

A wide-angle photograph of a water treatment pond at sunset. The sky is a mix of blue and orange, with soft clouds. The water is calm, reflecting the sky and the surrounding green trees and utility poles. The foreground shows a concrete or stone edge of the pond.

Water sector financial governance gap analysis in Central Asia

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EXECUTIVE SUMMARY

The CAREC Institute's 2022 research on water infrastructure in Central Asia revealed challenges in coordinated investment planning, suggesting that economic frameworks promoting cooperation and integrated planning could be more effective. Private engagement in the water sector is rare owing to regulatory hurdles and unclear ownership, which hinders financing solutions. Despite efforts to improve fee collection, significant challenges persist, prompting the project to identify governance gaps and prioritize actions for the appropriate financing of water infrastructure in each country.

The proposed consultancy involves delivering key outputs—including a water financing gaps report focusing on critical financial needs and infrastructure priorities; a water sector financing improvement action plan that systematizes existing schemes and addresses financing problems; and a policy paper and dialog series to initiate partnerships and agreements in Central Asia's water sector.

KAZAKHSTAN

Situational analysis/overview of the water sector

Kazakhstan—a vast, landlocked country in Central Asia—faces challenges in its water management and economy. With a large territory but low population density, its climate is continental and arid, leading to an uneven distribution of water resources. Climate change exacerbates these issues, causing floods of increasing frequency and economic damage. Kazakhstan experienced economic growth driven by natural resource extraction—particularly in the oil, gas, and mining sectors, which are concentrated in water-stressed regions. The water sector is fragmented, and the government is working on reforms; however, challenges include a lack of data, insufficient monitoring, and fragmented ownership. Water scarcity poses risks to agriculture, and projections suggest a 6 percent GDP decrease by 2050. Kazakhstan collaborates with neighboring countries on transboundary water management, with agreements in place. The water supply and sanitation infrastructure involve a mix of national, municipal, and private ownership. Common governance themes include diplomatic relations for water security, low water tariffs, limited citizen participation, and challenges in accountability.

The Open Budget Index (OBI) score for Kazakhstan indicates limited public participation in budget planning and control, improving from 38 points in 2010 to 63 in 2021. The budget code of 2008 governs the water management sector, financed primarily by the state budget and official development assistance, with evidence suggesting weak implementation and monitoring despite existing legislative frameworks.

Analysis of the drinking water supply and sanitation subsectors

Over the past two decades, Kazakhstan has invested in water supply and sanitation through various programs to enhance quality of life and economic potential; challenges include incomplete program implementation and limited public information about the outcomes. The Green Kazakhstan program launched in 2021 focuses on improving the environmental situation and preserving ecosystems. The country needs investment in the aging infrastructure, with numerous cities lacking wastewater treatment plants and requiring modernization. Kazakhstan emphasizes public–private partnerships (PPPs) in the water supply subsector, governed by the law on PPPs, but faces challenges—particularly in rural areas—hindering the development of PPP models.

Analysis of the industrial subsector

Major industrial players in Kazakhstan primarily in natural resources extraction—such as KazMunayGas, Kazatomprom, and Tau-Ken Samruk—are owned by National Holding Samruk-Kazyna. Despite significant water extraction, these companies—including KazMunayGas, Kazatomprom, and KAZ Minerals—often neither treat nor re-use wastewater. The Ministry of Ecology and Natural Resources (MENR) highlights the industrial pollution of surface waters, emphasizing the need for wastewater treatment plants and a reduction in the extraction of surface and groundwater. While some companies—such as KazMunayGas and Kazatomprom—report percentages of re-used water, others—such as Kazakhmys and KAZ Minerals—provide limited information on water use and recycling. Financial gaps in the industrial subsector, marked by profits from resource extraction, highlight the need for the construction of wastewater treatment plants to address water pollution and improve water quality.

Analysis of the land reclamation and irrigation subsectors

Between 2000 and 2019, water projects in Kazakhstan received only 0.24 percent of tracked investments, with annual irrigation investments being less than USD20 million from 2006 to 2010. In 2014-2015, annual investments increased to USD250 million to address growing water demand and improve infrastructure. Projections indicate potential water scarcity by 2030 if efficient water resources management measures are not implemented. Financial gaps in the land reclamation and irrigation subsectors, coupled with low water tariffs, lead to water losses, land salinization, and deteriorating infrastructure, negatively impacting food safety and security. The financial requirements for development include infrastructure reconstruction, construction of new reservoirs, tariff policy revision, and investment in water-saving technologies. The concept also emphasizes the need for digitalization and investment in staff training and infrastructure operations. While the action plan is expected to be financed from the state budget, specific budget details are not available as the concept is yet to be approved by the government.

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

- While improvements were made to PPP legislation in 2022, the complexity of PPP procedures and lack of clarity on investment return timeframes pose corruption risks in water projects in Kazakhstan.
- Factors like inconsistent financial returns and the Ukraine conflict make water sector investments risky, deterring potential investors.
- Blended finance, recommended by the World Bank and OECD, is proposed to make water projects attractive to private investors by mitigating environmental risks.
- Recommendations to address financial gaps in the drinking water supply, sanitation, industrial, and land reclamation sectors include enforcing the polluter pays principle, incentivizing water-saving technologies, and resolving governance issues.
- Challenges in the water management sector, such as water scarcity and pollution, require sustainable measures like integrated water resources management, investments in modern infrastructure, climate-resilient development, pollution prevention, education, and international cooperation.

Situational analysis/overview of the water sector

The infrastructure plans of the Kyrgyz Republic are dominated by the energy and transport sectors, with energy projects constituting 54 percent of investments between 2000 and 2018, while water-related investments are limited to 1 percent. The water resources service oversees the management and regulation of water resources, implementing a unified state policy on water use, protection, and interstate water relations. The Water Code of 2005 established the principles for water resources management, state competencies, and regulations for water use, pollution prevention, and ownership of water fund lands, with ongoing reforms focusing on basin management in accordance with the Water Code.

Analysis of the drinking water supply and sanitation subsectors

The drinking WSS subsectors in the Kyrgyz Republic, overseen by the Department for the Development of Drinking Water Supply and Sanitation, face challenges such as low access, poor service delivery, and financial gaps, with about 40 percent of the rural population lacking safe drinking water and limited sanitation infrastructure. The financial requirements for the subsectors involve substantial investments, especially in rural areas, and the government aims to establish state enterprises and technical service centers to address the infrastructure needs. The implications of financial gaps include low tariffs, inadequate salaries, and the government's inability to finance modernization, making international financing crucial for procurement and development.

Analysis of the hydropower subsector

The hydropower subsector in the Kyrgyz Republic, managed by the Department of Energy Efficiency, faces challenges related to poorly maintained assets and slow technology adoption. The government has implemented reforms to enhance energy infrastructure, including increased tariffs and the construction of the Kambar-Ata Hydroelectric Power P-1. Financial gaps exist, with the need for about USD14 billion by 2030 to realize the country's hydropower potential, creating jobs and increasing renewable energy capacity, and requiring strategies like tariff adjustments, institutional reforms, and alternative financing approaches.

Analysis of the land reclamation and irrigation subsectors

Financial analysis of the land reclamation and irrigation subsectors in the Kyrgyz Republic reveals the need for substantial support in areas such as agriculture, natural resources management, and climate adaptation. Challenges include fragmented agriculture production, limited post-harvest technologies, and inadequate logistics networks, all of which impact the competitiveness of the sector. To address financial gaps, the country requires significant investment for modernizing irrigation networks, providing drinking water, and implementing new irrigation technologies, with implications including high losses in on-farm irrigation and the need for improved water management at various levels.

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

- Kyrgyz Republic is categorized as group A for concessional assistance, having access to Asian Development Fund grants and concessional loans, with a moderate risk of debt distress.

- The Asian Development Bank’s sector priorities (2018-2022) in the Kyrgyz Republic include agribusiness, power, telecommunication, and ICT, with a focus on energy, transport, agriculture, education, public sector management, and water supply.
- Water sector challenges involve inefficient resource use and ineffective management, while measures include precision agriculture, water-saving technologies, tariff and administrative regulation, and cancelling groundwater licensing.
- Recommendations for addressing water sector financing gaps include strengthening public funding, enhancing cost recovery, encouraging private sector participation, and seeking international assistance, with key actions involving tariff adjustments, improved billing systems, and attracting private investment.
- Institutional development and governance initiatives in the water sector include delegating powers to the civil sector, establishing basin management bodies, improving financial management and governance, and recommending capacity building, partnerships, and anti-corruption measures for effective development.

TAJIKISTAN

Situational analysis/overview of the water sector

Tajikistan actively advocates for global water resource issues and climate change adaptation through initiatives such as UN resolutions. The country faces challenges in water sector financing owing to economic crises, climate change impacts, and aging infrastructure. The water sector—pivotal for Tajikistan's socio-economic development—involves key subsectors like hydropower, drinking water supply, and irrigation, necessitating reforms for financial sustainability and modernization.

Analysis of the drinking water supply and sanitation subsectors

The Republic of Tajikistan faces challenges in its drinking water supply and sanitation subsectors, with a coverage rate of 64 percent, leaving a significant portion of the population dependent on untreated water sources. Centralized services are provided by 85 enterprises, mainly under the state unitary enterprise Khochagii Manziliyu Kommunalni, but infrastructure deterioration, financial constraints, and low tariffs contribute to operational difficulties. Financial gaps result from insufficient funds, low tariffs relative to production costs, and low collection rates, posing risks to infrastructure, water quality, and public health, with estimated requirements of approximately USD2 billion over 30 to 40 years for clean water and sanitation.

Analysis of the hydropower subsector

Tajikistan possesses substantial hydroelectric potential, ranking eighth globally, but currently utilizes only 4 percent of its estimated 527 billion kWh resources. Hydropower constitutes about 90 percent of the country's 5,757 MW energy capacity. The main financial challenges in the hydropower subsector—led by Barki Tojik—stem from financial losses, debtor obligations, and insufficient tariffs, posing risks to infrastructure, energy security, and economic development, with emphasis on the need for approximately USD5.2 billion for the completion of the Rogun Hydroelectric Power Station and the financial recovery of Barki Tojik.

Analysis of the land reclamation and irrigation subsectors

The land reclamation and irrigation subsectors in Tajikistan play a crucial role in achieving strategic goals, including food security and rural employment. However, financial challenges, including infrastructure depreciation and insufficient profitability, pose risks. The water sector faces financial

gaps, with inadequate water tariffs, leading to debtor and creditor liabilities, and insufficient government subsidies, impacting infrastructure, natural disaster risks, and socio-economic development. The financial requirement for the sector's development—including infrastructure restoration, modernization, and construction—is estimated at around USD2 billion for sustainable operation and achieving its tasks.

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

- Financial challenges in subsectors include gaps in drinking water, sanitation, irrigation, and electricity services, with tariffs not covering production costs leading to high lending rates and accounts payable, which means profitability and stability must be achieved through financial and economic mechanisms.
- Infrastructure modernization is needed owing to the aging water infrastructure; this requires grants, loans, and public–private partnerships. Climate change impact includes melting glaciers, droughts, and land degradation. Integrated water resources management and basin principles are crucial for adaptation.
- Government initiatives focus on clean water, sanitation, and hydropower development, with recommendations for infrastructure assessments, automation, privatization, and tariff policies. The emphasis is on attracting funds for ecosystem-based adaptations and intersectoral strategies.
- Sector-specific financial strategies include recommendations for drinking water supply and sanitation, such as infrastructure improvement, automation, and tariff policies. In hydropower, the focus is on the Rogun Hydroelectric Power Plant, alternative energy, and the financial recovery of Barqi Tojik. For land reclamation and irrigation, recommendations cover infrastructure inventory, energy efficiency, automated monitoring, and cost recovery.

TURKMENISTAN

Situational analysis/overview of the water sector

Turkmenistan faces the challenge of managing water resources amid a projected population increase and decreasing water availability. The country demonstrates commitment through the reorganization of governing bodies, the launch of efficient water-use mechanisms, and international engagement. Financially, Turkmenistan relies on government funds, water tariffs, and international support, with a growing emphasis on water-related projects and large-scale infrastructure development.

Analysis of the drinking water supply and sanitation subsectors

Turkmenistan, grappling with the outdated water infrastructure from the Soviet era, has undertaken significant reforms and international collaborations since 2010 to enhance water management. The country developed an elaborate legal and institutional framework for drinking water supply and sanitation, outlining the general conditions, regulations, and dispute resolution. While water supply and sanitation have improved, the financial gaps pose challenges, with low tariffs and the need for increased investment in sewerage networks, treatment facilities, and water disinfection.

Analysis of the industry subsector

In 2022, Turkmenistan's industrial sector, particularly in hydrocarbons, expanded by 6.3 percent. Despite industry's significant role in the economy, it is not water-intensive, with water consumption

for production and industry being low compared to the agricultural sector. Financial gaps and environmental challenges arise in the industry subsector, especially concerning industrial wastewater discharge, pollution, and the need for effective environmental management.

Analysis of the hydropower subsector

Turkmenistan relies primarily on natural gas for energy generation, with limited renewable energy infrastructure. The country has two transboundary hydropower facilities—the Tuyamuyun hydro complex and the Dostluk reservoir dam—managed jointly with Uzbekistan and Iran, respectively. Although Turkmenistan has a small hydroelectric power station, the potential for small hydropower development remains largely untapped owing to financial gaps, challenges such as water scarcity, and insufficient expertise.

Analysis of the land reclamation and irrigation subsectors

Turkmenistan's land reclamation and irrigation subsector, primarily financed by the state budget, focuses on restoring and constructing large irrigation systems. With a total irrigated area of 1.815 million hectares and significant water consumption for agriculture, the agricultural complex aims to complete major investments, including drainage systems and irrigation networks. Financial gaps pose challenges, leading to deteriorating infrastructure, increased water scarcity, and potential economic losses due to climate change. The country is implementing measures—such as the construction of the Altyn Asyr artificial lake—to address water-related issues, but sustained funding and international support are crucial for sustainable development in this sector.

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

- Central Asian countries, including Turkmenistan, have witnessed an improvement in water sector financing from national budgets since the 2010s, reaching 49 percent to 60 percent of the required funds. By 2021, Turkmenistan achieved 60 percent financing, but the impact of climate change and aging infrastructure necessitates regular reviews of financial mechanisms.
- The government of Turkmenistan has recognized the increasing importance of financing the water sector, especially in response to challenges like low river levels in recent years. In 2022, the government established a commission on water supply, emphasizing the need for uninterrupted water resources and allocating funds for necessary equipment.
- With the agriculture sector consuming over 90 percent of the country's water resources, investments are directed towards critical projects, such as the construction of the Altyn Asyr artificial lake. Priorities include increasing reservoir capacity, upgrading irrigation systems, and improving the state of lands, reflecting in updated national programs with increased funds for water-related projects.
- To address financial gaps in the drinking water supply and sanitation subsectors, recommendations include developing a comprehensive financing mechanism, integrating funding for sewerage networks, exploring innovative disinfection solutions, planning financing collaboratively with other sectors, addressing seasonal water interruptions, and promoting collaborations between state and private efforts.
- Filling the financial gaps in the hydropower subsector involves cost-effective approaches to address siltation issues in reservoirs and considering simultaneous development and restoration of small rivers. In the land reclamation and irrigation subsectors, suggestions include attracting foreign investments, effective management, reconstruction of irrigation

networks, implementation of water-saving measures, and adopting progressive irrigation methods.

UZBEKISTAN

Situational analysis/overview of the water sector

Uzbekistan relies heavily on external water sources, particularly the Amu Darya and Syr Darya rivers, facing challenges in balancing agricultural irrigation demands with conservation. The country grapples with water scarcity issues, impacting both agriculture and domestic water supply, exacerbated by inefficient water usage patterns. To address these challenges, Uzbekistan is implementing strategies to modernize irrigation systems, promote water-saving technologies, transition to partial cost recovery, and focus on hydropower development for sustainable water management.

Analysis of the drinking water supply and sanitation subsectors

The country faces issues with outdated and deteriorated infrastructure, particularly in sewage systems, leading to contamination of surface water resources. Financial gaps, insufficient tariff structures, and limited access to centralized sewage systems contribute to the sector's stagnation, posing economic, health, and social risks. To address these issues, the government has initiated a comprehensive development program with a budget of USD6.8 billion, to modernize the water infrastructure, improve access, and ensure economic sustainability in the water supply and sanitation subsectors.

Analysis of the hydropower subsector

The Uzbekistan government has prioritized enhancing the hydropower sector's governance and financial sustainability, allocating significant funds for development projects. The country aims to achieve a balanced combination of foreign loans and government finance to support large-scale hydropower projects, with plans to increase capacity by 1.6 GW by 2030. The hydropower sector, contributing 14.3 percent to the total power output, is set to undergo substantial growth with the construction of 35 new hydropower plants (HPPs), the modernization of 27 existing ones, and a projected cumulative capacity of 3,785 MW by 2030. Financial challenges, including a less favorable external environment, necessitate comprehensive reforms for sustained economic growth and energy security. The government is actively seeking private sector involvement, international support, and alternative financing channels to bridge financial gaps, stimulate investments, and ensure the sector's sustainable development.

Analysis of land reclamation and irrigation subsectors

Uzbekistan allocates approximately 1.3 percent of its GDP—around UZ\$3 trillion to UZ\$4 trillion annually—for irrigation and drainage (I&D) works, but the real impact is challenged by factors like inflation. The aging infrastructure, with over 75 percent requiring repair, poses a significant obstacle, hindering water efficiency and agricultural output. Financial gaps, distorted investments, and insufficient funding for modernization highlight the complex challenges facing Uzbekistan's land reclamation and irrigation subsectors.

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

- Uzbekistan faces water challenges, necessitating substantial investments in improving effluent treatment, irrigation networks, and water supply systems. A World Bank public expenditure review (PER) emphasizes the importance of efficient public investments to counter the adverse effects of aging infrastructure and climate change, as Uzbekistan anticipates a 25 percent water deficit. Reforms and innovative technologies are being pursued to address these challenges and accommodate the growing population.
- The agricultural sector in Uzbekistan requires significant investment to achieve the widespread adoption of water-saving technologies, notwithstanding the positive outcomes from initiatives. Farmers, especially non-landowners, face barriers to investing in critical technologies. The government provides subsidies to encourage adoption, but the limitations impact resource allocation. The sector's water supply and sanitation infrastructure, developed during the Soviet era, requires extensive rehabilitation to improve accessibility, particularly in remote areas.
- The government aims to strengthen the hydropower sector's governance and financial viability, emphasizing improved operational procedures, regulatory frameworks, and transparency. Financial sustainability is a focal point, prompting strategic financial planning, investments, and the exploration of novel funding mechanisms. Tariff revisions, regional energy market integration, and long-term commitment are all recommended measures.
- To overcome financial gaps, recommendations include improving operational efficiency, exploring public–private partnerships, utilizing novel financing structures, implementing cost-reflective rates, and adopting smart water metering systems. Gradual increases in water costs reflect the expenses incurred and alleviate the financial strain on water delivery entities.
- Uzbekistan faces challenges in water management, prompting strategies such as water-saving technologies in agriculture, digitalization for efficient water management, addressing water scarcity and environmental impact, water allocation using tools like smartsticks, and integrated planning for coordinated efforts in water and sanitation improvement.

OBJECTIVE AND PURPOSE OF THE RESEARCH

In 2022, the CAREC Institute conducted a research project titled ‘Water Infrastructure in Central Asia: Advancing Sustainable Funding and Involvement of Private Capital.’ The study shed light on sector-specific challenges—including the limited coordinated investment planning in the water sector in the Kyrgyz Republic, the Republic of Uzbekistan, the Republic of Tajikistan—indicating that such an approach would not offer viable solutions for infrastructure financing. Instead, it suggested that economic frameworks encouraging cooperation and integrated planning across sectors could be a more effective approach. This strategy aims to take advantage of potential synergies, reduce costs, evaluate trade-offs, implement demand-side interventions, and provide decentralized services to ensure the sustainability of infrastructure projects. Within this context, the government could act as a social regulator, ensuring the equitable distribution of water resources among all users.

Privatization, concessions, or any other private engagement in the water sector is not common in Central Asian (CA) countries. Both ownership and investment in the water sector by private entities have rarely been observed in the region. The primary obstacle is the high degree of regulation and a lack of clarity regarding the ownership of water infrastructure, as well as an inadequate and unclear water governance system. While water agencies are responsible for the operation and maintenance (O&M) of water infrastructure, ownership rights are often poorly defined. In some cases, ownership is with the municipality; in other cases, infrastructure belongs to a different line of ministries or agencies (for example, energy or water supply). This situation also makes it challenging to trace the sources of financing streams.

The service fees charged by state water organizations are not fully collected, since water users are reluctant to pay for unreliable water supply. However, lately, household water supply fee collection has been improved owing to better metering and infrastructure improvements. For the irrigation water supply, the collected service fee rates are still significantly below the point where they can cover a substantial portion of the O&M costs. The countries are trying to increase service collection rates by introducing water metering (Uzbekistan), giving more roles to user organizations (the Kyrgyz Republic) and management organizations (Tajikistan), or giving them the right to keep part of the fees (Kazakhstan). None of these schemes alone can help solve financing problems in the water sector.

Therefore, by identifying water financing governance gaps in each country of focus, the project will shape priority actions that will facilitate the provision of the right finance to the right infrastructure.

KAZAKHSTAN

Situational analysis/overview of the water sector

General

The Republic of Kazakhstan is a landlocked CA country rich in natural resources that borders with the Russian Federation in the north and northwest, the Kyrgyz Republic and Uzbekistan in the south, the People's Republic of China in the east, the Caspian Sea in the west, and Turkmenistan in the southwest. Kazakhstan, with its territory of 2.72 million km², is the world's ninth-largest country and the population of 20 million—its population density of 7 people per km²—is one of the lowest population densities in the world.¹ Most of the population live in either the northeast or southeast, while the central and western regions are sparsely populated.²

The climate of the country is continental and arid. Annual precipitation levels are generally low, less than 100 mm in the deserts, between 250 mm to 350 mm in the steppes, and around 1,500 mm/year in the mountainous regions. Summer thunderstorms often produce flash floods in the steppes.² Kazakhstan's freshwater resources amount to 37,000 m³ per km². This translates into 6,000 m³ of renewable freshwater per capita per annum, placing the country in the middle of OECD member states.³ Surface and groundwater resources are distributed unevenly, with multiyear and annual dynamics across the country. The groundwater resources in the south and east of Kazakhstan exceed demand, while the north, center, and west of Kazakhstan experience significant water shortage.

The country is struggling with climate change adaptation needs for managing floods and other natural disasters. Floods causing damage to Kazakhstan's economy have become more frequent. This can be explained by the increase in water content in most of Kazakhstan's mountain rivers observed over the recent years. The increase in water content in the mountain rivers and flood frequency results from climate change, temperature rise, degradation of mountain glaciation, and increased water loss from glaciers. The temperature rise also causes lowland river reduction and earlier ice breakup on the upper reaches while the downstream is still covered with ice. The ice jams on lowland rivers, causing floods, as mostly observed on rivers flowing from the south to the north of the country (Syr Darya, Yertis, Yessil, and Tobol rivers).⁴ An increase in air temperature of 2°C by 2030 is expected to affect the hydrological regime of all water basins of the country.⁴ By 2050, the

¹ Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (BNS), 2024. Population of the Republic of Kazakhstan as of 1 January 2024. Retrieved on 19 February 2023, from the BNS official website: <https://stat.gov.kz/en/>

² UNECE, 2019. Казахстан: Обзоры результативности экологической деятельности

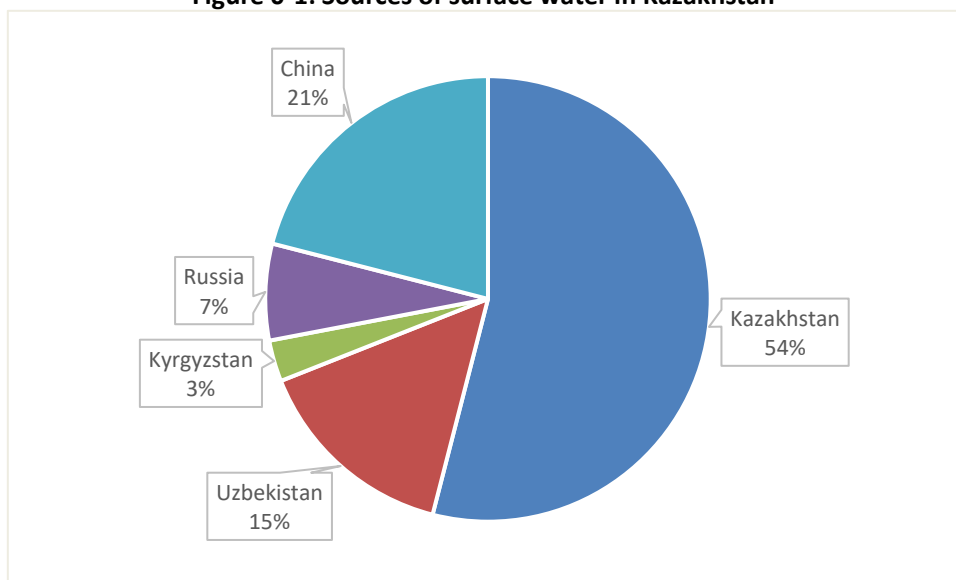
³ OECD, 2016. *Sustainable Business Models for Water Supply and Sanitation in Small Towns and Rural Settlements in Kazakhstan*, OECD Studies on Water, OECD Publishing, Paris, <https://doi.org/10.1787/9789264249400-en>

⁴ Ministry of Energy of the Republic of Kazakhstan, United Nations Development Programme in Kazakhstan, Global Environment Facility (Ministry of Energy, UNDP & GEF), 2017. Seventh National Communication and Third Biennial Report of the Republic of Kazakhstan to the UN Framework Convention on Climate Change. Retrieved on 15 October 2021, from https://kazhydromet.kz/uploads/calendar/29/march_4_file/5f8fd22701e3f7th-national-communication-of-the-rk-to-the-unfccc_2017.pdf

temperatures are expected to change in river basins. Projections from 2025 to 2050 show a possible increase of 2.5°C, compared with the historical trend, in the Yertis (Moiyldy and Oba rivers), Nura-Sarysu (Nura and Sarysu rivers), Zhayik-Caspian (Ilekr river), and Yessil (Yessil river) water basins.²

The hydrogeographic territory of Kazakhstan comprises eight river basins, five of which experience a significant deficit of surface and groundwater resources. The four largest river basins together constitute more than 90 percent of water resources and more than 70 percent of available resources of fresh water.² Seven out of eight river basins of Kazakhstan are formed in neighboring states and are of a transboundary nature. 15 groundwater basins are transboundary and are exploited jointly with neighboring states (the People's Republic of China, CA countries, the Russian Federation). Considering that 44 percent of the surface water is replenished from external sources, the transboundary cooperation in the context of water security of the country is very important and requires a strategic and integrated approach.⁵

Figure 0-1: Sources of surface water in Kazakhstan⁶



⁵ Government of Kazakhstan, 2024. Concept on the Development of the System of Water Resources Management of the Republic of Kazakhstan for 2024-2030. Retrieved on 19 February 2024 from <https://adilet.zan.kz/rus/docs/P2400000066#z20>

⁶ MWRI, 2024. About the Ministry. Retrieved on 19 February 2024 from <https://www.gov.kz/memleket/entities/water/about/structure?lang=ru>

Figure 0-2: Map of water basins in Kazakhstan²



Kazakhstan experienced accelerated economic growth from 2000 to 2010 owed mainly to the extraction and exports of natural resources that include hydrocarbons, uranium, coal, iron ore, manganese, chrome ore, nickel, cobalt, copper, molybdenum, lead, zinc, and bauxites.⁷ Kazakhstan has approximately 12 percent of global uranium reserves.⁷ Oil and gas are extracted in the west of the country and are exported mainly to Europe via the Russian Federation. In 2019, the share of crude oil and natural gas production amounted to 43.1 percent of the total volume of industrial production, where crude oil contributed 41.7 percent and natural gas 1.4 percent.⁸ 54.4 percent of the total volume of industrial production comes from mining and metals production.⁸ The oil and gas and mining and metals-generating industries—constituting around 30 percent of the national GDP and around 85 percent of the country’s exports—are concentrated in the water basins affected most by water stress.

In the water sector, the government aims to solve the problems with access to improved sources of drinking water for the urban and rural population and to solve problems with irrigation. One of the major concerns for agriculture is related to water availability: 90 percent of irrigated land in the south of the country benefits from water coming from glaciers in neighboring countries.² In 2050, Kazakhstan’s GDP is projected to decrease by 6 percent owing to water shortages.⁹ By 2040, water consumption is expected to increase by 56 percent and the water deficit will be around 12 billion m³.⁹ Thus, the country urgently needs to find solutions to the problems related to water availability.

Kazakhstan’s water supply sector is fragmented. Multiple public agencies, at different levels, share responsibility for water allocation and use. The Ministry of Water Resources and Irrigation (MWRI), formed in 2023, is responsible for the reforms in the water sector and for facilitating integrated,

⁷ OECD, 2017a. Reforming Kazakhstan: Progress, Challenges and Opportunities. Paris

⁸ EITI, 2020. 15th National Report. Retrieved on 13 August 2023 from https://eiti.org/sites/default/files/attachments/kazakhstan_2019_eiti_report.pdf

⁹ MEGNR, 2020. Project: Concepts of the State Program of the Water Resources Management for 2020-2030 in Kazakhstan (In Russian).

collaborative water management on a national level.⁶ The Committee on the Regulation of Natural Monopolies of the Ministry of National Economy (CRNM) approves and regulates water tariffs across the sector. The Committee for Construction and Housing and Communal Services of the Ministry of Industry and Infrastructure Development (CHCSA) oversees the water supply, drainage, utilities, and management of municipal waste.¹⁰ The Committee on Environmental Regulation and Control of the Ministry of Ecology and Natural Resources (CERC) controls the use and protection of the water fund, the dumping of harmful and radioactive wastes, sewage discharge, as well as regulatory compliance with the maintenance of water quality.^{11,12} The Committee for Water Resources of the Ministry of Water Resources and Irrigation (CWR) is the main implementing agency for locally and externally funded rural water supply and irrigation projects. The CWR is responsible for rural water supply development, the construction of group water supply systems, irrigation, drainage, river basin water resources management, transboundary natural water, and water use permits.¹³ The CWR functioned under the Cabinet of Ministers (1991-1997), the Ministry of Environment and Natural Resources (1997-2002), the Ministry of Agriculture (2002-2013), the Ministry of the Environment and Water Resources (2013-2014), the Ministry of Agriculture (2014-2019), and the Ministry of Ecology and Natural Resources (MENR) (2019-2023). During the annual presidential address on 1 September 2023, the CWR was transferred to the MWRI. At a local level, water regulation falls under either maslikhats (local representatives) or akimats (executive bodies). The akimats own public vodokanals, regulate the water consumption standards for users without meters, appoint the directors of the public water service companies, and approve the investment plans and tariff increase requests before their submission to the CRNM.¹⁴

The regulatory context for water utilities is not sufficiently comprehensive. There are no specific laws regulating the rights, obligations, and responsibilities of private and public water companies and the three laws regulating the water sector are the Water Code, the Environmental Code, and the Law on Natural Monopolies. The Environmental Code, adopted in 2021, is the primary legislation governing environmental protection and natural resource management in the country.¹⁵ The Law on Natural Monopolies (last amended in February 2017) deals with tariff setting, customer rights, obligations, and procurement oversight for natural monopolies. The Water Code serves as the basic legal document for water supply and sanitation (WSS) entities. It controls water resources management issues and defines the principles and types of water use and different forms of ownership. The new Water Code is under revision and has not yet been approved. The latest amended version was available from 1 May 2023. The Water Code designates the CWR to issue all approvals related to surface and groundwater and to establish the principles of river basin councils, which are advisory bodies of governmental organizations, water user associations (WUAs), and non-governmental organizations set to jointly resolve issues and implement basin agreements.¹⁴ The republican state enterprise (RSE) KazVodKhoz—a subordinate organization of the CWR—manages the operations, maintenance, and security of water facilities of national importance, as well as the

¹⁰ CHCSA, 2023. About the Committee. Retrieved on 3 June 2023 from <https://www.gov.kz/memleket/entities/kds?lang=ru>

¹¹ CERC, 2023. About the Committee. Retrieved on 3 June 2023 from <https://www.gov.kz/memleket/entities/cerc?lang=ru>

¹² CRNM, 2023. About the Committee. Retrieved on 3 June 2023 from <https://www.gov.kz/memleket/entities/krem?lang=ru>

¹³ CWR, 2023. About the Committee. Retrieved on 3 June 2023 from <https://www.gov.kz/memleket/entities/water?lang=ru>

¹⁴ Government of Kazakhstan, 2003. Water Code. Retrieved on 3 June 2023 from <https://adilet.zan.kz/rus/docs/K030000481>

¹⁵ Government of Kazakhstan, 2021a. Environmental Code. Retrieved on 3 June 2023 from <https://adilet.zan.kz/rus/docs/K2100000400#z4472>

supply of irrigation and drinking water. The main responsibility of RSE KazVodKhoz is the maintenance, operation, and restoration of hydraulic structures, multipurpose water reservoirs, and water mains held on the balance of the enterprise.¹⁶

In the 1990s, donor institutions concluded that combining the functions of policy setting, operating and managing the water utility, and regulating or governing its operations presented conflicts of interest and were not conducive to the efficient and effective governance of the water sector.^{17,18,19,20} Therefore, reformers and policy advocates prescribed a standard model for reform that involved separating the three sector functions by mandating them to different authorities or entities to improve sector governance.^{17,21} The water management sector of Kazakhstan needed an independent public regulatory agency or commission that was not linked to the utility, for instance, by owning it.⁷ In 2019, the Ministry of Ecology, Geology, and Natural Resources (MEGNR, restructured and renamed the Ministry of Ecology and Natural Resources or MENR in 2023) was formed to improve water governance in the country.²² On 1 September 2023, this function was transferred to the MWRI.

The situation in the water management sector is also hampered by a lack of data, insufficient monitoring of quality and implementation of measures to improve efficiency, and low levels of compliance.²³ There is no integrated national database containing critical information on water balance and consumption in various sectors, and no integrated electronic database on the state of the water bodies.^{23,24} There is a lack of transparency in the system of compliance with regulatory requirements on the part of organizations operating infrastructure facilities, utilities, industrial enterprises, and water users, as well as an inefficient monitoring and control system.^{23,24} Fragmented ownership and management of assets is also a big problem in the sector.^{23,24} For instance, the RSE KazVodKhoz manages infrastructure facilities on a national level.¹⁶ The water sector utilities own the municipal facilities.¹⁰ Agricultural infrastructure facilities are owned and operated by akimats (municipalities) or an association of consumer-farmers.²³

¹⁶ KazVodKhoz, 2023. Maintenance and operation of the hydrotechnical structures. Retrieved on 1 June 2023 from <https://www.qazsu.kz/ru/activity/>

¹⁷ Organisation for Economic Cooperation and Development (OECD), 2006. Environmental Finance: Local Capital Markets for Environmental Infrastructure Prospects in China, Kazakhstan, Russian Federation and Ukraine. Retrieved on 5 June 2023 from https://read.oecd-ilibrary.org/environment/local-capital-markets-for-environmental-infrastructure_9789264035966-en#page5

¹⁸ OECD, 2011. Water Governance in OECD Countries: A Multi-level Approach. Paris

¹⁹ Asian Development Bank (ADB), 2004. Past Experience and Future Challenges. Cooperation in Shared Water Resources in Central Asia. Water for All; Series 12. Manila

²⁰ ADB, 2012. National and Sector Level Risk Assessment and Risk Management Plans for Kazakhstan in Relation to Public Financial Management, Public Procurement System and Anti-Corruption Measures. Manila

²¹ OECD, 2022a. On the approval of the Concept for the development of housing and communal infrastructure until 2026. Retrieved on 3 June 2023 from <https://adilet.zan.kz/rus/docs/P2200000736>

²² Kapital.kz 2023. Реорганизовано Министерство экологии, геологии и природных ресурсов РК. Retrieved from on 1 June 2023 from <https://kapital.kz/gosudarstvo/111795/reorganizovano-ministerstvo-ekologii-geologii-i-prirodnokh-resursov-rk.html>

²³ UNECE, 2017. Improving the efficiency of river basin management. Challenges in water resources management and recommendations. Retrieved on 22 May 2023 from https://unece.org/fileadmin/DAM/env/water/meetings/Water_Convention/2016/Projects_in_Central_Asia/Review_of_the_main_challenges_of_the_river_basin_principles_implementation_in_Kazakhstan_and_recommendations.pdf

²⁴ UNECE, 2019. Казахстан: Обзоры результативности экологической деятельности.

The uneven distribution of surface water across the country poses economic and social risks.^{24,25} Half of the surface runoff is formed in the upstream neighboring countries. Similar to the river basins, there are eight water management basins in Kazakhstan.^{24,25} The largest rivers—Yertis, Syr Darya, and Ile—originate in neighboring countries.^{24,25} In most of the basins, there is a deficit in both surface and groundwater.^{24,25} The problem of water shortage has profound consequences for the lower reaches of the rivers and leads to a lack of irrigation water, a decrease in crop yields, a reduction in the income of the population engaged in crop and livestock production, a reduction in fisheries, a deterioration in the reclamation state of irrigated lands, as well as a lack of ecological releases, which led to the virtual disappearance of *Tugai* forests in the lower reaches of the river basins and deepening desertification.^{24,25,26} The scarcity of water resources is exacerbated by the poor condition of irrigation facilities, high seepage of irrigation canals, lack of advanced irrigation practices, poor technical condition of treatment facilities and their insufficient capacity, and outdated wastewater treatment technologies used in industrial and mining enterprises.^{24,25}

For all transboundary rivers, bilateral and multilateral agreements on water management have been signed with all neighboring states.²⁷ The bilateral cooperation of Kazakhstan in the field of water resources does not cover transboundary groundwater.²³ As seven out of eight water basins are transboundary, diplomatic agreements with neighboring countries are especially important for Kazakhstan.²⁸ The negotiations on the water intake are complex, can take years, and are not completely resolved with some of the neighbors.²⁸

Water relations with the People's Republic of China are regulated by the Agreement between the Governments on Cooperation in the Use and Protection of Transboundary Rivers, signed on 12 September 2001. In accordance with the agreement, two projects were completed in the past 20 years: the Dostyk hydraulic complex on the Khorgos River has been operating since 2013; and a reconstruction of the Kazakh–Chinese joint water intake facility on the Sumbe River was completed in 2018.

Water relations with the Russian Federation are regulated by the Agreement on the Joint Use and Protection of Transboundary Water Bodies, signed on 7 September 2010.²⁸ Six working groups on the protection and use of the Zhayik, Yertis, Yessil, Tobyl, Kigach, Karaozen, and Saryozen transboundary rivers meet at least once a year to exchange information on the hydrological and hydrochemical regime, and the prevention of pollution of the transboundary rivers.²⁹ Kazakhstan cooperates with the Russian Federation in five transboundary basins overall.²⁸

Relations with the Kyrgyz Republic are regulated based on the Agreement on the Use of Interstate Water Facilities on the Chu and Talas rivers, dated 21 January 2000.³⁰ The distribution of operating

²⁵ Global Water Partnership (GWP), 2021. Country Brief: Kazakhstan. How water resources management can support climate-resilient development in Kazakhstan

²⁶ Ministry of Ecology, Geology and Natural Resources (MEGNR), 2022. State Report on Environmental Condition and on the Use of Natural Resources of the Republic of Kazakhstan in 2021

²⁷ Agency on Strategic Planning and Reforms of the Republic of Kazakhstan (Агентство по стратегическому планированию и реформам Республики Казахстан. Бюро национальной статистик), 2021. Цели устойчивого развития в Казахстане 2016–2020. Статистический сборник

²⁸ UNECE, 2020. Отчет Республики Казахстан по глобальному целевому показателю ЦУР 6.5.2 (второй цикл отчетности). Ссылка: https://unece.org/sites/default/files/2021-11/Kazakhstan_2ndReporting_SDG652-WatConv_2020_web.pdf

²⁹ Central Asia Monitor, 2020. How Kazakhstan will introduce new technologies to save water. Retrieved on 22 May 2023 from <https://camonitor.kz/36169-kak-v-kazahstane-planiruyut-borotsya-s-deficitom-vody.html> (In Russian)

costs of the interstate water facilities and other issues of the joint use of water resources are facilitated by the agreement.³⁰ The water relations with the neighboring states of the Amu Darya and Syr Darya river basins are regulated by the Agreement on the Cooperation in the Field of Joint Management of the Use and Protection of Water Resources of Interstate Sources, signed on 18 February 1992 by Kazakhstan, the Kyrgyz Republic, Uzbekistan, Tajikistan, and Turkmenistan.²⁹ In 2020, the Ministry of Ecology, Geology, and Natural Resources (MEGNR) signed a roadmap on cooperation with the Ministry of Water Resources of Uzbekistan in the field of water relations between Kazakhstan and Uzbekistan.³¹

The WSS infrastructure can be owned by national, municipal, or private entities:¹⁴

- Transboundary, interbasin and interblast waterworks and the water resources of strategic significance are owned by the central government.
- Inter-raion, intersector waterworks, and urban water supply networks belong to municipalities. These water networks are financed by local budgets. These entities can generate income through the delivery of water supply services.
- Other waterworks are privately owned

Common governance themes of the water management sector through most historic periods have been:^{20,24}

- Ensuring water security through diplomatic relationships with the neighboring countries of the People's Republic of China, the Russian Federation, Uzbekistan, and the Kyrgyz Republic
- Issuance of affordable (low) water tariffs to water users
- Wide acceptance by citizens of the directives of government leaders, with little citizen participation
- Limited experience with holding managers accountable for results or with the requirements of modern public financial management or procurement systems.

Existing practice of financing the water sector

Kazakhstan's Open Budget Index (OBI) score, compiled by the Open Budget Survey, indicates limited public participation in the planning and control of the state and local budgets and limited audit control. The overall OBI score indicates improvement in budget transparency over the past 11 years, from 38 points out of 100 in 2010 to 63 out of 100 in 2021.³²

³⁰ GEF, UNECE, UNDP, 2018. Информационный отчет по результатам программы повышения потенциала: 'Разработка и реализация программы повышения потенциала по управлению водными ресурсами в бассейнах рек Чу и Талас' (translated from Russian: Information report on the results of the capacity building program: Development and implementation of a capacity building program for water management in the Chu and Talas River basins). Retrieved on 22 May 2023 from https://info.undp.org/docs/pdc/Documents/KGZ/Final_report_capacity_building_2018.pdf

³¹ Information and Analytical Center of Environment Protection (IACOOS), 2021. The head of the Ministry of Ecology, Geology and Natural Resources of Kazakhstan Magzum Mirzagaliyev announced the conclusion of an important document with Uzbekistan in the field of water relations. Retrieved on 22 May 2023 from <https://iacoos.kz/2020/07/03/7673> (In Russian)

³² International Budget Partnership, 2023. Kazakhstan Open Budget Index. Retrieved on 2 June 2023 from <https://internationalbudget.org/ru/open-budget-survey/country-results/2021/kazakhstan>

The Budget Code of 2008 governs budget and interbudget relations and establishes basic provisions, principles, and mechanisms of the budget system of the water management sector.¹⁴ The budget execution is subject to internal audit and external review by the Supreme Audit Chamber of the Republic of Kazakhstan (former Accounts Committee) and by the Parliament of the Republic of Kazakhstan.¹⁴ Financing the water management sector comes largely from the state budget and official development assistance.^{23,24} The national budget is developed annually on a rolling three-year basis and is approved into law by the Parliament of Kazakhstan.¹⁴

The state budget is the main instrument used for strategic planning. Financing of water and sanitation services development is normally from the state budget and is administered by the Ministry of Finance (MoF).¹⁴

Financial management and allocation of funding in the water sector

Evidence suggests that, despite the legislative frameworks in place, effective implementation and monitoring of the frameworks in the water management sector is weak.²⁰ The governance risk assessment shows that, while Kazakhstan is a fiscally responsible country, (i) it is good at planning, but bad at implementation and execution, and (ii) it is good at auditing, but bad at accounting and reporting.²⁰

The financial relationship between line ministries and municipal utilities has evolved over years of practical experience. Although the *de facto* relationship may seem adequately defined to the parties of annual budgeting and service delivery, a well-functioning credit market requires a more explicit commitment to budgetary support and contingent liability.^{17,32}

Kazakhstan clearly states that there is no implicit guarantee by the national government of subnational debt. On behalf of the Government of Kazakhstan, the Ministry of Finance (MoF) may choose to provide explicit guarantees for subnational borrowing, but in the absence of explicit loan covenants to this effect, the national government bears no liability for repayment of subnational debt obligations.¹⁴ This express statement of law insulates central fiscal authorities from irresponsible local debt management. It is also a building block for a responsible subnational government credit market, as it requires both borrower and lender to make realistic assessments of the borrower's capacity to repay loans rather than speculate about the probability of bailout by the central government.¹⁷ Kazakhstan has set a limit on debt service ratio of 10 percent of total local revenue, a limit on new annual borrowing of 10 percent of total local revenue, and a limit on stock debt of 25 percent of total local revenue.^{14,24} The MoF reviews subnational borrowing for the rural water supply subsector on a case-by-case basis.² Current laws permit only existing assets to be offered as loan collateral, not future revenues.¹⁴ In the absence of specific legislation stating that revenue streams can be offered as collateral for debt, the legal status of such pledges remains in doubt.

As the rural water supply subsector is considered unattractive for external investments, the government aims at directing state support primarily to the development of rural water supply. The government has already provided sovereign guarantees for the loans issued by the IsDB and the European Bank for Reconstruction and Development (EBRD) to the RSE KazVodKhoz to support the restoration of the rural water supply subsector.¹⁶

Institutional and capacity challenges present significant risks, particularly as more responsibilities and accountability evolve with an increasing demand for the development of the water management sector. To address these issues, the government:^{20,23,24}

- Is undertaking a tariff reform program
- Disseminates the full details of the budget documents to the public
- Supports private sector participation in public–private partnership (PPP) schemes
- Finances and co-finances water sector development programs

The following sources of funding can be considered for water-related projects at local level:²⁵

- Current revenue from the national or local budget
- Special grants from national budget
- Investment from the international financial organizations contracting with the government (projects co-financed from republican budget)
- Commercial banks
- Own funds of enterprises

General subsector analysis

National planning

The updated national development plan of Kazakhstan for 2021-2025 outlines the country's medium-term vision for economic diversification and development.³³ The plan focuses on ten tasks, the fifth of which is dedicated to the support of the agricultural sector, efficient water use, and wastewater treatment.³⁴ The government of Kazakhstan finalized the new economic policy (NEP) in September 2022, which is guided by several key principles, including ensuring private property rights, creating a favorable investment climate, promoting fair competition, sound public finance management, reducing administrative barriers, minimizing the state's role in the economy, and providing social protection.³³

Project financing and governance

The Supreme Audit Chamber carries out a complete and comprehensive external procurement audit.³⁵ Internal procurement audits and quality control are not carried out systematically. The evidence suggests that there are major bottlenecks in domestically financed project procurement, suggesting weak capacities in the regulatory regime.³² Capacity constraints occur in line ministries and water utility enterprises.³⁶ This is especially the case for water management enterprises that have limited experience or training in the procurement systems in place. For instance, RSE KazVodKhoz has been heavily involved in procurement processes while at the same time attempting to play a monitoring and regulatory role in the projects.

