

PROSPECTS FOR THE IMPLEMENTATION OF NEW MECHANISMS OF TRANSBOUNDARY INSTITUTIONAL COOPERATION IN THE FIELD OF WASTE RECYCLING IN CENTRAL ASIA

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Abstract

Research objective: To develop a scientifically grounded model for the transboundary integration of national waste recycling infrastructures into a unified regional circular economy system in preparation for the 2026 Regional Environmental Summit.

Methods: A mixed methods research design was applied, including comparative institutional and legal analysis, SWOT analysis, and qualitative methods (in-depth interviews with experts from four Central Asian countries).

Results: A high level of fragmentation in the regulatory framework was identified. Uzbekistan demonstrates leadership through public-private partnership mechanisms (attracting \$1.3 billion in foreign direct investment), while Kazakhstan relies on an extended producer responsibility system, facing fiscal risks. It was found that development is constrained by energy deficits, tax dualism, and limitations in statistical data collection.

Conclusions: A successful transition of the region to a circular economy is not feasible within isolated national jurisdictions. It requires inter-parliamentary legal harmonization, the development of CAREC digital corridors, and the formalization of the informal waste collection sector.

Keywords: *circular economy, Central Asia, waste recycling, institutional cooperation, extended producer responsibility, public-private partnership, environmental policy.*

1. INTRODUCTION

Context: The Central Asian region represents a complex system in terms of waste management. On the one hand, the countries are dealing with the heavy legacy of Soviet industrialization around the Fergana Valley alone, approximately 100 million tons of waste rock and technological tailings from uranium and heavy metal processing have accumulated.

The situation is further aggravated by the Aral Sea disaster, from which more than 100 million tons of toxic salt and dust are dispersed into the atmosphere each year.

On the other hand, rapid urbanization is leading to a sharp increase in municipal solid waste, while traditional landfill disposal methods have largely exhausted their capacity

and effectiveness. In this context, the transition from a linear economic model to a circular economy is considered a key strategy for preserving ecosystems in the region.

Research gap: Despite the active development of new regional integration platforms, there remains a significant lack of coordinated institutional structures and harmonized legal frameworks.

Differences in fiscal policies (tax dualism), asynchronous participation in international conventions, and the absence of a unified waste classification system make the regional secondary materials market highly risky and unattractive for institutional investors.

Aim of the study: To conduct a comprehensive interdisciplinary analysis of existing regulatory procedures and to develop a scientifically grounded model for the transboundary integration of national waste recycling infrastructures in Central Asia. This model is intended to serve as a conceptual foundation for decision-making at the 2026 Regional Environmental Summit in Astana.

2. MATERIALS AND METHODS

Study objects & participants: The study employed purposive stratified sampling. The total sample size consisted of 12 experts (3 respondents from each of the four countries: Kazakhstan, Uzbekistan, Kyrgyzstan, and Tajikistan).

The expert group included decision-makers and leading specialists in the field of environmental policy:

- **Kazakhstan:** representatives of the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan, as well as top management of the national Extended Producer Responsibility (EPR) operator — JSC “Zhasyl Damu” and the “KazWaste” Association.
- **Uzbekistan:** senior officials from the Agency for Waste Management and Circular Economy Development and representatives of foreign investors involved in the Waste-to-Energy project (CAMC Engineering, PRC).
- **Kyrgyzstan:** deputies of the Jogorku Kenesh participating in the Interparliamentary Platform on Circular Economy.
- **Tajikistan:** coordinators of the Regional Waste Management Center in Dushanbe and consultants of EBRD/OSCE landfill rehabilitation projects.

Study design & procedure: The study was conducted between September and December 2025. The primary method of collecting empirical data was semi-structured in-depth interviews with an average duration of 50 minutes.

The interviews were conducted in a hybrid format: remotely (via Zoom/MS Teams platforms) and in person during regional consultations (for example, within the framework of the ministerial meeting in Aktau in August 2025). All interviews were recorded with the informed consent of participants while ensuring full anonymity.

Methods of measurement & analysis: Qualitative data were transcribed and subjected to thematic coding. The key conceptual nodes identified included: “coordination barriers,” “fiscal risks (VAT),” “energy deficit,” and the “informal sector.”

