



MICRO-CREDENTIAL

CIRCULAR ECONOMY FOR LAND AND WASTE MANAGEMENT

14. – Case Studies and Project Work

Central Asian examples

CELWS-W14-V04





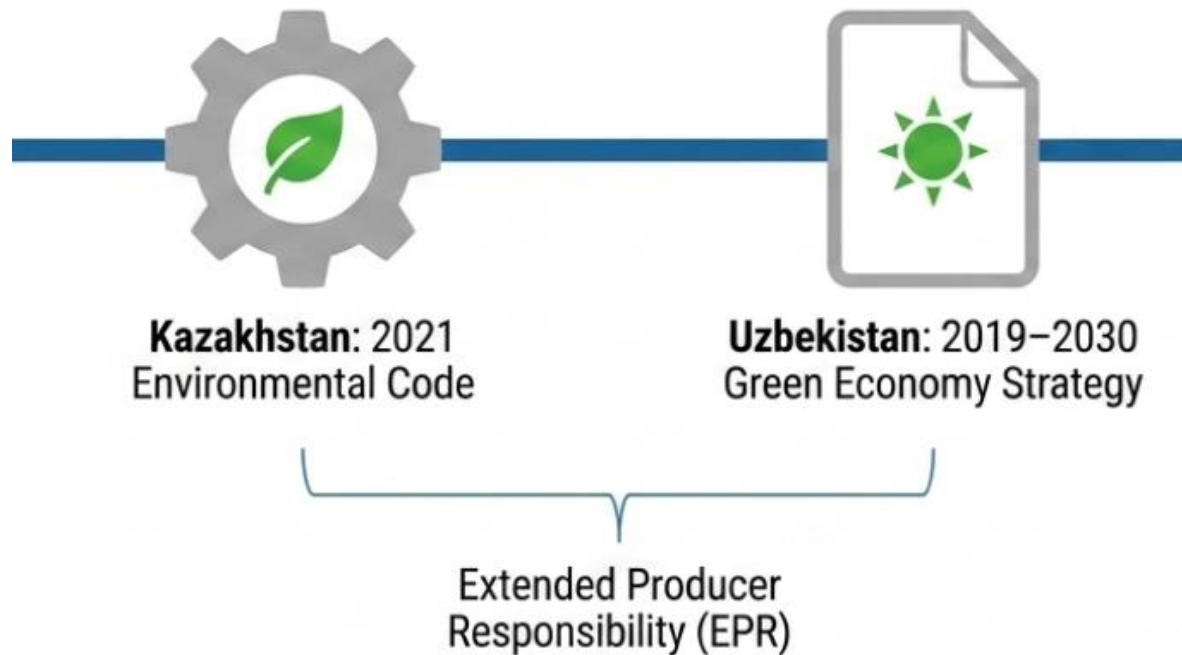
- Shifting the region away from traditional 'take-make-waste' macroeconomic models.
- Addressing the rising risks of natural resource depletion, severe water scarcity, and climate vulnerability.
- Aligning regional economic growth with the UN 2030 Sustainable Development Goals (SDGs).





- **Resource Inefficiency:** Regional material productivity is drastically low (e.g., Kazakhstan generates €0.2 GDP per kg of material, compared to the EU average of €2.1).
- **Waste Accumulation:** Recycling rates for municipal solid waste hover around a mere 11.5% in Kazakhstan and below 10% in Uzbekistan.
- **Climate Risk:** High dependency on conventional fossil fuels and water-intensive agriculture threatens long-term regional stability.

