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INVESTMENT IN THE WATER AND ENERGY COMPLEX OF CENTRAL ASIA

Reports and Working Papers **21/3**

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EDB | 15 years

Centre for Infrastructure and Industrial Research
Centre for Integration Studies

Almaty
2021

Vinokurov, E., Ahunbaev, A., Usmanov, N., Tsukarev, T., Sarsembekov, T. (2021) *Investment in the Water and Energy Complex of Central Asia.* Reports and Working Papers 21/3. Almaty, Moscow: Eurasian Development Bank.

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The report contains an analysis of the current situation, international cooperation, challenges, and investment activity in the water and energy complex of Central Asia 30 years after the five republics (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) gained their independence. The authors have also compiled a database of ongoing and future investment projects related to the CA water and energy complex by analysing investment strategies of the key players, and the relevant state programmes. The report presents a preliminary assessment of capital investment needs of the water and energy segments until 2030.

Keywords: investment, power industry, water resources, Central Asia, multilateral development banks, infrastructure.

JEL: F21, F33, F36, L94, L95.

The electronic version of this document is available at https://eabr.org/en/analytics/special-reports/

SUMMARY

The existing level of cooperation among the countries of Central Asia (CA) in the water and energy complex, as well as the technical and economic solutions currently in place, are leading to significant economic losses.

- The annual economic damage and unrealised economic benefits are estimated at up to USD 4.5 billion (adelphi and CAREC, 2017), which corresponds to 1.5% of the region's GDP. Losses in agriculture are estimated at 0.6% of CA GDP, and in the energy complex at 0.9% of CA GDP.

- Preliminary EDB estimates show that over the next five years, removal of water and energy complex inefficiencies may result in an increase of CA GDP by 7% (or by USD 22 billion). In five years, economic growth rates in CA countries will additionally increase by 1.5 pp (relative to the inertial development scenario).

- According to World Bank estimates, over the longer term (until 2050), the difference between the costs of the inertial scenario and the benefits of the scenario assuming the strengthening of CA water and energy complex cooperation may reach 20% of GDP.

The CA countries face a number of challenges:

Energy Sector:

- High wear and tear on power grid equipment and generating capacities (the share of facilities aged 30 years or more ranges from 44% to 75%);

- High electricity losses (7–20% of total generation in some countries);

- Lack of balance between generation and consumption of electricity in CA (loss of export potential of 11 billion kWh);

- Diminished reliability of power supply in Uzbekistan and in the south of Kazakhstan as a result of shortage of manoeuvrable capacity reserve and failure to use HPPs in the neighbouring countries;

- Non-rational use of hydropower, including seasonal shortages and sterile spills due to the failure to align generation and consumption peaks (according to PJSC RusHydro, annual unsatisfied demand in Kyrgyzstan and Tajikistan is estimated at 1.5–3 TWh and 4.0–4.5 TWh, respectively);

- Differences in the legal mechanisms and regulatory/tariff tools used by various countries.

Water Complex:

- Reduction of water supply in the countries of the Aral Sea basin to 1,400 m^3 per person per year (critical threshold: 1,700 m^3), and widening of the deficit of water resources in the lower reaches of water basins as a result of shrinkage of glaciers and decline of meltwater reserves;

- High share of irrigated lands becoming salinized and waterlogged (about 50%) as a result of deterioration of water management facilities (pumping stations, principal canals, the irrigation network, and the collector and drainage network);

- Deviations from designed operating regimes of reservoirs and HPPs;

- Loss of long-term storage capacity of reservoirs, and increasingly critical shortage of irrigation water even during wet years;