³³ ADB, 2022. Public–Private Partnership Monitor: Kazakhstan. Retrieved on 3 June 2023 from <https://www.adb.org/sites/default/files/publication/850386/public-private-partnership-monitor-kazakhstan.pdf>

³⁴ Government of Kazakhstan, 2021b. On amendments to the Decree of the President of the Republic of Kazakhstan dated 15 February 2018 No. 636 'On approval of the Strategic Development Plan of the Republic of Kazakhstan until 2025 and invalidation of some decrees of the President of the Republic of Kazakhstan.' Retrieved on 3 June 2023 from <https://adilet.zan.kz/rus/docs/U2100000521>

³⁵ Government of Kazakhstan, 2008. Budget Code. Retrieved on 3 June 2023 from <https://adilet.zan.kz/rus/docs/K080000095>

³⁶ Accounts Committee for Control over Execution of the Republican Budget of the Republic of Kazakhstan, 2015. *Bulletin of the Accounts Committee on the Execution of the Republican Budget #46 (IV Quarter of 2015)*. Astana (in Russian)

Contract management, part of the procurement cycle, faces major challenges. The performance aspects of an awarded contract, including quality assurance, time, and cost control, have been routinely neglected.^{20,25} As a result, some bidders have been quoting a very low bid price to take advantage of the weak monitoring of the cost, quality, and time of the contract.^{7,25} From the perspective of procuring entities and the private sector, the following areas could be considered for further improvement: (i) provision in procurement regulations addressing conflicts of interest and specific penalties to punish fraud and corruption in public procurement; (ii) monitoring and assessment of procurement, including data collection and analysis, and report preparation; (iii) civil society involvement as observers in the public procurement system (PPS) processes.^{7,20,25}

Based on the issues in the PPS, the water management sector is prone to the following governance risks to development effectiveness:^{3,20}

- The lack of procurement professionals and competent engineers can lead to loss of contracts, legal disputes, and non-delivery of services
- Technical specifications could suit favored contractors, precluding competitive procurement
- Large capital projects present opportunities for large-scale procurement, which can create vulnerability to leakages when transparent procurement processes are not employed
- Lack of due diligence and eligibility checks during prequalification can allow unsuitable contractors to bid, compromising value-for-money procurement
- Insufficiently specified bid documents allow low-cost contractors to bid despite lack of expertise, capital, and equipment
- Preselection of the winning bidder leads to a short bid evaluation period, compromising the integrity of the procurement process
- The absence of coherent guidelines for awarding contracts can lead to inconsistent procurement practices as well as disputes
- Large contracts with service providers in an environment characterized by weak watchdog institutions can provide opportunities for decision makers to make illegal gains
- Inadequate oversight of contracts and lack of functionality checks can lead to substandard services and facilities, which subvert sound resource uses
- Limited expertise in strategic planning, contract administration, and asset management undermines sector operations
- Conflict of interest regarding staff appointments, especially senior-level appointments with decision-making authority for the sector and subsectors, can interfere in the performance of staff duties and lead to actions that favor certain contractors and political patrons

Analysis of the drinking water supply and sanitation subsectors

Financial analysis of the drinking water supply and sanitation subsectors

Over the past 20 years, the government of Kazakhstan has made significant efforts to improve WSS services by investing public funds in the rehabilitation and development of WSS infrastructure.^{23,24} The investments undertaken initially—within the Drinking Water Program (2002-2010), Ak Bulak Program (2011-2020, discontinued in 2014), Regions Development Program (2015-2020, 2020-2025, discontinued in 2022), and Nurly Zhol (2020-2025, discontinued in 2022)—have been adopted to improve the quality of life of the population and the economic potential of the regions by, among others, developing the water management sector and modernizing the sector infrastructure.^{23,24,34} The sector development programs tend to stop in the middle of implementation and almost no information on the outcomes is readily available on public websites. To monitor public spending and improve accountability, participation, and predictability in the water management sector, it is

essential to provide information on water development programs on one web portal by different stakeholders, including line ministries and agencies.

The Green Kazakhstan 2021-2025 state program was launched in 2021; it was aimed at bettering the environmental situation, including improving air quality, efficient and careful water use, and preserving the ecosystems of Lake Balkhash and the North Aral Sea.³⁷ The program discontinued on 22 September 2023.

The most recent Residential and Communal Infrastructure Development Concepts 2023-2029, proposed by the Ministry of Industry and Infrastructure Development address a constant increase in technological violations in the systems of heat, WSS, and the requirement for more investment in aging infrastructure. Many existing water and wastewater treatment facilities have already exhausted their operational resources and require replacement. To date, out of 89 cities, 27 do not have a wastewater treatment plant, and 42 require modernization.³⁸ There is no financing for repairs, upgrades, and modernization.

The Government of Kazakhstan defines tariff policy in the water and sanitation sectors. Water tariffs vary across the country and are regulated by the CRNM. Formally, according to the current tariff regulation, the tariff covers all operating costs and provides a return on capital. Tariffs are based on actual costs, with lagged adjustments to changes in input prices like electricity plus a percentage markup for profit.³⁵ Water tariff collections in urban and rural regions are projected to repay the loans issued by the IFIs for the renovation of the sector.^{17,23,24,39} The CRNM have been working jointly with EBRD on the development of a framework to improve the tariff regulation of natural monopolies and, using the recommendations, on the implementation of pilot projects in, among others, the water supply sector.^{23,24} In April 2023, the government of Kazakhstan announced that, among others, water tariffs will rise depending on the current state of infrastructure in any given region.⁴⁰

Capacity constraint is also a major bottleneck towards achieving good public financial management (PFM) outcomes.³³ In some regional WSS entities, the labor turnover has been equal to 100 percent.^{23,24} Low salary, high intensity of work, and poor social benefits package are some of the reasons for the problem.² Additionally, public institutions do not have the capacity, facilities, or resources to organize and provide extensive training programs in the water management areas.² Consequently, most graduates with degrees in a water-related specialization (water engineers,

³⁷ Government of Kazakhstan, 2021c. On approval of the national project 'Green Kazakhstan.' Retrieved on 3 June 2023 from <https://www.adilet.zan.kz/rus/docs/P2100000731>

³⁸ Government of Kazakhstan, 2022. On approval of the concept for the development of housing and communal infrastructure until 2026. Retrieved on 3 June 2023 from <https://adilet.zan.kz/rus/docs/P2200000736>

³⁹ The tariff readjustment schedules need to be negotiated in advance with the CRNM. The World Bank's Atyrau Pilot WSS Project financed rehabilitation and replacement of water mains and sewers and was scheduled to repay from tariffs that would be adjusted to recover operating costs and debt service costs (OECD, 2006). However, as the WB report states, 'the lack of management and financial autonomy on the part of the vodokanal' made it impossible to recover the costs of the project (OECD, 2006). The CRNM did not approve any tariff adjustments over the lifetime of the project requiring the Atyrau akimat to cover the costs of the project (OECD, 2006).

⁴⁰ Primeminister.kz. 2023. Citizens of all Kazakhstan cities and villages to be provided with clean drinking water by 2025. Retrieved from the official website of the prime minister of Kazakhstan, on 4 June 2023 from: <https://primeminister.kz/en/news/citizens-of-all-kazakhstan-cities-and-villages-to-be-provided-with-clean-drinking-water-by-2025-23951>

hydrologists, and so on) do not acquire practical knowledge in college and, consequently, cannot find a job in the water management sector after graduation.

Implications of financial gaps in the drinking water supply and sanitation subsector

Kazakhstan aims to develop PPPs in the water supply subsector.³³ The water PPP projects are governed by the Law on PPPs 2015 (amended on 1 May 2023). The government allows 100 percent of foreign ownership of equity in greenfield projects in bulk water supply and treatment, water distribution, and wastewater collection and treatment. Since 2015, the government has been actively promoting PPPs, but no standard contracts for PPPs have been signed yet in the water and wastewater sector. According to the Kazakhstan PPP Center (2023), to date, four projects are at the post-investment stage, three are at the planning stage, and three are at the project preparation stage (Table 0-1). All projects are on a short-term basis—(re)construction—and have been promoted by local akimats.³³ There are no PPP projects at national level.^{33,41} Several factors that influence the small uptake of PPP models in rural areas in Kazakhstan are (i) lack of experience in applying lease contracts in small WSS supply systems; (ii) lack of WSS infrastructure and its poor condition, which may not be attractive to the private sector; (iii) small consumer base in rural areas.^{24,33} The development of PPP models requires a solid legal base and a consolidation of small local markets into larger markets that are more attractive to the private sector.^{24,33}

Table 0-1: PPP projects in water and sanitation sector⁴²

Project	Area	Project status	Cost (million KZT)	Initiative type	PPP level
Major repairs, trust management of the dam in the Sepe village, Atbasar district	Dam management	Post-investment period	100.9	Competition	Local
Reconstruction and construction of the wastewater treatment plant, Konayev City	Wastewater treatment	Post-investment period	5,895.7	Competition	Local
Water supply system, Kopa station, Zhambyl region	Water supply	Post-investment period	123.0	Competition	Local
Water supply system, Kainar village, Karasay region	Water supply	Post-investment period	249.6	Competition	Local
Water supply system, Zhaysan village, Zhambyl region	Water supply	Post-investment period	294.4	Competition	Local
Sanitary cleaning in Arys	Wastewater treatment	Planning stage	335.4	Competition	Local
Sanitary cleaning of Kentau city, Turkestan region	Wastewater treatment	Planning stage	385.6	Competition	Local

⁴¹ Kazakhstan PPP Center, 2023. Project Pipeline. Retrieved on 5 June 2023 from <https://kzppp.kz/ru/pipeline/>

⁴² Kazakhstan PPP Center, 2023. Project Pipeline. Retrieved on 5 June 2023 from <https://kzppp.kz/ru/pipeline/>

Sanitary cleaning of Kyzemshek, Sozak district	Wastewater treatment	Preparation stage	108.0	Competition	Local
Sanitary cleaning of Sholakkorgan, Sozak district	Wastewater treatment	Preparation stage	171.6	Competition	Local
Sanitary cleaning of Taukent settlement, Sozak district	Wastewater treatment	Preparation stage	90.2	Competition	Local
Mechanized cleaning of riverbeds and canals in Shymkent	Wastewater treatment	Post-investment stage	1,425.2	Competition	Local

Financial requirement for the development of the drinking water supply and sanitation subsectors

Ensuring access to safe drinking water and proper sanitation is essential for public health. Investment is needed in drinking water supply systems, water treatment facilities, distribution networks, and wastewater treatment plants. Financing is required to improve access to clean water, especially in rural areas, and to address water quality and sanitation challenges.⁵

Kazakhstan requires investments in the construction, rehabilitation, and maintenance of water infrastructure, including reservoirs, canals, pipelines, and treatment plants. This infrastructure is crucial for water storage, distribution, and wastewater management. Financing is needed to fund the initial construction and ongoing O&M of these facilities. The existing water supply network in the country needs urgent rehabilitation.⁴³ Between 2000 and 2019, Kazakhstan invested around USD471.1 million in WSS (56.3 percent) and irrigation and water management (43.7 percent) projects.⁷⁰ On average, 60 percent of the country's water supply and around 70 percent of wastewater disposal systems need replacement and require around KZT515.6 billion for the reconstruction of WSS networks in 86 cities. In 2018 figures it is stated that over KZT1.27 trillion is needed for the construction of new and rehabilitation of old WSS facilities.⁴⁴

Analysis of the industrial subsector

Financial analysis of the industrial subsector

Most major industrial players—such as KazMunayGas, KazAtomProm, Tau-Ken Samruk—are owned by National Holding Samruk Kazyna.⁴⁵ Other big players are Kazakhmys, Kazzinc, and KazMinerals. All these companies are in the natural resources extraction sector. None report the complete treatment and re-use of wastewater. The Ministry of Ecology and Natural Resources (MENR)⁴⁶ reports that most surface waters are being polluted, in many cases, by the industrial sector. To minimize the

⁴³ Kumenov A, April 2023. Kazakhstan: Steep utility tariff rises to arrive in summer. Prices for power, water and gas may see increases of up to 30 percent. Retrieved on 3 July 3, 2023, from <https://eurasianet.org/kazakhstan-steep-utility-tariff-rises-to-arrive-in-summer>

⁴⁴ EBRD, 2018. Commercialising the utilities sector in Kazakhstan. Policy paper on infrastructure. Retrieved on 22 May 2023 from <https://www.ebrd.com/documents/municipal-infrastructure/commercialising-the-utilities-sector-in-kazakhstan.pdf>

⁴⁵ OECD, 2017b. Anti-Corruption Reforms in Kazakhstan. Round 4. Monitoring of the Istanbul Anti-Corruption Action Plan. Paris

⁴⁶ Ministry of Ecology, Geology, and Natural Resources (MEGNR) (2022). State Report on Environmental Condition and on the Use of Natural Resources of the Republic of Kazakhstan in 2021

environmental impact of the extractive industry, the companies need to build industrial wastewater treatment plants and minimize the extraction of surface and groundwater for industrial use and dumping wastewater in storage ponds.

According to NC KazMunayGas—a hydrocarbon exploration, production, processing, and transportation operator—in 2021 the company extracted 84.3 million m³ of water resources; in 2020, 85.8 million m³; in 2019, 93.6 million m³.⁴⁷ The company extracted:

- 36.85 million m³ from surface water
- 25.99 million m³ from groundwater
- 3.3 million m³ from urban water supply
- 18.11 million m³ from the Caspian Sea
- 0.08 million m³ from wastewater sources

The company reports that 24 percent of the water is being re-used, most of it by Atyrau Oil Refinery. The construction of a desalination plant by the company with an estimated capacity of 50,000 m³ of water per day near the Kenderli recreational area in the Mangistau region is expected to release 6.2 million m³ of Volga River water resources per year.⁴⁷

In its annual report, KazAtomProm—the national operator for the export and import of uranium, rare metals, nuclear fuel, special equipment, and dual-use technologies—extracted 91,889,000 m³ of water in 2022 and 101,207,000 m³ in 2021.⁴⁸ The company extracted:

- 65,000 m³ from surface water (0.07 percent)
- 85,735,000 m³ from groundwater sources (93 percent)
- 6,089,000 m³ from municipal water sources

The company reports that mine wastewater is discharged into a storage pond. In 2022, KazAtomProm invested KZT47.4 million in improving the efficiency of existing dust and gas collection and water treatment plants.⁴⁸

NMC Tau-Ken Samruk JSC (2021)⁴⁹—Kazakhstani operator for exploration, development, extraction, processing, and sale of solid minerals, as well as reproduction of the mineral resource base of the country—reports that the discharge of mine wastewater was carried out in accordance with approved permits of the authorized body—namely, the Ministry of Ecology, Geology, and Natural Resources. In 2021, the company extracted:

- 42,975,000 m³ from groundwater sources
- 11,000 m³ from municipal water sources

⁴⁷ KazMunayGas, 2022. ESG Agenda: In trend of global challenges. Sustainability Report 2021. Retrieved on 3 July 2023 from https://www.kmg.kz/upload/iblock/496/eh0hopsa0777d4uzlee0ni80fxx9kb00/Отчет%20о%20устойчивом%20развитии_2021.pdf

⁴⁸ KazAtomProm, 2022. NAC Kazatomprom JSC Integrated Annual Report 2022. Retrieved on 4 July 2023 from https://www.kazatomprom.kz/storage/07/eng_annual_report_110523_fin4wbwrex2_y2ndvd6cvxnc.pdf

⁴⁹ TauKen Samruk, 2021. 2021 Annual Report. Retrieved on 4 July 2023 from <https://tks.kz/wp-content/uploads/2022/08/ENG-1.pdf>

The company reports that mine wastewater is disposed to the storage pond, whereas the sludge formed in the treatment facilities is collected by a specialized organization that transports it to an allocated landfill.⁴⁹ Therefore, the total volume of wastewater discharge equaled 902,000 m³ in 2021, including 891,310 m³ to the storage pond, 11,000 m³ transferred to third parties, and 47,949 m³ was re-used. The company reports that its main wastewater treatment plant consists of a modular unit with a capacity of 400 m³ dedicated to treating domestic wastewater.⁴⁹

Kazakhmys is the world's 20th largest producer of copper in concentrate (271,000 tons) and the 12th largest producer of blister and cathode copper (377,000 tons and 365,000 tons, respectively). In 2020, the company ranked third in power generation in Kazakhstan (7,267.54 million kWh). Its business in mining, enrichment plants, and copper smelters is in Balkhash, Zhezkazgan, and Karaganda. The company reports that 100 percent of the water supplied to its sites in Zhezkazgan comes from the Kengir reservoir, while technical water in Balkhash is supplied from the lake. The company does not specify what amount is being extracted and re-used. The corporate website provides information only on how Kazakhmys has helped the government by supplying drinking water to the cities of Zhezkazgan and Satpayev.⁵⁰

Kazzinc is a major fully integrated zinc producer with considerable copper, precious metals, and lead credits.⁵¹ The company operates in the East, Akmola, and Ulytau regions of Kazakhstan. The MENR⁶ reports serious pollution cases of water resources by the company. Kazzinc provides limited information on the water use and recycling. The only information available on the Kazzinc website is that the company's Ust-Kamenogorsk Metallurgical Complex recycles 91 percent of its wastewater and the Ridder and Altay Mining and Concentrating Complexes recycle 100 percent.⁵¹

KAZ Minerals is one of the largest copper producers in Kazakhstan and the CIS region. The total water extraction equaled 31.525 million m³ in 2020 and grew to 41.612 million m³ in 2021, consisting of:⁵²

- Surface water: 10.43 million m³ in 2020 vs. 17.506 million m³ in 2021
- Groundwater wells: 21.095 million m³ in 2020 vs. 24.106 million m³ in 2021

The company reports that all its mining sites benefit from access to sufficient freshwater sources.⁵² No information on how much is being recycled is provided by the company.

Financial gaps in the industrial subsector

According to their annual reports, the major oil, gas, mining, and metals companies mentioned earlier generate profits from extracting natural resources in Kazakhstan.^{47,48,49,51,52}

The volume of industrial recycled water supply is 9.3 km³, and the volume of re-used water supply is 1.1 km³. Based on existing production capacities, the industrial enterprises have already reached maximum capacity for water recycling; modernization and construction of new wastewater treatment plants are required to improve the water quality.⁵

⁵⁰ Kazzinc, 2023. Company-Community Relationship. Retrieved on 4 July 2023 from <https://www.kazzinc.com/eng/kompaniya-i-obshchestvo>

⁵¹ Kazzinc, 2023. Company-Community Relationship. Retrieved on 4 July 2023 from <https://www.kazzinc.com/eng/kompaniya-i-obshchestvo>

⁵² KAZ Minerals, 2021. Water. Retrieved on 4 July 2023 from <https://www.kazminerals.com/sustainability/environment/water/>

Implications of financial gaps in the industrial subsector

Water pollution caused by extractive industries poses a significant environmental concern. These industries release various pollutants (heavy metals, ammonia, and so on) into water bodies, leading to adverse impacts on aquatic ecosystems, human health, and water quality.²⁶ In 2022, six water bodies were classified as best quality (grade 1), 27 as good quality (grade 2), 37 as bad quality (grades 3 and 4), eight as the worst quality (grade 5), and 28 water bodies were unsuitable for any type of water use.⁵

Financial requirements for the development of the industrial subsector

While re-using water, very few extractive enterprises re-use treated wastewater. As the evidence suggests, most of the companies in Kazakhstan do not have industrial wastewater treatment plants; they either dump the wastewater in the tailing dams or treat it at municipal wastewater treatment plants from where it gets discharged.^{26,53,54} As such options increase water needs and pollute surface and groundwater resources, land, and air, these companies need to be encouraged to build wastewater treatment plants.

Analysis of the land reclamation and irrigation subsectors

Financial analysis of the land reclamation and irrigation subsectors

Between 2000 and 2019, out of the USD195.6 billion of tracked investments, water projects (water supply, irrigation, water resources management) accounted for only USD471 million (0.24 percent). Between 2006 and 2010, investment in irrigation was less than USD20 million annually. This level of investment was inadequate to maintain the extensive irrigation facilities spanning millions of hectares in the country.³³ In 2014-2015, annual investment reached USD250 million, in an attempt to address the growing water demand and improve the water infrastructure in Kazakhstan. Projections suggest that by 2030, the demand for water in Kazakhstan will surpass the available water supply. This indicates a potential water shortage unless adequate measures are taken to manage water resources efficiency, improve infrastructure, and implement water conservation measures.³³

Financial gaps of the land reclamation and irrigation subsectors

Water availability is a limiting factor for the development of the agricultural and industrial sectors of Kazakhstan. Farmers pay for water use in cash or instant bank transfers supported by Kaspi Bank to the social entrepreneurial corporations supervised by KazVodKhoz. The agriculture sector, especially small farmers, is at risk of being dependent on the will of the intermediary company, increasing the risks of corruption.⁵⁵

Of all the water lost during transportation, 90 percent comes from the agricultural sector. One of the major reasons for this is the wear of water facilities. Most dams in Kazakhstan were constructed 40

⁵³ Water Resources & Marketing, 2023. 19 May 2023 news. Retrieved on 5 June 2023 from <https://www.wrm.kz/rus/index.html#potreb>

⁵⁴ Zakon.kz 2016. When emitting hydrogen sulfide in Aktobe, the deputy asked to warn: do not breathe. Retrieved on 2 June 2023 from <https://www.zakon.kz/4819309-pri-vybrosakh-serovodoroda-v-aktobe.html>

⁵⁵ Khabar, 2022. Journalistic Investigations. Retrieved on 5 June 2023 from <https://www.youtube.com/watch?v=9HaQ87x9Zwc&t=1715s>

to 50 years ago and their depreciation will intensify in the coming years.⁴ The average wear of the dams is 40 percent and canals 60 percent to 80 percent. This results in an efficiency drop of 50 percent. Out of the total amount of water consumed, the water lost during transportation equals around 60 percent for the agricultural sector, 40 percent for the industrial sector, and around 50 percent for the municipal sector.²⁶ The overwhelming majority of on-farm canals, which passed into the ownership of water users, remained ownerless and became unusable. As a result, there is a low efficiency in distribution networks, large water losses, rising groundwater, and salinization of adjacent lands.

Low water tariffs lead to inefficient water consumption by the agricultural sector; discourage the adoption of water-saving technologies and crops; and prevent the proper maintenance, operation, and repair of irrigation systems. Economically justified water tariffs will ensure a return on investment for private stakeholders and promote water-saving practices in all sectors of the economy. These measures will be supported by the provision of subsidies to economically vulnerable population groups and farmers.⁵⁶

Implications of financial gaps in the land reclamation and irrigation subsectors

3,573 km (30 percent) of the main canals that are national property and in a critical state were repaired by the end of 2020. Consequently, non-revenue water in the main canals has dropped to 20 percent. Most inefficient water use is observed in local irrigated agriculture, where 40 percent of water transported through inter-farm and on-farm canals does not reach the fields.⁵

Financial gaps in the land reclamation and irrigation subsectors lead to high volumes of water losses during transportation, land salinization, the rise of groundwater, frequent flooding, and the further deterioration of the existing infrastructure. All these contribute negatively to food safety and the security of the country.

Financial requirements for the development of the land reclamation and irrigation subsectors

Kazakhstan's agricultural sector accounts for around 4 percent of its GDP and consumes 60 percent of the total water intake.^{1,5} Approximately 75 percent of the country's land is suitable for agriculture, but only around 30 percent of the territory is used for agricultural production.⁵⁷ The Concept for the Development of the Water Resources Management System of the Republic of Kazakhstan for 2024-2030 has outlined the target indicators shown in Table 2-2 for the next five years.⁵

⁵⁶ United Nations, 2020. Kazakhstan's transition to a green economy: A stocktaking report

⁵⁷ Deloitte, 2019. Business outlook in Kazakhstan. Deloitte CIS Research Centre. Retrieved on 10 September 2021 from https://www2.deloitte.com/content/dam/Deloitte/ru/Documents/research-center/Business_Outlook_Kazakhstan_2019_en.pdf

Table 0-2: Target indicators to reach within the next five years outlined by the Concept for the Development of the Water Resources Management System of the Republic of Kazakhstan

#	Indicator	Unit	2024	2025	2026	2027	2028	2029	2030
1	Level of water losses in agriculture during transportation through main and inter-farm canals (from 50% to 25%)	%	50	47	43	39	35	30	25
2	Volume of additionally accumulated water (increase by 2.4 km ³)	km ³	-	-	0.5	1.0	1.5	2.0	2.4
3	Saving irrigation water through the introduction of water-saving technologies in irrigated farming	million m ³ /year	135	230	300	400	500	600	690
4	Level of irrecoverable water consumption and losses during transportation in industry (decrease from 26% to 20%)	%	26	25	24	23	22	21	20
5	Coverage of water infrastructure with digital technologies (growth to 40% by 2030)	%	0	5	10	16	24	32	40
6	Volume of inflow into Lake Balkhash (at least 12 km ³ /year)	km ³ /year	12	12	12	12	12	12	12
7	Volume of the Northern Aral Sea (increase from 20 km ³ to 27 km ³)	km ³	20	20.6	21.2	22	23	25	27
8	Level of pressure on water resources:								
8.1	In the Aral-Syr Darya water basin (decrease from 57.2% to 53.2%)	%	57.2	57.2	56.7	56.2	55.2	54.2	53.2
8.2	In the Shu-Talas water basin (decrease from 56.8% to 52.8%)	%	56.8	56.8	56.3	55.8	54.8	53.8	52.8

The MWRI envisions that the following results will be reached by 2030:

1. Reduction of water losses to 690 million m³ per year through reconstruction and repair work on 14,450 km of irrigation network.
2. Commission of 20 new reservoirs and reconstruction of 15 existing reservoirs.
3. Creation of an information and analytical center for water resources in the form of a non-profit joint-stock company under the MWRI.

4. Creation of a national hydrogeological service in the form of a non-profit joint stock company under the MWRI.
5. Digitalization and automation of water accounting on main and inter-farm irrigation canals.
6. Creation of the local production of water-saving irrigation technologies, and water measuring instruments and installations.
7. Development of the digital geoservice flood.gharysh.kz for flood modeling and forecasting.
8. Development of an interactive geoinformation platform on water resources of the Republic of Kazakhstan hydro.gov.kz.
9. Signing of additional three agreements between the Republic of Kazakhstan and neighboring countries in the field of joint management and use of transboundary water bodies.

The digitalization of the water sector will require substantial funding to train staff and build and operate the infrastructure.⁵ The concept's action plan will be financed from the state budget.⁵ The following budget has been allocated from the state budget for the management of the water sector by the MWRI in 2024-2026⁵⁸:

- Effective water resources management: in 2024—KZT101,285,086; in 2025—KZT80,283,479; in 2026—KZT28,038,045
- Increase of accessibility of knowledge and scientific research in the water sector: in 2024—KZT800,000
- Services for coordinating activities in the field of use and protection of water resources, water supply, and sanitation: in 2024—KZT8,393,191; in 2025—KZT6,806,717; in 2026—KZT6,829,876
- Services for coordinating activities in the field of use and protection of water resources, water supply, and sanitation: in 2024—KZT8,393,191; in 2025—KZT6,806,717; in 2026—KZT6,829,876

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

General recommendations

While PPP legislation has undergone major improvements in 2022, the procedures remain complex. The regulations on the investment compensation do not set a clear investment return timeframe for the PPP projects. This gap in the legislation increases the risks of vulnerability to corruption at the contract award stage.³³

Factors such as inconsistent financial returns push potential investors away from the water sector.⁵⁹ The war in Ukraine and the effect of secondary sanctions from the West make most of the investment projects in the country highly risky.⁶⁰

Blended finance is increasingly advised by the World Bank (WB) and OECD. Blended finance aims to make a project 'bankable' for private investors. The bankability of water projects depends on the

⁵⁸ Law of the Republic of Kazakhstan dated 5 December 2023, #43-VIII. *On the Republican Budget for 2024-2026*. Retrieved on 19 February 2024 from <https://zakon.uchet.kz/rus/docs/Z2300000043>

⁵⁹ McCoy W & Schwartz K, 2023. The water finance gap and multiple interpretation of 'bankability.' *Water, Sanitation & Hygiene for Development*, 13(1): 19, doi: 10.2166/washdev.2022.201

⁶⁰ World Bank, 2023. Kazakhstan Economic Update—Spring 2023. Retrieved on 2 June 2023 from <https://www.worldbank.org/en/country/kazakhstan/publication/economic-update-spring-2023>

risk/return profile that a potential investor is willing to accept.⁵⁹ Thus, in the medium term, to attract private investment in the water sector, the government needs to mitigate the environmental risks imposed by water-polluting industries and solve the problem of rural water governance.

Recommendations for overcoming financial gaps in the drinking water supply and sanitation subsectors

Based on the issues in the PFM system, the water management sector is prone to the following governance risks to development effectiveness:^{20,61}

- Inadequate financial management capacity (computerized planning, executing, monitoring, and reporting) in sector agencies and utility enterprises can impair sector performance and optimal resource uses
- The mismatch between planned funding requirements, budgetary allocation, and actual fund releases can lead to significant delays in implementing projects
- Inadequate revenue streams to cover operations and maintenance costs, including depreciation, can lead to poor service quality and undermine new investments
- Weak enforcement of internal controls on revenue and expenditure management can lead to the diversion of funds to unauthorized uses, mismanagement, and fraud
- Weak accounting systems and record-keeping practices can hamper the provision of timely and adequate information on revenue streams, expenditure flows, liquidity, and debt levels
- Incomplete recording of transactions owing to technical weaknesses and disregard for comprehensiveness and accuracy can obscure fraudulent activity, impede auditing, and restrict management control

Recommendations for overcoming financial gaps in the industrial subsector

The industrial subsector is the second-biggest water consumer. 40 percent of all water transported to the sector is non-revenue water. One of the main reasons for this is the aging infrastructure.²⁶ Frequently, the industrial sector uses municipal wastewater treatment plants to treat the industrial wastewater, which harms both the WWTP and the environment (heavy metals cannot be treated by a municipal WWTP).²⁶

To close the financial gaps in the industrial water management sector, the government needs to reinforce the polluter pays principle.^{17,18} Weak enforcement of environmental standards for industrial and agricultural wastewater discharge lead to ongoing water pollution, environmental degradation, and social and economic risks.³³

Recommendations for overcoming financial gaps in the land reclamation and irrigation subsectors

The agricultural sector is the country's largest water consumer (60 percent).²⁶ 90 percent of all water lost during transportation (non-revenue water) comes from this sector.^{24,25} Currently, hardly anyone accepts responsibility for the operation and technical condition of the irrigation infrastructure that distributes water from the water intake to the fields. Most on-farm canals, which passed into the ownership of water users, remained practically ownerless and became unusable.²³ This resulted in a low efficiency of distribution networks, large water losses, rising groundwater levels, and the salinization of adjacent lands.²³ The main recommendations have been to incentivize farmers to save water by using subsidized water-saving technologies and by increasing water tariffs.^{23,25} Degraded

⁶¹ ADB, 2010. Governance and Anticorruption in Project Design. Office of the General Counsel Guide. Manila

land, the uneven distribution of water resources across the country, high amounts of non-revenue water, and frequent corruption cases in the national state enterprise KazVodKhoz make the rural water management sector particularly unappealing to private investors. The government provides sovereign guarantees to international financial organizations to borrow money to build and reconstruct the rural water infrastructure. To close the financial gaps in the rural water management sector, the medium-term recommendation is to solve the rural water governance problems by hiring qualified managers to the RSE KazVodKhoz to eliminate any corruption in the sector, deliver high-quality projects, and digitalize the water canals across the country.

Challenges and measures for effective water management based on an ecosystem approach

Challenges in the water management sector pose collective risks for all sectors of the economy that require a unified approach. Adoption of an ecosystem-based approach that considers the interconnectedness of water resources, ecosystems, and human activities promotes sustainable and resilient water management. The following are the identified challenges and proposed sustainable measures for the water sector of Kazakhstan:

Challenges

1. Water scarcity
2. Irrigation inefficiency
3. Transboundary water management
4. Water pollution
5. Infrastructure aging
6. Climate change impact

Proposed sustainable measures

1. Integrated water resources management principles support the optimization of the use of water resources, considering the environmental, social, and economic factors.⁶²
2. Investments in modern water infrastructure are necessary to reduce water losses, enhance efficiency of water use, and meet the increasing demand for water resources by all sectors of the economy.⁶³ Examples of modern water infrastructure investment include the implementation of smart water meters; advanced water and wastewater treatment plants; smart irrigation systems; the construction of distributed water storage facilities; the deployment of advanced leak detection technologies; the application of remote sensing and satellite technologies; and the implementation of decentralized small-scale water purification units for remote or underserved communities.⁶⁴

⁶² Meran G, Siehlow M, & von Hirschhausen C, 2020. Integrated Water Resources Management: Principles and Applications. *The Economics of Water*, 23-121. Retrieved on 25 January 2024 from https://link.springer.com/chapter/10.1007/978-3-030-48485-9_3

⁶³ United Nations, n.d. Water Infrastructure and Investment. High Level Panel on Water. Retrieved on 25 January 2024 from <https://sustainabledevelopment.un.org/content/documents/hlpwater/08-WaterInfrastInvest.pdf>

⁶⁴ OECD, 2022. Financing a Water Secure Future. OECD Publishing, Paris. Retrieved on 25 January 2024 from <https://www.oecd.org/environment/resources/policy-highlights-financing-a-water-secure-future.pdf>

3. Climate-resilient development gives the highest priority to reducing exposure and vulnerability to climate hazards, including water-related hazards.⁶⁵ The key initiatives include the implementation of water conservation programs to promote efficient water use in households, industries, and agriculture; the implementation of floodplain management strategies for effective flood control; water quality monitoring and management; the monitoring and regulation of groundwater extraction to prevent overextraction and depletion.⁶⁶
4. Pollution prevention and control: The Government of Kazakhstan is strongly advised to enforce and strengthen regulations to prevent water pollution and improve wastewater treatment systems.⁶⁷
5. Education and awareness programs shall target communities, emphasizing the collective importance of water conservation, sustainable resource management, and pollution prevention.⁶⁸
6. International cooperation: Active cooperation with the neighboring countries on transboundary water management by sharing data and developing joint strategies to address shared water challenges is the measure necessary to ensure sustainable and fair water consumption by all stakeholders.⁶⁹

KYRGYZ REPUBLIC

Situational analysis/overview of the water sector

General

The energy and transport sectors dominate Kyrgyz Republic's large-scale infrastructure plans. Out of the USD14 billion of investments tracked between 2000 and 2018, energy projects account for 54 percent, while transport investments make up a further 39 percent. Out of the total investments in the energy sector, more than half are concentrated in electricity generation (85 percent, mostly from hydroelectricity), while oil and gas pipelines account for 13 percent and the remaining 2 percent are in electric power transmission and distribution. By comparison, investments in industry and water are much smaller at 3 percent and 1 percent respectively.⁷⁰

International finance institutions (IFIs) are important stakeholders in supporting infrastructure investments. These include ABD, WB, EBRD, Islamic Development Bank (IDB), among others.

⁶⁵ Intergovernmental Panel on Climate Change, 2023. Sixth Assessment Report. Working Group II—Impacts, Adaptation and Vulnerability. Retrieved on 22 January 2024 from

https://www.ipcc.ch/report/ar6/wg2/downloads/faqs/IPCC_AR6_WGII_Overarching_OutreachFAQ6.pdf

⁶⁶ OECD, 2018. Climate-resilient Infrastructure. OECD Publishing, Paris. Retrieved on 25 January 2024 from

<https://www.oecd.org/environment/cc/policy-perspectives-climate-resilient-infrastructure.pdf>

⁶⁷ OECD, 2021. Toolkit for Water Policies and Governance: Converging Towards the OECD Council Recommendation on Water. OECD Publishing, Paris. <http://doi.org/10.1787/ed1a7936-en>

⁶⁸ Ardoin NM, Bowers AW, & Gaillard E, 2020. Environmental education outcomes for conservation: A systematic review. *Biological Conservation*, 241. <https://doi.org/10.1016/j.biocon.2019.108224>

⁶⁹ UNECE, 2015. Policy Guidance Note on the Benefits of Transboundary Water Cooperation: Identification, Assessment and Communication. United Nations, New York and Geneva. Retrieved on 25 January 2024 from https://unece.org/DAM/env/water/publications/WAT_47_Benefits/ECE_MP.WAT_47_PolicyGuidanceNote_BenefitsCooperation_1522750_E_pdf_web.pdf

⁷⁰ <https://www.oecd-ilibrary.org/sites/8b30e9f8-en/index.html?itemId=/content/component/8b30e9f8-en>

Figure 0-3: Asian Development Bank projects in the Kyrgyz Republic⁷¹

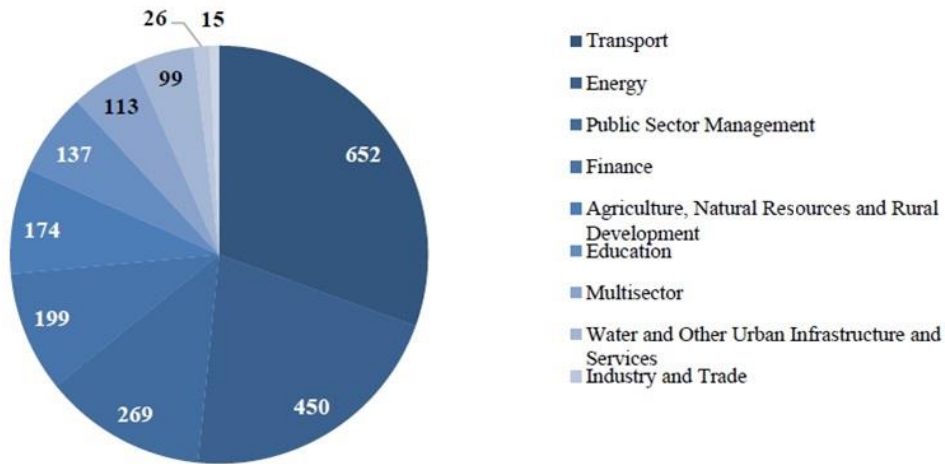
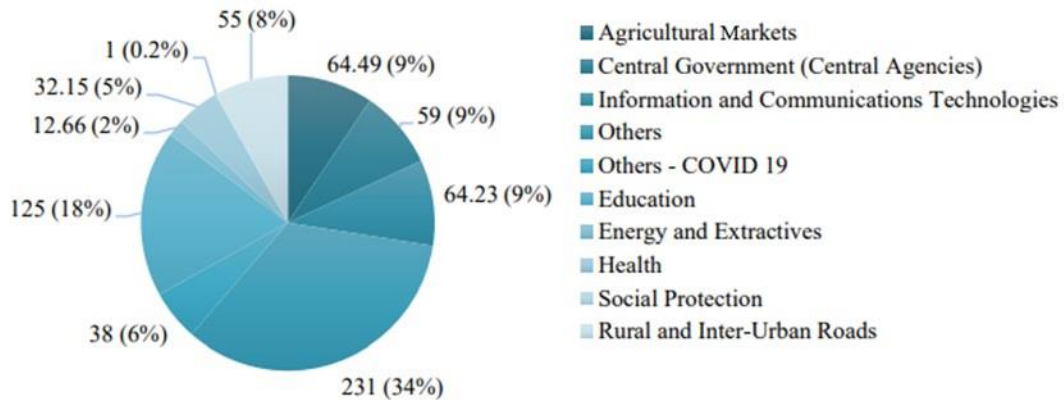


Figure 0-4: The World Bank projects in the Kyrgyz Republic⁷²



The Water Resources Service of the Ministry of Agriculture and Land Reclamation of the Kyrgyz Republic is the state body that provides management, monitoring, and regulation of the condition and use of water resources; irrigation and reclamation infrastructure facilities; and carries out executive, administrative, and coordinating functions for the implementation of a unified state water policy.

The Water Resources Service (WRS) implements a unified state policy in the fields of rational use and protection of the water fund, management of water resources and water infrastructure facilities owned by the state, and meeting the needs for water resources of all water users.

The WRS plans, organizes, and implements measures of administrative, economic, and legal regulation of water use for the operation of water facilities, the protection of water fund lands, as

⁷¹ https://www.unescap.org/sites/default/d8files/knowledge-products/RECI_infra%20financing_the_Kyrgyz_Republic_Mar2022%20-%20formatted_VS.pdf

⁷² www.unescap.org/sites/default/d8files/knowledge-products/RECI_infra%20financing_the_Kyrgyz_Republic_Mar2022%20-%20formatted_VS.pdf

water strategy and plans on use of water resources will be created; the use of surface, underground waters and payment for their use will be regulated; the measures on protection of water resources from pollution and depletion will be identified; the provisions on emergency situations that belong to water resources and dam safety will be introduced; water economy and irrigation sectors will be regulated; provisions on use and ownership of water fund lands will be established; the establishment of the State Water Inspectorate and obligations of the state water inspectors will be provided; violations of the law within water resource use will be identified; the attitude of this code to the obligations of the Kyrgyz Republic concerning international law will be identified.⁷⁶

Reforms on the establishment of basin management are in full swing as indicated in the Water Code.

Problems in subsectors and financing needs

The water sector in the Kyrgyz Republic has its own peculiarities and common issues well known by the rest of the region. Some call the country a regional ‘water tower’ which is largely true. Being a tower has its own strengths and weaknesses. The country experiences more problems than benefits from its advantageous geographic position. At this stage, the Kyrgyz Republic still needs to improve its water resources management and efficiency of water use, as well as the application of advanced technologies and introduction of digital techniques in all water subsectors.

The sector financing is split between:

- Physical requirements—capital investments
- O&M requirements—operation investments
- Upgrading facilities
- Climate change adaptation measures
- Legal provision and governance
- Capacity building and training
- Transboundary water management
- Regional cooperation

As indicated above, the financing sizes, terms, sources, and modalities can be sought based on different components. The following aspects have been ignored and underestimated:

1. ‘Water infrastructure’ is a broad term that encompasses a wide range of activities—from the river basin or catchment scale to the household tap, traversing projects as diverse as WSS, flood protection, irrigation, and reservoirs. Water projects with such disparate scales and purposes entail different levels of capital intensity and repayment periods; distinct credit, commercial and legal risks; and varied economic, financial, and social returns.⁷⁷

Financing problems

2. Weak investment climate and limited incentives. According to UNCTAD's World Investment Report 2022, FDI flows to the Kyrgyz Republic reached USD248 million in 2021, up from the

⁷⁶ [https://ampeid.org/documents/the_Kyrgyz_Republic/water-code-\(no-8-of-2005\)](https://ampeid.org/documents/the_Kyrgyz_Republic/water-code-(no-8-of-2005))

⁷⁷ Money A, 2017. Projects, investors, risks and returns
[https://www.oecd.org/env/resources/Money%20\(2017\)%20Projects,%20investors,%20risks%20and%20return%20s.pdf](https://www.oecd.org/env/resources/Money%20(2017)%20Projects,%20investors,%20risks%20and%20return%20s.pdf) (accessed on 27 July 2021)

level recorded one year earlier when inflows were negative by USD402 million. In the same year, the stock of FDI reached USD4.2 billion, or around 49.6 percent of the country's GDP.⁷⁸

3. Foreign direct investment has stagnated at about 8 percent of GDP and is concentrated in mining. Preferential tax, financing, and regulatory treatment for SMEs provides an incentive for domestic firms to remain small. This constrains their growth, adoption of new technologies, competitiveness, and export orientation. The Kyrgyz Republic was ranked 77 out of 190 countries in 2017 in the Doing Business survey. The finance sector is small and total domestic credit to the private sector in 2017 was 23 percent of GDP. A conducive enabling environment needs to be created that facilitates domestic firms becoming part of global and regional value chains.⁷⁹

The financing gap in the water sector in the Kyrgyz Republic refers to the shortfall between the financial resources required to meet the country's water sector development needs and the funds currently available. The Kyrgyz Republic, like many other developing countries, faces significant challenges in financing its water sector infrastructure, maintenance, and service delivery.

Table 0-3: Infrastructure financing needs in the Kyrgyz Republic (% of GDP, 2018)⁸⁰

Rank	Sector	% of GDP
1	Transport	10
2	Energy	5
3	Information and Communications Technology	3
4	Water Supply and Sanitation	1
	Total	19

Analysis of the drinking water supply and sanitation subsectors

The department for the development of drinking WSS under the State Agency for Architecture, Construction, Housing, and Communal Services under the Cabinet of Ministers of the Kyrgyz Republic (hereinafter referred to as the Department) is a subordinate unit of the State Agency for Architecture, Construction, Housing, and Communal Services under the Cabinet of Ministers of the Kyrgyz Republic (hereinafter referred to as Gosstroj) in the field of development of centralized drinking WSS of populated areas. The Department is responsible for the WSS sector development in the country.

The objectives of the Department are:

- Development of drinking WSS of populated areas in accordance with the requirements of regulatory legal acts
- Strengthening the capacity of entities servicing centralized WSS systems, including those providing services in the drinking WSS sector
- Development of international cooperation of the Kyrgyz Republic in the field of drinking WSS

⁷⁸ https://unctad.org/system/files/official-document/wir2022_en.pdf

⁷⁹ <https://www.adb.org/sites/default/files/institutional-document/455921/cps-kgz-2018-2022.pdf>

⁸⁰ www.unescap.org/sites/default/d8files/knowledge-products/RECI_infra%20financing_the_Kyrgyz_Republic_Mar2022%20-%20formatted_VS.pdf

- Construction, reconstruction, major repairs, and operation of centralized drinking WSS systems by creating a state enterprise for operation and construction
- Implementation of policies for the development of centralized drinking WSS in populated areas
- Coordination of activities for the construction and rehabilitation of centralized drinking WSS systems, financed from the republican budget and international financial institutions (IFIs)⁸¹

Drinking water systems are currently operated and maintained by the municipalities in urban areas and by local government (ayil okmotu) in rural areas.

Underground water is under the technical supervision of the Ministry of Natural Resources and Ecology.

The Kyrgyz Republic urgently needs to rehabilitate and modernize its water infrastructure, including water treatment plants, distribution networks, and wastewater management systems. The cost of upgrading or replacing outdated infrastructure is often substantial and adds to the financing requirements.

Financial analysis of the drinking water supply and sanitation subsectors

Low levels of access and poor service delivery of WSS are two of the main constraints. Implementing urban and rural development projects is fraught with challenges as a result. About 40 percent of the rural population does not have access to safe drinking water. Water quality is inadequate as 42 percent of rural water is untreated. The ability of the sector to finance the expansion and improvement of water quality is limited by water loss and nonrevenue water. The sanitation situation is worse as access to centralized sewerage systems for the entire population is at about 30.2 percent, decreasing to 0.4 percent in the most populated Osh region. The inadequate legal and regulatory framework, financial unsustainability because of low and varying tariffs, weak capacity of service providers, and inadequate incentives for staff are some of the main challenges that affect the economic and financial sustainability of WSS projects. The government estimates that water-related diseases cost the country USD70 million annually. One of the most important tasks is the construction and rehabilitation of a water supply system in 653 villages, including the construction and rehabilitation of a WSS system in 26 district centers and 22 cities. This will take place in 588 villages and 22 cities at the expense of external investors to the amount of USD636.23 million, and in 65 villages at the expense of the republican budget. The state will bring clean drinking water to 95 percent of the country.⁸²

Financial gaps in the drinking water supply and sanitation subsectors

The average investment cost per village for the construction/rehabilitation of drinking water supply systems is KGS20.9 million.⁸³

According to a preliminary assessment of enterprises for WSS of cities, the volume of required investments for the rehabilitation of drinking water supply systems in the cities of the republic (except for Bishkek and Osh) exceeds KGS9.79 billion.

⁸¹ <http://tunuksuu.kg/2023/08/29/polozhenie/>

⁸² <https://www.gov.kg/ru/programs/8>

⁸³ <https://www.fao.org/faolex/results/details/ru/c/LEX-FAOC205204/>

In rural areas, the improvement of water supply systems has exacerbated problems with sanitation and led to an increase in wastewater; purification and disinfection require technical solutions to avoid further pollution of water sources. According to the Program for the Development of Potable Water Supply and Wastewater Systems in Settlements of the Kyrgyz Republic until 2026, the total volume of necessary investments in the infrastructure of WSS in rural areas is approximately KGS64.7 billion.

It is therefore necessary to finance the construction and rehabilitation of sewerage systems in 27 district⁸⁴ centers—raion centers.⁸⁵ According to preliminary calculations made by the program, the required amount for the construction and rehabilitation of sewerage systems in these settlements exceeds KGS4 billion.

For the WSS subsectors, the government has developed a final concept of the state enterprise. It proposes to establish raion-level technical service centers as branch departments of the state enterprise Kyrgyz SuuKanal. These service centers will oversee the development and sustainability of water supply and wastewater disposal services, to establish a network of technical service centers. They will need to be provided with adequate equipment and personnel, which existing service operators are having difficulty obtaining owing to a lack of resources.

Implications of financial gaps in the drinking water supply and sanitation subsectors

- Low tariffs cannot cover the O&M⁸⁶ of the system
- Low salaries cannot provide sustainable systems operation
- The government is unable to finance the modernization and rehabilitation of the systems
- Loans are a heavy burden for the state budget

Financial requirements for the development of the drinking water supply and sanitation subsectors

It is proposed to use resources from international financiers to obtain technical equipment for the service centers, with supervision of their operation by the Department for Drinking Water Supply and Wastewater Disposal (DDWSWD).

A state enterprise will be established by decree of the Cabinet of Ministers. Gosstroï will have the mandate for its overall management, delegating management responsibility to the DDWSWD. The district department of the state enterprise will then be established all over the country.⁸⁷

Analysis of the hydropower subsector

The subsector is managed by the Department of Energy Efficiency, Energy Saving, and Development of Renewable Energy Sources under the Ministry of Energy.

