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Rethinking Institutional and Financial Mechanisms on Water and Energy Cooperation in Central Asia

Discussion paper

1

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This discussion paper, **Rethinking Institutional and Financial Mechanisms on Water and Energy Cooperation in Central Asia**, was prepared within the **Expert Platform on Water Security, Sustainable Development, and Future Studies** by the Scientific Information Center of the Interstate Commission for Water Coordination in Central Asia (SIC ICWC) and invited experts. The aim of the document is to provide background information on the current institutional and financial arrangements in the water and energy sectors in Central Asia, outline key issues surrounding these arrangements, and highlight examples from inside and outside of the region that could be useful to inform technical discussion on water-energy coordination in Central Asia. This document does not prescribe or recommend any particular solutions for the technical or political challenges faced by the governments of Central Asian countries, it aims to present a range of options to inform dialogue and for further investigation and development.

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A zero draft of this paper was prepared in December 2022. Extended executive summary then was discussed with experts and practitioners during online consultations and personal exchanges from January till June 2023. Based the feedback received, the paper was further revised in July 2023. The authors are grateful to colleagues from OECD and UNECE for their valuable contributions throughout the process and to the final version of this document.

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Executive Summary

Background and objectives of this discussion paper

Water and energy management is closely interlinked and has been a key factor of inter-state relations among the Central Asian countries since their independence in the early 1990s. Over the 30 years of independence, the Central Asian countries have made **continuous and constructive progress** in cooperation on natural resource management, including through joint work under institutions such as the International Fund for saving the Aral Sea (IFAS), the Interstate Commission for Water Coordination (ICWC), the Interstate Commission on Sustainable Development (ICSU) and the Coordinating Dispatch Centre (CDC) “Energy”. Several regional, bilateral and trilateral agreements have been adopted, promoting transboundary cooperation on water and energy, despite ongoing technical and administrative challenges.

The momentum towards **greater regional cooperation** is increasing. In 2018, the heads of Central Asian countries reiterated the need for strengthening the institutional and legal framework of IFAS, with Kazakhstan suggesting to discuss the establishment of a sustainable regional mechanism for the integrated use of water and energy resources in Central Asia. In July 2022, the Heads of Central Asian states reiterated the importance of strengthening mutually beneficial multilateral cooperation on the integrated and rational use of water and energy resources in the region, considering the interests of all countries in the region¹.

Following this, the working group on the improvement of legal and institutional structure of IFAS was established in 2018 and continues its mandate till now. Development partners also contributed to the discussion on improved water and energy coordination. The Germany’s Green Central Asia Initiative established a working group on water and energy. The European Union has offered support to Central Asia with environmental issues featuring prominently in its EU-Central Asia strategy and specific projects on regional cooperation and exchange on environment and climate change and dialogues on the water, energy and food nexus. The Eurasian Development Bank published an analytical study that suggests institutional solutions for effective regulation and development of Central Asia’s water and energy complex, including the

¹ The 2022 Joint Statement of the Consultative Meeting of the Heads of Central Asia States, www.icwc-aral.uz/pdf/92-en.pdf



establishment of an international water and energy consortium (IWECC).³ The USAID Regional Water and Vulnerable Environment Activity (WAVE) assessed the potential for establishment of an IWECC.⁴

This document intends to contribute to these discussions in four different ways. First, the document is prepared by regional experts and practitioners working on water and energy fields in Central Asia for decades and therefore suggests first-hand information on history, best regional practices, workable mechanisms and shortcomings. Second, it suggests starting with the Central Asian own experience, both positive and negative, on water and energy coordination before turning to international experience and possible revised financial and institutional mechanisms. Third, the paper focusses on the financial mechanisms of water and energy interactions, while acknowledging all other important and interrelated aspects. Finally, the paper does not prescribe any particular solution, it aims to present a range of options to inform dialogue and for further investigation and development.

Achievements and shortcomings of water and energy coordination in Central Asia

Over the past 30 years, the Central Asian countries have been cooperating through regional institutions to manage transboundary waters in a coordinated way and ensure the parallel operation of their energy systems but effective water and energy coordination is still lacking. The ICWC established a system of operational management of interstate water resources, performing its functions of information collection, annual planning, analysis, research and monitoring. Coordination Electricity Council of Central Asia and CDC "Energy" have been coordinating activities of national electricity operators. However, coordination *between* water and energy agencies for ensuring stable and mutually beneficial flow regulation is still limited.

The lack of sound coordination in assigning and adhering to operation regimes of major reservoirs in Amu Darya and Syr Darya river basins, combined with abrupt changes in water availability and low predictability of runoff, leads to **reduced efficiency and stability of flow regulation and operation of the Central Asia energy system.** Inefficiency of flow regulation has manifested, in particular, through shortage of electricity in winter and the

³ Vinokurov, E., Ahunbaev, A., Usmanov, N., Sarsembekov, T. (2022) Regulation of the Water and Energy Complex of Central Asia. Reports and Working Papers 22/4. Almaty, Moscow: Eurasian Development Bank

⁴ As of July 2023, this assessment was unavailable for review.



occurrence of idle water releases at hydropower plants, as well as a drop of available water supply to economic sectors caused by, among other things, insufficient water releases from reservoirs with hydropower plants during the summer period.

The 1998 Syrdarya Agreement and the bi- and trilateral protocols concluded on the Syr Darya Basin do not allow for multi-year regulation. These agreements were designed for short-term coordination, dealing mainly with seasonal regulation and missing mutually beneficial mechanisms to ensure multi-year flow regulation. Existing annual coordination does not always take into account the technical feasibility of the proper implementation of the agreed measures (such as the load of "narrow" sections and the voltages in electric grids, power generation capacities, etc.). This could limit the volume of planned electricity supplies.

The existing compensatory and other mechanisms for coordinated flow regime are not working optimally from an economic standpoint. For example, mutual supplies of electricity are agreed through intergovernmental protocols whereby the countries use notional electricity prices for water. Currently, each sector in the countries optimizes its operation based on its needs and its own short-term interests, making it difficult to optimize the management process to reach the regional benefits.

The countries co-finance the maintenance and operation of water facilities of interstate importance on a bilateral basis (with exception of water infrastructure transferred for the operation of BWOs). Such bilateral arrangements include water facilities of interstate use on Chu and Talas rivers between Kazakhstan and Kyrgyzstan and in the Amu Darya lower reaches between Turkmenistan and Uzbekistan as well as Orto-Tokoiskoye/Kasansai reservoir between Kyrgyzstan and Uzbekistan, Andizhan/Kempirabad reservoir between Kyrgyzstan and Uzbekistan, Farkhad dam between Tajikistan and Uzbekistan. These workable arrangements could be further strengthened by elaborations of technical and financial guidelines and calculations on cost-sharing.

Possible schemes and conditions for joint construction and operation of new interstate water structures are still to be developed and in demand. In particular, the President of Uzbekistan, Sh. Mirziyoyev noted that “to solve water-energy problems it is proposed to create, under the auspices of IFAS, a mechanism for joint construction and operation of interstate water facilities, including reservoirs and hydropower plants on the basis of public-private partnership”. The trilateral agreement reached in January 2023 between Uzbekistan, Kyrgyzstan and Kazakhstan on 1860-MW Kambarata-1



HPP opens opportunities for development of mutually beneficial financial and investment mechanisms for joint construction and operation of this project.

Countries' efforts to improve water and energy coordination

The Central Asian countries raised the need for better water and energy coordination in the region as far as in 1997, when the idea of establishing an international water and energy consortium in Central Asia (IWECC) first came up. However, no consistent and agreed by all countries views on the form and possible tasks of IWECC have emerged from many deliberations on IWECC since then. The 1998 Agreement and the Concept on the creation of an IWECC of the CACO member states lay the idea of IWECC as a *water-energy regulator*. But options, where IWECC has greater regulation authority (development of optimal schedules of HPP operation and energy cross-flows, with the right to transfer decisions to ICWC/BWO and CDC “Energy” for fulfillment), would require the fundamental revision of the existing institutional framework of water and energy cooperation in the region. It was also proposed to establish a consortium to *supplement and fill the gaps in* the existing cooperation framework by enhancing its efficiency, stability and responsiveness. Such approach was proposed by SIC ICWC and BWO Syr Darya (where the consortium is viewed as a financial and insurance mechanism to implement decisions) and also by Eurasian Development Bank, which suggests creating a consortium for specific infrastructure projects.

On 28 April 2009, the Heads of Central Asian countries expressed their readiness to strengthen the institutional and legal frameworks of the IFAS so as to improve its performance and achieve greater interaction with financial institutions and donors. Under the leadership of the Executive Committee of IFAS in Kazakhstan “Conceptual elements improving the institutional and legal framework of IFAS” were prepared with a proposal to extend the responsibility of ICWC by including, in addition to water-related issues, the hydropower aspects of transboundary water use. In 2018, the work on institutional and legal improvement of IFAS was resumed. As of July 2023, the specially established working group is still discussing the possible ways for developing a mechanism for improved coordination between water and energy, among other tasks. Either creation of a joint commission on water and energy or joint meetings of water commission and energy commission is considered as possible options.



Ways forward in improving water and energy coordination

Take a holistic approach in designing measures

Improvement of water and energy coordination in Central Asia would require a range of technical, legal, institutional financial-economic measures and cannot be solved only by the establishment of IWECC.

Technical measures: improve reliability of forecasts; support operation and construction of water infrastructure; adopt the telemetry monitoring systems (e.g. SCADA); exchange of data; and the management of return flows;

Legal measures: adopt and ensure implementation of mutually beneficial agreements for regulating the flow of the Amu Darya and the Syr Darya, based on comprehensive feasibility studies; involve all key actors in the preparation of draft agreements, including BWOs, system operators and CDC “Energy” that are de-facto executive bodies of water and energy regulation; develop a regional vision (strategy) for the rational use and protection of water resources in the Aral Sea basin;

Institutional measures: improve coordination between organizations dealing with planning and operation of reservoirs; introduce a reliable mechanism for coordination and enforcement of operation regimes of reservoirs by ICWC, BWO, and representatives of energy, agriculture and environmental sectors of the countries; ensure short- and long-term planning of coordinated regulation; improve cost-sharing mechanisms for the operation and maintenance of water facilities for interstate use;

Financial and economic measures: (e.g.) to promote Public-Private Partnerships (PPPs) to better mobilise funding for co-ordinated operation of major water facilities and jointly develop infrastructure; determine approaches to set prices for electricity to move away from mutual barter deliveries; consider penalties for deviations from established flow regulation regimes; calculate (and compensate by insurance) damages to the economic sectors arising from natural hazards.

Agree on key guiding principles in designing and implementing measures

To design and implement measures, Central Asian countries may consider several **key principles and conditions with the view to** improving water



and energy coordination across the region. Proposed key principles are listed as below:

- *Solidarity, coordination of actions and joint responsibility of Central Asian states* for sustainable and equitable use of water resources from interstate sources for population wellbeing, economic development and environmental security;
- *Commitment to adopted agreements, norms of international law, integrated water resources management principles and water, energy and land-use nexus*, with account of regional specificities and implementation of obligations;
- *Account of past lessons and regional specificities* for improving water and energy coordination and cooperation, and adopting new approaches;
- *Sound balancing of irrigation and energy regimes* in operation of reservoir cascades in the short-term, annual and multi-year perspectives based on mutual benefits and considering the environmental protection; ensuring consistent water supply during operational management; compliance with sanitary releases from reservoirs;
- *Sound balancing of economy, people and ecosystem needs* bearing in mind social and environmental implications of unsound use of natural resources in the region;
- *Enable conditions for attracting investments, developing Public-Private Partnership and adopting market mechanisms* for coordination between water and energy sectors, with account of transboundary nature of water resources and the interdependency between water and energy resources management;
- *Creation of effective mechanisms* to ensure fulfillment of obligations, using, for example, guarantees and insurance funds;
- *Extensive support for advanced knowledge, technology, digitalization and innovations* as the key factors of mid- and long-term of economic growth and sustainable development.

Build on the existing water and energy mechanisms

The need for more efficient water and energy management is imminent in Central Asia, while the region has experienced several technical and political challenges to creating an entirely new institution to achieve this. Effective coordination schemes would therefore benefit from improving the already **existing institutions that aim to manage and coordinate water and energy sectors.**

These institutions discussed earlier have demonstrated their effectiveness in operational management and coordination, while also showing certain needs for **adopting new elements, their interlinkages and mechanisms for further coordination, harmonization and provision of services.** The



improved coordination mechanisms would aim to achieve water-energy **management and coordination** that is economically sound and meets interests of all sectors involved. They include hydropower (in the total energy system), irrigated agriculture, and aquatic ecosystems. For this purpose, it would be worth considering **improving and combining the functions of the existing institutions** on water and energy in Central Asia, including IFAS bodies, with new mechanisms to better represent such varying interests, rather than creating another new institution.

Combine administrative and market-based approaches

It should be noted that the above argument assumes a successful completion of the on-going process of improving IFAS structure in terms of coordinated decision-making on flow regulation, with account of water and energy interests. Updating the IFAS structure, among others, implies strengthening the functions of coordination between water and energy agencies. This effort focusing on improving institutional and governance aspects of the IFAS bodies could be considered an “**administrative approach**” to the interstate regulation on water.

To support decisions made by the IFAS bodies and other relevant governmental agencies, **engagement with non-governmental and commercial organizations** should be further enhanced. These organisations, notably financial institutions, or consortia could play an important role in financing joint construction of water facilities of interstate importance, and their coordinated operation. Engagement with such entities could be better pursued through “**market-based approaches**” such as Public-Private Partnership schemes.

International experience outside Central Asia provides some valuable lessons on better water and energy coordination making use of **consortia as a public-private partnership mechanism rather than a regulator**. For example, *consortia without a legal entity*, typically established for fundraising. Thus, a consortium of 37 public and four private utilities in the United States (without establishing a legal entity) purchased one-half of the downstream power benefits under the Columbia River Treaty (the Canadian Entitlement) for the 30 years, providing money for construction 3 dams in Canada. This was done in addition to riparian countries authorization of national agencies or companies like the Bonneville Power Administration in US and B.C. Hydro in Canada to coordinate closely with counterparts in other countries. *Consortia can also be legal entities*, usually joint-stock or limited liability companies, operating under agreements for construction and operation. For example, the Nam Theun 2



Power Company Limited was formed by a state-owned company and private shareholders to build and operate a hydroelectric plant in Laos. Surely, interstate agreements are crucial for the functioning of these organizations. Economic assessments of cooperation benefits and costs, conducted by joint commissions, inform negotiations and are seen in treaties like those in the Columbia and Paraná basins.

Rather than relying on one single approach, it could be useful for Central Asia too to consider **combination of the administrative and market-based approaches in support of interstate regulation**. Such a hybrid approach could have the great potential to efficiently make and implement mutually beneficial decisions on water and energy in Central Asia.

Market-based approaches could also help Central Asian countries mobilize financial solutions for maximizing the region-wide benefits through flow regulation (to optimize water allocation in the interests of all riparian countries) and a scheme for sharing this benefit (through compensation and other mechanisms) between countries and economic sectors.

Having long-term mechanisms of financial and economic interaction could also increase transparency and predictability of coordination, reduce economic losses, and increase access to financial resources, including those from non-budgetary sources. Clearly determined amounts and conditions of financing will allow the countries to include necessary expenditures in their national budgets and plan their use more efficiently. Financial mechanisms should be defined for different types of costs and losses. For example, a consortium in Central Asia can be established to address specific tasks, such as the construction of Kambarata-1 or Rogun HPP, separate for each. Upon completion of the construction, each consortium, probably, would deal with operation in the same format (or be transformed into a joint venture or a joint stock company among stakeholders of the concerned countries).

There are several potential measures which Central Asian countries could adopt to ensure the long-term sustainability of **financial and economic base of cooperation**. The list below outlines options for such measures for further discussion among stakeholders in the region:

- **Improve existing schemes of mutual settlements under the current multilateral and bilateral agreements** for water, fuel and energy supplies between the countries. Options for such improvement could include:
 - **purchasing summer electricity** generated at HPP during periods for irrigation water releases **at winter prices**, and **compensating during winter at summer prices**: the difference in prices determines the cost to be compensated by users of irrigation water;



- including **algorithms** into the schemes of mutual settlements, which enable **calculation of prices of electricity and fuel resources** exchanged between the countries taking into account irrigation and energy revenues from utilization of regulated water flows in different sectors,
- **Discuss charges for regulation of flow** based on **multi-year** reservoir regulation that allows to accumulate water in wet years to use it in dry years to mitigate water scarcity:
 - For this it is important to develop a **methodology for calculating the price of flow regulation** based on estimation of incurred costs. This will require new agreements or amendments to existing ones;
- Develop and agree upon a methodology for **sharing costs of, and benefits from, the operation** of large multipurpose reservoir hydroschemes,
 - with **discussion** on options for cost sharing among the countries while ensuring adherence to obligations related to the agreed regime of hydroscheme operation;
 - One option could be assessment of maximal regional benefit and its distribution between sectors proportionally to their contributions to generation of such benefit;
- Along with the costs of flow regulation and reservoir operation, **consider the possibility of accounting for wider costs** associated with the formation of water resources, channel (transportation) costs for accumulating water in reservoirs and expenses related to natural disasters;
- Develop and agree upon a mechanism of relationships in water and energy in the context of a possible **common energy market and transboundary nature of main rivers** in Central Asia.
 - It would be necessary to develop a mechanism that would allow regulating the electricity and power capacity market, considering the specific relationships between upstream and downstream countries.
 - The mechanism should be comprehensive, considering not only the relationships in electricity and power capacity market, but also payments for re-regulation of river flows for provision of transboundary water storage in multi-year regulation of reservoirs.

All those options proposed in this document are **preliminary inputs to further discussion** among Central Asian stakeholders on the renewed schemes of economic relations and refreshed institutional forms of cooperation.



Introduction

Aims and objectives

The Central Asian countries differ in access to fossil fuel, land and water resources. Existing legal, institutional and financial mechanisms for the coordinated use of water resources have contributed to cooperation between the countries in the region over the last 30 years. At the same time, **more effective coordination of water, energy, food and ecosystem nexus is needed** in strategic and investment plans and the extended mutually beneficial regional cooperation is required to speed up economic development, improve welfare and protect the natural environment. Opportunities and advantages of intersectoral and coordinated regional planning and use of water, land, and energy resources should also be taken into account to increase resilience to climate change.

The momentum towards **greater regional cooperation** is increasing. In 2018, the heads of Central Asian countries reiterated the need for strengthening the institutional and legal framework of IFAS, with Kazakhstan suggesting to discuss the establishment of a sustainable regional mechanism for the integrated use of water and energy resources in Central Asia. In July 2022, the Heads of Central Asian states reiterated the importance of strengthening mutually beneficial multilateral cooperation on the integrated and rational use of water and energy resources in the region, considering the interests of all countries in the region⁵.

Following this, the working group on the improvement of legal and institutional structure of IFAS was established in 2018 and continues its mandate till now. Development partners also contributed to the discussion on improved water and energy coordination. The Germany's Green Central Asia Initiative established a working group on water and energy. The European Union has offered support to Central Asia with environmental issues featuring prominently in its EU-Central Asia strategy and specific projects on regional cooperation and exchange on environment and climate change and dialogues on the water, energy and food nexus. The Eurasian Development Bank published an analytical study that suggests institutional solutions for effective regulation and development of Central Asia's water and energy complex, including the

⁵ The 2022 Joint Statement of the Consultative Meeting of the Heads of Central Asia States www.icwc-aral.uz/pdf/92-en.pdf



establishment of an international water and energy consortium (IWECE).⁶ The USAID Regional Water and Vulnerable Environment Activity (WAVE) assessed the potential for establishment of an IWECE.

The International Climate Initiative's **Project “Regional mechanisms for the low-carbon, climate-resilient transformation of the energy-water-land nexus in Central Asia” (Nexus project)** is to start in 2023. The Project will be implemented by a consortium led by OECD, EBRD, UNECE, and SIC ICWC. The project aims to assist the Central Asian countries to operationalize the energy-water-land use nexus in the context of climate change. Among the key objectives is conducting analytical work to demonstrate the business case for cooperation, including facilitating discussions on renewed mechanisms for water and energy coordination and modeling benefits and costs of regional and cross-sectoral coordination.

This document intends to contribute to discussions on water and energy in four different ways. First, the document is prepared by regional experts and practitioners working on water and energy issues in Central Asia for decades and therefore suggests first-hand information on history, best regional practices and workable mechanisms. Second, it suggests starting with the Central Asian own experience, both positive and negative, on water and energy coordination before turning to international experience and possible revised financial and institutional redesign. Third, the paper focusses on the financial mechanisms of water and energy coordination, while acknowledging all other important and interrelated aspects.

It is hoped that the document will supplement the efforts on institutional and legal improvement of IFAS that are carried out by the countries in the region on behalf of the Heads of State.

A zero draft of this paper was prepared in December 2022 and then discussed with experts and practitioners during online consultations and personal exchanges from January till June 2023. The paper was further revised based the feedback received in July 2023. The authors are grateful to colleagues from OECD and UNECE for their valuable contributions throughout the process and to the final version of this document.

⁶ Vinokurov, E., Ahunbaev, A., Usmanov, N., Sarsembekov, T. (2022) Regulation of the Water and Energy Complex of Central Asia. Reports and Working Papers 22/4. Almaty, Moscow: Eurasian Development Bank



Proposed approach to discussion

IWEC in Central Asia is often viewed as a key institutional element of the financial-economic model of cooperation for mutually beneficial and coordinated use of water and energy resources in Central Asia. Authors of the present discussion paper do not intend to prescribe any particular **pre-determined institutional setup, including a consortium, rather we start discussion with identification of needs and tasks** in water and energy sectors in the region. We then discuss required improvement in coordination and sustainable financial-economic mechanisms to support such coordination. We will also present **examples of institutional setups to facilitate transboundary water coordination, and their financial and economic aspects**, applied in the world for similar tasks. Finally, at the third stage, we will suggest **options** of financial-economic mechanisms (including institutional setups) applicable **in Central Asia** for mutually beneficial and coordinated water and energy relationships, with account of climate challenges.

The document is intended to **initiate discussions and** provide experts with some background information on the current institutional arrangements in the water and energy sectors in Central Asia, outline key issues surrounding these. In doing so, the document by no means intends to prescribe any particular solutions for the technical or political challenges faced by the governments of Central Asian countries or their partners.

A systematic and comprehensive assessment of such institutions and potential solutions is required for development of sustainable and mutually beneficial model of water and energy cooperation in the region. The document will also be further extended and supplemented by the results of work being conducted on institutional and legal **improvement of IFAS** and the outputs of **economic modeling of benefits and costs** of regional water and energy cooperation in Central Asia under the Nexus Project.

Structure of the document

Section 1 “**Existing mechanisms of water and energy interactions in Central Asia**” outlines current interactions between the Central Asian countries in water and energy sectors. In particular, we address specifics of flow regulation in the Amu Darya and Syr Darya basins, its institutional and legal frameworks and effectiveness, with account of financial mechanisms. Main achievements and shortcomings that require enhanced coordination and refreshed financial mechanisms are summarized as well.

Section 2 “**Countries’ efforts on improving water and energy coordination: A chronology**” provides an overview of key analyses and



recommendations within the framework of CACO, SPECA, World Bank, SIC ICWC and BWO Syr Darya, ADB, EurAsEC, UNRCCA and EDB and some lessons learned.

Based on the needs and tasks identified in the above sections, Section 3 **“World practices concerning institutional and financial mechanisms of water and energy coordination at the interstate level”** considers examples of institutional and financial mechanisms to support benefit and cost sharing related to use of water resources in such river basins as the Columbia (US and Canada), Parana (Brazil and Paraguay), and Indus (India and Pakistan), as well as the experience in fundraising for construction of Nam Theun Hydropower Project in Laos.

Section 4 proposes **potential options for discussions on improved coordination and the financial-economic model of cooperation in Central Asia**. In particular, the key principles and conditions for improved water and energy coordination; options for refreshing financial and economic relationships to improve flow regulation; as well as options for institutional arrangements, taking into account specifics of river flow and hydropower regulation in Central Asia will be proposed.



Section 1. Existing mechanisms on water and energy interactions in Central Asia

This Section outlines current water and energy interactions between the Central Asian countries. In particular, it addresses specifics of flow regulation in the Amu Darya and Syr Darya basins, its institutional and legal frameworks, the effectiveness of current mechanisms of water and energy coordination and summarizes main achievements and shortcomings that require enhanced coordination and refreshed financial mechanisms.



1.1. Specifics of flow regulation in the Amu Darya and the Syr Darya

The Aral Sea Basin extends to the whole territory of Tajikistan and Uzbekistan, most of Turkmenistan, four provinces of Kyrgyzstan (Batkent, Dzhalsalabad, Naryn, and Osh), southern area of Kazakhstan, and the northern parts of Afghanistan and Iran. The Aral Sea Basin is comprised of basins of the two major rivers: the Syr Darya in the north and the Amu Darya in the south, which originate in Tien Shan, Gissaro-Alai and Pamir mountains.

The Amu Darya is the most water abundant river in Central Asia (79.3 km³ of average annual runoff). The river is formed by the confluence of the Vakhsh and Panj rivers, accounting for 43% and 25% of the runoff, respectively. The Amu Darya River basin extends to the territory of Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan and north Afghanistan.

The Syr Darya is the longest river in Central Asia and the second abundant river after the Amu Darya (37.2 km³ of average annual runoff). The river is formed by the confluence of the Naryn and Karadarya rivers, accounting for 39% and about 11% of the runoff, respectively. The Syr Darya River basin extends to the territory of Kyrgyzstan, Kazakhstan, Tajikistan, and Uzbekistan.

River flow in Amu Darya and Syr Darya basins is regulated by in- and off-stream reservoirs belonging to hydroschemes or hydroschemes with hydropower (run-of-river or diversion). The reservoirs provide multiyear, seasonal (annual), monthly, ten-day and daily regulation. The flow of interstate rivers is regulated by large reservoir hydroschemes with hydropower that have a transboundary impact. Those include:

- *in the Amu Darya basin* – Nurek hydroscheme on the Vakhsh River (seasonal regulation reservoir and HPP, Tajikistan), Tuyamuyun hydroscheme on the Amu Darya River (four seasonal regulation reservoirs and HPP, Uzbekistan and Turkmenistan), as well as Rogun dam is under construction;
- *in the Syr Darya basin* – Toktogul hydroscheme on the Naryn River (multiyear regulation reservoir and HPP, Kyrgyzstan), Bakhri Tojik hydroscheme on the Syr Darya River (seasonal regulation reservoir and HPP, Tajikistan), Shardara hydroscheme on the Syr Darya River (seasonal regulation reservoir and HPP, Kazakhstan), Andizhan hydroscheme on the Karadarya River (seasonal regulation reservoir and HPP, Uzbekistan), and Charvak hydroscheme on the Chirchik River (seasonal regulation reservoir and HPP, Uzbekistan). Besides the mentioned large hydroschemes, there are also six hydroschemes (including the planned Kambarata-1), total volume of 6 km³ and the capacity of 3,830 MW, on the Naryn River.