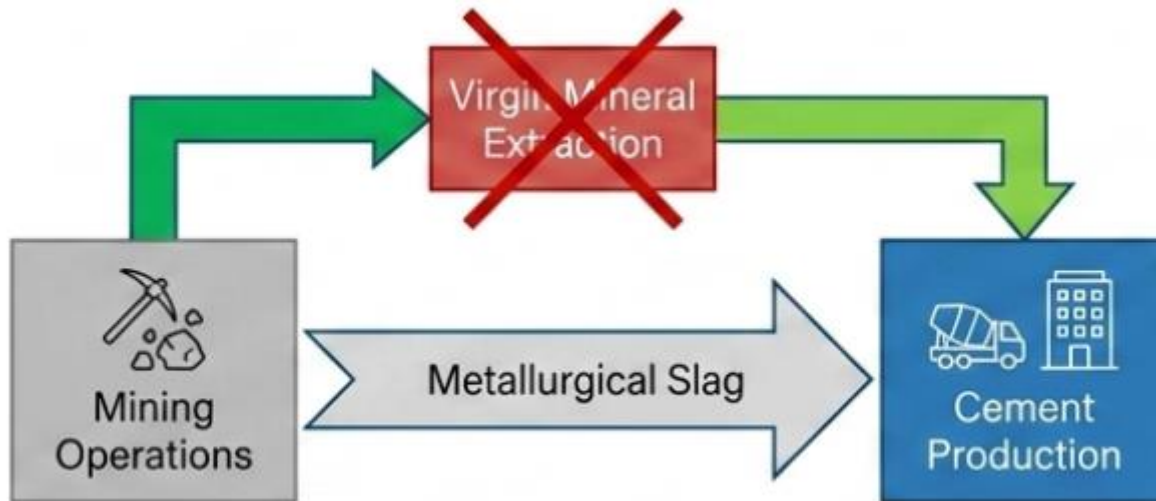




- **Kazakhstan:** The 2021 Environmental Code legally bans the landfilling of construction materials and incentivizes secondary resource recovery.
- **Uzbekistan:** The 2019–2030 Green Economy Strategy mandates a 10% reduction in GHG emissions per unit of GDP and a doubling of energy efficiency.
- **Regional Alignment:** Governments are steadily shifting toward Extended Producer Responsibility (EPR) frameworks and mobilizing green finance.



Case Study: Kazakhstan Circular Economy Initiatives



- The construction sector consumes roughly **65 million tons** of materials annually, with 30% imported.
- Domestic material extraction and production emit 13.9 Mt of CO₂e annually, accounting for 4% of national emissions.
- Recovering value from industrial by-products reduces both local waste storage requirements and the embodied carbon of new infrastructure.



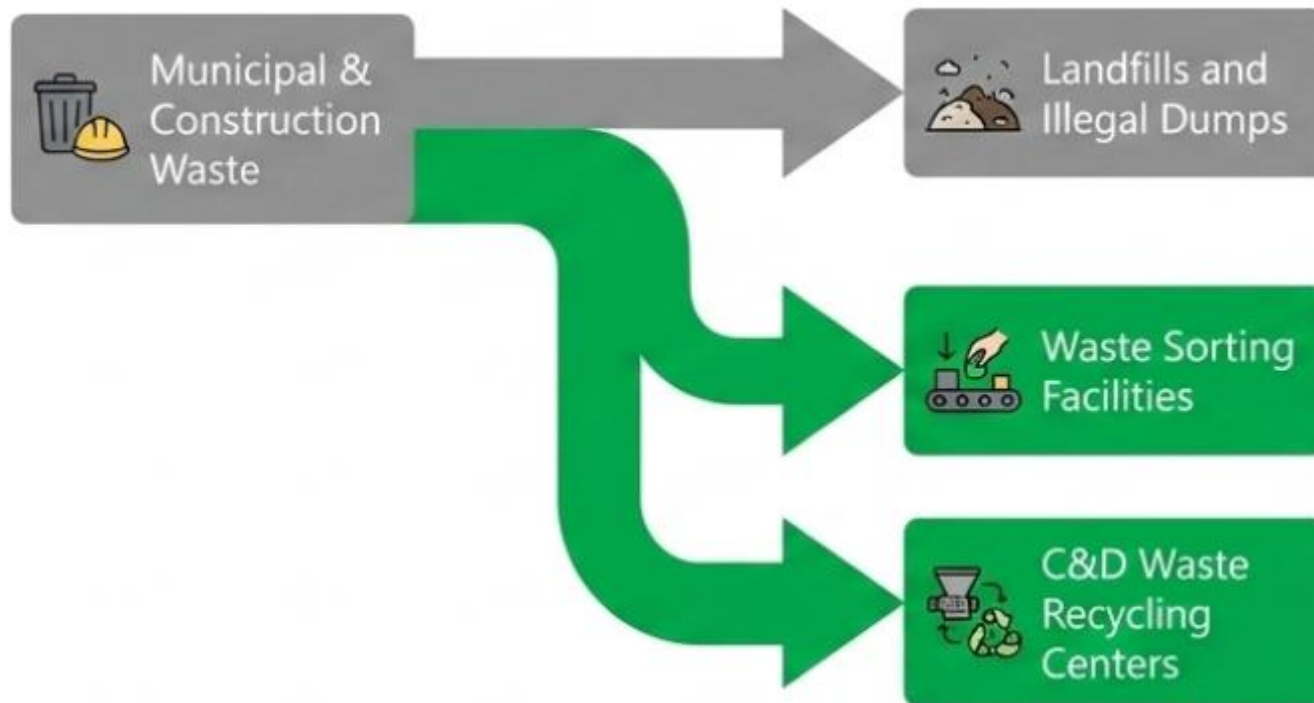
Case Study: Uzbekistan Agri-Food Circular Practices



- Agriculture drives 30% of national GDP but accounts for 18% of GHG emissions.
- Currently, 45% of perishable products are lost post-harvest due to severe shortages in refrigerated warehouse capacity.
- The Circular Economy Action Plan (CEAP) targets systemic technology upgrades to increase climate resilience and slash post-harvest losses.

