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## **CIRCULAR ECONOMY AS A STRATEGIC INSTRUMENT FOR GUARANTEEING SOCIETAL ECO-SECURITY AND SUSTAINABLE POST-WAR REVIVAL OF UKRAINE**

Contemporary worldwide difficulties tied to weather shifts, environmental decline, and the outcomes of the full-scale conflict necessitate a significant reshaping of Ukraine's economic system. The shift from a linear system ("extraction – creation – utilization – discarding") to a circular economy, founded on the tenets of reduce, repurpose, reclaim, and extended 9R–10R models (refuse, reconsider, lessen, reuse, mend, restore, remake, adapt, recycle, recover), is becoming a primary method for securing societal ecological safety [1, p. 12-15; 2].

The conflict has brought about immense ecological harm to Ukraine. As of March 2026, the total documented ecological losses reached nearly UAH 6.4 trillion, encompassing soil contamination (UAH 1.34 trillion), atmospheric air (UAH 1.15 trillion), and harm to protected natural zones (UAH 3.8 trillion) [3]. Furthermore, over four years of full-scale aggression (February 2022 – February 2026), the war caused supplementary greenhouse gas releases amounting to 311 million tonnes of CO<sub>2</sub> equivalent, which is comparable to France's yearly emissions. Of this total, 114 million tonnes are linked to direct military actions, 70 million tonnes to landscape blazes, and a substantial portion to the damage of energy frameworks and revival efforts [4, p. 4-6; 5]. The conventional linear recovery path will only amplify reliance on resources, pollution, and the community's susceptibility to new ecological hazards.

Of particular concern is the buildup of construction and demolition waste (CDW). By July 2025, over 6.4 million tonnes of war-related rubble had accumulated in Ukraine, and this quantity keeps rising [6]. Such debris presents not just an ecological danger (contamination of soil, groundwater, and air) but also a potential asset for reconstruction. The circular economy presents a fundamentally distinct approach: converting devastation into raw material. Reclaiming construction debris can supply 30–40% (and in certain instances more) of salvaged materials for new facilities, substantially lessening the strain on natural quarries, cutting down CO<sub>2</sub> emissions, and speeding up rebuilding [7]. International endeavors, notably by UNDP, already show positive results: as of early 2026, more than 1 million tonnes of debris have been cleared (equivalent in mass to three Empire State Buildings), entry to over 200 public areas has been restored, and reconstruction has been made possible at more than 1,600 severely impaired sites (housing, schools, medical facilities) [8; 9]. A portion of the waste is sorted and sent for reprocessing, enabling the creation of secondary aggregate and even circular cementitious materials.

Novel undertakings for upcycling conflict debris are especially noteworthy. Programs such as “Rebuilding Ukraine safely, sustainably, and swiftly” transform concrete fragments into premium building supplies, decreasing the demand for virgin resources and lowering the carbon impact. Based on projections, utilizing recovered materials in building can save 20–25% of revival expenditures and considerably lower CO<sub>2</sub> discharges, given that the manufacturing of cement and steel ranks among the most carbon-intensive processes [10; 11]. In farming, circular methods (composting of organic refuse, biogas generation, closed nutrient cycles) aid in soil rejuvenation, increased richness, and food security. In manufacturing, deploying resource-efficient and cleaner production (RECP) concepts permits a reduction in waste generation by 20–75% at the level of individual firms [2; 12].

A vital dimension is the societal integration of the circular economy. Expanding the recycling, mending, remanufacturing, and green technology sector generates fresh employment, particularly for disadvantaged populace segments — internally displaced persons, young adults, women, and inhabitants of struggling regions. This fosters not solely ecological but also social well-being for the community, mitigating destitution and disparity [1, p. 45-48; 13].

The directional aims for Ukraine are outlined by the European Green Deal and the EU Circular Economy Action Plan. As a prospective EU member, Ukraine is actively aligning its statutes: the Law of Ukraine “On Waste Management” (2022) has been enacted, a draft Strategy for the Progress of the Circular Economy until 2035 is underway, and local waste management blueprints are being executed [14; 15]. In February 2026, the Ukrainian Cabinet of Ministers sanctioned new regulations that encourage the reprocessing of building and demolition materials, setting clear conditions for commerce and local authorities [16]. The Ukraine Facility framework (up to €50 billion for 2024–2027) and the EU4Green Recovery initiative directly connect revival financing to adherence to the “do no major harm” standard and circularity [17; 18]. Global efforts by UNIDO, UNDP, and GIZ support the deployment of circular methods in industry and local governments, including pilot twinning projects for “green” municipal revitalization [2; 12; 19].

Nevertheless, execution confronts structural hindrances: an inconsistent regulatory structure, insufficient synchronization among agencies, restricted financing for “green” endeavors, low technological preparedness of companies, weak sorting and reprocessing infrastructure, and inadequate environmental consciousness among citizens. The absence of specific sector goals (especially for construction) and a dependable waste tracking system complicates the shift [2; 15; 20].

To surmount these obstacles, broad actions are essential:

- drafting and endorsement of a complete national Circular Economy Strategy featuring distinct benchmarks until 2035;

- encouraging public-private alliances and environmentally sound investments via fiscal breaks, subsidies, and “green” public purchasing;
- digitizing supply chains and establishing a national ledger of secondary assets;
- instructional schedules and awareness campaigns to cultivate a mindset of waste segregation and circular utilization;
- adjusting construction codes to European circularity norms (including the objective of 70% reclamation of construction and demolition waste) [17; 18; 21].

Therefore, the circular economy represents more than just a means for ecological safety; it is a vital impetus for Ukraine’s resilient post-war renewal. Its integrated and comprehensive execution will permit the transformation of destruction's aftermath into an asset for modernization, boosting the economy's ability to compete, hastening European unification, and assuring the long-term robustness of society against climate shifts and geopolitical uncertainties. Particularly promising is the advancement of circular methods in building, where conflict destruction can serve as the bedrock for “Build Back Better” — a renewal superior to before.

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