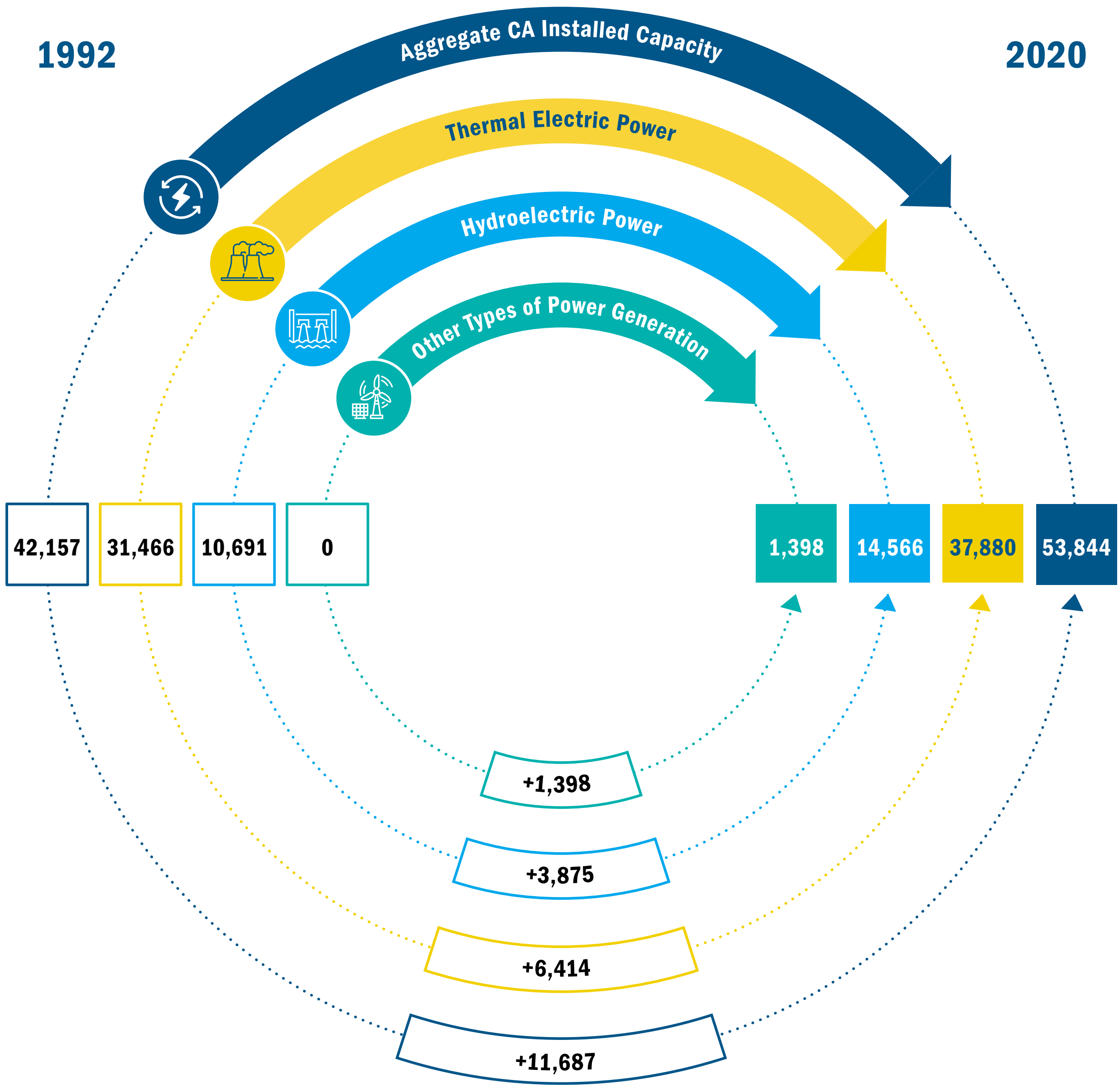
- Absence of efficient interstate water regulation required to meet irrigation water needs, which vary from season to season throughout the year;

- Conflict of interests between the countries situated in the upper and lower reaches of transboundary river basins with respect to water resources utilization regimes, etc.

The drastic weakening of cooperation in the Central Asia water and energy complex in the 2000s coincided with a period of rapid increase of the load borne by the energy sector. Net electricity consumption increased by 71.1% – from the post-Soviet minimum of 108.1 TWh in 1999 to 184.9 TWh in 2020 – due to the rapid expansion of energy-intensive industries (the average annual growth rate during the period was 6.7%, excluding Turkmenistan) and high population growth (by 33.5% from 54.3 million to 72.4 million). Parallel to a considerable decrease of average annual energy cross-flows, CA countries intensified construction of new and modernization of existing generating capacities, enabling satisfaction of the growing demand by domestic generation. In fact, over the last two decades, CA countries achieved **self-sufficiency of their energy systems.**

The CA energy sector evolved in the context of state programmes in the region. Subject to the ownership structure and the nature of investment projects in the water and energy complex, the state plays the key role in the development of the complex. The role of the state and state-owned companies is manifested at various levels, including conceptual frameworks for the development of the complex, determination of pricing policies, identification of funding sources, implementation of projects, etc. In 2020, the leaders in capital investment were Kazakhstan (USD 2.783 billion, or 1.6% of GDP) and Uzbekistan (USD 1.377 billion, or 2.4% of GDP). In Tajikistan and Kyrgyzstan, capital investment in the water and energy complex was USD 507 million (6.3% of GDP) and USD 89 million (1.2% of GDP), respectively. In Tajikistan, budget constraints did not prevent implementation of an active state investment policy, with foreign borrowings as the chief source of funding. Weak investment performance of the water and energy complex in the Kyrgyz Republic can be explained by the limited public revenues and low electricity rates, which do not cover the costs of generation.