If work in a coordinated way, these hydroschemes can **fulfil multiple tasks in an integrated manner** and increase reliability of water supply to population, economic sectors and environment.

1.2. Legal framework of water interactions

Water relationships between the republics of the Soviet Union in the Amu Darya and the Syr Darya river basins were regulated by the **Master Plans for comprehensive use and conservation of water resources**, and decisions on operation of large reservoirs and **flow regulation** were made as part of these Master Plans.

Reservoirs were operated by an authorized ministry or department based on the Council of Ministers resolutions. These authorities were to regulate river flow in line with **operation rules** and in cases of rules violation **special commissions** determined damages caused by deviations from agreed regimes. When developing the rules of reservoir operation, planning the regimes of flow regulation and operation of reservoirs and their cascades, optimization was conducted to meet, often contradictory, requirements of water stakeholders (hydropower, irrigation) and reach **optimum economic benefits**. Planned operation regimes of hydroschemes and operation **rules** was strictly monitored. The operation rules included following information: passport data, rule curve of regulation under different hydrometeorological conditions (within which planned and actual operation regimes of a hydroscheme should be), nature protection requirements (conditions), instructions on operation of structures, hydrometeorological servicing and accounting, and organizational setup of operation.

River flows were regulated according to the established priorities, at that time with **irrigation prioritized over hydropower**. The hydropower potential of the rivers in the Amu Darya and Syr Darya basins was developed by building and operating cascades of HPPs (Vakhsh, Naryn, Chirchik), which transmitted electricity to the unified energy system. Winter deficit of electricity, if occurred (in Kyrgyzstan, Tajikistan), given the increased summer water releases from HPPs (to meet irrigation needs), was covered from the unified energy system. Thus, all risks of potential water and power deficit in the Amu Darya and Syr Darya river basins were minimized. The impact of flow regulation on the environment, including aquatic ecosystems, was also assessed.

Since gaining independence, the Central Asian countries have signed the **Agreement on Cooperation in the Field of Joint Management of the Use and Conservation of Water Resources in Interstate Sources**



(Almaty, 1992). By this Agreement, the countries have agreed that they adhere to the existing structure and principles of water allocation and that they are guided by existing regulatory documents on allocation of water resources from interstate sources and they established the **Interstate Commission for Water Coordination** (ICWC). Thus, the countries confirmed that water allocation and flow regulation would be based on the Master Plans for comprehensive use and conservation of water resources of the Amu Darya and the Syr Darya.

In 1993, the Central Asian countries signed the **Agreement on joint actions for addressing the problems of the Aral Sea and its coastal area, improving the environment, and ensuring the social and economic development of the Aral Sea Region** (1993 Kzyl-Orda Agreement). This Agreement sets out the common objectives for mitigation of the Aral Sea crisis, including the rational use of land and water resources, restoration of disturbed ecosystem equilibrium, maintenance of appropriate water quality, improvement of water use efficiency, joint research, elaboration and implementation of a coordinated strategy for socio-economic development, with account of environmental security of people living in the region, etc.

In 1998, the Governments of the Republic of Kazakhstan, the Kyrgyz Republic and the Republic of Uzbekistan signed in Bishkek an **Agreement on the use of water and energy in the Syr Darya River Basin**. The Republic of Tajikistan joined the Agreement in 1999. According to this Agreement, the riparian countries recognize that:

- **benefits** derived from the joint operation of the reservoirs of the Naryn-Syr Darya Cascade, through a multi-year flow regulation and the flood control measures, include the use of water for irrigation and power generation;
- joint and integrated use of the water and energy resources of the Syr Darya basin needs to be performed taking into account **environmental security** of the region;
- the development of an **effective and coordinated mechanism** for water and energy use in the Syr Darya basin, taking into account the problems of the Aral Sea, is needed.

The 1998 Agreement envisages the following **procedure for joint use** of water and energy resources (Articles 4 and 8):

- The excess power generated at the Naryn-Syr Darya cascade emanating from summer water releases and the Toktogul operation in a multi-year regulation mode that exceed the domestic needs of the Kyrgyz Republic, shall be transferred to Kazakhstan and Uzbekistan;



- Annual and multi-year accumulation of water for irrigation made by Kyrgyzstan shall be compensated by equivalent amounts of energy resources, such as coal, gas, electricity and fuel oil, and other types of products (labor, services), or in monetary terms as agreed upon;
- A single tariff policy for all types of energy resources and their transportation shall be applied;
- Reservoir operation modes, electricity transmission and energy supplies are approved by annual intergovernmental protocols;
- The BWO Syr Darya and UDC (CDC) “Energy” shall be appointed as executive bodies responsible for the water release regimes and electricity transmissions;
- The Republic of Tajikistan annually operates the Kairakkum reservoir (now the Bakhri Tojik reservoir) under the regime agreed by the parties, while the Republic of Kazakhstan and the Republic of Uzbekistan deliver electricity in equal shares to the Republic of Tajikistan during the period of water accumulation in the reservoir, with the following return of equivalent amount of power in summer.

Unfortunately, the 1998 Agreement was not implemented in full, though it contributed to water and energy regulation between the countries in the Syr Darya River basin. Despite the fact that the Agreement has been suspended, it is important that it **stated the intention of the Syr Darya River Basin countries to coordinate their actions** – make joint decisions on operation regimes of reservoirs, HPPs, electricity transfers, compensation of electricity losses, etc.

Challenges to the sustainable operation of the 1998 Agreement are explained by the following:

- it did not take into account that Kazakhstan and Uzbekistan could get the positive effect (benefit) from the Naryn flow regulation only in dry years through additional summer releases from the water reserves accumulated in the Toktogul reservoir; in wet years, releases from the Toktogul reservoir operated in a hydropower generation mode were enough to avoid water deficits across the Syr Darya basin,
- the absence of clear **implementation mechanisms** led to difficulties in putting into practice new principles of management and coordination embedded in the Agreement,
- failure to observe in practice the irrigation-energy requirements of multiyear flow regulation by the Toktogul hydroscheme, in particular, because of **lack (or non-application) of a methodology for calculation of multiyear regulation and its impact on profitability of water using sectors**,



- a lack of a agreed formula to calculate water and energy exchange, including, for example, a methodology to calculate prices for transfer of electricity and estimate compensations. For this reason and due to problems in finding energy sources for compensation, countries tend to fail to supply energy as determined under the Protocols.
- barter exchanges through which electricity and energy supplies was done required signing intergovernmental agreements.

To ensure more effective water allocation in the Amu Darya River basin, **Turkmenistan and Uzbekistan signed a number of bilateral agreements**, including:

- Cooperation Agreement on water management (Chardjew, 1996), in which the parties **agreed to set out water allocation for the Amu Darya** (at section upstream of Karakum Canal) in equal shares (50/50) and deliver water, proportionally of their shares, to the Aral Sea;
- Agreement on sharing water resources in the Amu Darya lower reaches (Urgench, 2007), which addressed the **issue of flow regulation** by reservoirs of the Tuyamuyun Hydroscheme. The Agreement does not allow for unilateral decisions on the amount of water discharge from the hydroscheme. **Water releases shall be performed according to protocol decisions made at joint technical meetings;**
- Cooperation Agreement on operation, repair and rehabilitation of structures of the Republic of Uzbekistan and Turkmenistan located in the border area of the states (Tashkent, 10 March 2008) and the Protocol on amendment of the Agreement (Ashkhabad, 2 October 2012), in which, among other things, the parties agreed to **provide timely notification and negotiate terms** of construction and reconstruction of water facilities on transboundary watercourses, guided by the principle of do-no-harm to riparian states when using transboundary watercourses (Article 7);
- Agreement on joint Uzbek-Turkmen Intergovernmental Commission for Water (Ashkhabad, 2021), Article 2 of which sets out a task of **coordination of activities of countries' ministries, departments and organizations dealing with water-management;**
- Agreement on management, protection and sound use of water resources along the Amu Darya River (Tashkent, 2022), which stipulates that any actions that **impact the natural flow in the basin** of the transboundary Amu Darya River, including construction of new hydraulic structures, shall be subject to **independent international expertise** and be **agreed on** by all concerned riparian states (Article 7). The Agreement grants Turkmenistan and Uzbekistan a right to develop, if necessary, the **mechanisms for joint management, protection and sound use** of water resources in the Amu Darya River (Article 2) and establishes the possibility (if necessary) to establish a working group



to deal with issues arising between the countries in connection with the Amu Darya River (Article 9).

Afghanistan, a riparian country to the Amu Darya, is not formally involved in regional water management. However, the legal basis for such cooperation exists within applicable treaty and customary norms. Several agreements were concluded between Afghanistan and Russia (and, later, the USSR) on frontier matters that touch upon water use issues, including: the 1843 Agreement between Russia and the Great Britain; the 1887/1885 Protocol on Delimitation; the Exchange of Notes of 11 March 1895 between Great Britain and Russia; the 1921 Treaty of Friendship between Afghanistan and the Soviet Union; the 1931 Treaty concerning neutrality and non-aggression between the USSR and Afghanistan; the 1946 Frontier Agreement between Afghanistan and the USSR; the 1958 Treaty concerning the regime of the Soviet-Afghan state frontier; the 1958 Protocol between the USSR and Afghanistan on the joint execution of works for the integrated utilization of the water resources in the frontier section of the Amu Darya; the 1968 Agreement on economic and technical cooperation during the period 1967-1972; and the 1978 Treaty of friendship, good-neighborliness and cooperation. According to the rules of treaty succession, these agreements would still be in force to the extent that they create rights and obligations “attaching to” the parts of the Amu Darya basin to which they relate within the meaning of Article 12 of the Vienna Convention on Succession of States in respect of Treaties. Given agreements do not regulate water distribution along the Amu Darya River but only set the general order of the use of “frontier waters” and “waters of the rivers reaching the frontier or frontier waters” (in particular, in the 1958 Treaty).

In the recent years, **Afghanistan and Tajikistan signed several bilateral agreements** and memorandums of understanding on water management (2010), exchange of hydrological data (2014), natural disasters (2019) and environment (2020). Particularly, in the 2010 Agreement, Afghanistan and Tajikistan agreed to join forces in hydrological monitoring, operational information for flood and drought management, disaster risk notification, bank protection, research cooperation and consultation on irrigation of lands adjacent to the Panj (Amu Darya). Flow regulation is not addressed in those documents.



1.3. Institutional setup of water interactions

In the 1980s, **to improve inter-republican allocation of water resources in the Amu Darya and the Syr Darya basins and transfer to the basin principle of water management**, basin water-management organizations – BWO Amu Darya and BWO Syr Darya – were established. They reported directly to the Soviet Ministry of Water Management. Since independence and establishment of the Interstate Commission for Water Coordination (ICWC), BWOs have become a part of the Commission as its executive bodies (1992 Almaty Agreement).

Today, **ICWC** serves as the main institutional mechanism of transboundary water management.⁷ It determines the regional water policy and ensures integrated and sound management and use of water resources in the Amu Darya and the Syr Darya river basins, including planning and control of water allocation between the countries.

ICWC and its executive bodies (BWO Amu Darya, BWO Syr Darya, SIC, Secretariat and Coordination Metrological Centre) **implement measures and procedures for water distribution between the countries based on allocated limits (quotas) of water resources** in transboundary rivers of Amu Darya and Syr Darya basins and partially **regulate river flow by reservoirs**. ICWC operates under umbrella of the International Fund for saving the Aral Sea (IFAS) and is governed by bi- and multilateral agreements of the founder-states on the joint use of interstate water sources and by decisions of the IFAS Board.

These organisations managed to provide for **operational water management and accounting** on a timely manner and avoid the escalation of conflicts related to water allocation. Thus, **coordination between the countries on water allocation** in the Amu Darya and the Syr Darya basins and (to a degree) on regulation of flow by reservoirs is currently maintained. However, there are also **difficulties in the work of ICWC**. In particular,

- it is difficult to ensure coordinated decision making and implementation on full-scale regulation of river flow since large reservoirs and HPPs are operated by energy agencies or companies, while ICWC is comprised of the heads of water agencies of the Central Asian countries. Moreover, the Kyrgyz Republic has “frozen” its membership in IFAS and ICWC.
- BWOs do not have all required management powers, in particular, in part of assigning operation regimes of reservoirs, proceeding from their

⁷ In 2016, Kyrgyzstan “froze” its membership in Interstate Fund for saving the Aral sea and its commissions – ICWC and ICSD.



analysis of impacts of such regulation. Also, the jurisdiction of the BWO extends only to parts of the basin: in the Syr Darya basin - the main channel of the Naryn-Syrdarya up to the Chardarya reservoir; in the Amu Darya basin - parts of the Vakhsh, Pyanj, Kafirnigan rivers and the main channel of the Amudarya river up to the Aral Sea.

- The coordination between organisations working on water (ICWC/BWOs, national water agencies) and hydropower (the Coordination Council on Electricity / CDC “Energy” and relevant national agencies) could be much better.

1.4. Specifics of Central Asian energy system regulation

Central Asia has sufficient raw hydrocarbon deposits and a high hydropower potential. Given the geographical distribution of energy resources, thermal power was developed in Kazakhstan, Turkmenistan and Uzbekistan, while Kyrgyzstan and Tajikistan developed hydropower. In this context, there was intensive construction of main electric grids enabling large flows of electricity from one region to another. Based on such distribution, the operating regimes of the Unified Energy System of Central Asia were developed and performed.

The Unified Energy System (UES) of Central Asia was established in the 1960s and 1970s in the territories of Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan and five provinces in the south of Kazakhstan. UES CA is a set of energy systems connected with each other through 220 and 500-kV transmission lines that works in parallel with the Unified Energy System of Russia through Kazakhstan’s grids.

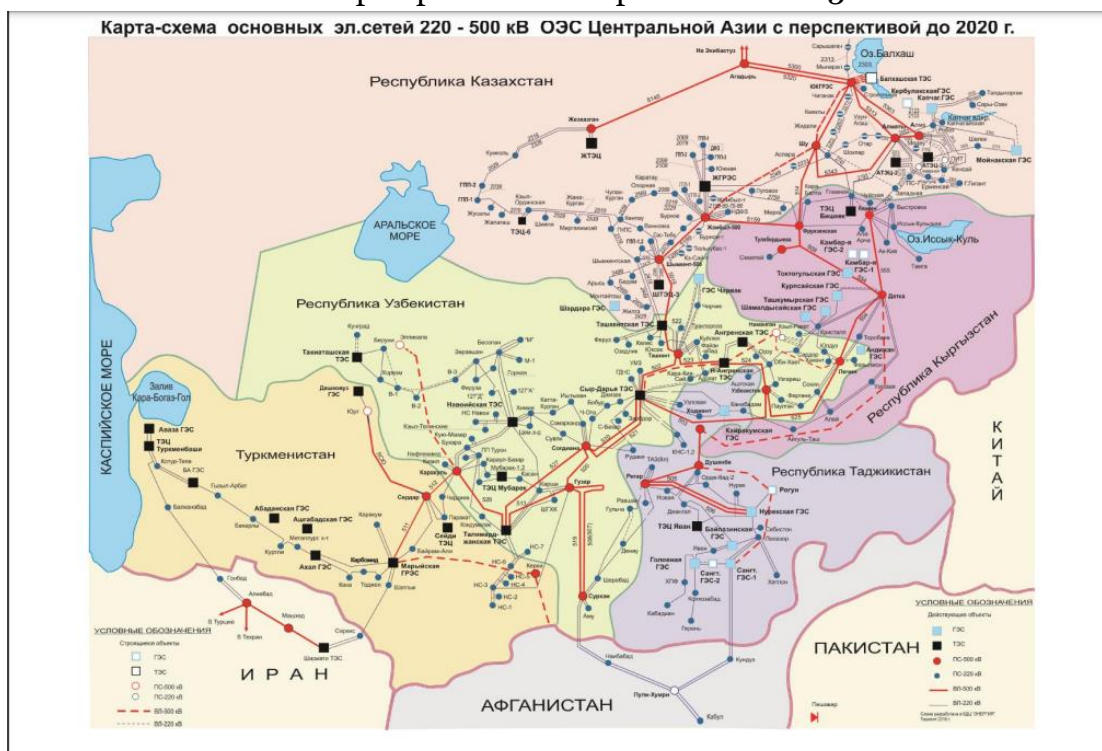
Since the very beginning, the UES CA has operated in isolation from the Soviet Union’s Unified Energy System and independently regulated frequencies and other parameters of the energy system. Dispatching control was performed from the single center located in Tashkent. The configuration of the grid was formed in the 70-s, when 500-kV transmission lines crossing the four republics were integrated into a single ring. This enabled reliable operation of all members of the parallel work. The ring-type work preserves parallel operation of energy systems even if any of its elements is disabled. But if radial feeders connecting the elements of the energy system are disabled, their parallel operation may fail.

The UES structure consisting of 30% of hydropower plants and 70% of thermal plants was optimal, in terms of science and operation, for regulation of frequency and capacity and for dealing with water and energy problems. The long-term planning of UES CA operation regimes took into account generating sources in each of energy systems in the UES and, accordingly, addressed the centralized provision of energy systems with fuel for power plants.



In the Soviet period, the system helped to balance seasonal fluctuations of electricity and irrigation water demands with variations of river water availability. In winter Kyrgyzstan and Tajikistan accumulated water in reservoirs and received electricity and energy resources (coal and natural gas) from Kazakhstan, Turkmenistan and Uzbekistan, while in summer Kyrgyzstan and Tajikistan delivered water to Uzbekistan and Kazakhstan for irrigation. Besides, Kyrgyzstan and Tajikistan supplied their neighbors with hydropower, which they generated in excess to their domestic needs.

Scheme of 200-kV and 500-kV electricity grids in UES CA with perspective development until 2030



Source: <https://e-cis.info/news/566/106508/>

Both energy and irrigation demands that are inextricably linked in the Central Asian region were taken into account under operating regimes. Optimization of operating regimes meant minimization of fuel inputs and electricity losses in grids of the unified system as a whole rather than in individual energy systems. Maintenance schedules were linked with each other, while spare parts were supplied on a centralized basis.

Since the collapse of USSR, the centralized supply with energy materials and resources has stopped. Urgent measures were taken for energy independence of

energy systems, i.e. self-balance in terms of energy and fuel supply; however, starting points of the countries differed considerably. Because of lack of own energy resources in the countries that had abundant hydropower, reservoirs started to release more water in winter. This led to breach of established water and energy regimes and to environmental problems. Thus, the achievement of optimal regime on the UES scale has melted away.

The energy systems of Kazakhstan, Kyrgyzstan and Uzbekistan owns the 500-kV ring. None of these energy systems has exited from the ring, operating in joint parallel work. The energy systems of Turkmenistan and Tajikistan work in isolation from the UES CA and are not related to the 500-kV ring.

Turkmenistan withdrew from the UES CA in 2003 on its own initiative and found a market in the Iranian energy system, with which it currently works in parallel. Turkmenistan works with the UES CA through the so-called insular schemes, by allocating individual generators and lines to Uzbekistan.

Tajikistan was separated from parallel work due to multiple breaches of the conditions of parallel work by a joint decision of other members of the UES CA. With the financial support of ADB, the Tajik energy system is under re-connection to the UES CA, but, as practice shows, re-connection after quite a long period of time requires years of joint efforts. Restoration of parallel work with Tajikistan is expected tentatively in 2023. In the meantime, all this time the Tajik energy system has regulated frequency independently because of its huge reserves at hydropower plants. This task cannot be solved through thermal plants (as in Kazakhstan and Uzbekistan) or poor reserves at hydropower plants (as in Kyrgyzstan in recent years). That's why the joint work of those energy systems under the single "Central Asian" ring is important for reliable parallel work of energy systems in Central Asia, enhanced mutually beneficial cooperation not only between them but also with "far" neighbors.

Currently, the energy systems of Tajikistan and Uzbekistan have agreed to the scheme for the connection through creation of yet another 500-kV ring through the Tajik energy system, which will significantly extend opportunities for regional trade. Connection of the Turkmen energy system will enable extending electricity trade in the region and electricity transit via the grids of the region's countries.



1.5. Interactions in the energy sector

Since the 1960s, the United (later, Coordination) dispatch center (CDC) “Energy” located in Tashkent has been dealing with interstate control of the UES CA. The Center is responsible for control of system’s operation regimes, reliability and quality of electricity supply, i.e. correspondence to standards in terms of frequency, voltage and other parameters.

While recognizing that neither energy system can independently ensure full and reliable supply for its consumers, the heads of energy systems signed an Agreement on parallel operation of energy systems in Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan on 19 November 1991 in Ashkhabad. They founded a United dispatch authority for Central Asian energy systems (later renamed as UDC “Energy”), with financing the authority on a shared basis.

The parallel operation of the UES has been controlled and coordinated by the Coordination Council of the Unified Energy System of CA (UES CA Council), comprised of top managers of energy systems who met quarterly. All decisions on parallel operation were made collectively.

In 2002, in connection with structural changes in energy systems, the Council of the Unified Energy System of CA made decision to adapt the status of the Council and UDC “Energy” to new realities and transformed the latter into a non-governmental entity.

By the Agreement on coordination of energy relationships in Central Asia signed on 27 October 2004, a **Coordination Electricity Council of Central Asia** (CEC CA) was established. This is an advisory body of energy systems replacing the Council of UES CA. CEC CA at its meetings, besides reviewing plans and reports on operation of the country energy systems during growing and autumn-winter seasons, discuss the issues related to availability of energy resources, prevention of crisis situations in time of water shortage in the region. In different periods of time, observers in the work of CEC CA were: DA Brishno Sherkat (Islamic Republic of Afghanistan, suspended in 2022), AO Samruk-Energo (Republic of Kazakhstan, refused from the status of observer in 2021), OAO CO EAS (Russian Federation, since 2022).

At the Council’s meeting on 29 September 2006, the members approved a founding treaty on establishment and operation of a non-governmental non-profit organization – the **Coordination Dispatch Center (CDC) “Energy”** responsible mainly for carrying out parallel operation and coordination of operational and dispatching work of energy systems in Central Asia. The headquarters of CDC “Energy” is in Tashkent. The organization reports to CEC



CA, which is a supreme governance body. Business activities are not allowed for CDC “Energy” by its Statutes. CDC “Energy” has started functioning as an international non-governmental non-profit organization since 1 July 2007.

Thus, close relationships on energy and unified control have been maintained in Central Asia for more than 60 years. CDC “Energy” (former United dispatch authority for Central Asia) celebrated its 60th anniversary in April 2020 and did not stop working. There is only a point of importance: once the United dispatch authority was a *control* body, while for the CDC the founders left the function of *coordinating* the joint work of the national dispatch centers. Thus, we can say that the **coordination of energy flows between the countries is still maintained**.

In the context of structural transformations in energy systems accompanied by division of vertically integrated energy companies, based on type of activity, the current actors of the CEC CA are the companies with the functions of system operator. These companies include AO “KEGOC” in Kazakhstan, OAO “NES of Kyrgyzstan” in Kyrgyzstan, AO “NES of Uzbekistan” in Uzbekistan and OAHK “Barki Tojik” in Tajikistan.

In 2021, coordination of interactions on energy systems raised to a new level. For the first time since 1991, it was decided to develop a Concept of joint development of the Kazakh energy system and UES CA to increase reliability and effectiveness of parallel operation of energy systems in Kazakhstan, Uzbekistan, Kyrgyzstan, and Tajikistan. NAO “Almaty University for Energy and Communications” was chosen to do this work at the expense of joint funds accumulated in CDC “Energy” through contributions from the energy systems in support of CDC “Energy”. The work is underway in close cooperation with the energy systems and CDC “Energy” and consists of:

- analysis of the current state of integration of energy systems in Central Asia and Kazakhstan;
- development of conceptual proposals on joint development of the Kazakh energy system and UES CA, including the development of market-based instruments, electric grid, generating sources, technological systems of automatic control and telecommunications. The work is to be completed in 2023.



1.6.Coordination of country interests and sectors when regulating river flows

BWO Amu Darya and BWO Syr Darya **consult and negotiate** with the national water agencies when preparing the operation regimes of large reservoir and HPPs in the Amu Darya and the Syr Darya basins. Approval is also sought from energy systems and CDC “Energy” on regimes of water releases from reservoirs for irrigation needs, taking into account the needs for hydropower generation.

1.6.1. Flow regulation in the Amu Darya River Basin

The operation regime of the **Nurek HPP** reservoir on the Vakhsh River (Tajikistan) is determined first by BWO Amu Darya on the basis of hydrometeorological forecasts of inflow to the Nurek reservoir and similar cases of flow regulation under given inflow (from historical databases of BWO) showing amounts of accumulation and water releases from the reservoir.

Next, BWO submits this operation regime to a regular ICWC meeting for approval and further fulfillment. The ICWC may correct the regime. It should be noted that coordination of operation regime of the Nurek reservoir with Tajik energy sector takes place at ICWC meetings as one member of ICWC is the Deputy Minister of Energy and Water Resources of Tajikistan.

The operation regime of the Nurek reservoir is close to the energy regime or replicate it when the reservoir is fully (or almost fully) drawn down by the beginning of the growing season. During the growing season at high flow, the reservoir is filled in a way to avoid its overflow by the end of the growing season and idle discharges leading to electricity losses..

In the future, after the Rogun HPP is put into operation, this scheme of coordination of flow regulation regime of the Vakhsh River (and hence the Amu Darya River) should be changed. Operation regimes of the reservoirs of Roghun HPP and Nurek HPP should be based on **the rules of operation of the Vakhsh cascade**. Development, coordination and implementation of operation regimes should be agreed upon by the riparian countries through an agreement. It seems that the most sound would be to approve such energy-irrigation schedule of water releases from the Nurek reservoir (close to the current one), where additional water releases are guaranteed during low-water summer seasons through multi-year storage in the reservoir of the Roghun HPP. It looks necessary to create a mechanism for evaluation of services provided by Roghun HPP on creation and maintenance of storage in the multi-year regulation reservoir as agreed upon by all concerned parties.



