUO ANALYSIS AND RECOMMENDATIONS

Restoring intra–Central Asian energy trade

As highlighted in the analysis, establishing and operating independent energy systems within still interconnected networks bears high costs and negatively affects the level of energy security in Central Asia in the transition period. Despite the fact that Central Asian energy supply inter–linkages have been significantly damaged the countries' independent energy policies and export routes diversification initiatives, restoring intra–Central Asian energy trade can provide some prospect for improving the level of energy security in the region:

- Coordinated operation of the Central Asian energy sectors and rationally exploiting energy potential would ensure stability and reliability of supplies prioritizing energy trade/resource exchange within the region. Such energy sector interactions will solve controversies over water–energy nexus and construction of the large HPPs. It will also ensure the sustainability of energy sectors providing sufficient and clean energy for the population and economic needs for the foreseeable future.

- Long-term stability and reliability of energy supplies as well as the resolution of disagreements over the construction of large HPPs in Central Asia will improve the investment climate for the private sector and will stimulate participation in energy projects and accelerate energy-led economic growth. Market mechanisms prevailing within the CAES may contribute to solving the problem of highly inefficient and subsidized energy sectors and promote alternative energy sources in the region.

- While energy interests of all countries are met simultaneously within the integrated CAES, Central Asian states perceive interdependence as a factor threatening national security and would refrain from full-scale reintegration of their energy sectors. The lack of political will is considered a major obstacle regarding restoring CAES. Recent political transition in Uzbekistan and the new course of the current leadership provide prospects for restoring intra–Central Asian energy trade.

Transparent, long–term and energy security prioritized energy policies

If properly managed, there is nothing wrong with pursuing energy policies designed to increase export capacity of the energy sectors in the region.

However, Central Asian energy policies as they stand right now can be characterized as short–term oriented, state–centric, and hydrocarbons/hydropower–focused. This implies that the Central Asian elites, having retained control over energy production and transportation industries, try to gain maximum benefits as long as they are in power. The Central Asian elites and their political clients collect rents and extract private benefits from mismanaging the energy sector. The lack of accountability and transparency in the energy sector affects the equal distribution of oil and gas funds. It undermines energy security concerns of the population and economies of the Central Asian countries as well as the development of non-conventional energy sectors from which elites cannot extract immediate benefits through export. So the revenues that Central Asian governments earn from selling their resources encourage these governments to increase exports to external markets even at the expense of domestic and regional energy consumption. Asymmetrical interdependence between regional producers and external customers who are eager to acquire the region's resources but who also prefer a bilateral format of cooperation remains a barrier to the establishment of strong energy links between Central Asian countries. Vlado Vivoda believes that "if a state does not have a clearly stated energy security policy, which addresses in detail the traditional and new energy security challenges, this allows that this state may not have the capacity and/or commitment to [timely and adequately] ensure energy security."[55] It is important though not only to set energy security policy, but also prioritize transparent energy sectors promoting long–term energy security focused initiatives.

Criteria	*Energy export diversification impact scenarios*	
	1	*2*
	Current shortsighted, state centric and export revenue oriented energy policies:	**Transparent, long–term and energy security prioritized energy policies:**

[55] Vlado Vivoda, "Evaluating Energy Security in the Asia-Pacific Region: A Novel Methodological Approach," *Energy Policy* 38 (2010), 5259, doi:10.1016/j.enpol.2010.05.028.

Criteria	*Energy export diversification impact scenarios*	
	1	*2*
	Current shortsighted, state centric and export revenue oriented energy policies:	**Transparent, long–term and energy security prioritized energy policies:**
Security of Energy Supplies	**Prospects**: -Promote establishing independent energy systems, which enhances resistance to external shocks and unilateral energy supply disruptions. **Challenges**: - Negative impacts on the functionality of the Central Asian countries' national energy systems as they were not initially designed to operate independently (very limited storage and processing capacity); - Do not solve the problem of seasonal variations of power production and unequal distribution of energy resources (excessive dependence on fossil fuels in downstream countries and lack of these resources in upstream countries); - Non–market mechanisms will be dominating in the energy markets.	**Prospects**: - Promote Intra–Central Asian energy trade, which would ensure stable and reliable supplies of diversified energy sources; - Improve energy security through rational use of existing energy producing and transporting infrastructures; - Encourage stakeholders to use market mechanisms in energy sales and distribution; - Prevent water spills from existing infrastructure in order to enhance electricity production. **Challenges**: - Intra-Central Asian energy trade will lead to losses if the states do not agree on who is responsible for the maintenance of transport infrastructure; -Continue to pursue establishing independent energy systems.
Energy demand management	**Challenges**: - Force producers to be extensively dependent on a single source of energy (Kazakhstan – oil; Uzbekistan and Turkmenistan – gas; Kyrgyzstan and Tajikistan – hydropower); - Result in increase of export at the expense of domestic consumption.	**Prospects**: - Reduce the demand for fossil fuels by exchanging energy resources; - Will allow Central Asian authorities to meet energy demand peaks if energy sectors are managed effectively; - Will secure a balance between export and import of energy resources.

