● Article ●

Energy Policies of Kazakhstan and Kyrgyzstan: Case for Energy Security through Cooperation*

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Abstract

The article examines energy policies of two Central Asian countries: Kazakhstan and Kyrgyzstan. The energy profiles of these two are dissimilar. Kazakhstan is a significant producer and exporter of hydrocarbon resources (oil, natural gas and coal) and the world's largest producer and exporter of uranium. Pursuing ambitious strategy for export routes diversification, Kazakhstan is keen to incorporate its energy potential into unfolding projects under the auspices of the Central Asia Regional Economic Cooperation (CAREC) program, Eurasian Economic Union (EAEU), China-led Belt and Road Initiative (BRI) and other initiatives. The most successful among the transition economies in Central Asia, Kazakhstan is still heavily dependent on coal, but increasingly interested to optimize its energy balance and commercialize its energy potential through the development of renewable energy. In contrast, Kyrgyzstan possesses no fossil fuels of significance, relies deeply on export thereof (increasingly, from Russia) and profoundly depends on hydro resources for electricity generation (while being susceptible to water disputes with the neighbors, most seriously, Uzbekistan). If Kazakhstan treats energy sector as one of the powerful engines for its economic dynamism, Kyrgyzstan realizes that energy factor challenges the country's prospects for sustainable economic growth. Facing the need of addressing numerous restraints, such as dependency on imported energy resources, reliance of the domestic gas sector on external state actor (Russian Gazprom), high energy intensity, mediocre energy efficiency, obsolete and insufficient energy generating capacities, Kyrgyzstan strives to employ various opportunities, but lacks the required expertise and

*This research was supported by a grant-in-aid from the JSPS KAKENHI Grant Number JP16KT0044, Waseda University grant-in-aid 2018B-312 and Waseda University grant-in-aid 2018K-388.

resources, financing, most of all. The article demonstrates that energy security of the two nations in question is inseparable from energy security of the entire Central Asian region and, therefore, necessitates regional and international cooperation.

Key words: Central Asia, energy policy, institutions

Introduction

Initially, energy sectors of Central Asian countries were designed to operate within a unified energy system, one of the major components of which was the Central Asian United Power System（CAPS）. Each state contributed in certain way to the regional energy system. Kyrgyzstan and Tajikistan generated hydro power, Kazakhstan produced oil and coal, Turkmenistan supplied gas and Uzbekistan shipped oil and gas. Such a comprehensive system ensured sufficient energy supplies throughout Central Asia. Importantly, the established resource-sharing mechanism was effective in solving the problem of seasonality of energy supply. Hydrocarbon-producing Kazakhstan, Turkmenistan and Uzbekistan provided continuous supply of oil products, natural gas and thermal electricity to the upstream Tajikistan and Kyrgyzstan in winter. In return, Tajikistan and Kyrgyzstan provided the agreed amount of water for the irrigation, as well as hydroelectricity to downstream states in summer. After the dissolution of the Soviet Union, mutually beneficial energy cooperation established by the socialist economic system started to weaken.

Nowadays, Central Asia represents a case where energy security is compromised by self-centered energy policies of the states. Since independence, energy policy coordination has given way to growing energy isolationism oriented at achieving self-reliance and maintaining self-control. Over this period, fossil fuel-rich Kazakhstan, Turkmenistan and Uzbekistan have succeeded in building new energy transporting networks, being most of all motivated by the prospects of expanding energy exports. Yet, Central Asian economies are far from being characterized as having improved the energy security.

Speaking of national energy security, Tajikistan cannot make efficient use of its gigantic hydro potential because of its own financial and technical constraints and, even more seriously, due to the long-standing disagreements with the neighbors over the water sharing mechanism. In low-income Kyrgyz

economy, suspension of vigorous market reforms in the energy sector over the concern of causing heavy social impact has eventually resulted in losing the control over the national gas sector to foreign state-owned company (Russia's Gazprom). For long, Turkmenistan has also been reluctant to launch market-oriented transformations in the national energy sector, going as far as, providing natural gas to the rural residents at virtually no fee. Such policy choice was understandable in the early period of independence of the low-income economy. As the country needed sources of revenue to draw the necessary finances from, Turkmenistan opted for shipping its newly discovered abundant natural gas to China. To materialize this export channel, Turkmenistan tided itself up by a large Chinese loan for the pipeline construction accepting stringent loaning terms. Kazakhstan, with its diverse energy resources (large deposits of hydrocarbons and uranium, and tremendous opportunities for harnessing renewable sources) and by far significant financial capabilities to bring about energy transitions, still heavily relies on environment unfriendly coal. Like other Central Asian nations, Kazakhstan attempts to solve the problem of geographically uneven development of domestic energy infrastructure, a feature inherited from the Soviet system where energy supply was coordinated not within the national energy complex but across the regional energy system. Uzbekistan, whose fossil fuel reserves are not especially significant, is increasingly challenged by growing domestic gas demand. Owing to its geographical position, Uzbekistan plays the key role in energy system of Central Asia. Therefore, it is a promising shift that under the new political leadership Uzbekistan became interested in reinforcing genuine regional cooperation and the Central Asian nations seem to be receptive to such calls.

The external dimension of energy security involves the matter of security of demand for Central Asian energy exports. Located relatively far from potential oil and gas consumers, Kazakhstan attempts to augment the output of hydrocarbons and diversify export destinations. In doing so, Kazakhstan invites foreign investment in national energy production, especially, in the form of production sharing agreements for the development of capital- and innovation-intensive offshore oil and gas fields. The recent shifts in regional dynamics (Uzbekistan's course toward economic liberalization and proactive foreign policy, signing the Caspian Sea Convention[1] and others) allow Kazakhstan to engage in large international energy projects in cooperation with

Azerbaijan, Russia, Turkmenistan, Uzbekistan and other countries. Overall, the multi-vector principle pursued by Kazakhstan in its foreign policy is being projected to the realm of foreign energy policy. Such course is supported by the EU and the United States. In contrast, self-isolated Turkmenistan, over various reasons, struggles to maintain stable gas exports to Russia and Iran. Effectively, Turkmenistan made itself dependent on the Chinese gas market but is yet to progress with bringing its gas to Europe (via the Trans-Caspian Gas Pipeline[2]) and building a new gas link with South Asian markets (the Turkmenistan-Afghanistan-Pakistan-India pipeline, TAPI). It is worth noting that Central Asian nations are invariably competing with Russia in hydrocarbon and hydropower export markets both in Europe and Asia.

The study explores the cases of energy policies of two Central Asian countries with different energy profiles: energy-sufficient and striving to diversify domestic energy sources and energy export markets Kazakhstan, and energy-deficient and struggling to employ its vast hydro potential for the national needs and export Kyrgyzstan. The principal objective of this study is to examine if the contemporary energy policies of the countries in question are capably addressing these countries' energy security concerns.

The rest of the article is organized as follows. Section one outlines the most principal for energy policy analysis concepts. Energy and economic profiles of Kazakhstan and Kyrgyzstan are examined in section two. Section three investigates national, regional and international contexts for the two countries' energy policies. The final section summarizes the principal findings of the study.