Regulation of flow of the Amu Darya River by the reservoirs of the **Tuyamuyun Hydroscheme** (TMHS) is determined by BWO Amu Darya on the basis of BWO's forecast of inflow to TMHS (Darganata section) and based on water accumulated in TMHS reservoir by the beginning of the season. Water releases from TMHS are calculated proceeding from the current water situation in lower reaches of the Amu Darya (from the river balance drafted by BWO).

Then BWO submits the TMHS operation regime to a ICWC meeting for approval and implementation. Next, the operation regime is passed to the TMHS Operation Authority, where it is adjusted for each reservoir of TMHS (Ruslovoye, Kaparas, Sultansandjar and Koshbulak).

Operation of the **Ruslovoe reservoir** is planned in such a way so that to meet, as maximum as possible, hydropower generation requirements (in terms of head and releases) for Tuyamuyun HPP and fill the Kaparas reservoir with low-saline water for drinking purposes.

Technical meetings of the Commission for water allocation in the Amu Darya lower reaches, comprised of representatives of Uzbekistan, Turkmenistan and BWO Amu Darya, are convened if necessary. They analyze the water-related situation, including, operation of TMHS and make decisions on water management not only in the lower reaches but also in the middle reaches of the Amu Darya River, including adjustment of limits of water withdrawal from the river and TMHS reservoirs, volumes of inflow to aquatic ecosystems of the South Aral region, etc.

1.6.2. Flow regulation in the Syr Darya River Basin

Coordination of operation regimes of large reservoir and HPPs between the countries in the Syr Darya River basin is more complex since the largest multiyear regulator in the basin – the reservoir of Toktogul HPP – can work in alternative regimes: irrigation-energy (design), energy (opposite to design), or energy-irrigation, when during the growing season also irrigation releases are carried out in addition to energy releases to improve water supply of users located downstream of the hydroscheme. The operation regime of Toktogul reservoir impacts operations of other reservoirs regulating flow of the Syr Darya River.

BWO Syr Darya determines the operation regime of the **Toktogul reservoir** located on the Naryn River (Kyrgyz Republic) proceeding from the schedule (regime) of water releases from Toktogul HPP, the data received from CDC "Energy" and the hydrometeorological forecast of inflows to the Toktogul



reservoir. The agreed operation regime of the Toktogul reservoir is used by BWO Syr Darya as input when drawing up balances of rivers and reservoirs in the basin, including the Bakhri Tojik/Kayrakkum reservoir (Tajikistan) and the Shardara reservoir (Kazakhstan) located downstream.

If low water is expected and additional irrigation releases from the Toktogul reservoir are needed in excess of energy releases during the growing season (April - September), its operation regime (schedules of filling and releases) is developed according to the treaties or protocols concluded:

- between the Ministry of Water Management and Ministry of Energy of Uzbekistan and the Ministry of Energy and Industry of Kyrgyzstan on mutual power supplies,
- between the Ministry of Ecology, Geology and Natural Resources and Ministry of Energy of Kazakhstan and the Ministry of Energy and Industry of Kyrgyzstan.

For example, in March 2021, a Protocol was signed between the Uzbek and Kyrgyz ministries on mutual electricity supplies in 2021-2023. By this Protocol, in total 750 million kWh shall be supplied from Uzbekistan in March and April 2021-2022 and in September and October 2021, and the same amount of electricity shall be delivered from Kyrgyzstan to Uzbekistan in June-August 2021-2023. These supplies must be carried out to avoid discharging the Toktogul reservoir down to a critical level and to provide irrigation water to users in Uzbekistan during the growing seasons of 2021-2023. Additionally, the Protocol specifies that the electricity shall be delivered “after the governments of Uzbekistan and Kyrgyzstan make relevant decisions”, and the national energy operators shall conclude separate contracts on mutual electricity supplies.

Also, in March 2021 a Protocol was signed between the Ministry of Ecology, Geology and Natural Resources and Ministry of Energy of Kazakhstan and the Ministry of Energy and Industry of Kyrgyzstan on the exchange of electricity. The protocol states that the parties shall guarantee the exchange of electricity in the amount of 900 million kWh at a nominal price of \$0.0000001 per kWh. Kazakhstan shall supply electricity to Kyrgyzstan from March to November 2021, while Kyrgyzstan shall return it from June to August 2021-2023 at 300 million kWh per year, with an equivalent discharge through the Uchkurgan HPP of 330 million m³ of water.

The nominal, almost zero price was adopted and agreed by governments of Kazakhstan and Kyrgyzstan to avoid barter in exchanging equivalent quantities of electricity, on the one hand, and do not load energy companies with excessive financial burden related to customs clearance and taxes, on the other hand, in



order to achieve the single goal – water supply of consumers. Similar scheme was agreed for 2022 between Kazakhstan and Kyrgyzstan and also between Uzbekistan and Kyrgyzstan. Moreover, the compensatory supplies from Uzbekistan and Kazakhstan were implemented for the first time before rather than after the growing season .

It should be noted that the use of non-market mechanisms assigning nominal electricity prices is the main reason for concluding agreements on mutual supplies of electricity in the form of intergovernmental protocols.

Neither CDC “Energy” nor BWO Syr Darya is formally involved in the Protocols. However, the ICWC members from Uzbekistan and Kazakhstan take part in elaboration and negotiation of schedules of water releases from the Toktogul reservoir and mutual supplies of electricity. It seems that **trilateral protocols** (between respective ministries of Kyrgyzstan, Kazakhstan and Uzbekistan) involving experts of CDC “Energy” and BWO Syr Darya **would help to make the process of coordination shorter and better and ensure proper implementation** of the protocols.

In the technical and legal documents regulating the water and energy relations of the countries for the Naryn River, the conditions for water discharge below the Uchkurgan HPP should be fixed. Today, the water flow downstream of the Uchkurgan HPP is uneven and depends on the regime of daily and ten-day regulation at the HPP. Large fluctuations in water flow (several times during the day) complicate the operational management of water distribution at the Uchkurgan hydroelectric complex, located below the Uchkurgan HPP.

The operation regime of the **Bakhri Tojik** reservoir for October-March is first developed by BWO Syr Darya based on calculations of inflow to the reservoir and then submitted to a ICWC meeting. For the summer season (June-August), the operation regime is determined by a tripartite protocol of the working meeting of the Kazakh, Tajik and Uzbek parties - representatives of the Ministry of Ecology, Geology and Natural Resources of Kazakhstan, Ministry of Energy and Water Resources of Tajikistan, and Ministry of Water Management of Uzbekistan. The agreed operation regime is then passed to BWO Syr Darya for implementation.

In June 2022, the working meeting of the Kazakh, Tajik and Uzbek parties signed a Protocol, in which they agreed on the following operation regime of the Bakhri Tojik reservoir for June-August 2022:

- the Tajik side will carry out additional water releases from the Bakhri Tojik reservoir (according to the schedule set out in the protocol), if the Uzbek side ensures at least 300 m³/s of inflow to the reservoir,



- if the agreed regime of water releases from the Bakhri Tojik reservoir is carried out, the Uzbek side shall deliver water along the Dostyk canal to Kazakhstan,
- if one of the parties fails to fulfill its obligations as specified in the protocol, the other party reserves the right not to fulfill its respective obligations.

In the Protocol 2022, in addition to coordination of reservoir operation regime, a number of other matters are addressed, in particular: logistical and technical support to the Tajik side; provision by Uzbekistan of inflow through South Fergana Canal and Big Fergana Canal to Tajikistan; keeping the water level in the Farkhad reservoir not lower than 319.2 m, etc.

Besides trilateral working meetings, the Ministers of Water Management of Uzbekistan and of Ecology, Geology and Natural Resources of Kazakhstan meet to consider again the operation regimes of the Bakhri Tojik reservoir for the **improvement of water supply**. The protocols of these meetings specify the terms and measures for power exchange between the riparian countries, the decisions made on water releases and drawdown of the Bakhri Tojik reservoir, on water delivery along the Dostyk canal. **If the parties consider that additional water releases are needed to improve water availability, new negotiations with the Tajik side are planned.**

The operation regime of the **Andizhan reservoir** on the Karadarya River is developed by the Ministry of Water Management of Uzbekistan, based on hydrometeorological forecast of inflow to the reservoir. The developed operation regime is coordinated with the Ministry of Energy of Uzbekistan and passed to BWO Syr Darya and then submitted to ICWC for approval. In addition, the water demand in the Karadarya River basin, as well as inflow from the Syr Darya River to the Bakhri Tojik reservoir are taken into account: if necessary, additional compensating discharge is made from the Andizhan reservoir to increase inflow to the Bakhri Tojik. Thus, Uzbekistan tries to implement the design schedule of inflow to the Bakhri Tojik reservoir.

The operation regime of the **Charvak reservoir** located on the Chirchik River is prepared jointly by the Ministry of Energy and the Ministry of Water Management of Uzbekistan and BWO Syr Darya based on hydrometeorological forecast of inflow to the reservoir. The developed operation regime is passed to BWO Syr Darya" and then to ICWC for approval.

The transboundary Chirchik River meets a portion of water needs of Kazakhstan and Uzbekistan in the Chirchik-Ahangaran-Kelek basin and forms a part of inflow to the Shardara reservoir (water from the Chirchik-Ahangaran-Kelek



basin is also discharged through the Ahangaran and Keles rivers and the Bozsut canal).

The ICWC negotiates the operation regimes on an integrated manner, based on water balances of reservoirs and rivers, but addresses separately the Amu Darya and the Syr Darya basins.

1.7. Effectiveness of flow regulation in the Amu Darya and Syr Darya basins

The rise in prices of energy resources meant that it was more profitable to export fossil fuels outside of Central Asia. This has led to breach of existing energy exchange patterns, reduction of interstate power trade (compensatory supplies) and, as a result, forced increase of water releases from reservoirs in winter.

The change in priorities of flow regulation has affected the operation regimes of large reservoirs. Thus, the operation regime of the Toktogul reservoir prioritized hydropower production, the rule curve of operation and rules of operation changed, both in the intra-annual dimension (reduction of water releases from the reservoir in summer and their increase in winter) and in principles of multi-year flow regulation (practices of increased power export and, accordingly, increased water releases from the reservoir in wet years). Today, the **operation regime relies on water release schedules that meet energy regime** of Toktogul HPP - about 3.5-4 km³ during the **growing season**. The countries negotiate on the amount of additional irrigation releases of 2-2.5 km³ for the growing season. **Water releases** from the Toktogul HPP in **winter** were within 4.5 - 5 km³ in the early 1990s and then increased to 6-7.5 km³.

The Nurek reservoir switched to the operation regime, where seasonal energy regulation is implemented (drawdown of the reservoir by the beginning of the growing season and its filling by the end of the growing season), although there is **possibility of partial multi-year regulation**, which allows avoiding drawdown of the reservoir to dead volume by the beginning of the growing season so that to use the saved volume for lessening water scarcity in summer. It should be noted that this requires high accuracy of flow forecasts and guaranteed importers of power to avoid idle/unproductive discharge from reservoirs.

The lack of effective coordination in assignment of, and adhering to, operation regimes for major reservoirs, combined with the abrupt changes in water availability and poor predictability of runoff, leads to **low efficiency and unsustainability of flow regulation regimes and operation of the**



Central Asian energy system. Inefficiency of flow regulation is expressed, in particular, in (a) lack of electricity in winter and unproductive water discharges from HPPs in summer due to early summer filling of reservoirs, which leads to overfilling of reservoirs by the end of summer and forced releases from HPPs, and, consequently, to electricity losses through such releases, (b) drop in water availability for different sectors, especially in summer.

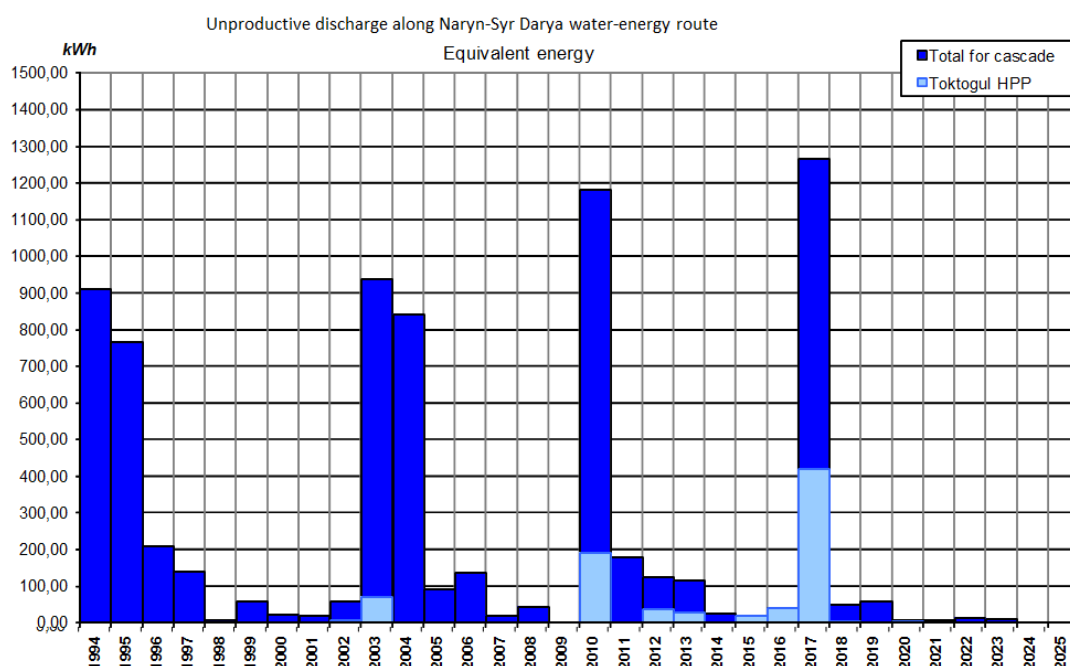
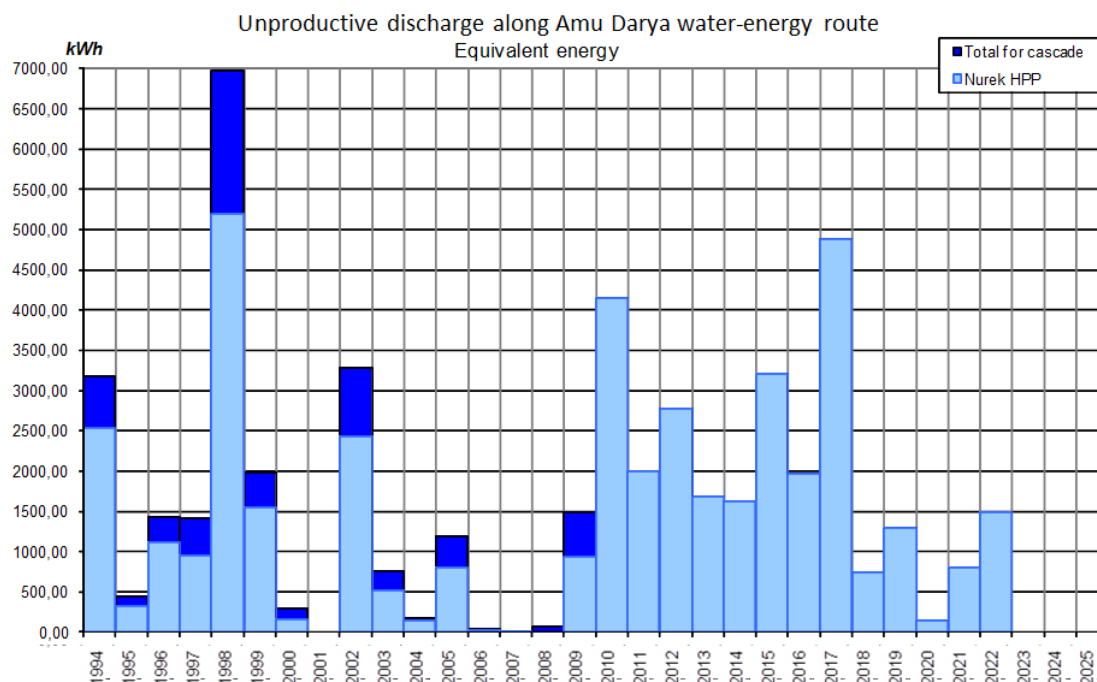
In dry years, the upstream countries strive to minimize water releases in order to save water to cover their energy needs in winter and, in case of the Toktogul reservoir, to meet water needs in subsequent years. This does not suit Uzbekistan and especially Kazakhstan located at the very end of the basin. In wet years, the irrigation water needs of Kazakhstan and Uzbekistan are met mainly through lateral inflow, i.e. they are interested in receiving electricity in less volume than that specified in the intergovernmental agreements. For example, in the wet year 2017, at Kyrgyzstan's request, Uzbekistan purchased 1.2 billion kWh of summer power at mutually acceptable price, below the market price, to prevent unproductive discharges. Kazakhstan did not buy electricity from Kyrgyzstan in the same year. The inflow was so high that water for 1.3 billion kWh of electricity equivalent was discharged unproductively through the Naryn cascade.

At the same time, compensatory supplies of energy resources to the upstream countries are reduced accordingly in the subsequent winter season, and the upstream countries have to increase winter water releases from the reservoir to cover their energy needs. Therefore, due to unpredictability and insufficient guarantees of energy resource supplies from neighboring countries in winter, there is a significant risk for Kyrgyzstan and Tajikistan after fulfillment of their obligations on irrigation releases.

Disruption of established patterns of energy exchange led not only to additional water releases from reservoirs. In some dry years, to avoid excessive reservoir drawdown, Kyrgyzstan and Tajikistan were forced to impose restrictions in the energy systems for consumers. At the same time, unproductive water releases in summer became more frequent due to absence of demand for electricity and the limited capacity of reservoirs.

In Tajikistan, particularly large unproductive discharges occurred after its energy system was disconnected from the UES CA to isolated operation in 2009 (due to breaches in observance of balances in terms of capacity and energy). In the wet year 2017, water equivalent to 9.160 billion kWh was discharged from the Nurek HPP in waste.





Seasonal flow regulation does not allow utilizing full regulating capacities of reservoirs to lessen water scarcity in dry years as much as possible. Among the key reasons is the lack of clear agreements on multi-year regulation of river flow. Thus, the 1998 Syr Darya Agreement was not implemented properly, in particular, since it lacked a tool for estimation of multi-year regulation and a mechanism for implementation of such regulation.



Another significant factor is that ICWC cannot assign and control regimes of annual and multi-year flow regulation by reservoirs, based on its analysis of river balance, since upper reservoirs are operated by countries largely unilaterally.

1.8. Compensation and financial mechanisms on flow regulation

Since independence, the Central Asian countries have elaborated the financial mechanisms of water cooperation. This section will review matters related to (1) financing of ICWC bodies; (2) co-financing of interstate water infrastructure; (3) compensations for implementation of the agreed flow regime; and, (4) co-financing of construction and operation of hydropower plants.

1.8.1. Financing of regional bodies

According to its Charter, ICWC establishes its executive bodies and provides financing of their activities on the parity principle through contributions of national water agencies, with share participation of the parties [...] (Charter of ICWC, p. 3.4.).

As the 1992 Almaty Agreement states, BWOs shall be financed through allocation of national water agencies on parity and shared basis (Article 9). BWOs' statutes set out that BWO Amu Darya and BWO Syr Darya shall be financed by the concerned parties of ICWC on shared basis (By-law, p. 1.2). In practice, BWO and its territorial divisions are financed from the budget of the country, where the BWO is located.

Financing of the Secretariat is provided by the ICWC member state, which hosts the Secretariat as the share participation for maintaining BWO Syr Darya and BWO Amu Darya (By-law of Secretariat, p.5).

SIC ICWC and its national branches are financed through national water ministries:

- for information system development and maintenance [...] at expense of member fees to the International Fund for Aral Sea Saving proportionally to amount of water resources used;
- for publication of ICWC bulletin and other information materials - in equal shares for the republics;
- for strategic planning and development of research and design work based on ICWC approved work plan ... by each national water ministry



at expense of member fees to the International Fund for Aral Sea Saving (By-law of SIC, p. 3.5).

In practice, the headquarter of the SIC ICWC in Tashkent is financed from the budget of the Republic of Uzbekistan through the Ministry of Finances as the country's contribution to IFAS.

CDC "Energy" and its founders are not in the IFAS structure. CDC "Energy" is financed through the fees of CEC CA members in equal shares based on the cost estimate, which is approved annually at CEC CA meetings.

1.8.2. Co-financing of water infrastructure of interstate use

Central Asia has gained some experience in sharing and financing the water infrastructure of interstate use on a bilateral basis.

Turkmenistan and Uzbekistan agreed on a clear legal and financial framework of joint operation of water infrastructure of interstate use in 1996. The Cooperation Agreement on water management (16 January 1996, Chardjew) sets out that Turkmenistan shall provide to Uzbekistan the **land, for compensated use**, for the location of all facilities and organizations of **Karshi and Amu-Bukhara canals and of Tuyamuyun Hydroscheme** that are the property of Uzbekistan and also for all other actually used water facilities and interstate water systems (Ozerniy and Daryalyk collecting drains, Makhankul' collecting drain, Karshi/Southern collecting drain). By the Agreement on compensated land-use (17 April 1996, Ashgabat) the Parties agreed to make mutual settlements, by agreeing on concrete amount of money, once a quarter. Thus, every year Uzbekistan pays to Turkmenistan the inscribed in the Agreement amount of \$11,433,005.5 as the payment for compensated land-use. **Maintenance and operation** of all facilities are covered from the budget of Uzbekistan. Until 2020, funds had been allocated through the Ministry of Water Management; since 2020, these waterworks have been maintained at the expense of local budgets, except for the Amu-Bukhara Canal, which continues to be financed through the central budget of the Ministry.

Since 1996, Kazakhstan and Kyrgyzstan have been cooperating in operation of facilities in the river basins Chu and Talas on the shared participation basis, first, at interdepartmental level and, then, since 2000 through an intergovernmental Agreement on the Use of Water Management Facilities of Intergovernmental Status on the Rivers Chu and Talas. The Parties attribute to intergovernmental status to the following water management facilities owned by the Kyrgyz Republic: the Orto-Tokoiskoye Reservoir on the River Chu, the By-Pass Ferroconcrete Chu Canals on the River Chu from the Bystrovskaya Hydroelectric Power Plant to the city of Tokmok, the Western and



Eastern Big Chu Canals with the Chumysh Hydrosystem on the River Chu and the Kirovskoye Reservoir on the River Talas (Article 2). The Parties shall **share expenses connected with the operation and maintenance** of water management facilities of intergovernmental status and with other mutually agreed activities pro rata according to the amount of water they receive (Article 4). The calculation of maintenance costs is made every year and approved at regular meetings of the Chu-Talas Water Commission. Vehicles, equipment, raw materials and other objects necessary for the operation and maintenance of water management facilities of intergovernmental status shall be free from any customs duties (Article 11).

Kyrgyzstan and Kazakhstan allocated \$34,646.9 for maintenance of water management facilities in the Chu and Talas river basins from 1997 to 2019. According to the Law of the Kyrgyz Republic “On Public Procurement”, all types of repair and restoration work at irrigation facilities must be carried out in accordance with the procurement requirements. At present, water management organizations of the Republic of Kazakhstan undertake their part of repair and restoration work at interstate facilities without tender procedures. The Kyrgyz side proposed to the Republic of Kazakhstan to follow the requirements of the Kyrgyz legislation in shared participation in maintenance work for the interstate facilities in the Chu and Talas. All efforts at the interstate facilities should be made at prices approved by the State Committee for Construction of Kyrgyzstan. The Kazakh side agreed to consider the possibility of transferring funds to the accounts of the Kyrgyz side in accordance with the current legislation of the Republic of Kazakhstan, but further reported that there was no such possibility in the legislation of the Republic of Kazakhstan. Hence, it is necessary to amend the relevant article of the 2000 Agreement.

In 2022, the President of the Kyrgyz Republic, Sadyr Zhaparov, launched the construction of a new Bala-Saruu hydroelectric power plant at the Kirov reservoir. With assistance from the Ministry of Energy and Industry of the Kyrgyz Republic and National Holding Company OJSC, Chakan HPP OJSC began the construction of "Bala-Saruu" HPP on the downstream of the Kirov reservoir. The Bala-Saruu HPP project involves the construction of a hydroelectric power plant with three generators with a total capacity of 25 megawatts, with an average annual electricity generation of 92 million kWh. This project will allow the most efficient use of the hydropower resources of the Kirov reservoir in the Talas region, which have not been used since the construction of the reservoir until now.

Kyrgyzstan and Uzbekistan agreed on the interstate use of the Orto-Tokoiskoye (Kasansai) reservoir in Ala-Buka district, Dzhalal-Abad province in



Kyrgyzstan on **6 October 2017**.⁸ The Orto-Tokoiskoye (Kasansai) reservoir is designed for irrigation mainly. It was decided that the Kyrgyz side will operate, maintain, ensure safety of facilities and release water from the reservoir within the limits agreed on by the parties. The Uzbek side will **share the costs of operation and maintenance** of the reservoir and finance other agreed actions proportionally to the amount of water it receives (Article 2).

Operation and maintenance costs include personnel costs, repair and maintenance, and other operating costs. The costs are not subject to any tax and charge requirements. The scope of repair and maintenance efforts is determined on the basis of a statement of defects drafted by the working group composed of representatives of the Parties. The operation and maintenance costs shall be estimated in line with regulations of the Kyrgyz side and financed by the parties on quarterly basis. The Uzbek side transfers the funds on the basis of the invoice issued by Kyrgyz side.

Based on the approved protocols, in 2019-2020, Uzbekistan allocated and directed to Kyrgyzstan its cost share to cover maintenance of the Orto-Tokoiskoye (Kasansai) reservoir. Until 2017, the reservoir had been maintained and operated by Uzbekistan, and funds had been allocated from the Ministry of Water Management.

Tajikistan and Uzbekistan reached a cooperation agreement on operation of the **Farkhad dam** on **9 March 2018**.⁹ The Farkhad Hydroscheme on the Syr Darya River extends to 22 km near the Khudjand city in Tajikistan and the Syrdarya province in Uzbekistan. It is an important strategic structure for both countries. The reservoir of Farkhad HPP irrigates over 45 thousand ha in Tajikistan and more than 330 thousand ha in Uzbekistan. All generated hydropower is used by Uzbekistan. The agreement did not determine the administrative status of the land, where the hydroscheme was located, and its ownership right. However, it was agreed that Uzbekistan would operate, maintain and **cover all costs related to stable operation of the Farkhad dam**, while Tajikistan would keep rule of law, security and protection of the structure. At the same time, goods and services for operation of the structure shall be free from all kinds of duties. The agreement is concluded for 49 years without the right of denunciation during this term.