To ensure the reliability of the findings, data triangulation was applied by comparing expert opinions with reports from the World Bank, UNEP, and Aretera Public Affairs.

Quantitative data on recycling rates (Uzbekistan — 5–10%, Kazakhstan — 2–3%) were processed using descriptive statistical methods.

3. RESULTS

Most important result: The findings indicate that national policies across Central Asian countries remain highly fragmented, with different speeds and approaches to institutional transformation.

The Republic of Uzbekistan emerges as a clear leader in the commercialization of the waste management sector. Through the introduction of public-private partnership (PPP) mechanisms and significant liberalization measures (including a reduction of sector-specific taxes to 1%), the country has attracted a foreign direct investment portfolio of approximately \$1.3 billion for the development of Waste-to-Energy facilities.

At the same time, the Republic of Kazakhstan demonstrates progress in the institutionalization of extended producer responsibility (EPR). However, this model is associated with notable fiscal risks. In particular, the planned increase of VAT from 12% to 16% in 2026 is expected to significantly raise the financial burden on small and medium-sized enterprises operating in the recycling sector.

Table 1. Comparative Analysis of National Waste Management Models in Central Asia

Country	Primary Economic Mechanism	Investment Volume	Recycling Rate	Key Strategic Risk
Kazakhstan	Extended Producer Responsibility (EPR / ROP)	High (State & Private)	12–15% (Industrial) / 2–3% (MSW)	Tax Code instability & Logistic costs
Uzbekistan	Public-Private Partnership (PPP / GCHP)	Rapidly Growing	5–10%	Energy deficit for processing plants
Kyrgyzstan	Donor-funded projects (EBRD/ADB)	Moderate / Low	1%	Infrastructure degradation & Glacial melting impact
Tajikistan	State-managed utilities & Grants	Low	< 1%	Accumulation of obsolete pesticides & Topography
Turkmenistan	Centralized state investment	Limited data	N/A (Estim. < 2%)	Lack of transparency & Institutional isolation

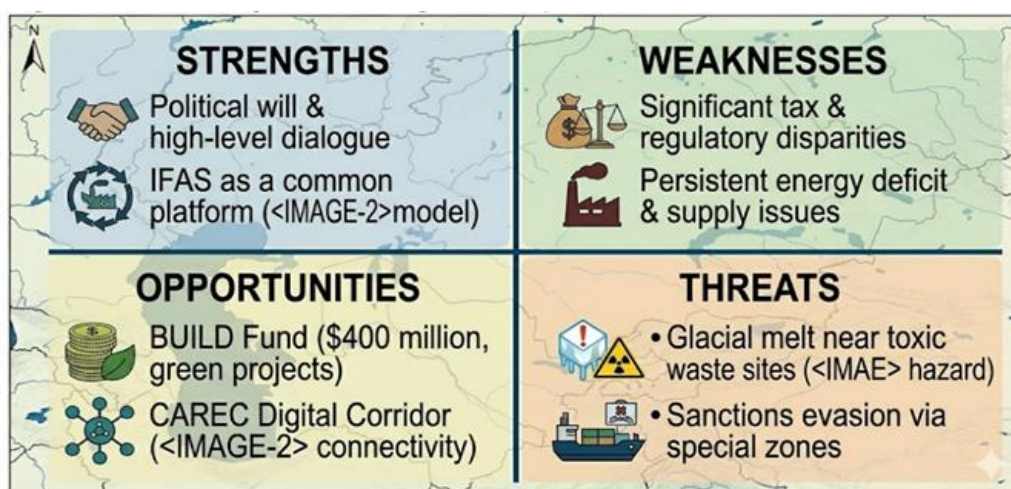
Note to Table 1: The data highlight a significant fragmentation in the initial positions of the countries in the region. It is evident that without supranational coordination (within the frameworks of CAREC programs or the SWITCH-Asia Inter-Parliamentary Platform), it is not feasible to integrate such diverse tax and investment regimes into a unified secondary materials market.