1. Analytical Framework

The analysis of energy policy draws on the Institutional Analysis and Development (IAD) framework (Polski & Ostrom 1999; Ostrom 2005, 2011) (Fig. 1). The IAD framework has been applied to a wide range of topics involving collaboration across organizational and state boundaries to manage common goods. This study perceives energy security of a nation as an ultimate outcome of a country's energy policy and treats energy security of a nation as a public good (in line with Goldthau 2012).

A particular mode of every nation's energy policy is unique because it

is informed by numerous factors. Energy resource endowment is the most obvious one. Having abundant hydrocarbon resources Kazakhstan actively exploits them for the domestic energy needs and seeks the opportunities for the expansion of energy exports. By the same token, having no fossil fuels Kyrgyzstan traditionally relies on hydro resources and imports hydrocarbons.

Away from the nature, institutions,[3] which are humanly devised rules (North 1990, 1991, 1994, 1995, 1997), whose principal merit lies in reducing the uncertainty associated with human transactions (Calvert 2006), affect every stage of energy policy making and implementation. The diversity of institutions can be presented by a three-tier model (Williamson 2000). At the highest level, there are informal, or so-called embedded, institutions, such as traditions, norms, customs, beliefs, expectations and so on. At this level, the treatment of energy can be described along one of the two dimensions: marketization or securitization. By extension, a particular nation's approach to energy policy either reflects the expectations for and the acceptance of a prominent role of the government in domestic energy sector or, vice versa, demonstrates public beliefs in the efficiency of the market forces. In the Central Asian economies, energy sector is traditionally regulated and controlled by the state. Only lately, some advanced economies in the region (Kazakhstan, in particular) have started popularizing the need for the market-driven logic to be incorporated in the national energy policies. Such novelties, however, are never well-received by the population, who is accustomed to energy subsidies as one of the traditional mechanisms of compensation for the absolutely low or insufficiently high incomes. The latter is especially relevant to Kyrgyzstan.

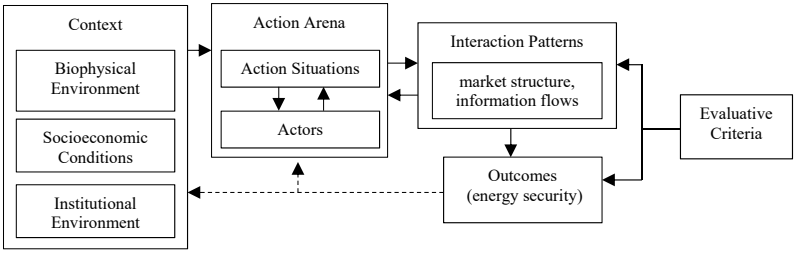

Fig. 1. Institutional Analysis and Development (IAD) Framework

Source: author, adapted from Ostrom 2005: 15.

At the second level, there are deliberately designed formal institutions, which compose a specific institutional environment. The institutional environment is determined by the type of economic system, specificities of the national political processes, organization of the government and bureaucratic structures, character of the judiciary system（especially in relation to property rights, contract law, dispute resolution and so on）, role of civic society and others. All of these inform a characteristic mode of energy policy-making and implementation. Elaborations by North et al.（2009）on the types of institutional environment, such as open access orders（OAO）and limited access orders（LAO）, seem to be especially relevant to this study. OAO enable open, relatively equal access to economic wealth and political power through the predominance of impersonal relationships in economic and political systems, preponderance of rule of law ensuring the equality of all the economic agents before the law and guarantying the protection of property rights. OAO enhance competitive environment, which reduces the opportunities for seeking economic rents, and promotes the Schumpeterian creative destruction. In contrast, in the LAO the governing elite is focused on creating and capturing rents. The survival of the political and economic elite is guaranteed by continuous cooperation within this group, which is underpinned by personal relationships, patronage and clientelism. Because only the stability of institutional setting secures the continuity of rent flows, the LAO tries to escape institutional changes. Illustrating the instances of OAO, Norway with its transparent resource management masters the efficient use of export revenues for the sake of inclusive economic growth immune to the disruptive impacts of commodities' price fluctuations. In sharp contrast, energy-rich Kazakhstan and Turkmenistan failed to introduce energy policy that ensures equally high living standards of all citizens and safeguards them against economic malaises caused by the volatility of commodity prices.

At the third level, there are institutions determining transactions among the individual economic agents, firms in particular markets, within and across government bureaus, networks and various hybrid structures; these are often approached upon the transaction cost economics. The theory of varieties of capitalism（VoC）, which treats firm as a focal unit of economic system and proposes that at the core of any economic transaction is the coordination problem, postulates that there are two types of coordination mechanisms:

liberal market economies and coordinated market economies (Hall & Soskice 2001). The former is dominated by competition and permanently advanced by the Schumpeterian process of path-breaking innovations. The latter is more static, favoring incremental changes and at best capable of gradual path-dependent transformations. More recent advances on VoC add a peculiar new rather broad type – dependent market economies (DME), implying that over the course of their transition, some economies developed various dependencies on external markets for trade, investment or other kinds of transactions (Nolke & Vliegenthart 2009). Singled out in Maszczyk & Rapacki (2012) examples of DMEs are Kazakhstan with its reliance on energy export revenues and Kyrgyzstan over its dependency on remittances.

Increasingly, the impact of natural resource endowment on economic performance is studied not only from the economic but also from the institutional theory standpoint. Within the former, the resource curse debate treats natural resources as a hindrance to economic growth but offers a variety of explanations to the phenomenon. The Dutch Disease theory argues that resource-dependent economy is weakened by the negative structural transformations triggered by the unbalanced development of resource sector (Sachs & Warner 1995). Other studies see the problem in the commodities' price volatility (van der Ploeg & Poelhekke 2009). The institutional curse studies point at the worsening institutional deficiencies in the rent-dependent economies (Auty 1994, 1998, 2001). In turn, institutional theory treats the problem of economic growth separately from resource endowment, arguing that it is the quality of institutions that define the extent of economic progress (Gylfason et al. 1999, Gylfason 2001, Torvik 1999, 2001, Mehlum et al. 2006).

The so far outlined notions are pertinent to the level of national energy policy. Important to the argument of this study component is the coordination of the national energy policies. There is a growing body of literature on energy policy harmonization and the overall energy integration studying the case of the EU's climate change policy and Energy Union (Kustova 2017). Szulecki et al. (2016) analyze the EU's contemporary energy and climate policy upon liberal intergovernmentalism, supranationalism and governance-oriented approaches arguing that the potential of the latter seems to be underestimated. Kostanyan with colleagues (Assessing ... 2018) discuss the issue of coherence, presenting two dimensions of such: horizontal (the coherence of aims, means

and so on within a state when formulating and implementing a national energy policy) and vertical (the convergence of strategic interests, goals, policy initiatives, financial, technical expertise, institutions and so on across the countries, neighboring states in a region or the members of an integration project). Similarly, studying the case of the Eurasian energy integration, Shadrina (2018) argues about the importance of institutional complementarity in the process of common energy markets' formation.

In the following, the pertinent to energy policies of Kazakhstan and Kyrgyzstan notions of actors, positions, policy actions, policy effects and outcomes are operationalized.