Figure A. Changes in CA Installed Capacity, MW



Source: based on data provided by EIA and Fitch Solutions (2020 estimate).

Inasmuch as the water and energy complex of most CA countries has weak investment appeal for private capital and foreign investors, multilateral development banks (MDBs) act as an important source of financial resources required to implement state initiatives. At this time, there are 104 ongoing MDB-financed projects, with a total value of USD 10.2 billion. The EBRD tops the list of funding providers with a portfolio of USD 3.3 billion, or 32.7% of total MDB financing in CA. It is followed by the WB (USD 3.0 billion, or 29.6%) and the ADB (USD 2.6 billion, or 26.2%). The combined EDB, EFSD, EIB, and AIIB portfolio stands at USD 1.2 billion (11.5%). The MDBs have continued to finance the CA water and energy complex despite the global drive to minimise the effects of the COVID-19 pandemic. In 2020, the MDBs approved financing of 24 CA water and energy projects for a total of USD 1.8 billion.

Figure B. Participation of MDBs in the Financing of Investment Projects in the CA Water and Energy Complex

Share in Total CA Financing, %		Amount of Financing, USD billions
32.7	European Bank for Reconstruction and Development	3.318
29.6	The World Bank IBRD • IDA	3.005
26.2	ADB Asian Development Bank	2.659
6.7	Eurasian Development Bank / EFSD Eurasian Fund for Stabilization and Development	0.677
3.8	European Investment Bank	0.389
1.1	AIIB Asian Infrastructure Investment Bank	0.107
100	**Total:**	**10.155**

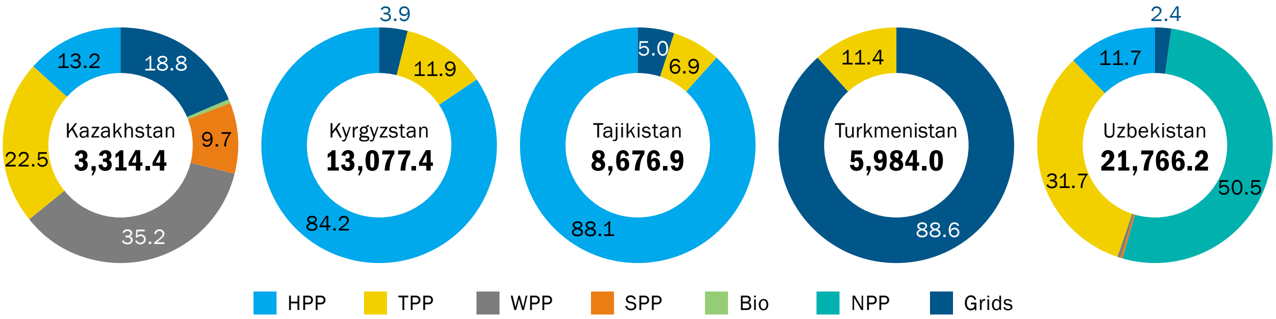
Source: calculated by the authors on the basis of public MDB data as of 1 April 2021.

It is anticipated that the average CA GDP growth rate over the long term will remain relatively high because of considerable demographic growth (according to UN forecasts, the median CA population will increase from the current 74.4 million to 90.0 million in 2050), and development of manufacturing, services, and agriculture. Those processes will boost electricity consumption in the region and, accordingly, increase the loads experienced by the existing generating capacity and the grid infrastructure, which are already degraded by significant wear and tear. On the other hand, because of the geographic isolation of the area, the land-locked status of its transboundary river basins, and increasing changes in climate, the growth of water consumption is becoming the chief driver of interstate water use and, accordingly, of interstate relations in the region.

The infrastructure of the CA water and energy complex has substantial investment needs of at least USD 90 billion in 2021–2030 (about USD 9 billion per year, which is much more than would be indicated by the current regional trend). Annual investment needs of the CA water and energy complex stand at 1% of GDP for Kazakhstan, 5.7% of GDP for Kyrgyzstan, 7.4% of GDP for Tajikistan, 3.5% of GDP for Uzbekistan, and 1.7% of GDP for Turkmenistan (Branchoux et al., 2018).

Total identified investment proposals in the energy segment of the CA water and energy complex are currently estimated at **USD 52.8 billion**, with the generation segment and the power grid accounting for USD 45.4 billion (86.0%) and USD 7.4 billion (14.0%), respectively. The main purpose of the relevant projects is to ensure energy supply efficiency, and to do that, it will be necessary to diversify energy sources, build up generating capacities that are traditional for each country, expand into new electricity markets, and reinforce internal power industry ties.

Figure C. Value and Structure of Identified CA Energy Investment Projects, %, as of 1 April 2021



Source: calculated by the authors on the basis of publicly available data.