Other results: Additional findings reveal significant infrastructural and geopolitical barriers in other countries of the region. In the Kyrgyz Republic, the development of

advanced recycling is constrained by a chronic energy deficit, as more than 90% of electricity generation depends on hydropower, as well as by the dominance of the informal waste collection sector.

In Tajikistan, which faces high ecosystem vulnerability and the legacy of approximately 10,000 tons of obsolete Soviet-era pesticides, there is a lack of internal financial capacity. As a result, the country remains highly dependent on support from international donors (such as the EBRD and the OSCE).

Scheme 1. Institutional SWOT Analysis of Interregional Cooperation in Waste Management



- **Strengths:** High political will for integration (preparation for the RES-2026 "Bir Tamyr" Summit); establishment of the Regional Waste Management Center in Dushanbe.

- **Weaknesses:** Asynchrony in national legislation and "regulatory dualism" (WTO vs. EAEU); chronic energy deficits making recycling costly; low reliability of official waste statistics.

- **Opportunities:** Launch of the "CAREC Digital Corridor" for paperless transit of secondary materials; strategic funding via the BUILD fund (\$400 million) for border modernization.

- **Threats:** Climate-related risks (melting glaciers threatening tailings management facilities); potential capital outflow to the informal sector due to high tax burdens (e.g., VAT increase in Kazakhstan).

4.4. CONCLUSIONS AND RECOMMENDATIONS

Based on the conducted analysis and the empirical data obtained in the study, the following conclusions were formulated, which will serve as the foundation for the Regional Action Program until 2030:

From model flexibility to regional solidarity: Considering the identified deep institutional fragmentation — ranging from the PPP model in Uzbekistan to the EPR

system in Kazakhstan and donor dependence in Tajikistan — our findings indicate that the creation of a unified and rigid legal framework for the region would be premature. It is therefore recommended to develop adaptive coordination mechanisms through “umbrella” regional structures (such as the ICSD IFAS), enabling countries to synchronize waste classification standards without radically transforming their national governance systems.

Energy security as a driver of recycling development: The identified critical energy deficit (14% in Uzbekistan and electricity consumption restrictions in Kyrgyzstan) demonstrates that traditional energy-intensive recycling models are economically unsustainable. Based on this finding, the study recommends prioritizing regional Waste-to-Energy projects within the integration agenda. The transformation of waste into an energy asset — as illustrated by the USD 1.3 billion projects in Uzbekistan — would make it possible not only to process up to 4.7 million tons of waste annually, but also to partially compensate for regional electricity shortages, thereby converting an environmental burden into an economic resource.

Fiscal coordination against the informal sector: The identified risks associated with the planned VAT increase to 16% in Kazakhstan (expected in 2026), combined with tax incentives in neighboring states, create conditions for capital outflow into the informal economy, which already accounts for up to 20% of regional GDP. The findings therefore support the establishment of a Regional Coordination Council on Fiscal Policy in the field of green business. Such a mechanism would help prevent “tax dumping” and ensure the sustainability of small and medium-sized enterprises (SMEs) involved in primary waste collection and recycling activities.

Digitalization as a tool for data verification: Since the research confirmed the low reliability of waste statistics — including visual estimations of waste volumes and the absence of verification systems in Tajikistan and Kyrgyzstan — the data suggest that the implementation of the “CAREC Digital Corridor” is essential for creating a transparent secondary raw materials market. The study recommends introducing a system of electronic mutual recognition of compliance certificates, which would enable real-time monitoring of transboundary waste flows and increase the attractiveness of the sector for institutional investors.

Social formalization of a “just transition”: The high concentration of informal waste pickers (up to 1,000 individuals at a single landfill in Bishkek) highlights the social vulnerability of current reforms. The study concludes that without the legalization and integration of this sector, state-led initiatives will face a persistent shortage of recyclable raw materials. It is therefore recommended to develop social integration and vocational training programs for informal workers, thereby implementing the principles of a “Just Transition” within the framework of the “Bir Tamyr” summit ideology.

These conclusions and the applied mechanisms developed on their basis will be presented to expert groups for inclusion in the Joint Declaration of Heads of State at the Regional Environmental Summit in Astana (April 2026).

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