2. Economic and Energy Profiles of Kazakhstan and Kyrgyzstan

Energy profiles of Kazakhstan and Kyrgyzstan are dissimilar. Kazakhstan's oil reserves are assessed at 30 bb, natural gas – at 2.4 tcm, coal – 31.3 bt, and hydro power potential is evaluated at 20,000 MW.[4] In turn, Kyrgyzstan possesses no fossil fuels of significance: its oil reserves are assessed at 0.04 bb, natural gas – 5.7 bcm, and coal at 0.9 bt. Kazakhstan is a significant producer and exporter of energy resources (10^{th} largest in the world for the output of coal, 16^{th} – of oil and 23^{rd} – of natural gas, and 7^{th} largest in the word for the export of coal, 12^{th} – of oil and 20^{th} world's largest exporter of natural gas).[5]

The most advanced economy of Central Asia, Kazakhstan experienced economic slowdown in 2015-2016, but reported a 4 per cent growth in 2017 (Shadrina 2017). Unstable economic performance (Table 1) can be explained by structural factors, such as dependency on export of commodities with volatile

Table 1. Economic Profiles of Kazakhstan and Kyrgyzstan, 2011-2017

	Kazakhstan							Kyrgyzstan						
	2011	2012	2013	2014	2015	2016	2017	2011	2012	2013	2014	2015	2016	2017
Population, mn	-	16.9	17.2	17.4	17.7	17.9	18.2	-	5.7	5.8	5.9	6.0	6.1	6.3
Population growth, %	-	1.4	1.5	1.4	1.4	1.4	1.3	-	1.7	2.0	2.0	2.1	2.1	2.0
GDP growth, %, y-o-y	7.4	4.8	6.0	4.2	1.2	1.1	4.0	6.0	-0.1	10.9	4.0	3.9	4.3	4.6
GDP pc, PPP, US$	-	22,392	23,774	24,797	25,048	25,280	26,604	-	2,923	3,229	3,345	3,447	3,694	3,913
GDP pc growth, %, y-o-y	-	-	6.2	4.3	1.01	0.9	5.2	-	-	10.5	3.6	3.1	7.2	5.9

Source: retrieved from Yevraziiskii ekonomicheskii soyuz v tsifrah: kratkii statisticheskii sbornik. Yeavraziiskaya Ekonomicheskaya Komissiya. Moskva. 2017, 2018.

prices, as well as an apparent exhaustion of a low base effect.[6] Recently, the low-income Kyrgyzstani economy has been demonstrating higher economic and income growth.

Throughout the transition period, economy of Kazakhstan has been growing at over 4 per cent a year (Fig. 2), while the average growth of total electricity output was slightly over 1 per cent a year and the total final energy consumption (TFEC) even declined by more than 1 per cent a year on average. Kyrgyzstan's average annual economic growth of over 3 per cent was accompanied by a mere 0.4 per cent increase in total electricity output and almost 1.6 per cent decline in TFEC.

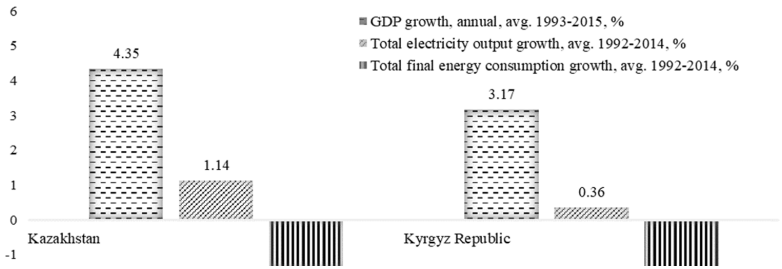

Fig. 2. Kazakhstani and Kyrgyzstani Economies' Growth – Energy, average annual growth 1992-2015, %

Source: computed based on WB Database.

In 1990-2014, the two economies have been exhibiting dissimilar shifts in the patterns of electricity output and TFEC (Fig. 3). According to the WB data, Kazakhstan saw a dramatic decline in electricity generation in the late 1990s, which recovered to the 1990 level only in 2010. In 2014, Kazakhstan's generation was by around 20 per cent above the 1990 level. From 2000, the recovery of electricity output in Kyrgyzstan has been unstable and in 2014 was still under the 1990 level. In 2014 Kazakhstan's TFEC was at around its 1996 level, Kyrgyzstan had TFEC close to the level of 1993.

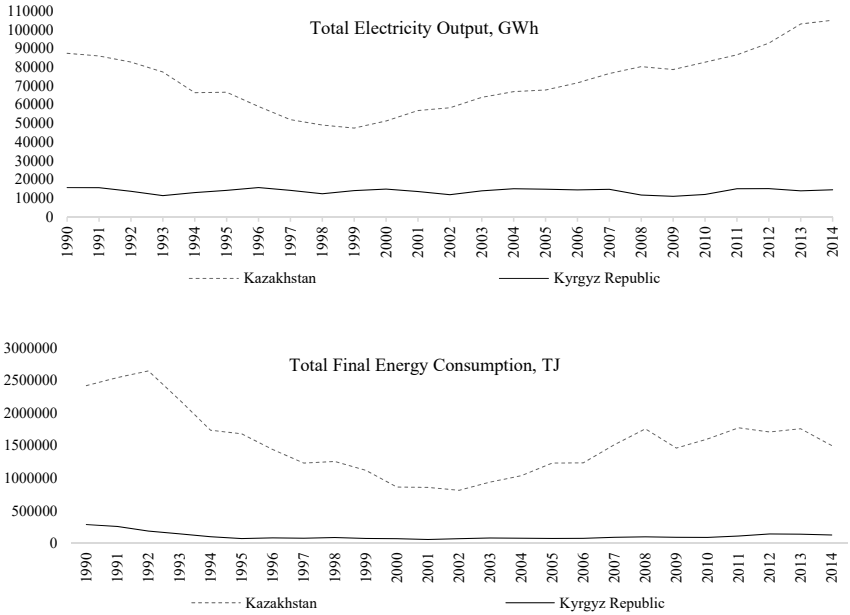

Fig. 3. Total Electricity Output and Total Final Energy Consumption, 1990-2014

Source: author, based on WB Database.

Coal occupies the most significant share in Kazakhstan's total primary energy supply (TPES) followed by natural gas (Table 2). As of 2015, Kazakhstan's electricity generation is 72 per cent coal-based, while natural gas-fired facilities contribute about 19 per cent. The most important component of Kyrgyzstan's energy mix is oil, followed by coal, but 85 per cent of its electricity generation is

Table 2. Energy Mix of Kazakhstan and Kyrgyzstan, %, 2015

	Kazakhstan	Kyrgyzstan
Coal	44	24
Natural gas	35	6
Oil	20	44
Hydro	1	26

Source: International Energy Agency EU4Energy, https://www.iea.org/media/publications/EnergyBalancesFactsheet.pdf

powered by hydro resources. The industrial sector and the residential sector are the principal consumers of energy in Kazakhstan[7] and Kyrgyzstan,[8] respectively.

Compared to 2012, Kazakhstan increased its oil output by some 18 per cent and gas – by 32 per cent (Table 3). More than half of Kazakhstani oil is concentrated at the super-giant Tengiz and giant offshore Kashagan fields. Almost 80 per cent of the nation's natural gas is located at Karachaganak (44 per cent), Kashagan (12 per cent), Tengiz (12 per cent) and Imashevskoe (7 per cent). However, most of Kazakhstan's gas output is reinjected in oil fields to maintain oil output (Shadrina 2018).