The Government of Uzbekistan and the Cabinet of Ministers of the Kyrgyz Republic signed an Agreement on joint management of water resources of the

⁸ Agreement between the Government of the Republic of Uzbekistan and the Government of the Kyrgyz Republic on the interstate use of the Orto-Tokoiskoye (Kasansai) reservoir in Ala-Buka district, Dzhahalal-Abad province in the Kyrgyz Republic, <https://lex.uz/ru/docs/3601296>

⁹ Cooperation agreement on operation of the Farkhad dam www.adlia.tj/showdoc.fwx?rgn=131156



Andizhan (Kempirabad) reservoir on 3 November 2022. The reservoir was built in the bed of the Karadarya River in the territory of Uzbekistan and designed to provide stable water supply to the population and economic sectors of the two states (Article 1). It is agreed that water resources of the reservoir will be managed by the Joint Commission (Article 2). The Uzbek side shall operate, maintain, ensure safety of the reservoir and release water within the limits agreed with the Kyrgyz side (Article 4).

1.8.3. Compensations and other mechanisms for implementation of the agreed flow regime

In Article 12 of the 1992 Almaty Agreement the Parties agreed to develop within 1992 a mechanism of economic responsibility and other sanctions for violation of the agreed water use regime and quotas. Unfortunately, such a mechanism has not been developed yet.

Kazakhstan, Kyrgyzstan and Uzbekistan signed an Agreement on the use of water and energy in the Syr Darya River Basin in **1998 (Tajikistan** joined the Agreement in 1999). To ensure the agreed-upon operating regimes of hydropower facilities and reservoirs of the Naryn-Syr Darya Cascade and deliver water for irrigation needs, the Parties decided to coordinate annually and make decisions on water releases, generation and transmission of electricity, and on compensations for energy losses in equivalent basis (Article 2). Moreover, according to Article 4, the additionally generated power emanating from water releases during the growing season and the multi-year flow regulation in the Toktogul reservoir that exceeds the needs of the Kyrgyz Republic, will be transferred to Kazakhstan and Uzbekistan. The **compensation** for it shall be made as supply in equivalent amounts of **energy resources** (coal, gas, electricity and fuel oil) and **other types of products (labor, services), or in monetary terms as agreed upon**, to the Kyrgyz Republic, for annual and multi-year irrigation water storage in the reservoirs. A single tariff policy for all kinds of energy resources and their transportation shall be applied for mutual settlements.

Besides, Uzbekistan managed with Tajikistan water releases from the Bakhri Tojik/Kairakkum reservoir during the growing season. For water accumulation in the Kairakkum reservoir, the Uzbek side ensured necessary inflow from the Syr Darya River at Akdjar gauging station, receipt of electricity in summer from Tajikistan, deliveries of electricity and material-technical resources to Tajikistan in winter, and made the agreed measures for river bank protection and lowering water level (cleaning of channel) in the area of the Kairakkum reservoir. The Parties provide each other services on transit of electricity and regulation of capacity (frequency).



For implementation, the parties organized expert working meetings to draft a multilateral intergovernmental protocol involving regional organizations. These meetings were useful because they allowed coordinating the interests of all actors. Volumes of water releases and, accordingly, of electricity receipt were scheduled for months and sometimes for decades. This allowed considering the irrigation needs more accurately.

Intergovernmental protocols have been increasingly adopted on a bilateral basis since mid-2000's. Regional organizations were not involved in the drafting of such bilateral protocols, since it was believed that these organizations should perform executive functions. The expert working meetings was gathered in a narrow format. The negative consequences began to appear more and more often: failure to take into account the technical capabilities of the parties, such as the load of "narrow" sections and the voltages in electric grids, the generating capacities, etc. could limit the volume of planned supplies.

Let's consider the mechanism of this model using the example of a very dry year 2000 (See the table below). In summer, Kyrgyzstan supplied electricity to Kazakhstan and Uzbekistan, and in winter electricity and fuel resources were supplied to Kyrgyzstan. Supplies during the growing season from Kyrgyzstan to Kazakhstan and Uzbekistan totaled 3.3 billion kWh. Such amount could not be returned by generation at thermal power plants in winter, thus, along with electricity, fuel and lubricants, services, etc. were returned.

Table 1: Electricity export and import within Central Asian countries

Export	2000	Energy systems of Central Asian countries					MkW
		Import					
		Kaz	Kyrg	Taj	Turk	Uzb	Total:
	Kazakhstan						0.0
	Kyrgyzstan	1252.9		154.4		1925.6	3332.9
	Tajikistan		125.7			243.9	369.6
	Turkmenistan	34.8		818.7		67.8	921.3
	Uzbekistan		194.6	728.8	32.5		955.9
	Total:	1287.7	320.3	1701.9	32.5	2237.3	5579.7



Such an approach was ineffective, since not all involved agencies fulfilled their obligations in full measure. Given that compensations usually were made post-factum, i.e. as supplies in response, Kyrgyzstan could not be sure that its winter needs would be adequately compensated. Consequently, as mentioned above, in recent years compensatory supplies of electricity only have been practiced. Moreover, they were implemented both post-factum and before the beginning of the growing season. Besides compensatory supplies of electricity, the parties provided supplemental services related to electricity.

Thus, the Protocol signed on March 11, 2021 between the Ministry of Energy and Industry of the Kyrgyz Republic and the Ministries of Energy and Water Management of the Republic of Uzbekistan envisaged that, besides compensatory supplies, the Uzbek side was to provide transit services via its grids for electricity bought by Kyrgyzstan from Turkmenistan. This Protocol aims to keep water resources in the Toktogul reservoir in the period of continued dry cycle. To implement the Protocol, OAO “Electric Stations” has signed a contract with AO “NES of Uzbekistan” for transit of electricity from Turkmenistan via the Uzbek energy grid during July-September 2021. After, the contract was prolonged till November 2021. The total transit volume was 501.9 MkW under the contract.

1.8.4. Co-financing construction and operation of HPP

Central Asia has **no experience in joint construction of hydraulic structures so far but such opportunities are emerging**. An Agreement¹⁰ was signed in 2021 between the Government of Tajikistan and the Government of Uzbekistan on the establishment of a joint stock company and on conducting feasibility study for construction and operation of two HPPs in the Zarafshan river basin.¹¹ The HPPs in the Zarafshan river basin are designed mainly for hydropower. According to the Agreement, a joint venture in the form of the joint stock company shall be established for construction of Yovon HPP and Fandaryo HPP. The construction will be financed through loans and grants of international financing institutions and also through own funds that will form the share capital of the joint stock company.

¹⁰ Agreement on construction of hydropower plants in the Zarafshan river basin.
<https://minenergy.uz/ru/news/view/1294>

¹¹ Since Zarafshan river flow does not reach Amu Darya anymore, some hydrologists consider the Zarafshan as an independent river basin,



1.9. Lessons learnt

Water and energy coordination mechanisms have been established and function in Central Asia, but there are still various areas to improve their effectiveness. Over 30 years, ICWC has established a system of operational management of interstate water resources, performing its functions of information collection, annual planning, analysis, research and monitoring. CDC "Energy" coordinates joint work of national dispatch centers, including observance over fulfillment of obligations accepted by parties for implementation of intergovernmental protocols. However, coordination *between* water and energy agencies in terms of ensuring stable and mutually beneficial flow regulation is still problematic.

The lack of appropriate coordination in assigning of, and adhering to, operation modes of major reservoirs, combined with abrupt changes in water availability and low predictability of runoff, leads to **reduced efficiency and instability of flow regulation regimes and operation of the Central Asia energy system**. Inefficiency of flow regulation is expressed in (a) shortage of electricity in winter and unproductive discharges at hydropower plants, (b) drop in available water supply for economic sectors caused (among other things) by the lack of water releases in summer from reservoirs.

The 1998 Agreement and the bi- and trilateral protocols concluded currently on the Syr Darya River Basin do not allow for integrated and multi-year regulation. Intergovernmental agreements between Uzbekistan and Kyrgyzstan began to be concluded in 1995, and then were in force under the 1998 Syr Darya Agreement through 2003. Then, the intergovernmental agreements were concluded in 2007. Since 2016, the intergovernmental bilateral protocols began to be concluded again. These protocols form the basis for the conclusion by economic entities of contracts for mutual supplies of electricity and/or energy resources, while meeting the needs of water users. The expert working meetings were held for drafting these protocols. However, the development of these protocols has been restricted to a very limited group of experts, excluding regional organizations. The negative consequences began to appear more and more often: failure to take into account the technical capabilities of the parties, such as the load of "narrow" sections and the voltages in electric grids, the generating capacities, etc. could limit the volume of planned supplies. Another disadvantage of bilateral and trilateral agreements is their short-term nature (seasonal regulation) and the absence of provisions concerning multi-year flow regulation guaranteeing storage in the reservoirs and its use to cover summer deficits.

In general, the regulation of flow in river basins does not enable maximizing the regional benefit of integrated water resources use. It



is difficult to optimize the management process (to reach the regional effect), because each sector in the countries optimizes its needs based only on its own short-term interests.

Existing institutional and financial mechanisms played an important role in operational (seasonal) regulation of river flows (see table 1) but could not ensure mutually beneficial and long-term regulation of flow to the benefit of all countries in the region and sustainability of water infrastructure.

Table 1. Selected financial mechanisms in CA

Agreement	Key financial mechanisms
Operation and maintenance	
Agreement on the use of water management facilities of intergovernmental status on the rivers Chu and Talas	Sharing expenses connected with the O&M of reservoir pro rata according to the amount of water they receive.
Agreement on the interstate use of the Orto-Tokoiskoye (Kasansai) reservoir	<ol style="list-style-type: none"> 1. Sharing the costs of O&M of the reservoir proportionally to the amount of water it receives. 2. Transfer of funds on the base of invoice.
Cooperation agreement on operation of the Farkhad dam	<ol style="list-style-type: none"> 1. Full financing by the Uzbek party. 2. Zero tax for goods and services designated for O&M of the dam.
Regulation of flow	
Agreement on the use of water and energy in the Syr Darya River Basin	<ol style="list-style-type: none"> 1. Compensation for annual and multi-year irrigation water storage in the reservoirs: <ul style="list-style-type: none"> • in equivalent amounts of energy resources (coal, gas, electricity and fuel oil); • in equivalent amounts of labor and services; • in equivalent amounts in monetary terms. 2. Single tariff policy for energy resources and their transportation.
Construction and O&M	
Agreement on construction of hydropower plants in the Zarafshan river basin	Financing construction through: <ul style="list-style-type: none"> • loans and grants of international financing institutions; • own funds of joint stock company.

The regional organizations under IFAS umbrella are financed on a regular basis, but this financing is insufficient for their full performance. The



possibilities of improving the mechanisms of financing the regional organizations are studied as part of the work on institutional and legal improvement of IFAS.

Co-financing the maintenance and operation of individual water facilities of interstate importance is provided on a bilateral basis and is long-term:

- a. Clearly specified payment in the Turkmen-Uzbek agreements ensured uninterrupted payments from the state budget of Uzbekistan for these needs and, accordingly, coordination of interactions in water management between the countries.
- b. Agreements on Chu-Talas and Orto-Tokoiskoye (Kasansai) reservoir stipulate that both countries will share the costs of operating and maintaining the water management facilities. The key role is to be played by bilateral commissions in calculating the costs. It seems that reaching an agreement on the formula for calculating costs could facilitate the work of the commissions and ensure unconditional and timely allocation of funds from state budgets of the countries for these purposes. A challenge faced by the implementation of the Chu-Talas Agreement is that it does not provide a procedure of settlements and does not take into account the requirements of Kazakh legislation in the field of financial and economic relations.
- c. All costs of maintenance and operation of the Andizhan (Kempirabad) reservoir, Farkhad dam and water facilities of interstate significance between Turkmenistan and Uzbekistan are fully covered by Uzbekistan, and the second party shares other related costs (ensuring law and order, security, protection, etc.).

The available compensatory and other mechanisms for ensuring coordinated flow regime are based on mutual settlements to ensure annual (seasonal) regulation, without taking into account the needs of multi-year regulation. It seems that multilateral and long-term agreements between all riparian countries, with the involvement of representatives of CDC “Energy” and BWO Syr Darya, could improve their effectiveness.

Financial obligations in all agreements are based on administrative approaches, which do not always take market-based (public-private partnership) mechanisms into account and do not work without strict administrative control. Sustainability in the long term requires introduction of financial mechanisms that are based on sound economic calculations, taking into account the interests of all countries and the legislation of the parties.

There is a need to elaborate region-specific options for joint construction and operation of new interstate hydraulic structures. In particular, the President of Uzbekistan, Sh. Mirziyoyev noted that “to solve water-energy problems it is



proposed to create, under the auspices of IFAS, a mechanism for joint construction and operation of interstate water facilities, including reservoirs and hydropower plants on the basis of public-private partnership”.

Strengthening coordination between sectors and **introducing an economic mechanism of interaction could contribute to maximizing the region-wide benefit through flow regulation (to achieve an optimum in the interests of all riparian countries) and a scheme for sharing this benefit (through compensation and other mechanisms)** between countries and economic sectors.

A range of technical, legal, institutional and financial-economic measures is needed for the improved coordination of water and energy.

Technical: improve reliability of forecasts; support operation and construction of water infrastructure; adopt the telemetry monitoring systems (e.g. SCADA), exchange of data and return flow management;

Legal: conclude and ensure implementation of mutually beneficial agreements on regulation of flow of the Amu Darya and the Syr Darya, preceded by systemic feasibility studies for drafting agreements; involve in drafting agreements all key actors, including BWOs, system operators and CDC “Energy” that are de-facto executive bodies of water and energy regulation; develop a regional vision (strategy) for the rational use and protection of water resources in the Aral Sea basin;

Institutional: improve coordination between organizations dealing with planning and operation of reservoirs; introduce a reliable mechanism for coordination and observance of operation regimes of reservoirs by ICWC/BWO, energy and environmental sectors of the countries; ensure short- and long-term planning of coordinated regulation;

Financial-economic, including PPP: adopt a common, agreed upon and economically justified methodology of mutual settlements on water and energy, by determining approaches to setting prices for electricity, moving away from mutual barter deliveries; calculate and impose penalties for violations of established flow regulation regimes; calculate damages in the sectors arising from natural factors to cover the former from insurance funds.



Section 2. Countries' efforts in strengthening water and energy coordination: A chronology

This section reviews key activities related to water and energy coordination in Central Asia, with the focus on establishment of an international water and energy consortium or other financial mechanisms. It presents the findings of deliberations within the framework of CACO, SPECA, World Bank, SIC ICWC and BWO Syr Darya, ADB, EurAsEC, UNECE, UNRCCA and EDB and propose an approach for their consideration in the future work.



2.1. International Water and Energy Consortium in Central Asia: Background

The idea of establishing a “consortium” to facilitate coordination between water and energy sectors in Central Asia arose in 1997 for the first time. At that time, the Interstate Council of Kazakhstan, Kyrgyzstan and Uzbekistan made a decision “On practical measures for deeper integration of the country signatories of the Treaty on the common economic space” (July 24, 1997) and the Concept on principles of interactions in establishing international consortia (December 12, 1997) was developed. In 1997-1998, the interstate commissions formed by the countries started working on drafting documents for the establishment of an International Water and Energy Consortium in Central Asia (IWECC).

The establishment of IWECC was mentioned in the 1998 Agreement on use of water and energy resources of the Syr Darya Basin, Article 8, which stipulates that “before the establishment of IWECC and its executive bodies”, the executive body of ICWC – BWO Syr Darya – will be responsible for provision of regimes of water releases from reservoirs, while ODC (United Dispatch Center or, currently, CDC – Coordinating Dispatch Center) “Energy” will be responsible for provision of electricity flows. Thus, the Agreement confirms the idea of IWECC as a **regulator of water-energy relations** between the countries.

The Program of Concrete Actions for Environmental and Socio-Economic Improvement in the Aral Sea Basin for 2003-2010 (ASBP-2) had in its list the project 1.4. “Elaborating some provisions to the strategy for water use and protection” (dates: 2003-2005), which provided for the development of economic mechanisms for transboundary resource management and a feasibility study of establishment of a water-energy consortium.

In 2004, a draft Concept for the establishment of an IWECC was agreed at a meeting of the Council of the Heads of Member State of the Central Asian Cooperation Organization (CACO). The efforts for development of a consistent mechanism for water-energy regulation in the Syr Darya and Amu Darya basins, also through the establishment of IWECC in some cases, were made in subsequent years. The sections below will overview briefly the key proposals and approaches to water and energy cooperation at regional level, even when they do not explicitly talk about the establishment of an IWECC.



2.2. SPECA: Strategy of cooperation for rational and efficient use of water and energy resources in Central Asia (2002)

Since 1998, the United Nations Economic Commission for Europe (ECE) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) have been working jointly with the Central Asian countries for the implementation of United Nations Special Programme for the Economies of Central Asia (SPECA). SPECA is a regional platform focused on promoting regional cooperation and economic integration among the five Central Asian countries to address common challenges and enhance sustainable development in the region. In 2000, a Working Group, led by Kyrgyzstan, was established to coordinate and guide collaborative activities in region's water and energy resources. In 2000-2002, the national experts nominated by the Governments of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, with the assistance of regional organizations and international consultants, have developed the *diagnostic study on water resources in Central Asia* and the *diagnostic study on energy resources in Central Asia*. The studies provided a basis for the formulation of a *strategy for cooperation in promoting the rational and efficient use of energy and water resources in Central Asia*.¹³ The strategy outlines the national approaches of the participating countries to development of the regional water-energy policy.

The abovementioned strategy notes, in particular, that existing institutions may be reformed or new specialized ones may be established to improve cooperation on use of water and energy resources (par. 38). The Central Asian countries will support the establishment of joint ventures, companies, *consortia* and other independent institutions to implement joint projects for the rehabilitation and development of water-management, fuel and energy sectors (par. 41). The countries can transfer the functions and powers involved in the operation of specific installations to interstate bodies, including parity commissions, *consortia* and others (par. 45). The countries of Central Asia will coordinate activities and implement joint projects for the operation, rehabilitation and modernization of water management and hydropower facilities of interstate significance (par. 48).

As *economic mechanisms* of interstate relations, the Strategy presents joint measures that include: coordination of investment, pricing, tax, tariff and customs policies; sharing of the cost involved in providing funds for activities of interstate significance; further development of repayment options provided by seasonal water- and power exchange schemes; consolidation of economic

¹³ <https://unece.org/DAM/SPECA/documents/weandenvironment/effuser.pdf>



relations between government and municipal authorities and between economic actors of neighboring countries; cooperation in attracting foreign investment and donor aid for regional cooperation programs (par. 55).

2.3. CACO: approaches developed in 2004 for establishment of IWECC

At a meeting of the Council of the Heads of Member Country of the Central Asian Cooperation Organization (CACO) in 2004, a concept on the creation of an IWECC of the CACO member countries was agreed. The concept developed by the interdepartmental working group of the member states under support of the World Bank presents a wide variety of tasks to be undertaken by the Consortium. Those include the following:

- *Developing and implementing agreed activities* in the area of rational and efficient development and use of region's water and fuel-energy resources;
- *ensuring the implementation of agreements* concluded by the member countries on the issues of cross-supply of water and fuel-energy resources;
- *ensuring the optimal mix of energy and irrigation regimes* for operation of cascades of reservoirs in annual and perennial cycles breakdown and with consideration of balances of water and fuel-energy resources;
- *enabling the mobilization of investments* for rehabilitation of existing assets and for construction of water and power facilities to develop and use effectively the region's water and energy potential; and
- *creating conditions for industrial and technological cooperation* in the water and fuel-energy sectors, expanding their exports and adopting advanced technologies. (See Annex 2).

Many of the proposed tasks and areas of IWECC's activities would duplicate those of the IFAS system. The concept agreed on by the CACO member states remains unclear in terms of how existing institutions should interact with the Consortium, decisions of which bodies will prevail in case of controversies. It also remains unclear what the unique role of the proposed Consortium is in the overall water and energy cooperation system in the region.



2.4. WB: Water energy nexus in Central Asia – improving regional cooperation in the Syr Darya Basin (2004)

In 2004, the World Bank prepared a report, which outlined a methodology for valuing costs and benefits involved in different types of arrangements. Further, the report identifies the policy options, structural options and institutional improvements to be pursued by the countries to reinforce the cooperation arrangements. In particular, in order to make sustainable cooperation between the countries of Central Asia, the report suggested: (a) to agree to pay explicitly for annual and multi-year water storage and regulation services to be performed by the Kyrgyz Republic at considerable costs to its economy; (b) to have arrangements with a multi-year perspective to take into account normal, dry and wet years; and (c) to divide the compensation for water services into a fixed charge and a variable charge to enable an equitable sharing and mitigation of risks arising from rainfall variations. Among the several factors considered for determining the level of fixed charges, the value of the natural gas needs of the Kyrgyz Republic to meet its winter energy demand appeared to be the most appropriate one. This will ensure a greater consistency in that country's adherence to the agreed levels of summer and winter discharges.

Economic analysis carried out for valuing the costs to the Kyrgyz economy, and irrigation and electricity benefits accruing to the economies of Uzbekistan and Kazakhstan under the power regime (low summer discharges and higher winter discharges) and the irrigation regime (high summer discharges and restricted winter discharges) clearly indicates that the latter alternative is distinctly superior with substantially higher net basin benefits as shown below:

Item	Power regime	Irrigation regime	Difference
Costs to the Kyrgyz Republic (\$ m)	13.4	48.5	35.1
Benefits to Uzbekistan (\$m)	10.5	46.3	35.8
Benefits to Kazakhstan (\$m)	8.4	39.9	31.5
Sub Total of Benefits	18.9	86.2	67.3
Net basin benefit (\$ m)	5.5	37.7	32.2

The above table also indicates that in order to motivate both parties adequately to adhere to the irrigation regime, compensation payments to the Kyrgyz Republic have to be somewhere in the middle of the range \$35.1 million and \$67.3 million. The agreed compensation in 2001 valued at \$48 million was in this range but an actual payment at \$29 million was substantially lower. In the analysis, fixed payments are sought to be linked to the Kyrgyz Republic's annual consumption of gas valued at \$20 million and treat the remaining charge as variable – varying as a function of variable discharges for dry and wet years and



the consequent changes in the quantity of power produced for summer export. Following a simple model, 80% of the years are assumed to be normal, 10% dry and 10% wet. In dry years annual discharges and summer discharges are higher and in wet years annual discharges and summer discharges are lower than in the normal year. On this basis, an illustrative scheme of fixed and variable payments for water services and variable payment for electricity exports is presented below.

Year	Fixed Water Services charge (\$ m)	Variable Water Services charge (\$ m)	Variable electricity charge (\$ m)	Total charge (\$ m)
Normal	20	6	22	48
Dry	20	7	30	57
Wet	20	4	10	34

Non-compliance with the agreed obligations is a serious problem under the present arrangements. To overcome this, Uzbekistan and Kazakhstan could open a letter of credit for the water services charge. In such an arrangement, the fixed fee could be deducted from the account in the form of six equal monthly payments based on confirmation from the monitoring organization that the agreed water volume was released during the summer. The variable charge could be deducted in one installment at the end of the winter based on BWO certification that winter discharges did not exceed the agreed levels. This arrangement could be backed by guarantees provided by a Guarantee Fund contributed by bilateral and multilateral donors.

2.5. SIC ICWC and BWO Syr Darya: Approaches to the establishment of IWECE suggested in 2005

In 2005, SIC ICWC and BWO Syr Darya proposed their approach to the establishment of IWECE as a **specialized commercial entity**, which could ensure performance of the most optimal flow regulation options to the benefit of hydropower and irrigated agriculture in participating countries. As opposed to CACO, this approach does not suggest substituting existing regulation and coordination bodies for water (ICWC) and energy (Coordination Electricity Council of Central Asia (CEC CA, CDC “Energy”). This approach proposes that IWECE should be:

- *a financial mechanism* (a) to mobilize additional sources of financing in case the power and fuel buyers do not have enough funds to cover the costs of flow regulation, and (b) to guarantee timely payments.



- *an insurance mechanism* to cover potential damage caused for reasons beyond control (the damage caused on subjective grounds is supposed to be compensated by the offending party in the form of penalties).

This study by SIC ICWC and BWO Syr Darya proposed establishing a Consortium to harmonize the system of payments and financial flows between the Central Asian countries and ensure sustainable performance of the water-energy complex. The latter will function sustainably only in case of timely implementation of interstate agreements on the rational use of water and energy resources (at the country level), fulfillment of ICWC decisions on operation regimes of reservoirs (BWO's activity), and ensuring compensatory supplies of fuel and energy according to reached arrangements (CDC "Energy").¹⁴

2.6.ADB RETA 6163: Draft agreements on the use of water and energy resources in the Amu Darya and Syr Darya basins (2005-2007)

ICWC, by the decision of its 42nd meeting (April 28-29, 2005), approved the ADB's initiative to support and enhance water cooperation in the Aral Sea basin by conducting joint work among national and regional organizations within the framework of the regional ADB RETA 6163 Project "Improved Management of Shared Water Resources in Central Asia". Discussions on water-management policies were directed, first, to drafting a new multilateral Agreement on use of water and energy resources in the Syr Darya Basin.

The draft Agreement included a point that the parties coordinate and decide annually on water releases, hydropower generation and transfers, and compensatory power supplies and, through multi- and bilateral arrangements, ensure multi-year flow regulation of the Naryn River by the Toktogul reservoir - on the basis of the long-term planning of operation regime and its enforcement - and seasonal flow regulation by the Barki Tojik/Kairakkum reservoir. *There were no provisions for establishment of the Consortium in this draft Agreement.*

The draft Agreement also set the following as *financial mechanisms*

- The parties shall develop a mutually acceptable approach for compensation of costs and damage resulting from use of water and energy resources in the basin (8.13).

¹⁴ See details in SIC ICWC. International Water-Energy Consortium. CAREWIB Project Publications Series, Issue 2. February 2005 <http://www.cawater-info.net/library/rus/carewib/02iwec.pdf>



- Supplies of fuel and energy resources to the Kyrgyz Republic and to the Republic of Tajikistan can be provided from the non-party countries (8.14).
- The costs that each party bears in relation to maintenance of hydraulic facilities for interstate water allocation shall be distributed between the parties proportionally to the amount of supplied water (11.1).
- The costs related to operation of reservoirs, including water accumulation, and hydropower facilities of interstate importance shall be borne by the party owners on the condition of compensation by other parties in line with relevant provisions of the Agreement (11.2).
- Each party shall take measures for fulfillment of its obligations before other parties by allocating budget funds, providing sovereign guarantees, opening credit lines, depositing funds, etc. (11.3).
- The parties have agreed do not impose customs duties and charges for supplies of power, materials and equipment for repair and modernization of water and hydropower facilities and the related operations and services performed as part of given Agreement (12.1).