Chakan GES/HPP is an open joint-stock holding company (OJSHC) that was created by the initiative of the government. The main activities are the operation, design, and construction of small hydroelectric power stations on the territory of the Kyrgyz Republic, as well as the production,

⁸⁴ Raion level is within the region oblast

⁸⁵ Administrative unit under oblast

⁸⁶ Improper O&M are a basic reason for system failures

⁸⁷ SE concept—state enterprise concept for O&M of WSS

transmission, and sale of electricity. OJSHC Chakan HPP sells electricity to the domestic market and has 28 electricity customers.⁸⁸

It is worth noting that the surface water, the potable water, and the underground water are under different state agencies. However, it is difficult to distinguish between these waters, since all water is the same depending on whether it is used/consumed for a certain human activity. So, to improve the management of the whole sector, it is imperative that a single agency is responsible for the country's water. This idea was mooted at a round table meeting held by the National Institute for Strategic Studies on the topic 'Problems of protection and rational use of water resources in the Kyrgyz Republic.' There is an urgent need to create a separate department exclusively responsible for water resources—namely, strategic issues. By creating such a body, it will be possible to identify existing problems with water resources and the responses to them, as well as directly contact the ministries of neighboring countries, thereby improving joint activities aimed at resolving problems of a global nature. The unresolved water and energy problems of one country are directly reflected in issues of water provision for other CA countries. The Kyrgyz Republic is in the formation zone of almost half the region's water resources, which are used by all neighboring countries. It is therefore necessary to unite the efforts of all countries in the region, including global international organizations, to attract investment in the environmental sector of the Kyrgyz Republic.

In this context, it is appropriate to mention the proposal of the President of the Kyrgyz Republic, Sadyr Japarov, to create a regional center in Bishkek for the implementation of energy-efficient and resource-saving technologies in Central Asia to contribute to the development of a unified water sector in the CA region.⁸⁹

Financial analysis of the hydropower subsector

The energy sector, which depends on hydropower, is constrained by poorly maintained assets. Technology adoption has been slow, and the potential for other renewable energy sources, such as solar, remains untapped. Recently, the government has paid more attention to renewable energy production. The sector depends on substantial direct and indirect subsidies, and tariff reforms have been slow. But the government has taken steps to change the situation for the better. For instance, the tariff from May 2023 was increased by 23 percent from 77 tyin to KGS1 for the population. This change was introduced in all sectors of the economy. These measures, among others, were taken to protect the energy infrastructure and empower the country's economy.

In line with the transformation of the energy sector from the Kyrgyz Republic's forum of 8 April 2022, the Cabinet of Ministers is carrying out several reforms to rebuild and ensure the sustainable development of the energy system. Structural reforms were launched to consolidate energy companies and optimize their activities; a medium-term tariff policy for electricity and heat was adopted, taking into account support for families and citizens in need; and enhanced measures are being taken to increase electricity generation capacities and achieve carbon neutrality goals. The construction of the Kambar-Ata HPP-1 will be launched. The volume of the reservoir will increase to 6 billion m³ of water. The Kambar-Ata HPP-1 will generate 1.5 times more electricity than the Toktogul HPP.

⁸⁸ https://invest.gov.kg/wp-content/uploads/2021/12/44_1%D1%84%D0%B8%D0%BD%D0%B0%D0%BB.pdf

⁸⁹ https://water.gov.kg/index.php?option=com_k2&view=item&id=2979:v-nisi-rasskazali-o-tom-kak-the-Kyrgyz-Republic-mozhet-reshit-problemy-defitsita-vodnykh-resursov-i-ikh-neeftivnogo-ispolzovaniya&Itemid=1437&lang=ru

Financial gaps in the hydropower subsector

Construction of the Bala-Saruu hydroelectric power station has begun, and budgetary funds were allocated to ensure the start of construction. About 70 percent of the hydropower potential of the country remains unrealized. To develop this potential, priority projects have been identified for the development of hydropower with a capacity of more than 6 GW until 2030.⁹⁰

According to preliminary calculations, the implementation of the proposed reforms and priority investments in the draft strategy will require approximately USD14 billion by 2030.⁹¹

Implications of financial gaps in the hydropower subsector

As a result of the implementation of the planned reforms and investment projects in the short and long term, effective operational management of the assets of the energy industry is assured. 100 MW of small and medium-sized HPPs will be commissioned by 2026, including 1 billion kWh of energy under the Green Billion program and solar projects up to 700 MW launched by 2030. These projects ensure an economically justified and transparent tariff setting for energy resources by 2030 and have created at least 5,000 new jobs in the field of renewable energy and energy efficiency.

Financial requirements for the development of the hydropower subsector⁹²

- Power deficit to be covered in just over five years, otherwise government should import power
- Tariffs should cover sector expenses
- Institutional reforms should be implemented
- The role of the government in the sector strategy should increase
- Along with hydropower, renewable sources should be applied
- Other ways of financing to be considered instead of loans from IFIs⁹³

Analysis of the land reclamation and irrigation subsectors

Financial analysis of the land reclamation and irrigation subsectors

Sizable support is needed for agriculture, natural resources management, climate adaptation, and disaster risk reduction. Fragmented agriculture production and processing; limited post-harvest technologies; and inadequate logistics networks hamper the sector's ability to compete in regional markets. The national agriculture policy has focused on raising productivity by improving irrigation infrastructure, developing agribusiness and value-chains, and institutionalizing cooperatives and rural financing. With the highest population growth rate in the region, the country is facing pressure arising from unequal access to water. The poor condition of the irrigation infrastructure needs

⁹⁰ <https://www.gov.kg/ru/post/s/21159-akylbek-zhaporov-2030-zhylga-cheyin-kubattuulugu-6-gvt-ashyk-bolgon-gidroenergetikany-nktr-boyuncha-artykchylyktuu-dolboorlor-anyktaldy>

⁹¹ <https://www.gov.kg/ru/post/s/21159-akylbek-zhaporov-2030-zhylga-cheyin-kubattuulugu-6-gvt-ashyk-bolgon-gidroenergetikany-nktr-boyuncha-artykchylyktuu-dolboorlor-anyktaldy>

⁹²

https://kaktus.media/doc/486764_etoy_zimoy_bydet_deficit_elektroenergii_akylbek_japarov_sdelal_obrashenie_k_narody.html

⁹³ Neighboring countries take part in financing large generating facilities and when commissioned receive sustainable and reliable power

attention. More than 90 percent of the country's territory is mountainous, half of it above 2,500 meters high. Overgrazing and deforestation cause soil erosion and affect dry land agriculture. Climate change risks are expected to have an added negative impact. The country's water resources are most vulnerable and could account for more than half of economic losses in the absence of adaptation actions. Disasters caused by natural hazards such as floods, mudflows, and earthquakes are frequent, costing 1 percent to 1.5 percent of GDP annually.

A meeting was held on 8 June with the WRS (former Water Resources Department) Deputy Director Mr VG Gutnik. The main topic was the financing gaps in the water sector of the Kyrgyz Republic. The deputy director said that there is no current financing deficit for operation expenses and the same is true for capital costs. The latter is covered within the state program of irrigation development for 2017-2026.

Infrastructure and irrational use of water resources

There is limited capacity to monitor water resources and the State Water Cadastre is an insufficient system. The limitations of the organizational structure for maintaining the state accounting of water and the State Water Cadastre led to the ambiguity of data on water resources. Regulatory, legal, scientific, and methodological bases do not correspond to the modern level of development of science technology. At present, the capacity of the authorized agencies to assess the water resources of the Kyrgyz Republic is insufficient. At the same time, the scientific institutions of the Kyrgyz Republic and individual experts give ambiguous estimates of the available water resources. The lack of monitoring data on water resources is owing to the reduction of the observation network, types of work, and subdivisions for conducting hydrometeorological monitoring. The system of the departmental observation network has been destroyed. The issues around improving the legal, regulatory, technical, scientific, and methodological foundations, as well as the metrological support of state water accounting were resolved outside the Kyrgyz Republic. In addition, in the 1990s, the monitoring was interrupted in certain narrow-profile types of work, such as expeditionary observations of lakes and glaciers, providing the metrological foundations for conducting measurements, and so on. The reduction of the monitoring network and the release of reference and analytical information led to insufficient data on water resources and the state of the natural environment. The state fund of data on the water resources of the Kyrgyz Republic requires streamlining; regulation by regulatory legal acts at state level (currently maintained at departmental level, where document safety is not ensured); increased responsibility for maintaining state funds (archived data on water resources); and transferal to a digital basis.

The State Water Resources Agency annually allocates resources for the development and improvement of the irrigation system. These resources are allocated both through the agency and under the item 'capital investments.' The amounts are significant (approximately KGS1.5-2 billion).

An annual allocation of KGS1 billion would be sufficient to maintain the irrigation network in the Kyrgyz Republic.⁹⁴

To solve its water problems, the Kyrgyz Republic needs USD1.2 billion. This was stated by the head of the Cabinet of Ministers, Akylbek Japarov, on 31 May during the Bishkek Water Forum. According to him, today the most pressing issue is the safety of drinking and irrigation water. Together with the WB, the Cabinet of Ministers calculated that USD800 million will be needed in the near future to

⁹⁴ https://www.water.gov.kg/index.php?option=com_k2&view=item&id=1032:ezhegodnoe-vydelenie-1-mlrd-somov-bylo-by-dostatochnym-dlya-soderzhaniya-irrigatsionnoj-seti&Itemid=1437&lang=ru

modernize the irrigation networks, while USD400 million will be needed to provide the entire population with drinking water.⁹⁵

Financial gaps of the land reclamation and irrigation subsectors

Key factors contribute to the financing gap in the water sector in the Kyrgyz Republic:

Losses of irrigation water in the canals of the Kyrgyz Republic amount to 30 percent to 50 percent.⁹⁶ The norm for irrigation water loss ranges from 15 percent to 18 percent. The depreciation of irrigation canals in the republic, according to the Department, is 60 percent to 80 percent. In total, there are 28,000 km of irrigation canals in the republic, of which 20,263 km are earthen and 7,737 km are lined. More than 20,200 km of irrigation canals need modernization.⁹⁷ According to the agency, KGS45 billion (USD511 million) is needed to modernize the state irrigation network, KGS55 billion (USD600 million) is needed to modernize the on-farm network.

The state program continues to address the issues of irrigation development and the introduction of new irrigated lands; it started as part of the implementation of the National Strategy for Sustainable Development (NSSD) and the state program⁹⁸ for 2011-2015.

The implementation of the state program is entrusted to the Ministry of Agriculture, Food Industry, and Land Reclamation of the Kyrgyz Republic with the assistance of the Ministry of Finance and the Ministry of Economy to finance and attract external investment sources. The implementation of the state program provides for the construction of water management facilities divided into three categories.

The first category includes irrigation facilities, the construction of which is provided for by a grant from the People's Republic of China, a loan from the IDB, as well as facilities where work has already begun at the expense of the republican budget.

This category includes 17 objects worth about KGS4,895 million, with a capacity of 8,965 hectares of new irrigated land, 29,340 hectares of increasing water availability of lands, and 2,800 hectares of transfer from conditionally irrigated to irrigated lands. As a result, 28,290 jobs will be created.

The second category includes facilities for which work has already begun with international financial organizations, donors, and investors (IDB, WB, ACG, Economic Development Assistance Fund [Republic of Korea], and so on).

This category includes 17 facilities worth about KGS36,526 million, with a capacity of 40,256 hectares of new irrigated land, 9,662 hectares of land water supply increase, 5,000 hectares of transfer to gravity irrigation, and 200 million m³ to 400 million m³ of water saving. This will create 150,500 jobs.

⁹⁵ https://economist.kg/novosti/2023/05/31/the_Kyrgyz_Republicu-nuzhno-1-2-mlrd-dlya-resheniya-vodnyh-problem-akylbek-zhaparov

⁹⁶ Water Resources Service, Bishkek Water Forum

⁹⁷ <https://www.worldbank.org/en/events/2023/05/31/bishkek-water-forum>

⁹⁸ <https://www.gov.kg/ru/programs/8>

The third category includes facilities for the construction of which it is necessary to find external and internal sources of financing, to work out the issue with international financial organizations, donors, and investors.

This category includes 12 facilities worth about KGS17,365 million, with a capacity of 17,350 hectares of new irrigated land, 12,083 hectares of increasing water availability of land, and 4,511 hectares of transfer to gravity irrigation. 66,400 jobs will be created. The total would be KGS58,786 million. However, there is no information about drainage problems and subsoil waterlogging.

Implications of financial gaps in the land reclamation and irrigation subsectors:

- High losses on the level of on-farm irrigation, high no revenue water (NRW)
- Old degraded infrastructure requiring significant investment
- Inappropriate water management at the lowest level—water users
- Aging irrigation technological schemes require heavy investment to apply new ones

Financial requirements for the development of the land reclamation and irrigation subsectors:

- The government should support irrigation entities (WUAs, other enterprises)
- Tariff for irrigation water should be reviewed
- New irrigation technologies should be applied (for example, drip irrigation)
- The government to offer low percent loans to the farmers

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

Distribution of loans as per sectors

The Kyrgyz Republic is a group A concessional assistance-only country with access to grants from the Asian Development Fund and concessional ordinary capital resource loans. The indicative Asian Development Fund grant and concessional ordinary capital resource loans available for commitment during 2018–2022 will be approximately USD641 million. The Kyrgyz Republic is likely to remain at moderate risk of debt distress. Thus, the existing equal distribution of Asian Development Bank (ADB) support between loans and grants is likely to continue. ADB's Private Sector Operations Department will seek opportunities in agribusiness, power, telecommunications, and ICT, complementing public sector financing. Six sectors are prioritized by the country partnership strategy (CPS). Planned sector allocations for 2018 to 2022 are energy (20 percent to 25 percent); transport (20 percent to 25 percent); agriculture, natural resources, and rural development (15 percent to 20 percent); education (10 percent to 15 percent); public sector management (10 percent to 15 percent); and water supply and other municipal infrastructure and services (10 percent to 15 percent). Indicative shares of modalities are project loans (64 percent), sector development programs (14 percent), results-based lending (12 percent), policy-based loans (9 percent), and likely financial intermediation loans. Technical assistance will total about USD9.7 million for 2018 to 2022 and cover knowledge work, policy dialog, and capacity development in project implementation.⁹⁹

The tariff per cubic meter of water is 3 tyin in summer quarters and 1 tyin in winter quarters. The salary of water management employees, who conserve water all year round, provide strategic water

⁹⁹ <https://www.adb.org/sites/default/files/institutional-document/455921/cps-kgz-2018-2022.pdf>

supply, take care of engineering structures, in some places is KGS3,000 to KGS4,000—USD35 to USD45.

An annual allocation of KGS1 billion would be sufficient to maintain the irrigation network of the Kyrgyz Republic.¹⁰⁰

Policy and management actions for improving water sector financing

A significant part of the water resources in the republic (more than 95 percent) are used for irrigation and agricultural water consumption.¹⁰¹ Adopted in 2017, the state program for the development of irrigation of the Kyrgyz Republic for 2017 to 2026 provides support for the construction of irrigation infrastructure to provide rural residents with new irrigated lands. It is expected that the implementation of the state program will enable the introduction of 66,500 hectares of new irrigated lands, increase the water availability of lands by 51,080 hectares, transfer 9,500 hectares from machine to gravity irrigation, and improve reclamation by 50,000 hectares of land condition. In 2019 and 2020, only 2,446 hectares of new irrigated land were introduced, the water supply system was improved on 5,460 hectares, and soil fertility was improved on 1,082.8 hectares.¹⁰²

Water scarcity in certain agricultural areas is associated with the inefficient use of this resource and excessive water losses during delivery to the consumer; about 27 percent of the total water intake is one of the reasons for reducing agricultural productivity. The use of groundwater for agricultural production, in cases where it does not harm nature, faces unacceptably high administrative barriers and monetary costs for obtaining the right to use groundwater. Also, when planting, farmers do not take into account the possibility of water supply for certain types of crop, which subsequently leads to low yields. Even though WUAs have been operating for more than 20 years, and during this time they have received sufficient financial assistance, they have not been able to ensure effective water resources management at the level of inter-farm management.

Tasks and measures in relation to increasing the efficiency and rational use of water resources

To increase the efficiency and rationality of the use of water resources, it is necessary to apply tariff and administrative regulation and economic incentives:

- Ensure the sustainable operation of water facilities intended for irrigation; increase the efficiency of their use by the state and WUAs to meet the needs of farms for water resources in terms of volume and time of use; support for the expansion of the use of water-saving technologies (drip irrigation, sprinklers)
- Oblige WUAs to introduce measurement and accounting systems, introducing the necessary incentives, as well as sanctions for excess water resources
- Cancel licensing for the right to use groundwater for agricultural producers
- Create incentives for agricultural producers and organizations performing work on the restoration of irrigated wells and drainage systems by exempting them from land tax for a certain period, expanding access to concessional financing, and transferring agricultural land to them on a long-term lease

¹⁰⁰ Water Resources Agency Deputy

¹⁰¹ Development of the country agricultural sector_2021-40

¹⁰² State Program for the Development of Irrigation of the Kyrgyz Republic for 2017-2026

Tasks and measures to increase the efficiency of water management:

- Ensure the efficient use of the available fleet of agricultural machinery and earthmoving equipment on the territory of the *ayil okmotu*¹⁰³ by entities engaged in agricultural activities (WUAs, cooperatives, machine-technological stations). Determine the forms and methods of sharing equipment on a lease basis.
- Improve the economic mechanisms for the formation of financial resources for the development of the entire irrigation system through the widespread introduction of the economic principle of pricing for irrigation services by the state and within the WUA itself.
- Improve management and coordinate decisions to integrate WUAs with representatives of local authorities. Consider the option of transferring the WUA irrigation network to a management company.
- Strengthen the responsibilities of and develop systems for evaluating the effectiveness of the activities of state bodies, local self-government bodies, and WUAs in terms of water resources management.

Expected results of the water management actions:

- Completion of the reform of the water sector
- Ensuring effective management of water resources for agriculture
- Rational, careful use of water resources with the widespread use of water-saving technologies (drip irrigation, sprinklers)
- Ensuring a fair payment for irrigation services

The State Water Resources Agency annually allocates resources for the development and improvement of the irrigation system. These resources are allocated both through the agency and under the item 'capital investments.' The amounts are quite significant (approximately KGS1.5 billion to KGS2 billion).¹⁰⁴

According to the country's 2040 strategy, the steps to improve the water resources management are:¹⁰⁵

Establishment of basin management bodies

The establishment of basin councils will ensure the participation of all stakeholders, including public organizations, in the decision-making process on water resources management and a shared responsibility for the development of territories, thereby increasing the efficiency and effectiveness of decision-making.

Water resources management within the main basins

The implementation of management within the basins, which is one of the principles of integrated water resources management, will favor the development of the local level of water resources management. The decision to develop the basins will be based on the social, environmental, and

¹⁰³ Local rural government

¹⁰⁴ https://water.gov.kg/index.php?option=com_k2&view=itemlist&layout=category&Itemid=985&lang=ru

¹⁰⁵ https://info.undp.org/docs/pdc/Documents/KGZ/ENG_%20Strategy%202040_07082018.docx

economic assessment of the basin, considering the use of economic instruments in conjunction with administrative measures and methods of social motivation.

Measures—in financial sector:

Strengthened governance can have a transformative impact on investment and growth. It is estimated that governance reforms in the Kyrgyz Republic could increase its growth by 1.2 percentage points each year, and output gains could be even larger if accompanied by other reforms. The Kyrgyz Republic could considerably improve its standing in governance indicators by strengthening control of corruption, the rule of law, the regulatory quality, competition, and the transparency and accountability of the public sector.

Measures—in water sector:

- Implementation of water-saving technologies
- Development and implementation of pilot projects to create original irrigation schemes
- Organization of production and processing of drip irrigation systems, sprinklers
- Modernization of water distribution systems and water management infrastructure
- Reconstruction of hydraulic structures
- Creation of systems for monitoring the safety of hydraulic structures
- Automation of water distribution and accounting for irrigation systems
- Measures, steps, and programs for financing improvement

the Kyrgyz Republic has concluded 33 bilateral agreements on the promotion and protection of investments with such countries as Austria, Great Britain, Germany, India, Kazakhstan, Qatar, Republic of Türkiye, the People's Republic of China, Kuwait, the Russian Federation, the United States, Switzerland, South Korea, and so on.

To attract and increase investment opportunities, the Kyrgyz Republic has introduced a visa-free regime for up to 60 days for citizens of 61 states.

The accession of the Kyrgyz Republic to the Eurasian Economic Union (EAEU) opened substantial opportunities for economic development and the attraction of investments to the republic. With accession to the EAEU, barriers to the movement of goods, services, and capital to the markets of five EAEU member countries with a population of more than 180 million are removed for the Kyrgyz Republic and its partners. At present, the EAEU is 3.2 percent of world GDP, one of the largest world markets or 2.5 percent of the world's population, and the largest territory in the world (more than 20 million km²).

In recent years, the Government of the Kyrgyz Republic has carried out the following reforms to attract investment to the country:

- To guarantee and protect investments, a stabilization regime was introduced for foreign investors, which allows the investor to choose the most favorable regulatory regime in the event of amendments and additions to the regulatory legal acts of the Kyrgyz Republic governing tax and non-tax payments. According to paragraph 2 of Article 2 of the Law of the Kyrgyz Republic 'On Investments in the Kyrgyz Republic,' within ten years from the date of signing the stabilization agreement, the investor (as well as the invested enterprise) has the right to choose the most favorable conditions for them to pay taxes, including value-added tax, but excluding other indirect taxes and non-tax payments (except for payments for

services rendered by state bodies) in the manner established by the legislation of the Kyrgyz Republic.

- The government has established the Business Ombudsman Institute, whose activities are aimed at ensuring the protection of the legitimate interests of entrepreneurs and investors before state and local bodies and officials.
- The Investment and Trade Promotion and Protection Agency (IPPA) of the Kyrgyz Republic was also established, which is the body responsible for supporting and protecting investments.
- To stimulate foreign investment in preferential industrial enterprises and determine preferential settlements, the Law of the Kyrgyz Republic ‘On Amendments to the Tax Code of Kyrgyz Republic’ and the Decree of the Government of Kyrgyz Republic dated 24 April 2019 No. 193 ‘On Measures to Implement Articles 153, 159-1, 213, 315, 330, 344 of the Tax Code of Kyrgyz Republic,’ are providing conditions for newly created enterprises (from 1 January 2019) on the basis of concluded investment agreements for exemption from property tax, land tax, income tax, and sales tax within five years.

The Kyrgyz Republic entered the top 20 reforming countries in the Doing Business 2020 ranking published by the WB. In the top 20, the WB selects countries that have implemented reforms that make doing business easier in three or more of the 10 Ease of Doing Business ranking indicators this year.

According to the WB, the Kyrgyz Republic improved its performance on the indicators: ‘connecting to the electricity grid,’ ‘getting a loan,’ and ‘taxation’; the government has strengthened control over power outages and infrastructure upgrades, improved the work of the credit bureau, and simplified reporting and tax payment procedures.

To increase the export potential of the country and the competitiveness of domestic products in the world market, the Government of the Kyrgyz Republic approved the program for the development of exports of the Kyrgyz Republic for 2019 to 2022, as well as the action plan for its implementation.

In addition, a stable and sustainable base has been formed in the Kyrgyz Republic for developing the potential of PPPs. To simplify procedures and reduce time in the process of preparing PPP projects, a new version of the Law of the Kyrgyz Republic ‘On PPP’ was developed and adopted.¹⁰⁶

The PPP Centre was established by the decree of the Government of the Kyrgyz Republic dated 28 June 2019 No. 333.¹⁰⁷ The purpose of the center is to support and accelerate the development of infrastructure projects of national and municipal importance and improve the quality of state and municipal infrastructure development services using various public–private partnership tools.

Quantitative indicators are the signing of PPP agreements in the following sectors/industries:¹⁰⁸

- Energy—at least five PPP projects with an investment of about KGS30 billion
- Municipal infrastructure and services—at least 10 PPP projects with an investment of about KGS15 billion
- WSS—at least five PPP projects with an investment of about KGS2 billion

¹⁰⁶ <http://cbd.minjust.gov.kg/act/view/ru-ru/112275>

¹⁰⁷ <http://cbd.minjust.gov.kg/act/view/ru-ru/14504?cl=ru-ru>

¹⁰⁸ PROGRAM for the development of public–private partnership in the Kyrgyz Republic for 2022-2026

- Agriculture—at least five PPP projects with an investment of about KGS8 billion

Important conditions for the successful implementation of the program are consistency and commitment to the intended course. In this regard, it is necessary to identify key values and principles, opportunities and prohibitions.

The country has limited resources, so it is necessary not to dilute them, but to focus them on priority areas in which the country is competitive—agriculture, hydropower, tourism, mining, and light industry. It is important to introduce efficiency programs and the rational use of strategic resources.

For the sustainability of the supply of clean drinking water, a financial model for the operation of enterprises providing drinking water will be developed in a market format with a reliable system of subsidizing vulnerable groups of the population.

Relevant projects:

- Implementation of the WB project in Issyk-Kul, Osh, and Chui regions (project amount—USD71.2 million); Jalal-Abad region (project amount—USD23 million); ongoing
- Implementation of the project of the IDB and the Saudi Development Fund in Batken and Talas regions (project amount—USD60 million); ongoing
- Implementation of the ADB project in the Naryn region (project amount—USD32.9 million); ongoing
- Implementation of the project of the government of the People’s Republic of China in the Jalal-Abad region (project amount—USD100 million); ongoing
- Implementation of the project of the government of the Republic of Korea for Osh, Chui, and Jalal-Abad regions (project amount—USD100 million); new project
- Implementation of the WB project ‘Water Security’ in Issyk-Kul, Osh, and Batken regions (project amount—USD100 million). The problem of external debt will put pressure on the freedom of decision-making in various areas of public policy¹⁰⁹

It is necessary to abandon the sectoral and administrative principles of management and make the transition to performance-oriented budgeting. The issue of redistributing the functions of economic and financial planning and structural changes in the Ministry of Economy and Finance will be studied by the Government of the Kyrgyz Republic.¹¹⁰

Performance budgeting should become a mechanism for improving the efficiency of budget expenditures using non-financial performance indicators in making funding decisions.

The high degree of dependence on ‘cheap resources’ from international donors has largely ‘relaxed’ the management system.

The solvency of the budget remains thanks to concessional external support. It is necessary to move away from the dependent position and begin to form new principles of development financing.

¹⁰⁹ <https://www.worldbank.org/en/news/press-release/2022/04/19/new-financing-package-of-100-million-to-enhance-water-service-provision-in-kyrgyz-republic>

¹¹⁰ <http://cbd.minjust.gov.kg/act/view/ru-ru/430700>

Features of infrastructure projects:¹¹¹

- Introduction of fully fledged budgeting, oriented towards results, to optimize and increase the efficiency of budget expenditure
- Introduction of mechanisms for linking strategic documents with the budgeting system and the implementation of strategic goals
- Development of project proposals for the exchange of public external debt for the implementation of development projects in the field of environmental protection, ecology, 'green' economy or with an emphasis on the implementation of programs in the social sphere
- Initiating negotiations with donor countries on the restructuring of the external debt of the Kyrgyz Republic (write-off, partial conversion into a grant) based on project proposals for the exchange of public external debt
- Introduction of a new system of interbudgetary relations aimed at strengthening the powers and responsibilities of local authorities
- Carrying out full or partial privatization; transfer of non-strategic objects of the public sector for management within the framework of PPP based on the results of a comprehensive analysis of the activities of state enterprises and business entities with a controlling state block of shares
- Reorganization of the remaining state enterprises through consolidation and subsequent corporatization
- Introduction of amendments to the legislation on public procurement of mechanisms for accounting for the cost of ownership, quality-price ratio

Integrated national financing frameworks (INFFs) are one of the most powerful tools for the implementation of the UN Agenda 2030 and the 17 sustainable development goals (SDG). They are comprised of four main blocks: assessment and diagnostics; financing strategy; monitoring and review; governance and coordination. Each block is a critical component that allows countries to track resources and direct financial flows more accurately and comprehensively to the areas where they are most needed.

In the Kyrgyz Republic, the program assists the government to form the concept of priority reforms required for the implementation of the INFF and building the capacity of the authorities to increase their ongoing efforts to develop institutions and train key individuals to increase the impact of financial resources on the achievement of the SDGs in the country. This will help the country improve its framework for achieving the goals of the national development strategy and the SDGs; strengthen the monitoring and oversight of their implementation; as well as enhance the administrative system of strategic planning and budgeting.

The INFF will ensure that public and private resources, budget allocations and execution, investment strategies, and fiscal policy objectives and partnerships are efficient and effective for achieving sustainable development outcomes, with particular focus on vulnerable groups, including women and children.

¹¹¹ National Development Program of the Kyrgyz Republic until 2026

Recommendations for overcoming financial gaps in the drinking water supply and sanitation subsectors

To address the financing gap in the water sector, the Kyrgyz Republic can consider various strategies:

- Strengthening public funding: the government can prioritize water sector investments in its budgetary allocations, ensuring that adequate resources are earmarked for infrastructure development, operation, and maintenance. This may involve reprioritizing spending or exploring innovative financing mechanisms.
- Enhancing cost recovery: improving the efficiency of billing and collection systems, implementing fair and transparent tariff structures, and reducing water losses can increase revenue generation and improve the financial sustainability of water utilities.
- Encouraging private sector participation: creating an attractive investment environment for the private sector through regulatory reforms, transparent procurement processes, and public–private partnerships can unlock additional financing for water sector projects.
- Mobilizing international assistance: the Kyrgyz Republic can seek support from international development partners, multilateral organizations, and donor agencies to access grants, loans, and technical assistance for water sector development. Engaging in regional cooperation initiatives can also facilitate access to financing for transboundary water management.
- Promoting integrated water resources management: adopting a holistic approach to water resources management can optimize the allocation and use of water, reduce losses, and improve the efficiency of the water sector. This can contribute to cost savings and make the sector more financially sustainable.

Overall, addressing the financing gap in the water sector in the Kyrgyz Republic requires a multipronged approach involving government commitment, policy reforms, and collaboration with domestic and international stakeholders.

Classification of the major problems, highlighting policy and management actions for improving water sector financing in the Kyrgyz Republic

The water sector in the Kyrgyz Republic faces several major problems related to financing. These can be classified into different categories, including inadequate funding, inefficiencies in revenue collection, inadequate cost recovery, and limited investment in infrastructure. To address these issues, policy and management actions should be taken. Here is a classification of the major problems and potential actions for improving water sector financing in the Kyrgyz Republic:

Inadequate funding

Problem: insufficient budget allocation for the water sector

Actions:

- Increase the budget allocation for the water sector to ensure adequate funding for maintenance, operation, and development of water infrastructure
- Advocate for increased international aid and donor support to supplement domestic funding

Inefficiencies in revenue collection

Problem: inadequate mechanisms for revenue collection from water users

Actions:

- Strengthen billing and metering systems to accurately measure and charge for water consumption
- Improve collection processes—including meter reading, billing, and debt recovery—to minimize revenue losses
- Enhance the capacity of water utility staff to effectively manage revenue collection

Inadequate cost recovery

Problem: low levels of cost recovery owing to inadequate tariffs and subsidies

Actions:

- Conduct a comprehensive cost assessment to determine realistic tariffs that reflect the true cost of WSS services
- Gradually increase tariffs to ensure cost recovery while considering affordability for low-income households
- Explore targeted subsidies or social assistance programs to support vulnerable populations in accessing affordable water services

Limited investment in infrastructure

Problem: insufficient investment in water infrastructure maintenance and expansion

Actions:

- Develop a long-term investment plan for the water sector, considering the rehabilitation of existing infrastructure and the construction of new facilities
- Promote PPPs and attract private sector investment to finance infrastructure projects
- Seek international financing, loans, and grants to support infrastructure development in the water sector

Weak financial management and governance

Problem: Lack of financial accountability, transparency, and effective governance in the water sector

Actions:

- Strengthen financial management practices—including budgeting, auditing, and reporting—to improve transparency and accountability
- Enhance governance mechanisms, such as establishing an independent regulatory body to oversee tariff setting and monitor service delivery
- Implement anticorruption measures and promote integrity in financial management processes

Capacity building and institutional strengthening

Problem: limited technical and managerial capacity in the water sector

Actions:

- Provide training and capacity-building programs for water sector professionals to enhance their skills in financial management, project planning, and implementation
- Establish partnerships with international organizations, universities, and training institutions to facilitate knowledge transfer and capacity development
- Strengthen the institutional framework by creating specialized units or agencies responsible for water sector financing and management

These actions, if implemented effectively, can contribute to improving water sector financing in the Kyrgyz Republic. However, it is essential to adapt these measures to the specific context and continuously monitor and evaluate their effectiveness to ensure sustainable progress. The measures can be applied both for potable water supply and irrigation/land reclamation.

Recommendations for overcoming financial gaps in the hydropower subsector

- **PPPs:** Establishing PPPs can help attract private investment and expertise in hydropower projects. This can diversify funding sources and reduce the burden on the government budget.
- **Policy and regulatory framework:** Develop a clear and stable regulatory framework that provides transparency and consistency for investors. A predictable regulatory environment can boost investor confidence and attract more funding.
- **Project feasibility studies:** Conduct thorough feasibility studies for hydropower projects to assess their technical, economic, environmental, and social viability. This will provide potential investors with credible information and increase the likelihood of securing funding.
- **Risk mitigation:** Implement risk mitigation strategies to address uncertainties associated with hydropower projects, such as geological risks, political risks, and currency fluctuations. This can attract both domestic and international investors.
- **International financing institutions:** Collaborate with IFIs like the WB, ADB, and EBRD. These institutions can provide financial assistance, technical expertise, and project development support.
- **Local financing:** promote the development of local financial markets and institutions that can provide loans, bonds, and other financing mechanisms for hydropower projects. This reduces dependence on external financing sources.
- **Energy market reforms:** Implement energy market reforms that encourage private investment and competition. This can create a more attractive market for investors and improve the financial sustainability of the sector.
- **Tariff structure:** Establish realistic and cost-reflective tariff structures that ensure revenue generation to cover project costs and provide a reasonable return on investment for investors.
- **Capacity building:** Invest in developing local technical and managerial capacities to effectively plan, implement, and manage hydropower projects. A skilled local workforce can reduce project costs and improve project success rates.
- **Environmental and social sustainability:** Prioritize environmental and social sustainability in project planning and execution. Aligning projects with international best practices can improve the likelihood of securing funding from socially responsible investors.
- **Innovative financing:** Explore innovative financing mechanisms—such as green bonds, climate funds, and impact investment funds—that are specifically focused on renewable energy projects.

- Stakeholder engagement: Involve local communities and relevant stakeholders early in project development to ensure their support and to address potential conflicts that could disrupt project financing.
- Project packaging: Consider bundling smaller projects together to attract larger investors or financing packages. This can increase the overall attractiveness of the investment opportunity.
- Technical assistance: Seek technical assistance from international organizations and development agencies to improve project planning, execution, and management.

Recommendations for overcoming financial gaps in the land reclamation and irrigation subsectors

- Strengthening public funding: The government can prioritize water sector investments in its budgetary allocations, ensuring that adequate resources are earmarked for infrastructure development, operation, and maintenance. This may involve reprioritizing spending or exploring innovative financing mechanisms.
- Enhancing cost recovery: Improving the efficiency of billing and collection systems, implementing fair and transparent tariff structures, and reducing water losses can increase revenue generation and improve the financial sustainability of water utilities. It is planning to work according to WUA tariffs. Reforms will be applied to Water User Associations.
- Encouraging private sector participation: Creating an attractive investment environment for the private sector through regulatory reforms, transparent procurement processes, and PPPs can unlock additional financing for water sector projects.
- Mobilizing international assistance: the Kyrgyz Republic can seek support from international development partners, multilateral organizations, and donor agencies to access grants, loans, and technical assistance for water sector development. Engaging in regional cooperation initiatives can also facilitate access to financing for transboundary water management.

Challenges and measures for effective water management based on an ecosystem approach

Agriculture should work on the principle of ‘water less, harvest more’ and with less environmental impact. This is a serious problem, and addressing it implies that a ‘smarter’ precision agriculture will be required to manage water resources for sustainable crop intensification. It is necessary to modernize and further build irrigation infrastructure, considering advanced, climate-resistant solutions and water-saving technologies, as part of climate change adaptation policy and addressing issues of efficient, rational, and economical use of available water resources. Examples of these solutions and technologies include:

- Use drip irrigation and subsoil watering
- Inter-farm and on-farm channels lining
- Building of reservoirs for accumulation of water
- Re-use of drainage water and wastewater for irrigation needs
- Re-use of wastewater for domestic needs
- Installation of sensors on hydromasts for more accurate water measuring

Situational analysis/overview of the water sector

General

Tajikistan has been actively promoting the use and protection of water resources in the sustainable development agenda for the period up to 2030 for several years. By the initiative of Tajikistan, the UN General Assembly adopted several important resolutions on water—in particular, the announcement of 2003 as the International Year of Fresh Water; the International Decade for Action ‘Water for Life’ for the period from 2005 to 2015; the announcement of 2013 as the International Year of Water Cooperation; the International Decade of Action ‘Water for sustainable development’ for the period from 2018 to 2028; as well as the announcement of 2025 as the International Year for the Preservation of Glaciers; and 21 March as the World Day for the Preservation of Glaciers.¹¹²

One of the main issues that the country is promoting on a global level is financing in the water sector, since the consequences of the financial and economic crises have had a negative impact on the proper financing of the water sector. Also, Tajikistan, like the rest of the world, is facing such challenges as the impact of the global process of climate change. The melting of glaciers and the risk of natural disasters associated with water have become more frequent and eventually may lead to a decrease in water resources in the CA region. More financial resources are needed for the introduction of water-saving and energy-saving technologies, as well as the use of modern methods to prevent and reduce the risk of water-related disaster.

In addition, the water infrastructure in the country—built mainly in the last century—has undergone moral and physical deterioration, which requires timely restoration and modernization using modern technologies.

Review of the water sector of Tajikistan

Tajikistan’s water sector plays a crucial role in the country's socio-economic development. Tajikistan accounts for 55.4 percent or 64 km³ per year of the water resources of the Aral Sea basin, including 62.9 km³ (80.17 percent) from the Amu Darya basin and 1.1 km³ (3 percent) from the Syr Darya basin.¹¹³

The water sector of Tajikistan encompasses the following subsectors: hydropower, drinking WSS, land reclamation and irrigation, industry, water-based recreation, and others.

The main water users in the water sector are such subsectors as drinking WSS, agriculture, industry, water recreation, and the environment. The average annual water use in these subsectors is between 8 km³ and 14.5 km³.¹¹⁴

¹¹² Internet source 2023 <https://Mfa.Tj/Ru/Main/View/12308/Dushanbinskii-Vodnyi-Protsess-Sirodzhiddin-Mukhriddin-Chelovechestvu-Ponadobilos-Pochti-50-Let-Chtoby-Obedinit-Usiliya-Po-Vodnym-Problemam>

¹¹³ Basic Provisions of the Water Strategy of the Aral Sea Basin, 1997, p42, <http://www.cawater-info.net/library/rus/reg-str-full.pdf>

¹¹⁴ Water Sector Reform Program for 2016-2025, 2015, p4, http://www.adlia.tj/show_doc.fwx?Rgn=126214

State regulation in the field of use and protection of water resources in Tajikistan is carried out by the following authorized bodies:¹¹⁵

- The Ministry of Energy and Water Resources of Tajikistan has the following water facilities on its balance sheet: the Golodnostep Department of Hydroelectric Complexes, the Dustlik Canal of the Syr Darya basin water organization (BWO), and the Upper Amu Darya Department of the Amu Darya Basin Water Management Association of the BWO Amu Darya for water intake from the basins of the Amu Darya and Syr Darya rivers.
- The Committee for Environmental Protection under the Government of Tajikistan has on its balance sheet hydrometeorological stations of the Agency for Hydrometeorology to monitor the volume and quality of water, as well as the country's snow reserves.
- The Agency for Land Reclamation and Irrigation under the Government of Tajikistan has on its balance sheet water reservoirs for irrigation purposes; reclamation and irrigation systems; irrigation, observation, and vertical drainage wells; mudflows; as well as bank protection structures.
- The Forestry Agency under the Government of Tajikistan has on its balance sheet irrigation facilities intended for the development of forestry.
- The Service for State Supervision of Safe Work in Industry and Mining Supervision under the Government of Tajikistan has on its balance sheets deposits of medicinal, mineral, and thermal waters.
- The Main Department of Geology under the Government of Tajikistan has observation wells on its balance sheet.
- The state unitary enterprise (SUE) Khojagii manziliyu komunalni has on its balance sheet the infrastructure for drinking WSS, as well as the infrastructure for watering pastures.
- Open joint-stock holding company (OJSHC) Barki Tojik has on its balance sheet reservoirs for hydropower and irrigation purposes, as well as hydropower facilities for regulating the flow of rivers by generating electricity.
- The Water Users Association has some on-farm reclamation and irrigation facilities on its balance sheet.
- Local authorities include the WSS systems of the cities and districts of Dushanbe, Khujand, Rogun, Nurek, and Sarband; also on the balance sheet of the local authorities there are temporary/seasonal rivers.
- There are community-managed channels in mountainous areas.

All of the above state bodies for regulating the use and protection of water resources have an appropriate water infrastructure (water facilities) for the maintenance and operation of which funds are allocated from the state budget; from the local budget; from special funds; from funds for capital construction; and at the expense of loans and grants from IFIs and international organizations.

The main infrastructure for water resources management and conservation is utilized in sectors such as drinking WSS, hydropower, as well as land reclamation and irrigation. These infrastructures were built predominantly in the last century and require restoration, modernization, and financial resources for the sustainable O&M of the water infrastructure in these sectors.

The subsectors of drinking WSS, hydropower, as well as land reclamation and irrigation are key sectors that utilize water for the production of electricity, drinking water, and irrigation water for consumer services. However, physically deteriorated infrastructure leads to increased production costs, reflected in higher tariffs for the products, as well as the provision of unreliable and low-

¹¹⁵ Water Code of the Republic of Tajikistan, 2020, article 11, <http://ncl.tj/content>

quality services. As a result, there is a deficit in financing in all these subsectors, with costs for production and service provision exceeding the revenue generated from the product's cost.

Reforms are being implemented to improve the situation in the water sector and its subsectors, aiming to enhance the financial and economic state of these sectors. For example, the Water Sector Reform Program of Tajikistan for 2016 to 2025 has been adopted. Government Resolution No. 234 of 28 April 2018, 'On the Reorganization of Joint Stock Companies,' specifically refers to the reorganization of the OJSHC Barki Tojik. Additionally, the Concept of Housing and Utilities Sector Reform of Tajikistan for 2010 to 2025 is being pursued.

Existing practice of financing the water sector

The authorized bodies responsible for subsectors in the water sector are funded from various sources, including primarily from the state budget; from the local budgets of local executive authorities; from services related to the production of goods, and the provision of drinking and irrigation water; from grant and credit investments of IFIs; from projects by international organizations; as well as from membership fees of water users and a certain contribution from the water users themselves.

The funding sources for authorized bodies in the subsectors of the water sector:

- Ministry of Energy and Water Resources of the Republic of Tajikistan: funding sources include the state budget; fines and sanctions collected through the State Supervision Service in the field of GTS safety. It also has a Water Resources Department/Center, financed through credit and grant funds from IFIs and through other projects of international organizations.
- Committee for Environmental Protection under the Government of Tajikistan: funding sources include the state budget; special funds generated from fines and sanctions related to activities of state control in the field of rational use and protection of water resources; and revenue from providing meteorological and hydrological data services. It also has a Water Resources Department/Center, financed through credit and grant funds from IFIs and through other projects of international organizations.
- Agency of Land Reclamation and Irrigation under the Government of Tajikistan: funding sources include the state budget; local budgets of executive authorities of state power; and special funds generated from irrigation water supply services. It also has a Water Resources Department/Center, financed through credit and grant funds from IFIs and through technical assistance from other projects of international organizations.
- Forestry Agency under the Government of Tajikistan: funding sources include the state budget and special funds generated from forestry services. It also receives technical assistance from projects by international organizations.
- State Service for Supervision of Safe Operation in Industry and Mining under the Government of Tajikistan: funding sources include the state budget; special funds generated from fines and sanctions related to state control over medicinal, mineral, and thermal waters. It also receives technical assistance from projects by international organizations.
- State Geological Department under the Government of Tajikistan: funding sources include the state budget.
- SUE Khochagii Manziliyu Komunali: funding sources include the state budget; local budgets of executive authorities of state power; and special funds generated from WSS services. It also has a Water Resources Department/Center, financed through credit and grant funds from IFIs and through technical assistance from other projects of international organizations.

- Barki Tojik: funding sources include special funds for providing heat and electricity to consumers and support from the state budget. It also has a Water Resources Department/Center, financed through credit and grant funds from IFIs and through technical assistance from other projects of international organizations.
- WUA: funding sources include membership fees from members of the association in the service area of reclamation and irrigation systems.
- Local authorities of state power: funding sources include the state budget, local budgets, and contributions from water users (insignificant).

The budgets of authorized bodies—formed from special funds including revenue from WSS services and from irrigation water supply services—are approved annually by the Ministry of Finance of the Republic of Tajikistan.

Financial management and allocation of funding in the water sector

As noted, the main source of funding for subsectors in the water sector in Tajikistan is the state budget of Tajikistan. Annually, the Government of Tajikistan adopts the Law of the Republic of Tajikistan ‘On the State Budget of the Republic of Tajikistan.’

This law provides the overall amount of revenues of the state budget from all sources and the overall amount of expenditure from the state budget. It also indicates the overall budget deficit and the sources for covering it. The formation of the state budget is presented in Table 2-4.

Table 0-4: Total volume of revenue and expenditure of the state budget of Tajikistan¹¹⁶

Name	Years				On average for 4 years %
	2019 USD ¹¹⁷	2020 USD ¹¹⁸	2021 USD ¹¹⁹	2022 USD ¹²⁰	
Total income, incl.	2,586,281,500	2,433,885,130	2,446,530,860	2,920,606,370	
Tax revenue	1,730,476,800	1,616,040,030	1,663,896,900	1,810,931,060	
Non-tax revenue	190,446,250	123,471,900	144,310,530	129,511,420	
Grants to support the budget at the expense of international financial organizations	31,814,710	126,971,670	30,968,700	58,849,560	
State investment projects, at the	449,831,700	366,160,400	503,510,300	702,533,810	

¹¹⁶ Law of the Republic of Tajikistan on the State Budget of the Republic of Tajikistan for 2019-2022, <http://ncz.tj/>

¹¹⁷ NBT exchange rate for 31 December 2018, USD1—TJS9,4296, <https://nbt.tj/ru/kurs/kurs.php?date=31.12.2018>

¹¹⁸ NBT exchange rate for 31 December 2019, USD1—TJS9,6872, <https://nbt.tj/ru/kurs/kurs.php?date=31.12.2019>

¹¹⁹ NBT exchange rate for 31 December 2020, USD1—TJS11,3, <https://nbt.tj/ru/kurs/kurs.php?date=31.12.2020>

¹²⁰ NBT exchange rate for 31 December 2021, USD1—TJS11,3, <https://nbt.tj/ru/kurs/kurs.php?date=31.12.2021>

expense of international financial resources					
Of which loans	269,340,590	188,598,870	241,575,580	286,884,960	
Of which grants	180,491,110	177,561,520	261,934,720	415,648,850	
Special funds of budgetary institutions and organizations	183,712,030	201,241,120	234,142,990	218,780,530	
The total amount of expenses, incl.	2,755,548,380	2,688,428,130	2,929,871,380	2,975,819,120	
Bodies of state power and administration	140,358,450	124,202,560	148,512,160	125,749,380	5.01
Education	467,132,960	468,001,900	577,781,300	557,878,320	19.16
Health protection	184,582,170	356,086,070	262,908,060	254,990,270	9.93
Social insurance and social protection	390,031,180	413,983,090	430,910,070	383,327,610	15.08
Culture and sports	80,673,310	92,277,130	107,626,460	106,119,380	3.58
Housing and communal services ecology and forestry	102,690,040	98,660,500	131,716,700	132,936,110	4.30
Fuel and energy complex	627,865,550	420,876,930	395,672,640	532,956,730	18.42
Agriculture, fishing, and hunting	97,078,240	67,840,860	76,512,610	91,199,200	3.09
Industry and construction	16,579,920	18,817,100	19,958,810	18,744,340	0.69
Transport and communication	185,747,330	186,254,850	233,249,240	235,454,510	7.77
Other sectors of the economy and services	51,40,090	5,853,080	8,113,700	11,092,830	0.28
Other expenses	268,382,120	246,235,860	325,832,950	322,696,190	10.74
Total deficit	169,266,880	320,680,900	76,023,410	55,212,740	
Including external debt repayment	128,494,530	48,517,630	16,037,970	192,845,400	
<i>Including for OJSHC Barki Tojik</i>		40,434,800	41,111,670	81,638,410	1.47
<i>Including for SUE Obu Korezi Dushanbe</i>		588,410	636,610	1,491,150	0.02
<i>Including for Pamir Energy OJSHC</i>		495,500	509,740	1,027,430	0.02
Including domestic debt service financing	23,542,040	87,406,780	51,492,690	62,322,300	
Budget expenditure for functional qualification					

Housing and communal services, ecology and forestry	8,543,310	5,522,650	8,073,950	9,454,600	
<i>Including for drinking water supply and sanitation</i>	168,350	176,030	135,870		0.01
Fuel and energy complex	424,556,720	292,538,400	226,280,450	238,279,290	
<i>Including for the development of hydropower</i>	222,702,980 ¹²¹	227,103,810 ¹²²	216,780,910 ¹²³	221,238,940 ¹²⁴	8.28
Agriculture, fishing, and hunting	15,640,850	14,922,990	18,809,250	16,476,900	
<i>Including for land reclamation and irrigation</i>	8,059,720	8,857.04	9,044.55	8,327.43	0.32

Note: The amount of the state budget in the laws of the Republic of Tajikistan is indicated in the national currency somoni. Therefore, the amounts indicated in US dollars are approximate and depend on the exchange rate.