Table 3. Production of Oil, Natural Gas and Electricity in Kazakhstan and Kyrgyzstan, 2012-2017

	Kazakhstan						Kyrgyzstan					
	2012	2013	2014	2015	2016	2017	2012	2013	2014	2015	2016	2017
Output of natural gas, bcm	40.3	42.4	43.4	45.5	46.7	53.2	0.03	0.03	0.03	0.03	0.03	0.03
Output of oil, mt	79.2	81.8	80.8	79.5	78.0	86.2	0.1	0.1	0.1	0.1	0.1	0.2
Generation of electricity, TWh	90.6	92.6	94.6	91.6	94.6	103.1	15.2	14.0	14.6	13.0	13.1	15.4

Source: retrieved from Yevraziiskii ekonomicheskii soyuz v tsifrah: kratkii statisticheskii sbornik. Yeavraziiskaya Ekonomicheskaya Komissiya. Moskva. 2017, 2018.

Because Kazakhstan's gas production is concentrated in the west, while the consumption is localized in the north, east and south, and the domestic pipeline system is under-developed, the country imports some 3 bcm from Turkmenistan and Uzbekistan. Due to uneven development of domestic gas infrastructure, Kazakhstani KazMunayGas practices gas swaps with Russian Gazprom. KazMunayGas supplies Russia's Orenburg Gas Processing Plant with gas from the Karachaganak field. Gazprom, in turn, supplies the Aktiubinsk and Kostanai regions of Kazakhstan with Russian gas. Kazakhstan transits natural gas from Turkmenistan and Uzbekistan to China through the Kazakh section of the Central Asia-China pipeline, but Kazakhstan also aspires to increase its own gas exports to China to up to 10 bcm a year (Shadrina 2018).

Kazakhstan's endowment by energy resources informs the economy's dependency on energy sector (Table 4) and determines its foreign trade and investment links with the EU, US and Asian nations.[9]

Table 4. Kazakhstan's Dependency on Oil and Gas, %

Oil and Gas Sector in GDP	Oil and Gas in Merchandised Exports*	Oil and Gas Revenues in Total Fiscal Revenues
20	65	30

Source: adapted from Shadrina（2018）.

Note: (*) data on 2015 export is from Comtrade,[10] HS codes 2709（crude oil）; 2710（oil products）; 271111（LNG）and 271121（natural gas）.

Kazakhstan is energy self-sufficient. In contrast, Kyrgyzstan's energy self-sufficiency ratio is 50 per cent（Table 5）.[11] The economy depends on imported gas, oil, diesel and gasoline（Shadrina 2018）. Effectively, Kyrgyzstan has a single ample indigenous source for generating electricity – hydro resources. Hydropower potential of Kyrgyzstan is the second largest in the region（after that of Tajikistan）; it is evaluated at 26,000 MW. However, a lack of intra-regional cooperation, disallows Kyrgyzstan to fully materialize its hydro potential for domestic needs as well as for export.

Table 5. Energy Characteristics of Kazakhstan and Kyrgyzstan, 2016

	Kazakhstan	Kyrgyzstan
Fossil fuel energy consumption, % of total	99.17	69.30
Renewable energy consumption, % of total final energy consumption	1.36	28.25
Alternative and nuclear energy, % of total energy use	0.93	30.13
Combustible renewables and waste, % of total energy	0.03	0.08
Energy use, kg of OE pc	4,434.40	650.40
Energy use, kg of OE per $1,000 GDP（constant 2011 PPP）	188.01	204.42
GDP per unit of energy use, PPP $ per kg of OE	5.32	5.14
GDP per unit of energy use, constant 2011 PPP $ per kg of OE	5.39	4.89
Energy intensity level of primary energy, MJ/$2011 PPP GDP	7.60	8.60
Energy imports, net（% of energy use）	-116.89	49.54

Source: author, based on World Bank data.

Throughout 1990-2014, the share of renewable sources in electricity output in Kazakhstan peaked in 2002（to 15 per cent）, but as the total electricity generation has increased, the share of renewable energy shrunk to 8 per cent（Table 6）. In Kyrgyzstan, renewable energy plays by far significant

Table 6. Renewable Energy in Kazakhstan and Kyrgyzstan, 2014, %

	Kazakhstan	Kyrgyzstan
Renewable electricity share in total electricity output	7.88	91.26
Renewable energy share in TFEC	1.36	28.25

Source: author, based on WB database Sustainable Energy for All (SE4All).

role. Yet, the decisive share in Kyrgyzstani power generation belongs to large-scale hydropower plants (HPP),[12] which produce nearly 99 per cent of the country's electricity.[13]

In Kazakhstan, large HPPs contribute nearly 92 per cent to electricity generation in the renewable segment. The main hydropower resources and majority of Kazakhstani 24 HPPs are located in the eastern and south-eastern regions. The Irtysh river hosts the largest HPPs: Bukhtarma (675 MW), Ust-Kamenogorsk (332 MW) and Shulbinsk (702 MW). Other large scale HPPs are Kapchagay HPP (364 MW) on the Ili river, Moinak HPP (300 MW) on the Charyn river and Shardara (100 MW) on the Syrdarya river. The commissioning of Kerbulak (50 MW), Bulak (68 MW) and a number of smaller HPPs with a total installed capacity of 56 MW is planned by 2020.[14]

In the post-Soviet period, Kyrgyzstan's reliance on renewable sources for electricity generation increased by some 28 per cent.[15] The Kyrgyz energy system is divided into the northern and southern parts, which are connected with a 500 kV line (Toktogul HPP – Frunzensky) and Central Asia Power System (CAPS). More than 80 per cent of aggregate generating capacity is located in the south, while more than 60 per cent of consumption is localized in the north. Currently, electricity generation in Kyrgyzstan depends entirely on hydro resources, which are assessed as being enormous and exploited at less than 10 per cent of their potential.

The largest HPPs of Kyrgyzstan are Toktogul (1,200 MW), Kurpsai (800 MW), Tash-Kumyr (450 MW), Shamaldy-Sai (240 MW), Uch-Kurgan (180 MW) and Kambar-Ata-2 (120 MW) on the Naryn river.[16] A number of new HPPs is planned: by 2020, Kambar-Ata-1 (1,860 MW); by 2025, Verkhne-Narynsky cascade of HPPs (237.7 MW); by 2025-30, Kazarman cascade of HPPs (1,050 MW) and Susamyr-Kokemerens cascade of HPPs (1,305 MW). The HPPs are distributed unevenly: six out of seven

large HPPs with aggregate capacity 2,990 MW are located in the south. In the north, there is one 40 MW HPP and one thermal power plant（TPP）with installed capacity of 666 MW. The latter was built in 1961 and before its recently completed modernization was used at no more than 30 per cent of its capacity. In 2018, the quality of work by a Chinese contractor came in question after the renovated TPP malfunctioned, causing the capital's residents to freeze in their houses amidst the January cold.[17]

The problem of Kyrgyz HPPs is high degree of their wear（Aminjonov 2016）. The Kambar-Ata 120 MW HPP is the newest addition（2010）, while major generating capacities were built in the 1960s and 1970s, including the largest Toktogul HPP. The majority of small HPPs were constructed in 1940-1960s. A total of 1,250 MW capacity was constructed in the 1980s.[18] Besides large HPP, the renewable energy in Kyrgyzstan remains mostly untapped contributing a mere 1.1 per cent to electricity generation.