The draft Agreement was not signed.

2.7. EurAsEC: Proposals on interaction of the member countries in the area of water-energy regulation in Central Asia (2006)

In 2005, after the merger of CACO and EurAsEC, the efforts on water-energy relations in Central Asia have been intensified. A High-level group for development of a consistent mechanism for water-energy regulation in the Syr Darya and Amu Darya basins has been formed at the EurAsEC Integration Committee¹⁵. The eighth meeting of the Council for energy policy at the EurAsEC IC (April 20, 2006) generally approved and recommended for further elaboration on cooperation issues the Roadmap for development of a cooperation mechanism for the Eurasian Economic Community member countries in the field of water and energy regulation in Central Asia. In particular, the Roadmap outlines the key principles and requirements for cooperation mechanisms in the field of water and energy regulation, including:

- obligatory fulfillment of decisions made;

¹⁵ See: 1. Protocol of the meeting of the High-level group for development of a consistent mechanism for water-energy regulation in the Syr Darya and Amu Darya basins (06.10. 2006, Moscow). 2. Decision of the EurAsEC Interstate Council No. 315 of 16.08.2006 on the draft Concept for effective use of water and energy resources in the Central Asian region. 3. Roadmap for development of a cooperation mechanism for the Eurasian Economic Community member countries in the field of water and energy regulation in Central Asia (Protocol 1 of the HLG meeting of 06.10.2006, Annex 3); etc.



- mutual benefit from water and energy regulation for all actors;
- responsive solution of arising problems;
- observance of main principles of international water right agreed by the riparian states of the Aral Sea basin for region-specific conditions;
- simultaneousness and coordination in addressing the issues on water and energy regulation and investments in energy development;
- responsibility of private business (in case of its involvement in investments and regulation) for provision of operation regimes of reservoirs and energy systems agreed at the interstate level;
- nexus of water and energy regulation;
- ensuring environmental security;
- forming guarantee funds for fulfillment of obligations at the expense of contributions from the Parties;
- establishment of joint ownership of water and energy facilities of transboundary nature;
- forming joint water and energy balances;
- establishment of joint governance and permanent executive bodies with relevant powers in line with requirements;
- presence of strong political will to achieve mutually coordinated decisions.

The Roadmap represents a plan for stepwise creation of common market conditions for integration of water and energy sectors of the Community states. It is composed of 3 stages. Each stage corresponds to higher level of integration in water and energy sharing in transboundary Amu Darya and Syr Darya. Cooperation mechanisms imply a system of economic, technical, institutional and political measures.

The Roadmap *does not make provisions for establishment of a consortium*; however, it is mentioned that institutional aspects include organization of clear interaction between the national water and energy management bodies and regional organizations – the International Fund for the saving the Aral Sea, Coordinating Dispatch Center of Central Asia (CDC “Energy”) - with integration bodies of the Eurasian Economic Community. The Council for Energy Policy at the EurAsEC Integration Committee will play a coordinating role in organization of this work. The aim of this work should be establishing joint management and permanent executive bodies with authorities sufficient for fulfilling the functions assigned by founder states. (see Annex 3).

However, those documents are stalled.



2.8. UNECE: Assessment of the water-food-energy-ecosystems nexus in the Syr Darya River Basin (2017)

In 2016-2017 UNECE assessed the “water-food-energy-ecosystems” nexus in the Syr Darya Basin of Central Asia following a methodology developed under the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention).

A transboundary nexus approach to assist in enabling cross-sectoral and cross-country interventions is needed to address current challenges in the Syr Darya River Basin. Transboundary cooperation in the management of basin resources has the potential to generate large economic **benefits for countries** in the Syr Darya River Basin. Such benefits might be achieved by: reducing input costs; increasing the value of agricultural production; promoting exports of energy carriers; enhancing the sustainability of economic activities; reducing the costs of droughts and power cuts; and promoting cross-border investments and the development of regional markets for goods, services and labour. Improved cooperation in managing basin resources can result in geopolitical benefits, environmental benefits (including improved status of riverine ecosystems) and several social benefits (including poverty reduction, employment generation and improved levels of health).

The Syr Darya nexus assessment has identified a menu of solutions to address specific inter-sectoral challenges in the basin and to help realise **potential benefits**. Such a programme would encompass: (i) energy diversification in upstream countries (including local use development of non-hydro renewable energy sources and some fossil fuel-based generation capacities) to improve energy security, reduce dependency of hydropower in winter, and facilitate crop diversification; (ii) modernisation of energy and water infrastructure to minimise system losses; (iii) introduction of policy packages to increase energy and water efficiency (including pricing reforms, public-awareness campaigns, and the development and coordinated implementation of energy-efficiency policies and standards); (iv) operation of agricultural extension programmes to support crop-shifting and the adoption of sustainable resource management policies; and (v) development of regional markets for energy and agricultural products, while at the same time lowering barriers to trade. The implementation of such measures would also require institutional reforms and capacity development to facilitate basin-wide integrated resources planning at both the national level and the basin level.

This assessment as compared to other initiatives brought to discussion the food element of the nexus, emphasizing that regional cooperation would allow to



plan sustainable agriculture to grow different crops in different countries according to best climatic conditions, optimize the use of water regionally.

The assessment of the Syr Darya River Basin is part of a series of intersectoral (nexus) assessments in transboundary basins using a specifically designed methodology. Website: <http://www.unece.org/env/water/nexus.html>

2.9. IFAS: Institutional and legal improvement of IFAS (2009-2012, 2018-2022)

2009-2012

On 28 April 2009, the Heads of Central Asian countries expressed their readiness to strengthen the institutional and legal frameworks of the International Fund for Saving the Aral Sea (IFAS) so as to improve its performance and achieve greater interaction with financial institutions and donors.

In this context, the Executive Committee of IFAS (EC IFAS) in Kazakhstan with the support of UNECE and GIZ Agency formed a Working Group among national experts from CA countries and international consultants. The document “Conceptual elements improving the institutional and legal framework of IFAS” was prepared jointly as a basis for discussion of key aspects on the status, structure and organization of activities of IFAS and its bodies.

In particular, it was proposed to extend the responsibility of ICWC by including, in addition to water-related issues, the hydropower aspects of transboundary water use. To this end, it is proposed to add heads (or deputies) of energy agencies of CA countries to the list of ICWC members. This way, the enlarged Commission could make decisions on the entire list of issues related to multipurpose use of water resources. Such decisions would be obligatory both for water users and hydropower. This would provide ICWC with the ability to effectively influence operation of waterworks facilities in the upstream of transboundary rivers.

The documents had no provisions for *establishment of a consortium neither discussed financial mechanisms* of interactions between the states.

2018-2022

The work on institutional and legal improvement of IFAS was resumed in 2018. On January 30, 2018, the IFAS Board approved the Work plan of EC IFAS, upon which a Working group for institutional and legal improvement of IFAS was



formed. During the chairmanship of Turkmenistan (2017-2019) in IFAS, the working group had three meetings. In line with the decision of the Heads of CA States of November 29, 2019, the IFAS chairmanship was passed to the Republic of Tajikistan for the period from 2020 to 2022. Activity of the working group continued, and the group held eight meetings in Dushanbe, Almaty and Tashkent by December 2022.

The work is conducted in five stages: (i) IFAS tasks, taking into account agreements in force, new realities and requirements of founding states; (ii) identification of problems in performance of IFAS bodies; (iii) drafting recommendations for strengthening IFAS institutional framework; (iv) drafting recommendations for improvement of financing of IFAS governance; (v) preparation of proposals on strengthening legal framework in order to create an effective and sustainable institutional mechanism of cooperation.

By December 2023, members of the working group have agreed on geographical scope (Aral Sea basin), four areas of cooperation (water, energy, environment, socio-economic development), and the main goal of IFAS improvement (enhancement and further development of regional cooperation in the Aral Sea basin in water-management, energy, environmental and socio-economic fields for sustainable development of the riparian countries). Tasks and sub-tasks have been formulated for each field.

One of the key elements of consultations is developing a mechanism for improved coordination between water and energy. Either creation of a joint commission on water and energy or joint meetings of water commission and energy commission is considered as possible options. *Creation of a consortium under umbrella of IFAS is not considered.* Discussions on financial issues address *only financing of IFAS activity.*

2.10. UNRCCA: Draft conventions on Amu Darya and Syr Darya proposed in 2017

In 2017, the UN Regional Center for Preventive Diplomacy for Central Asia proposed that the countries resume negotiations on a mutually beneficial mechanism for water use in the region through two draft Conventions on use of water resources in Amu Darya and Syr Darya basins. Only Uzbek MFA expressed its support, while other countries did not accept the idea of discussing the draft documents prepared without their participation. Instead, Kyrgyzstan proposed resuming cooperation within the framework of the 1998 Agreement



on Syr Darya, which envisaged the compensation mechanism for water and energy use.

The draft Conventions have provisions that coordination of activities of the Parties in part of implementation of the Conventions shall be delivered by ICWC, which may create working groups or other mechanisms to address the issues related to implementation. *Creation of a consortium was not envisaged.*

The article on *financing* sets that costs related to financing the activities of joint bodies are shared by the Parties proportionally to amount of received water; each Party takes measures to fulfil its obligations before other Parties by allocating budget funds, providing sovereign guarantees, opening credit lines, depositing funds and in other forms.

2.11. EDB: Approaches to regulation of the water and energy complex in Central Asia proposed in 2022

In 2022, the Eurasian Development Bank prepared the report “*Regulation of the Water and Energy Complex of Central Asia*”¹⁶, which proposed five potential solutions.

First, the following key principles of effective regulation were proposed:

- Sovereign equality, territorial integrity, and mutual benefits of equitable use of water and energy resources in the region on the basis of international water law and international principles of integrated resources management for all member states;
- Ensuring an optimal mix of the irrigation and power regimes of operation of reservoir cascades, taking into account annual and long-term cycles of flow fluctuations and balances of water and energy resources;
- A market mechanism for meeting the energy needs of the upstream states, among other things on the basis of contractual and market principles and coordinated investment policies aimed at creating an optimal regional mix of generating capacities and ensuring reliable access to energy resources through joint construction, upgrading, and operation of the necessary power generation infrastructure;
- Strengthening the existing and creating new interstate governing and executive bodies with appropriate status to perform their functions of coordinated and transparent regulation of the water and power regimes

¹⁶ Vinokurov, E., Ahunbaev, A., Usmanov, N., Sarsembekov, T. (2022) Regulation of the Water and Energy Complex of Central Asia. Reports and Working Papers 22/4. Almaty, Moscow: Eurasian Development Bank. E-version: <https://eabr.org/en/analytics/special-reports/>



of the rivers on the basis of the basin principle; development and use of water and energy resources; regulation of interstate electricity cross-flows and energy supplies associated with the agreed water and energy regime of the rivers in the CA region;

- An effective mechanism to create investment incentives and attract investment to implement projects to renovate existing and build new hydropower and water management facilities of interstate importance, in order to develop and effectively use the water and energy potential of the region, taking into account environmental protection requirements;
- Creating conditions for industrial, technological, and scientific cooperation in the water and energy sectors to enhance their export potential and introduce advanced technologies.

Second, based on the key principles, it is proposed to **upgrade and enhance the existing regional organizations** involved in regulation (IFAS, CEC CA, and CDC “Energy”).

Third, it is proposed to create a new institution — the **International Water and Energy Consortium of Central Asia (IWECA)**— on the political platform of IFAS to take on the key function of seeking and providing financing for national and transboundary infrastructure projects in the CA water and energy sectors. The proposed approach is based on the economic interest of the parties in joint implementation of new water and energy projects and the operation of existing facilities, as well as enhancement of regional and national water and energy infrastructure. The Water and Energy Consortium should rely on the modernized existing framework: IFAS, ICWC, BWO Amu Darya, BWO Syr Darya, CDC “Energy”, etc. Taking into account complexities, stakeholders could rely on simpler forms of cooperation to build major infrastructure facilities for the CA water and energy complex (for example, HPPs), such as a project consortium using the BOT (build — operate — transfer) or BOOT (build — own — operate — transfer) model and based on the principles of project financing.

Fourth, a **financial operator (-s)** is proposed for IWECA activities. The financial operator of the IWECA may be an IFI (or IFIs), including the EDB, whose activities will be regulated by a special agreement with the Consortium.

Fifth, the activities of the SIC ICWC and CDC “Energy” based in Tashkent could be supplemented through the creation of an **International Research Centre of the Water and Energy Complex of Central Asia** (with technical assistance from EDB).



2.12. Lessons learnt

The review of the past experience of the countries in strengthening water and energy coordination, including by establishing IWECC, allows us to make the following conclusions:

Despite the decision of the Heads of State, the establishment of IWECC has not been elaborated in detail in any platform. CACO with the support from the World Bank in 2004, SIC ICWC and BWO Syr Darya in 2005 and the Eurasian Development Bank in 2022 made some progress in this respect (see Table below).

Table 2. Earlier proposed forms and tasks of IWECC
SPECA, 2004
<p>Possible form: independent international institution</p> <p>Tasks: possibility to establish consortia and other independent institutions to implement joint projects for the <i>rehabilitation and development</i> of water-management, fuel and energy sectors; possibility to transfer the functions and powers involved in the <i>operation of specific installations</i> to consortium and other international organizations</p> <p>Relationships with existing institutions: not mentioned</p>
CACO, 2004
<p>Possible form: a legal person established on the basis of international agreement; will be governed by a Council (supervisory body) formed among authorized representatives of member countries following the principle of equal representation of all the parties.</p> <p>Tasks: wide circle of tasks, including <i>developing and implementing agreed activities</i> in the area of rational and efficient development and use of region's water and fuel-energy resources; <i>ensuring the implementation of agreements</i> concluded by the member countries on the issues of cross-supply of water and fuel-energy resources; <i>ensuring the optimal mix of energy and irrigation regimes</i> for operation of cascades of reservoirs in annual and perennial cycles breakdown and with consideration of balances of water and fuel-energy resources; <i>enabling the mobilization of investments</i> for rehabilitation of existing assets and for construction of water and power facilities to develop and use effectively the region's water and energy potential; <i>creating conditions for industrial and technological cooperation</i></p>



in the water and fuel-energy sectors, expanding their exports and adopting advanced technologies.

Relationships with existing institutions: not clearly written; however, the areas of activity largely duplicate or replace those of the IFAS system

SIC and BWO, 2005

Possible form: Specialized commercial entity to be founded by government-assigned ministries and agencies, national corporations and companies, enterprises and institutions of fuel-energy and water sectors.

Tasks: to harmonize the system of payments and money flows between the Central Asian countries and ensure sustainable performance of the water-energy complex under market conditions. In particular, should be

- *a financial mechanism* (a) to mobilize additional sources of financing in case if the power and fuel buyers do not have enough funds to cover the costs of flow regulation, and (b) to guarantee timely payments.
- *an insurance institution* to cover potential damage caused for reasons beyond control (the damage caused on subjective grounds is supposed to be compensated by the offending party in the form of penalties).

Relationships with existing institutions: supplements the activities of existing institutions in terms of implementation of the most optimal options of flow regulation

EDB, 2022

Possible form: Individual entity on the political platform of modernized IFAS, simpler project form to build major infrastructure facilities for the CA water and energy complex (for example, HPPs), using the BOT (build — operate — transfer) or BOOT (build — own — operate — transfer) model and based on the principles of project financing.

Tasks: attract and ensure *financing* of national and transboundary *infrastructure projects* in the water and energy sectors.

Relationships with existing institutions: should rely on the modernized existing framework: ICWC, BWO Amu Darya, BWO Syr Darya, CDC “Energy”, etc.



The history of deliberations shows that no agreement exists on potential tasks of IWECC and its relations with existing institutions.

The 1998 Agreement and the Concept on the creation of an IWECC of the CACO member states lay the idea of IWECC as a *regulator of water-energy relations*. It seems that options, where IWECC has greater regulation powers (development of optimal schedules of HPP operation and energy cross-flows, with the right to transfer decisions to ICWC/BWO and CDC “Energy” for fulfillment), will require the fundamental revision of existing institutional framework of water and energy management. There is possibility that the countries would not accept this (except for Kyrgyzstan, which insists on radical reforms). Most documents proposed establishing a consortium (or other mechanisms) that would not destruct the existing and mainly effective system of governance but *supplement this system* to improve its performance, stability and responsiveness. Such approach was proposed by SIC ICWC and BWO Syr Darya (where the consortium is viewed as a financial and insurance mechanism to ensure proper implementation of decisions) and also by EDB, which suggests to create a consortium for individual infrastructural projects relying on existing institutions.

None of the projects or documents provided detailed elaborations on the establishment of a consortium or any other mechanism in combination with financial-economic mechanisms of its functioning under market-based relations.

The World Bank’s report 2004 is more elaborated in part of valuation of costs and benefits of the enhanced coordination in water and energy. Based on the assessment of the Kyrgyzstan costs for regulation of flow and the benefits derived by Uzbekistan and Kazakhstan, it proposed to compensate Kyrgyzstan for regulation (including for multiyear regulation) and share with Kyrgyzstan a portion of benefits derived by Kazakhstan and Uzbekistan. In opinion of the authors, such approach of cost and benefit sharing would ensure sustainability of mutual settlements between the countries if double-tariff compensation is applied with multi-year perspective, i.e. when compensation is divided into a fixed (annual) charge and a variable charge (additional to take into account current flow conditions in the Syr Darya basin). Hence, the charges were connected with flow conditions rather than with countries’ needs for additional irrigation releases.

Such a scheme of benefit and cost sharing was not supported by downstream countries. As an alternative approach, experts suggest conducting economic analysis for valuing the costs of water accumulation in the Toktogul reservoir and delivery of this water to Uzbekistan and Kazakhstan, with account of all benefits and costs for all countries, and associate the costs (\$) with the quantity of supplied water (m³).



Section 3. World practices concerning institutional and financial mechanisms of water and energy coordination

The world practice has no examples of an international consortium established for water-energy regulation but there are successful stories of other institutional and financial mechanisms for coordination of water for different uses. This Section shows several examples of such mechanisms. In particular, we consider here institutional and financial mechanisms of benefit and cost sharing related to use of water resources in such river basins as the Columbia (US and Canada), Parana (Brazil and Paraguay), and Indus (India and Pakistan).



3.1. Coordinated flow regulation for hydropower production and flood control in the Columbia River Basin (United States and Canada)

A Treaty on cooperative development of the water resources of the Columbia River Basin was signed between Canada and the United States of America in 1961 and came into force in 1964. The main objective of the Treaty is building and operating four large storage dams for hydropower generation and flood control. The cumulative information is given in Table below.

SUMMARY ON THE COLUMBIA RIVER

General information	<ul style="list-style-type: none"> – Three dams (Mica, Arrow, and Duncan), with 19.1 km³ in Canada and Libby dam in USA – Columbia River – About 15% of the basin is located and 38% of runoff is formed in Canada.
Legal and institutional frameworks	
Basin-wide legal framework	Boundary Waters Treaty, 1909
Individual project-related treaty	Columbia River Treaty of 1961 (9 years of negotiation) optimizes flood control and electricity generation in the both countries through construction of 4 dams (3 in Canada and 1 in USA), compensation payments and joint management.
Basin-wide joint body	International Joint Commission (1909)
Special body on HPP and coordination of activity	<p>Organizations responsible for implementation of the Treaty (operating organizations) are the Bonneville Power Administration (BPA) and U.S. Army Corps of Engineers (USACE) and B.C. Hydro in Canada.</p> <p>Permanent Engineering Board, consisting of 2 members per Canada and the U.S. assigned by governments, for independent assessment of implementation and reports to federal governments of the U.S. and Canada.</p> <p>Operation of reservoirs is coordinated by operating plans and weekly consultations (conference call):</p> <ul style="list-style-type: none"> - Assured operating plan for 6 years - Detailed operating plans every year update the 6-year plan (fishery and recreation items can be included)
Benefit and cost sharing mechanism	
Country interests	<ul style="list-style-type: none"> • Bulk of water, which caused devastating flooding in Portland in 1894, came from Canada. • Highest and stable runoff is in northern basins (Mica and Revelstoke), while the runoff of southern basins is low and unstable.



Assessment of benefits and costs	<ul style="list-style-type: none"> Both countries' needs for electricity generation and flood control. United States' initiative (downstream country) <p>In 1959, International joint commission prepared a report containing the assessment and methodology for calculation and sharing of benefits and costs that laid the basis for the 1964 Treaty.</p> <p>Benefits for the first 30 years were estimated at \$64 million as relates to flood control and \$512 million as relates to hydroelectricity generation.</p>
Benefit and cost sharing	<p>Canada:</p> <p>Built three storage dams (Mica, Arrow, and Duncan) with 19.1 km³ on the Columbia River and operates them in its territory for optimal electricity production and flood regulation to the benefit of the both countries. Canada shall operate the dams in accordance with the agreed monthly plan but it has flexibility in operation of individual projects at its discretion, provided that the general regulation meets the requirements of the Treaty and as long as the net flow requirement at the U.S. border is met.</p> <p>USA:</p> <ul style="list-style-type: none"> built Libby storage dam and operates it in its territory by paying Canada compensation for resettlement and damage caused by flooding a part of the Canadian territory; paid Canada 50% of the estimated future flood regulation for 60 years (\$64 million), paid Canada 50% of the increased hydropower production in USA as a result of construction of hydropower plants stipulated by the Agreement for 30 years (the so-called Canadian entitlement for downstream power benefits - \$254 million). <p>The 30-year period ended in 2003 and the benefits are now not equal: payments to Canada turned to be higher than expected in 1964, while the US' benefits are lower due to conflict of interests at the national level between hydropower and fisheries.</p> <p>By April 2003, the 30-year period of supply of 50% of the increased hydropower production to Canada expired, and now the energy share which is due to Canada is returned to the boundary with British Columbia.</p>
Construction financing	<ul style="list-style-type: none"> British Columbia acting on behalf of Canada sold the "Canadian entitlement for downstream power benefits" for \$254 million and built three dams within its territory at this expense. A dam in USA was built at US' expense.
Period of validity the mechanism and revision of terms	
Period of validity the mechanism	<p>The 1964 Treaty does not indicate the date of termination but stipulates that any of the states may terminate the Treaty at any time after the Treaty has been in force for sixty years if it has delivered at least ten years written notice to the other of its intention to terminate the Treaty. If the Treaty is terminated:</p> <ul style="list-style-type: none"> Mica, Arrow, Duncan, and Libby will continue operating under the framework of the Boundary Waters Treaty, 1909. Canada shall respond to a call for flood control from USA



Revision of treaty terms	<p>until the reservoirs exist while USA shall compensate Canadian operating costs and losses from undersupplied energy. However, flood control after 2024 cannot be more than before 2024.</p> <ul style="list-style-type: none"> – Canada also may divert water from the Kootenay River (though yet diversion has not been made). <p>Irrespective of whether the 1964 Treaty will be in force after 2024, the procedures for annual flood regulations terminate in 2024.</p>
	<p>There are three options after 2024: 1) the Treaty continues, 2) the Treaty terminates, 3) provisions of the Treaty revised.</p> <p>Continuation of the 1964 Treaty is the most beneficial option for Canada but still position and benefits of USA are not clear. The prevailing view in the U.S. is that payments to Canada for flood control and hydropower benefits should be reviewed and significantly reduced, or these services should also include water releases for fish and maintenance of downstream ecosystems, which are currently provided only at U.S. expense. Climate change also introduces additional complexities, requiring, among other things, more flexible regulatory mechanisms for the Columbia River Basin.</p>

Institutional and financial mechanisms^{17,18,19}

Institutional setup. The Columbia Treaty does not make provision for establishment of a joint body but requires that each state shall designate entities to carry out operating arrangements. These are the Bonneville Power Administration and the United States Army Corps of Engineers from the U.S. and BC Hydro from Canada. They are responsible for the daily operations of the reservoirs and hydroelectric facilities. Nevertheless, the International Joint Commission (IJC), an independent bilateral organization established by the United States and Canada, plays the role in overseeing boundary water issues and disputes between the two countries. The IJC is responsible for monitoring and regulation, dispute resolution, recommendations on water resource management, environmental considerations.

Construction financing. The construction costs are distributed between the two countries as follows:

- Canada shall construct (Article 2) and has constructed three dams (Mica, Arrow, and Duncan) in its territory. The dams were constructed for the

¹⁷ <https://engage.gov.bc.ca/app/uploads/sites/6/2012/04/Columbia-River-Treaty-Protocol-and-Documents.pdf>

¹⁸ <https://engage.gov.bc.ca/columbiarivertreaty/faqs/#faq1>

¹⁹ <https://engage.gov.bc.ca/app/uploads/sites/6/2012/07/A-Review-of-the-Range-of-Impacts-and-Benefits-of-the-Columbia-River-Treaty6.pdf>



money received by British Columbia, acting on behalf of Canada, from the sale for the first 30 years of the Canadian entitlement for downstream power benefits to a consortium of 37 public and 4 private utilities in the United States for \$254 million;

- The United States has constructed the Libby dam and operates it in its territory, paying Canada the compensation for resettlement and damage caused by flooding of a part of the Canadian territory.

Compensation for damage from construction. The United States paid Canada the compensation for resettlement and damage caused by flooding of a part of the Canadian territory as a result of construction of the Libby dam in the U.S.

Compensations for improved flow regulation. The Treaty makes provisions for two types of compensation for the improved, through joint development, regulation of flow: (a) transfer to Canada of one half of power generated downstream through coordinated operations of the Canadian dams (the so-called Canadian Entitlement); (b) payments to Canada for flood control.

(a) “Canadian entitlement”. Canada (British Columbia) is entitled to 50% benefits from additional power generated downstream in the United States (Articles 5 and 7). Additional power can be generated in the United States as a result of flow regulation by storage reservoirs in Canada (the so-called “downstream power benefits”). Downstream power benefits are computer modeled and calculated using procedures set out in the Treaty and are defined six years in advance. They are not calculated based on actual amount of downstream power generated. These benefits are shared equally between both countries. The United States provides the Canadian Entitlement to British Columbia as energy and capacity, not money. Powerex sells the Canadian Entitlement on behalf of Canada at market value to either BC Hydro or utilities in Alberta or United States. Over the last ten years the Canadian Entitlement was worth on average approximately \$202 million annually and goes into the Canada’s general revenue account.