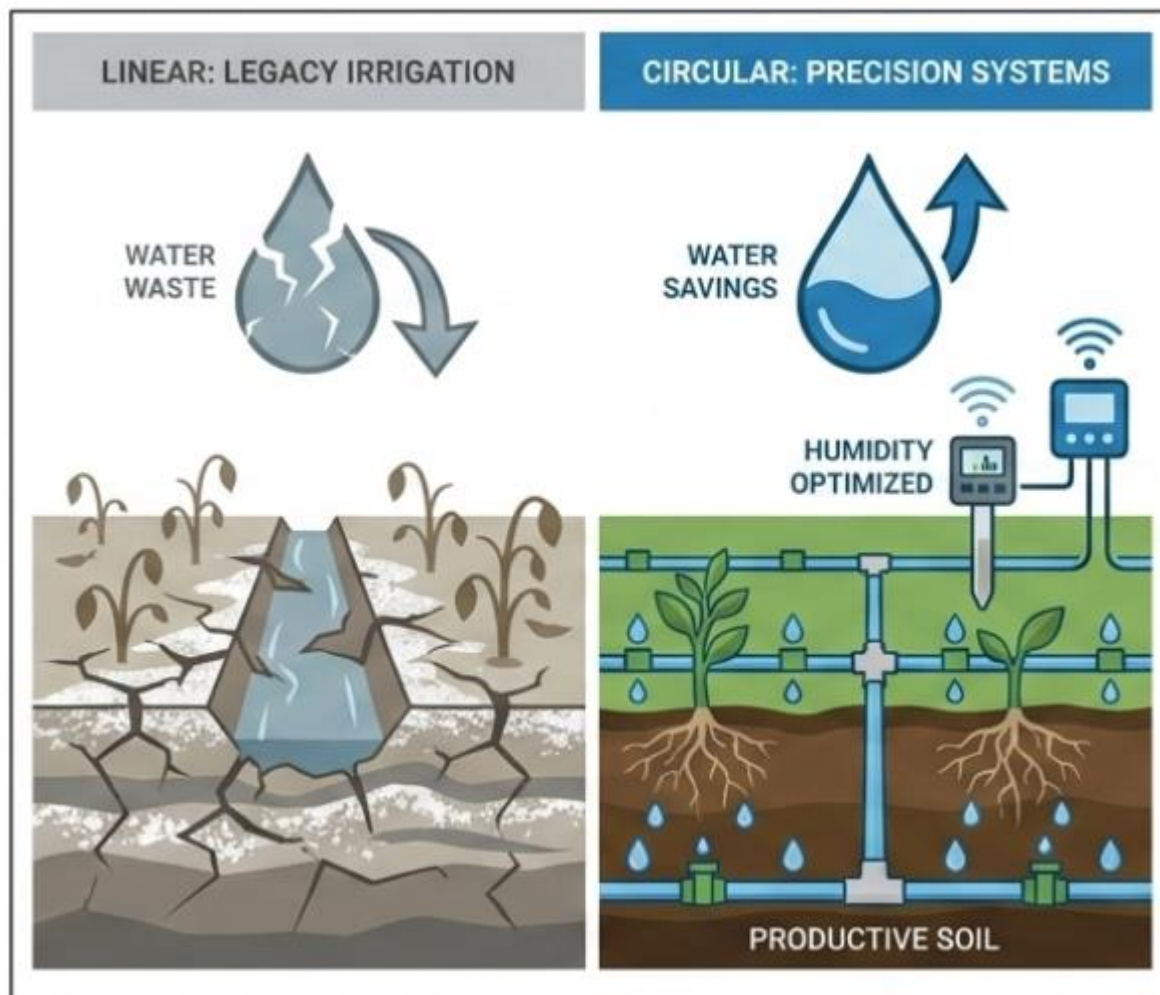


Case Study: Almaty Municipal Waste System



- Generating 20% of the national GDP, Almaty currently recycles just 14% of its municipal waste and virtually zero construction waste.
- The city-level Action Plan outlines a required \$368M infrastructure investment by 2030.
- Primary Goal: Divert 21 million tons of primary materials and formalize waste processing over the next decade.