In the allocation of the state budget, special attention is given to the education sector, which receives an average of 19.16 percent of the total revenue of the state budget over a four-year period. The fuel and energy complex receive 18.42 percent, social insurance and social protection (including the pension fund) receive 15.08 percent, and healthcare receives 9.93 percent. The funding for subsectors in the water sector is included in articles such as housing and communal services, ecology and forestry (4.3 percent), the fuel and energy complex (18.42 percent), and agriculture, fisheries, and hunting (3.09 percent).

Budget expenditures for the main subsectors in the water sector, based on functional classification, average as follows over a four-year period: 0.01 percent for the activities of drinking WSS by the SUE KhMK, 0.02 percent for the external debt payments of the SUE Obu Korezii Dushanbe, 8.28 percent for the development of hydropower, including the OJSHC Rogun HPP, 1.47 percent for the external debt payments of the OJSHC Barki Tojik, and 0.32 percent for land reclamation and irrigation from the total amount of the state budget.

For these subsectors, financial resources are allocated primarily as state support since they operate based mainly on the services provided in their respective fields.

For the drinking WSS subsectors, funds from the state budget are allocated to regulate debtor and creditor obligations to water users of budgetary organizations. It also covers external debt payments.

¹²¹ Internet source 2017, <https://tj.sputniknews.ru/20171110/rogunskaya-ges-tajikistan-1020998648.html>

¹²² Internet source 2021, <https://asiaplustj.info/ru/news/tajikistan/economic/20210804/ustavnoi-kapital-rogunskoi-ges-viros-pochti-na->

¹²³ Internet source 2022, <https://avesta.tj/2022/02/02/minfin-na-stroitelstvo-rogunskoj-ges-budet-vydeleno-2-5-mlrd-byudzhethnyh-sredstv/>

¹²⁴ Internet source 2023, <https://avesta.tj/2023/02/17/strong-na-stroitelstvo-rogunskoj-ges-v-2022-godu-bylo-napravleno-3-8-mlrd-somoni-strong/>

For the hydropower subsector, financial resources from the state budget are allocated mainly for the repayment of external debt and the construction of the Rogun HPP.

For the land reclamation and irrigation subsectors, funds from the state budget are allocated primarily for salaries and partial payment of electricity.

The activities of these subsectors in the water sector are dependent mainly on the production and provision of services related to electricity supply, drinking WSS, and providing irrigation water to water users.

The financial resources generated through the production activities and service provision in these subsectors are the main means for the financial activities of the authorized bodies responsible for these subsectors.

Analysis of the drinking water supply and sanitation subsectors

Financial analysis of the drinking water supply and sanitation subsectors

The unique mountainous nature of Tajikistan contributes to the availability of high-quality water resources suitable for drinking water supply. However, not all populations in the country have access to drinking WSS services, with a coverage rate of 64 percent.¹²⁵ The remaining population relies on water from open sources such as rivers, streams, canals, wells, and so on, without proper water treatment technologies.

Centralized drinking WSS services in Tajikistan are provided by 85 WSS enterprises, which are part of the subsidiary structure of the SUE Khochagii Manziliyu Komunali (SUE KhMK), SUE Dushanbevodokanal, SUE Khujandvodokanal, WSS utilities of the cities of Rogun, Nurek, and Sarband, as well as rural small enterprises, associations, and water user committees.

The total length of water pipelines, trunk lines, and distribution networks is 6,871 km, including 2,335.3 km under the responsibility of SUE KhMK. The sector operates 84 treatment plants with a total production capacity of 1,366,400 m³/day, including 26 treatment plants with a capacity of 307,200 m³/day under SUE KhMK. The length of sewer collectors and networks is 1,363.1 km, including 673.3 km¹²⁶ under SUE KhMK.

The main challenge in ensuring sustainable drinking WSS is the deteriorated infrastructure, which was built primarily in the last century. Currently, the state of the infrastructure is critical, with only 68 percent of urban and district-level infrastructure in working condition, 7 percent partially operational, and 25 percent non-functional. In rural areas, approximately 40 percent is in working condition, 44 percent partially operational, and 16 percent non-functional.¹²⁷

¹²⁵ Program for the development of housing and communal services of the Republic of Tajikistan for 2021-2024 dated 27 February 2021, No. 53, p3. http://www.adlia.tj/show_doc.fwx?rgn=138972

¹²⁶ Review of the situation of drinking water supply in cities and districts of the Republic of Tajikistan, 2012, p4. https://unece.org/fileadmin/DAM/env/water/meetings/NPD_meetings/2012-05_25_Water_supply_status_in_TJ_Dadabaev.pdf

¹²⁷ Program for the development of housing and communal services of the Republic of Tajikistan for 2021-2024 dated 27 February 2021, No. 53, p3. http://www.adlia.tj/show_doc.fwx?rgn=138972

SUE KhMK is the main enterprise responsible for policy-making in this area and provides drinking WSS services in 15 cities, 24 districts, and 40 district centers.

SUE KhMK faces financial problems related to the sustainability of its operations. On the one hand, the enterprise lacks the financial resources to modernize the existing facilities and build new ones for drinking WSS. On the other hand, the enterprise has outstanding debts and liabilities related to the provision of drinking water and wastewater disposal.

Financial gaps in the drinking water supply and sanitation subsectors

The financial gaps in the drinking WSS sector result mainly from factors such as a lack of financial resources and low tariffs relative to the cost of water, as well as low collection rates for drinking WSS services.

According to SUE KhMK data, the company provided water users with 65,387,500 m³ of drinking water amounting to TJS181,876,000 (USD16.09 million) in 2020, and wastewater disposal of 21,715,000 m³ amounting to TJS95,711,400 (USD8.5 million)¹²⁸.

However, the average tariff for providing drinking water services, which was determined in 2022, is 1.09 Diram (USD0.009) per 1 m³, while the cost of the tariff considering production expenses exceeds several times that amount.¹²⁹

Production costs should be calculated according to the procedure for developing tariffs for drinking water supply and wastewater disposal services, adopted by the Resolution of the Government of Tajikistan on 23 June 2020, No. 364. According to this procedure, the cost of services is calculated based on expenses related to water abstraction, water treatment, and water transport, including costs for electricity, depreciation, repair and maintenance, labor costs, contributions to social needs, and production and administrative expenses. Considering these costs, the cost amounts to 4 Diram (USD0.003) per 1 m³ of drinking water.¹³⁰

The collection of funds for WSS services from the population ranges from 60 percent to 70 percent, from commercial consumers 70 percent to 80 percent, and among budget organizations approximately 40 percent to 50 percent.¹³¹

The outstanding receivables of the enterprise from water users, including the population and budget organizations, amount to TJS81,390,000 (USD7.20 million). At the same time, the accounts payable of SUE KhMK related to its activities amount to TJS85,398,000 (USD7.55 million), including tax obligations.¹³²

¹²⁸ https://www.narodnaya.tj/index.php?option=com_content&view=article&id=12904%3A2021-02-18-05-08-11&Itemid=213

¹²⁹ <https://www.asiaplustj.info/ru/news/tajikistan/society/20220211/zhkh-tadzhikistana-obetshaet-cherez-8-let-u-vseh-zhitelei-tadzhikistana-budet-chistaya-pitevaya-voda>

¹³⁰ <https://www.asiaplustj.info/ru/news/tajikistan/society/20220211/zhkh-tadzhikistana-obetshaet-cherez-8-let-u-vseh-zhitelei-tadzhikistana-budet-chistaya-pitevaya-voda>

¹³¹ PROJECT REPORT Water Infrastructure in Central Asia: Promoting Sustainable Financing and Private Capital Participation, January 2023, p.30

¹³² Program for the development of housing and communal services of the Republic of Tajikistan for 2021-2024 dated 27 February 2021, No. 53, p15. http://www.adlia.tj/show_doc.fwx?rgn=138972

The Government of Tajikistan allocates an annual subsidy of TJS1.5 million (USD132,743) from the state budget to support SUE kHMK. In addition, the government has provided support in the form of offsetting the tax receivables and payables between SUE kHMK and budget organizations, related to drinking WSS services for the period of 2015-2019, totaling 6,525,000 TJS (577,433 USD), as well as deferring tax payments for a period of three years, totaling TJS12,618.700 (USD1.11 million).¹³³

SUE kHMK also has creditor obligations for implementing investment projects with the EBRD. As of 2020, the company's creditor obligations to the EBRD amounted to TJS188,843,400 (USD16 million). The repayment term for these funds is set for 2028.¹³⁴

Implications of financial gaps in the drinking water supply and sanitation subsectors

The financial gaps in the drinking water supply subsector consist mainly of a catastrophic lack of funds for the reconstruction and modernization of the drinking water infrastructure, and the payment of creditor obligations, including taxes and loans. This is owing to the infrequent collection of debtor obligations, including payment for WSS services, as well as low tariffs that do not cover the cost of the provided services.

Drinking water is a vital resource, but the consequences of financial gaps can lead to a range of problems—such as the bankruptcy of enterprises and the loss of highly skilled specialists; the deterioration of laboratory conditions for water and wastewater quality assessment; a lack of funds for the procurement of reagents for water treatment and disinfection; as well as the deterioration of the existing drinking water and sanitation infrastructure.

These problems can result in the following consequences: limited access of the population to clean drinking water and sanitation to meet their drinking, physiological, and domestic needs; pollution of water bodies by untreated sewage; increase in infectious diseases and mortality among the population; decline in food production; decline in the healthcare sector, heavy and light industries, and so on. The damage from these consequences to the country's economy would be immeasurable.

In addition, the population will be forced to use water from open sources and groundwater without proper determination of water quality, leading to various infectious diseases and their spread among the population.

Financial requirements for the development of the drinking water supply and sanitation subsectors

Ensuring clean drinking water and sanitation for the entire population is not an easy task. On the one hand, it is necessary to restore and upgrade the existing infrastructure, and on the other hand, investments are needed to construct new infrastructure for providing clean drinking water and sanitation.

It is necessary to establish profitable operations in these subsectors, create an economic mechanism for the activities of each enterprise, improve the level of service quality and revenue collection for WSS services, attract highly skilled specialists, strengthen laboratory research on water quality, and enhance efforts in the treatment and disinfection of drinking water and wastewater. In areas where

¹³³ Program for the development of housing and communal services of the Republic of Tajikistan for 2021-2024 dated 27 February 2021, No. 53, p15. http://www.adlia.tj/show_doc.fwx?rgn=138972

¹³⁴ Program for the development of housing and communal services of the Republic of Tajikistan for 2021-2024 dated 27 February 2021, No. 53, p15. http://www.adlia.tj/show_doc.fwx?rgn=138972

centralized water supply and wastewater systems are not available, it is necessary to build new decentralized small-scale enterprises for WSS. Other measures should also be implemented to ensure the provision of clean drinking water and sanitation to the entire population of the country.

According to SUE kHMK, achieving full provision of the country's population with clean drinking water and sanitation would require approximately USD2 billion and around 30 to 40 years.¹³⁵

Analysis of the hydropower subsector

Financial analysis of the hydropower subsector

Tajikistan possesses a large reserve of hydroelectric potential and ranks eighth in the world in terms of hydroelectric resources. These resources are estimated at approximately 527 billion kWh and are currently utilized at only 4 percent. The country's energy capacity is 5,757 MW, with hydroelectric power accounting for about 90 percent of electricity generation. The hydroelectric sector utilizes 30 km³ to 35 km³ of the potential water energy annually, generating an average of around 16 billion kWh of electricity.¹³⁶

The development of its hydroelectric potential will enable Tajikistan to become a regional leader in the generation of cheap, environmentally clean energy, as well as expand its export and transit opportunities for clean electricity. Revenues from electricity exports can be directed towards supporting and developing the country's hydroelectric sector through the modernization of the existing hydroelectric infrastructure and ensuring its sustainable O&M.

Out of the total installed energy capacity of 5,414 MW in the country, 4,996 MW or 93 percent is accounted for by hydroelectric power. Hydroelectric power accounts for 98 percent to 99 percent of annual electricity production. Each year, water passing through the country's hydroelectric power plants, with a volume of 30 km³ to 35 km³, generates a total of 16 billion kWh to 17 billion kWh of electricity.¹³⁷

The hydroelectric infrastructure is mainly under the balance of the OJSHC Barki Tojik, shares of which are owned by the state and private companies created based on the PPP mechanism called 'Pamir Energy.' The company Pamir Energy, established in 2002, operates 11 small and mini HPPs with a total installed capacity of 44.16 MW, a 35/10/0.4 kV power transmission line with a total length of 2,609 km, and supplies electricity exclusively to the Gorno-Badakhshan Autonomous Oblast (GBAO).¹³⁸

OJSHC Barki Tojik holds a dominant position in electricity generation in the country. It also engages in electricity trading with neighboring countries, which is driven by its operational needs. The main electricity generation and supply are carried out by five HPPs and two thermal power plants, which are its structural units.

OJSHC Barki Tojik includes HPPs such as the Nurek HPP, Baipazy HPP, the Vakhsh Cascade HPP, and the Kayrakkum HPP. Considering that the economic lifespan of HPPs is 50 years and that the

¹³⁵ Internet source, 2023, <https://asiaplustj.info/ru/news/tajikistan/economic/20230206/skolko-stoit-voda-i-skolko-za-nee-platyat-zhiteli-dushanbe-i-regionov-tadzhikistana>

¹³⁶ [https://www.mewr.tj/?page_id=614,](https://www.mewr.tj/?page_id=614)

¹³⁷ [https://www.mewr.tj/?page_id=614,](https://www.mewr.tj/?page_id=614)

¹³⁸ <http://www.pamirenergy.com/en/>

mentioned HPPs and distribution power infrastructure were built mostly in the last century, financial resources are required for the modernization of these HPPs and energy infrastructure. It has been proven that it is usually more cost-effective to rehabilitate and upgrade existing HPPs to increase capacity than to build new ones in the same locations.

The hydroelectric sector is primarily financed through the state budget for the construction of the Rogun HPP, attracting grants and loans from IFIs, electricity sales to consumers, and electricity exports to neighboring countries.

Currently, the tariff for electricity does not cover the expenses associated with the restoration, modernization, construction of new facilities, operation, and maintenance of the energy infrastructure.

Financial gaps in the hydropower subsector

As already noted, OJSHC Barki Tojik holds a dominant position in electricity generation in Tajikistan. It encompasses all major HPPs that supply electricity to consumers within the country and abroad. The budget of Barki Tojik relies mainly on the internal sale of electricity and exports to neighboring countries.

However, Barki Tojik faces financial difficulties and consistently ends each year with financial losses primarily owing to creditor and debtor obligations.

According to Barki Tojik's data, as of the beginning of 2022, electricity generation amounted to 15.9 billion kWh. Revenue from the sale of this electricity amounted to TJS3,421,426,000 (USD302.7 million), while production costs reached TJS3,203,704,000 (USD283.5 million), and costs related to transportation and distribution amounted to TJS1,379,670,000 (USD122.09 million).¹³⁹

The debtor obligation to Barki Tojik from energy consumers at the beginning of 2022 amounted to TJS1,613,391,000 (USD142.7 million).¹⁴⁰ The main debtors to Barki Tojik during this period include the population of the country, the reclamation and irrigation sector, the industry, and debts for electricity exports to other countries, including Uzbekistan, the Kyrgyz Republic, and Afghanistan.

To address the payment issues related to the use of electricity by pumping stations, the government has started subsidizing the land reclamation and irrigation sectors from the state budget since 2018, with an amount of around TJS40 million.¹⁴¹ Additionally, it has provided funds several times for the repayment of the debt of Barki Tojik, particularly in 2014 with TJS242.8 million (USD22.27 million), in 2017 with TJS81.95 million (USD7.5 million), and to the OJSHC 'Distribution Electric Networks' in 2023 with TJS456.9 million (USD42 million).

Barki Tojik's creditor obligation for the purchase of electricity as of the beginning of 2022 amounted to TJS6,993,688,000 (USD618.9 million).¹³⁹ This creditor obligation is incurred primarily through the purchase of electricity from Sangtudinskaya HPP 1, Sangtudinskaya HPP 2, Rogun HPP, and others.

¹³⁹ OJSHC Barqi Tojik. Consolidated financial statements and independent auditor's report for the year ended 31 December 2021, [barki tojik.pdf \(minfin.tj\)](#)

¹⁴⁰ OJSHC Barqi Tojik. Consolidated financial statements and independent auditor's report for the year ended 31 December 2021, [barki tojik.pdf \(minfin.tj\)](#)

¹⁴¹ Annual report of ALRI 2022

Barki Tojik takes out investment loans to carry out projects for the construction of new energy facilities and the modernization of existing facilities. The creditor obligation for investment loans as of the beginning of 2022 amounted to TJS18,600,981,000 (USD1.6 billion). The weighted average effective interest rate on the loans received was 4.1 percent. Thus, the total creditor obligation, including electricity purchases, amounted to TJS25,594,669,000 (USD2.26 billion).¹⁴²

These creditor funds were allocated for increasing the production capacity by 1900 MW, construction of power transmission lines over 1,100 km, the construction of four substations with a capacity of 500 kV, ten power plants with a capacity of 220 kV, and the modernization of other energy infrastructure to establish an integrated power system in Tajikistan.

Therefore, owing to the discrepancy between the electricity tariff and production costs, distribution costs, as well as the constant need for financial resources for the construction of new energy infrastructure and the modernization of existing power systems, Barki Tojik faces a financial deficit for its sustainable operations.

Implications of financial gaps in the hydropower subsector

The government attaches great importance to the development of Tajikistan's hydropower potential. The development of hydropower is one of the country's strategic directions. Therefore, an average of 18.4 percent of the total state budget for 2019 to 2022 is allocated to the development of the fuel and energy complex of the country, including around 10 percent for the development of hydropower.

However, Barki Tojik is currently on the verge of bankruptcy, with creditor liabilities exceeding company income several times over and amounting to the annual budget of the country.

The lack of financial resources can lead to the deterioration of infrastructure, increased energy losses during transportation, the imposition of energy consumption restrictions, and a decline in the country's socio-economic development. The damage caused by the shortage of electricity in the country can amount to billions of US dollars.

Financial requirements for the development of the hydropower subsector

The main financial need for the development of hydropower in Tajikistan is the construction of the Rogun HPP, located upstream of the Nurek HPP on the Vakhsh River. The Rogun HPP is the largest hydroelectric power station in Central Asia. Once completed, the HPP will address water supply issues for downstream countries through the regulation of reservoir cascades on the Vakhsh River, cover the electricity deficit during the winter, and increase the country's export potential by optimizing the operation of the energy system.

The Rogun HPP is being constructed on the Vakhsh River and consists of a dam-type hydroelectric power station with a rock-fill dam height of 335 m and a reservoir volume of 73.6 million m³. The designed capacity of the HPP is 3,600 MW, and the average annual generation is expected to be between 13 billion kWh and 17 billion kWh. The construction of the Rogun HPP began in 1976.¹⁴³

¹⁴² OJSHC Barqi Tojik. Consolidated financial statements and independent auditor's report for the year ended 31 December 2021, [barki tojik.pdf \(minfin.tj\)](#)

¹⁴³ Official web page of JSC of Rogun HPP <http://rogunges.tj/ru/home-ru/>

The commissioning of the first turbine unit with a capacity of 120 MW took place on 16 November 2018, and the second turbine unit was launched on 9 September 2019. The completion and commissioning of all six hydropower turbine units are planned for December 2029, with the reservoir reaching its designed water level by 2032.¹⁴⁴

The cost of constructing the Rogun HPP is estimated at USD5 billion.¹⁴⁵ Tajikistan started construction using funds from the state budget, proceeds from the sale of Rogun HPP shares, and Eurobonds. Since the start of construction in 2008, approximately USD3 billion¹⁴⁶ has been spent. Currently, Tajikistan is actively attracting IFIs to co-finance this project.

Also, according to the action plan for 2019 to 2025, USD1.2 billion is needed for the financial recovery of OJSHC Barki Tojik.¹⁴⁷

Analysis of the land reclamation and irrigation subsectors

Financial analysis of the land reclamation and irrigation subsectors

Land reclamation and irrigation are key subsectors of the country's economy, contributing to the achievement of strategic goals set by the government. These goals include ensuring food security, creating employment opportunities in rural areas, preventing and reducing water-related natural disasters, and improving the socio-economic well-being of the population.

As approximately 80 percent of agricultural production is supported by irrigated land, the total volume of water used for irrigation from all sources averages 8 km³ to 10 km³ per year. Over 90 percent of the total water withdrawal from natural sources is used for irrigated agriculture.¹⁴⁸ Around 70 percent of the country's active population is engaged in irrigated agriculture. Agriculture accounts for about 20 percent of the country's GDP.

The authorized agency responsible for land reclamation and irrigation in Tajikistan is the Agency of Land Reclamation and Irrigation under the Government of Tajikistan (ALRI). ALRI has several tasks, but its main ones include implementing state policies in the field of land reclamation and irrigation; managing water resources through land reclamation and irrigation systems at the basin and sub-basin levels of small and large rivers; delivering water to water users and draining drainage water through I&D systems based on agreements with water users; developing new lands and restoring lands that have been taken out of agricultural circulation; improving the land reclamation status; reducing and preventing water-related natural disaster risks through river channel regulation and bank protection works; as well as regulating and coordinating the activities of the association and union of water users. To serve the irrigated lands in the country, 26,700 km of irrigation networks and main canals, and 11,400 km of collector-drainage networks have been constructed, along with 7,099 hydraulic structures, 390 pumping stations (with a total length of pressure pipelines amounting to 624.67 km), 1,500 units, 505 vertical wells, 169 culverts, 110 aqueducts, 5,455 water

¹⁴⁴ Official web page of JSC of Rogun HPP <http://rogunges.tj/ru/home-ru/>

¹⁴⁵ Tajikistan, Master Plan for the Development of the Energy Sector—Final Report, 2017, https://mewr.tj/wpcontent/uploads/files/Plan_razv_energo_tom1.pdf

¹⁴⁶ <https://tj.sputniknews.ru/20220511/rogun-ges-tajikistan-1048340998.html>

¹⁴⁷ <https://www.dialog.tj/news/v-tadzhikistane-dlya-ozdorovleniya-barki-tochik-v-blizhajshie-6-let-potrebuetsya-1-2-mlrd>

¹⁴⁸ Water Sector Reform Program for 2016-2025, 2015, p4. http://www.adlia.tj/show_doc.fwx?Rgn=126214

distribution points, and 3,858 hydrometric posts. Additionally, ALRI manages four irrigation reservoirs and 1,386 km of bank protection dams.¹⁴⁹

Large cascade pumping stations, consisting of two to seven lifts, have been constructed to develop foothill areas. In total, the country has 228 cascade pumping stations with 922 units, which irrigate 213,200 hectares.¹⁵⁰

The main problems in the land reclamation and irrigation subsectors are financial instability and lack of profitability. These problems are related, on the one hand, to the physical and moral depreciation of over 30 percent of the water infrastructure under the management of ALRI and, on the other hand, the insufficient financial resources for sustainable O&M of water management facilities, payment of electricity bills, and collection of fees for water supply services, resulting in both debtor and creditor liabilities.

Financial gaps of the land reclamation and irrigation subsectors

In general, all the hydraulic structures of the ALRI system were built in the last century, and financial resources are necessary for their maintenance. Therefore, the main financial problem of the ALRI system is the lack of funds to carry out its tasks, including the sustainable O&M of hydraulic structures in the land reclamation and irrigation system, bank protection dams, payment of creditor liabilities, and collection of debtor funds.

Overall, this sector is considered non-profitable. The water tariff does not cover the expenses associated with water intake, storage, and transportation for irrigation purposes. Currently, the tariff for water supply services amounts to 2 Dirams (USD0.0018) per 1 m³ of water delivered to consumers. At the same time, the electricity tariff for ALRI pumping stations during the vegetation period is 9.2 Dirams (USD0.0084) per 1 kWh, and during the non-vegetation period, it is 26.51 Dirams (USD0.024) per 1 kWh.¹⁵¹

Considering that the cascade pumping stations lift water up to seven cascade levels, the water delivery tariff does not cover only production costs but also the costs associated with electricity consumption.

For example, in 2022, ALRI provided water delivery services to water users amounting to 4.2 billion m³ of water, totaling TJS80.5 million (USD7.9 million). The revenue from water supply services amounted to TJS69 million (USD6.7 million), which is 86 percent of the total. Meanwhile, the electricity consumed by the pumping stations amounted to TJS125 million (USD11.46 million).¹⁵²

The debtor liabilities in the ALRI system in 2022 amounted to TJS207,611.400 (USD20.3 million). These liabilities resulted primarily from water users not paying for water supply services on time.¹⁵³

In contrast, the creditor liabilities in the ALRI system amounted to TJS586,857,000 (USD57.5 million), resulting mainly from debts for unpaid taxes and electricity.¹⁵⁴

¹⁴⁹ Official web site of ALRI <https://www.alri.tj/tj/land-irrigation>

¹⁵⁰ Water Sector Reform Program for 2016-2025, 2015, p4. http://www.adlia.tj/show_doc.fwx?Rgn=126214

¹⁵¹ Annual report of ALRI 2022 <https://www.alri.tj/>

¹⁵² Annual report of ALRI 2022 <https://www.alri.tj/>

¹⁵³ Annual report of ALRI 2022 <https://www.alri.tj/>

¹⁵⁴ Annual report of ALRI 2022 <https://www.alri.tj/>

The government has allocated financial resources several times to cover electricity payments on behalf of ALRI to the OJSHC Barki Tojik, particularly in 2014 to the amount of TJS242.8 million (USD22.27 million USD), in 2017 TJS81.95 million (USD7.5 million), and to the OJSHC Raspredelitelnye Elektricheskie Seti in 2023 TJS456.9 million (USD42 million).

In addition, the government provides annual subsidies from the state budget to the ALRI system. In 2022, subsidies amounting to TJS78.1 million (USD7.65 million) were allocated for ALRI's activities, including TJS40 million (USD3.92 million) for electricity payments, TJS29.7 million (USD2.91 million) for salary payments, and TJS7.4 million (USD725,490) for taxes and other expenses related to production activities.¹⁵⁵ However, this is still insufficient for the sustainable operation of this sector.

Implications of financial gaps in the land reclamation and irrigation subsectors

The consequences of financial gaps in the I&D subsectors can also lead to the deterioration of infrastructure, increased risk of water-related natural disasters, deterioration of land reclamation conditions, withdrawal of land from agricultural use, loss of employment in agriculture, and a decrease in water and land productivity.

The consequences of financial gaps can result in a decline in agricultural development, thereby affecting food security and employment of the population, reducing the share of agriculture in the country's GDP formation, and overall undermining the socio-economic development of the country.

Financial requirements for the development of the land reclamation and irrigation subsectors

Sustainable operation and achievement of tasks in the ALRI system require financial resources. As mentioned earlier, the outdated infrastructure of the land reclamation and irrigation systems needs sustainable operation, maintenance, restoration, and modernization with the use of modern energy-efficient equipment for pumping stations.

Additionally, the land reclamation and irrigation systems require the construction of new hydraulic structures to develop new lands. The ALRI system also needs financial resources for the maintenance and operation of existing bank protection dams, the construction of new bank protection dams, and riverbed regulation works to reduce and prevent the risks of water-related natural disasters.

Owing to population growth and to ensure food security, it is necessary to develop an average of 15,000 hectares of new land annually. This would require approximately USD300 million per year.¹⁵⁶

To restore the inter-farm balance on an area of 550,000 hectares, USD110 million is needed. To restore the intra-farm irrigation network in this area, approximately USD165 million is required. For the restoration of drainage systems in this area, an additional USD100 million is needed.¹⁵⁷

Restoring and modernizing all pumping stations, considering the implementation of new energy-efficient equipment in the ALRI system, would require over USD1 billion.¹⁵⁸

¹⁵⁵ Annual report of ALRI 2022 <https://www.alri.tj/>

¹⁵⁶ Data from ALRI, 2023

¹⁵⁷ Data from ALRI, 2023

¹⁵⁸ Data from ALRI, 2023

To restore bank protection dams, approximately USD135.5 million is needed, which is also 3.35 percent of the book value of bank protection dams for their maintenance.¹⁵⁹

Equipping the ALRI system with specialized machinery and equipment would require around USD215 million.¹⁶⁰

Therefore, an estimated amount of approximately USD2 billion is needed for the complete restoration of the water infrastructure in the ALRI system.

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

The profitability and financial stability of organizations responsible for subsectors within the water sector can be assessed based on the following criteria:

- **Cash flow gap:** This occurs when an organization lacks sufficient funds to meet its short-term obligations, such as paying tax bills and other operational expenses
- **Funding deficit:** This occurs when an organization needs additional funds to finance its operations or investments, but cannot obtain them from its current sources
- **Profit gap:** This occurs when an organization's profit is lower than expected or desired, which can lead to difficulties in fulfilling financial obligations and investing in future development
- **Debt gap:** This occurs when an organization has a high level of debt that it cannot service or repay, resulting in financial difficulties
- **Asset gap:** This occurs when an organization's assets are insufficient to cover its obligations, which can lead to insolvency

In the financial analysis of the subsectors of drinking WSS, hydroelectric energy, and land reclamation and irrigation, it has been identified that all the aforementioned criteria for assessing profitability and financial stability are applicable to the organizations responsible for these subsectors.

In these subsectors, the main financial gaps are the collection of drinking water and sanitation services, the collection of irrigation water services, and the collection of electricity services. Also, the application of tariffs in these subsectors does not cover the cost of production costs, resulting in high lending rates in the hydropower subsector, which leads to accounts payable.

However, it should be noted that profitability and financial stability can be achieved in all these subsectors. Therefore, it is necessary to develop a financial and economic mechanism within the framework of ongoing reforms in these subsectors to ensure the sustainable operation of organizations responsible for the subsectors within the water sector. Financial instruments need to be identified, including the application of penalty sanctions for persistent non-payers of the services received.

¹⁵⁹ Data from ALRI, 2023

¹⁶⁰ Data from ALRI, 2023

It is necessary to record the volume of services rendered and product delivery to consumers. Efforts should be made to reduce losses during product transportation, and a billing system should be implemented to account for delivery and payment of the received products.

Considering that the entire water infrastructure was built primarily in the last century, it is important to attract grants and loans from IFIs and engage in PPPs for the modernization of existing infrastructure. This modernization should consider the application of new energy-efficient technologies, as well as the construction of new hydraulic structures and hydroelectric power plants, while considering the payback period.

Challenges and measures for effective water management based on an ecosystem approach

The global process of the impact of climate change on the water sector leads to consequences such as melting glaciers, drought, lack of drinking and irrigation water, land degradation, including arable land and pastures, mudflows and floods, avalanches, landslides, which affect biodiversity and the ecosystem. Especially in recent years, the country has experienced abnormal fluctuations in precipitation and temperature.

According to forecasts, because of the impact of climate change in some regions of the country, the decline in agricultural yields will be 30 percent by the end of this century. Reduced agricultural productivity and pasture productivity will negatively impact food security. Changes in biodiversity and ecosystems can cause a lack of drinking water and sanitation, which leads to infectious diseases and outbreaks of waterborne diseases.

The main solution in this direction is the introduction of integrated water resources management based on the ecosystem approach. As part of the first stage of the water sector reform for 2016-2025, the basin principle of water management and distribution between sectors by water users is being introduced based on established basin councils to protect the environment, biodiversity, and ecosystems. As part of the reform, investment projects are being implemented in subsectors of the water sector to modernize water infrastructure to adapt to climate change.

Also, as part of the water sector reform, the national water strategy of Tajikistan for the period until 2040 is at development stage. It includes a number of measures to improve water supply to the population: increase water efficiency and productivity; introduce innovative water-saving technologies; reduce water loss in irrigation systems and systems drinking WSS; increase energy efficiency in irrigation; improve the reclamation state of agricultural lands; reduce the risks of water-related natural disasters; and other measures to ensure sustainable development of the water sector, which will affect the preservation of the ecosystem¹⁶¹.

However, there is currently no clear action plan at system level for the intersectoral subsectors of the water sector to properly manage water resources based on an ecosystem approach and provide ecosystem services.¹⁶² In this regard, although adaptation projects and programs are being implemented in cross-sectoral subsectors of the water sector, efforts are needed to integrate

¹⁶¹ Internet page of the website Ministry of Energy and Water Resources of the Republic of Tajikistan, 2013 <https://www.mewr.tj/?p=2769>

¹⁶² National Strategy for Adaptation to Climate Change of the Republic of Tajikistan for the period until 2030, approved by decree of the Government of the Republic of Tajikistan dated 2 October 2019, No. 482

biodiversity and ecosystem management issues into subsector development planning activities to conserve biodiversity and maintain ecosystem services.

This requires attracting funds to implement large-scale, ecosystem-based adaptation actions needed to reduce the increasing climate risks and threats facing the environment.

It is expected that, after the approval of the country's national water strategy, intersectoral strategies for the development of subsectors will be adopted, including for drinking WSS, hydropower, land reclamation and irrigation until 2040. These will cover the issues regarding ecosystem conservation.

Recommendations for overcoming financial gaps in the drinking water supply and sanitation subsectors

The government gives special importance to providing the population with clean drinking water and sanitation. It seeks to attract financial resources from IFIs and organizations to modernize and reconstruct the drinking WSS infrastructure.

In order to develop the SUE Water Supply and Sewerage Company, the government has adopted several five-year programs, including the program for the development of housing and communal services for 2021-2024, approved by the Resolution of the Government of Tajikistan No. 53 on 27 February 2021.

This program identifies financial gaps in the subsectors but does not fully address the economic mechanisms for the development and profitability of the drinking water supply and wastewater subsectors. It pays little attention to decentralization and demonopolization of the subsectors; involvement of the private sector; implementation of mechanisms of PPP, including long-term management rights transfer to private partners considering the payback period and income generation; tariff policy; reasons for low revenue collection for the services provided; construction of small-scale systems; and so on.

In this regard, recommendations to address the gaps and formulate a strategy for achieving financial sustainability in the subsectors are as follows:

- Conduct a comprehensive inventory of the technical condition of drinking water supply, sanitation, and wastewater treatment infrastructure.
- Identify leaks, losses, and unauthorized connections by water users.
- Improve accounting for water supplied from the main pipeline to the end user.
- Implement a billing system for payment of WSS services. Automate water supply and disconnection in case of non-payment for the services rendered.
- Invest credit funds in the construction of decentralized small-scale drinking water supply systems as separate enterprises with separate financial management, applying tariff policy and considering the payback period.
- Modernize pumping stations using energy-efficient modern technologies. Where possible, utilize gravity-based water supply systems that eliminate the need for pump stations.
- Implement a demonopolization approach in the subsectors, attract private companies through the mechanism of PPP for transferring management rights in the drinking WSS system.
- Implement water consumption limits and apply higher tariffs for excessive water usage.
- Assess the population's payment capacity and apply tariff policies for gradually increasing tariffs for WSS services, considering profitability.

- Subsidize all state budget enterprises and organizations from the state budget for full payment for drinking water supply and sewage services. Set usage limits for water at these enterprises.
- Improve existing regulatory acts and develop new ones to ensure profitability in this industry, involving the private sector.

Based on the above, it is necessary to develop a long-term financial strategy for at least 15 years, with an analysis of various scenarios for the development of the drinking WSS subsectors.

Recommendations for overcoming financial gaps in the hydropower subsector

The government attaches special importance to the development of the country's hydropower potential, considering it a strategic direction to ensure energy security. The development of hydropower in Tajikistan will enable the generation of cheap and environmentally clean electricity.

If construction of the Rogun Hydroelectric Power Plant were to be resumed, once operational, the cost of electricity generation would be only 1.5 cent/kWh to 2 cents/kWh. By comparison, the cost of electricity generation for a thermal power plant is around 4 cents to 5 cents and for a nuclear power plant it is 5 cents to 6 cents.¹⁶³

The export of electricity by the OJSHC Barki Tojik to neighboring countries is carried out at a tariff of USD0.0456/kWh. In 2021, Barki Tojik exported 2.4 billion kWh of electricity.¹⁶⁴ With the annual generation capacity of the Rogun Hydroelectric Power Plant of 13.8 billion kWh, exporting at such a tariff could generate approximately USD630 million per year. Thus, the payback period for the Rogun Hydroelectric Power Plant would be around ten years.

In the hydropower subsector, there is a successful company called Pamir Energy, which was established based on the mechanism of PPP. Since its creation in 2002, the company has maintained a stable financial performance and provides electricity to 98 percent of the population of the Gorno-Badakhshan Autonomous Region of Tajikistan.

The government places special importance on the financial recovery of Barqi Tojik. In 2018, an action plan was prepared for the period 2019-2025, stating that USD1.2 billion would be required for the financial recovery of the company.

To improve the asset management of the company, the government issued a resolution on 28 April 2018, No. 234, 'On the reorganization of joint-stock companies,' to create the following joint-stock companies based on Barqi Tojik: OJSHC Shabakahoi Intikoli Bark, responsible for electricity transmission; and Rasedelitelnye Elektricheskie Seti, responsible for electricity distribution among consumers.

All three organizations responsible for generation, transmission, and distribution have their own separate financial accounts. The main financial challenge of these companies is creditor debt, which is difficult to resolve without appropriate assistance from the government and development partners.

¹⁶³ <https://pressa.tj/rogunskaya-ges-novaya-sila-tadzhikistana/>

¹⁶⁴ <https://tj.sputniknews.ru/20220214/barki-tochik-price-afghanistan-1045836453.html>

The primary measures to overcome the financial recovery of Barqi Tojik depend on collecting funds from electricity sales, minimizing losses during transmission and distribution, introducing alternative renewable energy sources, and implementing the cost-reflective tariff mechanism where applicable. The following recommendations are made:

- Conduct a comprehensive inventory of the power system. Identify losses and unauthorized connections to the grid. Implement an automated management system.
- Full transition to a billing system for electricity payment. Implement tariff policies and set limits for consumers, charging a higher tariff for usage exceeding the limit. Impose penalty sanctions for habitual non-payers and restrict their access to electricity usage.
- Determine the payment capacity of consumers and gradually increase tariffs based on the profitability of the enterprise.
- Subsidize budget organizations from the state budget to pay fully for the electricity.
- Subsidize pumping stations in the reclamation and irrigation subsector to pay fully for the electricity.
- Invest credit funds in the implementation of alternative renewable energy sources where applicable.
- Gradually implement the cost-reflective tariff mechanism.
- Improve existing regulatory acts and develop new ones to achieve profitability in the sector, involving the private sector.

Based on the above, it is necessary to develop a long-term financial strategy for at least 15 years, analyzing various scenarios for the development of the hydropower subsector.

Recommendations for overcoming financial gaps in the land reclamation and irrigation subsectors

In the land reclamation and irrigation subsectors, there are similar financial gaps related to the collection of funds for irrigation water services, increasing accounts receivable and accounts payable. In addition, the main cost-related problem in the subsectors is the implementation of measures to lower and prevent water-related natural disaster risks, including bank protection and canal regulation works. These works are financed through the collected funds from irrigation water services.

In this regard, the following recommendations are made to overcome the financial gaps in the land reclamation and irrigation subsectors:

- Conduct a comprehensive inventory of I&D systems, pumping stations, substations, power transmission lines, bank protection dams, and other infrastructure.
- Attract credit and grant funds for the modernization of pumping stations using energy-efficient modern technologies. Preliminary calculations suggest that up to 10 percent (140 million kWh) of electricity can be saved in this subsector.
- Implement an automated monitoring system for electricity consumption at all pumping stations. Identify unauthorized connections by other users to the electricity supply. Preliminary calculations suggest that at least 1 percent (14 million kWh) of electricity usage in these subsectors can be saved through this measure.
- Allocate funds from the state budget for the full payment of electricity used by pumping stations.
- Implement alternative renewable energy sources, such as solar panels, where applicable. Construct mini-hydroelectric power plants in irrigation systems.

- Create a comprehensive registry of water users using GIS mapping for cultivated areas. Establish and implement a fully automated water accounting and billing system for water supply and drainage services.
- Apply tariff policies with tariff increases to the level of cost and profitability of the enterprise. Impose penalty sanctions for excessive water withdrawals by applying a higher tariff.
- Completely exclude the funding of works to reduce water-related disaster risks from irrigation water services. For this purpose, allocate budget funds from the state budget.
- Strengthen the financial sustainability of I&D organizations. Implement cost recovery mechanisms in small-scale I&D systems.
- Improve existing regulatory acts and develop new ones to achieve profitability in the sector, involving the private sector.

Based on the above, it is necessary to develop a long-term financial strategy for at least 15 years, with an analysis of various scenarios for the development of the land reclamation and irrigation subsectors.

TURKMENISTAN

Situational analysis/overview of the water sector

General

By 2050, the population of the CA region is forecast to increase from the current 75 million to 95 million, with water availability estimated to decrease by more than a third compared with current levels.¹⁶⁵ Largely dependent on transboundary waters and, owing to the progressing impacts of climate change, along with economic and demographic indicators, Turkmenistan's position in the management of the water sector today is transferring to a more advanced level. This can be observed in the financial investment programs, which demonstrate a considerable increase in funding.

The reforms made in the structure of higher governing bodies demonstrate the country's pursuit to improve the efficacy of activities and enhance management. Thus, in accordance with the decree of the President of Turkmenistan, the reorganization of agricultural, environment protection and water resources sectors of the country took place and received new forms of management structure in July 2023.¹⁶⁶ According to the decree, to replace the abolished Ministry of Agriculture and Environmental Protection of Turkmenistan, two independent governing bodies were created—the Ministry of Agriculture of Turkmenistan and the Ministry of Environmental Protection of Turkmenistan. In addition, to address the challenges of climate change, the desiccation of the Aral Sea and insufficiency of water in general, alongside the tasks of the national programs envisaging the development of the agricultural sector, the government has placed timely mechanisms on using and managing water more efficiently. Thus, in August 2022, with a view to the rational use of water resources, as well as the creation of additional water reserves in Turkmenistan, the Government

¹⁶⁵ FAO, World Bank, 2022. Modernization of Irrigation Systems in Central Asia. Concept and Approaches. <https://www.fao.org/3/cb8230ru/cb8230ru.pdf>

¹⁶⁶ Turkmenistan State News, 2023. Decree of the President of Turkmenistan on the establishment of the Ministry of Agriculture of Turkmenistan and the Ministry of Environmental Protection of Turkmenistan. <https://tdh.gov.tm/ru/post/36781/ukaz-prezidenta-turkmenistana-o-sozdanii-ministerstva-selskogo-ozvyajstva-turkmenistana-i-ministerstva-ohrany-okruzhayushchej-sredy-turkmenistana>

Commission on Water Supply was established.

Turkmenistan organized the Summit of IFAS (International Fund of Saving the Aral Sea), where the *joint communiqué* stipulating cooperation on addressing the water resources problems in CA region was issued. In May 2019, the country also initiated the resolution of ‘Cooperation between the United Nations and the International Fund for Saving the Aral Sea’ designed to provide an integrated approach to solving the problems of the Aral crisis with the broad participation of stakeholders. At the national level, measures are being studied and expanded to increase water resources, mainly through the construction of new and additional reservoirs and the modernization of existing ones, the construction of hydraulic structures, increasing the capacity of irrigation canals and improving land reclamation. Developments in safe drinking WSS services in the country’s regions are also observed in national and international assessment reviews.

The development of the water resources sector with integrated investments is planned in the mid to long term. These schemes are the program of the president of Turkmenistan on socio-economic development for 2022 to 2028 (SEDP 2022-2028) and the national program for the transformation of social and living conditions in villages, towns, and cities of districts and district centers until 2028 (National Rural Program), as well as other policies that reflect the state's commitment to the provision of drinking water and sanitation.

Today, the country—having inherited the infrastructure of the Soviet period designed initially to irrigate strategic crops and reach a larger population to provide water—is tasked with studying and deploying systems of effective water use. It is further challenged to review its present institutional and financial mechanisms to maintain security of key economic sectors, including water resources management, owing to growing threats of climate impact on the availability of hydrological resources.

Existing practice of financing the water sector

The financial and economic mechanism is an important component of any industry management. At the same time, an efficient, thoroughly planned funding structure is an essential aspect of the continued and successful operation of any social and economic sector. In the water sector, a proper financial system allows for due regulation of water requirements and water savings.¹⁶⁷

In Turkmenistan, the monetary investments for water resources management, alongside other national domains, are mainly secured by government funds.

Besides the state investments, the sector and other respective domains are also funded by a tariff for WSS services; however, its share is argued to be very low.

In addition to government funding, there are investments in the form of loans, credits, or grants from international development organizations. Reviewing the financial support provided by those structures, especially from 2020 to 2022, it can be observed that water-related projects were not in the first line; only the health sector received most of the investments in 2020,¹⁶⁸ likely caused by the global COVID-19 pandemic. The review of the projects of those organizations shows that the financial assistance was directed mainly at supporting the development of healthcare, digitalization,

¹⁶⁷ Dukhovny V, Pinkhasov M, & Mirzaev N, 2009. Financial and economic instruments

¹⁶⁸ United Nations Turkmenistan, 2020. UN Turkmenistan Annual Results Report

and trade by the UN;¹⁶⁹ SMEs focused on the production of foods or related products, and plastic products by the EBRD;¹⁷⁰ and energy and transport connectivity by ADB.¹⁷¹ At the same time, there were certain water and land-related projects initiated by USAID and the Global Environment Facility (GEF) (through UN Turkmenistan).

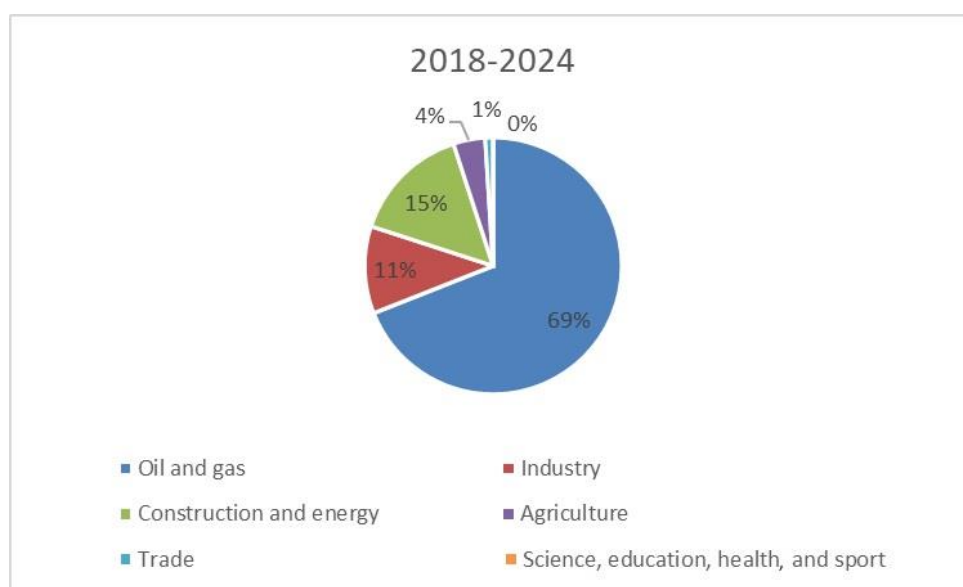
Financial management and allocation of funding in the water sector

The financial management of water resources and the development of its mechanisms are carried out exclusively by government bodies and subordinate entities in Turkmenistan.

Traditionally, the hydrocarbon sector receives most of the country's investments. The allocation is so large that the oil and gas sector alone accounts for around 60 percent to 70 percent of total funds.

Annual financial investments for the country's water sector ranged around at TMT240 million, which is 60 percent of required funds¹⁷² or more than USD2 billion to USD4 billion,^{173,174} spread over several years depending on the scale of projects according to the socio-economic development programs (for 2019-2015 and 2022-2028). A positive trend in the increased financing of water-related projects is observed in the section of agriculture complex of each edition of the program. (Figure 0-6).