It is expected that despite the growth of electricity consumption in the region, completion of investment projects scheduled for the next decade will avoid electricity shortages. Electricity surplus in the region will increase from 37.2 TWh in 2020 to 45.6 TWh in 2030 (EDB calculations based on data published by Fitch Solutions, 2020, 2021a, 2021b, 2021c, 2021d) which, in turn, will encourage electricity exports and raise the issue of where such surplus electricity should be sold.

The structure of the investment portfolio comprising ongoing CA water and energy projects is not optimal. In all CA countries, most identified investment projects pursue national interests without proper regard for regional interests, which is a consequence of the uncoordinated evolution of the water and energy complex. Accordingly, development of cooperation in the CA water and energy complex will improve the balance of water and energy resources in the region, and streamline the volume and structure of the investment portfolio. In particular, efficient use of regional hydropower resources will reduce the region's need for new generating capacity.

The challenges faced by the energy segment of the CA water and energy complex are numerous, and each country is trying to find its own solution to counter those challenges. The main problems in that area will come from the growing shortage of water resources. The use of water in CA has been growing rapidly, especially since 1960, due to demographic factors and the development of manufacturing and agriculture, particularly irrigation. The CA countries in the Aral Sea basin are distinctive in that their social and economic development proceeds in the context of **depletion of water resources**. In other words, the volume of resources used exceeds the volume available, and that trend will be determining the nature of interstate relations among the countries of the region. While the natural river runoff in the Aral Sea basin is 116.0 km^3/year, total water intake reached maximum values back in the 1980s–1990s at 120.69–116.27 km^3/year. The elevated demand for water is supported by recycled water.

In 2020, the countries of the Aral Sea basin continued to suffer from water shortages. According to the international classification of availability of water resources, they fall under the "stress" category (1,405 m^3 per person per year; threshold: 1,700 m^3 per person per year). Under the moderate development scenario for CA, this trend will persist over the long-term perspective. If CA countries fail to engage in meaningful regional economic cooperation (including water and energy integration), by 2050 they may move closer to the "scarcity" category (1,296 m^3 per person per year; threshold: 1,000 m^3 per person per year). The water situation will continue to deteriorate due to demographic factors (including persistently high population growth and urbanisation rates in the region) and the possible increase of the area of irrigated lands.

Achievement of the sustainable social and economic development goals facing CA is largely linked to the state of its water resources. Reaching a consensus on interstate water distribution in transboundary river basins is the key task that requires political will and an integrated solution embracing social, economic, and environmental changes as well as the political situation in the countries adjacent to the region. Tasks related to the alignment of positions on joint use of transboundary water resources cannot be regarded separately from country-specific economic development models and regional economic cooperation frameworks. The strengthening of trade and economic ties among the countries of the region and their close cooperation, with water policy becoming an effective economic integration factor, will help deal with the issues associated with the joint use of transboundary water resources.

Figure D. Use of Water and Land Resources in the Aral Sea Basin

	1980	1990	2000	2020	2030	2050
Population (millions)	26.8	33.6	41.5	74.4	81.6	90.0
Irrigated Lands: Total (thousand hectares)	6,920	7,600	7,990	8,040	8,100	8,200
per capita (hectares per person)	0.26	0.23	0.19	0.11	0.1	0.09
Water Intake: Total (km³ per year), including	120.69	116.27	105.0	104.6	107.5	106.3
Irrigation (km³ per year)	106.79	106.4	94.66	94.1	87.5	78.72
Irrigation per hectare (m³ per year)	15,430	14,000	11,850	11,704	10,800	9,600
per capita (m³ per person per year)	4,500	3,460	2,530	1,405	1,317	1,296

Note: Total water intake projections incorporate data on reuse of discharge, collector and drainage water, prospective rate of urbanisation in the countries of the region, and climate change.

Source: IWMCC RIC, authors' calculations.

Water infrastructure facilities are the most important long-term investment targets in any country, as capital investment in such facilities determines the quality of life of the population and the state of the economy for the next 20–30 years. That is why it is clearly necessary to design an efficient capital investment utilization mechanism, and to take into account the real risks to which infrastructure projects are exposed due to corruption and inefficient decision-making. To mitigate risks at all stages of implementation of such projects, it is important to ensure availability of accurate and updated information, rigorous planning, and clearly defined and audited business processes. Because construction of hydropower and water management facilities is very expensive, and it takes a very long time to go through the preparation and construction periods, loan and credit financing requires government bodies and financial institutions to thoroughly analyse and forecast the financial, economic, and environmental implications of each project. That is why it would make sense for the EDB, as well as for the ADB and the World Bank (the only MDBs involved in the funding of water projects), to pay more attention to analytical assessment and pre-investment substantiation of hydropower and water management projects, keeping in mind that they are directly linked to sustainable development.