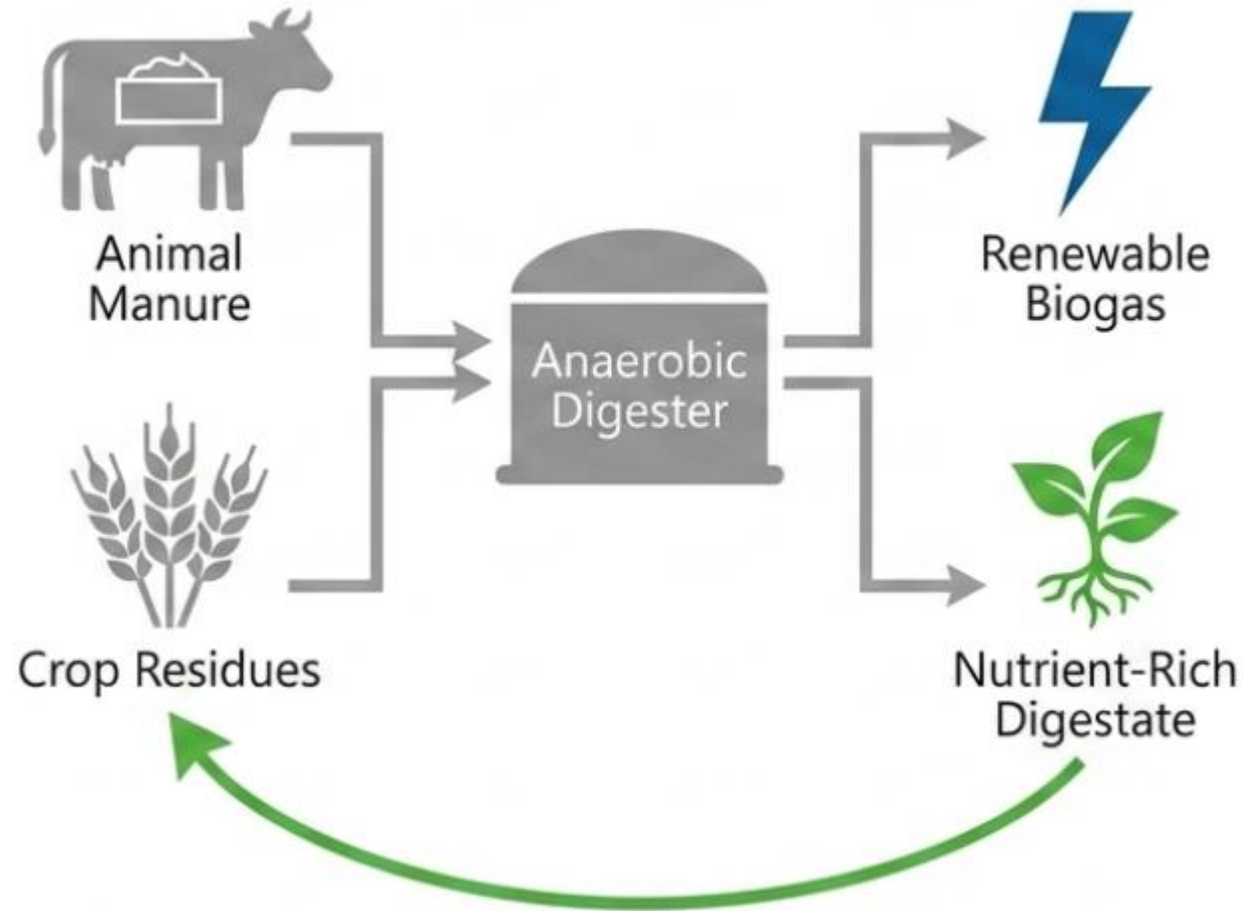




- Legacy irrigation methods lead to severe soil salinization, land degradation, and massive transboundary water stress.
- Implementing drip irrigation systems combined with soil humidity sensors optimizes water usage directly at the root zone.
- These precision technologies yield projected water savings of 433 million liters and a 2.2 million ton reduction in CO₂.



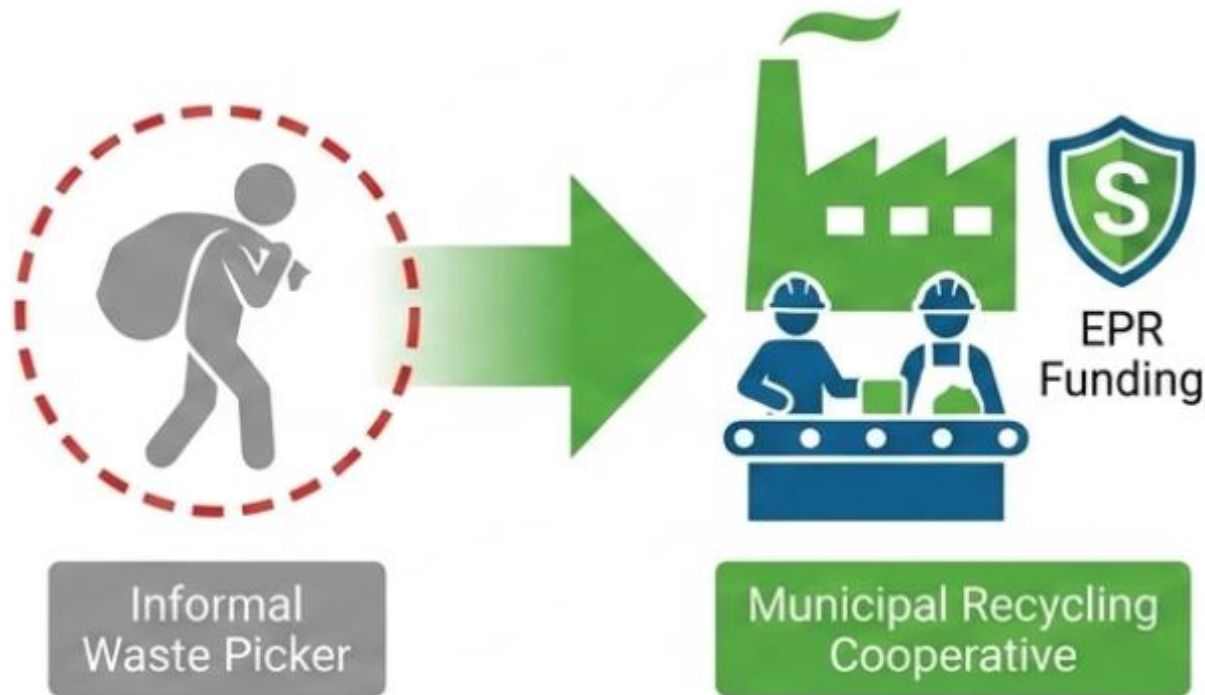
Circular Agriculture and Biomass Recovery