Figure 0-6: Breakdown of investments for socio-economic complexes of Turkmenistan¹⁷⁵



¹⁶⁹ UNDP. UNDP Turkmenistan projects. <https://www.undp.org/turkmenistan/projects>

¹⁷⁰ EBRD. EBRD Projects In Turkmenistan. <https://www.ebrd.com/where-we-are/turkmenistan/data.html>

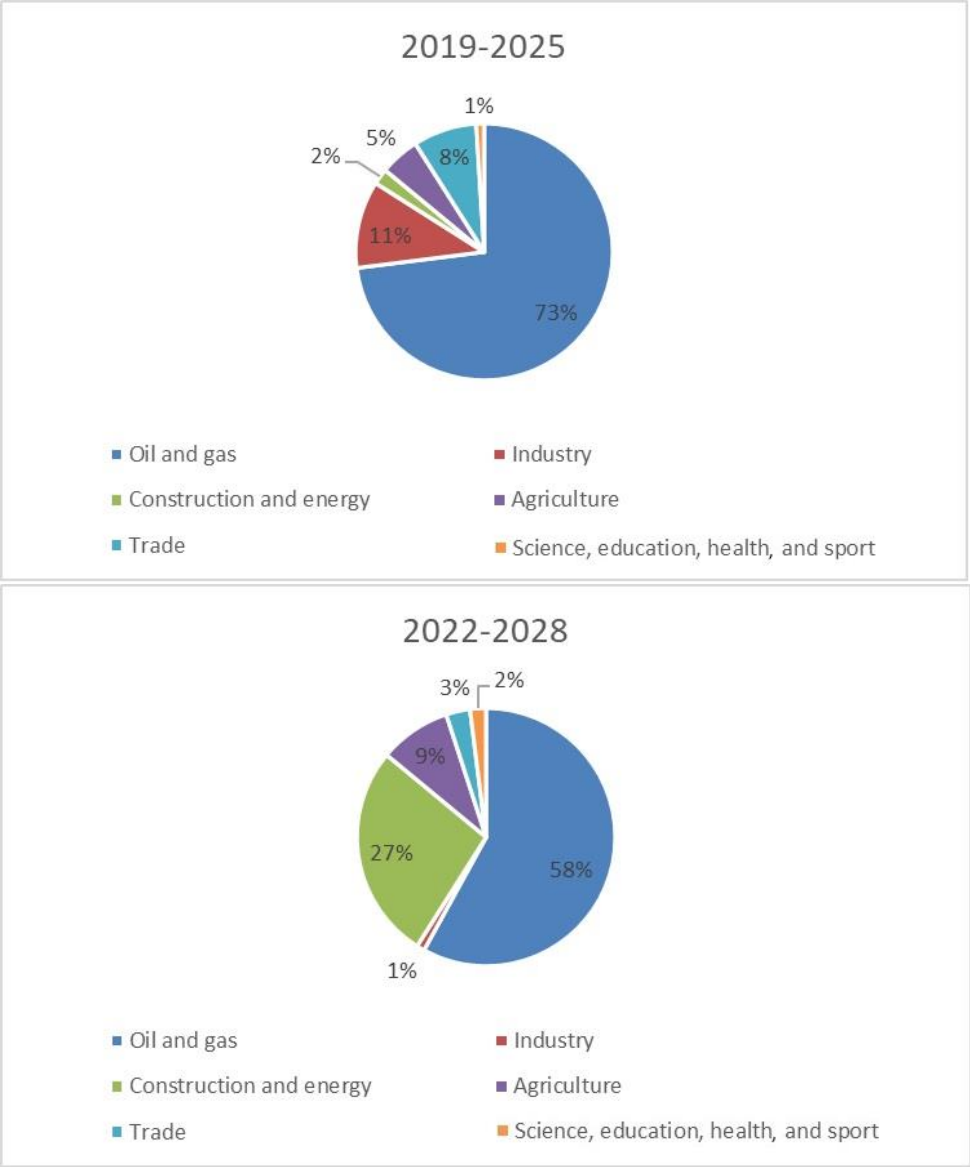
¹⁷¹ ADB. Turkmenistan and ADB. Turkmenistan projects. <https://www.adb.org/countries/turkmenistan/projects-results>

¹⁷² USAID, 2020. Water sector of Central Asia and Afghanistan

¹⁷³ Central Bank of Turkmenistan. The exchange rate (all further indicated values in USD will be referred to this link).

¹⁷⁴ SEDP 2019-2025

¹⁷⁵ SEDP 2018-2024; SEDP 2019-2025; SEDP 2022-2028



In the previous edition of the SEDP of Turkmenistan for 2019 to 2025, the share of investments for water and land related projects was indicated at TMT7.4 billion (USD2,1 billion) or 4.6 percent of the total financing of the program. In the new edition of the program, financial allocations for projects in the water and land sectors almost doubled, to TMT14.7 billion (around USD4.2 billion) taking up 8.6 percent of the project list. At the same time, the investments provided only for the initiatives of the State Committee for Water Resources of Turkmenistan account for more than TMT13.8 billion (more than USD3.9 billion).

The new version of the seven-year SEDP includes seven major projects, each with a budget of more than TMT400,000 for a total of over TMT10.2 billion (USD2.9 billion) (Table 2-5). At the same time, it is noticeable that the cost of the first two projects has been or will be extended beyond the period of 2022 to 2028. The given large-scale projects list includes the construction of reservoirs, pits, and a water treatment plant; the reconstruction of dams and riverbeds; and the building of the Altyn Asyr drainage collector network.

Table 0-5: Major projects of the water sector listed in SEDP for 2022-2028

No.	Project	Value, TMT	Value, USD
1	Construction of drainage system of Karakum Lake (Turkmen Lake of Altyn Asyr)	about 5 billion	over 1.4 billion
2	Construction of a new pit of the (Zeyit) reservoir with a volume of 4,000 million m ³ in the upper reaches of the Karakum River; construction of phase II of the reservoir '15 years of Independence' with a volume of 1.65 billion m ³	about 1.5 billion	over 0.4 billion
3	Construction of a pit for an additional reservoir with a volume of up to 3,000 million m ³ in the upper reaches of the Karakum River	over 1 billion	about 0.3 billion
4	Reconstruction of state dams along the Amuderya River, Lebap province	about 1 billion	about 0.3 billion
5	Reconstruction of a bed of Shasenem canal (10,0,18 km) and construction of a reservoir with a total volume of 90 million m ³ by installing an impervious lining; Dashoguz province	about 0.9 billion	over 0.250 billion
6	Construction of a drinking water treatment plant in the city of Ashgabat	about 0.6 billion	about 0.17 billion
7	Construction of water reservoir in Gorogly district of Dashoguz province	over 0.4 billion	over 0.1 billion

There are also several groups of initiatives to be implemented in various parts of the country. The following are the grouped prioritized tasks retrieved from the SEDP 2022-2028 giving in total around USD2.6 billion:¹⁷⁶

- Reservoirs: (re-)construction, expansion—over USD1.3 billion
- Hydraulic units: construction, (re-)construction, repair—over USD0.5 billion
- Irrigation canal and drainage networks: capacity increase—USD0.322 billion
- Land reclamation improvement—USD0.240 billion
- Karakum River: capacity increase—USD0.187 billion

As for the investments for the protection and rational use of water, land, and forest resources, in 2020, the last two received equally high investments of about TMT18.500 each (around USD5.3 million), while the sector for water resources received a decent TMT2.300. However, in 2021, the total investments aimed at measures for the protection and rational use of natural resources in Turkmenistan moderately increased by 14 percent, from TMT39,764.600 (more than USD11.3 million) to TMT45,336.300 (more than USD12.9 million), where the share of water resources surged dramatically, to more than seven-fold or to 682 percent compared with the previous year (

¹⁷⁶ Döwlet Jumakuliev, Water Sector Financing in Turkmenistan; In: Water Infrastructure in Central Asia: Promoting Sustainable Financing and Private Capital Participation. 2023. CAREC Institute

Table 0-6).

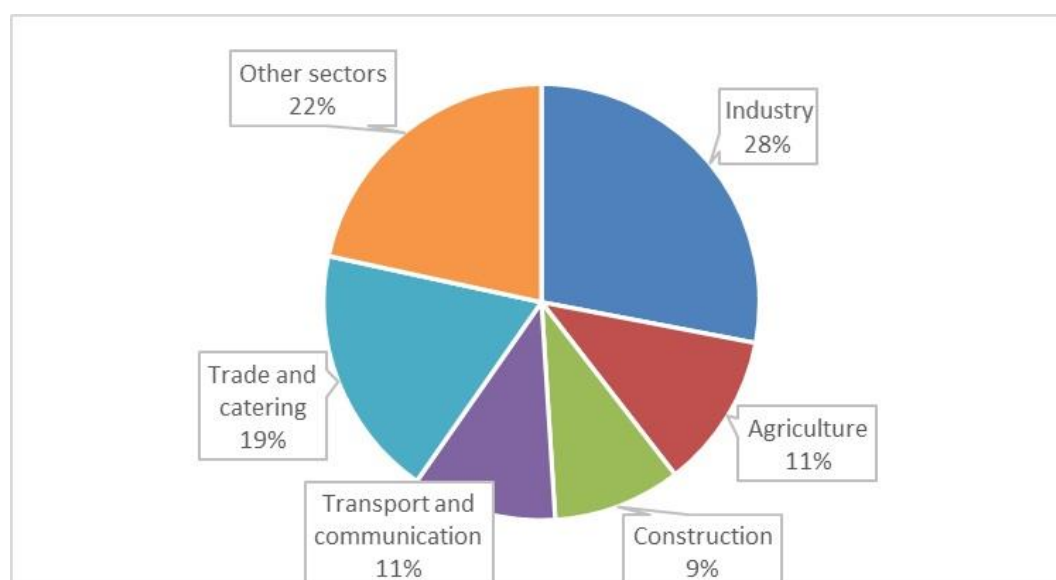
Table 0-6: Breakdown of financial investments for the protection and/or rational use of natural resources, in TMT¹⁷⁷

Year	Total disbursed	for the protection and rational use of water resources	for the protection of atmospheric air	for the protection and rational use of land resources	for the protection and rational use of forest resources	organization of nature reserves and other protected areas
2020	39,764,600	2,264,200	415,500	18,312,600	18,772,300	n/a
2021	45,336,300	17,707,200	210,600	13,705,300	12,467,300	1,245.9
Increase, %	14%	682%	-49.4%	-25.2%	-33.6%	n/a

Given the trend towards increased financial support in recent years, it can be concluded that state policy in the water sector is given more priority today.

The share of agricultural products in the country's export items, which ranks second after fuel and mineral products,¹⁷⁸ indicates the greater importance of the agricultural sector (including the water sector) in the country's economy.¹⁷⁹ Moreover, the share of agriculture in GDP, recovered as of 2015 and remaining at around 11 percent, is generally positioned third among the five individual sectors, highlighting its significance. However, despite a higher ranking compared to other exported products and an upward trend in GDP, this domain is not a serious competitor to other priority sectors for a large share of financial investment.

Figure 0-7: Structure of GDP of Turkmenistan by industry in 2020¹⁸⁰



¹⁷⁷ Statistical compendium, Environmental Protection and Use of Natural Resources in Turkmenistan for 2021

¹⁷⁸ OEC. Turkmenistan. Historical Data. Yearly Trade.

<https://oec.world/en/profile/country/tkm?depthSelector1=HS2Depth>

¹⁷⁹ Durdymadov A, Ballyev Y, Khydyrova L, & Ovezov A, 2022. 'Features of financing the agricultural sector.' Scientific journal *In situ*: pp2,411–7,161/ISSN (e) 2712-9500

¹⁸⁰ Nationally Determined Contribution of Turkmenistan under the Paris Agreement; Turkmenistan, 2022

Analysis of the drinking water supply and sanitation subsectors

Financial analysis of the drinking water supply and sanitation subsectors

Built in the Soviet period, the significant part of the infrastructure of the region aimed mainly at water-strategic industries and the population, and without due consideration of effective water utilization, it was already substantially worn out by the 2000s, demanding colossal financial investment.¹⁸¹ As a result, the state started reviewing new, adaptive mechanisms of water sector management.

Thus, by 2009-2010 extensive analysis jointly with international organizations was carried out to review the institutional and financial policies, the state of the infrastructure, and other related aspects of the country's water resources sector. This was the period when international organizations were involved in collaboratively reviewing the system of integrated water resources management. Thus, in 2010, the national policy dialog (NPD) in Turkmenistan was launched.¹⁸² Another milestone was the adoption of several legal norms based on one of the subsectors of the water resources complex, the drinking WSS.

The legal document on drinking water supply was first defined in the state law 'On drinking water' in 2010 (with subsequent changes and additions in 2017, 2018, and 2019), with seven chapters setting out general conditions; the state regulation of drinking water supply; systems, guarantee, economy of drinking water; dispute resolutions; and responsibility for drinking water supply offences.¹⁸³

Another state policy that determines the legal, economic, and social conditions for ensuring the sanitary and epidemiological well-being of the population, and the implementation and protection of citizens' rights to a favorable environment, including drinking water—the 'Sanitary Code of Turkmenistan' (new edition), was put into effect at the beginning of 2010.¹⁸⁴

The provisions and investments stipulating the safe supply of drinking water and sanitation are included in other national programs and policies, which include:

- General program for provision of residential places of the country with clean potable water.
- Program for the development of networks and facilities for water supply and sewerage in Ashgabat for the period up to 2050.
- Investment program of Turkmenistan for 2023.
- National program for the transformation of social and living conditions of villages, towns, and cities of districts and district centers until 2028 (National Rural Program).
- Program of the President of Turkmenistan on socio-economic development for 2022 to 2028 (SEDP 2022-2028).

The country's activities in these subsectors are periodically covered by local official news agencies or reflected in the reports of the responsible organizations and state cabinet meetings to review the implementation or status of tasks over a certain period. In addition, there are international reviews or joint work by the government with other development organizations to assess the country's

¹⁸¹ UNDP, 2010. Analytical Review of Water Sector of Turkmenistan

¹⁸² UNECE, official website. NPD/IWRM in Turkmenistan in 2010, <https://unece.org/environment-policy/publications/npdiwrm-turkmenistan-2010>

¹⁸³ Turkmenistan Law 'On drinking water' (2010)

¹⁸⁴ Sanitary Code of Turkmenistan (2009)

performance in various sectors. Thus, Turkmenistan, according to the recent release of the voluntary national review of Turkmenistan on the progress of implementation of the global agenda for sustainable development 2023 (VNR 2023) has reached the 100 percent target for ten of the 17 SDGs.¹⁸⁵ Nevertheless, the SDGs for water and sanitation along with the rational use of lands did not fall into the group of maximum performers, showing indicators at 88 percent and 67 percent, respectively. These figures are, however, higher compared with the other three SDGs (except for SDGs 5 and 16). Also, the document stressed the gradual development in water availability and sustainable management, highlighting at the same time improved indicators of WSS.

Today, because of population growth, the growth of industrial and individual constructions and tasks on the development of rural areas, the need for centralized water supply is constantly growing.

As stated in goal 6 (ensure availability and sustainable management of water) of the VNR 2023, efficiency of water use, along with indicators of drinking WSS, as well as its infrastructure, have improved over the past decade. Thus, according to the document, in 2020 the population's access to clean and safe water increased by 17 percent to reach 95 percent, whereas in 2010 it stood at 82 percent. The central water supply network, the primary water supply system for the population, also had a positive trend by 2021, having increased to 1.3 percent (from 5,000 km in 2019 to 7,700 km in 2021). At the same time, the share of the population using water supply services organized in compliance with safety requirements reached an almost maximum value of 99.9 percent in 2020, an increase of 17 percent compared with indicators of 2015 to 2016. Also, according to the statistical compendium *Environmental Protection and Use of Natural Resources in Turkmenistan for 2021*, the length of the street sewer network in urban settlements at the end of 2021 reached 1,420.6 km.

In addition, as part of the implementation of the tasks of the National Rural Program, 9,200 km of water lines, 1,600 km of sewer lines, 587 wells, eight water treatment facilities, and five sewage treatment facilities were put into operation in the provinces of the country over the past 14 years (2008 to 2022). In 2022 to 2028, according to the new edition of the National Rural Program (up to 2028), a total of 5,100 km of water supply lines, 20 water purification plants, 25 vertical wells, 1,200 km of sewer lines, and 15 sewage treatment facilities will be built and put into operation.

The share of the population using basic sanitation services organized in compliance with safety requirements (including handwashing devices with soap and water) was also positive at 98.7 percent in 2019.

Furthermore, according to data from the State Sanitary and Epidemiological Service, water samples in 2015 to 2022 showed that the water in 80 percent of reservoirs was good quality.

Separate evidence on the progress in drinking water, sanitation, and hygiene in schools during 2000 to 2021 for children was provided by the UNICEF/WHO report where Turkmenistan was in the line of basic needs providers, positioned among the best performers out of three executors: 1. basic needs, 2. limited service, and 3. no service.¹⁸⁶

In general, both national and international reviews note the gradual development in drinking WSS over the last decade in the country.

¹⁸⁵ UN Turkmenistan, 2023. Voluntary national review of Turkmenistan on the progress of implementation of the global agenda for sustainable development

¹⁸⁶ WHO, UNICEF, 2021. Progress on drinking water, sanitation, and hygiene in schools; 2000-2021 data update

Financial analysis of the drinking water supply and sanitation subsectors

Historically, the population of the country was free to pay for utilities until 2017, when a new policy came into force to revise the system of financing housing and communal services. In November 2017, new tariffs were introduced for heating, rent, potable water supply, and sewerage services. According to the resolution, the payment of 50 tenge (TMT0.5 or 0.1428 cents) per 1 m³ of water consumed in excess of the free limit volume and 40 tenge (TMT0.4 or 0.1142 cents) for the service of the sewerage system per person was set.¹⁸⁷ Further, from 1 January 2019, the free supply of electricity, gas, drinking water, and table salt was canceled,¹⁸⁸ stipulating the removal of a free limited volume of water supply.

Thus, at the beginning of 2019, the widespread installation of water consumption metering systems began. According to the analysis, there were improvements in the rational use of water¹⁸⁹ and sewerage services, with the installation of metering devices and imposed tariffs. However, it is argued that the established tariffs were low and not sufficiently sustainable to cover the O&M costs of the WSS services.

Ideally, with a water consumption of 458.9 million m³ (in 2021)¹⁹⁰ and a price of TMT0.5/m³, the maximum estimated annual total income would be TMT229,450,000 or USD65.5 million. However, considering other types of consumption, the charges for which differ, as well as other technical moments, this estimated figure will change. Also, considering the 46.8 percent share of the population in cities and the lower level of centralized sewerage in rural areas, the estimate of the annual payment for the use of sewage services by the population might be about USD320,000 (for a population of six million).

According to official data, investments planned for WSS during the seven years of the National Rural Program until 2028 will account for:¹⁹¹

- More than TMT1.5 billion (more than USD400 million) for the construction and reconstruction of water supply networks
- More than TMT1.1 billion (more than USD300 million) for the construction and reconstruction of water treatment facilities
- More than TMT0.5 billion (more than USD140 million) for the construction and reconstruction of sewer networks
- TMT0.3 billion (more than USD82 million) for the construction of wastewater treatment plants

At the same time, annual investments range between:

- TMT211 million—TMT360 million (USD60 million—USD102 million) for water supply networks

¹⁸⁷ Turkmenportal online news agency. <https://turkmenportal.com/blog/12162/v-turkmenistane-s-1-noyabrya-2017-goda-ustanovleny-novye-tarify-na-zhilishchnokommunalnye-uslugi>

¹⁸⁸ Turkmenportal online news agency. <https://turkmenportal.com/blog/15891/turkmenistan-s-1-yanvary-2019-goda-uprazdnyayet-besplatnoe-potreblenie-elektroenergii-gaza-pitevoi-vody-i-stolovoi-sol>

¹⁸⁹ UN Turkmenistan, 2023. Voluntary national review of Turkmenistan on the progress of implementation of the global agenda for sustainable development; Dovlet Jumakuliev, Water Sector Financing in Turkmenistan; In: Water Infrastructure in Central Asia: Promoting Sustainable Financing and Private Capital Participation. 2023. Carec Institute

¹⁹⁰ Statistical compendium. Environmental Protection and Use of Natural Resources in Turkmenistan for 2021

¹⁹¹ National program for the transformation of social and living conditions of villages, towns, and cities of districts and district centers until 2028

- TMT52 million—TMT497 million (USD14.8 million—USD142 million) for water treatment facilities
- TMT40 million—TMT130 million (USD11.4 million—USD37.1 million) for sewer networks
- TMT30 million—TMT63 million (USD8.6 million—USD18 million) for sewer treatment facilities

making annual estimated maximum income from payments for water and sewer services usage insufficient to cover the above annual investments.

In general, according to the National Rural Program, investments during 2022 to 2028 for the water supply sector will amount to over USD750 million including for wells, and over USD229 million for the sewerage system in the settlements of the provinces of the country. However, these figures do not encompass water and sanitation development in the capital city.

Financial gaps in the drinking water supply and sanitation subsectors

Today the following challenges of the WSS subsectors need to be considered for the development of the regulatory and economic scheme:

- Financing to increase sewerage networks and sewerage treatment
- Capital investment for general repair of water supply network and water treatment facilities
- Advanced and effective solutions for water disinfection operations
- Low tariffs to cover O&M costs of water supply and sewerage systems
- Development of a mechanism to attract qualified specialists and capacity building programs of existing staff
- Encouragement of more active involvement of the private sector in water supply management

Implications of financial gaps in the drinking water supply and sanitation subsectors:

- Failure to comply with sanitary standards can lead to a deterioration in public health and entail severe diseases.¹⁹² In the country, there are improvements in indicators for sewage networks, which is generally common for larger towns and cities in provinces or districts. In addition, the indices of wastewater treatment operations, which more than tripled to 57.4 percent by 2022,¹⁹³ have the potential for further growth, which implies the need for additional funding.
- The outdated water and sewer infrastructure, ubiquitous in almost all the region, started requiring more financial investment by the late 2000s. The national development programs may reflect lower investment owing to the development of socio-economic sectors by investing in the construction of new social, industrial, or commercial projects because of economic and demographic growth; in the long term there will be *ad hoc* and excessive expenditure on the Soviet-era infrastructure, leading to an ineffective management system.
- Water disinfection in modern conditions has become a complex problem, so it needs to be considered in all aspects: hygienic, environmental, economic, and technological. The issue may become more challenging in older facilities owing to the outdated systems.
- Maintained largely by state funds, countries in the region enjoy low tariffs for WSS services. However, according to numerous analyses, in future such subsidies will have negative implications for all sectors. The consequences may include a growing tendency to neglect easily accessible resources and services, thereby damaging the system fueled by unsustainable consumption. Insufficient return on investment may be another impact on already aging

¹⁹² WHO, 2023. Sanitation. <https://www.who.int/news-room/fact-sheets/detail/sanitation>

¹⁹³ Voluntary National Review of Turkmenistan, 2023

infrastructure in the future, while at the same time placing the sector in a challenging position to compete for additional financial sources with other developing sectors.

- Another challenge faced by water management in CA countries may be the lack of sufficient skills to maintain uninterrupted utility services,¹⁹⁴ which can lead to excessive and irrational costs and poor-quality service.
- The government-supported centralized management system in almost all states of the region may pose additional challenges over time as the economies develop. Numerous analyses suggest¹⁹⁵ that greater private sector involvement at certain stages of water management development will have a positive impact across the sector.

Financial requirement for the development of the drinking water supply and sanitation subsectors

Tens of millions of US dollars for the new construction of large-scale centralized water supply and sewerage projects were directed in Turkmenistan in the period until 2010.¹⁹⁶ By 2010, to meet the needs of the country's three largest cities, four large drinking water treatment stations were built, with a total capacity of 610,000 m³/day (over USD70 million). The implementation of about 30 more smaller projects totaling over USD60 million has been completed.¹⁹⁷

According to forecasts and recommendations, the amount needed in 2009 to 2015 in the water supply sector amounted to USD700 million, which is several times more than the invested funds (USD180 million) for the period from the year of independence to 2009—that is, more than 15 years.¹⁹⁸

Today, the country continues to develop the appropriate hydraulic infrastructure. Thus, at the beginning of 2019, the water treatment plant with a capacity of 30,000 m³ of water per day was put into operation in the Kaahka district of Akhal province.¹⁹⁹ In general, financial investments in the coming years will amount to around USD1 billion for the water supply and sewerage system in the settlements of the provinces of the country,²⁰⁰ while in the capital city construction of a water treatment plant is planned for over USD166 million.²⁰¹

The financial requirements of these subsectors are also emphasized by the development organizations. The amount of official development assistance received for water and sanitation amounted to USD0,01 million at 2021 exchange rates.²⁰²

¹⁹⁴ USAID, 2020. Water sector of Central Asia and Afghanistan

¹⁹⁵ Zhiltsov S, 2015. Policies of Central Asian countries in the sphere of use of water resources of transboundary rivers; USAID, 2020. Water sector of Central Asia and Afghanistan; UNDP, 2010. Analytical Review of Water Sector of Turkmenistan

¹⁹⁶ UNDP, 2010. Analytical Review of Water Sector of Turkmenistan

¹⁹⁷ GWP, 2009. Regional Review. Water supply and sanitation in the countries of Central Asia and Southern Caucasus

¹⁹⁸ UNDP, 2010. Analytical Review of Water Sector of Turkmenistan. p53

¹⁹⁹ IFSA, 2019. Key water events in Central Asian countries

²⁰⁰ National Rural Program

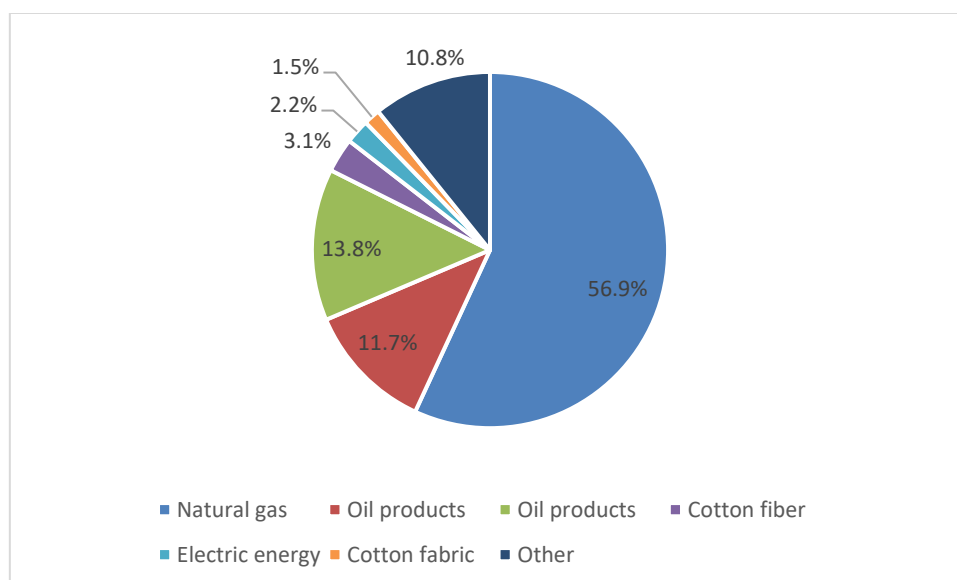
²⁰¹ SEDP 2022-2028

²⁰² UN, SDG 6

Analysis of the industry subsector

The industrial sector of Turkmenistan traditionally leads by a significant margin in exports and in GDP share (Figure 0-8). In 2022 the sector was reported to have expanded by 6.3 percent, particularly in hydrocarbons.²⁰³

Figure 0-8: Structure of Exports, 2021²⁰⁴



Nevertheless, despite the leading position of industry in the country's economy, the sector is not water intensive. The water supplied and consumed for production and industry organizations, as well as for other fields like fisheries and pasture watering, is very low compared to the share of the agriculture sector.

For technical water supply and other production needs, specially designated surface waters, treated waters are used. Drinking water, including underground water, can be used only under certain conditions.²⁰⁵ Also, in some areas where exploration and production wells are located, there are no natural sources and water reservoirs; these wells utilize sea water supplied to the oil fields.²⁰⁶

The distribution of water resources in Turkmenistan is carried out based on preliminary applications from each of the economic sectors. The volume of water required for industry is determined according to production plans, considering the technological processes involved. Each ministerial enterprise determines the volume of water resources necessary to solve intradepartmental tasks and submits its applications for water each year.²⁰⁷

Today, globally, 72 percent of the world's fresh water is used in agriculture, 16 percent in industrial production, and 12 percent in domestic services.²⁰⁸ In Turkmenistan—whereas agriculture constitutes over 90 percent of the total volume of water use—household and drinking water

²⁰³ ADB, 2023. Turkmenistan. Asian Development Outlook

²⁰⁴ ADB, 2023. Turkmenistan. Asian Development Outlook

²⁰⁵ Water Code of Turkmenistan, 2016

²⁰⁶ Deryayev A, 2022. Protection of the subsoil and environment during the development of gas fields

²⁰⁷ ADB, 2004. Past Experience and Future Challenges. Cooperation in shared water resources in Central Asia

²⁰⁸ FAO, 2023. Activity book

supplies; industry and production; the power sector; fisheries; as well as the watering of pastures all account for less than 10 percent of the total volume of water used in the country.²⁰⁹ The water use of industry and the production sector accounts for about 5.3 percent or 931 million m³ to 937 million m³ after the primary water consumer, the agricultural sector.(Table 0-9)

The main state industry organizations are oil and gas production, exploration and processing concerns or complexes: State Concern TurkmenGas (Turkmen Gas); State Concern Turkmennebit (Turkmen Oil); Turkmenbashi Complex of Oil Refineries (TCOR); as well as enterprises of the Ministry of Energy and gas, chemical, and other mineral production complexes and processing plants. Besides the government organizations, there are also international organizations operating under a production sharing agreement (PSA) for the production and exploration of hydrocarbons. Consistent data for volumes of water consumption, re-use, or wastewater treatment and utilization by the sector organizations—both state and MNCs—are not available.

While questions on water supply for the country's enterprises are managed by the State Committee on Water Resources, issues related to wastewater are dealt with mainly by the State Committee for Environmental Protection and Land Resources founded in 2016. The Environmental Protection Department of the Natural Gas Research Institute of the State Concern TurkmenGas, established in 2001, is the entity that ensures environmental safety in the oil and gas production and exploration sectors, and gas chemical complexes.

Industrial wastewater that meets environment protection norms, if not re-used or directed to specially organized systems, is discharged into the desert or the Caspian Sea by oil and gas companies or chemical complexes operating near the sea.

Financial analysis of the industry subsector

The Law of Turkmenistan on Environmental Protection (a.10), (2014) enshrines the mandatory payment for environmental use as one of its basic principles and provides for two types of payment: for the use of natural resources within and above limits and discharges of pollutants into the environment, also within and above set limits.²¹⁰ Almost everywhere, the highest payment for water falls on industrial and municipal water supply, which fully covers the share of the water sector's costs for their maintenance. However, in CA countries, the industrial sector, like other water users, enjoys relatively low tariffs.²¹¹

In Turkmenistan, for the first time, in accordance with Presidential Decree No. 1,800 of 5 May 1994, water charges were introduced for industrial enterprises and other water users whose activities are unrelated to land irrigation for the entire volume of water used.^{212,213} At the same time, the reconstruction and operation of water supply systems is the responsibility of municipalities and will be done at the expense of the state.²¹⁴

Payments for discharges of contaminants are collected from state organizations regardless of their affiliation and form of ownership. The size of the payment is established in accordance with the

²⁰⁹ UNDP, 2010. Analytical Review of Water Sector of Turkmenistan

²¹⁰ Ministry of Agriculture and Environment Protection of Turkmenistan, 2021. *Problems of Desert Development*

²¹¹ Dukhovny V, Pinkhasov M, & Mirzaev N, 2009. Financial and economic instruments

²¹² UNDP, 2010. Analytical Review of Water Sector of Turkmenistan

²¹³ ADB, 2004. Past Experience and Future Challenges. Cooperation in shared water resources in Central Asia

²¹⁴ UNECE, 2012. Environmental Performance Reviews. Turkmenistan. First Review

coefficient and standards for the level of environmental pollution and assessments. In cases where permission is absent or standards are exceeded, a fee is charged within the limit of excess discharge, and penalties are determined in accordance with the state legislation and regulatory documents.²¹⁵

Financial gaps in the industry subsector

While the oil and gas complex is the main contributor to the state economy, the sector is the main source of industrial pollution, generating about 90 percent of all registered industrial waste.²¹⁶ The Law of Turkmenistan on Environmental Protection obliges specialists of the country's fuel and energy complex to gradually introduce modern technologies, ensure effective control over the environmental state, and improve the system of environmental standards and requirements for facilities under construction. In addition, as stated by the Water Code (Article 77) 'legal entities that have reservoirs of industrial wastewater or mine, quarry and mine waters are obliged to take the necessary measures to purify these waters, use effective technologies for their neutralization and disposal and carry out reclamation of lands occupied by these reservoirs.' As noted by the local experts,^{217,218} in addition to pollution from the return flow from irrigated fields, containing salts, pesticide residues, defoliant, there is also a decent portion of contamination by industrial and municipal wastewaters, implying due financial allocations for such measures.

Another issue in this section is related to the payment for utilizing natural resources. According to the analysis, payment for the use of natural resources is provided for by many legal acts and laws. However, as noted by the expert,²¹⁹ a comprehensive system of payments for environmental management has not yet been fully formed, and criteria for their assessment for many types of natural resource have not been developed.²²⁰

Implications of financial gaps in the industry subsector

The threat posed by industrial wastewater discharge creates a plethora of environmental and public health concerns. The effluents of the industrial sectors create significant stress on ecosystems while at the same time the microorganisms contained in wastewater—such as viruses, bacteria, protozoans, and algae—induce toxicity causing detrimental effects on human health.²²¹ The main industry complex, oil and gas, which usually generates the most industrial waste, might in turn also have a significant impact on marine biodiversity (as many oil producers operate offshore) and other types of environmental and health issues, thus implying a broad review of environmental and social protection regulations. Besides hydrocarbons, the chemical industry operates intensively thanks to the rich mineral resources in the country. One of them is the iodine and bromine production sector, whose operation is also associated with wastewater. The discharge of these waters containing

²¹⁵ Ministry of Agriculture and Environment Protection of Turkmenistan. 2021. *Problems of Desert Development*

²¹⁶ UNECE, 2013. Seminar under SPECA project

²¹⁷ Ovezberdyeva A, 2009. Sustainable water management in Turkmenistan. Challenges and solutions

²¹⁸ Atalyev K, Sustainable drainage water management at the transboundary level

²¹⁹ Kepbanov Y, 2021. Legal support of environmental payments in Turkmenistan. In: *Problems of Desert Development*. International scientific and practical journal. National Institute of Deserts, Flora and Fauna. Ministry of Agriculture and Environment Protection of Turkmenistan

²²⁰ Ministry of Agriculture and Environment Protection of Turkmenistan, 2021. *Problems of Desert Development*

²²¹ Chowdhury Z, Labidi J, & Dewil R, 2023. Industrial Wastewater on the Environment and Human Health

certain harmful ingredients (strontium, copper, zinc, cadmium, chromium) and exceeding norms might cause irreparable environmental damage to flora and fauna.²²²

Another challenge is the absence of comprehensive and strict regulations or the imposition of small fines for the violation of regulations, which are claimed to reduce the incentive for industries to comply with environmental and technical standards. In some situations, industries find it more economic to pay fines rather than to invest in treatment solutions.²²³

Financial requirements for the development of the industry subsector

In accordance with the oil and gas complex development program, for the needs of TCOR operations, it was planned to build an offshore facility and seawater desalination plant valued at more than USD80 million. The project is envisaged to be realized during the period from 2023 to 2025.

As the industry complex is projected to develop, oil and gas account for 90 percent of all exports and the primary source of budget revenue.²²⁴ The large volume of income from sales of its products could stimulate the deployment of innovative and effective wastewater solutions and/or facilities for hydrocarbon and other industry sectors of the country.

Analysis of the hydropower subsector

In Central Asia, there are about 280 reservoirs that regulate the seasonal and annual flow of rivers. Most are multifunctional and are used for irrigation, municipal water supply, power generation, and flood control.²²⁵ Hydrotechnical facilities that generate and supply energy are located in the countries in the lower reaches of the region. Turkmenistan, which does not have its own large sources of water resources but has large hydrocarbon reserves, generates its energy mainly from natural gas.

Table 0-7: Power energy generation by source in 2021, Turkmenistan²²⁶

Generation in 2021	GWh	%
Non-renewable	23 730	100
Renewable	3	0
Hydro and marine	3	0
Solar	0	0
Wind	0	0
Bioenergy	0	0
Geothermal	0	0
Total	23 733	100

²²² Yevzhanov H & Altyyeva A, 2006. Complex use of ground industrial water of Turkmenistan

²²³ WWAP, 2017. The UN World Water Development Report. Wastewater: The Untapped Resource

²²⁴ ADB, 2023. Turkmenistan. Asian Development Outlook

²²⁵ CARECO. Information brochure about demonstration Nexus projects.

https://www.carececo.org/publications/nexus/%D0%9A%D0%BE%D1%80%D0%BE%D1%82%D0%BA%D0%B0%D1%8F%20%D0%B2%D0%B5%D1%80%D1%81%D0%B8%D1%8F_Factsheets%20on%20demo%20projects_rus_%D1%81%D0%B5%D0%BD%D1%82%202022.pdf

²²⁶ IRENA, 2021. Statistical Profiles. Turkmenistan.

https://www.irena.org/IRENADocuments/Statistical_Profiles/Asia/Turkmenistan_Asia_RE_SP.pdf

This factor largely explains the absence of medium- to large-scale renewable energy facilities, including hydroelectric power plants. In general, the country is provided with electricity by 14 to 15 power plants with a total capacity of approximately 7.9 MWt,²²⁷ operating mainly on gas turbines and some steam turbine units. However, the country has two transboundary hydraulic structures (managed jointly with other bordering countries), the functions of which, in addition to providing water to nearby areas, include generating hydropower. This is the Tuyamuyun hydro complex (THC), operated jointly with Uzbekistan, and the reservoir dam Dostluk (Friendship), operated in cooperation with Iran. The country also has the only hydroelectric power station, the Hindu Kush, on the Murgab River, whose contribution to the country's electricity generation, however, is extremely small (which, in percentage, gives less than 0 percent) (

Table 0-7).

In addition to the Hindu Kush hydroelectric power station, the country previously also had small hydroelectric power stations built in the post-war period on the cascade of the Murgab River and small rivers flowing from the Kopetdag.²²⁸ However, these turned out to be uneconomic owing to the low water content of the rivers and the impracticality of using small hydraulic turbines with a power of 0.5 kW to 2.0 kW on the fast-flowing mountain rivers. Regarding the Amu Darya, it flows through the flat part of the territory of Turkmenistan for 1,000 km and the construction of special structures on it is noted to be inappropriate.²²⁹

The management of water resources and hydraulic facilities is carried out by the production associations of the State Committee for Water Resources of Turkmenistan. At the transboundary level on the Amu Darya River, units of the Amu Darya BWO are involved. At the Dostluk reservoir dam, management functions related to ensuring the safety of the dam are performed by the special Turkmen–Iranian commission for joint operation.²³⁰

²²⁷ IRENA, 2021. Statistical Profiles. Turkmenistan.

https://www.irena.org/IRENADocuments/Statistical_Profiles/Asia/Turkmenistan_Asia_RE_SP.pdf

²²⁸ History of the formation of Turkmen statehood and the territory of Turkmenistan.

<https://uchebnikfree.com/sotsialnaya-geografiya-ekonomicheskaya/istoriya-formirovaniya-turkmenskoy-44733.html>

²²⁹ Dikambayev R, 2013. Synthesis research to promote the implementation of advanced technologies for energy efficiency and renewable energy sources in Central Asian countries. UNECE.

https://unece.org/fileadmin/DAM/energy/se/pp/eneff/IEEForum_Tbilisi_Sept13/Day_2/ws3/p4/Dikambaev_r.pdf

²³⁰ UNECE, 2011. The Aral Sea drainage basin and other transboundary waters in Central Asia. In: Second assessment of the state of transboundary rivers, lakes and underground water.

https://unece.org/DAM/env/water/publications/assessment/Russian/G_PartIV_Chapter3_Ru.pdf ;
<https://unece.org/second-assessment-transboundary-rivers-lakes-and-groundwaters>

Table 0-8: Hydropower stations operating in Turkmenistan²³¹

Facility	Managed by	Owned by (country)	Location (country)	River	Power generation capacity	Power consumer (countries)	Water reservoir capacity (million m ³)	Water consumers
Tuyamuyun hydro complex (THC)	Turkmenistan-Uzbekistan	Uzbekistan	Turkmenistan	Amu Darya	150 MW power station with six 25 MW hydroelectric turbine generators	Uzbekistan 450 million kWh/yearly	7,800 (four reservoirs: Ruslovoe, Sultansanjar, Kaparas, Koshbulak)	Turkmenistan, Uzbekistan
Iran-Turkmenistan Friendship reservoir dam	Turkmenistan-Iran	Turkmenistan-Iran	On the border Turkmenistan-Iran	Tejen	16 MW	Turkmenistan-Iran	1,200	Turkmenistan: 410 million m ³ Iran: 410 million m ³
Gindikush hydroelectric station	Turkmenistan	Turkmenistan	Turkmenistan	Murghab	1.2 MW power station with three 400 MW hydroelectric turbine generators	Turkmenistan	31	n/a

Tuyamuyun hydro complex

The Tuyamuyun hydro complex (THC) is a transboundary water-energy facility located along the Amu Darya River on the border between Uzbekistan and Turkmenistan. The hydraulic structure belongs to Uzbekistan, which leases land in Turkmenistan based on bilateral agreements. Uzbekistan is also involved in the maintenance and financing of the structure. Ownership and management rights of the hydroelectric complex are regulated by four bilateral interstate regulatory documents. The facility regulates the water flow in the lower reaches of the Amu Darya and distributes water resources between the sides; it provides irrigation water to 425,000 hectares of land in Turkmenistan and 779,300 hectares in Uzbekistan; it generates 450 million kWh of electricity per year for Uzbekistan; and it provides potable water to the Khorezm region and the autonomous republic of Karakalpakstan of Uzbekistan.²³²

Dostluk (Friendship) reservoir dam

The Iran-Turkmenistan Friendship reservoir dam is located on the Tejen River (or Hariroud), in the south of the country. Being the highest dam in the country (78 meters), the jointly produced project

²³¹ CARECO. Information brochure about demonstration Nexus projects; UNECE, 2011. The Aral Sea drainage basin and other transboundary waters in Central Asia. In: Second assessment of the state of transboundary rivers, lakes and underground water; Dikambayev R, 2013. Synthesis research to promote the implementation of advanced technologies for energy efficiency and renewable energy sources in Central Asian countries. UNECE; MoE IRI, UNECE, 2017. Water allocation in transboundary basins: a global workshop on the status and good practices Geneva-Switzerland https://unece.org/fileadmin/DAM/env/documents/2017/WAT/10Oct_16-17_WS_on_Water_Allocation/Session_3_Vatanfada_Present_2017.pdf; 'Orient,' 2020. Turkmen-Iranian dam 'Druzhba' increases water supply. <https://orient.tm/ru/post/24325/turkmeno-iranskaya-plotina-druzhba-povyshaet-vodnyj-zapas>

²³² CARECO. Information brochure about demonstration Nexus projects. https://www.carececo.org/publications/nexus/%D0%9A%D0%BE%D1%80%D0%BE%D1%82%D0%BA%D0%B0%D1%8F%20%D0%B2%D0%B5%D1%80%D1%81%D0%B8%D1%8F_Factsheets%20on%20demo%20projects_ru_s_%D1%81%D0%B5%D0%BD%D1%82%202022.pdf

solves the problems of flood prevention, runoff accumulation,²³³ and electricity generation. The facility, with its 1.2 billion m³ reservoir capacity, provides drinking water and irrigation for the surrounding areas along with hydroelectric power. When operating a reservoir jointly, documents are used to ensure maintenance, preventative, and emergency work in the transboundary zone, and to simplify border crossing for technical personnel.²³⁴ The dam was constructed in 2004 with an agreement signed on equal rights to the river water to the volume of 410 million m³ each, which allows irrigation of 25,000 hectares of land on each side of the river.²³⁵

Gindikush hydroelectric power station

The only state-owned hydroelectric power station, the Gindikush, was built in 1913 with three hydraulic turbines, each with a capacity of 400 kW. Built during the years of the Russian Empire, the hydroelectric power station is one of the oldest in the world and today has more significance as a historical monument rather than in terms of its energy production, given its insignificant share of the country's total energy output.

Potential for small hydropower

The construction of small hydropower (SHP) stations on small rivers and in mountainous regions is one of the most promising areas for the use of renewable energy sources in remote, hard-to-reach regions of CA. Installed capacity of SHP in CA is relatively low, at 221 MW. However, a large amount of potential capacity remains to be developed—6,112 MW—indicating that just 4 percent has been developed so far. The possible SHP potential in Turkmenistan is estimated at 1,300 MW.²³⁶ The economic potential of SHP exceeds the potential of other types of non-traditional energy sources according to local experts.²³⁷ As noted, one of the most effective directions in the development of renewable energy sources in Turkmenistan is the use of energy from small watercourses using microhydropower and small hydropower stations (up to 10 MW).²³⁸ For example, as a result of calculations from 10 kW of small hydropower stations, eco-energy potentials were identified: savings in fuel consumption of 8 tons; electricity generation of 20,000 kWh/year.²³⁹

In the past, proposals for the possible installation of nine small hydropower stations were voiced, but there were no further discussions and actions for their implementation.²⁴⁰ To date, this area has been little studied owing to the country's abundant fossil sources.

²³³ 'Meteojournal,' 2021. <https://metejournal.ru/obem-vody-vodohranilishha-dostluk-sootvetstvet-urovnyu-malovodnyh-let/>

²³⁴ UNECE, 2021. Safety of hydraulic structures in Central Asia: capacity building and regional cooperation. https://unece.org/sites/default/files/2021-07/Dam%20Safety%20Review_RU.pdf

²³⁵ 'Trend.' 2011. Turkmenistan and Iran equally divided the water of the border river Tedjen-Gerirud. <https://www.trend.az/casia/turkmenistan/1901305.html>

²³⁶ UNIDO, ISCHP, 2016. World small hydropower development report

²³⁷ Penjiyev A, 2013. Water resources as alternative energy source of Central Asia. <https://cyberleninka.ru/article/n/gidroresursy-kak-alternativnyy-istochnik-energii-v-tsentralnoy-azii>

²³⁸ Penjiyev A & Gurbanov E, 2015. Basics of geoinformation system in the development of small hydropower engineering in Turkmenistan. <https://cyberleninka.ru/article/n/osnovy-geoinformatsionnoy-sistemy-v-razviti-maloy-gidroenergetiki-turkmenistana> p. 63

²³⁹ Penjiyev A & Gurbanov E, 2015. Basics of geoinformation system in the development of small hydropower engineering in Turkmenistan. <https://cyberleninka.ru/article/n/osnovy-geoinformatsionnoy-sistemy-v-razviti-maloy-gidroenergetiki-turkmenistana> p.70

²⁴⁰ Laljebaev M, Isaev R, & Sauhimov A, 2022. Renewable energy sources in Central Asia: potential, use, prospects and barriers. UCA

Financial analysis of the hydropower subsector

To update and develop the country's water infrastructure, significant financial investments are required. Funding for the construction, reconstruction, and operation of dams and reservoirs is secured from the state budget of Turkmenistan as part of the country's socio-economic development programs (the national program for the socio-economic development of Turkmenistan for 2011-2030; the programs for the socio-economic development of the country for a seven-year period; and the general program for providing settlements in the country with clean drinking water). In addition, the country is cooperating with international development organizations in these areas. The recently completed demonstration project of the European Union aimed at solving the siltation problems of the Tuyamuyun hydro complex is an example of such international financial support.