(b) payments to Canada for flood control. The Treaty makes provisions for two types of flood risk management: (i) assured annual flood control, and (ii) on call flood control during periods of very high water inflows (Article 6). Canada received 50% of the estimated cost of future flood control benefits (\$64 million) for 60 years (Assured Annual Flood Control) in the United States; this provision expires in 2024. For on call flood control the United States must pay Canada the power losses, operating costs and any economic loss resulted from the use of reservoir storage for flood control. If full operation of any storage is not commenced within the time specified, the payment to Canada for flood control shall be reduced (Article 6(2)).



Key conclusions and lessons from the Columbia case:

1. From the very beginning, the Treaty was developed in such a way so that be **beneficial for both the United States and Canada**. Both countries have benefited from the coordinated operation of reservoirs in the upper Columbia Basin and have been able to work out a formula for equally sharing the additional benefits from such operation. The two countries have also committed themselves to equitable sharing of the costs associated with the initial filling of the reservoirs.
2. The Columbia River Treaty is a **balanced combination of incentives and sanctions** that make its implementation and investment beneficial. The Treaty was based on a thorough economic evaluation of benefits and costs carried out by the International Joint Commission in 1959, which demonstrated to both countries the benefits of implementation. In terms of sanctions, the Treaty contains a number of provisions that provide for compensation in the event of violations of its terms. For example, if Canada failed to construct three dams in specified time, it would have been obliged to pay a forfeit to the United States.
3. It is important to develop such mechanisms that ensure all parties have **maximum flexibility** in terms of operating their portions of cooperative water systems but with observance of certain specified restrictions. Thus, Canada shall operate three reservoirs in line with the agreed monthly plan but the country is flexible in management of some reservoirs on its own discretion, provided that general regulation meets requirements of the Treaty and the agreed flow is ensured on the boundary with the United States.
4. An important element of decision making is **flexibility and adaptability** which enables addressing matters that are not directly mentioned in agreements. The 1964 Treaty does not regulate the issues related to maintenance of aquatic ecosystems and flow for fish but the Parties search for ways for these needs. Thus, the Treaty requires annual development of the “Assured operating plan” for Canadian reservoirs designed to achieve optimum power benefits and certain protection from floods in Canada and the U.S. and enables the authorized bodies to develop and adopt “detailed operating plans” that are “more advantageous” for the countries. The authorized bodies interpret “more advantageous” in wider sense to include, besides power production and flood control, fish protection, recreation needs, and other benefits. Thus, if both countries agree, the detailed operating plans may consider ecosystem and fish needs.
5. Joint operations of the United States and Canada are of interest for the Central Asian countries in part of organization of **negotiation process**,



which is based on scientific grounds and active involvement of all stakeholders.

6. The Columbia case shows diverse benefits from the **involvement of the private sector**.

First, the Bonneville Power Administration and B.C. Hydro, operating entities, are **commercial organizations**. Therefore, the countries under the Treaty interact mainly at the level of commercial organizations. Their revenues depend on smooth operation of the entire system, so they are interested in smoothing out and resolving any conflicts as quickly as possible, focus on economic development and look for more creative solutions to problems. Even in one case, when a dispute reached the level of the federal government, finally these two commercial organizations found a mutually acceptable solution.

Second, the private sector can help raise funding to cover capital costs. Before the signature of the Treaty, power utilities in California were very interested in a joint U.S.-Canadian project under discussion that time. A consortium of 41 power utilities had purchased from Canada its 30-years entitlement to downstream power benefits for \$254 million and signed respective Agreement with the U.S. and Canada. As a result, the private sector guaranteed future power sale, allowed Canada to construct three reservoirs in its territory, and encouraged both countries to construct the facilities as soon as possible. Since the Agreement with the consortium was not linked to the actual construction of reservoirs or conclusion of the Treaty, Canada and the United States would have had to fulfil their obligations before the consortium even if they had not signed the Treaty between themselves.

7. It is important to have an agreed list of **priorities** of interests outlined by the parties. For example, flood control or "immediate needs" have priority over hydropower generation, etc.
8. Creation of an independent **overview body** helped ensure implementation and resolve any misunderstandings.
9. At the core of effective cooperation is developing **good personal relationships** as mentioned by many analysts. These involve relations on both a professional and personal level. Entities organize weekend meetings at which families are invited for special events.²⁰

²⁰ Hearn G. Columbia Basin: Initial Dam Filling and Flood Warning and Monitoring Mechanisms in Altinogoz, M. et al. 2018. "Promoting Development in Shared River Basins: Case Studies from International Experience." Washington, DC, World Bank.



3.2. Coordinated development of the Parana River's hydropotential (Brazil and Paraguay)

Itaipu HPP is a joint project of Brazil and Paraguay for mutually beneficial use of hydropower resources of the Parana River. Itaipu is the second largest in terms of capacity and one of two largest in terms of generation hydropower plants in the world (along with the Three Gorges HPP). Brazil and Paraguay signed a Treaty for the Hydroelectric Utilization of the Water Resources of the Paraná River on 26 April 1973. This Treaty has become the key document regulating the terms of construction and operation of water resources of the Parana River shared by the countries in condominium.²¹ The Itaipu Binacional was established on 17 May 1974 to administrate the construction of HPP and then its operation. Itaipu HPP is designed mainly for generation of hydropower in the interests of two countries.

Summary on Itaipu HPP (Brazil and Paraguay)

General information	<ul style="list-style-type: none"> – 20 turbogeneration units with a capacity of 700 MW each (14 GW) – Annual generation – 103,098 million kWh (record high) – Parana River (La-Plata basin)
Legal and institutional frameworks	
Basin-wide legal framework	The 1969 Treaty on the River Plata Basin (Argentina, Bolivia, Brazil, Paraguay, Uruguay) – coordinated basin development
Individual project-related treaty	<ul style="list-style-type: none"> – Final Act of 1966 between MFAs of Paraguay and Brazil (<i>preliminary agreement on sharing water resources of the Parana River</i>) – 1973 Treaty of Itaipu between Paraguay and Brazil (<i>all terms of joint construction and operation</i>) – 1979 Treaty between Argentina, Brazil and Paraguay (<i>set out levels of inflow to Argentina</i>) – Revision of the 1973 Treaty in 2009
Basin-wide joint body	Intergovernmental coordination committee (1973)
Special body on HPP	Binational company Itaipu Binacional: <ul style="list-style-type: none"> – acts on the base of international treaty rather than national law – owned in equal shares by both countries (capital - \$100

²¹ Treaty between the Federative Republic of Brazil and the Republic of Paraguay concerning the hydroelectric utilization of the water resources of the Parana River owned in condominium by the two countries, from and including the Salto Grande de Sete Quedas or Salto del Guaira, to the mouth of the Iguassu River (26 April 1973), www.cawater-info.net/projects/peer-amudarya/pdf/itaipu.pdf



	<p>million)</p> <ul style="list-style-type: none"> – internal and external control by both countries: management bodies (administrative council/board of directors and executive direction) are formed with equal participation of citizens of the two countries – personnel 50/50: 1500 citizens of Paraguay and 1500 citizens of Brazil (2018) transparent reporting
Benefit and cost sharing mechanism	
Country interests	<p>Mutual interest in power generation:</p> <ul style="list-style-type: none"> - Brazil's interest: fixed prices and guaranteed power for 50 years - Paraguay's interest: Brazil investments in construction, power for own needs and revenue from export to Brazil
Assessment of benefits and costs	A Joint Technical Commission was established on 12 February 1967 to carry out a preliminary feasibility study. The Feasibility study was implemented in 1970.
Benefit and cost sharing	<ul style="list-style-type: none"> – Participation in construction and operation – 50/50 – Division of generated power - 50/50 – Generation of power only for Brazil' and Paraguay's needs, no sale to third countries – Possibility to sell power to each other at fixed prices – The formula for power cost is set in the Treaty – The Governments of Brazil and Paraguay receive compensation (royalty) from the Itaipu Binacional for the utilization of the hydropower potential of the Parana River (US\$650 per GWh plus adjustment)
Construction financing	Private creditors under sovereign guarantee of Brazil
Effect from implementation	
Political effect	<ul style="list-style-type: none"> – Settlement of territorial dispute between Paraguay and Brazil – Complication of relations with Argentina which was settled by signing a trilateral treaty in 1979 – Model for other bilateral projects in the region
Economic effect	<ul style="list-style-type: none"> – Impetus to economic development in the both countries – Symbol of regional integration – Itaipu meets 5% of the power needs of Brazil and 86% of Paraguay – 93% of generated power is consumed by Brazil – since 1985 to 2005, revenue received by Paraguay from the transfer of power from Brazil (export sale) amounted to US\$1 billion, i.e. the double amount of all direct investments to the country for the same period of time
Environmental and community impact	<ul style="list-style-type: none"> – Resettled 65 thousand people – Flooded the world's most beautiful and largest water falls – Disturbed habitats of flora and fauna
Mitigation	<ul style="list-style-type: none"> – Program is implemented on environmental sustainability and



measures	<p>social responsibility</p> <ul style="list-style-type: none"> – Created Itaipu technology park (3 universities, 9 research institutes, 26 companies and 55 laboratories), which serves as a scientific and technological hub
Period of validity the mechanism and revision of terms	
Period of validity the mechanism	<ul style="list-style-type: none"> - Fixed price until 2023 - The treaty's period in force is not specified
Revision of treaty terms	In 2009, some unfair, in view of Paraguay, terms of the 1973 Treaty were revised. Brazil took on the following obligations: 1) increase threefold the price of electricity export from Paraguay (from \$124 million to US\$360 million a year); 2) "consider" the possibility to sell electricity to third countries after 2023; 3) allow Paraguay to sell electricity directly on Brazil market rather than to only Eletrobrás monopoly; 4) finance construction of a 348-km 500-kV transmission line connecting Itaipu and Asuncion, which was put in operation in 2013 and was worth US\$450 million; 5) the Control-Financial Authority of Paraguay will audit all Itaipu's debts, and the financial reports will be more transparent.
Future development	Possible development options after 2023: 1) no changes in the 1973 Treaty leading to 60% reduction in Itaipu costs; 2) changes in the amounts of royalties and payments to Paraguay for the transfer of unutilized electricity to Brazil; 3) radical changes, particularly, allowing Paraguay to sell electricity at market prices to other countries, e.g. to Argentina.

Institutional and financial mechanisms

Institutional setup. With the purpose of carrying out the hydroelectric development of the Parana River, the state energy companies of Brazil (ELETROBRÁS) and Paraguay (ANDE) established, with equal capital participation, a binational entity denominated Itaipu Binacional (Article 3). The Itaipu Binacional has a unique institutional and legal status. It can be considered neither purely public entity nor joint venture. The entity is governed by the rules (including financial, administrative and control ones) established in the international treaties signed by the parties, rather than by their national laws. The Itaipu Binacional acts on the base of a concession granted by Brazil and Paraguay to execute the hydroelectric development of the stretch of the Paraná River.

The capital of the Itaipu Binacional is \$100 million. ELETROBRÁS and ANDE contributed \$50 million each in equal and non-transferable parts (Annex A to the Treaty, Article 6). Resources for the capital shall be provided by Brazil and Paraguayan treasuries or other financial entities designated by respective governments. Thus, the Paraguayan energy company "ANDE" borrowed \$50



million from Banco do Brasil on the condition of return of this amount of money during 50 years (until 2023).

Tax and compulsory rate privileges. Taxes and compulsory rates shall not be applied to electricity services provided by Itaipu Binacional; upon the materials and equipment that Itaipu acquires; upon the profits and upon the payments and remittances (Article 12).

Financial bases for the provision of the electricity services of Itaipu Binacional (Article 15):

- Itaipu Binacional shall pay Brazil and Paraguay, in equal amounts, the "royalties" due to the use of the hydraulic potential;
- Itaipu Binacional shall include in the cost of its service the amount necessary for the payment of the returns on the capital, the amount necessary for remunerating one of the Parties that cedes energy to the other;
- The real value of the quantity of dollars of the United States of America required for the payment of the royalties, for the return on capital and for the remuneration, shall be maintained constant. This value in relation to the weight and title in gold of the dollar of the United States of America may be substituted, in the case of the currency referred to not maintaining its official parity in relation to gold.

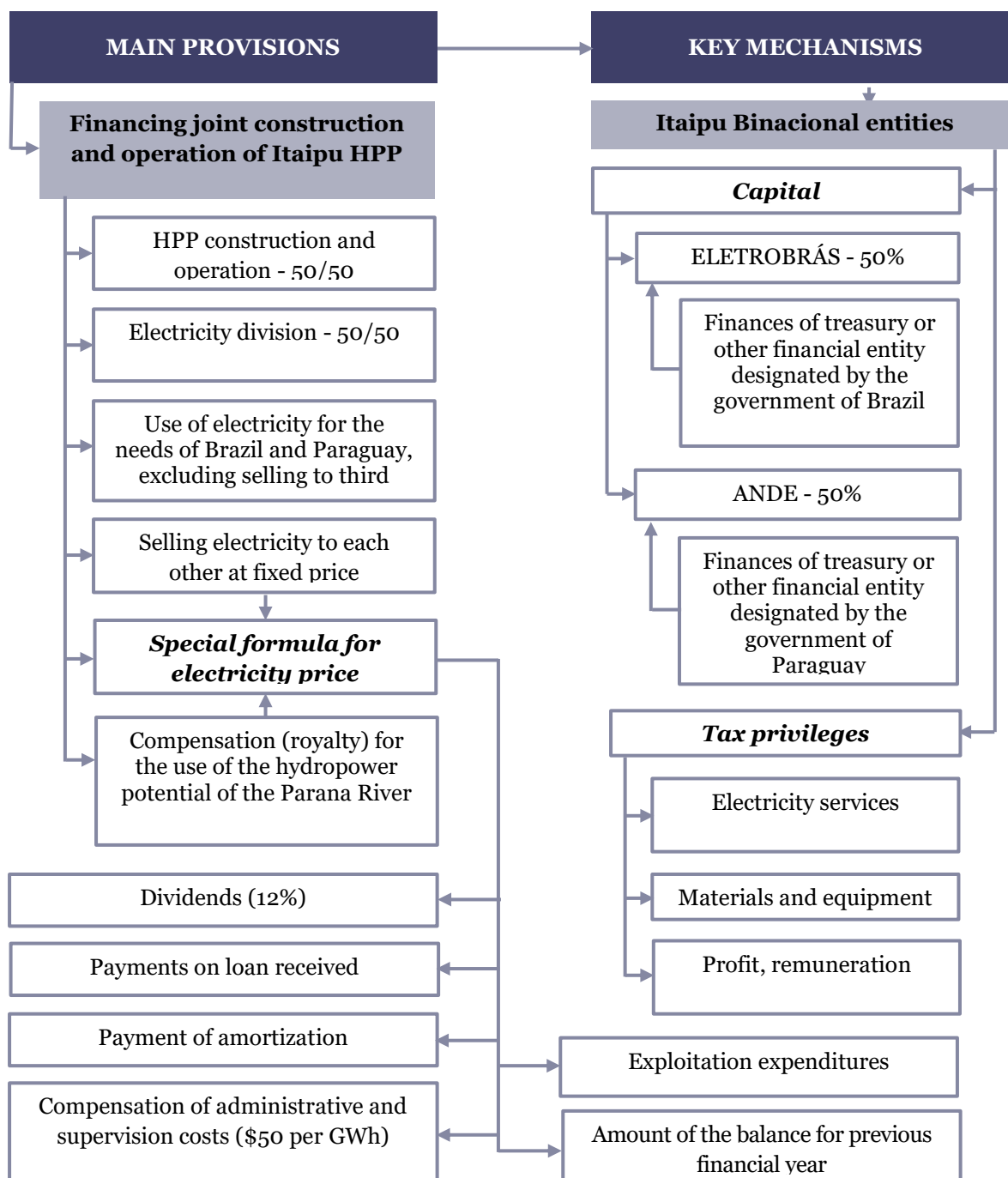
The formula of electricity price (the cost of electricity services) is set in Annex C to the Treaty. It prescribes that the annual income will have to be equal to the cost of the service (without profit). The cost of the electricity service shall be composed of the following:

- (1) dividends paid to ANDE and Eletrobrás in the amount of 12% per annum;
- (2) payments on the loans received;
- (3) payment of the amortization of the loans received;
- (4) payment of the "royalties" to Paraguay and Brazil for the utilization of hydropower potential (\$650 per GWh plus adjustment factor); this amount cannot be lower than \$18 million a year. The Payment of the "royalties" is to be effected monthly by Itaipu Binacional, in the currency available;
- (5) the payment to ELETROBRÁS and to ANDE, in equal parts, as compensation for the charges of administration and supervision related to the Itaipu Binacional, calculated as the equivalent to \$50 per gigawatt-hour generated plus adjustment factor;
- (6) the amount necessary to cover the exploitation expenditures;
- (7) the amount of the balance, positive or negative, of the exploitation account pertaining to the previous exercise;



- (8) remuneration to one of the Parties, equivalent to \$300 per gigawatt-hour ceded to the other Party. This remuneration shall be effected monthly by Itaipu Binacional, in the currency available.²²

Figure 2. Financial mechanism in the Treaty concerning the development of hydropower resources of the Parana River



²² Currently paid to Paraguay for the transfer of electricity to Brazil (\$300 per GWh plus adjustment factor).



Key conclusions and lessons from Itaipu HPP are as follows:

1. Joint hydropower construction and operation projects can, in case of sound regulatory, institutional, and financial framework, bring significant benefits to all countries involved.
2. Fairness does not always mean equality. Benefit sharing must be based on the different needs and capabilities of countries. In case of Paraguay, receiving 50% of the electricity generated at Itaipú would not be fair without the ability to sell it. For Brazil, by contrast, the investment would not have been justified without the possibility of guaranteed acquisition of most of Paraguay's share at fixed prices, in view of the growing demand for electricity in the country.
3. The flexibility of treaties, which allow for the revision of provisions over time, is important for peaceful settlement of disputes and for restoring justice in case, when one of the parties feels itself the victim of inequality.
4. Bilateral projects and treaties must be in line with regional and basin agreements. The Itaipú Treaty is signed as part of the La Plata Basin's five-party framework agreement.
5. The willingness to change previous rigid positions and revise previously established provisions for the benefit of regional integration and good neighborly relations reflects the position of responsible leadership. Brazil has demonstrated twice that it can make substantial economic concessions - in 1979, with Argentina (by ensuring a permanent flow in the river) and in 2017, with Paraguay (by tripling the price of imported electricity).
6. Water projects became a steppingstone for integration processes in the region. The 1979 tripartite agreement was the first step to create a common market of South American countries - Mercosur.
7. Agreements with affected countries that are not directly involved in the project can bring additional benefits for regional coordination.
8. The reliable institutional and legal form of implementation of joint projects plays an important role. The Itaipu Binational has proven to be an exemplary entity, generating revenue for both countries and pursuing a policy of social responsibility and environmental sustainability.
9. Through the technology park, Itaipu serves a scientific and technological hub for Brazil and Paraguay.
10. The governments of Brazil and Paraguay receive compensations (royalties) for the utilization of the hydroenergy potential of the Parana Rivers. This money is used for the needs of adjacent areas.



For details see "Benefit and Cost Sharing Mechanism for the Joint Construction and Operation of the Itaipú Hydropower Plant" (in Russian) on www.cawater-info.net/projects/peer-amudarya/pdf/itaipu.pdf.

3.3. The Indus Basin Development Fund for implementation of the Treaty between India and Pakistan

Indus Waters Treaty²³

India and Pakistan signed the Indus Waters Treaty in 1960 brokered by the World Bank. The key provisions of the Treaty are as follows:

- Six main tributaries of the Indus are divided equally between India (three eastern rivers – the Sutlej, Ravi, and Beas) and Pakistan (three western rivers – the Indus, Jhelum, and Chenab). The countries can use the rivers that are under control of another country for specific purposes only;
- A transition period of 10 years (1960-1970) was permitted in which India was bound to supply water to Pakistan from its eastern rivers until Pakistan was able to build the canal system for utilization of waters of the western rivers;
- India agreed to make a fixed contribution of £62,060,000 in ten equal annual installments during the transition period towards the cost of construction of new head-works and canal system for irrigation from western rivers in Punjab province of Pakistan (Article 5.1);
- Either party must notify the other of plans to construct any engineering works which would affect the other party (Article 7.2).
- The parties agreed on provisions on data exchange, cooperation through the establishment of a Permanent Commission and dispute settlement.

Financial mechanisms of Treaty implementation

To ensure implementation of the Treaty, the World Bank proposed a plan for external financing the construction of canals and reservoirs to transfer water from western rivers to Pakistan so that to compensate water losses by Pakistan, which transferred its rights to eastern rivers. To this end, the Indus Basin Development Fund Agreement was signed between Australia, Canada, Germany, New Zealand, Great Britain, U.S., Pakistan and the International Bank for Reconstruction and Development (Karachi, 19 September 1960).²⁴ The

²³ www.cawater-info.net/library/rus/water/ind.pdf

²⁴ <https://documents1.worldbank.org/curated/en/239781468100481033/pdf/Loan-0266-Pakistan-Indus-Basin-Project-Development-Fund-Agreement.pdf>



Supplemental Agreement of 1964 made provisions for additional resources to cover the cost of those works.²⁵

The money allocated by donor countries along with the fixed contribution of £62,060,000 from India according to Treaty's Article 5.1, shall be under trust of the Bank and shall be used exclusively for the purposes of the Agreement (Article 1).

Contributions to the Fund from donor countries are shown in the Table below. Pakistan undertook to contribute to the Fund £440,000 and the equivalent of £9,850,000 in rupees (Article 2.04.).

Contributions to the Fund in Agreements signed in 1960 and 1964

Country	Currency	Grant	
		Agreement 1960	Supplemental Agreement 1964
Australia	A£	6,965,000	4,667,666
Canada	C\$	22,100,000	16,810,794
Germany	DM	126,000,000	80,400,000
New Zealand	NZ£	1,000,000	503,434
Great Britain	£	20,860,000	13,978,571
USA	US\$	177,000,000	118,590,000

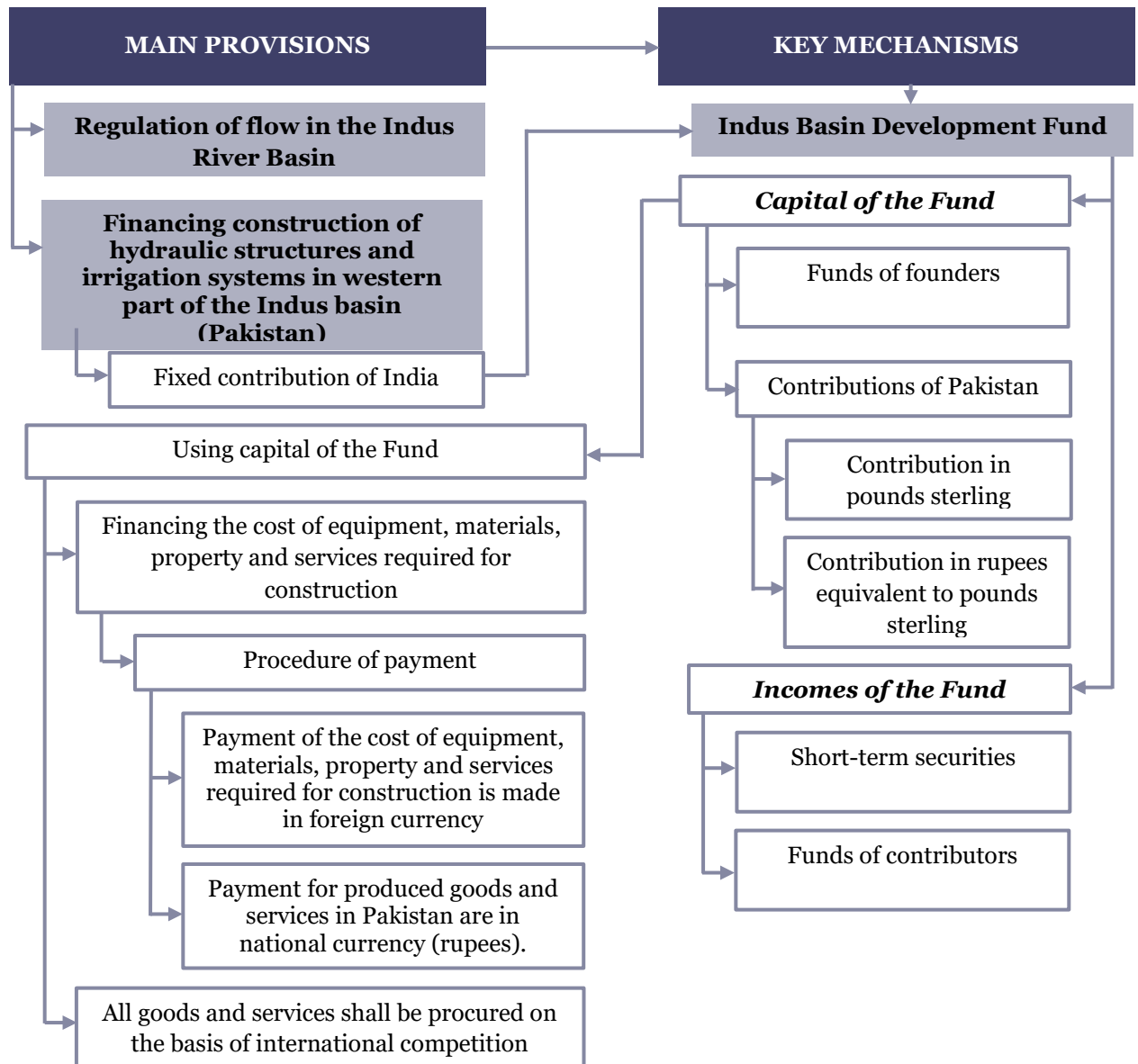
All goods and services shall be procured on the basis of international competition under arrangements, except as the Bank shall otherwise agree on grounds of efficiency or economy (Article 7.01 (b)).

The Bank may invest monies held by the Fund pending disbursement in such short-term securities as it shall deem appropriate. This provision will apply primarily to the Special Reserve. The Bank will, however, have power to invest on a short-term basis any monies from the contributors which are surplus to its immediate requirements. The income from such investments shall become part of the assets of the Fund (Article 8.02).