Because the regional cooperation in water-energy nexus proved to be difficult to achieve, Kyrgyzstan has been challenged to match its growing demand for electricity with the existing generating capacities（Smirnov 2018）. Being a low-income economy, Kyrgyzstan lacks financial and technical expertise required for upgrading the generating facilities and constructing new capacities.

Thus, Kazakhstan and Kyrgyzstan have dissimilar economic and energy profiles. Since its independence, Kazakhstan has been rather successful in mastering market transition. Also, Kazakhstan developed the national energy sector not only to satisfy the domestic needs, but to activate new export opportunities. Kyrgyzstan, despite a noticeable progress in reforming the national economy since the early 1990s, still faces multiple challenges while pursuing market transition. Energy sector of Kyrgyzstan especially requires comprehensive policies to improve their performance, develop their capacity and actualize their export potential.

3. Analysis of Energy Policies

3.1. National Context

3.1.1. Energy Policy of Kazakhstan

The state is an active player in Kazakhstani energy sector; the national

oil and natural gas company KazMunayGaz represents the state's interests in the industry. In addition to equity interests in the major fields - Karachaganak (10 per cent), Kashagan (16.68 per cent) and Tengiz (20 per cent) - KazMunayGaz holds shares ranging between 33 per cent to 100 per cent in many other national projects. In electricity sector, a state-owned Electricity Grid Operating Company is responsible for electricity transmission and network management. A number of medium and small companies handle distribution, some are privately-owned. In Kazakhstan, electricity transmission and distribution sectors are considered to be natural monopolies and regulated by the government. The wholesale generation of power is treated as a competitive market with the most generation assets being in private ownership.

The adopted Strategy 2050 attributes important roles to the energy and climate change policies.[19] Endorsed in 2013, the Green Economy Concept outlines the priority goals for increased resource productivity, modernization and development of infrastructure, improved well-being of the population, upgraded quality of environment, strengthened security, including water supply, and others.[20] The Concept declares that alternative energy sources (notably solar and wind power, but also nuclear) would account for 30 per cent of the country's total electricity production by 2030 and at least half – by 2050. By 2020, the total installed capacity of solar power stations is projected within a range of 75-100 MW, and of wind farms - at no less than 1,000 MW. Some 500-700 MW of capacity is to be reached through the instalment of small-scale HPP and biogas capacities.

Kazakhstan possesses diverse sources for renewable energy.[21] Its potential is exceptionally large for wind generation (Karatayev & Clarke 2016; Karataev et al. 2016). Geographically, the greatest potential is concentrated in the Dzungarian Gates, Mangystau Region, the Karatau Peak and the Chu-Ili Mountains.[22] As of 2016, Kazakhstan utilizes only small portion of this potential having nine wind farms (the Yerementau in Akmola oblast' and the Kordai in Zhambyl oblast', among others) of total projected installed capacity of 98.2 MW.[23] Also, Kazakhstan, especially its southern regions, are blessed with high insolation: between 2,200 and 3,000 hours of sunlight per year, equivalent to 1,200-1,700 kW/m2 annually. This makes both concentrated solar thermal and solar photovoltaic solar power generation suitable technically

and feasible economically. In the last several years, Kazakhstan started to develop solar energy projects, which（of total number 16）now contribute most significantly to the expansion of renewable generation. There are new projects under construction: the Karaganda solar farm with capacity 100 MW and Burnoye Solar-2 of 50 MW capacity（in addition to the Burnoye Solar-1 of the same capacity completed in 2015）. In 2016, the cumulative installed capacity of solar farms was 57.3 MW. In Kazakhstan, the biomass waste is barely utilized. Only 10 per cent of agricultural residual is used, not necessarily for electricity generation.[24] The total installed capacity of biomass is assessed at 0.4 MW. The only large-scale facility Vostok Biogas operates in Kostanai region generating 3 mn kWh annually.

Yet, so far, Kazakhstan's transition from coal to cleaner energy sources has been challenged by a continuing growth in energy consumption and construction of new thermal power stations. To enable progress towards sustainable growth and development, Kazakhstan introduced the ecological code with climate provisions, laws and programs on energy savings and renewables; launched emissions trading; adopted comprehensive programs envisioning industrial development, housing modernization and climate mitigation; introduced energy labelling, audit and certification; commissioned special fixed tariffs for renewable energies, among the principle measures.[25]

The Green Bridge Partnership Program[26] on the implementation of the Astana Initiative for 2011–2020 aims to promote regional, trans-regional and inter-sectoral cooperation in Europe, Asia and the Pacific for the sake of adoption principles of green economy. The Partnership is designed to improve access to green technologies, innovations and investment, and facilitate transfer of best practices to the parties concerned.

Among the most recent green growth oriented international initiatives by Kazakhstan was the Astana EXPO-2017, whose theme was "Future Energy: Solutions for Tackling Humankind's Greatest Challenge."

Since the onset of its independence, Kazakhstan has been pursuing multi-vector energy strategy trying to explore and develop new oil and gas fields, establish direct export routes and lessen the transit of hydrocarbons through Russia.[27] Unlike other Central Asian economies, Kazakhstan does not depend critically on the Chinese investment in energy sector. Kazakhstan's major fields Karachaganak, Kashagan and Tengiz are developed with the

European, American, Japanese and Chinese capital via the mechanism of production sharing agreements. In the early 2000s, regular shipments of oil from the Tengiz field started via a pipeline owned by the Caspian Pipeline Consortium (formed by Kazakhstani, Russian and other companies) to the Russian port of Novorossiysk at the shores of the Black Sea. In 2009, Kazakhstan opened the Atyrau – Alashankou oil pipeline to China. Completed in 2010 gas pipeline to China, made Kazakhstan a transit country for Turkmen gas, but also allowed Kazakhstan to ship up to 20 bcm of its own natural gas to China. Initially, to attract Chinese capital for the construction of oil and gas pipelines, Kazakhstan altered the national law, de facto making the national legislation especially favorable for China exclusively.[28] Since that early period of reforms, Kazakhstan's investment climate significantly improved causing the contemporary government's concern about the legal ways to eliminate special regime for China.

Thanks to new massive discoveries, Kazakhstan's giant oil and gas Kashagan field in the northernmost waters of the Caspian Sea is expected to be the main source of growth of domestic hydrocarbons output in the future.[29] The project participants are KMG Kashagan BV (16.88 per cent), AGIP Caspian Sea BV (16.81 per cent), CNPC Kazakhstan BV (8.33 per cent), Exxon Mobil Kazakhstan Inc. (16.81 per cent), INPEX North Caspian Sea Ltd. (16.81 per cent), Shell Kazakhstan Development BV (nearly 16.81 per cent) and Total E&P Kazakhstan (nearly 16.81 per cent). The field is operated by North Caspian Operating Company BV (NCOC).