Financial gaps of the hydropower subsector

The possibilities of small hydroelectric power stations are actively discussed in connection with their advantages over other energy sources. However, in the region, the possibilities for SHP development are hampered by such barriers as a lack of skilled personnel and local technologies, limited financial resources, low electricity tariffs, water scarcity, low awareness of the possible applications of SHP, and limited data on the potential of SHP.²⁴¹ Also, local experts, emphasizing the benefits of small hydroelectric power plants, especially for remote settlements and for the environment, note that hydropower resources in Turkmenistan are insufficiently studied owing to the scarcity of water resources.²⁴²

One more persistent problem in the region is siltation of hydraulic structures reservoirs. It reduces the benefits of capital-intensive water supply facilities, affecting the performance of water users and hydroelectric power plants. In turn, this negatively affects the regulation of river flow, accurate accounting of water resources, and the safety of dams.²⁴³ Another task for hydraulic structures reservoirs may be technical re-equipment. For example, at the reservoirs of the Dostluk dam, basically no renovations have been carried out (by mid-2021) since they were put into operation. The condition of the structural elements, instruments, and equipment of the hydraulic structure is generally satisfactory, but at the same time, they require scheduled repairs.²⁴⁴

Another common problem for both small HPPs and hydraulic structure stations remains the low qualifications of staff and the limited employment of specialists, which necessitates the need to improve the educational process and plan the industry's staffing needs.²⁴⁵

Implications of the financial gaps in the hydropower subsector

Owing to the impact of extreme temperatures on the level of rivers and reservoirs, the issue of water security is at the forefront of the state agenda in the lower reaches of water flows in the region. Low-water reservoirs have become an urgent problem in connection with climate

²⁴¹ UNIDO, ISCHP, 2016. World small hydropower development report

²⁴² Penjiyev A & Gurbanov E, 2015. Basics of geoinformation system in the development of small hydropower engineering in Turkmenistan <https://cyberleninka.ru/article/n/osnovy-geoinformatsionnoy-sistemy-v-razvitiim-aloy-gidroenergetiki-turkmenistana>

²⁴³ CARECO. Information brochure about demonstration Nexus projects

²⁴⁴ UNECE, 2021. Safety of hydraulic structures in Central Asia: capacity building and regional cooperation

²⁴⁵ UNECE, 2021. Safety of hydraulic structures in Central Asia: capacity building and regional cooperation

warming.²⁴⁶ If preventative and precautionary measures are not taken by the technical, expert, the consequences on the required water and electricity supplies will be significant with further unplanned financial expenditures.

Other consequences for the hydropower structures are the intense siltation of reservoirs. The level of siltation in the main reservoir of THC reached 70 percent, which prevented the flow of water for irrigation and drinking needs. According to the business-as-usual scenario, by 2040 the reservoir will be completely silted, which will jeopardize the water and energy security of a total of more than 5 million people in Uzbekistan and Turkmenistan as a whole.²⁴⁷

Financial requirement for the development of the hydropower subsector

As noted earlier, financial support is needed to carry out several measures to study the potential or need for SHP, as well as to acquire the required technical solutions. In addition, for existing hydraulic structures and hydroelectric power stations, regular financial allocations for such activities as technical re-equipment, prevention of siltation of reservoirs, advanced training of local personnel, and conducting comprehensive technical analyses and subsequent workshops with all involved parties (experts from the energy, water, ecology sectors and so on) are of particular importance.

Analysis of the land reclamation and irrigation subsectors

The land reclamation and irrigation subsectors of Turkmenistan are financed mainly from the state budget. The country is actively working on the restoration of several large irrigation systems and the construction of new ones.²⁴⁸

The total irrigated area of Turkmenistan is currently 1.815 million hectares and the water consumption for irrigation is more than 16,193 million m³. The volume of consumption for agriculture, including irrigation, is the largest compared with the demands of other sectors.²⁴⁹

Table 0-9: Distribution of water resources of Turkmenistan by economic sectors in 2021²⁵⁰

Water consuming sector	Consumed water (million m ³)	% of total volume
Irrigation and agricultural water supply	16,193.9	92.1%
Production	937.6	5.3%
Household and drinking water supply	458.9	2.6%
Total water consumption	17,590.4	100%

The Agricultural Complex of Turkmenistan—which includes the State Committee on Water Management in its structure—was tasked with the completion of major investments in building drainage collectors, reservoirs, irrigation, land reclamation, water supply systems, drainage systems, and vertical wells, as well as agricultural equipment and tools, water-lifting, and engineering facilities and so on for the total amount of TMT7.4 billion (USD2.1 billion) in the SEDP 2019-2025. This

²⁴⁶ ‘Meteojournal,’ 2021. <https://meteojournal.ru/obem-vody-vodohranilishha-dostluk-sootvetstviet-urovnyu-malovodnyh-let/>

²⁴⁷ CARECO. Information brochure about demonstration Nexus projects

²⁴⁸ SEDP 2018-2024; SEDP 2019-2025; SEDP 2022-2028

²⁴⁹ Statistical compendium, Environmental Protection and Use of Natural Resources in Turkmenistan for 2021

²⁵⁰ State Committee of Statistics of Turkmenistan

increased two-fold in the new edition of the SEDP 2022-2028 to TMT14.7 billion (around USD4.2 billion).

Today, the total area of the country's irrigated lands is more than 1.8 million hectares and the country's reclamation fund suitable for development is more than 17 million hectares.²⁵¹ As a result of the implementation of the investment program in the system of ameliorative structure during the 2019-2025 period, the plan is to irrigate 3,110,000 hectares of pasture land, put into operation new irrigated lands with an area of 5,150 hectares, improve existing irrigation land on 289,140 hectares, and finish the construction of water reservoirs with a total volume of 151.8 million m³.²⁵²

The head organization of the water management complex in Turkmenistan, responsible for the land reclamation and irrigation subsectors, is the State Committee for Water Resources, established in January 2019. This body is endowed with the right of ownership and operation of hydraulic structures, as well as state control in this area. The group of management bodies for operational systems of the committee consists of organizations for managing the operation of irrigation systems in the provinces. The main water system of the Karakum Canal is under the jurisdiction of the Garagumdersyuvkhodzhalyk Association, which has nine operational departments. Subdivisions of the Amu Darya Water Basin Management Association are also involved in the management of water resources and hydrotechnical facilities at the transboundary level.

Hydraulic structures are of strategic importance for the land reclamation and irrigation subsectors, since the main consumer of water resources is the agro-industrial sector of the economy, which uses about 96 percent of all water resources of Turkmenistan.²⁵³ The 1,100 km long Karakum Canal that takes water from the Amu Darya River and passes through the Karakum Desert towards the Caspian Sea is a key element of this system. The country's water sector uses 16 reservoirs with a total capacity of over 3.5 billion m³. The total length of the collector-drainage network is about 37,000 km, including the interstate and interdistrict network—1,993 km; inter-farm—7,425 km; and on-farm—27,471 km.²⁵⁴ The essential value to the environmental, economic, and societal aspects of the country is added by the diversion of a significant part of the collector and drainage waters into the specially designated lake Altyn Asyr, previously released into the Amu Darya. The share of currently utilized collector and drainage waters is insignificant, although numerous research studies have been carried out on their application in irrigating salt-tolerant crops. As claimed, the development of specific measures to improve the management of return water will considerably decrease the issues of water resource scarcity, enhance the state of the environment, create jobs, and thereby improve the standard of living of a certain part of the population. However, these activities require significant financial investment.²⁵⁵

Currently, for the inter-farm part of the irrigation and collector-drainage systems with numerous large hydraulic structures on the balance of its state water management organizations, the State Committee for Water Resources of Turkmenistan ensures the supply of water to irrigated lands and implements a program of repair and restoration work on the reclamation network, hydraulic structures, pumping stations, wells, and gauging stations. As a result, the upkeep of the entire inter-farm system has been improved and maintained in a satisfactory condition. Owing to the

²⁵¹ UN Turkmenistan, 2022. Nationally Determined Contribution of Turkmenistan under the Paris Agreement

²⁵² SEDP 2019-2025

²⁵³ Dukhovny & Sorokin, 2016. Adaptation of water resources management of transboundary water basin Amu Darya to possible climate changes

²⁵⁴ Dukhovny & Sorokin, 2016. Adaptation of water resources management of transboundary water basin Amu Darya to possible climate changes

²⁵⁵ UN Turkmenistan, 2022. Nationally Determined Contribution of Turkmenistan under the Paris Agreement

restructuring of land use and the transition to a market economy, with many forms of land relations—Daikhan associations and land tenants, Daikhan farms, private owners, long-term land tenants, agricultural firms, and so on—the previous system of on-farm water consumption was disrupted with no replacements put in place. This led to inconsistency between water consumers and, ultimately, to the inefficient use of supplied irrigation water on the ground.²⁵⁶

Financial analysis of the land reclamation and irrigation subsectors

Today, the tasks related to irrigation and land reclamation are recognized as a state priority in the agro-industrial complex, along with other projects to secure water resources through the construction and modernization of reservoirs and hydraulic structures and increasing the capacity of Karakum River.

The share of investments through SEDP 2022-2028 for the projects within land reclamation and irrigation takes a sizable amount of financing which is:²⁵⁷

- Around USD0.322 billion to increase the capacity of irrigation canals and drainage networks
- Around USD0.240 billion to advance land reclamation

Another challenge of the country's water and land resources management is managing the formed return waters and discharging them into natural depressions²⁵⁸ or into the trunk of a river, lake, or wetland, since collector-drainage flow is a source of salts entering rivers and polluting water bodies.²⁵⁹ To this end, apart from the grouped tasks on the increasing capacity of irrigated lands, drainage networks, and the improvement of land reclamation, there is a large-scale construction project of the artificial lake Altyn Asyr with a network of drainage collectors promising to significantly improve the state of the land.²⁶⁰ The project is a unified system of collectors to amass drainage water from irrigated lands in all regions of the country and divert it to the gigantic Garashor hollow located in the north-west of the country. Divided into three phases, the project commenced in 2000 and by mid-2009 the first phase was commissioned. In early 2019, the state news agencies reported that the total amount of investments allocated from the state budget for the implementation of the project to date was USD553,378,000. The overall value of the project to be implemented during the 2000-2035 period is stated as over USD1.4 billion.

Other financial contributions for the given subsectors are being provided in the form of capacity building events for improvements in land quality and effective water use. Thus, to improve soil quality and achieve effective water management, as well as maintain ecosystems, UNDP and the former Ministry of Agriculture and Environmental Protection of Turkmenistan in 2022 launched a project 'Conservation and sustainable management of land resources and ecosystems of high natural value in the Aral Sea Basin for multiple benefits' to improve local knowledge. In 2022 and in March and April 2023, workshops were held in the Dashoguz and Lebap provinces as part of the project. The USD4.6 million project aims to promote the mitigation of land degradation through an initial investment in participatory integrated land use planning to restore and improve land and

²⁵⁶ Kurtovezov GD, 2021. Socio-economic analysis, resources, legal basis and stakeholders for realization of demo project Nexus on Tuyamuyun hydrostructure from the Turkmenistan side

²⁵⁷ Carec Institute, 2023. Water Sector Financing in Turkmenistan

²⁵⁸ Atalyev K, Sustainable drainage water management at the transboundary level

²⁵⁹ Yakubov H, Yakubov M, & Yakubov Sh, 2011. Collector-drainage flow of Central Asia and assessment of its use for irrigation

²⁶⁰ State Information Agency, 2015.

water use.²⁶¹ Another initiative to improve the state of the land is ‘Integrated natural resource management in drought-prone and saline agricultural landscapes in Central Asia and Türkiye’ supported by the Food and Agriculture Organization (FAO) and GEF. The regional project valued at more than USD75 million is aimed at scaling up sustainable management practices that minimize the pressures and negative impacts on natural resources that reduce risks and vulnerability, and enhance the capacity of rural communities to cope with or adapt to drought and salinity.²⁶²

Financial gaps of the land reclamation and irrigation subsectors

The nationwide surveys reflect the global assessment of the high costs of land degradation. For example, in Central Asia, the annual costs of land degradation are estimated at USD6 billion.²⁶³ Production in Turkmenistan could fall by 20 percent by 2030 owing to reduced water supply for irrigation, in line with projections based on current trends.²⁶⁴ High water stress in Turkmenistan can be attributed to extensive water use and water resource constraints owing to both supply and demand factors.²⁶⁵

A regional study conducted in 2003 showed that agricultural losses in Turkmenistan associated with the poor management of irrigation systems, causing waterlogging and soil salinization, can amount to USD378 million per year.²⁶⁶ Climate change could badly affect Turkmenistan's economy if no adaptation measures are taken to combat the consequences. Potential losses in the agriculture sector could reach up to USD20.5 billion between 2016 and 2030.²⁶⁷ Climate change could also lead to annual increases in floods and mudflows of 10 percent, heavy rainfall of 5 percent, and heatwaves (at a rate of 1.6 percent per year).²⁶⁸

Harsh natural and deteriorating weather conditions badly affect agriculture because of global climate change and play a key role in increasing the funding for the land reclamation and irrigation subsectors and agro-industrial complex. This entails an increase in government budget items to curb the negative consequences of climate change on water availability.

Turkmenistan, according to the UN Framework Convention on Climate Change (2006), may be the most affected by climate change. Agriculture, which is entirely based on irrigation, may suffer the most.

According to the nationally determined contribution (NDC) under the Paris Agreement (2022), as a result of climate change, Turkmenistan could face significant water shortage owing to a temperature increase, a decrease in river flow, and an increase in evaporation by 2030. In this case, the possible annual damage from loss of agricultural products may amount to several billion TMT.²⁶⁹

During the government session in June 2022, the President of Turkmenistan signed a resolution to instruct the State Commission to tackle water supply issues and later establish a permanent center

²⁶¹ UNDP Turkmenistan. Projects. UNDP and partners held a workshop on water diplomacy to strengthen national capacity to participate in regional cooperation

²⁶² Information Agency ‘Orient,’ 2022. Specialists from Turkmenistan were trained to make maps of saline soils

²⁶³ Kirui O & Mirzabaev A, 2015. Economics of land degradation and improvement in Tanzania and Malawi

²⁶⁴ FAO, World Bank, 2022. Modernization of Irrigation Systems in Central Asia. Concept and Approaches

²⁶⁵ IMF Staff Discussion Note, 2015

²⁶⁶ FAO, World Bank, 2022. Modernization of Irrigation Systems in Central Asia. Concept and Approaches

²⁶⁷ OECD, 2016. Financing Climate Action in Turkmenistan

²⁶⁸ UNDP, 2012. Turkmenistan's National Climate Change Strategy

²⁶⁹ UN Turkmenistan, 2022. Nationally Determined Contribution of Turkmenistan under the Paris Agreement

for management of water resources. Its main objectives are an uninterrupted water supply to all sectors of the national economy, the rational and efficient use of water resources, and the creation of water reserves.

The decrease in the volume of water resources in the country makes it necessary to revise methods of using irrigation water and increase the efficiency of irrigation systems through their modernization. Despite efforts made, a high level of water loss is reported—about 40 percent of water in irrigation networks.²⁷⁰

Another issue facing the sectors is the low productivity of water in agriculture. Owing to the large scale of irrigation, the land reclamation and irrigation subsectors require ongoing public funding for equipment O&M costs. However, the water management structure is challenged to ensure the reliability and efficient operation of existing irrigation and reclamation systems, which entails an increase in government spending and amendments to the budgeting of the agro-industrial complex and related industries. Thus, in addition to the program for the socio-economic development of Turkmenistan for 2019-2025, a new edition with amendments for 2022-2028 was adopted.

In addition, despite significant changes in the water sector over the past decade, the challenges in meeting the market requirements of water use were overcome by the integrated water resources management system, where rational water management proved its effectiveness. In this context, the government recently took decisive steps to address structural issues at ministerial level. Thus, the state meeting held on 14 July 2023 necessitated the achievement of tasks related to the effective implementation of state environmental policy, as well as food security and other industries. To this end, the decision was taken to disband the Ministry of Agriculture and Environmental Protection and create in its place the Ministry of Agriculture and the Ministry of Environmental Protection.

Implications of financial gaps in the land reclamation and irrigation subsectors

The aging I&D infrastructure in the CA region has led to a significant reduction in irrigated areas. Most irrigation systems are still in operation, but much of their potential remains untapped owing to years of underfunding for their maintenance alongside management and political challenges.²⁷¹ Underfunding these subsectors can lead to the further deterioration of systems, facilities, and infrastructure, and an increase in water losses. Low tariffs and cost subsidization practices make the entire sector dependent on the state budget and make it difficult for the private sector to get involved. Investment in water infrastructure is a driver of growth and a key to more jobs in agriculture and the agro-industrial complex. According to the OHCHR report, in 2019, 517 Daikhan (farm) associations, 3,400 Daikhan households, and 1,056,600 families—owners of personal subsidiary farms—were engaged in the production of agricultural products. In crop production, the number of tenants reached 389,600 people, in animal husbandry—24,000. The volume of gross agricultural output (GAO) in 2019 amounted to TMT23.4 billion and increased by 27.2 percent compared with 2015.²⁷²

²⁷⁰ USAID, 2020. Water sector of Central Asia and Afghanistan

²⁷¹ FAO, WBG, 2022. Modernizing Irrigation in Central Asia: Concept and Approaches

²⁷² OHCHR, 2021. Common core document, which is an integral part of the reports of the participating States of Turkmenistan

<https://docstore.ohchr.org/SelfServices/FilesHandler.ashx?enc=FhOD6sgggzAhFXD9F%2FeKaFMm83LbFY75RhklFGrig%2B4D4OM4egch4TmOoeVMX8j55rfyS3M8mo%2BvtWos3xKbnT2CR%2B%2FlsjBYR2DBqPaaSaluweSvN8F%2B7v3YZBwkwggr>

The sustainability of water resources management requires better financing in the future. Funding is needed not only for investment in infrastructure, but also for major expenditures such as data collection, analysis and dissemination, and development of human resources and technical capabilities. Generating data for policy makers and managers is a necessary complement to effective decision making. Investing in upgrading national water information databases for the systematic reporting of basic data can be quite lucrative and a desirable target for international development agencies. The poor financing of this sector and a lack of investment can lead to an increase in water scarcity for irrigation and melioration needs, thereby limiting the future economic development of the country.

Financial requirements for the development of the land reclamation and irrigation subsectors

The development and modernization of the country's land reclamation and irrigation subsectors require investments of significant financial and material resources. As stated, the necessary adaptation measures in the country (comprehensive reconstruction of irrigated lands; improvement of land reclamation; reconstruction of existing and construction of new hydraulic structures, and so on) will bring fourfold benefits in 2030 at a ratio of 4:1 (that is, USD1 invested today could yield a return of USD4).²⁷³

In general, the construction, reconstruction, and operation of dams, reservoirs, irrigation networks, main canals, collector and drainage networks, hydraulic structures, pumping stations, vertical wells, water pipes, and water distribution points are financed from the state budget of Turkmenistan within the framework of the country's socio-economic development programs. Among them are the resolution of the Halk Maslahaty: 'On further improvement of reforms in the agricultural sector' (dated 25 September 2018); 'Socio-economic development program of Turkmenistan for 2011-2030'; 'Socio-economic development program of Turkmenistan for 2018-2024'; 'Socio-economic development program of Turkmenistan for 2019-2025'; 'Socio-economic development program of Turkmenistan for 2022-2028'; National Strategy of Turkmenistan on Climate Change.

The 'Program for the rational use of water resources of Turkmenistan and the increase of throughput capacity of Karakum Canal for the period of 2015-2020' was adopted in January 2015. Its budget is TMT1,411.26 million (USD403.2 million). During 2019-2025, the State Committee on Water Management of Turkmenistan plans to increase the capacity of the Karakum Canal (1,100 km) which requires an investment of TMT187,770,000 (USD53.6 million).

The amended edition of the seven-year development program prioritizes such important tasks as:²⁷⁴

- Construction/reconstruction, expansion of reservoirs—over USD1.3 billion
- Construction/reconstruction, expansion of hydraulic structures—over USD0.5 billion
- Improvement on increasing capacity of irrigation canals and drainage networks—USD0.322 billion
- Advancement of land reclamation—USD0.240 billion
- Increase capacity of Karakum River—USD0.187 billion
- Bank protection works—over USD0.033 billion

On top of this high priority building project, the Turkmen Lake of Altyn Asyr has been under construction by drainage collectors to the value of USD1.4 billion since 2000.

²⁷³ Nationally Determined Contribution of Turkmenistan under the Paris Agreement; Turkmenistan, 2022 p19

²⁷⁴ CAREC Institute, 2023. Water Sector Financing in Turkmenistan

At the same time, Turkmenistan keeps attracting international funding. The European Union provided support in solving the problem of silting at the Tuyamuyun hydroelectric complex. With the support of the UNDP GEF project for USD7 million, a number of research and development sites were created nationwide to study irrigation and land improvement with the most advanced technologies and innovations and to study the best international practices of rational use of land and water resources.²⁷⁵ Within the framework of the new technical assistance project organized by FAO, both ancient hydraulic techniques and the operation of the collector-drainage and irrigation networks of the country's water economy, as well as the efficiency of implemented innovations—drip irrigation and the sprinkler method—will be studied. Furthermore, water metering sensors will be installed on the project territory, hydraulic units of inter-farm irrigation networks will be improved, a weather station will be created, and irrigation trainings will be conducted.

The National Strategy of Turkmenistan on Climate Change plans numerous adaptation measures to adapt the water sector to climate change. These include increasing the efficiency of irrigation systems through modernization and technical re-equipment; improving water resources management through the transition to integrated water resources management (IWRM); improving the legal regulation of management, protection and use of water resources; improving the system of joint water resources management in the region; developing smart information systems for irrigation planning; transferring diesel pumping stations to electric drives; and using renewable energy sources (solar, wind).

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

Since the 2010s, the financing of the water sector from national budgets in the CA region has improved, reaching 49 percent to 60 percent of the necessary funds. In Turkmenistan, by 2021 the required financing reached 60 percent.²⁷⁶ With an increase in investments in the water sector, this could cover most of the sector needs; however, the increasing threat of climate change—which has a huge impact on the security of water resources—as well as the rapidly aging infrastructure, coupled with growing economic and demographic indicators, will require regular reviews of financial mechanisms and investment funds.

Today, financing the country's water sector is becoming increasingly important, and demands are periodically voiced at national and regional levels. In 2022, the challenge became even more pressing owing to low river levels in previous years caused by the rising temperatures. The government, emphasizing the importance of ensuring uninterrupted water resources in mid-2022—in addition to the creation of a government commission on water supply and the development of an action plan for cleaning and concreting river beds—called for the preparation of proposals for financing the purchase of necessary special equipment.²⁷⁷ (Thus, by the end of 2022 and 2023, the relevant enterprises began to receive batches of the required equipment).²⁷⁸

Besides the challenges on regional collaborative work on water resources management and the need for more precise national policies, the situation with water resources security for agriculture will require intense reviews for the development of long-term policies. Consuming more than 90 percent of the country's water resources, the agriculture sector is expected to attract most

²⁷⁵ UNDP Turkmenistan. Projects. Energy efficiency and renewable energy for sustainable water management in Turkmenistan

²⁷⁶ USAID, 2020. Water sector of Central Asia and Afghanistan

²⁷⁷ News Central Asia, 2022. Turkmenistan will take a number of measures to prevent water shortage

²⁷⁸ Salam news. A new part of earthmoving techniques was delivered

technical, institutional, and financial development. Many investments directed towards critical need and prioritized projects are reflected in strategic national programs. Updated regularly, this time, the programs indicate increased funds for water related projects. According to the documents, investments are directed towards the construction of a strategically important facility for the country—the artificial Turkmen lake Altyn Asyr. The project, for which colossal financial and time investments have been allocated, is expected to play a huge role in the agricultural, environmental, and socio-economic conditions of the country. Other priority work will focus on securing the country's water resources by increasing reservoir capacity (construction, reconstruction), increasing throughput capacity, and upgrading I&D systems because of aging infrastructure built in the last century. In addition, improvement works on the ameliorative state of lands will be implemented along with work on increasing the capacity of the Karakum River by inspecting its bed and constructing or expanding reservoirs and other hydraulic units.

Apart from investments for agriculture in the water sector, there are also investments planned for the development of the provinces by building and modernizing new socio-economic facilities and houses, including constructing and repairing water and sewer systems.

Recommendations for overcoming financial gaps in the drinking water supply and sanitation subsectors:

- Initiate a policy to support the development of a separate and comprehensive mechanism for a regular, systematic financing of the WSS subsectors with multiple phases to monitor. The integration of a funding scheme to extend sewerage networks in rural areas and increase capacity share of wastewater treatment is essential to the development of the state investment program.
- In recognition that financing the WSS sectors is not an easy task, the state has reduced the financial burden to the population in the form of low-tariff payments. Also, given the smaller proportion of people living in less populated settlements, the scale of threat might not be that great. Nevertheless, the management of community and household wastewater and sewer systems plays an important role in providing sanitation and disease prevention, whereas effective sewage treatment is vital for public health.
- Traditionally, the sanitary and epidemiological safety of drinking water is ensured by water disinfection with chlorine. However, the stimulus for studies of other cost-effective and more innovative solutions and the subsequent introduction of the most applicable could be provided.
- Tariffs for drinking water and services for the use of centralized sewer systems, as well as the volume of drinking water and the procedure for its use for the population, are approved by the Cabinet of Ministers of Turkmenistan.²⁷⁹The authorized executive body in the field of public utilities carries out a comprehensive analysis and forecast of directions for the development of water supply systems. It is also entrusted with the development of proposals to improve the financing of drinking water supplies, which allows them to influence the scale of investments.²⁸⁰ In this context, the recommendation is to develop a financing plan in collaboration with other interdependent sectors, while bearing other influencing factors in mind.
- Seasonal interruptions in the supply of drinking water during hotter periods have become more systematic. Besides the impact of the warming climate, the human factor is another cause of disruption to supplies of safe drinking water. Poor maintenance by repair and service organizations often leads to interruptions in the supply of drinking water. As a rule, a faulty repair of one section of the line can lead to the failure of the entire network, which can incur

²⁷⁹ Turkmenistan Law 'On drinking water,' 2010. Chapter 5. Article 25

²⁸⁰ Turkmenistan Law 'On drinking water,' 2010. Chapter 2. Article 7

excessive costs. Water lines that have not been pressure tested or were not insulated are another standard norm that is usually ignored when they are poorly serviced. One of the reasons for such an approach is low qualification of maintenance personnel or less responsibility for maintenance tasks. To eliminate such technical barriers, appropriate funding for the regular capacity building of local personnel with subsequent mandatory events on skill checks carried out by professionals is recommended.

- All CA states still largely rely on government funding for the water sector. However, the collaboration of state and private efforts is argued to have a higher success rate than non-collaborative. According to numerous recommendations and practical experience, the effectiveness of water supply management is achieved through permanent and long-term financing, where a certain part is covered by private funding. In addition, the state law on 'Potable Water' (chapter 3) stipulates 'attraction of investments in any form, including from international organizations and private entrepreneurs for financing of development of programs of drinking water supply.'²⁸¹

Recommendations for overcoming financial gaps in the industry subsector:

- In general, return water disposal of industrial and municipal wastewater is usually disposed of together with drainage runoff, especially when it is discharged into river basins or into natural depressions (if not discharged into specially designated systems). Therefore, when developing disposal measures, it is advised to consider these together, alongside the technical aspect that industrial wastewater is more polluted.²⁸²
- The use of technological reservoirs (cooling ponds of thermal stations, fish ponds, settling ponds, and other reservoirs) must be carried out in accordance with the norms and operating rules established by the legislation of Turkmenistan.²⁸³ Oil production companies must dispose of contaminated water in barns and evaporation fields, regardless of the volume of oil production.²⁸⁴
- All legislative and regulatory acts on environmental protection must be considered when developing a field project and projects for the construction of gas processing plants and be approved by the Ministry of Environmental Protection of Turkmenistan. Upon completion of drilling additional gas wells and commissioning gas processing facilities, a comprehensive environmental survey of the field area must be conducted to assess the environmental impact.²⁸⁵
- Exceeding the limits of water intake and discharge of untreated industrial wastewater entails the imposition of established penalties on the enterprise.²⁸⁶ Mandatory payment for emissions of pollutants is stipulated by the law 'on protection of atmospheric air' for all local and international entities operating in the state's territories. At the same time, the state law 'on hydrocarbon resources' exempts subsoil users working under a PSA from all types of tax, fee, duty, and other obligatory payment when carrying out oil operations, while providing for the collection of payments for income tax and for the use of subsoil. In this regard, it is recommended that all contracting companies pay fees for regulatory pollutants.²⁸⁷

²⁸¹ Turkmenistan Law 'On drinking water,' 2010. Chapter 3. Article 11

²⁸² Atalyev K. Sustainable drainage water management at the transboundary level

²⁸³ Water Code of Turkmenistan, 2016

²⁸⁴ Deryayev A, 2022. Protection of the subsoil and environment during the development of gas fields

²⁸⁵ Deryayev A, 2022. Protection of the subsoil and environment during the development of gas fields

²⁸⁶ GWP, 2009. Regional Review. Water supply and sanitation in the countries of Central Asia and Southern Caucasus

²⁸⁷ Ministry of Agriculture and Environment Protection of Turkmenistan, 2021. Problems of Desert Development

- Over time, societal and environmental pressures have urged industry to reduce the amount of wastewater generated and to treat it before discharge.²⁸⁸ Given the forecast development of industry in Turkmenistan, the measurement of decreasing effluents and the effective treating of such is a necessary recommendation for leading industry sectors.
- Owing to industrialization in recent years, environmental deterioration has become a major issue in different countries. In this context, Turkmen scientists periodically demonstrate innovative ways of treating industrial water.^{289,290} To this end, development programs for relevant industries may provide additional funding for research centers on alternative advanced methods of treating wastewater.

Recommendations for overcoming financial gaps in the hydropower subsector:

Government authorities of both countries of THC are jointly looking for cost-effective technical and investment approaches to solve the problem of siltation in the Ruslovoye reservoir.²⁹¹ In view of systematic problems with the siltation of reservoirs, the use of such approaches is recommended for other transboundary hydropower structures, such as the Dostluk reservoir dam.

The CA region has a rich potential—just over 6,000 MW—of areas suitable for the construction of small hydroelectric power plants (with a maximum capacity of 10 MW), which is constrained by internal barriers.²⁹² In Turkmenistan, this potential is estimated to be approximately 1,300 MW.²⁹³ At the same time, however, given the realities of water scarcity in the future, when developing hydroelectric power station projects, it is recommended to take into account options for the simultaneous development and restoration of small rivers:²⁹⁴

- The development of small hydropower plants should be closely linked to the improvement of the condition of small rivers. The created dams and reservoirs should not only not disrupt the life of small rivers, but, on the contrary, they should contribute to their revival.
- It is necessary to develop water protection measures taking into account the needs of nearby enterprises for water resources.
- Clearing, deepening of channels, and a number of other measures should help control the depth of small rivers, and the degree of sedimentation.

Further, it is emphasized that small rivers are the most vulnerable link in the river system; therefore, consideration of the prospects for developing hydropower potential on them requires an extremely cautious approach and a balanced assessment of both positive and possible negative consequences.²⁹⁵

²⁸⁸ WWAP, 2017. The UN World Water Development Report. Wastewater: The Untapped Resource

²⁸⁹ Information Agency 'Orient,' 2023. Turkmen scientists are investigating a biological method of sewage treatment

²⁹⁰ State news agency 'TurkmenistanGoldenAge,' 2020. Innovative solutions of Turkmen chemists—in a new collection

²⁹¹ CARECO. Information brochure about demonstration Nexus projects

²⁹² UNIDO, ISCHP, 2016. World small hydropower development report

²⁹³ Laljebaev M, Isaev R, & Sauhimov A, 2022. Renewable energy sources in Central Asia: potential, use, prospects and barriers. UCA

²⁹⁴ Penjijev A, 2013. Water resources as alternative energy source of Central Asia

²⁹⁵ Penjijev A, 2013. Water resources as alternative energy source of Central Asia

Recommendations for overcoming financial gaps in the land reclamation and irrigation subsectors:

The implementation of measures to overcome financial gaps in the land reclamation and irrigation subsectors requires significant capital investment and may include a range of activities:

- Attracting additional foreign investment and long-term loans at low interest in the water sector, which lags behind the oil and gas sector, to accelerate the construction and reconstruction of new and existing hydraulic structures.
- Establish effective management in such areas as monitoring and licensing groundwater abstraction activities, as well as monitoring and control of excessive water consumption both by the population and industry. Some of these management functions can sometimes be self-financed through higher water charges and water pollution fines.
- Reconstruction of the on-farm irrigation network with additional equipment at the points of water release, with water metering devices to account for the water supplied to all water users and tenants. This requires additional operational and financial costs, and the installation of water measuring devices.
- Implementation of numerous measures to save irrigation water, including the reconstruction of irrigated land.
- Accelerating the introduction of progressive irrigation methods (drip irrigation, sprinklers) and improving the existing (furrow) method of irrigation; the introduction of such methods will save 30 percent to 40 percent of water.²⁹⁶
- Follow UNDP recommendations on the optimal placement of the suction and pressure pipelines of pumping stations and the rational use of electric power equipment, ensuring the most economical use of energy with the required pumping capacity. According to experts, modern energy-efficient pumps (40 kW) consume about 2.5 times less energy than operating pumps (110 kW) but give the same performance.²⁹⁷
- As noted earlier, according to NDC Turkmenistan 2022, the complex reconstruction of irrigated lands is carried out on an area of 70,000 hectares and land reclamation improvement on 170,000 hectares.²⁹⁸

As can be seen, significant funds are needed to implement the entire range of planned activities. The most optimal option for financing the proposed activities is a combination of the following sources:

- Government funding
- Funds from various donors allocated in the form of loans and grants
- Funds from the municipal budget (khyakimlik)
- Population-owned funds including those received in the form of a loan from national banks

Challenges and measures for effective water management based on an ecosystem approach

In the current reality of climate change, population growth, and projected increase in water consumption, technical and socio-economic data alone are not enough to manage the water sector effectively. Effective, sustainable, long-term management should include sustainable, material, and cost-effective solutions with zero waste; modernized water systems as per current and future climatic trends and demands; environment friendly water-saving technologies; and climate-adaptive, resilient tools that integrate up-to-date and projected data. Alongside this, the challenges of transfer of expertise for long-term policies, and effective inter- and cross-sectoral cooperation should be

²⁹⁶ Third National Communication of Turkmenistan under the UNFCCC, 2015

²⁹⁷ UNDP Turkmenistan. Projects. Improving energy efficiency in the water sector of Turkmenistan

²⁹⁸ UN Turkmenistan, 2022. Nationally Determined Contribution of Turkmenistan under the Paris Agreement

addressed for effective management of the water sector. Without adaptation measures, water saving technologies, climate-resilient technologies, and long-term state policies, the result could be a significant drop in agricultural income as well as serious food shortages. In general, the following aspects should be carefully considered when implementing climate-friendly and effective water sector management for the long-term benefit of the country.

Adaptation measures

Failure to take adaptation measures may have a strong impact on the socio-economic state of any nation.²⁹⁹ The country may face water scarcity, increased desertification, land degradation, droughts, and hazards leading to unsustainable agricultural production and threatening food security. The water shortage owing to climate change in Turkmenistan may reach 5.5 billion m³ by 2030 if no action is taken.³⁰⁰ If preventive adaptation measures are not taken, the total amount of damage in the agricultural sector alone may amount to tens of billions of manats by 2040. In addition, the implementation of adaptation actions by 2030 will require international financial support of approximately USD0.5 billion.³⁰¹

Water saving technologies in agriculture

In the drinking water sector of the country, much work had been done by introducing water metering devices. Additionally, given the anticipated challenges of water deficit in other water divisions, various projects involving water saving methods were implemented. At the same time, the scale of such technologies is not yet widespread, and might be concentrated within certain demonstration projects (scientific or jointly with development organizations), or sectors—in particular, in private entrepreneurship which stimulates the purchase of such technologies, whose share is in the initial stages of development.

Climate-resilient and adaptive water infrastructure

Another aspect of effective management of the water sector, considering environmental and climate aspects, is climate-resilient and adaptive water infrastructure.³⁰² This includes the reduction of soil salinity and the improvement of ecosystems through the integration of climate-resilient systems. Of particular current concern in Turkmenistan are the areas of collected drainage and waste waters, which require effective solutions not only improve the soil quality but also to enhance the ecological state of the land areas. The relevant state water sector operates collector-drainage systems, with which some collector-drainage waters are diverted to depressions in the Karakum Desert. Under high temperatures, the water in these areas intensively evaporates; as a result, the mineralization increases sharply and becomes unsuitable for use; land degradation occurs, and desert ecosystems disappear.³⁰³

²⁹⁹ GWP, 2019. Addressing Water in National Adaptation Plans. Water Supplement to the UNFCCC NAP Technical Guidelines. Second edition

³⁰⁰ UN Turkmenistan, 2022. Nationally Determined Contribution of Turkmenistan under the Paris Agreement

³⁰¹ UN Turkmenistan, 2022. Nationally Determined Contribution of Turkmenistan under the Paris Agreement

³⁰² Caldecott B, 2018. Water infrastructure for climate adaptation. The opportunity to scale up funding and financing. GWP, WWC

³⁰³ Turkmenportal, 9 May 2019. Scientists of Turkmenistan discussed the functioning of an artificial lake in the Karakum Desert. <https://turkmenportal.com/blog/18897/uchennye-turkmenistana--obsudili--voprosy--funkcionirovaniya--v-pustyne-karakumy--iskusstvennogo--ozera>

Knowledge transfer and integration into long-term policies

The low-level dissemination of acquired information and the deployment of frontline expertise of climate-resilient, adaptive, ecological, and water-saving solutions of pilot projects into the government's long-term planning present another challenge for sustainable and efficient water management. It is recommended that activities such as the integration of drip irrigation and the community-based management of water resources are incorporated with the targeted long-term results.³⁰⁴

Measures

The development of measures to adapt priority sectors of the economy of Turkmenistan to climate change is integrated into the main national development documents of the country, such as the 'National Strategy for the Economic, Political, and Cultural Development of Turkmenistan for the period until 2030' and the new edition of the National Rural Program.

Additionally, in accordance with the National Strategy of Turkmenistan on Climate Change, the following measures are planned to adapt agriculture to climate change: development and implementation of a set of measures to adapt agricultural production to climate change; optimization of the location of agricultural production, taking into account the country's needs for necessary agricultural products and minimizing the use of water resources; creation of agricultural innovation systems that provide consulting services to agricultural producers, among others.³⁰⁵

In general, to date, the following measures, projects, and policies at national and bilateral levels have been or are being developed to facilitate effective and rational water use or management: program for the rational use of water resources of Turkmenistan and the increase of the throughput capability of Karakum Canal for the period 2015-2020; rules for using drinking water supply and drainage systems within a state law on drinking water; bilateral agreement between the governments of Turkmenistan and Uzbekistan on the management, protection, and rational use of water resources of the Amu Darya River; the concept of a national program for the Aral Sea.

Funds for adaptation measures

Regarding the growing climatic risks, one way to reduce the low level of adaptation measures is to establish a special source of funds at national level. The National Strategy of Turkmenistan on Climate Change envisages the establishment of a National Clean Climate Fund, the budget of which would come from various internal, external, as well as innovative sources of financing for Turkmenistan (during 2022 to 2026). The organizations responsible are the Ministry of Agriculture and Environmental Protection of Turkmenistan, the State Committee on Statistics of Turkmenistan, the Academy of Sciences of Turkmenistan, with the assistance of the UNFCCC Secretariat, UNDP, and UNEP and so on.³⁰⁶

³⁰⁴ UNDP, 2014. Addressing climate change risks to farming systems in Turkmenistan at national and community level UNDP Turkmenistan Country Office. p48. https://www.adaptation-fund.org/wp-content/uploads/2011/07/484450UNDP_Turkmenistan_AFMTEFINAL6MAR15-1.pdf

³⁰⁵ UN Turkmenistan, 2022. Nationally Determined Contribution of Turkmenistan under the Paris Agreement

³⁰⁶ UN Turkmenistan, 2022. Nationally Determined Contribution of Turkmenistan under the Paris Agreement

Water-saving technologies in agriculture

Considering the challenge of the availability of adequate water resources in the future, scientific studies are being conducted by local researchers, technologies are being integrated by local entrepreneurs, and collaborative pilot projects are being implemented with development organizations by applying water-saving methods. In the field of science, experimental projects in which wastewater is treated in cost- and time-efficient methods open up the potential to largely avoid using freshwater. The research and production center of the State Energy Institute of Turkmenistan is currently working on identifying in practice the biological method of wastewater treatment based on the microalgae *Chlorella vulgaris*. The first results showed that, in general, microalgae adapt well to local collector-drainage waters, even those characterized by saturation with toxic and other harmful substances.³⁰⁷ In the private agricultural sector of Turkmenistan, water-saving technologies have recently begun to occupy an increasing place. In particular, this is facilitated by state support in the form of providing land for long-term use and targeted soft loans for the purchase of agricultural equipment or water-saving devices on preferential terms.^{308,309} For example, there is a water facility of pumping stations built by the local joint-stock company Miwe, where the construction of irrigation facilities complies with the principles of the rational use of water resources and environmental criteria.³¹⁰ Another example of water saving are the drip and sprinkler methods of irrigation. In recent years, the acquisition of sprinkler technologies with the personal funds of local entrepreneurs facilitated the saving of irrigation water.³¹¹ As stated by local experts, in recent years, the use of drip irrigation has increased productivity indicators and achieved two-fold to three-fold of water savings.³¹²

The national long-term, land-lending policy also has the potential to drive water-saving technologies. The trade sector of the SEDP 2022-2028, which also attracts the private sector, includes over 160 projects, of which 104 are planned for crop cultivation over an area exceeding 21,000 hectares, with each state applying water-saving methods.³¹³

³⁰⁷ Turkmenportal, 18 January 2024. The direction of biological wastewater treatment is being developed in Turkmenistan. <https://turkmenportal.com/blog/72778/v-turkmenistane-razvivaetsya-napravlenie-biologicheskoi-ochistki-stokovyh-vod>

³⁰⁸ Arzuw news, 7 July 2020. UNDP supports the development of water-saving technologies in Turkmenistan. <https://arzuw.news/proon-podderzhivaet-razvitie-vodosberegajushhih-tehnologij-v-turkmenistane>

³⁰⁹ Jumakuliyev D, 2023. Water sector financing in Turkmenistan. In: Water Infrastructure in Central Asia: Promoting Sustainable Financing and Private Capital Participation. CAREC Institute. p12

³¹⁰ TDH, 4 May 2021. President of Turkmenistan: careful use of land and water resources is the basis of food abundance. <https://tdh.gov.tm/ru/post/27154/prezident-turkmenistana-berezhnoe-ispolzovanie-zemelno-vodnyh-resursov-osnova-prodovolstvennogo-izobiliya>

³¹¹ Jumakuliyev D, 2023. Water sector financing in Turkmenistan. In: Water Infrastructure in Central Asia: Promoting Sustainable Financing and Private Capital Participation. CAREC Institute

³¹² Central Asia news, 2 February 2023. Turkmenistan has rationalized the use of water resources. <https://centralasia.news/20512-turkmenistan-racionaliziroval-ispolzovanie-vodnyh-resursov.html>

³¹³ SEDP 2022-2028

Situational analysis/overview of the water sector

General

Uzbekistan is distinguished by its significant reliance on water resources and its scarce local freshwater supplies within its economic sectors. The task of reconciling the demands of agricultural practices with the conservation of water resources presents a multifaceted and intricate dilemma. The agricultural sector continues to be the primary user of existing water supplies. Irrigated agriculture obtains its water supply from the Amu Darya and Syr Darya rivers and their respective tributaries—the two most important river basins in Central Asia. Approximately 75.2 percent of the runoff from the Syr Darya river originates from the Kyrgyz Republic. The Syr Darya river traverses the territories of Uzbekistan and Tajikistan before ultimately discharging into the Aral Sea in Kazakhstan. Uzbekistan, Kazakhstan, and Tajikistan contribute 15.2 percent, 6.9 percent, and 2.7 percent, respectively, to the overall flow of the Syr Darya River. Approximately 74 percent of the Amu Darya river's volume originates from Tajikistan. The river traverses the international boundary between Afghanistan and Uzbekistan, passing into Turkmenistan, before ultimately discharging into the Aral Sea in Uzbekistan. Approximately 13.9 percent of the water in the Amu Darya river originates from Afghanistan and Iran. Uzbekistan provides around 8.5 percent of the total flow.³¹⁴

The dependence of Uzbekistan on water resources from surrounding countries is evident from the size of the contribution of its sources to the overall 123 km³ water resources of the Aral Sea Basin—only 9 percent. Uzbekistan depends on bulk water provided via massive, complicated interregional conveyance systems that move water over long distances from distant mountainous catchment areas, vast multifunctional reservoirs, and deep regional aquifers. In recent years, Uzbekistan's annual amount of water resources has averaged 51 km³ to 53 km³.³¹⁵ Renewable groundwater is produced naturally in catchment regions and via the process of filtration on irrigated plains. The literature shows that groundwater recharge in Uzbekistan is between 23 km³ to 27 km³/year. The main recharge sources are natural subsurface inflow, infiltration from river channels, and atmospheric precipitation. About 37 percent of all groundwater recharge originates from subsurface inflow and precipitation, whereas 63 percent comes from artificial sources (infiltration from irrigation canals and water reservoirs, and seepage from irrigated lands). The quality of groundwater has degraded over time, partly as a result of agricultural chemicals and pesticides being transported by surface water and seeping into the groundwater.³¹⁶ Promoting sustainable and environmentally conscious agricultural practices necessitates the provision of financial incentives, training initiatives, and subsidies to incentivize farmers to use fewer detrimental pesticides and fertilizers.

The water requirement is met with a combination of surface water (50.9 km³/year), usable groundwater (0.5 km³/year), and recycled collector and drainage water (1.6 km³/year). Water use allocation across different industries may be succinctly described as follows: agriculture comprises roughly 90 percent to 91 percent of the economy, while the municipal sector contributes around 4.5 percent. The industrial sector represents approximately 1.4 percent of the economy, with fisheries

³¹⁴ http://www.cawater-info.net/aral/water_e.html

³¹⁵ <https://lex.uz/docs/5307918>

³¹⁶ Rakhmatullaev Shavkat et al. 'Groundwater resources of Uzbekistan: an environmental and operational overview.' *Open Geosciences* 4.1 (2012): 67–80

contributing approximately 1.2 percent. Thermal power accounts for 0.5 percent of the economy, while the remaining 1 percent is allocated to other sectors.³¹⁷

The need for irrigation in the country arises from its desert climate, since it plays a crucial role in supporting agriculture and ensuring the economic stability, job opportunities, and overall well-being of the impoverished population that relies upon it. Several studies show that, over the next two decades, there will be a substantial surge in demand for water in Uzbekistan, accompanied by a notable decline in the availability of water resources.³¹⁸ Consequently, this would exacerbate the existing water scarcity issue five-fold. By that point in time, Uzbekistan is projected to be categorized among the areas experiencing a significant deficit of water resources. The country has been positioned as the 34th most water-stressed country in the world, among a pool of 164 nations.³¹⁹

In recent years, the country has experienced a water scarcity issue in two important areas. Firstly, the agricultural sector has significant difficulty securing enough water resources for irrigation. Secondly, the availability of drinkable water is insufficient to meet the population's demands, posing challenges in ensuring access to clean drinking water. The agricultural sector in Uzbekistan accounts for a significant portion of the nation's freshwater withdrawals, while exhibiting one of the lowest levels of water usage efficiency globally. The agricultural output depends on irrigation for around 80 percent to 85 percent of the crop area. The suboptimal use of the country's limited water resources renders the nation's water consumption patterns unsustainable. Uzbekistan has notable obstacles in its endeavors to enhance per capita water supply. Only 22 percent of the area has renewable freshwater resources, while the water availability per capita is only 57 percent of the average for the region.³²⁰

Annual water use has displayed a downward trajectory over time, partly because of the water scarcity problem. Over the last 15 years,³²¹ there has been a decline in the annual per capita water volume from 3,048 m³ to 1,589 m³. For example, in 2019, the average volume of water used amounted to 53.9 billion m³. This figure decreased to 51.2 billion m³ in 2020 and dropped further to 43.2 billion m³ in 2021. The insufficiency of water resources in the country, therefore, also results in a scarcity of drinking water; water scarcity, therefore, is a pressing issue that affects not just agricultural activities but also domestic use.

According to Uzsvtaminot³²² JSC, there are 10,269 localities in the country, of which 3,350 are served entirely by centralized water supply and 4,654 are covered in part. 2,265 communities lack access to a centralized water supply. There are 72,000 km of water mains, 9,400 water structures, 11,600 pumps, 58 sewage treatment facilities, and 8,600 sewerage networks.³²³ Uzsvtaminot manages and develops the municipal and sanitation industry in Uzbekistan. The government has limited financial resources, which makes it difficult for the country to manage and maintain its infrastructure assets. This is particularly evident in the areas of WSS. Because of this, it is challenging for Uzsvtaminot to invest in new infrastructure and maintain the existing infrastructure, particularly

³¹⁷ <https://unfccc.int/sites/default/files/resource/FBURUZeng.pdf>

³¹⁸ <https://www.droughtmanagement.info/portal/wp-content/uploads/2022/11/Uzbekistan-Observation-Report-on-Drought.pdf>

³¹⁹ <https://www.wri.org/applications/aqueduct/country-rankings/>

³²⁰ <https://kun.uz/en/news/2022/05/28/wb-agriculture-in-uzbekistan-is-one-of-the-most-inefficient-in-terms-of-water-consumption-in-the-world>

³²¹ <https://kun.uz/en/news/2022/08/10/water-scarcity-in-uzbekistan-probable-drought-and-escalating-environmental-challenges>

³²² <https://uzsuv.uz/en/general-info>

³²³ http://www.cawater-info.net/yearbook/2021/05_yearbook2021_uz_en.htm

in rural areas. Ensuring a consistent water supply is becoming challenging owing to the aging infrastructure of the country's water distribution system. The deteriorating water infrastructure is another factor that adds to the significant amount of water lost throughout the distribution system. Aging pipelines, leaks, and inefficient water distribution systems may lead to significant water loss even before its arrival to the intended recipients. This matter not only represents the squandering of a valuable resource but also presents obstacles in establishing a dependable and enduring water supply.