- Organic farm and food-processing waste represents massive, untapped energy potential across Central Asia.
- Anaerobic digesters convert potent emissions liabilities into localized, clean renewable energy.
- The resulting digestate effectively replaces synthetic chemical fertilizers, closing the agricultural nutrient loop.

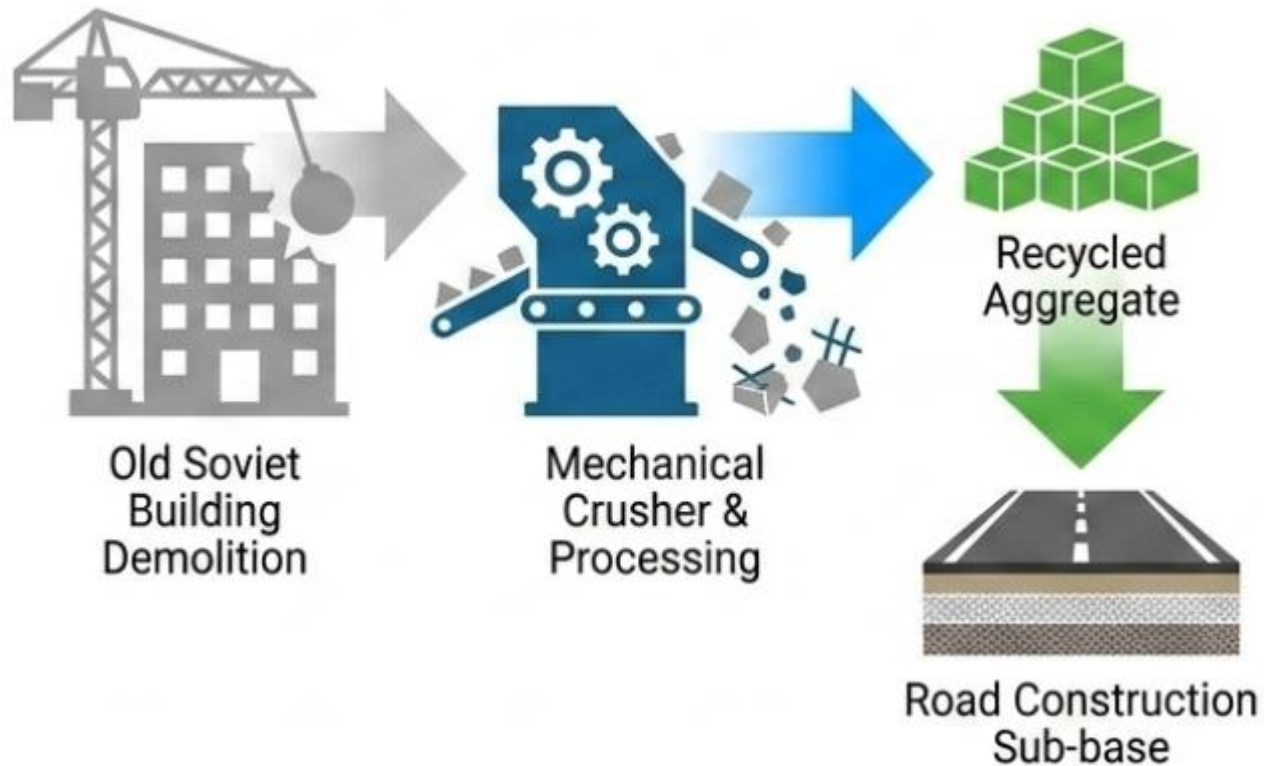


Informal and Formal Waste Systems



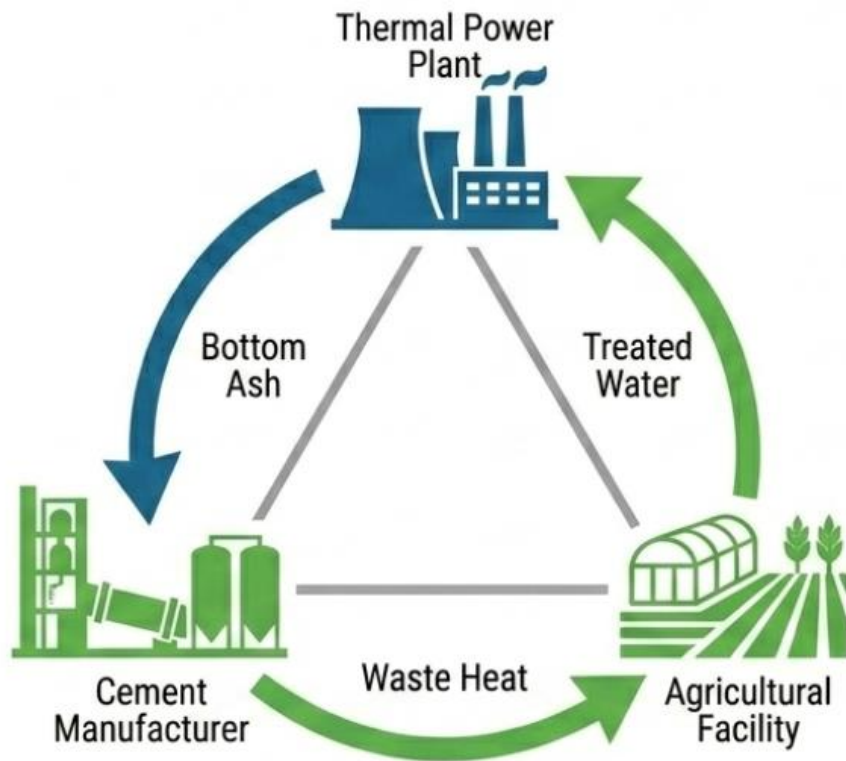
- Informal sectors handle a massive portion of recycled materials (e.g., 9,000 informal pickers in Bishkek collect 35,000 tons annually).