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<https://timeline.worldbank.org/themes/timeline/pdfs/web/viewer.html?file=%20%20%20%20%20%20%20%20%20%20%20%20%20/sites/timeline/files/timeline/archival-pdfs/event31IndusSupplementalDraftAgreement1788558.pdf>

Figure 2. Financial mechanism of Indus Waters Treaty implementation



Key conclusions and lessons:

1. **Not ideal but feasible solution.** Initial negotiations were based on implementation of joint and integrated use by the countries of both westerns and eastern rivers, but that time relations between the countries showed the importance of keeping by each country the control over a portion of its “own” resource. Therefore, it was decided to set ownership of rivers for one country and specify their limited use by another party.
2. **Active and permanent participation of the third party, which is trusted and can guarantee the fulfilment of decisions made,**



sometimes is the key factor of success. The active involvement of the World Bank was crucial to the success of the Indus River Treaty. Not only did the Bank offer its good offices and technical and financial support, but it was also a Party to the Treaty.

3. **Financial support can be a good incentive to reach agreement.** The Bank helped raise nearly \$900 million from the international community. This removed Pakistan's objections to signing and implementation of the Treaty.

3.4. Multilateral financing and risk insurance for implementation of the Nam Theun 2 Multipurpose Hydropower Project in Laos

The World Bank's Nam Theun 2 (NT2) Multipurpose Hydropower Project and the Social and Environment Project brought together 27 development partners and financiers to help the government of Lao People's Democratic Republic (PDR) develop a sustainable hydropower project that could generate power and expand livelihood opportunities.

Institutional and legal setup

The Nam Theun 2 Power Company (NTPC) was established as a *limited liability company* in 2002 to oversee the development, construction and operation of the Nam Theun 2 hydroelectric power plant. Its shareholders are EDF International (40%), the Thai Electricity Generation Company EGCO (35%), and the government of Laos, which has a 25% stake.²⁶

In October 2002 a BOT (Build-Operate-Transfer) *concession agreement* was concluded, with the Government of Laos granting the EDF-led *consortium* the right to develop, finance and operate the 1,070 MW hydroelectric power plant for 25 years. Upon completion of the operation period, the project will be passed to the Government of Laos.

In November 2003 *power purchase agreements* were signed between the Nam Theun 2 Power Company, on the one hand, and Electricity Generating Authority of Thailand (EGAT) and the Laotian state-owned power company Electricite du Laos (EDL), on the other.

In 2004, the construction started and the power plant went into commercial service on April 30, 2010.

²⁶ www.namtheun2.com/



Project financing

The project base cost is funded through US\$330 million of *equity* and US\$920 million of *debt*. It is financed through equity, loans and guarantees from 26 financial institutions, including

- four multilateral development banks (the World Bank Group, the Asian Development Bank, the European Investment Bank, and the Nordic Investment Bank),
- three export credit agencies (Coface of France, EKN of Sweden, and GIEK of Norway),
- three bilateral financing agencies (French Development Agency, PROPARCO, and the Export-Import Bank of Thailand),
- nine international commercial banks providing finance in hard currencies (grouped together in a "lead arrangers group" including BNP Paribas, Crédit Agricole Indosuez, ANZ from Australia, Société Générale, Fortis Bank, and Bank of Tokyo-Mitsubishi), and
- seven Thai commercial banks providing finance in Thai baht.

Risk insurance. All financing in hard currencies is guaranteed through political risk insurance provided by the above-mentioned three export credit agencies, the ADB (US\$50 million), the International Development Association (IDA) of the World Bank Group (US\$50 million), and the Multilateral Investment Guarantee Agency (MIGA) of the World Bank Group (US\$91 million). Specifically, MIGA has provided a US\$86 million guarantee to Fortis Bank of Belgium against the risks of expropriation, breach of contract, war and civil disturbance, as well as transfer inconvertibility in both Laos and Thailand.

The government's *initial equity contribution* of US\$83 million (25%) was largely funded by donors, including a US\$20 million grant from the International Development Association of the World Bank Group, the ADB (US\$20 million), France, and the EIB.

The power purchase agreement between NTPC, on the one hand, and EGAT and EDL, on the other, was designed as to stabilize the cash flow despite hydrological variation and consequently variation in power output. Revenues will be partially in USD and partially in Thai baht. Power demand from Thailand is expected to be strong.

Lessons learnt from Nam Theun 2

1. The World Bank played a key convening role throughout the project for bringing together financial partners, communicating with international stakeholders, and facilitating dialogue and monitoring of the project:



- a. The International Development Association of the World Bank Group provided partial financing to the project and a partial risk guarantee to cover private lenders, or investors through shareholder loans, against the risk of a government (or government-owned entity) failing to perform its contractual obligations with respect to a private project.
 - b. The Multilateral Investment Guarantee Agency (MIGA) of the World Bank Group provided \$91 million political risk insurance for the project.
 - c. The World Bank played an enabling role in the project financing plan with partial financing of government equity and an IDA guarantee that leveraged the presence of other financiers, including the Asian Development Bank, Agence Française de Développement, the European Investment Bank, and European and Thai export credit agencies.
2. The international financial institutions, project proponent (Nam Theun 2 Power Company) and Lao government (at all levels) worked together throughout project implementation, particularly in the final years, through a *Joint Working Group*.
3. *Consortium* of commercial lenders and international financial institutions, including the World Bank and ADB implements the project.²⁷ The consortium also established a separate limited liability company.

²⁷ www.namtheun2.com/



3.5. Lessons learned from international experience

A summary of institutional and financial mechanisms used in the studied examples for the construction and/or operation of water facilities of interstate significance, as well as for flow regulation, is given in the Table below.

Table 3. Institutional and financial mechanisms in Columbia, Parana and Indus basins

	Columbia	Parana/ Itaipu	Indus
CONSTRUCTION			
financing source	Three dams – at the expense of selling by Canada of its share of additionally generated electricity in the U.S. Libby dam at U.S. expense	Brazil and Paraguay (50/50) Private lenders under sovereign guarantee of Brazil	India and Indus Development Fund financed the construction of canal system in Pakistan
sanctions for delayed construction	Canada would have lost its "Canadian entitlement" for a period of delay Both countries were to pay costs to the Consortium of investors	-	-
compensation for damage	U.S. paid Canada compensation for resettlement and damage for flooding of a portion of the Canada territory as a result of Libby dam construction in the U.S.	Itaipu Binacional paid compensation of \$190 million for acquisition of land in Paraguay and Brazil	
OPERATION OF INFRASTRUCTURE			
operating entities (OE)	U.S.: Bonneville Power Administration and the United States Army Corps of Engineers Canada: BC Hydro.	Joint body – Itaipu Binacional	Each country in its territory
mechanism of coordination and	- regulation regime	- regulation regime	Permanent



planning	in the Treaty - OE coordinate operating plans - Permanent Engineering Board oversees implementation of the Treaty	in the Treaty - Itaipu Binacional operational and strategic planning	Commission
financing	at the expense of each country in its territory	50/50	Each country in its territory
damage	compensation for damage in Article XIII (2)		
tax and financial privileges		Taxes and other fees shall not be applied to Itaipu and its electricity services (Art. 12(a)). Itaipu may take loans under guarantees of Brazil and/or Paraguay.	
REGULATION OF FLOW			
Royalty	-	Brazil and Paraguay receive from the Itaipu Binacional financial compensation (royalty) for the utilization of hydropotential of the river	-
Payment for regulation services	- Payment to Canada of 50% of additional electricity generated downstream through improved flow regulation (Canadian entitlement); - payments to Canada for flood control	Not stipulated. Generated electricity is divided equally between the countries, with the right to sell excess electricity to each other for own use	-
Sanctions for breach of the	Payments to Canada for flood control		



agreed regime	could have been reduced if storage reservoirs had not started operating on time Other damage (Article XVIII)	-	
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The above examples allow making the following conclusions:

1. For financing construction and operation both **public and private finances** are mobilized. Financing models in the form of public-private partnerships as consortiums and funds are rapidly developed.
2. **Financial mechanisms and tools are effectively elaborated** and specified in treaties, where each party undertakes to implement them. The financial mechanisms may be further improved based on the results and lessons from implementation. Besides sharing benefits and costs, such mechanisms as financial sanctions, political risk insurance, tax and customs privileges, etc. are applied. Refreshing such set of financing mechanisms and sources and their application in the context of Central Asia will allow creating a solid base for improved coordination.
3. A **detailed economic assessment of cooperation benefits and costs** had been made before signing Treaties in Columbia and Parana basins. In both cases this work was undertaken by joint commissions: the U.S.-Canada International Joint Commission and the Brazilian-Paraguayan Joint Technical Commission for preliminary feasibility study of Itaipu HPP. These assessments laid the basis for further agreements. Regular assessments of costs and benefits are envisaged in the treaties on the Columbia and the Parana.
4. For construction and operation of water and hydropower projects, basically **commercial companies** or consortia in the form of limited liability companies are established, with financing from government budgets or loans. Also, these entities ensure implementation of treaties on flow regulation between riparian countries. A joint body, as a rule, oversees implementation.
5. **The world practices have no examples of the consortium established as a regulator. Consortia** are usually created for integrating efforts of different partners for implementation of a specific project or construction and operation of water and hydropower facilities.
6. **Consortia having no the legal person status** are established mainly for attracting financing and may not have the word "consortium" in their



name although in fact being a consortium. For example, a *consortium* of 37 public and 4 private utilities in the United States concluded a treaty for buying the Canadian entitlement for downstream power benefits of the Columbia River. The money was used for the construction of 3 dams in Canada. The *consortium* of commercial creditors and international financing institutions, including the World Bank and ADB, ensured implementation of the Nam Theun 2 Multipurpose Hydropower Project in Laos. The *Indus Basin Development Fund* was established with no the legal person status under trust of the World Bank for accumulation and agreed use of funds of countries and development partners to ensure appropriate implementation of the Indus River Treaty between India and Pakistan.

7. **Consortia as a legal person** are established as a rule in the form of a joint stock company or a limited liability company and act under a “build and/or operate” or hydro development concession agreement. For example, the Laotian state-owned company (Lao Holding) in consortium with private shareholders Electricité de France International Nam Theun Holding (EDF-NTH) and Electricity Generating Public Company Limited (Thai power generation companies) established the Nam Theun 2 Power Company Limited for construction, operation and transfer of the Nam Theun 2 hydroelectric power plant for first 25 years of its operation (BOT model). Upon completion of the operation period, the plant will be transferred to the Laotian government.
8. **The world practices have examples of establishment of unique entities (companies) that act on the base of the international treaty rather than national laws.** Thus, according to Treaty for hydroelectric development of the hydraulic resources of the Paraná River, the *Itaipu Binacional* was created. The entity is governed by the rules and procedures (including financial, administrative and control ones) established in the international treaties signed by the parties, rather than by their national laws. The entity acts on the base of a concession granted by Brazil and Paraguay to execute the hydroelectric development of the stretch of the Paraná River.
9. **In some basins riparian countries do not establish joint organizations but authorize national agencies or companies construct and operate water or hydropower facilities in close coordination with counterparts in other riparian countries.** For example, organizations responsible for implementation of the Columbia River Treaty (operating organizations) are the Bonneville Power Administration and U.S. Army Corps of Engineers in the United States and B.C. Hydro in Canada. Operation of reservoirs is coordinated by



operating plans and weekly consultations. The Permanent Engineering Board (consisting of 2 members per country assigned by governments) performs independent assessment of implementation and reports to federal governments of the U.S. and Canada.

10. **A prerequisite for successful functioning of all above mentioned operating or financing organizations is the interstate agreement**, which sets the agreed regimes and/or conditions of flow regulation (or construction and operation of facilities) between riparian countries in multi-year perspective; clearly specified procedures for actions and monitoring of implementation of obligations; planning of future work and possibility for adjustments upon consultations with countries; financial obligations of each party, mechanisms of risk insurance and other measures for enforcement.
11. **The comprehensive economic assessment of benefits and costs of cooperation on sharing water of interstate sources is the basis for negotiation of effective and mutually beneficial interstate agreements**. For example, a detailed economic assessment of cooperation benefits and costs had been made before signing Treaties in Columbia and Parana basins. In both cases this work was undertaken by joint commissions: the U.S.-Canada International Joint Commission and the Brazilian-Paraguayan Joint Technical Commission for preliminary feasibility study of Itaipu HPP. The treaties also make provisions for regular assessments of costs and benefits.
12. **New financing mechanisms and sources**, such as different funds (global and green climate, adaptation funds), green bonds, and water bonds need to be further studied for their potential application in Central Asia.



Section 4. Proposals for the improved water and energy coordination in Central Asia

Existing challenges and untapped potential in water and energy requires the enhancement of mutually beneficial cooperation between the Central Asian countries. Improvement of water and energy coordination in Central Asia would require a range of technical, legal, institutional financial-economic measures, as outlined in this paper. Establishment of the abovementioned IWECC alone may not cover all these necessary measures given their complexity and scale. While all of those measures are needed for the improved coordination of water and energy, this section focuses on some institutional and financial-economic mechanisms for improved coordination.

Regional institutions discussed earlier have demonstrated their effectiveness in operational management and coordination, while also showing certain needs for adopting new elements, their interlinkages and mechanisms for further coordination, harmonization and provision of services. The improved coordination mechanisms would aim to achieve water-energy management and coordination that is economically sound and meets interests of all sectors involved. They include hydropower (in the total energy system), irrigated agriculture, and aquatic ecosystems. For this purpose, it would be worth considering improving and combining the functions of the existing institutions on water and energy in Central Asia, including IFAS bodies, to better represent such varying interests, rather than creating another new institution

As noted above, currently the work is under way on the improvement of legal framework of the IFAS that includes development of a mechanism of improved coordination in **regulation** of water and energy relations at the level of country ministries and agencies. Either establishment of a joint water and energy commission consisting of the heads of water and energy agencies or holding joint meetings of separate water and energy commissions is considered as a solution.

Thus, this document focuses on **supporting mechanisms that can ensure enforcement of the decisions made on a long-term and sustainable basis**. In particular, the following is proposed for discussion:

- Key principles and conditions for organization of improved water and energy coordination;
- Approaches to strengthening water and energy interactions;



- Options of institutional mechanisms, taking into account specifics of flow regulation and hydropower in Central Asia.

4.1. Key principles and conditions for improved water and energy coordination

In 2022, the IFAS Board approved the Position paper “9th World Water forum: Central Asia for peace and development. Priorities, actions and challenges for the future”.²⁸ Based on these principles and those proposed in the “Roadmap for development of a cooperation mechanism for the Eurasian Economic Community member countries in the field of water and energy regulation in Central Asia” and the Eurasian Development Bank’s report “Regulation of the Water and Energy Complex of Central Asia”, the following **key principles and conditions** are suggested for organization of improved water and energy coordination:

- *Solidarity, coordination of actions and joint responsibility of states* in Central Asia for sustainable and equitable use of water resources in interstate sources for population wellbeing, economic development and environmental security;
- *Commitment to adopted agreements, norms of international law, integrated water resources management principles and water-energy-land-use nexus approach*, with account of regional specifics and obligatory implementation of obligations accepted;
- *Account of past lessons and regional specifics* for improving water and energy coordination and cooperation and when adopting new approaches;
- *Tradeoff of irrigation and energy regimes* in operation of reservoir cascades in operational, annual and multiyear dimension on the base of mutual benefit and taking into account environmental protection requirements in the short- and long-term; ensuring uniform water supply during operational management, without large flow fluctuations caused by energy daily regulation (example of the Uchkurgan HPP); compliance with sanitary releases;
- *Sound balancing of economy, people and ecosystem needs* bearing in mind social and environmental implications of unsound use of natural resources in the region;
- *Creation of conditions for attraction of investments, development of public-private partnership and adoption of market mechanisms* of

²⁸ Position paper “9th World Water forum: Central Asia for peace and development. Priorities, actions and challenges for the future”. Dushanbe. 2022. <http://cawater-info.net/9wwf/pdf/position-paper-en.pdf>.



- interactions in water and energy sectors, with account of transboundary nature of water resources and water and energy nexus;
- Creation of *effective mechanisms for implementation* of accepted obligations, including guarantee and insurance funds;
 - Widespread support of *advanced knowledge, technology, digitalization and innovations* as the key factors of mid- and long-term economic growth and sustainable development.

4.2. Possible approaches to assess and enhance mutual benefits

Economically, water and energy relations between the countries should be based on **mutual benefit** from improved cooperation (coordination) in the short- and long-term. The **long-term mechanisms of financial and economic interactions** will increase transparency and predictability of interactions, reduce economic losses, and increase access to financial resources, including those from non-budgetary sources. Clearly determined amounts and conditions of financing will allow the countries to include necessary expenditures in their national budgets and plan their use more efficiently. Financial mechanisms should be agreed upon for different types of costs and losses.

There are several potential measures which Central Asian countries could adopt to ensure the long-term sustainability of **financial and economic base of cooperation**. The list below outlines options for such measures for further discussion among stakeholders in the region:

- **Improve the existing schemes of mutual settlements (payments) under the current multilateral and bilateral agreements** for water, fuel and energy supplies between the countries. Options for such improvement could include:
 - **purchasing summer electricity** generated at HPP during periods for irrigation water releases **at winter prices**, and **compensating during winter at summer prices**: the difference in prices determines the cost to be compensated by users of irrigation water;
 - including **algorithms** into the schemes of mutual settlements, which enable **calculation of prices of electricity and fuel resources** exchanged between the countries taking into account irrigation and energy revenues from utilization of regulated water flows in different sectors,
- **Adopt charges for regulation of flow** based on **multi-year** reservoir regulation that allows to accumulate water in wet years to use it in dry years to mitigate water scarcity:



- For this it is important to develop a **methodology for calculation of price of flow regulation** based on estimation of incurred costs. This will require new agreements or amendments to existing ones;
- Develop and agree upon a methodology for **sharing costs of, and revenues from, the operation** of large multipurpose reservoirs,
 - with **discussion** on options for cost sharing among the countries while ensuring adherence to obligations related to the agreed regime of hydroscheme operation;
 - One option could be assessment of maximal regional benefit and its distribution between sectors proportionally to their contributions to generation of such benefit;
- When appropriate, along with the costs of flow regulation and reservoir operation, **consider the possibility of accounting for wider costs** associated with the formation of water resources, channel (transportation) costs for accumulating water in reservoirs and expenses related to natural disasters;
- Develop and agree upon a mechanism of water and energy interactions in the context of a possible **common energy market and transboundary nature of main rivers** in Central Asia.
 - It would be necessary to develop a mechanism that would allow regulating the electricity and power capacity market, considering the specific relationships between upstream and downstream countries.
 - The mechanism should be comprehensive, considering not only the relationships in electricity and power capacity market, but also payments for re-regulation of river flows for provision of transboundary water storage in multi-year flow regulation.

In recent years, all energy systems under the UES CA have produced excess energy and declare positive electricity balances, including until 2030. This is a good basis for development of the electricity market, which should lead to lower prices. There is great surplus of generating capacities in the Central part of UES CA, including such large thermal power plants as Tashkent (1900 MW), Novo-Angren (2100 MW), and Syrdarya (3000 MW), from which energy is transferred to other, energy deficient parts of UES CA (Samarkand - Bukhara part of Uzbekistan, Northern Tajikistan, Southern Kazakhstan). Excess of power is observed in the south of Kyrgyzstan, while the north is energy deficient. Massive surplus of electricity supply is observed in summer in the south of Tajikistan, portion of which is transferred to deficient Syrkhandarya node in Uzbekistan, while the bulk is delivered through 500-kV Regar-Guzar to UES CA. In winter, when the Tajik



energy system is in very short-supply, massive power supplies are provided from neighboring energy systems to the republic.

At the same time, some countries have imbalanced capacities during the peak load hours – this is the indicator for development of capacities market on the base of regulating hydropower plants.

Massive development of renewables in Kazakhstan and Uzbekistan will lead to: (a) critical aggravation of the issue related to regulation of imbalances and the capacity reserves required for this (electricity accumulators need to be constructed); (b) huge surpluses of energy generated by solar plants in summer; (c) the problem with gas surpluses in the daylight hours and the following need to solve this problem.

Given the increasing water scarcity year after year due partly to temperature rise and glacier melting, more generation will be needed using the same amount of water. Moreover, huge surplus of renewable energy will be generated in daylight hours and will need to be utilized. The focus should be shifted to construction of pumped storage hydropower (PSH), including on the base of available reservoirs. Thus, Italy constructed 5-GW PSH (regulating range – 10 GW) for accumulation of solar power (19 GW in 2017) that, combined with gas generation and traditional hydropower, allowed solving the problem of renewable variability and discontinuity.

There are limitations related to stability requirements that do not allow increasing energy flows. These limitations are observed between Tajikistan and Uzbekistan (500-kV Regar-Guzar line) at the connection between Central and Western parts of the energy system, between the Fergana part and the Northern Kyrgyzstan and in other sub-regions.

Recently, the major connection, in terms of sustainability, is the North – South Kazakhstan connection, through which the UES CA operates in parallel mode with the Kazakh and Russian energy systems. In winter in 2022, this connection failed due to overload, and all energy systems of the UES CA had considerable power cuts. The high load of this connection causes that failure of any power generating unit or deficit in any energy system of the UES CA leads to automatic capacity load surge and consequent disconnection of users that have automated connection. The well-known energy principle of reliability - n-1, by which the disconnection of one element of the grid shall not lead to the breach of reliability requirements, is not met.

The high degree of integration of electrical grids and emergency automation in the Central Asian Power System practically excludes the possibility of independently designing and constructing energy facilities in the region, both network-related and power-generation ones, without coordination with other energy systems.



Alongside the development of the power grid infrastructure in countries, it is essential to expand the coverage areas of energy integration. Specifically, this can be achieved by reintegrating the energy systems of Tajikistan and Turkmenistan into the Central Asian Power System and expanding the energy market in South Asia.

To achieve this, a mechanism needs to be designed to regulate the electricity and power market, considering the unique relationships between upstream and downstream countries. For example, maintaining quotas for mandatory purchase of electricity, regardless of market conditions. This mechanism should be comprehensive, taking into account not only the electricity and power market dynamics but also potentially considering payment for services related to river flow regulation, including the creation of transboundary water reserves in long-term reservoirs.

4.3.Options of improved institutional mechanisms for water and energy interactions

It should be noted that the argument below assumes a successful completion of the on-going process of improving IFAS structure in terms of coordinated decision-making on flow regulation, with account of water and energy interests. Moreover, updating the IFAS structure, among others, implies strengthening the functions of coordination between water and energy agencies. This effort focusing on improving institutional and governance aspects of the IFAS bodies could be considered an **“administrative approach”** to the interstate regulation on water.

To support decisions made by the IFAS bodies and other relevant governmental agencies, **engagement with non-governmental and commercial organizations** should be further enhanced. These organisations, notably financial institutions, could play an important role in financing joint construction of water facilities of interstate importance, and their coordinated operation. Engagement with such commercial organisations could be better pursued through **“market-based approaches”** such as Public-Private Partnership schemes.

Rather than relying on one single approach, it could be useful to consider combination of the administrative and market-based approaches in support of interstate regulation. Such a hybrid approach could have the great potential to efficiently make and implement mutually beneficial decisions on water and energy in Central Asia.

Market-based approaches could also help Central Asian countries mobilize financial solutions for maximizing the region-wide effect



through flow regulation (to optimize water allocation in the interests of all riparian countries) and a scheme for sharing this effect (through compensation and other mechanisms) between countries and economic sectors.

Having long-term mechanisms of financial and economic coordination could also increase transparency and predictability of coordination, reduce economic losses, and increase access to financial resources, including those from non-budgetary sources. Clearly determined amounts and conditions of financing will allow the countries to include necessary expenditures in their national budgets and plan their use more efficiently. Financial mechanisms should be defined for different types of costs and losses.

There could be different options for a regional financial mechanism for coordinated financing or construction and operation of water facilities of interstate importance, as outlined in the table below. For example, the consortium could be established as a legal entity to address specific tasks, such as, for example, construction of Kambarata-1 or Rogun HPP, where individual consortium is formed for each of the facilities. Upon completion of the construction, each consortium, probably, would deal with operation in the same format (or be transformed into a joint venture or a joint stock company among stakeholders of the concerned countries). Involvement of IFIs may not be limited by the period of construction only since the former could guarantee implementation by parties of obligations envisaged in the agreements signed between them. Authorized public authorities or joint bodies may monitor implementation of the obligations. *The consortium without formation of a legal entity* could be established mainly for consolidation of funds of the countries, financing institutions and insurance agencies for implementation of clearly determined scope of tasks.



Institutional setups for coordinated financing or construction and operation of water facilities of interstate importance

A. Consortium or Foundation without formation of a legal entity

Status: Temporal or permanent entity without legal person status.

Scope: depends on the tasks to be solved. Possibly, separately on the Amu Darya basin and the Syr Darya basin, the Aral Sea region or for individual investment projects.

Actors/founders: stakeholders and organizations, with assignment of international financing organizations (e.g. World Bank or EDB) or other guarantors as the administrator of the Consortium or Fund

Relations with existing organizations: Additional mechanism to ensure implementation of the obligations accepted at the interstate level (IFAS, ICWC, others)

Possible objectives and tasks:

- accumulating funds for financing joint implementation of large investment projects in the energy and/or water sectors (e.g. construction or modernization of multipurpose waterworks facilities with hydropower); or implementation of large food, infrastructure, transport, research and technological, and innovation projects in water and/or energy sectors;
- financial and insurance guarantees (political risk insurance) for implementation of regimes of flow regulation or operation of facilities agreed among the countries.

Financing sources: contributions of actors; bank loans; bonds; equities, etc.

Other financial mechanisms: financial sanctions; bonuses; insurances; environmental compensations, etc.

Key conditions for implementation: agreement on establishment, with clearly specified tasks; agreement between the countries on the agreed regulation of flow or the conditions for construction and operation of given facility; available external guarantor and/or insurance agent of political risks as an administrator of the Consortium or Fund.

Examples from international practice:

- Indus Basin Development Fund (administrator – World Bank);
- Consortium of 37 public and 4 private utilities in the U.S. concluded a contract for buying the Canadian entitlement for downstream power benefits for \$254 million, at the expense of which three dams were built in Canada.
- The *consortium* of commercial creditors and international financing institutions, including the World Bank and ADB, ensured implementation of the Nam Theun 2 Multipurpose Hydropower Project in Laos.



B. Consortium as a legal entity

Status: Joint stock company or joint venture as a commercial economic entity on the basis of laws of member countries.

Founders: big concerned companies of member countries or foreign states.