Uzsvtaminot has struggled with generating sufficient funds owing to the low water rates, which makes it challenging for the company to invest in new infrastructure and maintain current equipment. As noted earlier, population growth is putting a strain on the existing infrastructure, which in turn makes it impossible to ensure a consistent water supply owing to the increased demand for water. On the other hand, water resource scarcity is growing, partly because of the consequences of climate change, making it even harder to ensure a consistent water supply.

Because of the extensive changes in the hydropower industry, new HPPs have been put into operation, and the number of newly developed energy sources is growing each year throughout the nation. It is important to emphasize that the practical work that has been done in this area has helped speed up the process of modernizing the existing HPPs. Uzbekistan's primary sources of energy production are natural gas, hydropower, and coal. The country's hydropower resources cover only 4.92 percent of the country's total land area.³²⁴ According to WB projections, the streamflow decline in the Syr Darya river basin could reach 2 percent to 5 percent by 2050 and 10 percent to 15 percent in the Amu Darya river basin, resulting in an increased water shortage.³²⁵

Uzbekgidroenergo JSC was established in accordance with the decree of the President of the Republic of Uzbekistan No. UP-5044, dated 18 May 2017.³²⁶ Uzbekgidroenergo assumes a prominent position within Uzbekistan's energy industry—namely in hydropower. Since there were no plans in place for managing integrated water and energy resources via the development of hydropower, agriculture was given priority in the exploitation of water resources (that is, for irrigation). The overlooked hydropower development in Uzbekistan was hampered by several factors, including a low energy price, geological and hydrological hazards, and socio-environmental imprints. Agriculture and hydropower are both at risk since there is a possibility that HPP output in parts of the region might be reduced by 20 percent by 2050.

This development prompted more advancements in the hydropower industry and led to an expansion in the use of renewable energy resources. The projected hydropower capacity of Uzbekistan from 2021 to 2030 is expected to undergo a significant expansion of over 1.7 times, reaching a total of 3,416 MW. This growth will be achieved via the implementation of two strategies: the building of new HPPs and the upgrading of existing ones. The government intends to secure funding via loans obtained from IFIs, and through funds provided by Uzbekgidroenergo as well as investments collected from various investors.³²⁷

The depletion of water resources in the Amu Darya and Syr Darya rivers would have implications for Uzbekistan's energy industry, given the presence of several HPPs in the country. The productivity of

³²⁴ Gusev L. Water-energy problems of Central Asia and ways to address them/Bulletin of MGIMO University. June 2013 (33). p36

³²⁵ <https://cabar.asia/en/uzbekistan-s-water-sector-environmental-and-managerial-issues>

³²⁶ <https://www.lex.uz/uz/docs/-3210102>

³²⁷ <https://uz.sputniknews.ru/20211215/uzbekistan-za-10-let-uvelichit-moschnosti-gidroenergetiki-v-17-raza-21795303.html>

these power plants is contingent upon several factors, including the yearly water input from these rivers. For example, in 2021, the Ministry of Energy (MOE) of Uzbekistan reported a notable decline of 23 percent in the overall energy generation from HPPs.³²⁸ This decline was attributed to insufficient water levels experienced during this period.

Existing practice of financing the water sector

Most of the water infrastructure in the country was constructed in the 20th century. Efforts to tackle the issues presented by the aging water infrastructure are of the utmost importance in guaranteeing the maintenance of water quality, minimizing water losses, and fostering the general resilience of the water supply system. As a result, it urgently needs repair and modernization, which requires massive investments. Updating the existing water infrastructure and developing new systems, both of which are required, are necessary to ensure the efficient use of available water resources. It is imperative to acknowledge that improvements in irrigation water resources, access to clean drinking water, sanitation systems, and other types of physical infrastructure would also promote rapid economic growth and job prospects.³²⁹ In recent years, the legislation about the amendment and supplementation of the law on water and water use has introduced several notable provisions:

- It has enhanced the authority and financial capabilities of public departments and authorities responsible for water-related matters
- It has been established that the funding for WUAs shall be derived from annual membership fees, water service fees, and other lawful sources
- It has imposed restrictions on activities that would violate the sanitary protection and water buffer zone regime
- It has explicitly stated that PPPs may be involved in the utilization or operation of water sites or their respective components (ZRU-733 of 30 November 2021)³³⁰

To accomplish the 2020-2030 national water sector development concept (UP-6024 of 10 July 2020), the Uzbek government adopted the strategy for managing water resources and developing the irrigation industry for 2021-2023 (PP-5005 of 24 February 2021).³³¹ The strategy involves various actions addressing the management of sustainable water resources and the modernization of the nation's irrigation industry:

- It is intended to improve irrigation system and network performance from 0.63 to 0.66; to decrease the irrigated area with inadequate water supply from 526,000 hectares to 424,000 hectares
- To increase coverage of water-saving technologies from 0.308 million hectares to 1.1 million hectares, including drip irrigation technologies from 121,000 hectares to 822,000 hectares
- To decrease the area of salinized soil from 1,926,000 hectares to 1,888,000 hectares, and turn 232,000 hectares of withdrawn irrigated land into agricultural use

Implementation of a unified state policy in the field of integrated and rational use, management, and protection of water resources and coordination of the activities of ministries, state committees, departments, and other legal entities is carried out by the Cabinet of Ministers (CM) of

³²⁸ <https://minenergy.uz/ru/news/view/1581>

³²⁹ <https://elibrary.worldbank.org/doi/pdf/10.1596/39518>

³³⁰ <https://lex.uz/docs/5748712>

³³¹ <https://lex.uz/docs/5307918>

Uzbekistan.³³² The Ministry of Water Resources (MOWR) of Uzbekistan (for surface water) and the Ministry of Mining Industry and Geology (MOMIG) of Uzbekistan (previously, the State Committee of Uzbekistan on Geology and Mineral Resources for groundwater) are the two specifically authorized state bodies in the field of water use regulation within their respective competences.³³³ Local government bodies and territorial water management authorities are directly responsible for regulating the use and management of water resources in their respective territories.³³⁴

Key WSS stakeholders include:

- The Cabinet of Ministers, which is responsible for establishing sector policy and endorsing major investment decisions.
- The Ministry of Construction, Housing, and Communal Services (MCHCS), oversees the WSS sector. Notably, every year, the MCHCS studies regions with relatively low levels of centralized drinking water supply and draws up a list of projects to be implemented in the coming years in coordination with the commissions of local municipalities to improve water supply and drainage systems.
- The Communal Services Agency Kommunhizmat (CSA), which serves as a focal point in the development and management of projects funded by IFIs.
- The State Inspectorate for the Control of WSS distribution is the responsibility of provincial WSS suvokovas, which are essentially state unitary companies. These suvokovas have branch offices in every administrative district and large town in their respective provinces.³³⁵
- Uzsuvtaminot—management of local water supply companies, enhancement of the water sales and distribution system for the public, and management of the sewage system; establishing favorable and open investment environments and utilizing a range of financial instruments (such as bonds) to draw in funding; constructing a competitive tariff structure to guarantee the equitable profitability of the business; release of financial statements compliant with international financial reporting standards and ongoing improvements to the water delivery infrastructure.
- By PD-2910 of 20 April 2017,³³⁶ ‘On the program for the comprehensive development and modernization of drinking water supply and sewerage systems for 2017-2021,’ the Fund for the Development of Water Supply and Sewerage Systems was established under the Ministry of Finance (now the Ministry of Economy and Finance [MOEF]). This was done to create guaranteed sources of financing for the radical improvement of the water supply system; the modernization and further expansion of the network of water intakes, water pipes, pumping stations, distribution points, and water distribution networks; and in connection with the population increase in Uzbekistan, the construction of new housing estates, and the expansion of towns and settlements. The fund’s main objectives are to organize the timely financing of approved programs to improve WSS systems and proposals and preparations on the amounts and sources of funds from investment programs.

³³² Article 6, Water Use Law

³³³ <https://bcp.comite255.europa.eu/en/publication-detail/-/publication/31e0e122-71c5-11ec-9136-01aa75ed71a1>

³³⁴ Article 8, Water Use Law

³³⁵ <https://www.adb.org/projects/documents/uzb-50259-002-rrp>

³³⁶ <https://www.lex.uz/uz/docs/3174689>

Several laws and resolutions were passed in 2021 and 2023 to implement the Agricultural Development Strategy of Uzbekistan for 2020-2030.³³⁷ These included laws and resolutions on Dekhkan farms; subsistence farming; the improvement of land leasing and use; additional measures for financial support of individual farms, peasant farms, and subsistence farmers; additional measures for the improvement of agricultural land use and protection; and equality and transparency in agricultural land use and protection.

The government of Uzbekistan founded Uzbekgidroenergo with the dual goal of (i) transitioning to an energy system with lower greenhouse gas emissions via the development of indigenous hydropower resources and (ii) meeting the competitive demand for water consumption in a variety of economic sectors. The HPPs of the utilities Uzbekenergo—a vertically integrated electricity provider—and Uzsuvenergo—a hydropower company under the Ministry of Agriculture and Water Resources (currently two different ministries)—were merged to become Uzbekgidroenergo. This organization oversees the directing of the large investment program that the government is undertaking for hydropower.³³⁸ The approved program of additional hydropower development and efficiency measures for 2021-2030 (PP-44 of 10 December 2021)³³⁹ foresees an increase of 66.5 percent in the country's hydropower capacity from 2,051.9 MW to 3,416 MW by 2030. This increase is achieved by the implementation of new and incremental station upgrading strategies and the expanded use of renewable energy sources. The existing rules have been modified to categorize hydropower installations with a capacity below 5 MW as micro, installations with a capacity ranging from 5 MW to 30 MW as small, and installations with a capacity above 30 MW as large. These resources are classified as renewable.

Financial management and allocation of funding in the water sector

At state, regional, and water basin levels, water demand is determined based on the importance of water consumption for various economic and environmental sectors, considering future changes such as climate change and economic expansion. Water intake restrictions are established based on their importance to the population and various economic sectors, including municipal usage, industry, agriculture, and ecological restoration. While the government heavily subsidizes this sector, it is envisioned to reduce subsidies and move forward towards full cost recovery. This is possible because of the implementation of market mechanisms in the water management sector and the partial cost recovery of water supply from water consumers. For example, in recent years, the share of budget funds allotted to the water sector has been reduced by 3 percent, 6 percent, and 9 percent in 2021, 2022, and 2023 respectively (KM-310 of 22 May 2020).³⁴⁰ As per the Water Resources Management and Irrigation Sector Development Strategy in Uzbekistan for 2021-2023 (in brief, the Water Strategy for 2021-2023), the cost of water delivery to water users as well as the government's social and economic policy aims, are taken into consideration in the development of a new methodology for calculating water consumption tax rates depending on the amount of water utilized. A differentiation of rates is carried out based on the cost of delivering the water and considering the industrial and technical features of various types of water customer, including the quality of return water.

³³⁷ <https://lex.uz/docs/4567334>

³³⁸ <https://www.adb.org/sites/default/files/project-documents/50130/50130-002-tar-en.pdf>

³³⁹ <https://lex.uz/docs/5769767>

³⁴⁰ <https://www.lex.uz/uz/docs/-4823390>

Table 0-10: Execution of revenues of the state budget in 2021 and 2022, UZS billion^{341,342}

Revenue	2021	2022
Total	164,799.40	201,863.70
Direct taxes	58,930.30	64,447.10
Corporate income tax	38,363.30	37,649.90
Turnover tax	1,649.40	2,512.70
Personal income tax	18,917.70	24,284.50
Indirect taxes	56,290.40	71,390.20
Value added tax	38,439.00	52,189.40
Excise tax	13,086.50	13,455.00
Customs duties	4,764.90	5,745.70
Resource taxes and property taxes	23,036.40	23,912.80
Property tax	2,457.30	4,015.40
Land tax	4,082.80	5,305.90
Subsurface use tax	15,811.90	13,887.40
Water resource use tax	684.4	704.1
Other revenues and non-tax revenues	26,542.20	42,113.70

In 2021, proposals for changes in partial cost recovery by water users were produced based on a full review of the best international practices on cost recovery for the operation of water management organizations and the present system in Uzbekistan (PP-5005 of 24 February 2021).³⁴³ Accordingly, water consumers recover 9 percent of the cost of irrigation water supply. Taxes on water use are one source of (indirect) funding for the water sector. For example, as Table 0-11 shows, the water use tax collected in 2021 was UZS684 billion. In 2022, this figure rose to UZS704 billion. Despite the indexation of water resource use tax rates by 10 percent or 30 percent in some sectors of the economy, collected revenues from this tax have increased only slightly— by UZS19.7 billion, or by 2.9 percent, as compared with 2021. According to the approved budget, the 2023 water use tax is estimated at UZS878.5 billion. State budget revenues in 2023 are expected to amount to UZS232,607 billion or 21.8 percent of GDP.

Table 0-11: Allocation of the state budget for 2023, UZS billion³⁴⁴

Indicators	Billion sum
Total funds allocated from the state budget	203,737.3
including:	
Current expenses	129,725.7
of them:	
Expenditure on development programs	25,676.1
Capital investments for design, construction (reconstruction), and equipment of facilities	8,982.3
Transfers to government trust funds	27,402.0
Regulatory transfers allocated from the republican budget of Uzbekistan to the budgets of the Republic of Karakalpakstan, local budgets of regions, and the city of Tashkent	24,280.8
Reallocated appropriations	13,346.4
Ministry of Housing and Communal Services of the Republic of Uzbekistan	1,272.0

³⁴¹ https://api.mf.uz/media/document_files/Budjet_21P_eng_KeeAac8.pdf

³⁴² https://admin.openbudget.uz/media/post_attachments/Budjet_22_P_uz_2UMxO70.pdf

³⁴³ <https://lex.uz/uz/docs/-5307918>

³⁴⁴ <https://lex.uz/uz/docs/-5307918>

Transfers to the Fund for the Development of Water Supply and Sewerage Systems	1,002.5
Ministry of Agriculture of the Republic of Uzbekistan	657.1
Subsidies for the introduction of water-saving technologies in agriculture	16.7
Ministry of Water Resources of the Republic of Uzbekistan	3,382.4
including:	
Current expenses	2,317.4
of them:	
Expenditure on development programs	1,809.3
Costs to cover part of the costs of introducing drip irrigation by raw cotton producers	260.0
Costs for clearing silt in the upper pool of the Takhiatash hydroelectric complex on the Amu Darya River using dredgers	30.0
Costs of electricity consumption by pumping stations of the water management system	1,349.3
including redistributed expenses:	
Subsidies to cover the cost of electricity consumed by pumping units of farms producing raw cotton and cereal grains	170.0
Capital investments for design, construction (reconstruction), and equipment of facilities	1,065.0
Committee of Uzbekistan for the development of sericulture and wool industry	176.8
Subsidies for the implementation of a drip irrigation system on mulberry plantations and the construction of a borehole for water extraction, as well as a pumping station for pumping water from rivers, canals, and other bodies of water	20.0
Subsidies for the construction of a borehole for water extraction in Karakul farming clusters, as well as a pumping station for pumping water from rivers, canals, and other bodies of water	20.0
State Committee for Veterinary Medicine and Livestock Development of Uzbekistan	665.6
Costs of introducing drip and rainfall irrigation technologies in drylands and grasslands	0.5

Table 0-12 shows the state budget allocation specifically for the water sector within different ministries and agencies. As indicated earlier, the primary source of funding for these allocations comes from various forms of taxation, particularly the taxation on water resources, which is directly tied to the cost of water. It is a complicated topic with almost endless variations of price conceivable within its four dimensions (volumetric pricing versus uniform pricing and flat fee versus variable tariff). The calculation methodology used in Uzbekistan remains somewhat ambiguous; however, it is implemented nationwide. Table 2-12 reveals that water use for agricultural purposes is subject to a levy of UZS45 for 1 m³ of water in 2023.³⁴⁵ These levies are often used to incentivize the more effective utilization of water resources, fostering the adoption of sustainable agriculture methods, and generating revenue for the enhancement of water management and infrastructure. The generated funds from these levies may be allocated towards reinvestment in various programs, including the enhancement of irrigation systems, the use of water-saving technology, and the general improvement of water resources management.

Table 0-12: Tax rates for water resources in 2023³⁴⁶

		Tax rate per 1 m ³ (in UZS)	
		Surface water sources	Underground water sources
1	Enterprises of all sectors of the economy	265	320
2	Industrial enterprises	570	680

³⁴⁵ <https://lex.uz/acts/-6333246?ONDATE=01.01.2023%2000#-6334723>

³⁴⁶ <https://lex.uz/acts/-6333246?ONDATE=01.01.2023%2000#-6334723>

3	Power plants and utilities	90	110
4	The volume of water used for irrigation of agricultural land and breeding (growing) of fish, including Dehkan farms and individuals with agricultural land	45	45
5	The volume of water used to wash motor vehicles	2,410	2,410
6	The volume of water used to produce soft drinks and alcoholic beverages other than beer and wine	30,500	30,500

Tariffs for water and wastewater services may differ and are often subject to periodic revisions depending on variables such as the costs of maintaining infrastructure, the expenditure associated with treatment, and restrictions mandated by the government. Table 0-13 shows the tariffs for drinking water and wastewater services as of 5 October 2023, charged by Uzsuvtaminot. The tariffs have three different categories, and each category is also divided into drinking water and wastewater. These values do not provide true cost values, which are 1.7 to 2 times higher than estimates show. As a result, water supply enterprises lost UZS127.4 billion in 2021, UZS286.8 billion in 2022, and UZS120.4 billion in the first quarter of 2023.³⁴⁷ This current trend hinders the modernization of the drinking water supply system.

Table 0-13: Information on tariffs for drinking WSS services³⁴⁸ (1 m³, UZS)

Regions	Population		Budget organizations		Others	
	Drinking water	Waste water	Drinking water	Waste water	Drinking water	Waste water
Karakalpakstan	1,850	1,100	3,695	2,350	3,695	2,350
Andijan	1,500	1,500	2,400	2,400	3,800	3,200
Bukhara	2,400	1,800	3,800	2,600	3,800	2,600
Jizzah	2,500	100	3,500	1,500	3,500	1,500
Qashqadarya	2,000	1,000	4,000	2,200	7,000	4,400
Navoiy	3,000	2,700	7,500	7,000	7,500	7,000
Namangan	2,550	700	3,315	875	3,315	875
Samarkand	1,850	1,300	3,500	2,800	3,500	2,800
Surkhondaryo	2,140	950	5,000	1,800	5,000	1,800
Sirdaryo	1,250	530	2,500	1,200	2,500	1,200
Tashkent	1,700	850	7,000	1,850	7,000	1,850
Farg'ona	1,000	300	1,300	365	1,300	365
Khorazm	2,800	1,550	5,700	2,400	5,700	2,400
Tashkent City	400	350	400	350	1,000	820

³⁴⁷ <https://kun.uz/ru/39558563>

³⁴⁸ <https://uzsuv.uz/ru/tariflar>

Analysis of the drinking water supply and sanitation subsectors

Financial analysis of the drinking water supply and sanitation subsectors

While agriculture accounts for most water withdrawals throughout the country, there is a rising need to improve strategies for managing water needs in urban areas. This is because certain rapidly growing cities are becoming big water consumers. Historically, groundwater has been the primary water source used by residential water distribution systems. On the other hand, the shallow groundwater supplies in many regions have been heavily mined or contaminated owing to the discharge from irrigated agricultural land.

The provision of WSS services continues to pose a considerable obstacle in terms of accessibility and quality. The WSS infrastructure, mostly established during the period of Soviet central planning, has essentially reached the end of its operational lifespan and needs substantial restoration and renewal efforts. It has not kept up with the growing demand brought on by shifting demographics, increasing urbanization, and expanding industrialization. At the same time, these endeavors demand significant financial expenditure. Although public spending has significantly increased in recent years, it has not adequately matched the need for asset replacement, maintenance, and system growth. Consequently, there has been a significant decline in the condition of water supply and sewage infrastructure in all parts of the country.

The presence of infrastructural challenges, coupled with limitations in institutional capacity, has led to a state of stagnation or deterioration in the quality of water services. This situation has severely impacted rural regions and district towns, which are home to most of the population.³⁴⁹ The local population is in desperate need of clean drinking water, as well as water for hygiene and sanitation. Both those who live in cities and those who live in distant rural locations face increasing obstacles.

Strategic resource allocation for infrastructure development is generally regarded as a critical aspect of driving economic growth and achieving national development goals, with a particular focus on WSS. Since obtaining independence in 1991, the government's major priorities have been to increase access to water sources, ensure service continuity, increase efficiency, and promote water conservation. Despite a strong focus on sustainability and improving quality of services, the industry remained underfunded. This caused frequent water delivery outages, and many urban households and most rural users suffered supply constraints. Because most of the water supply infrastructure has deteriorated, there is a greater risk of water supply pollution, substantial leakage losses, and irregular service.

The annual increase in water resource scarcity may be attributed to many factors, including global climate change, the expanding population of Uzbekistan, the fast growth of diverse economic sectors, and the escalating demand for water within these sectors. The prevalence of water shortage and drought in Uzbekistan is seeing a notable escalation owing to the declining availability of freshwater resources. Clean, fresh drinking water is primarily a finite resource. Furthermore, it might be classified as a kind of exorbitant social expenditure. To provide universal access to water, it is imperative to implement water conservation measures at government level. However, the prevailing tariffs make it exceedingly challenging to cultivate a culture of frugality throughout the population.

³⁴⁹ <https://documents1.worldbank.org/curated/en/802111584324088462/pdf/Uzbekistan-Water-Services-and-Institutional-Support-Project.pdf>

The one factor that may incentivize and induce individuals to save water is the presence of true market pricing.

Changes in water flow inside water pipelines have been observed throughout several areas of the country. Owing to the depletion of water reserves in the sources of water pipelines, the current water availability has significantly diminished. The depletion of groundwater resources for drinking purposes exhibits a consistent downward trend over successive years. The flow of water in the irrigation canals, at one time a familiar sight, has now ceased. There is a growing awareness among experts and the public about the gravity of the issue at hand. Table 0-14 shows the level of drinking water provision for Uzbekistan’s population by region.³⁵⁰ The population's level of drinking water provision is still 74.4 percent. In particular, the provision of drinking water in the Surkhondaryo and Jizzah regions is about 60 percent to 62 percent. The lowest region in terms of water supply in the republic is the Kashkadarya region—51.6 percent. The potential loss of drinking water supply contributes to about 35 percent of the total volume distributed, leading to quasi-fiscal deficits with an economic impact equivalent to 0.47 percent of GDP.

Table 0-14: Drinking water coverage in Uzbekistan, 2023³⁵¹

Regions	Coverage
Overall in Uzbekistan	74.4
Karakalpakstan	70.5
Andijan	85.4
Bukhara	73.1
Jizzah	61.6
Qashqadarya	51.6
Navoiy	76.0
Namangan	79.7
Samarkand	70.6
Surkhondaryo	61.0
Sirdaryo	85.4
Tashkent	72.6
Farg'ona	76.3
Khorazm	85.6
Tashkent City	97.3

In contrast to water supply, sewage services exhibit a far lower level of development and are especially susceptible to the projected consequences of climate change. The sewage system, which was constructed throughout the 1970s and 1980s in metropolitan regions, has seen significant neglect over the years and is now in a state of disrepair with ongoing deterioration. Wastewater treatment facilities exhibit degradation, often rendering them non-operational, leading to surface water resource contamination. Consequences include high running costs, frequent breakdowns, and costly repairs. A decade ago, it was claimed that just 17 percent to 20 percent of the population as a

³⁵⁰ <https://kun.uz/news/2023/10/13/barchamiz-uchun-vijdon-ishi-va-kelajak-kafolati-suvdan-oqilona-foydalanish-nima-uchun-zarur>

³⁵¹ <https://kun.uz/news/2023/10/13/barchamiz-uchun-vijdon-ishi-va-kelajak-kafolati-suvdan-oqilona-foydalanish-nima-uchun-zarur>

whole had access to a centralized sewage system. Recent statistics indicate that there has been no improvement in the current state of the wastewater industry.

It is claimed that around 3.7 million individuals, accounting for 12 percent of the overall population, were seen to be beneficiaries of a centralized sewage system. Most of these individuals were concentrated in the city of Tashkent and its surrounding territory. The documentation of rural sanitation status is limited, with primary responsibility for its improvement falling on families and communities. Most homes residing in rural regions depend on self-constructed, onsite sanitation systems such as dry pit latrines or septic tanks, which facilitate the disposal of waste generated by houses equipped with indoor bathroom facilities. In residences equipped with septic tanks, the task of emptying or maintaining these tanks is often assigned to the *suvokova* and is carried out upon request.

Table 0-15 shows the budget lines which are allocated for WSS under the MHCS’s budget. As can be seen, the highest allocation is for expenditure on the development of drinking water supply and sewage systems to provide the population with clean drinking water; this shows the commitment of the government to upgrade the whole system to an optimum level.

Table 0-15: Budget allocations to the Ministry of Housing and Communal Services from the state budget, 2021, UZS billion³⁵²

Ministry of Housing and Communal Services of Uzbekistan	1,047.00
of which:	
Current expenditure	115.6
of which:	
Expenditure on maintenance and operation of multi-apartment housing stock	73.6
Capital investments for design, construction (reconstruction), and equipment of facilities	931.4
of which:	
Expenditure on the development of drinking water supply and sewage systems to provide the population with clean drinking water	782.4
Construction, reconstruction, and modernization of heat supply facilities	100

It is clear from looking at Table 0-16 that the most significant portion of the budget did not change between 2022 and 2023. On the other hand, in 2023 it was moved straight to the Fund for the Development of Water Supply and Sewerage Systems, which is part of the MOEF. There is also an Inspection of Drinking Water Use Control in the MHCS system, with a budget of UZS4.4 billion (2022) and a total of 89 personnel. This inspection ensures that technical regulations governing the safe and efficient generation, distribution, and consumption of potable water and the provision of sewage and wastewater treatment services are followed.

³⁵² https://api.mf.uz/media/document_files/Budjet_21P_eng_KeeAac8.pdf

Table 0-16: Budget allocations to the Ministry of Housing and Communal Services from the state budget, 2022, 2023 (billion UZS)^{353,354}

Ministry of Housing and Communal Services of Uzbekistan	2022	2023
	1,324.0	1,272
of which:		
Current expenditures	19,3	19,5
Capital investments for design, construction (reconstruction) and equipment of facilities	323,4	250,0
of which:		
Construction, reconstruction and modernization of heat supply facilities	320,0	250,0
Expenditures on the development of drinking water supply and sewage systems to provide the population with clean drinking water	981,3	1002,5

As of the beginning of 2023, the remaining funds of the Water Supply and Sewerage Systems Development Fund amounted to UZS161.5 billion. This year, the fund's income amounted to UZS52.3 billion. At the same time, transfers from the state budget of UZS818.2 billion were allocated to the fund. This year, the fund's expenditure plan was planned for UZS1,056.9 billion. Its implementation amounted to UZS964.1 billion (91.2 percent), including UZS964.1 billion for the construction and reconstruction of drinking water supply and sewage system facilities, as well as project-research financing, based on the comprehensive development program of drinking water supply and sewage systems. At the end of the reporting period, the total balance of the fund amounted to UZS67.9 billion.³⁵⁵

Financial gaps in the drinking water supply and sanitation subsectors

The infrastructure issues and institutional capacity constraints have resulted in a stagnation or decline in WSS quality in urban and rural areas. On the one hand, national statistics still report 'high levels of access,' mainly in urban areas, reflecting a presence of physical water/sewerage infrastructure that is outdated, oversized, and deteriorated. However, for both sanitation and drinking water the situation is not promising in rural areas. Most importantly, the quality of services masks significant inequities between and within provinces, communities, and even neighborhoods.

Although official figures reflect roughly only 30 percent, non-revenue water is as high as 50 percent. The discrepancy is because water bills are determined by consumption norms rather than precise measurements from metered networks. In addition, Uzbekistan provides energy-intensive services for wastewater management and water supply. For instance, the water utilities used about 640 million kWh of electricity in 2017, which is about 1.2 percent of the nation's overall electricity usage. At 2017 pricing, the utility energy costs came to approximately USD19.5 million, or 20 percent to 50 percent of their overall operating expenses. In addition, these expenses are anticipated to increase in the upcoming years, along with the rise in repressed energy tariffs.³⁵⁶

³⁵³ https://admin.openbudget.uz/media/post_attachments/Budjet_22_P_uz_2UMx070.pdf

³⁵⁴ https://api.mf.uz/media/document_files/Budjet_23_uz.pdf

³⁵⁵ https://api.mf.uz/media/budget_activity_files/6_%D0%BE%D0%B9%D0%BB%D0%B8%D0%BA_%D0%B8%D0%B6%D1%80%D0%BE_nhZhwlK.pdf

³⁵⁶ <https://elibrary.worldbank.org/doi/pdf/10.1596/39518>

Limited access to and the declining quality of water services hinder both economic and social progress. Inadequate water, sanitation, and hygiene conditions have substantial economic, budgetary, health, and broader welfare repercussions. Insufficient and inequitable access to water, sanitation, and hygiene services is projected to result in the nation's annual economic loss of around USD635 million, equivalent to 1.3 percent of its GDP.³⁵⁷ These numbers reflect the expenses incurred regarding monetary resources and time allocation to obtain access to potable water. Additionally, it highlights the considerable financial implications stemming from detrimental health consequences, affecting both individuals and communities, as well as the strain placed on public health systems. Moreover, it underscores the negative impact on labor productivity, resulting in decreased efficiency and the subsequent loss of workdays. These factors collectively impose a significant burden on households reliant on daily wages. These effects are particularly widespread in rural regions, district towns, and peri-urban areas. The primary individuals who face the responsibility of gathering water for consumption are women and children of school age. Furthermore, in addition to the economic ramifications, the deterioration of water services is emerging as a catalyst for social strife and dissatisfaction, particularly when viewed in the context of wider economic progress, escalating socio-economic ambitions, and heightened citizen participation and desire for enhanced public amenities. Similarly, there exists a discernible disparity in the perceived level of urgency regarding the implementation of local infrastructure objectives. Rural areas tend to place greater emphasis on addressing many needs—such as improved access to gas and water supplies, the establishment of paved roads, the development of parks, and the installation of irrigation systems—as compared with urban regions. The effective management of private sector enterprise investment is currently not fully exploited; however, it can significantly enhance the provision and availability of crucial public services.

In 2018, revisions were made to regulated rates to accommodate some expenditure related to modernization and development, which were deemed necessary owing to the network's significant technical losses. Tariffs exhibit variations based on geographic regions and individual consumers. Businesses face levies that are twice as high as those imposed on the public. The quasi-fiscal imbalance of the water utilities, resulting from the insufficient recovery of expenses, amounts to 1.1 percent of GDP. The under-collection of revenues results in losses equivalent to around 0.2 percent of GDP. These losses include both non-payment and under-billing, mostly owing to the limited implementation of metering systems, which results in incomplete coverage of consumers. The volume of drinking water provided experiences a significant loss, up to 35 percent. The quasi-fiscal deficit resulting from technical losses in water delivery is estimated to be 0.47 percent of GDP.³⁵⁸

Implications of the financial gaps in the drinking water supply and sanitation subsectors

According to available data, the proportion of individuals in Uzbekistan who had access to a centralized sewage system was around 17 percent in 2020. It is projected that efforts will be made to enhance this figure to 35 percent by 2026 and further boost it to 57 percent by 2030. Wastewater is often collected without undergoing treatment by international standards owing to the prevalent issue of wastewater treatment facilities operating at a minimal capacity. Consequently, wastewater is probably being dumped into aquatic bodies without adequate treatment.

Historically, the rules and methods related to tariff-setting have been unsuitable for sustainable service delivery. Despite the consistent increase in tariffs, they have remained too low to cover the

³⁵⁷ <https://documents1.worldbank.org/curated/en/802111584324088462/pdf/Uzbekistan-Water-Services-and-Institutional-Support-Project.pdf>

³⁵⁸ documents1.worldbank.org/curated/en/471601582557360839/pdf/Uzbekistan-Public-Expenditure-Review.pdf

O&M costs and to enable service providers (or other service providers) to generate sufficient funds for investment. For instance, the average unified tariff for domestic customers in 2016 was UZS719/m³ or USD0.20/m³, significantly higher than UZS93/m³ or USD0.06/m³ in 2010. The range of tariffs varied from USD0.08/m³ to USD0.37/m³. Moreover, the existing tariff framework, which entails charging customers without meters based on an excessively high assumed consumption level, eliminates the motivation for service providers to install meters. Customers typically consume significantly less water (owing to limited availability) than they are billed for. Consequently, previous government endeavors to augment metering rates have encountered opposition, as service providers have determined that they cannot bear the subsequent decline in income. In regions where water is accessible, the absence of customer meters fosters excessive use and inefficiencies in water and energy utilization, which exacerbates the challenges associated with providing sustainable services.³⁵⁹

The key factors contributing to the financial gaps in the subsector responsible for providing drinking water include a severe scarcity of funds for infrastructure reconstruction and modernization and an inability to meet creditor commitments such as taxes and loans. The inadequate enforcement of debtor obligations, such as payment for WSS services, coupled with the presence of low tariffs that fail to cover the provided service costs adequately, contributes to this situation. Financial gaps can have a range of negative outcomes, such as business failure and the departure of skilled professionals. Additionally, these gaps can result in declining laboratory conditions for assessing water and wastewater quality, insufficient funds for acquiring reagents for water treatment and disinfection, and the deterioration of the current drinking water and sanitation infrastructure.

While water use is a fundamental need, the ramifications of financial disparities may give rise to many issues. The potential consequences of untreated sewage pollution in water bodies include increased prevalence of infectious diseases and mortality rates among the population; reduced food production; compromised healthcare sector; and a decline in heavy and light industries, among other related outcomes. The potential damage to the nation's economy owing to these repercussions would be immeasurable. Furthermore, individuals would be obliged to consume water from open sources and groundwater without properly assessing water quality, leading to the proliferation of many communicable diseases and their subsequent transmission among the population.

Financial requirements for the development of the drinking water supply and sanitation subsectors

As reported by the WB, freshwater lost in Uzbekistan for 2018 was estimated to be 469 million m³, accounting for around 32 percent of the total drinking water produced.³⁶⁰ This loss might be attributed to several different sources, including poor infrastructure, antiquated water delivery systems, leaks, and insufficient conservation efforts. To address these problems effectively, a comprehensive strategy is required, including investments in the modernization of water infrastructure, implementing water-saving technology, and developing awareness about the need for responsible water usage. Additionally, the government and relevant authorities may need to enforce stricter regulations to prevent water wastage and promote sustainable water practices.

Ensuring universal access to clean drinking water and sufficient sanitary facilities poses significant challenges. One aspect that warrants attention is the preservation and modernization of the current infrastructure. Funding allocation is necessary to facilitate the development of novel infrastructure

³⁵⁹ <https://documents1.worldbank.org/curated/en/802111584324088462/pdf/Uzbekistan-Water-Services-and-Institutional-Support-Project.pdf>

³⁶⁰ https://cabar.asia/en/uzbekistan-s-water-sector-environmental-and-managerial-issues#_ftnref3

to provide access to uncontaminated potable water and adequate sanitary facilities. It is imperative to establish financially viable operations within these subsectors to establish an economic framework for each enterprise's activities. Additionally, there is a need to enhance the level of service quality and revenue generation for WSS services. This can be achieved by attracting highly skilled professionals, bolstering laboratory research on water quality, and intensifying efforts to treat and disinfect drinking water and wastewater. There is a requirement to do all these tasks. In areas characterized by the limited availability of centralized water supply and wastewater systems, establishing decentralized small-scale enterprises becomes necessary to facilitate the provision of WSS services. Further measures must be implemented to provide universal and continuous access to potable water and adequate sanitation facilities for everyone in the country.

The government began the Program for the Comprehensive Development and Modernization of Water Supply and Sewerage Systems, 2021-2025, in September 2020 (PP-6074 of 25 September 2020).³⁶¹ This program outlines the strategic priorities of WSS investments. These priorities include (1) implementing integrated measures to enhance public access to clean drinking water; (2) reconstructing and rehabilitating existing water and wastewater infrastructure; (3) incorporating modern information and communication technology, such as automated billing for water consumption; (4) transferring WSS systems to business entities through PPP agreements in 2021-2022; and (5) establishing conditions for the financial and economic sustainability of water supply organizations and improving pricing for services. Moreover, it delineates specific goals, which include enhancing the accessibility of secure and dependable water supply systems throughout the whole nation. These objectives are quantified by establishing targets of 98.5 percent for urban areas and 87 percent for rural regions, based on the national average.

To attain the sector development objectives, the program outlines a selection of infrastructure projects that are most important. These projects are intended to be commenced and executed by Uzsvtaminot over five years. The program in question has a total budget of USD6.8 billion, with USD4.1 billion allocated for water supply initiatives and USD2.7 billion designated for the construction of the sewage system. Investments in the WSS sector are seen as a component of the government's efforts to advance social services, enhance living standards, and stimulate economic growth.³⁶²

The state investment program outlines 36 infrastructure projects of the utmost importance that are set to commence over five years. The Kommunkhizmat Agency executes these projects under the purview of the MHCS. The program in question has a total value of USD1.35 billion, with about 55 percent (USD730.7 million) designated for supporting IFIs. The remaining funds are distributed via the state budget. During this timeframe, around 45 percent of the overall expenditures will be allocated toward enhancing wastewater management, including activities such as collection, transportation, treatment, and re-use. Investments in the WSS sector are seen as a component of government efforts to promote the advancement of social services, enhance living standards, and facilitate economic growth.³⁶³

³⁶¹ <https://lex.uz/uz/docs/-5017983>

³⁶² <https://elibrary.worldbank.org/doi/pdf/10.1596/39518>

³⁶³ <https://documents1.worldbank.org/curated/en/802111584324088462/pdf/Uzbekistan-Water-Services-and-Institutional-Support-Project.pdf>

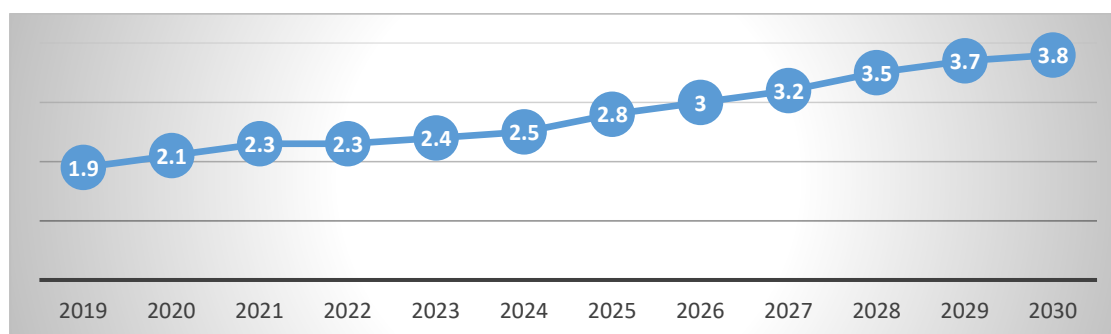
Analysis of the hydropower subsector

Financial analysis of the hydropower subsector

The government has undertaken significant endeavors to enhance the hydropower industry's governance and its ability to maintain financial sustainability. The Program for the Development of the Electric Hydropower Industry of the Country in 2016-2020 put forward USD889.4 million for these years. The hydropower development plan for Uzbekistan in 2020 aimed to achieve a well-balanced combination of foreign loans and government finance to support the implementation of large-scale projects. The government has prioritized revenue enhancement as a key component of its recovery efforts. This included the deployment of a new cost recovery tariff and improving revenue collection via sophisticated national metering schemes. Considering this, the government decided to enact an investment initiative with a projected expenditure of USD2.6 billion to augment the capacity of HPP by 1.6 GW by 2030.³⁶⁴ The expansion plans included the construction of two more HPPs along the Pskem River in the Bostanlyk area. These HPPs were the Pskem plant, with a capacity of 404 MW, and the Mullalak plant, with a capacity of 240 MW.³⁶⁵ The total installed energy production capacity within the nation amounts to around 14,000 MW, although the accessible capacity falls short of 11,000 MW. In 2018, the nation's energy production amounted to around 63,000 GWh. The majority, almost 85 percent, was derived from thermal fossil fuels, while the remaining proportion was sourced from hydropower.³⁶⁶

The hydropower sector generates around 14.3 percent of the total power output in Uzbekistan. It has a total of 42 hydroelectric facilities, including both reservoir-based and run-of-river designs. These plants together possess a cumulative energy generation capacity of 1.91 GW. According to estimates, Uzbekistan has a hydroelectric potential of 27.5 billion kWh annually, with a usage ratio (the efficiency of hydropower utilization) of 27 percent for its hydropower capacity. Uzbekistan has outlined its intention to undertake a total of 62 projects over the timeframe spanning from 2020 to 2030. As shown in Figure 0-9, it is expected that by 2030, HPP installed and available generating capacity will reach 3.800 MW (13.1 percent).

Figure 0-9: Growth of installed HPP capacity in 2018-2030, MW³⁶⁷



The initiatives include the construction of 35 novel HPPs, which together possess a total installed capacity of 1,537 MW. Additionally, there is a plan to enhance the capacity of 27 existing HPPs via

³⁶⁴ <https://www.adb.org/sites/default/files/linked-documents/47296-001-ssa.pdf>

³⁶⁵ European Commission, Joint Research Centre, Minnebo P & Ardelean M, Sustainable power sector development in Uzbekistan and Tajikistan, Publications Office of the European Union, 2021. <https://data.europa.eu/doi/10.2760/940927>

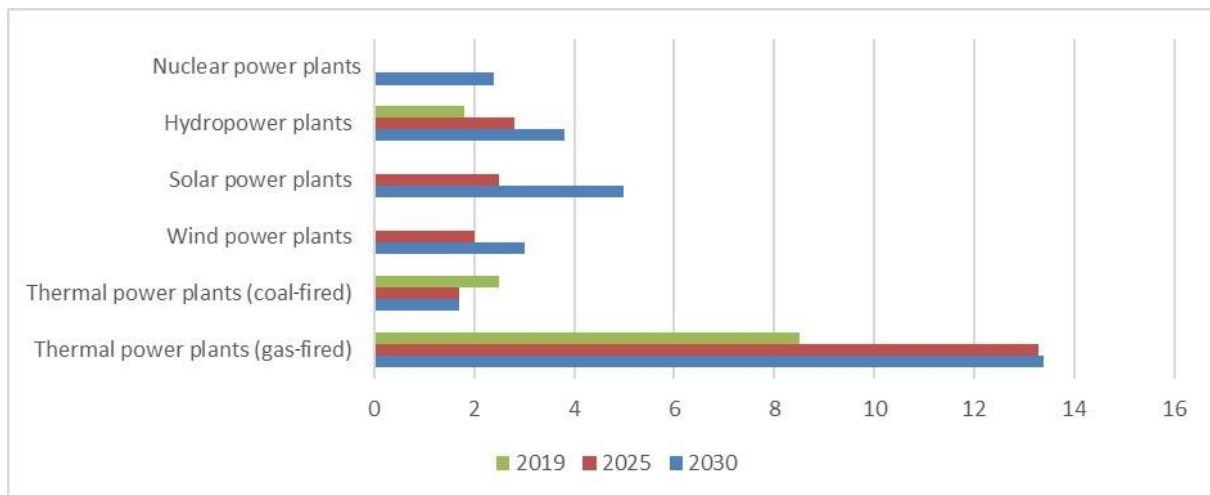
³⁶⁶ <https://www.adb.org/sites/default/files/linked-documents/47296-001-ssa.pdf>

³⁶⁷ https://minenergy.uz/uploads/01261b5c-9c52-2846-9fcf-e252a67917e6_media_.pdf

modernization efforts, resulting in an augmented capacity of 186 MW. Thus, the cumulative capacity of HPP is expected to reach 3,785 MW by 2030, resulting in energy production of 13.1 billion kWh (10.8 percent of total power generation in 2030). This represents a 2.2-fold increase compared to the energy output in 2019.^{368,369} By 2030, HPP growth capacity will remain second after thermal (gas-fired) power plants. (Figure 0-10)

The broad use of hydropower is a viable strategy for effectively mitigating greenhouse gas emissions. Nevertheless, the region's predominant river flow source is from glaciers in the mountainous areas. The glaciers in question serve as a primary water supply for several water systems inside the nation. The use of hydropower, particularly run-of-river technology characterized by little or no reserve capacity, is vulnerable to the reduction in river flows and water availability resulting from the impacts of climate change. Insufficient scrutiny of water supply problems during the planning and design phases of HPPs may adversely affect power output.³⁷⁰ Hydropower facilities are eligible for tax exemptions on water withdrawals when using salt-leaching methods.

Figure 0-10: Growth of capacity in 2019-2030, MW³⁷¹



Financial gaps in the hydropower subsector

Owing to the high prices at which commodities have been trading, the economy of Uzbekistan has been growing at an annualized rate of 8.4 percent on average during the last decade. However, a less favorable external environment, substantial state control, insufficient governance, and restricted foreign investments have significantly slowed the pace of economic growth, necessitating comprehensive reforms. These factors have combined to make comprehensive changes necessary. Uzbekistan's energy industry has been a driving force behind the country's sustained economic expansion, and it now accounts for around 20 percent of the country's GDP. However, this industry has challenges in putting market-oriented concepts into practice to encourage investment from the private sector, diversify energy supplies, and make large expenditures on necessary infrastructure to keep up with rising electricity demand and ensure its long-term survival. Despite this, it is important

³⁶⁸ <https://iea.blob.core.windows.net/assets/8c1cefe6-4c29-46b0-82fa-c524714e54a5/UzbekistanEnergyProfile.pdf>

³⁶⁹ https://minenergy.uz/uploads/01261b5c-9c52-2846-9fcf-e252a67917e6_media_.pdf

³⁷⁰ <https://www.adb.org/sites/default/files/project-documents/50130/50130-002-tar-en.pdf>

³⁷¹ https://minenergy.uz/uploads/01261b5c-9c52-2846-9fcf-e252a67917e6_media_.pdf

to note that the energy sector has been a driving force behind Uzbekistan's sustained economic growth. This has been made possible by the country's reliance on energy exports.

The current government has undertaken substantial reform endeavors, primarily focusing on using renewable energy sources. Uzbekistan has a wide array of renewable energy resources, among which hydropower is the primary source, accounting for around 13 percent of the country's total installed capacity. The hydropower industry in Uzbekistan now has a total installed capacity of 1.9 GW. Nevertheless, it should be emphasized that this estimate incorporates roughly only 20 percent of the overall hydropower capacity, which amounts to 7.5 GW, within the nation. The absence of regulations integrating water and energy resources, particularly in the context of hydropower development, has led to a prioritization of agricultural activities reliant on water resources, including irrigation. The sluggish advancement in the execution of hydropower initiatives in Uzbekistan may be ascribed to a confluence of factors, including the comparatively low cost of electricity, geological and hydrological risks, and socio-environmental ramifications.³⁷²

Implications of financial gaps in the hydropower subsector

Uzbekistan's economy is growing, and in parallel with that, its energy consumption is increasing. The government is, therefore, looking to invest in a reliable and sustainable power supply. According to government plans, by 2030, the total hydropower capacity in Uzbekistan should be brought to 6,000 MW.³⁷³ One of the key strategies for advancing hydropower involves promoting the active participation of the private sector in generating electricity through natural watercourses. This entails providing state support and incentives and ensuring their reliable integration into the unified electric power system. Additionally, establishing a system for the guaranteed purchase of electricity generated is crucial. Hydropower projects are associated with a considerable degree of risk and require a large financial investment for construction. Prominent investors, including international development agencies and individual entrepreneurs, often provide major financial support. The attainment of a balanced and mutually beneficial relationship between public and private interests is of utmost importance in efficiently tackling social and environmental challenges, encouraging private investment via attractive revenue streams, and ensuring affordable consumer tariffs. Most investment projects of Uzbekgidroenergo are financed from the credit funds of foreign government financial organizations (FGFO) and IFIs. These organizations adhere to international standards when selecting and financing investment projects.