- Operating outside formal structures exposes workers to severe health risks and prevents accurate data tracking.
- Transitioning to formalized cooperatives improves worker safety, operational efficiency, and allows for public-private financing.



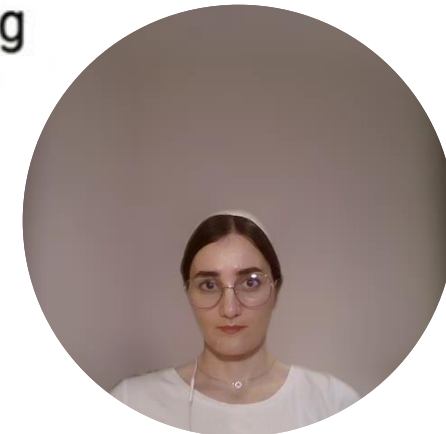


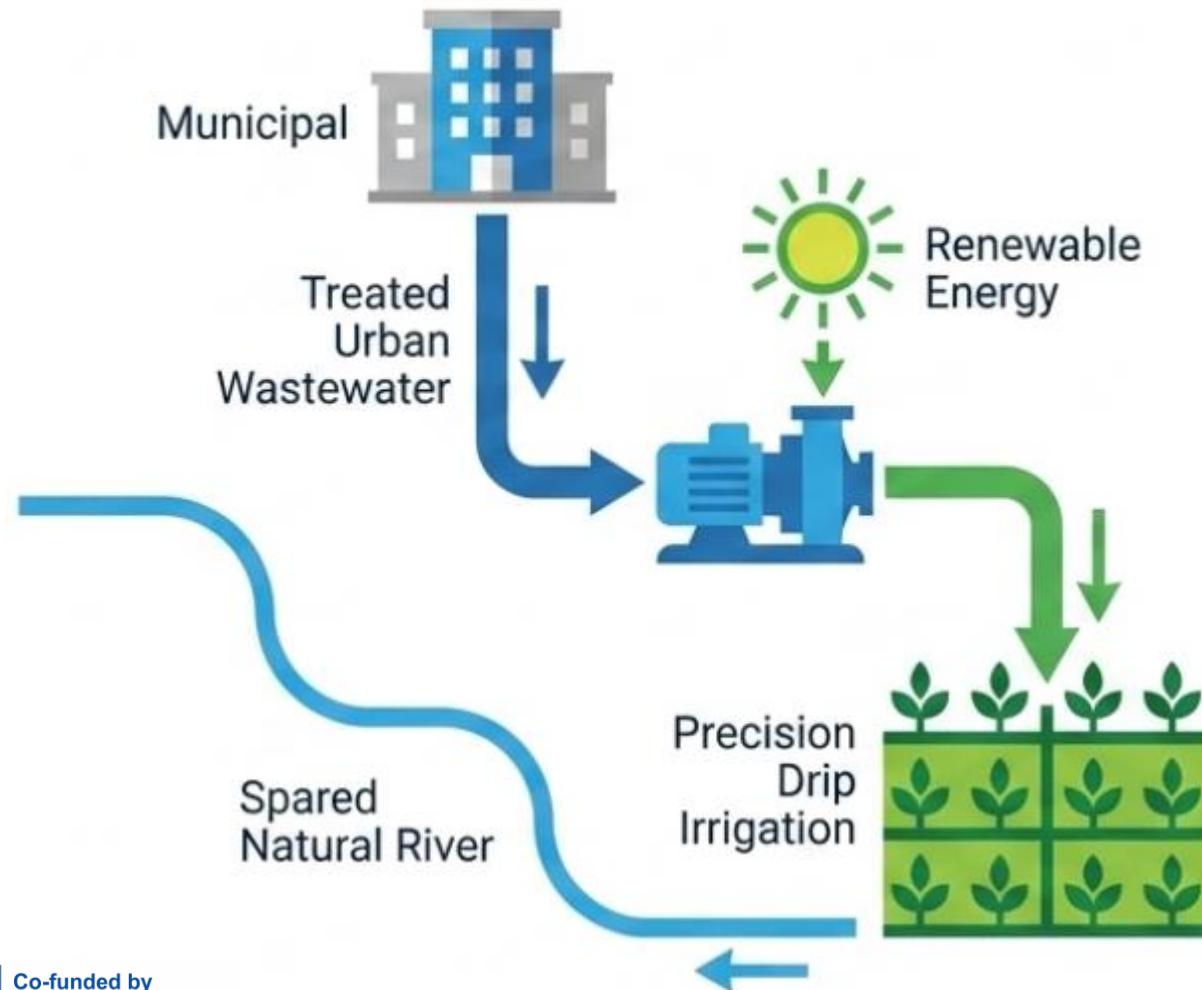
- Replacing traditional, destructive demolition with 'Design for Disassembly' principles.
- Processing concrete debris into high-value recycled aggregate (a scalable \$5M Almaty pilot project proves feasibility).
- Substitutes virgin mineral extraction, cuts transportation emissions, and directly reduces illegal dumping.