The Kashagan has rather problematic history. It started oil production only in October 2016, after eight years of delay, sixteen years of development and more than $50 bn of investment from the North Caspian Sea Production Sharing Agreement (NCSPSA) Consortium operated by NCOC. Kashagan is believed to be one of the most expensive projects in the history of oil industry. For long, Kazakhstan's plans for pipeline exports were impossible due to the unsettled status of the Caspian Sea. On August 12, 2018, by signing the Convention on the legal status of the Caspian Sea[30] Azerbaijan, Iran, Kazakhstan, Russia, and Turkmenistan removed the legal barriers to building pipelines. One of the long-planned projects is the Trans-Caspian gas pipeline stretching from Turkmenistan to Europe. Also, Kazakhstan and Azerbaijan reiterated their intention to build the Kazakhstan Caspian Transportation

System（KCTS）oil pipeline to bring Kazakh oil from Quryq across the Caspian Sea to Baku.[31]

The only principal limitation to the projects, which have strong support of the EU, is the current market situation. The yet-to-be-built pipelines shall offer shipments at competitive vis-à-vis the current Russian supplies prices as well as the prices of increased recently LNG deliveries.[32] In practice, however, political and strategic considerations of some Caspian states may shape their attempts to use the environmental concerns as the ground for the vetoing pipeline projects in the Caspian Sea（Khrennikova 2018）. Position of some European nations to prevent the construction of new pipelines from Russia through the Baltic Sea（the Nord Stream I and, lately, II）can serve as a reference case.

Pursuing multi-vector energy policy Kazakhstan is keen to diversify energy exports. In doing so, Kazakhstan simultaneously explores economic, political and geopolitical avenues. At the same time, Kazakhstan declares intention to commercialize its gigantic renewable energy potential and positions itself as a regional leader popularizing green economy through hosting regional and international renewable energy forums.

3.1.2. Energy Policy of Kyrgyzstan

Kyrgyzstan's government reasonably links the task of ensuring the national energy security with the agenda of improving energy efficiency and pursuing sustainable economic development. Addressing the problem of fluctuations in domestic hydropower production, obsolete energy infrastructure, profound reliance on imported hydrocarbons, extreme energy inefficiency, among others, are the important agendas for Kyrgyzstan. The country's plans to develop indigenous energy sources（mainly, hydro and coal）as well as rehabilitate and expand the transmission and distribution networks are essential for strengthening the national energy security.

Kyrgyzstan has a number of legislative and regulatory provisions in the realm of energy policy, which, nonetheless, appear to be not in tune with the contemporary practices of greening the national economic growth and turning energy into one of the drivers of economic growth.

Introduced in 2016, the Concept for Energy Sector Development of the Republic of Kyrgyzstan till 2030 advances the provisions of the earlier

National Energy Program for 2008-2010 and Strategy for the Fuel-Energy Complex Development till 2025.[33] On August 13, 2018, Kyrgyzstan endorsed the National Development Strategy till 2040,[34] which announces the role of renewable sources in energy mix to grow up to 50 per cent and the parameters of energy intensity and efficiency to improve on a par with the OECD countries' practices. Adopted the same day, the Strategy for Sustainable Development till 2040[35] emphasizes the need for addressing the problem of energy security through the development of infrastructure[36] and endorses 16 projects of a total investment requirement of $8.3 bn.[37]

Given the role of hydro resources in the energy system of Kyrgyzstan, the country's principal challenges are in energy – water nexus, the absence of thorough consideration of this aspect in the most recently endorsed documents appears to be surprising. Overall, despite numerous program documents (strategies and concepts) have been endorsed, most of these documents make impression of being declarative rather than strategic and outlining the long-term visions.

The water-energy nexus has been one of the most difficult dilemmas for the Kyrgyz energy sector. For long, the downstream nations (Uzbekistan, in particular) were opposing the plans of Kyrgyzstan (and Tajikistan) to build large HPPs. The prospects for solving the problem are closely linked to the Kyrgyz and other respective governments' ability to establish the necessary inter-governmental regulatory environment for sharing water resources. Moreover, besides the existing conflict of interests between energy-generating upstream nations and agriculture-sensitive downstream economies, there are other complications. The Kambar-Ata-1 HPP has an especially entangled history. Initially, Russia was intending to implement the project. In 2012, the agreements on the construction of the two cascades – the Kambar-Ata-1 and the Verkhne-Narynsky – were signed. By 2014, the estimated expenditure almost doubled from $400 mn to $700 mn. In 2015 it became clear that the Russian investor is not capable of financing the project. Kyrgyzstan started to look for other foreign investors and signed an agreement with Czech company Liglass Trading in 2016. In 2017, it, however, became known that the company is insolvent.[38] Now, the project seems to have slightly brighter prospects owing to a changed attitude of Uzbekistan. Having emphasized its adherence to the course of regional cooperation, Uzbekistan has recently publicized its interest to

join the Kambar-Ata 1 project.[39] Essentially, Kyrgyzstan's prospects for massive electricity exports to a large degree depend on Uzbekistan's position.[40] Neither private investors nor the Russian or Chinese government would complicate their bilateral relations with economically and geopolitically significant Uzbekistan. However, despite the scale of the new HPP projects opens a variety of opportunities for a large number of potential participants, principal concerns remain uncleared. The feasibility of large HPP is impossible in the context of heavily subsidized electricity tariffs in Kyrgyzstan. Another significant obstacle relates to the mechanism of compensation for the land ownership to Kyrgyz citizens.

Unlike Kazakhstan's energy sector, Kyrgyz fuel energy complex severely suffers from a lack of investment. Characterized by obsolete infrastructure and high losses, Kyrgyzstan's energy sector operates at less than a half of its full capacity. The significant deterioration of energy assets is largely a result of heavy subsidies, particularly for electricity consumption. In such circumstances, it is impossible to accumulate financial resources sufficient for the system maintenance and investment.

Insolvency of a 83 per cent state-owned enterprise KyrgyzGaz resulted in Russia's Gazprom control over the Kyrgyz gas sector. In December 2013, KyrgyzGaz sold its gas network to Gazprom for a symbolic $1 in exchange for a takeover of $38 mn debt and Gazprom's pledge of $600 mn investment in the country's gas infrastructure over 25 years. JSC Gazprom Kyrgyzstan operates the transmission and distribution networks for natural gas. Kyrgyzstan's main source of gas supply - the northern branch of the Bukhara–Tashkent–Bishkek–Almaty pipeline - is owned by Gazprom and operated by KyrKazGas, a Kyrgyz-Kazakh joint venture. JSC KyrgyzNefteGaz is the only upstream natural gas and oil enterprise in the country.

The overall trend is such that the government essentially re-established the pre-2001 model of vertically integrated market structure. In 2016, the Kyrgyz government established a new state-owned company, the OJSC Energy Holding Company, which absorbed all the major market actors of the electricity sector: two electricity-producing companies, a transmission system operator, four distribution companies and a heat distribution and supply company.

Kyrgyzstan has been very enthusiastic about the opportunity to use the

Chinese capital for funding various projects in national economy. Recently, a soberer attitude regarding the Chinese model of extending loans under its BRI has been growing in prominence.[41] Among the Central Asian economies, Kyrgyzstan is found to be in especially vulnerable position as over a half of the country's foreign debt is held by China.[42]

During the post-Soviet economic transformation, willingly or not, Kyrgyzstan shifted away from the regional cooperation towards energy independence, which resulted in considerable inefficiencies. Some recent developments promise to reverse this trend, providing an opportunity to reap the benefits of more coordinated, integrated and competitive energy markets. After joining the EAEU in 2015, Kyrgyzstan became a party of the projected common energy markets (Shadrina 2018). A very important project for Kyrgyzstan's energy integration and trade is the internationally-supported CASA-1000 (Central Asia South Asia Electricity Transmission and Trade Project).