Delays in the development of hydropower projects might be attributed to financial shortfalls. The primary emphasis on developing big hydropower projects is centered on the Tashkent area, which has significant untapped hydropower resources. The water resources of Uzbekistan are not as large as those of other countries in the region, such as Tajikistan or the Kyrgyz Republic. There are not many large rivers in the country. Therefore, recent attention has been paid to the construction of small HPPs that correspond to the pressure and flow of river water. Experts have, however, identified rivers where hydropower production capacity can be increased. There is significant potential for establishing small HPPs within the Andijan, Samarkand, and Kashkadarya areas. However, this needs to be further investigated, which requires huge investments. The potential consequences of inadequate investment in the hydropower development sector might be detrimental to the nation's energy security, given the substantial role that hydropower plays within the overall energy portfolio. Consequently, there is an increased dependence on alternative energy sources, which may have lower sustainability and greater costs. The resolution of financial

³⁷² <https://www.adb.org/sites/default/files/project-documents/50130/50130-002-tar-en.pdf>

³⁷³ <https://daryo.uz/en/2023/11/01/uzbekistans-hydropower-push-6000-megawatts-by-2030-and-transformer-overhaul>

deficiencies within the hydropower subsector necessitates a holistic strategy that involves the cooperation of government entities, financial establishments, and private stakeholders. This collaborative effort is crucial to promote the enduring advancement of hydropower initiatives. To effectively tackle these consequences, all relevant parties must explore alternative financing channels, better project planning and management practices, and foster cooperation to attract investments and thereby facilitate the sustainable growth of the hydropower subsector.

Financial requirements for the development of the hydropower subsector

The government has implemented a proactive national energy strategy to achieve a twofold increase in the electricity output derived from hydropower sources by 2030. The proposal includes constructing seven large-scale projects with 1.2 GW of hydropower capacity. Prominent international and foreign finance agencies, such as ADB and the French Development Agency (FDA), provide substantial support to enterprises seeking to engage in Uzbekistan's hydropower industry.³⁷⁴

Uzbekistan has undertaken an initiative to restore existing hydroelectric facilities and create new ones in accordance with its comprehensive national energy strategy. By 2025, there will be a significant augmentation in the amount of hydropower within the overall energy composition, resulting in an increase of 15.8 percent from the present level of 12.7 percent. The projected increase in growth may be ascribed to the effective execution of a comprehensive endeavor to establish 18 new hydropower projects and renovate 14 existing units.

The strategic goal of increasing Uzbekistan's hydropower capacity to 3,416 MW by 2030—representing a significant increase of 1,477 MW—is outlined in PP-44 of 10 December 2021, 'On supplementary measures for the progressive advancement of hydropower.' The target will be attained by the implementation of a systematic approach aimed at the modernization of current HPPs and the construction of novel facilities. Some of these initiatives encompass the enhancement of the capacity of the Tupolangskaya high-pressure power facility by 145 MW through a process of modernization, the establishment of the Pskemskaya high-pressure power plant with a capacity of 400 MW, and the advancement of the Khodjiktent pumped storage facility with a capacity of 200 MW.³⁷⁵

The collection comprises a comprehensive inventory of projects that have comparable characteristics. To promote private investment in small-scale hydroelectric projects, the government provides several forms of assistance, such as ensuring reliable connectivity to the power grid and committing to purchase the electricity produced by these initiatives.

The determination of purchase tariffs for run-of-river, reservoir, and pumped storage facilities of Uzbekhidroenergo is as follows: the second-tier consumer rate for run-of-river facilities accounts for 70 percent of the total rate, which is USD0.04/kWh. In contrast, reservoir facilities charge 100 percent of the equivalent rate, while pumped storage facilities charge 150 percent of their respective rate. Feed-in tariffs are provided as incentives for developing small-scale hydropower facilities, solar photovoltaic plants, and biogas auto production plants with capacity of less than 5 MW. These facilities can receive a feed-in tariff for any surplus energy they produce, established at a rate corresponding to 80 percent of the standard tariff. Between 2024 and 2030, a collection of 23 small and micro-HPPs will be offered for purchase by private developers. The combined capacity of

³⁷⁴ documents1.worldbank.org/curated/en/471601582557360839/pdf/Uzbekistan-Public-Expenditure-Review.pdf

³⁷⁵ <https://iea.blob.core.windows.net/assets/0d00581c-dc3c-466f-b0c8-97d25112a6e0/Uzbekistan2022.pdf>

these HPPs amounts to 33.8 MW, resulting in an annual generation of 156.2 GWh. Additionally, the emphasis will be placed on establishing regulatory frameworks that facilitate and encourage private investment in micro and small hydropower projects.³⁷⁶

The hydroelectric investment plan implemented by the government relies heavily on climatic and hydrological data from the Soviet period, neglecting the incorporation of international climate resilience principles. Considering the difficulties posed by climatic variability and the anticipated long-term decline in water resources in Uzbekistan, integrating pragmatic climate-resilient measures into the hydropower planning process would guarantee the technical and economic viability of enduring investments. Furthermore, considering the substantial financial requirements associated with developing hydropower projects, it is imperative to stimulate private sector investments in this sector. Additionally, examining the potential of PPP arrangements to fund hydropower projects is crucial.

Analysis of land reclamation and irrigation subsectors

Financial analysis of the land reclamation and irrigation subsectors

According to WB data from recent years, the financial allocation for I&D works (including energy cost) remained about UZ\$3 trillion to UZ\$4 trillion per year, or around USD35 per hectare, between 2016 and 2018. This equates to around 1.3 percent of the country's GDP. Based on data obtained from government sources, the financial outlays allocated to water management as a sector, funded by the state budget for the fiscal year 2019, showed little fluctuation, remaining relatively constant at around UZ\$3.9 trillion. It was around UZ\$5 trillion for 2020 and UZ\$6.6 trillion for 2021. Although the alterations seem to be substantial, it is crucial to consider the impact of inflation and the appreciation of the US dollar to other currencies. Consequently, the enhancement in real value terms remains intangible.

The government significantly emphasizes the implementation of water-saving and agricultural land efficiency technology at field level. According to official statistics, it is indicated that throughout 2019 to 2021, a sum of UZ\$1,218.4 billion was granted from the state budget as subsidies. These subsidies were intended to partially cover the expenses of implementing water-saving technologies on a total land area of 149,099 hectares. Furthermore, according to the water strategy for 2021-2023, projects involving foreign financial institutions and international financial organizations successfully secured foreign loans amounting to a cumulative sum of USD696.7 million. The relative amounts attracted in 2021, 2022, and 2023 were USD211.2 million, USD230.7 million, and USD254.8 million. The water management organizations in Uzbekistan must pay their operating costs out of the state budget to keep the country's water infrastructure functioning properly. The state removes water management expenses from water users via the price system for agricultural goods and taxes. The state then pays for its operations via the state budget, which the water consumers originally funded. The trends seen in the expenditures associated with funding water management reveal an increase in financing from the state budget. However, a different picture emerges when one analyses the investments at similar costs and considers inflation and growing prices for power, material, and technical resources. The commencement of extensive I&D projects in the 1960s marked the start of cotton crop growth and bolstered the Soviet Union's economy. I&D systems depend heavily on substantial flow diversions executed by the Amu Darya and Syr Darya rivers. Pumped irrigation constitutes more than 50 percent of Uzbekistan's overall irrigated land area. The

³⁷⁶ <https://iea.blob.core.windows.net/assets/0d00581c-dc3c-466f-b0c8-97d25112a6e0/Uzbekistan2022.pdf>

used energy costs amount to around 16 percent to 20 percent of the country's overall power production.³⁷⁷

It is widely acknowledged that over 75 percent of the primary irrigation infrastructure in Uzbekistan requires repair or rehabilitation, necessitating a fourfold increase in annual capital expenditure. In practice, most of the funds allocated for O&M are allocated primarily to cover electricity expenses for pumping, resulting in limited resources available for infrastructure renewal. Table 0-17 shows budget allocation for 2021, 2022, and 2023, which was given to MOWR from the state budget.

Table 0-17: Budget allocations to first-level budget administrators from the state budget of the Republic of Uzbekistan for 2021, 2022, and 2023, UZS billion^{378,379,380}

Ministry of Water Resources of Uzbekistan	2021	2022	2023
Total	2,971.07	3,440	3,382.4
of which:			
Current expenditure	1,689.43	2,190	2,317.4
of which:			
Expenditure for development programs	1280,19	1,737.1	1,809.3
Expenditure on the introduction of drip irrigation for raw cotton producers	198.87	935	260
Expenditure on cleaning from siltation in the upper embankment of the Takhiatash hydro scheme on the Amu Darya River using dredgers	x	x	30
Expenditure on the power supply for pumping stations	752,11	802.1	1,349.3
Subsidies to cover the cost of electricity consumed by pumping units of farms producing raw cotton and grain ear crops			170
Expenditure on repair and recovery work for melioration facilities	329.21	x	x
Capital investments for design, construction (reconstruction), and equipment of facilities	1,281.63	1,250	1,065

Furthermore, the report on the implementation of the state budget and the budgets of state special funds for the first half of 2023³⁸¹ has a section on the country's restoration and capital repair of irrigation and reclamation facilities. It states that during the reporting period, UZS461.3 billion was financed for 147 irrigation objects (96 transitioning from year to year, 51 new ones). UZS124.9 billion of funds was used for 47 land reclamation facilities (including 21 transitioning from year to year and 26 starting a new one). These funds were spent on reconstructing canals, channel networks, hydro-technical structures, pumping stations, pressure pipelines, irrigation wells, and bridges. The implementation of these projects is expected to improve the technical condition of irrigation and land reclamation facilities, such as the water supply of 207,000 hectares of land and the reclamation of 114,000 hectares of irrigated land, respectively.

³⁷⁷ <https://www.adb.org/sites/default/files/linked-documents/53120-001-cp.pdf>

³⁷⁸ https://api.mf.uz/media/document_files/Budjet_21P_eng_KeeAac8.pdf

³⁷⁹ https://admin.openbudget.uz/media/post_attachments/Budjet_22_P_uz_2UMxO70.pdf

³⁸⁰ https://api.mf.uz/media/document_files/Budjet_23_uz.pdf

³⁸¹ https://api.mf.uz/media/budget_activity_files/6_%D0%BE%D0%B9%D0%BB%D0%B8%D0%BA_%D0%B8%D0%B6%D1%80%D0%BE_nhZhwLK.pdf

According to PP-144³⁸² dated 1 March 2022, the government subsidized UZ\$8 billion for each hectare in which drip irrigation was adopted; this figure was even higher for the Karakalpakstan Republic and the Khorezm region (UZ\$12 billion) where there is a massive water scarcity problem. It is estimated that a total of UZ\$110 billion is allocated to cover 50 percent of the costs of implementing drip irrigation systems in 2022; 50 percent of the costs of implementing water-saving technologies on 36,600 hectares in 2023; and UZ\$200 billion for alternative energy and portable generators. Drip irrigation systems were installed on a total of 300,000 ha in 2023 to boost the efficiency of utilizing water resources, minimize energy consumption, and broaden the scope of applying water-saving technology in agricultural production.

According to WB research, throughout the analysis spanning from 2016 to 2018, a significant portion of public spending was directed towards general support services (GSS), primarily focusing on I&D initiatives. In 2018, the GSS constituted a significant portion of public spending in the agricultural sector, amounting to 86 percent. The allocation of funds towards farmers, namely via direct payments for farmers (DPF), was 12 percent of the total, while the remaining 2 percent was attributed to tax expenditures. Most of the funds are allocated to the MOWR, responsible for implementing I&D programs. In 2018, the MOA ranked third in agricultural budget allocation, falling behind the MOWR and the MOEF.

Table 0-18: Agriculture public expenditure by government ministry³⁸³

Ministry	2016	2017	2018
MOWR	3,036	3,419	4,100
MOA	733	848	655
MOEF	231	317	766
Cabinet of Ministries (veterinary and plant quarantine)	0	0	289
Forestry	52	59	69
Research and education (various ministries)	400	492	410
Other (various ministries)	462	528	732
Total	4,913	5,663	7,058

Note: adopted from WB (2019)³⁸⁴

GSS in Uzbekistan, akin to DPF, exhibits a significant concentration on a single initiative: the establishment and upkeep of infrastructure. During 2016 to 2018, this program comprised 71 percent of the overall GSS budget. An insignificant 10 percent of the GSS budget was allocated to agricultural innovations and knowledge. In 2018, agricultural research and education expenditures constituted a mere 0.02 percent of GAO. A budget for agricultural marketing and promotion was not allocated. In 2016 to 2018, expenditures exclusively allocated to I&D constituted 1.3 percent of GDP.

³⁸² <https://www.lex.uz/uz/docs/-5884584>

³⁸³ <https://documents1.worldbank.org/curated/en/471601582557360839/pdf/Uzbekistan-Public-Expenditure-Review.pdf>

³⁸⁴ <https://documents1.worldbank.org/curated/en/471601582557360839/pdf/Uzbekistan-Public-Expenditure-Review.pdf>

Nonetheless, the current capital and recurring expenditure level fails to meet anticipated requirements, which presents a significant obstacle.³⁸⁵

Financial gaps of the land reclamation and irrigation subsectors

Agriculture in Uzbekistan utilized 39 billion m³ of water in 2022. Of this, 36 percent, or more than 14 billion m³, were lost in canals and ditches with clay bottoms. Over 5,000 pumps are being utilized to irrigate 2.5 million hectares of land, using 7 billion kWh of power annually. However, 80 percent of the pumps have been operating for 35 to 40 years and have reached the end of their useful lives.³⁸⁶ Outdated I&D systems, which account for up to 70 percent of total water loss, cost the nation USD1.7 billion annually, equivalent to nearly 8 percent of GDP³⁸⁷. An estimated USD2 billion is lost yearly in agricultural output owing to inadequate water management.³⁸⁸ The combination of aging infrastructure, inadequate management practices, significant inefficiencies, and reliance on pumping leads to elevated prices. The domain of O&M lacks financial resources since the state budget covers only around 15 percent to 25 percent of the necessary financing.

The I&D infrastructure of Uzbekistan needs urgent maintenance and replacement. According to government statistics, 75 percent of Uzbekistan's present I&D must be rebuilt. 70 percent of drainage pumps need capital maintenance, 66 percent of all major canal equipment requires antifiltration coverings, and 30 percent of irrigated fields require extra drainage.

However, high power costs from aged water pumping stations are crowding out funding for these critical infrastructure requirements. Uzbekistan's irrigated agriculture is heavily reliant on electric pumping. Pumping stations, most of which were erected more than 30 years ago, account for most of the power usage in the agricultural sector and around 16 percent of total national electricity consumption. The dominance of power expenses drives out operations, maintenance spending, and capital investments in I&D. Electricity prices consume over half of the irrigation budget and around 70 percent of the O&M budget. This comes at a severe potential cost: the high power costs associated with pumping stifle much-needed expenditure into asset upgrades and land enhancements.

To keep the country's water infrastructure operational, water management agencies in the country must pay their running expenses from the state budget. The state deducts water management costs from water users via the agricultural pricing system and taxes. The state then pays for its operations via the state budget, which water customers initially supported. The changes in expenditures related to supporting water management show that there has been an increase in spending from the state budget. A different picture emerges when the investments are assessed at similar pricing, including inflation, rising power rates, and material and technical resources. Despite increased funding, the actual volume of water infrastructure repair work is declining.

As mentioned earlier, the budget outlines a tax rate of UZS45 for using water resources specifically for irrigating agricultural land. This tax includes the expenses associated with compensating water providers for the provision of water. The proposed allocation strategy entails dedicating 80 percent

³⁸⁵ documents1.worldbank.org/curated/en/471601582557360839/pdf/Uzbekistan-Public-Expenditure-Review.pdf

³⁸⁶ <https://www.gazeta.uz/ru/2023/10/20/water/>

³⁸⁷ documents1.worldbank.org/curated/en/980471499047339716/pdf/Uzbekistan-Feghana-PAD-06122017.pdf

³⁸⁸

http://wash.earthforever.org/lib/uz/water_critical%20resource_Uzbekistan_en_ru_uz/English/Water_EN.pdf

of paid taxes to the municipal budget, while the remaining 20 percent is allocated to specific water services. The price of specialized water services for the provision of water to agricultural establishments amounts to UZS9.26/m³. The aggregate sum required for 160 districts is around UZS300 billion. To address this financial need, a suggested solution involves augmenting the tax rate for agricultural firms by UZS10.

An alternative perspective arises when examining the investments conducted at comparable costs while considering inflation, escalating electricity costs, and material and technical resource costs. Notwithstanding the increase in financial resources, the manual labor required for the upkeep of the water infrastructure has decreased. The distance of the subsurface drainage system required to be cleaned and maintained annually was reduced by more than half, from 3,500 km to 1,000 km. Renewing and repairing concrete flumes presents an even greater challenge.³⁸⁹

Implications of financial gaps in the land reclamation and irrigation subsectors

Government allocations fund the primary expenses associated with the provision of water to agricultural farmers. The remuneration received by agricultural producers for water delivery services is not inherently tied to the quantity of water they use. The current level of compensation is inadequate to incentivize the adoption of productive and efficient water use practices. The primary responsibility for overseeing and maintaining the main and inter-farm infrastructure lies with the organizations under the MOWR, with funding mostly sourced from the state budget. However, these entities lack sufficient incentives to adopt water and energy-saving technology, which would result in cost savings associated with infrastructure maintenance and upgrades. Implementing PPPs in the industry has not been well executed so far. The aging water management infrastructure, installed mainly in the 1960s and 1970s, and the increase in the number of farmers after farm restructuring in the 1990s has made water distribution a growing challenge. This became especially apparent in elevated irrigation zones where large pump stations lift water for crop irrigation on highlands and foothills. These lands represent more than 50 percent of the irrigated area.³⁹⁰

The government agencies responsible for irrigation have survived since the country's independence; nevertheless, their capacity has diminished owing to decreased budgets, an aging workforce, and declining technical expertise. Using water user organizations, more and more individual farmers are taking personal responsibility for field and on-farm irrigation operations. On the other hand, the performance has been inconsistent owing to inadequate training and technical assistance. Because of outdated infrastructure that is inadequately maintained and run—both on- and off-farm—many irrigation systems cannot provide appropriate and timely irrigation water to farmers, resulting in decreased agricultural yields and output. The current modes of financing for investment in the irrigation industry and the provision of services are the purview of public funds and are significantly subsidized. This results in monetary restrictions, counterproductive incentives, and inadequate financing. Water rates are far lower than the levels needed to recoup the service costs, resulting in wasteful use of resources, postponed maintenance, and inadequate investment. Dams are an essential component of the infrastructure for water management that is required to satisfy the growing need for water, food, and electricity while also protecting against flooding. The failure of the Sarboda Reservoir dam in Uzbekistan in May 2020 had repercussions for around 100,000 people in both Kazakhstan and Uzbekistan. Since the Sarboda dam was constructed relatively recently, this has highlighted mounting concerns over the safety and sustainable functioning of hydraulic

³⁸⁹ https://cgspace.cgiar.org/bitstream/handle/10568/107853/FULL-COSTS-RECOVERY-ON-OPERATION-AND-MAINTENANCE-OF-IRRIGATION-SYSTEMS-IN-THE-PILOT-RIVER-BASINS_ENG.pdf?sequence=2&isAllowed=y

³⁹⁰ http://centralasia.iwmi.cgiar.org/regional-content/central_asia/pdf/overview-of-water-related-programs-in-uzbekistan.pdf

constructions. One nation is responsible for the upkeep and operation of several dams in the area; however, these dams benefit many nations (for water supply, electricity, and flood control, among other things). This is particularly true of the transboundary rivers in CA, which call for constructive collaboration among the countries in the area, focusing on the importance of technical factors such as establishing mutually advantageous early warning processes, collaborative action during crises, and rehabilitation.³⁹¹

Deficiencies influenced the prevalence of pumping and the rate of sector advancements in public investment management. The presence of a suboptimal investment management structure and the provision of subsidies for power pumping and water access create distortions in investment choices within the industry. Over time, the absence of comprehensive provisions mandating the inclusion of ongoing O&M expenses—such as electricity and repairs, in the budgeting of public investment projects—coupled with electricity tariffs set below levels necessary for cost recovery, has played a significant role in the extensive adoption of pump-based irrigation systems as opposed to gravity-based systems. It should be noted that the higher initial costs associated with electric pumps, primarily owing to the requirement of land remediation, have not deterred their widespread implementation. Regions that are mostly reliant on pump irrigation tend to exhibit lower levels of economic efficiency in their O&M costs. The provinces that primarily use gravity irrigation systems have an average return on O&M costs fivefold greater than those relying mostly on electrical pumping irrigation. The O&M expense per 1,000 m³ of irrigation water in gravity systems is, on average, 6.2 times cheaper than electrical pumping (lift) irrigation. Notwithstanding these notable disparities, the adoption of gravity irrigation initiatives is hindered by financial subsidies allocated to cover the power expenses for irrigation pumps. These subsidies accounted for 0.6 percent of GDP in 2019, or 1.8 percent of the overall budgetary outlays. The provision of power subsidies in Uzbekistan to large-scale farmers engaged in cotton and wheat cultivation incentivizes increased electricity consumption, distorting farmer motivation, and impeding investment in modernization and long-term agricultural production.

Financial requirements for the development of the land reclamation and irrigation subsectors

In general, the anticipated cost of land reclamation and irrigation in Uzbekistan might change, based on several different aspects. These considerations include the kind of infrastructure to be used, the size of the area to be watered, and the desired degree of development. Significant expenditures are necessary to facilitate the modernization of obsolete I&D systems, enhance water efficiency, and effectively manage salt levels. Owing to a scarcity of water resources inside its borders, the republic exhibits the highest proportion of water consumption in the area. It is also reliant on its transboundary water resources to a significant extent. In addition to the adverse environmental implications associated with desertification and salinization, the issue of water shortages is increasingly emerging as a limiting factor for the expansion of irrigated agriculture. These inefficiencies have significant potential costs, considering the government's current fiscal limitations. The estimated range for the overall expenses associated with the restoration of infrastructure for I&D in Uzbekistan spans from USD23 billion to USD31 billion.³⁹²

According to a study that Boston Consulting Group (BCG) presented at the Tashkent International Investment Forum in 2023, based on the research findings, implementing all water-saving technology would require investments totaling USD10 billion. It is predicted that USD4 billion will be

³⁹¹ <https://documents1.worldbank.org/curated/en/802111584324088462/pdf/Uzbekistan-Water-Services-and-Institutional-Support-Project.pdf>

³⁹² Irrigation and Drainage Sector Strategy Study, the World Bank, 2000; National Plan for Water and Salt Management, GEF WEMP, 2002

required for infrastructure—especially for pumping stations, concreting canals, and flushing activities—and that around USD6 billion will be required for subsidies to economic agents such as farmers and dekhkans for introducing technology that saves water. BCG has estimated that USD600 million is sufficient for the operations of canal concreting, which would guarantee a return on investment of more than 30 percent according to the internal rate of return (IRR), considering the economic benefits held by farmers and dekhkans.³⁹³ To maintain the existing service level of water infrastructure over the next ten years while addressing these infrastructure gaps would need an annual investment of USD400 million—double the amount required to upgrade the system. In contrast, the entire capital expenditure for I&D in 2020 was under USD200 million.

The current level of capital investment has been inadequate for starting the process of modernizing I&D infrastructure and management. Based on an estimated total irrigated land area of 4.2 million hectares, the reported capital investments in I&D in 2018 amounted to KGS1,274 billion, equivalent to USD35 per hectare. Owing to the restriction, a minimum investment of USD250 per hectare that does not use irrigation technology is required. For irrigation, it would be essential to increase the amount spent on capital expenditures to a level of USD1,400 per hectare to ensure a water supply that is reliable, adequate, and flexible. In addition, the total upgrading of the whole I&D infrastructure from 2015 until 2030 would need financial investment ranging from USD5.5 billion to USD16 billion throughout that period. In addition, more resources and effort are required for the efficient execution of O&M-related tasks.

The industry's existing financial problems are made much worse by quasi-fiscal deficits, which are caused by low collection rates and the practice of pricing water consumption and irrigation services at prices that are lower than their actual costs. The predicted cost-recovery barrier was set at USD120 per hectare in 2023; however, the costs for water consumption amounted to only USD45 per hectare in 2023—a significant decrease from the previous threshold. In general, the financial challenges that are plaguing the land reclamation and irrigation business in Uzbekistan are complicated and need an all-encompassing solution.

Summary/results of the review of the critical financial needs of the water sector, concentrating mostly on major infrastructure, including priorities

In common with other CA countries, the water sector in Uzbekistan necessitates substantial investments in infrastructure development. This encompasses the improvement, upkeep, and restoration of effluent treatment facilities, irrigation networks, and water supply systems. Numerous reviews and analyses have examined the essential financial requirements of the water sector, with specific emphasis on significant infrastructure projects. For instance, a public expenditure review (PER) was undertaken by the WB to assess the efficacy of government expenditure in Uzbekistan, specifically in water resources management. This report supports this review and emphasizes the significance of more efficient public investments to safeguard the economy of Uzbekistan against the adverse effects of using old infrastructure including obsolete equipment, especially during climate change. Several forecasts indicate that Uzbekistan will experience a water deficit of 7 billion cm³, which is equivalent to 25 percent of its present consumption. The expanding population of Uzbekistan places additional strain on its water resources. To address these challenges, the government is in the process of implementing new reforms and adopting innovative technologies.

In the agricultural sector, while initiatives such as the implementation of water-saving technologies show encouraging outcomes, huge investments are required to achieve wide adoption across the

³⁹³ <https://www.gazeta.uz/oz/2023/04/30/suv/>

country. Moreover, the pursuance of sustainable water management has become a significant challenge, especially for farmers who, despite playing a vital role, encounter barriers when attempting to adopt water-saving technologies. It is important to highlight that a significant number of these producers are users rather than proprietors of the land, which further complicates their ability to invest in critical technologies. There are some positive signals, such as recognizing the important role of water-conserving technologies in bolstering agricultural resilience; the government has implemented subsidies to encourage farmers to adopt these innovative practices. This is a praiseworthy initiative. Nevertheless, the existing subsidy framework is confronted with certain constraints, predominantly attributable to its restricted ambit and, on certain occasions, resource misallocation.

Primarily developed during the Soviet era, the nation's water supply and sanitation infrastructure have also largely outlived their usefulness and are in dire need of extensive rehabilitation. Recent years have witnessed significant investments by Uzbekistan in the improvement of its sanitation and water supply systems. Notwithstanding these endeavors, access to dependable and potable water services remains difficult to attain, especially in remote and rural regions. Owing to the prolonged period in which the price of potable water in Uzbekistan has remained exceptionally low, water delivery organizations have been under significant financial pressure to generate adequate revenue to support their operations. The adverse consequences of this protracted period of reduced pricing are evident in the deterioration of water service quality and accessibility throughout the country. In view of the pressing necessity for a sustainable resolution, a significant transition commenced in 2023 when gradual hikes in the cost of delivered water were implemented. The objective of this strategic modification is to enhance the reflectiveness of the true expenses linked to the provision of potable water, thus mitigating the financial strains experienced by water delivery entities.

The government has initiated large-scale activities with the objective of strengthening the hydropower sector's governance and ensuring its long-term financial viability. These endeavors emphasize a dedication to cultivating a resilient and effectively led industry that can satisfy the increasing energy needs while guaranteeing sustainability in the long run. With the aim of fostering improved governance, the government has enacted extensive initiatives to optimize operational procedures, streamline regulatory frameworks, and increase transparency in the hydropower sector. The objective of placing emphasis on good governance practices is to establish a setting that fosters accountability, efficient decision-making, and ethical behavior in every aspect of hydropower operation. The importance of fiscal well-being in safeguarding the industry's resilience has led to a heightened focus on financial sustainability in these initiatives. The government endeavors to strengthen the hydropower industry's economic underpinnings via prudent management practices and strategic financial planning. This encompasses endeavors to secure investments, enhance operational efficiency, and investigate novel funding mechanisms that are in line with the sector's overarching goals.

Recommendations for overcoming financial gaps in the drinking water supply and sanitation subsectors:

- Improve operational efficiency in water supply and sanitation facilities. This may include minimizing non-revenue water (water lost before reaching the user), enhancing billing systems, and using contemporary technology for monitoring and maintenance.
- Examine possibilities for establishing collaborations between the public and private sectors to attract private funding and specialized knowledge. PPPs have the potential to attract supplementary finance, advanced technology, and enhanced managerial expertise to enhance the provision of services.

- Investigate the possibility of using novel financing structures such as revolving funds, green bonds, and water bonds. In addition to providing projects with flexible finance, these methods can entice investments from a wide variety of sources.
- It is extremely important to develop and implement cost-reflective rates for water services. This guarantees that the rates paid to customers are sufficient to cover the real costs of providing the service, which may include the expenses of maintenance and upgrades to the infrastructure.
- To increase revenue assurance and ensure accurate measurement of water usage, the implementation of smart water metering systems is recommended. The use of smart meters makes it possible to monitor data in real time, which helps to decrease billing inconsistencies and improves overall financial management.

Recommendations for overcoming financial gaps in the hydropower subsector:

- Enact tariff revisions to ensure that hydropower pricing accurately reflects the actual expenses of producing and maintaining the electricity. This may need regular modifications to align with inflation, operating expenses, and essential investments. Explore regional energy market integration to leverage cross-border trade and enhance revenue streams. This can increase the market for hydropower-generated electricity and improve financial sustainability.
- The government needs to exhibit a robust and long-term commitment to the growth of the hydropower industry by implementing policies that are helpful, by establishing regulatory frameworks, and by providing constant financial assistance.
- Examine adaptable financial arrangements that may support the distinctive characteristics of hydropower projects, including extended development times and significant initial capital inputs. Customizing finance arrangements to match project requirements might appeal to a broader spectrum of investors.
- Implement a comprehensive approach to water and energy planning to maximize the efficient use of water resources for both hydropower production and other critical purposes. By adopting a comprehensive strategy, this method guarantees effective water management, thereby minimizing operating hazards.

Recommendations for overcoming financial gaps in the land reclamation and irrigation subsectors:

- Allocate resources towards the acquisition of cost-effective and water-efficient irrigation technology, such as drip and sprinkler systems. Although the initial expenses may be greater, the long-term benefits of water conservation and improved agricultural output can rationalize the financial commitment.
- Engage in partnerships with international organizations and development banks to get financing and technical support for extensive irrigation initiatives. These may include concessional loans, grants, and the transfer of information.
- Establish and enforce clear and transparent systems for farmers to pay fees for the irrigation services they get. An equitable pricing system may enhance the preservation and long-term viability of irrigation infrastructure.
- Offer monetary assistance, subsidies, or loans with low interest rates to small-scale farmers to encourage them to use water-conserving technology and enhance the irrigation infrastructure on their agricultural lands.
- Examine climate finance alternatives and green financing methods to provide financial assistance for irrigation projects that are resilient to climate change. These financing sources often promote sustainable practices and environmental advantages.

- Establish long-term strategic plans for the development of irrigation infrastructure and ensure policy coherence. Clear and well-reasoned policies attract long-term funding and improve the investment climate.
- Create and implement risk mitigation measures to address water-related difficulties encountered by farmers. One such approach is to establish insurance plans or contingency funds to assist farmers in managing the economic consequences of water shortage or crop failure.

Challenges and measures for effective water management based on an ecosystem approach

Uzbekistan encounters substantial obstacles in water management, namely in relation to water shortage and the need for sustainable and effective water use. The country has been enacting many strategies to tackle these difficulties, with an emphasis on upgrading water infrastructure, diminishing water use in agriculture, and advocating the adoption of water-conserving technology. The primary measures and problems for ensuring efficient water management in Uzbekistan, using an ecosystem approach, may be summarized as follows:

Water-saving technologies in agriculture

Uzbekistan has been striving to use water-conservation methods in the agriculture industry. The country has derived inspiration from the exemplary methodologies of countries such as the United States, the People's Republic of China, The Republic of Türkiye, and Australia, and has achieved noteworthy progress in this area. The implementation of water-saving technology has risen to cover 28,000 hectares, which accounts for 27 percent of the whole irrigated area. Uzbekistan has great potential for benefiting from the adoption of water-saving technology, together with the implementation of efficient water management techniques and governmental support. Through the optimization of water use and the reduction of reliance on agricultural water, these technologies have the potential to enhance food security, improve water availability for other industries, and promote sustainable agricultural growth within the whole country.

Digitalization of water management

The country has prioritized the use of digital technology to enhance water management. The use of 'smart water' and other comparable digital technologies is intended to enhance the monitoring and administration of water resources with greater efficiency. Novel forecasting technologies are being used to monitor water levels in prominent rivers, including instances of severe flooding. The approach of digitizing water management offers a substantial potential for Uzbekistan to address and solve its water-related difficulties. With technology, the country can enhance water efficiency, enhance water safety, and encourage the implementation of sustainable water management methods, thus laying the path for a more promising future.

Addressing water scarcity and environmental impact

To tackle the issue of water shortage and its environmental consequences, it is crucial to take prompt and inventive measures, given the pressing nature of the problem and the insights gained from previous agricultural methods. Uzbekistan is experiencing a severe water shortage and it requires a comprehensive strategy that tackles several obstacles related to environment, finances, information, and infrastructure. The country is actively striving to enhance water productivity and embrace sustainable methodologies to tackle the water issue. Tackling water shortage and its environmental consequences is a multifaceted problem. However, by applying innovative

technologies and promoting cooperation, it can strive towards a sustainable future where water is a communal asset managed conscientiously for the welfare of all.

Water allocation and conflict resolution

The use of instruments such as ‘smartsticks’ has played a crucial role in diminishing conflict and conserving water resources in Uzbekistan. These techniques facilitate equitable water distribution among farmers, safeguarding land against drought conditions, and enhancing the ability of farmers withstand the impacts of climate change. Although water allocation and conflict resolution in Uzbekistan continue to be intricate problems, a water-secure and tranquil future is attainable through the implementation of effective strategies and concentrated efforts. By adopting a comprehensive and cooperative strategy, placing sustainability and fairness as top priorities, and cultivating confidence among the relevant parties, Uzbekistan can address this delicate matter effectively and guarantee that its invaluable water resources are conserved for the collective good.

Integrated planning and coordination

The fragmented nature of water management in Uzbekistan requires the implementation of integrated planning and coordination to successfully address the difficulties associated with water and sanitation, as well as the preservation of water resources. Efforts to enhance water and sanitation in Uzbekistan need a synchronized approach and comprehensive planning.

CONCLUSION

Water financing gaps in Central Asia are severe, especially considering the increasing demands of the growing population as well as the aging Soviet infrastructure that is still in operation. Significant amounts of water are lost in aging canal systems, and water systems and consumption are not well managed so there is huge demand for investment in the entire chain from water transfer to water use as well as water management.

There are significant opportunities for transboundary cooperation between countries, making use of their individual strengths. At the same time, individual planning undertakings need to consider the activities of other countries—for example, new irrigation canal works in upstream Afghanistan that will reduce river flow and water availability downstream. It should also be noted that any infrastructure investments should be accompanied by the necessary management investments, institutional reforms, and so on to achieve a system that performs well overall.

Financing gaps occur from different sides. Water tariffs are not set up to maintain existing infrastructure in a sustainable way and to gradually pay for their renewal. There is a lack of private investment owing to insufficient market opportunities and planning security. Also, external funding/lending will need well designed and planned investments with long-term sustainability.

A summary breakdown of the main gaps in the Central Asian countries is provided below.

In Kazakhstan, investment requirements in the drinking water supply and sanitation subsectors include the construction, rehabilitation, and maintenance of water infrastructure, including reservoirs, canals, pipelines, water supply systems, and treatment plants. On average, 60 percent of Kazakhstan's water supply systems and around 70 percent of wastewater disposal systems need replacement and require around KZT515.6 billion. In 2018 figures, over KZT1.27 trillion is needed for the construction of new and the rehabilitation of old WSS facilities. In the industrial subsector, according to annual reports, major oil, gas, mining, and metals companies generate profits, which requires the modernization and construction of new wastewater treatment plants. In the land reclamation and irrigation subsectors, the development of a water resources management system for 2023 to 2029 has been outlined as a need to improve agricultural production and water use. The action plan will be financed mainly from the state budget. As the concept has not yet been approved by the government, no information on its budget is available.

In the Kyrgyz Republic, in the drinking water supply and sanitation subsectors, the total volume of necessary investment in the infrastructure of water supply and sanitation in rural areas (with the exception of the cities of Bishkek and Osh) is within KGS64.7 billion, but Bishkek and Osh also require investment. In the hydropower subsector, about 70 percent of the hydropower potential of the country remains unrealized. To develop this potential, priority projects have been identified up to 2030 for the development of hydropower with a capacity of more than 6 GW. According to preliminary calculations, the implementation of the proposed reforms and priority investments in the draft strategy will require approximately USD14 billion by 2030. In the land reclamation and irrigation subsectors more than 20,200 km of irrigation canals need modernization. KGS45 billion (USD511 million) is needed to modernize the state irrigation network, whereas KGS55 billion (USD600 million) is needed to modernize the on-farm network.

In Tajikistan, the financial gaps in the drinking water supply and sanitation subsectors result mainly from factors such as a lack of financial resources and low tariffs relative to the cost of water, as well as low collection rates for drinking water supply and sanitation services. The government provides subsidies and support in the form of offsetting and deferring taxes. In the hydropower subsector, the

OJSHC Barki Tojik holds a dominant position. It encompasses all major HPPs. The budget of Barki Tojik relies mainly on the internal sale of electricity and exports to neighboring countries; however, the company is facing financial difficulties and consistently ends each year with financial losses primarily owing to creditor and debtor obligations. The government is supporting Barki Tojik through subsidies and direct payments. The main financial need for the development of hydropower in Tajikistan is the construction of the Rogun hydroelectric power station on the Vakhsh River. Once completed, the dam will address water supply issues for downstream countries, cover the electricity deficit during winter, and increase the country's export potential. The cost of construction is estimated at USD5 billion. Tajikistan started construction using funds from the state budget, proceeds from the sale of Rogun shares, and eurobonds. Since the start of construction in 2008, approximately USD3 billion has been spent. Currently, Tajikistan is actively attracting IFIs to co-finance the project. Also, according to the action plan for 2019 to 2025, USD1.2 billion is needed for the financial recovery of Barki Tojik. In the land reclamation and irrigation subsectors, all hydraulic structures are aging and financial resources are necessary for O&M. The government provides significant financial support to the sector, although this does not fully cover the current need. In addition, an average of 15,000 hectares of new land annually needs to be developed to deal with population growth. This would require approximately USD300 million per year. To restore the inter-farm balance on an area of 550,000 hectares, USD110 million is needed. To restore the intra-farm irrigation network on this area, approximately USD165 million is required. For the restoration of drainage systems, an additional USD100 million is needed. Restoring and modernizing all pumping stations, considering the implementation of new energy-efficient equipment, would require over USD1 billion. To restore bank protection dams, approximately USD135.5 million is needed. Specialized machinery and equipment would require around USD215 million. Overall, an estimated amount of approximately USD2 billion is needed for the complete restoration of Tajikistan's irrigation water infrastructure.

In Turkmenistan, in the drinking water supply and sanitation subsectors, there is a need for the rehabilitation and expansion of water supply networks, sewerage networks, and sewerage treatment. The financial investment needs expected for the coming years will amount to around USD1 billion in the provinces and USD166 million in the capital. In the industry subsector, while the oil and gas complex are the main contributor to the state economy, the sector is the main source of industrial water pollution. Regarding investments, the construction of a seawater desalination plant is planned valued at more than USD80 million. In the hydropower subsector, the potential of small hydroelectric power stations is actively discussed in connection with the advantages of hydropower over other energy sources, but there are no plans for these yet. In the land reclamation and irrigation subsectors, development and modernization require the investment of significant financial and material resources. This includes adaptation measures including the reconstruction of irrigated lands; the improvement of land reclamation; and the reconstruction of existing and the construction of new hydraulic structures. In general, the construction, reconstruction, and operation of dams, reservoirs, irrigation networks, main canals, collector and drainage networks, hydraulic structures, pumping stations, vertical wells, water pipes, and water distribution points are financed from the state budget within the framework of the country's high priority socio-economic development programs, with investment needs exceeding USD4 billion.

In Uzbekistan, in the drinking water supply and sanitation subsectors, a program with a total budget of USD6.8 billion is planned, with USD4.1 billion allocated for water supply initiatives and USD2.7 billion designated for the construction of the sewage system. In the hydropower subsector, Uzbekistan has undertaken an initiative to restore existing hydroelectric facilities and create new ones in accordance with its comprehensive national energy strategy. In the land reclamation and irrigation subsectors, I&D infrastructure needs urgent maintenance and replacement. The estimated range for the overall cost spans from USD23 billion to USD31 billion. Nevertheless, the current level

of capital investment has been insufficient. The industry's existing financial problems are made much worse by quasi-fiscal deficits, caused by low collection rates and the practice of pricing water consumption and irrigation services at prices that are below their actual costs.

Across the CA countries there is huge potential for synergy and joint mutual benefit from coordinated development and water management strategies. This refers to the power sector and the joint development of power resources and power stations, agricultural development and, in particular, joint planning for timely water flows for agricultural irrigation, as well as the development of joint industries and cross-border trade, be it in horizontal or vertical cooperation along supply and product chains. While the old Soviet plans are outdated in this regard, sector specific, but also sector-overarching joint coordination between countries would be very beneficial—especially coordinating between upstream–downstream relations for hydropower flows, timely irrigation flows, guaranteeing base municipal and industrial water demands, as well as considering flood management aspects. Further areas of cooperation include cross border research, education, and capacity building.

Opportunities to improve the financing situation and close water financing gaps

Various opportunities are available within the existing sectoral setups to reduce costs and increase revenues while creating overall win-win situations for water users and system operators. This aims mainly at streamlining, saving, and increasing accountability—including the improvement of the financial management capacity of sector agencies and utility enterprises; the improvement of accounting systems, controlling and reporting; the revision of tariff structures to promote water saving; the expansion of meter-based payments; the improvement of fee collection; the revision of revenue streams to stay within a subsector; the implementation of the polluter pays principle; and the promotion of integrated water resources management. These actions will reduce water consumption, lower costs, and increase water availability through savings, thereby opening up opportunities for increasing productivity.

At the same time, significant investments are needed that cannot be covered by the collected water user fees. For such capital investments, prioritization is key to define the investments with the best rates of return considering their holistic impact. One of these priorities should be loss reduction to increase water availability and, respectively, opportunities for increased production. For covering investment needs, two main options are available, including private sector involvement (including public–private partnership) or through approaching international assistance for accessing grants, loans, and technical assistance for water sector development. For smaller projects, local financial markets and institutions that can provide loans, bonds, and other financing mechanisms could be developed.

To encourage private sector investment, it is necessary to create an attractive investment environment through regulatory reforms—ensuring a clear and stable policy and regulatory framework—transparent procurement processes, possibilities for PPPs, and the implementation of market reforms. Further, conducting project feasibility studies to clearly lay out and present options would be a good way to ‘market’ investment opportunities for the private sector.

Considering transboundary regional development to make the best use of countries’ resources from a joint perspective is another important point for development.

ANNEX 1—STUDY METHODOLOGY AND NEXT STEPS

The study is based mainly on desk research as well as spot interviews by national consultants where necessary. Key institutions/stakeholders are listed in the report. During this desk research, published financial data and documents from various public sources is used and analyzed. The analysis is done using a systematic approach to qualitative and quantitative analysis of the existing financial situation of the water sector. The research method is a theoretical analysis of data sources for the research problem. In addition to the data and document analysis, national consultants provide their knowledge and blend it into the reporting. Further, works are well coordinated between national and international experts.

With this ‘report of water financing gaps’ forming a situational analysis, the next steps will include building evidence based on a ‘draft water sector financing improvement action plan.’ Similar to the situational analysis, the action plan will be built on a combination of national and regional published documents, national and international expertise, as well as stakeholder input.

Overall, the study includes:

1. Draft national report on governance gap in water sector financing, including:

- Classification of the major problems, highlighting policy and management actions for improving water sector financing
- Draft report mapping the major water financing needs of the water sector
- This includes a draft assessment of both the efficiency and performance of various water financing initiatives recently introduced

2. Brief report on water infrastructure priorities, the current state of financing, and financing plans

- Report identifying potential financing schemes in Central Asia (mostly focusing on major water infrastructure)
- This will also assess the financing requirements of the water sector, with or without climate change
- This will indicate the additional financing requirements in the climate change scenario
- Key activities (led by the international consultant) will include:
 - Systematizing current water sector financing schemes from the region and international best practices for developing financing options
 - Finding the major water financing problems and obstacles in the region

3. National report on governance gap in water sector financing

- Classification of the major problems, highlighting policy and management actions to improve water sector financing
- Report mapping major water financing needs of the water sector
- This includes assessment of both the efficiency and performance of the water financing initiatives recently introduced
- Key activities (led by the international consultant) will include:
 - Conducting a review of critical financial needs of the water sector, concentrating mostly on major infrastructure
 - Understanding the major water infrastructure priorities of the member states (with regional significance)

- Developing a water financing gap report for regional and national water infrastructure in Central Asia

International expert, based on input from the national experts, will provide:

1. Draft report on water financing gaps (this report)

- Includes national expert report
- Draft national report on governance gap in water sector financing
- Draft report showing results of:
 - Conducting a review of critical financial needs of the water sector, concentrating mostly on major infrastructure
 - Understanding major water infrastructure priorities of the member states (with regional significance)
 - Developing water financing gap report for regional and national water infrastructure in Central Asia

2. Draft water sector financing improvement action plan

- Includes national expert report
- Brief report on water infrastructure priorities, current state of financing, and financing plans
- Draft report showing results of:
 - Systematizing the current water sector financing schemes from the region and international best practices for developing water sector financing options
 - Finding the major water financing problems and obstacles in the region
 - Preparation of the water infrastructure financing plan for selected regional and national infrastructure
 - Report identifying potential financing schemes in Central Asia (mostly focusing on major water infrastructure)
 - This will also assess financing requirements of water sector, with or without climate change
 - Additional financing requirements under climate change scenario
 - Systematizing the current water sector financing schemes from the region and international best practices for developing water sector financing options
 - Finding major water financing problems and obstacles in the region

3. Draft policy paper

- Draft paper showing results of:
 - Developing and conducting a series of policy papers and policy dialogs for initiation of partnerships, potential agreements

4. Final report of water financing gaps

- Final report
- Finalized description of the draft report of water financing gaps in accordance with comments received from the CAREC Institute, ADB, and other peer reviewers. Report of water financing gaps in the water sector of five Central Asian states, highlighting water infrastructure priorities.

5. Final policy paper, dialog, and water sector financing improvement action plan

- Final report
- Finalized description of the (i) draft report of water financing gaps and the (ii) draft water sector financing improvement action plan in accordance with comments received from the CAREC Institute, ADB, and other peer reviewers. Report of major obstacles for efficient water sector financing—water sector financing improvement action plan. Policy paper and policy dialog series to develop implementation agreements, financing schemes, and ownership processes.

ANNEX 2—IMPLEMENTATION PLAN

The revised project implementation plan is outlined as follows:

Delivery date		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
National reports:														
18.08.2023	1. Draft national report on governance gap in water sector financing													
10.09.2023	2. Brief report on water infrastructure priorities and current state of the financing													
15.10.2023	3. National report on governance gap in water sector financing													
Regional reports														
26.08.2023	1. Draft report of water financing gaps													
30.09.2023	2. Draft water sector financing improvement action plan													
28.10.2023	3. Draft policy paper													
30.11.2023	4. Final report of water financing gaps													
30.11.2023	5. Final policy paper and dialog & water sector financing improv. action plan													

ANNEX 3—INSTITUTIONS OR STAKEHOLDERS TO BE CONSULTED

A list of potential stakeholders to be consulted include:

Tajikistan

- Ministry of Energy and Water Resources of the Republic of Tajikistan
- Ministry of Finance of the Republic of Tajikistan
- State Committee on Investments and State Property Management of Tajikistan
- Agency for Land Reclamation and Irrigation under the Government of Tajikistan
- State unitary enterprise KhMK
- OJSHC Barki Tojik

Kazakhstan

- Ministry of Ecology and Natural Resources of the Republic of Kazakhstan
- Water Resources—Marketing Utility Company
- Kazakhstan PPP Center
- Ministry of Ecology and Natural Resources

Kyrgyz Republic

- Ministry of Natural Resources Ecology and Technical Supervision
- WRS at Ministry of Agriculture (former department)
- Department of Drinking Water and Wastewater Disposal at Gosstroï
- Ministry of Energy

Turkmenistan

- The State Committee for Water Resources of Turkmenistan
- Ministry of Agriculture of Turkmenistan
- Ministry of Environmental Protection of Turkmenistan

Uzbekistan

- Ministry of Agriculture of the Republic of Uzbekistan
- Ministry of Water Resources of the Republic of Uzbekistan
- Ministry of Energy of the Republic of Uzbekistan
- Ministry of Construction, Housing and Communal Services of the Republic of Uzbekistan

In addition, general stakeholders include WB, OECD, UNECE, UNDP, GEF, EBRD, ADB



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