Relations with existing organizations: Additional mechanism to ensure implementation of the accepted obligations, in particular ICWC (regulation of water releases) and CDC “Energiya” (coordination of energy flows).

Possible functions:

- joint or coordinated construction and/or operation of water facilities of interstate importance;
- ensuring implementation of regimes of flow regulation or operation of facilities agreed among the countries.

Financing sources: contributions to the capital, bank loans; bonds; equities; own funds, etc.

Other financial mechanisms: financial sanctions; bonuses; insurances; environmental compensations, etc.

Key conditions for implementation:

- agreement on the conditions of establishment and functioning (e.g. BOT (build — operate — transfer) or BOOT (build — own — operate — transfer) concession agreement;
- agreement between the CA countries on the coordinated regulation of flow or the conditions of construction and operation of individual facilities (projects); on insurance of political risks in regulation of flow or construction and operation of individual facilities (projects);
- monitoring of implementation from the side of interstate organizations or authorized bodies.

Examples from international practice:

- The Nam Theun 2 Power Company Limited was established as a limited liability company by the Laotian state-owned company (Lao Holding) and private shareholders Electricité de France International Nam Theun Holding (EDF-NTH) and Electricity Generating Public Company Limited (Thai power generation companies) for construction, operation and transfer of the Nam Theun 2 hydroelectric power plant for first 25 years of its operation (BOT model). Upon completion of the operation period, the plant will be transferred to the Laotian government.²⁹

²⁹ www.namtheun2.com/



C. Bi- and multinational specialized company

Status: a company established on the base of a treaty, regulated by provisions and procedures emanating from international treaties rather than national laws of the parties.

Founders: companies of member countries.

Relations with existing organizations: Additional mechanism to ensure implementation of the accepted obligations, in particular ICWC (regulation of water releases) and CDC “Energiya” (coordination of energy flows).

Possible functions:

- joint or coordinated construction and/or operation of water facilities of interstate importance;
- ensuring implementation of regimes of flow regulation or operation of facilities agreed among the countries.
- political risk insurance.

Financing sources: contributions to the capital, government loans, bank loans; bonds; equities; own funds; green, water bonds, etc.

Other financial mechanisms: financial sanctions; bonuses; insurance funds; environmental compensations, etc.

Key conditions for implementation:

- agreement on the conditions of establishment and functioning (e.g. BOT (build — operate — transfer) or BOOT (build — own — operate — transfer) concession agreement;
- agreement between the CA countries on the coordinated regulation of flow or the conditions of construction and operation of individual facilities (projects); on insurance of political risks in regulation of flow or construction and operation of individual facilities (projects);
- monitoring of implementation from the side of interstate bodies or authorized bodies.

Examples from international practice:

- The Itaipu Binacional binational entity belongs in equal shares to Brazil and Paraguay and acts on the base of the international treaty rather than national laws of the countries.



D. National companies or agencies authorized by countries

Status: No special organization is established. Countries authorize national agencies or companies, while preserving their economic and legal independence.

Relations with existing organizations: Mechanism for coordinated implementation of the accepted obligations in the countries, with monitoring of implementation from the side of ICWC (regulation of water releases) and CDC “Energiya” (coordination of energy flows).

Possible functions:

- coordinated construction and/or operation of water facilities of interstate importance;
- ensuring implementation of regimes of flow regulation or operation of facilities agreed among the countries.

Financing sources: state budget, with attraction of loans under sovereign guarantees.

Other financial mechanisms: financial sanctions; bonuses; insurance funds; environmental compensations, etc.

Key conditions for implementation:

- agreement between the CA countries on coordinated regulation of flow and conditions of construction and operation of individual facilities (projects), as well as on authority for monitoring from the side of interstate bodies; on conditions of coordinated functioning, including development of operating plans.

Examples from international practice:

- Organizations responsible for implementation of the Columbia River Treaty (operating organizations) are the Bonneville Power Administration and U.S. Army Corps of Engineers in the United States and B.C. Hydro in Canada. The Permanent Engineering Board (consisting of 2 members per country assigned by governments) performs independent assessment of implementation and reports to federal governments of the U.S. and Canada. Operation of reservoirs is coordinated by operating plans and weekly consultations (conference call).



To strengthen the **analytical base for coordinated decision making** on water and energy, experts suggest two approaches.

First. If ICWC is enlarged to the Interstate Commission for Water and Energy Coordination (or any other coordination mechanism is formed), the **functions of SIC ICWC** may be extended to include information of sound planning of water and energy regimes for the coming year(s) and monitoring of their observance. This work is mostly seasonal, so there is no need to create another new organization but to strengthen analytical coordination with power men.

Second. Another suggested option is a **Center for Coordination of Water and Energy Relations**. An information-analytical division is proposed to be formed at the Center to search for coordinated decisions based on economic assessment of benefits to countries (economic sectors) from joint regulation of flow. Its tasks may include the following: make economic calculations on water and energy; calculate multi-year regulation; develop normative-legal documents; provide information support to the process of water-energy coordination; develop coordination and data exchange protocols. If a **financial and insurance operator** is mobilized (contracted) in the coordination scheme, a number of routine services, e.g. for search of power sources and consumers, calculation of prices and costs, insurance, etc. can be provided. This scheme implies **subsidizing the water and environmental sector** through a specially established **Environmental Fund** - to **pay for water releases to aquatic ecosystems** in dry years that are ensured through **target regulation** of flow (possibly through services on purchasing electric energy by the financial and insurance operator and its transmission to the party that provides target flow regulation).

4.4. Conclusions and next steps

Among the issues to be addressed for enhanced trust and cooperation:

- elaboration of a procedure for maintaining water facilities of regional importance according to a mutually agreed list;
- development of a regulation on water related information exchange and, ultimately, the conclusion of an relevant interstate agreement;
- improvement of the interstate management system for the integrated use and protection of water resources of interstate rivers;
- development and improvement of the legal basis of interstate relations for the use and protection of water resources of interstate rivers;
- establishment of a coordination mechanism, including on international assistance.



In this document, based on the analysis of the challenges faced by the region for improved water and energy coordination and the international practice, we propose preliminary options of the renewed interactions, including through PPP mechanisms. Next steps will be based on the outcomes of consultations between the countries and the preferable options chosen by them.

For creation of a renewed coordination mechanism, it is important to harmonize the **approaches to economic assessment** of the cost of services on flow regulation, including the services on multiyear and seasonal regulation of river flow by hydroscheme cascades belonging to different countries, on joint construction and operation of water and energy facilities of interstate importance, on exchange and flows (water-power), and on guarantees for implementation of obligations by the parties.

In this context, it is planned to elaborate and agree upon the approaches and undertake an **economic assessment of damages and benefits from flow regulation**. The overview of regulation practices in the Amu Darya and the Syr Darya basins identified several options of the base regime to build on in the assessment of economic damages and effects from flow regulation.

The following areas are proposed for further elaboration: i) utilizing the potential of multi-year flow regulation, which guaranteed water accumulation in reservoirs and their use to cover water shortage in summer, - recommendations for calculating tariffs for provision of multi-year regulation services; ii) strengthening water and energy coordination by adding the services of financial and insurance companies and other mechanisms; iii) improving the existing institutions dealing with water and energy coordination; iv) the option of a Consortium (or any other entity) to ensure joint construction and operation of reservoirs, including agreements guaranteeing operation conditions for the parties, operation cost sharing, etc.

It is also necessary to: i) study the existing legal and institutional-economic mechanisms of each actor dealing with regulation of water releases and energy flows in the Syr Darya River Basin; ii) develop a mechanism ensuring “the right to water bonuses” for the downstream countries and “the right to energy bonuses” for the upstream countries in order to coordinate water and energy relations between the Central Asian countries on the basis of international experience; iii) develop a mechanism for insurance of political and other risks in flow regulation and electricity flow; iv) study new mechanisms and sources of financing that might be applicable for Central Asia, such as funds (global and green climate, adaptation funds), green and water bonds.



APPENDICES

Appendix 1. Protocol decision of the Interstate Council of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan on the establishment of the IWEC, June 26, 1998.

Protocol decision on the establishment of the International Water and Energy Consortium

Having discussed the information of the Intergovernmental Commission about the draft Agreement between the Government of the Republic of Kazakhstan, the Government of the Kyrgyz Republic, the Government of the Republic of Tajikistan and the Government of the Republic of Uzbekistan on the establishment of the International Water and Energy Consortium (IWEC) and taking into account that the Republic of Tajikistan joined to the Treaty on Common Economic Space, the Council of Heads of Government (Prime-Ministers).

Has decided:

1. To take into account the information of the Intergovernmental Commission on the establishment of international Consortiums about progress in drafting Agreement.
2. The Intergovernmental Commission on the establishment of international Consortiums shall:
 - prepare proposals on creation of the Council of Consortiums, a working body, and the management structure by August 1, 1998.
 - draft By-laws of the International Water and Energy Consortium by September 1, 1998.
 - draft the Foundation Agreement by September 20, 1998.
 - submit documents for consideration at the regular meeting of the Council of Ministers for decision making.

Done at Bishkek on June 26, 1998, in one original copy in Russian.

The original copy remains in the office of the Executive Committee of the Interstate Council of the Republic of Kazakhstan, Kyrgyz Republic, Republic of Tajikistan and Republic of Uzbekistan, which shall submit certified copies to each participating country.

**For
the Government
of the Republic
of Kazakhstan**

**For
the Government
of the Kyrgyz
Republic**

**For
the Government
of the Republic
of Tajikistan**

**For
the Government
of the Republic
of Uzbekistan**



Appendix 2. Concept on the creation of an IWEC of the CACO member countries (the draft was prepared by the World Bank in 2004).

CONCEPT

on the creation of an International Water and Energy Consortium of the Central Asian Cooperation Organization (CACO) member countries States

The Concept on the creation of an International Water and Energy Consortium (hereinafter, 'the Consortium') reflects the agreed view of member countries of the Central Asian Cooperation Organization (hereinafter, 'the CACO') on the creation of favorable economic and legal environment for economic entities of water, fuel-energy and other sectors (hereinafter, 'Entities') of the CACO member countries.

1. Objectives of the Consortium:

- developing and implementing agreed activities in the area of rational and efficient development and use of region's water and fuel-energy resources;
- ensuring the implementation of agreements concluded by the member countries on the issues of cross-supply of water and fuel-energy resources;
- ensuring the optimal mix of energy and irrigation regimes for operation of cascades of reservoirs in annual and perennial cycles breakdown and with consideration of balances of water and fuel-energy resources;
- enabling the mobilization of investments for rehabilitation of existing assets and for construction of water and power facilities to develop and use effectively the region's water and energy potential;
- creating conditions for industrial and technological cooperation in the water and fuel-energy sectors, expanding their exports and adopting advanced technologies;

Other functions provided for by international agreements may be assigned to the Consortium.

2. Main areas of activity:

- coordination of joint activities of the Entities in the area of rational and effective development and use of water and energy resources within the competence specified by the founders;
- coordination of research and analytical efforts to study feasibility of water and fuel-energy projects on the regional scale funded through domestic and external sources;
- development of mechanisms for implementation of agreements on use of water resources and regional trade of energy and fuel;
- preparation of proposals on harmonization of respective legislations and improvement of international legal framework of the member countries;
- coordination with international organizations and other bodies concerned;
- drafting international agreements aimed at ensuring effective operation of water-energy systems, taking advantage of parallel operation of national energy systems and the mutually beneficial cross-supplies of water and fuel-energy resources;



- development of measures to prevent damage to other member countries resulting from Consortium Entities operation;
- monitoring the practical implementation of international agreements on rational and efficient use of water, energy and fuel resources.

3. Conditions for establishment of the Consortium

The Consortium is a legal entity established on the basis of an international agreement.

Its legal status, start-up conditions, conditions of establishment, and the size of its authorized fund and location, as well as other conditions of establishment of the Consortium shall be stipulated by an international agreement.

In the agreement, each member country will determine the Consortium founders.

The Consortium will be managed by the Council (oversight body) of the authorized representatives of the member countries with equal representation of the parties. Each party will have equal voting power in decision making. Decisions will be made on consensus principle.

Chairman:

From the IBRD

From the Republic of Kazakhstan

From the Kyrgyz Republic

From the Republic of Tajikistan

From the Republic of Uzbekistan

* Adopted at the meeting of the heads of interdepartmental working groups of the CACO member countries and representatives of the World Bank on discussion of the draft Concept on the creation of an IWEC (July 30, 2004, Almaty)

**This draft forms the basis for the Concept on the Creation of an IWEC of the CACO member countries approved at the meeting of the Council of Heads of OCAC member countries of October 18, 2004.



Appendix 3. Roadmap for development of a cooperation mechanism for the Eurasian Economic Community member countries in the field of water and energy regulation in Central Asia (April 2006)

The draft version was reviewed at the 8th meeting of the Council for Energy Policy at the EurAsEC Integration Committee on April 20, 2006.

Under centralized economy conditions, complex issues of water and energy regulation in the Aral Sea Basin were addressed through the water and energy exchange scheme, where the energy resources deficit in some republics of the former USSR was covered with no lags. Since independence, the Central Asian states faced with the problem of organizing effective transboundary water and energy resources management at the regional level, taking into account new economic and political realities.

Cooperation between Central Asian countries in water and energy field has a rather pronounced tendency to strengthening cooperation as reflected in respective multi- and bilateral agreements.

Interstate institutions have been established for regional cooperation, with IFAS (International Fund for Saving the Aral Sea) and ICWC (Interstate Commission for Water Coordination) as the most representative ones.

The 1998 Framework Agreement between Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan on water and energy use in the Syr Darya River basin provided for the creation of compensatory mechanisms to regulate operation regimes of the Toktogul Reservoir and of an Interstate Water and Energy Consortium. However, it didn't achieve its main objective –ensuring sustainable control of operation regime of the Naryn – Syr Darya cascade of HPPs to the benefit of all participating countries. In this context, the heads of EurAsEC member countries set the task to draft an Agreement on participation of states in developing hydropower resources in the Syr Darya and the Amu Darya river basins and mechanism for regulating water and energy regime in the region.

Also, Agreement between the Governments of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan on parallel operation of their energy systems is not fully implemented. The Parties have not yet addressed the issue on regional energy pool. Establishment of open electric power market would enable optimization of power plant operation in the region both in daily and seasonal mode and export electric power from the region to third-country markets.

The emergence of newly independent states has created barriers to transportation of goods and made it difficult to reach regional water and energy balance, necessitated the development of a common legal space for energy resource transfer and of investment laws addressing co-financing of projects, in particular, in the energy sector.

The principal drawback of existing regional and national water and energy institutions is the lack of effective cooperation mechanisms, although the former use the same water and energy facilities (multi-purpose reservoirs).



Decisions are mostly guided by short-term economic benefits. Under independence statehood conditions, an agreed approach to improving water use efficiency is seen only through the perspective of thorough account of each state interests and finding of mutually acceptable compromises. Such approach will contribute to sustainable development in the countries and overcome tension in water and energy relationships in the region.

The existing regional institutional set-up of transboundary water and energy management during the independence helped to mitigate potential negative consequences of transitional period and adaptation of the region states to new political and economic conditions. Nevertheless, the drawbacks become evident during critical moments of dry and wet years, when lower reaches suffer from droughts or sudden flooding, while upper reaches are exposed to mudflow and floods and power deficit in winter and spring.

Thus, despite the efforts to improve water and energy regulation effectiveness in Central Asia by integration and regional organizations (with the support of international organizations), convergence of positions of the parties on this issue still remains the most acute problem in the region.

Taking into account the international water law norms in the context of the Aral Sea Basin, the key principles and requirements for cooperation mechanisms in the field of water and energy regulation in Central Asia include:

- obligatory fulfillment of decisions made;
- mutual benefit from water and energy regulation for all actors;
- responsive solution of arising problems;
- observance of main principles of international water right agreed by the riparian states of the Aral Sea basin for region-specific conditions;
- simultaneousness and coordination in addressing the issues on water and energy regulation and investments in energy development;
- responsibility of private business (in case of its involvement in investments and regulation) for provision of operation regimes of reservoirs and energy systems agreed at the interstate level;
- nexus of water and energy regulation;
- ensuring environmental security;
- forming guarantee funds for fulfillment of obligations at the expense of contributions from the Parties;
- establishment of joint ownership of water and energy facilities of transboundary nature;
- forming joint water and energy balances;
- establishment of joint governance and permanent executive bodies with relevant powers adequate to requirements;
- presence of strong political will to achieve mutually coordinated decisions.

The cooperation mechanisms imply a system of economic, technical, institutional and political measures.



Economic mechanisms imply implementation of joint investment projects, mutually beneficial participation in water and energy regulation, with formation of shared ownership of the facilities of transboundary importance.

In technical and technological terms, cooperation is not of special complexity, as electric power systems of EurAsEC member countries operate in parallel mode. The executive regional organizations – Basin Water Organizations (BWO) Amu Darya and Syr Darya, the CDC "Energy", function quite successfully, though without proper mutual coordination. Interstate power and energy resource supplies are maintained. However, these are not systematic, and there is still a need for inter-agency and interstate coordination of operation regimes of HPP cascades and energy systems.

Institutional issues include organization of effective interactions between the national water and energy agencies and the regional organizations – the International Fund for Saving the Aral Sea, the CDC "Energiya" and the integration bodies of the Eurasian Economic Community. The Council for Energy Policy of the EurAsEC Integration Committee will play a coordinating role in organization of this work. The aim of this work should be to establish joint management and permanent executive bodies, with authorities sufficient for fulfilling the functions assigned by founder states.

Politically, activity of the Eurasian Economic Community bodies in water and energy sector is regulated by decisions made by the EurAsEC Interstate Council (152, 169 and 224) and Integration Committee (472), which set tasks on defining cooperation mechanisms for the Community states.

Also, the Council of Heads of CACO member countries mainly approved the Concept on the creation of an International Water and Energy Consortium, developed with the support of the World Bank, by its decision of October 18, 2004 (without Russia's participation). The analysis of COCA and EurAsEC approaches to water and energy regulation in Central Asia shows no fundamental differences.

The decision to integrate the COCA into EurAsEC and the accession of the Republic of Uzbekistan to EurAsEC creates new opportunities for formation of an agreed policy and decision-making with the involvement of all concerned Parties.

The complexity and variety of challenges in the use of the Syr Darya and the Amu Darya transboundary resources, their close interconnection with all economic sectors and the natural environment in the region requires also the strong political will to achieve the objectives set in the Roadmap.

The Roadmap represents a plan for stepwise creation of common market conditions for integration of water and energy sectors of the Community states. It is composed of 3 stages. Each stage corresponds to higher level of integration in water and energy sharing in transboundary Amu Darya and Syr Darya.

In the Roadmap, provisions and conclusions from the following documents were taken into account:

- Regional Strategy for rational and effective water and energy use in Central Asia (developed in 2003 within the framework of the UN Special Program for the Economies of Central Asia);
- Concept on the creation of an International Water and Energy Consortium;



- Concept on the creation of the Common Electricity Market of the CIS member states;
- Appeal of participants of the International Conference on Regional Cooperation in Transboundary River Basins to the governments of the world and the international organizations.

The phases of the Road Map are implemented sequentially due to both the requirement of convergence of the Parties' positions on the content of common interaction mechanisms and the need for practical testing of interaction elements in investment activities and the scheme of water and energy exchange, as well as in environmental issues.

Phase “ZERO”: the current situation

Currently, there is a limited exchange of electricity between the states of the Community, as well as inconsistent supplies of other energy resources. Accordingly, the operation regimes of the Naryn-Syr Darya and Vakhsh HPP cascade reservoirs meet largely the energy needs of the upstream states. Such kind of relationships reduces the reliability of forecasts of economic development in the Community states and causes certain damage, prevents from attraction of funds for joint investment of large energy facilities and, ultimately, does not meet the requirements of economic integration in the Community.

A number of projects are implemented under umbrella of the Eurasian Economic Community to consistently achieve the objectives of joint rational and effective use of water and energy and hydropower development in the Syr Darya and the Amu Darya Basins.

Thus, Sangtuda- 1 and Rogun is constructed by joint efforts of the Russian and Tajik parties in Tajikistan.

The Agreement on joint development of the fuel and energy balance of the Community states was adopted by the decision 239 of September 27, 2005 of the EurAsEC Interstate Council (at the level of heads of government).

The draft Protocol on the conditions of electric energy transfer between the Community states was prepared by the Council on Energy Policy. It is planned to sign the Protocol at the regular meeting (in 2006) of the EurAsEC Interstate Council (at the level of heads of government).

By the decision of the EurAsEC Integration Committee (No. 472 of 21 June 2005) “On progress in implementing Decision 169 of 18 June 2004 of the EurAsEC Interstate Council (at the level of heads of state) “On cooperation between EurAsEC member states for effective development of water and energy resources in the Syr Darya and Amu Darya Basins”, the energy ministries and departments of EurAsEC countries have been instructed to prepare proposals for developing and implementing a scheme to cover winter energy shortages in EurAsEC member states, considering the possibility of implementing this scheme in the autumn-winter 2005-2006. The purpose is to create conditions for water accumulation in reservoirs and ensure implementation of the irrigation regime. In particular, the possibility of supplying natural gas through “Gazprom” to Central Asia for processing at thermal power plants in the region to cover winter energy shortages in Tajikistan and Kyrgyzstan is under consideration.



By Decision 224 of June 22, 2005 of the EurAsEC Interstate Council (at the level of heads of state) it is proposed to create, together with the CACO, a working group for elaboration of an agreed mechanism for cooperation on use and development of hydropower potential of the Syr Darya and the Amu Darya. Currently, a High-level Group is formed among the heads of national water and energy agencies for implementation of the above tasks, considering the integration of CACO into EurAsEC and joining of the Republic of Uzbekistan to the Community (by decision of the EurAsEC Integration Committee of April 14, 2006).

By decision 300 of June 23, 2006 of the EurAsEC Interstate Council (at the level of heads of state), the governments of EurAsEC member-states and the EurAsEC Integration Committee were requested to take measures to adapt for EurAsEC the documents adopted by CACO bodies, including on issues related to water and energy.

Phase "ONE": Preparation of individual elements of the cooperation mechanism

Phase "ONE" envisages actions for creation of a legal and institutional framework of cooperation on use and development of water and energy resources in the transboundary Syr Darya and Amu Darya rivers:

1. Formation of a High-level group to work out an agreed mechanism of water and energy regulation in the region, use and development of hydropower potential of the Syr Darya and the Amu Darya.
2. Agreeing upon and approval of the Roadmap;
3. Agreeing upon the principles of cooperation in water and energy sectors of Central Asia, taking into account the international water law norms and specifics of the Syr Darya and the Amu Darya Basins and the tasks set by EurAsEC integration organizations;
4. Implementation in practice of natural gas supplies to Central Asia and organization of mutual energy supplies on a commercial basis, with conclusion of long-term contracts between concerned parties – creation of a commercial Operator;
5. Development and approval of joint fuel-energy balance of the Community states for 2007-2008, taking into account the coverage of winter energy shortage of upstream states;
6. Coordination of schedules of water discharge from reservoirs of the Naryn-Syr Darya and Vakhsh HPP cascades for the growing season 2006, with the condition that they work under irrigation regime;
7. Adoption of the Protocol on conditions of electricity transfers between the Community states;
8. Organization of work on the draft Agreement "On interaction of EurAsEC member countries on effective development of water and energy resources of the Syr Darya and the Amu Darya Basins";
9. Preparation of financial and investment mechanisms for joint construction of Kambarata- 1 and 2 in Kyrgyzstan;
10. Determination of mechanisms for cooperation between EurAsEC bodies and existing regional cooperation organizations in the water and energy sphere, adapting decisions adopted within the framework of the Central Asian Cooperation Organization to the conditions of their implementation in the format of the Eurasian Economic Community;



11. Assessment of environmental impact of water-energy regulation processes in the Aral Sea Basin.

Completion of this phase will allow starting formation of individual elements of the cooperation mechanism and their practical implementation.

Phase “TWO”: Fine-tuning of cooperation elements

1. Assessment of the performance of the commercial Operator of mutual energy supplies and making recommendations;
2. Signature of agreements on the construction of Kambarata-1 and 2 in Kyrgyzstan, taking into account the possibility of joint management of the Naryn-Syrdarya HPP cascade and determining investment mechanisms;
3. Protection of joint investments through national or most-favored-treatment regime, whichever is most favorable.
4. Practical implementation of the joint fuel and energy balance of the Community states for 2006-2008;
5. Identification and removal of legal and regulatory barriers for companies to enter the energy markets of the Community states;
6. Preparation of draft Agreement "On interaction of EurAsEC member countries on effective development of water and energy resources of the Syr Darya and the Amu Darya basins";
7. Determination of environmental requirements and barriers to joint water management in the transboundary Syr Darya and Amu Darya rivers.
8. Studying possibilities for EurAsEC member countries to join the UNECE Water Convention (Helsinki, 1992) (except for Kazakhstan) and the UN Convention on the Law of Non-Navigational Uses of International Watercourses (1997);
9. Organization of cooperation with existing regional joint bodies on transboundary water management.

Phase “THREE”: Formation of the cooperation mechanism

1. Adoption of the Agreement “On interaction of EurAsEC member countries on effective development of water and energy resources of the Syr Darya and the Amu Darya Basins”, with assignment of functions and powers of the joint bodies established;
2. Formation of management and permanent executive bodies for water and energy regulation in the Amu Darya and the Syr Darya Basins;
3. Development and adjustment of the regulatory and legal, institutional and economic frameworks of regulatory bodies;
4. Optimization of interactions between the national and regional regulatory authorities and the commercial operator;
5. Development and approval of national and regional programs for water and energy sector development, and determination of financial mechanisms for joint investments;
6. Development and approval of programs for maintaining environmental equilibrium in the Aral Sea Basin in terms of water.

Upon completion of Phase «THREE», regulatory and legal, economic and institutional conditions will be created for full functioning of governance and executive bodies of EurAsEC on joint water and energy management in the Syr Darya and the Amu Darya Basins. Based on this, it will be possible to implement the integrated management of



water and energy resources of transboundary rivers, while balancing the interests of all EurAsEC member countries.

Formalizing the Roadmap

The draft Roadmap was considered at the 8th meeting of the Council on Energy Policy of the EurAsEC Integration Committee (April 2006) and recommended for implementation. This document will be submitted to the High-Level Group for discussion, as well as for discussion as part of the feasibility report "Mechanisms of interaction of EurAsEC member countries in water and energy regulation in Central Asia" at the scientific-practical conference of EurAsEC and international organizations (October-November, 2006).

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