- Industrial symbiosis ensures one industry's waste physically becomes another's raw material input.
- Example: A \$278M investment in Almaty processes 1 million tons of thermal power plant bottom ash annually into marketable metallurgical and construction products.
- Capturing waste heat and utilizing treated wastewater significantly lowers overarching operational costs.

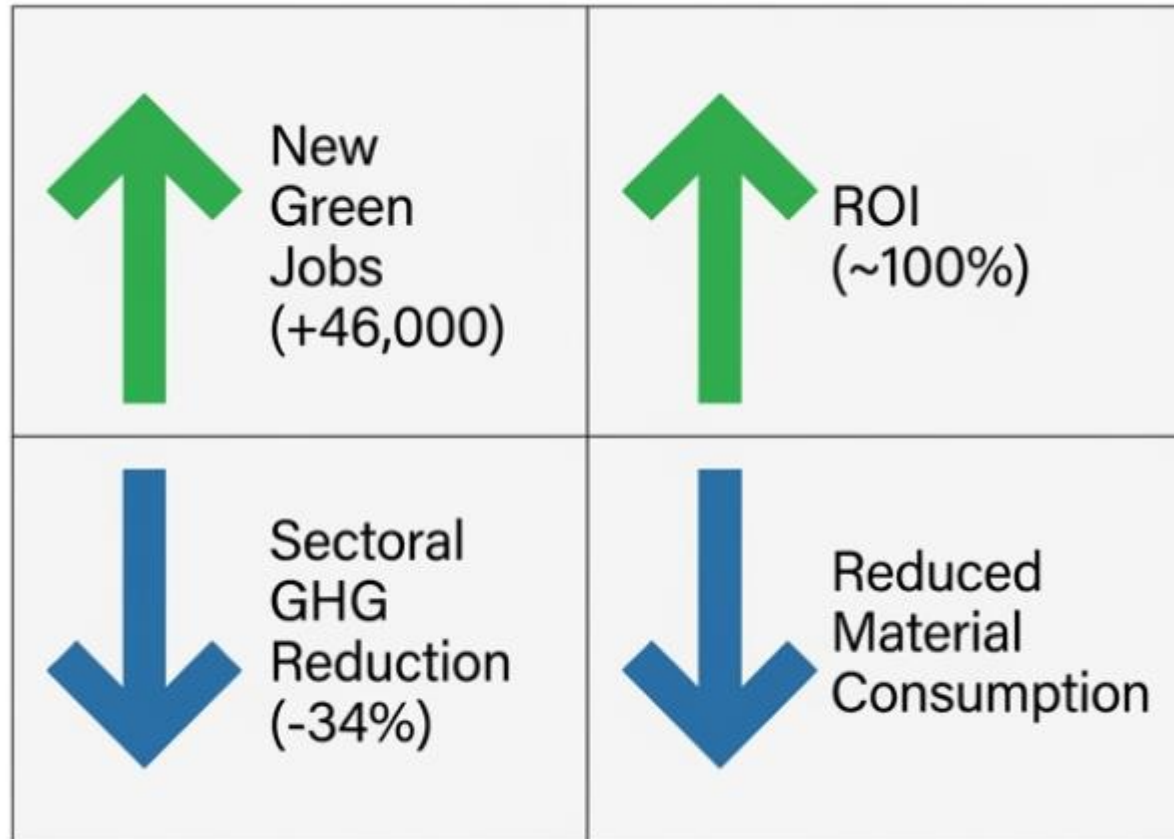




- Central Asia faces severe, escalating transboundary water stress and drought risks.
- Integrating modern wastewater treatment with peri-urban agriculture safely reuses municipal water, sparing natural river basins.
- Powering the pumping infrastructure with renewable solar and hydro ensures a completely low-carbon utility cycle.



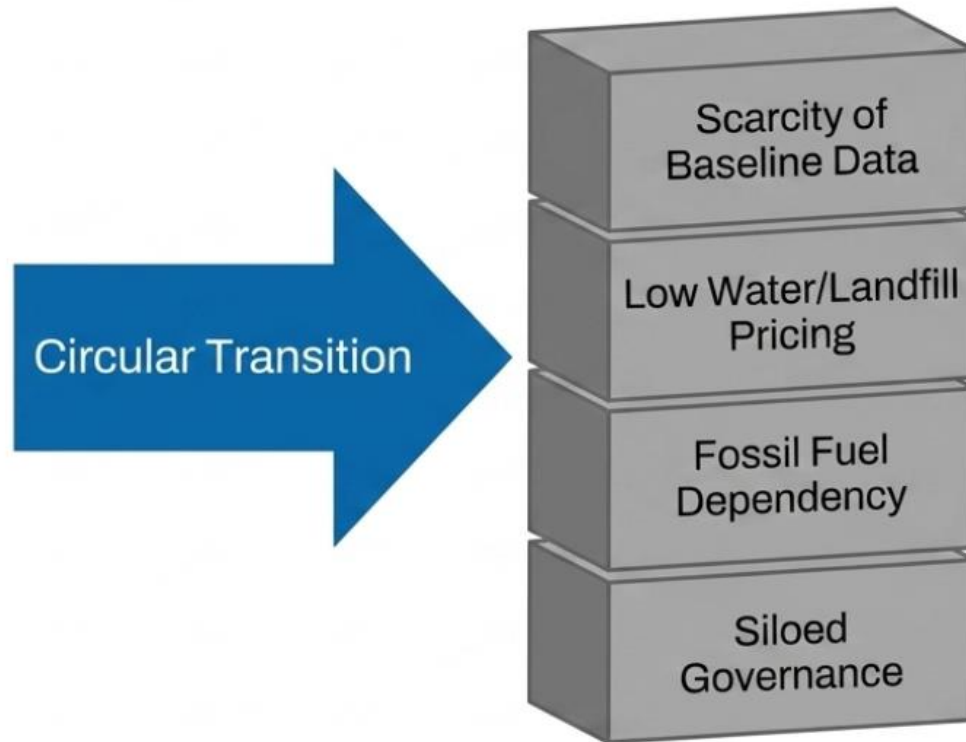
Economic and Social Benefits of CE Transition



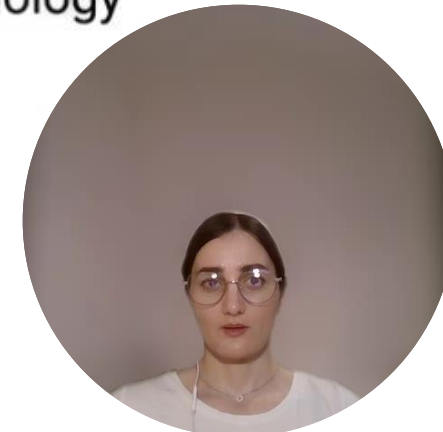
- The return on investment for executing sectoral Circular Economy Action Plans frequently approaches 100% over a 9-year horizon.
- Strategic implementation in Uzbekistan alone is projected to create 46,000 new jobs while cutting agricultural GHGs by 34%.
- Crucially decouples sustained economic growth from finite environmental extraction.



Barriers to Circular Economy in Central Asia



- The artificially low cost of landfilling and water drastically disincentivizes circular innovation and resource conservation.
- A severe absence of reliable baseline data on waste streams hampers rigorous policy monitoring and enforcement.
- Overcoming these barriers requires targeted capacity building, market-based tax incentives, and technology transfer.



	Shared Data Systems	Joint Green Finance	Policy Alignment
Construction	✓	✓	✓
Agriculture	✓	✓	✓
Municipal	✓	✓	✓

- Transboundary challenges—such as shared river basins and climate impacts—demand standardized, regional solutions.
- Prioritizing unified material tracking, combined green bond investments, and joint R&D accelerates progress for all five republics.
- The ultimate goal is moving from fragmented pilot projects to a robust, economy-wide circular ecosystem.





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