Criteria	*Energy export diversification impact scenarios*	
	1	*2*
	Current shortsighted, state centric and export revenue oriented energy policies:	**Transparent, long–term and energy security prioritized energy policies:**
Energy Efficiency	**Challenges**: - Result in shortages of energy production in winter in the upstream states until financially and timely intensive large hydropower projects are implemented. - Cause water spills in summer; - Lead to inefficient and irrational use of fossil fuels (Burning fossil fuels produces electricity and is used for heating in winter; avoiding HPP water spills).	**Prospects**: Guaranteed and long-term availability of energy for both Upstream and Downstream countries to work all year round by using hydro-power and fossil fuels in the most efficient way. **Challenges**: - May not solve the problem of subsidizing inefficient energy sector in the short–run, as such initiatives would entail large investments and introduction of new technologies.
Economic aspect	**Challenges**: - Limited oil and gas processing capacities in Kazakhstan, Kyrgyzstan and Tajikistan will result in increasing import of oil and gas products from outside the region for higher cost; -Building independent energy systems (electric power transmission lines and pipelines) increases the cost of energy per unit; - Increasing total fuel production costs demands higher subsidies in the energy sector to avoid social tensions and political instability.	**Prospects**: - Relatively stable pricing policies; - Limited exposure to energy related economic risks; - Reduced fuel and energy prices (import of cheaper fossil fuels and electricity from the neighboring states); - Incentives to redirect revenues earned from energy exports to the development of energy infrastructure and security of energy supplies for both population and economic needs.

Criteria	*Energy export diversification impact scenarios*	
	1	*2*
	Current shortsighted, state centric and export revenue oriented energy policies:	**Transparent, long–term and energy security prioritized energy policies:**
Environmental aspect	**Prospects**: -Slowly developing RES. **Challenges**: -For Downstream states, increasing fossil fuels consumption to cover the loss of electricity previously imported form Upstream states; -For Upstream states investment in the development of its fossil fuel deposits.	**Prospects**: -More balanced consumption of fossil fuels due to periodical exchange of cleaner energy sources; -Efficient use of natural gas (cleaner than oil and coal) and hydro power due to exchange of energy resources, contributes to long-term sustainability of the regional ecosystem.
Human Dimension	**Challenges**: -Supply of energy to population spots that are already connected to energy system is limited due to state's inability to meet domestic needs; -Energy supply shortage due to breakdown of the unified Central Asian energy system; -Increasing export at the expense of domestic household energy consumption.	**Prospects**: -Availability of additional energy to meet peak demands; -Incentive to wider introduce RES technology in remote areas/ transition to more sustainable energy sectors. **Challenges**: -Availability of energy is too dependent on ups and downs of negotiation processes; -Increasing export at the expense of domestic consumption remains.

Criteria	*Energy export diversification impact scenarios*	
	1	*2*
	Current shortsighted, state centric and export revenue oriented energy policies:	**Transparent, long–term and energy security prioritized energy policies:**
Military/Security Dimension	**Challenges**: -Exposure to military conflict over Rogun and Kambarata–1 HPPs; -Inability to take coordinated actions against non-traditional threats (terroristic attacks); -Using energy exports as a weapon (influence the decision making of other countries).	**Prospects**: -Low risk of conflict over resources among Central Asian countries; -Provide security of energy supply and transit within the region; -Governments' can secure necessary amount of energy to meet basic needs in the period of energy crisis to avoid social uprising and political confrontation. **Challenges**: - Interdependency: energy export and ressources can be used as a political lever. -Some external state actors may perceive such union as a threat.

Criteria	*Energy export diversification impact scenarios*	
	1	*2*
	Current shortsighted, state centric and export revenue oriented energy policies:	**Transparent, long–term and energy security prioritized energy policies:**
Regional Cooperation	**Prospects**: -Multilateral Inst. provide support (grants) to Tajikistan and Kyrgyzstan to improve energy security. **Challenges**: -Frequent energy supply cuts due to lack of an effective enforcement mechanism; -Image of an unreliable partner.	**Prospects**: -Short-term and bilateral contracts for the functioning of the CAES are better than the disintegrated system; -Long-term and multilateral agreements in energy sector; -Effective mechanism (The Energy Security Center for Regional Cooperation) to timely and efficiently respond to energy security threats. **Challenges**: -No effective and trustworthy mechanism regulating regional cooperation.

CONCLUSION

Having experienced the negative consequences of excessive dependence on the Russian pipelines, Central Asian exporters started pursuing diversification of gas export routes to obtain access to various energy markets. However, the Central Asian region is considered to be a source of energy for customers from outside the region. Thus, increasing the volume of gas, oil and electricity exports has a reverse effect on the availability of gas for domestic and intra-regional consumption.

Despite energy shortages for regional consumption, Central Asian gas producers will most likely continue increasing their export capacity to meet growing international demand. There are three major reasons for the regional exporters' willingness to restrict domestic consumption in favor of increasing export capacity: first, resource dependent economies heavily rely on revenues from exporting energy to external markets; second, regional exporters are attempting to compensate their economic losses from subsidized energy for domestic consumption by generating higher revenues from gas, oil and electricity exports; third, asymmetrical power relations between Central Asian gas producers and such external customers as Russia and China force regional exporters to go along with the system (in which gas export to the external markets is prioritized) rather than to challenge it.

For exporting countries, moving energy out to external markets does not contribute to their energy security in terms of availability of resources for domestic consumption. Energy sectors regulated by market mechanisms can naturally eliminate the difference between domestic and external energy prices, thus increasing the attractiveness of internal markets. However, the development of energy sectors extensively controlled and subsidized by state actors requires government policies that are specifically designed to ensure energy security, not the ones prioritizing export of energy resources to external markets.

In this regard, such factors as the mismatch between production capacity and external demand, ineffective and unaccountable energy sector governance, excessive dependence on a single major loans provider or a customer threaten Central Asian producers' ability to increase export capacities without compromising domestic energy needs. Negative impacts of export diversification policies can be mitigated by prioritizing intra–Central Asian energy trade and pursuing long–term, transparent and reliable energy policies.

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