Overall, energy policy of Kyrgyzstan can be characterized as being continued in a conventional mode, where competitive energy market and renewable energy sources are not prioritized. Such vision precludes Kyrgyz economy from harnessing new drivers for sustainable growth. Development of Kyrgyzstan's energy sector necessitates regional cooperation for establishing the mechanisms for sustainable water sharing, energy projects funding, electric power trading and others.

3.1.3. Quality of Institutions as Determinant of Energy Policy

Several readily available rankings, such as the Ease of Doing Business Ranking (EDBR), Corruption Perception Ranking (CPR) and Global Competitiveness Ranking (CR), help shed some light on the two nations' institutional performance. Fig. 4 suggests that Kazakhstan and Kyrgyzstan still struggle to overcome corruption. Despite definite progress as of ten years ago, corruption persists and affects all the spheres of the national economies (Batsaikhan & Dabowski 2017). In 2018, corruption followed by the policy and government instability are named the major hurdles affecting Kyrgyzstan's EDBR. For Kazakhstan, corruption is ranked the second most problematic aspect (after the "poor access to financing" and before the "inadequately educated work force").

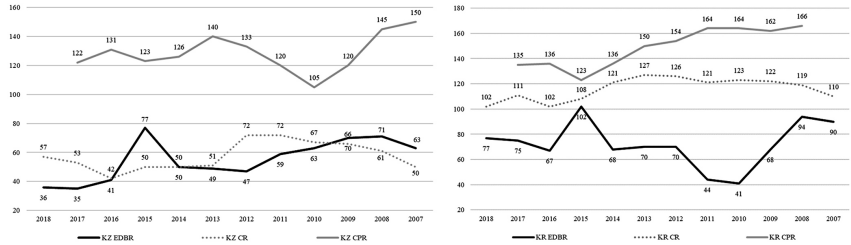

Fig. 4. Kazakhstan's (KZ) and Kyrgyzstan's (KR) EDBR, CR and CPR

Source: compiled based on Ease of Doing Business, http://www.doingbusiness.org; Global Competitiveness Ranking http://reports.weforum.org; Ease of Doing Business Ranking, http://www.doingbusiness.org; Corruption Perception Ranking, https://www.transparency.org.

Table 7 elucidates a related to the theme at hand case - the ease of access to electricity in Kazakhstan and Kyrgyzstan. In the latter, access to electricity is outstandingly bad: prohibitively expensive, involves extremely time-consuming procedures and provided at nontransparent pricing. Overall, Kazakhstan's score is lagging behind that of the best performers by one quarter, while Kyrgyzstan's performance is divided from the forerunners by more than 65 per cent.

Table 7. The Ease of Getting Access to Electricity in Kazakhstan and Kyrgyzstan

Parameter	Kazakhstan	Kyrgyzstan
Getting electricity, rank	70	164
Distance to frontier score for getting electricity, 0-100	76.77	44.19
Procedures, number	7	7
Time, days	77	125
Cost, % of income per capita	47.4	814.4
Reliability of supply index and transparency of tariffs index, 0-8	8	0

Source: excerpts from Doing Business 2018. Reforming to Create Jobs. World Bank Group, 2018, http://www.doingbusiness.org/~/media/WBG/DoingBusiness/Documents/Annual-Reports/English/DB2018-Full-Report.pdf.

The quality of institutional environment in the economies with significant role of extractive sector is being assessed by the Extractive Industries Transparency Initiative (EITI). Kazakhstan, with much of its revenue coming from the extractive sector, was among the first Central Asian countries to commit to the EITI in 2005. According to the EITI's 2016 Validation report, Kazakhstan's progress in implementing the EITI Standard[43] is assessed as meaningful. A member of the EITI from 2007, Kyrgyzstan (with the gold mining being the key sector of the national economy), to the contrary, is still found to apply inadequate efforts.

3.2. Regional Context

3.2.1. Central Asia Power System

A product of socialist planning, by 1991 the CAPS linked 83 power stations with total generating capacity of 25,000 MW.[44] The system enabled intra-regional electricity transmission based upon the agreements among the respective states. More than half of total CAPS electricity was generated in Uzbekistan, 15 per cent in Tajikistan, almost 14 per cent in Kyrgyzstan, 10 per cent in Turkmenistan and 9 per cent in Kazakhstan. The Integrated Dispatch Center Energiya, which controlled the electric power supply operations of the entire CAPS, was based in Tashkent.

Soon after having obtained sovereignty, economically more prosperous fossil-fuel Central Asian nations opted for self-centered policies overlooking the benefits of maintaining regional energy cooperation.

Bordering the four Central Asian countries, Uzbekistan holds the key to transit. Unfortunately, Uzbekistan has been demanding unreasonably high, above-market transit fees, thereby impeding the profitability of the established arrangements of power exchange, or arbitrarily interrupting transit deliveries. In contrast to the coordination between the Kazakhstani the Russian power systems involving the monthly net flow agreements and hourly transfer schedules, cooperation among the Central Asian economies has been complicated as it is linked to water sharing and must be agreed upon by all the affected parties. Even the settled annual agreements have been often violated. Within the CAPS, the Kazakhstani-Uzbek bilateral electricity trade is known for being the most problematic. UzbekEnergo (Uzbekistan's national utility) has been practicing unscheduled power transfers from the Kazakhstani system

during the periods of peak demand causing an overload of the Kazakhstani North–South interconnector and triggering blackouts in southern Kazakhstan.

Additionally, the unsettled cross-border disputes between Uzbekistan and Kyrgyzstan and Uzbekistan and Tajikistan impaired the bilateral relations and further complicated the water-energy dialogue. These tensions accelerated the disintegration of the CAPS: Turkmenistan withdrew from the CAPS in 2003, electricity-for-fuels schemes between Tajikistan and Uzbekistan were stopped in 2009 and Tajikistan de facto departed from the CAPS in 2009. As a result, the intra-regional trade in electricity declined from 25 TWh in 1990 to about 2-3 TWh lately（Aldayarov et al. 2017）forcing Tajikistan and Kyrgyzstan to build some alternative electricity capacities. To decrease its dependence on neighboring countries, Kazakhstan linked its southern and western regions with the main energy resources in the north by two transmission lines（completed in 1997 and 2009）. Currently, the CAPS connects southern Kazakhstan, Uzbekistan and Kyrgyzstan. Following a decline in the interregional electricity trading via CAPS, Turkmenistan expanded its export to Iran, while Uzbekistan and Tajikistan opted for selling some power to Afghanistan.[45]

As mentioned, since 2017, the prospects for regional cooperation have been improving owing to Uzbekistan's increased openness and determination to mend ties with the neighbors.[46] Speaking of which, Uzbekistan agreed to allow Turkmenistan's electricity to transit its territory towards Kyrgyzstan and southern Kazakhstan with a possibility also open for the winter deliveries to Tajikistan. This partially re-establishes the CAPS. The resumption of trading and the recovery of the capacity market across the whole CAPS, as well as interconnection to the grid of eastern Afghanistan can significantly improve the power cooperation in Central Asia.[47]

3.2.2. Energy – Water Nexus

In Central Asia, extremely poor in fossil energy resources, Kyrgyzstan and Tajikistan are enormously endowed by hydro resources.[48] Their respective Naryn and the Amu Darya rivers have gigantic hydropower potential for generating abundant electricity. The Soviet-era energy-water sharing mechanism not only solved the problem of uneven distribution of energy resources, but also prevented electricity supply disruptions due to seasonal

variations in generation in the upstream nations. However, there has always been a significant conflict of interests between water-rich Kyrgyzstan and Tajikistan and fossil fuels endowed Turkmenistan, Kazakhstan and Uzbekistan. As the downstream economies need irrigation water in summer for their agriculture, they have been opposing the upstream economies' attempts to augment their hydropower generating capacities, including those for prospective export. This is easy to comprehend once checking the dependency of downstream nations on the transboundary water. It is ranging from being critical (Turkmenistan - 94 per cent and Uzbekistan - 77 per cent) to high (Kazakhstan - 42 per cent). This aspect has been the key impediment for the hydropower development in the upstream countries.

Under the new leadership, Uzbekistan initiated rapprochement with the neighbors moving ahead with the long-awaited agenda for the trans-boundary water management as well as border delimitation.[49]

3.3. Common Energy Market of the Eurasian Economic Union

Kazakhstan and Kyrgyzstan (together with Armenia, Belarus and Russia) confirmed their commitment to the creation of the common energy market within the EAEU (Shadrina 2018). Among the envisioned three markets, common electricity market is scheduled to begin functioning the first - in 2019. The common market for oil and oil products and the common gas market are planned to be launched by 2025. Such a sequence is largely rational given the level of interconnectedness already achieved across the EAEU's economies in three respective sectors, the extant regulatory provisions (more uniform in the electricity and oil markets), and the characteristics of the national markets (such as size, organizational structure, and so on). The creation of each of the markets necessitates specific regulatory, institutional, technical and other decisions to enable the grand project. Among those principal specific aspects are the unification of regulatory environment, enhancement of competition and establishing the common electricity trading system in the case of electricity market; harmonization of technical standards, pricing and export tariffs for the case of common oil and oil products market; and access to transport and distribution energy infrastructure and pricing in the case of gas market.

Following the launch of the EAEU, the institutional format for

cooperation among the member states has changed from being predominantly bilateral to the supranational, one comparable to the case of the EU（Zemskova 2018）. Since Kazakhstan and Kyrgyzstan are also the members of the WTO and the Energy Charter Treaty（ECT）, their established systems of legal and institutional provisions enable energy cooperation between the two nations and the counterparts outside the EAEU.

3.4. CASA-1000

The Central Asian nations are involved into the international projects backed by the World Bank and Asian Development Bank（ADB）. Among such in the electricity sector are the ongoing CASA-1000 and TUTAP. The latter links by electrical grid power exporters Turkmenistan, Uzbekistan and Tajikistan with power importers Afghanistan and Pakistan.

The CASA-1000 is a 500 kV Obi-Garm – Sangtuda – Kunduz — Puli Khumri – Kabul transmission line connecting electricity-exporting Kyrgyzstan and Tajikistan with power-deficient Afghanistan and Pakistan.[50] The project's relatively slow progress is mainly because of the security concerns in Afghanistan, as well as issues with the financing. Some other international projects may prove feasible. Kazakhstan, for instance, is exploring export opportunities to the Chinese electricity market（Aldayarov et al. 2017）. The latter would be logistically and technically possible after the construction of north-south interconnectors is completed.

Provided better connectivity is achieved within the national and intra-regional grids, all Central Asian nations stand to benefit from the improved national energy security and expanded trading opportunities.

Conclusion

The article examined energy policies of resource-rich Kazakhstan and resource-poor Kyrgyzstan to demonstrate that regional and international cooperation offers solutions to each nation.

Distribution of energy resources in Central Asian economies suggests a case for solid regional cooperation, which, however, has been problematic throughout the period of post-Soviet independence. The dissolution of the Soviet economic system resulted in gradual physical degradation of trans-boundary

energy infrastructure in the apparent absence of the regional political leaders' will to reshape regional integration in mutually beneficial formats.

In the long run, Kazakhstan aims to diversify energy mix away from coal. Among the key energy policy priorities, the Kazakhstani government identifies the diversification of energy export routes and securitization of external demand; strengthening the independent and self-sustaining energy system; and enhancing large–scale renewable energy generating capacities.

Although Kyrgyzstan is impacted by the shortage of energy (electricity, in particular), the government links energy policy priorities with electricity export. The diversification is primarily focused on increasing power production capacity by further developing hydropower potential and improving performance of the national electricity generating sector by addressing the problem of seasonality (building Verkhne-Narynsky cascade and Kamba-Ata–1 and coal–fired Kara–Keche TPP).

Overall, Kazakhstan treats energy sector as one of the powerful engines for its economic dynamism and foreign trade and investment, while Kyrgyzstan realizes that energy factor challenges the country's own prospects for sustainable economic growth. Facing the need of addressing numerous restraints, such as reliance on external state actor, high energy intensity, low energy efficiency, obsolete and insufficient energy generating capacities, Kyrgyzstan seeks to employ various opportunities, which invariably demand regional policy coordination.

Both nations are keen to incorporate their energy potential into unfolding initiatives under the auspices of the CAREC, EAEU, China-led BRI, the EU (INOGATE, Investment Facility for Central Asia, Sustainable Energy Programme for Central Asia, among many),[51] the World Bank (Central Asia Energy Water Development Program and CASA-1000 under Central Asia South Asia Regional Electricity Market program, to name a few), the Asian Development Bank (Central Asia Regional Economic Cooperation - CAREC, and other projects and programs), the EBRD (renewable energy projects in Central Asia, particularly in Kazakhstan), the Eurasian Development Bank (renewable energy projects in Central Asia, especially in Kazakhstan), among others.

The analysis demonstrated that despite the Central Asian nations attempt to restrain the extent of intra-regional energy cooperation, energy

dependency is not only unavoidable but is a component of regional energy security. Every Central Asian nation naturally has its own priorities and vision as to how to design its energy policy, but, as has been presented in this article, regional and international cooperation is the key to enhancing energy security in the region.

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1 Convention on the Legal Status of the Caspian Sea. August 12, 2018, available at http://en.kremlin.ru/supplement/5328, accessed August 20, 2018.

2 The pipeline has been a central element of the EU's Southern Gas Corridor, a concept developed by the European Commission in the early 2000s, and officially recognised in the EU Energy Security and Solidarity Action Plan in 2009.

3 The literature on institutions is ample and growing. Review of these scholarly contributions is beyond the scope of this work; only the key relevant ideas are briefly outlined in this section.

4 Data on energy reserves of both countries are compiled from the CIA Factbook.

5 IEA Kazakhstan.

6 "Kazakh economy ministry projects real GDP of 3.8 percent in 2018", *The Astana Times,* April 5, 2018, available at https://astanatimes.com/2018/04/kazakh-economy-ministry-projects-real-gdp-of-3-8-percent-in-2018/, accessed April 30, 2018.

7 IEA Kazakhstan - International Energy Agency Kazakhstan Energy Factsheet http://www.iea.org/countries/non-membercountries/kazakhstan/Kazakhstan_EU4Energy_Factsheet.pdf

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