RECYCLING INITIATIVES IN SUSTAINABLE POLYMER WASTE MANAGEMENT

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The transition from landfilling and incineration to industrial recycling is a core priority of the European Union's circular economy policy and is particularly critical in humanitarian contexts, where emergency responses generate large volumes of plastic waste. Since 2022, humanitarian shelter operations in Ukraine have relied heavily on plastic tarpaulins for emergency roof repair and temporary shelter. While essential for protection, these materials create a significant secondary waste stream once damaged or no longer required.

This study explores the potential for transforming humanitarian shelter plastics into durable construction materials through organized recycling initiatives in Ukraine. According to EU Directive 2018/851 on waste, by 2035 the proportion of municipal waste sent to landfill should be reduced to 10%, while reuse and recycling rates should reach 65%. Achieving these targets requires a shift from disposal-based waste management toward industrial recycling systems.

In Ukraine, large-scale humanitarian assistance following Russia's full scale invasion in 2022 resulted in the distribution of millions of tarpaulins. These tarpaulins, typically composed of woven HDPE or polypropylene scrims coated with LDPE, are technically recyclable but logistically difficult to recover once dispersed across communities. This study applies qualitative and quantitative review methods to assess recycling feasibility, including analysis of estimated tarpaulin waste volumes generated between 2022 and 2025, and compatibility with conventional recycling technologies such as extrusion, compression moulding, and injection moulding.

An international comparative case is examined through a UNHCR pilot project in Lebanon that repurposed used plastic sheeting into shelter doors [1]. This case provides benchmarks for technical feasibility, cost efficiency, and product durability relevant to the Ukrainian context. The analysis indicates that Ukraine's humanitarian plastic waste stream is sufficiently large to support pilot and potentially industrial-scale recycling initiatives. Ukraine already possesses relevant industrial capacity. The Polygreen plant, the largest enterprise in Ukraine engaged in secondary processing of polyethylene film waste, demonstrates the feasibility of large-scale polyethylene recycling under domestic conditions. The material composition of tarpaulins distributed in Ukraine is compatible with existing recycling machinery, including equipment operated by Polygreen.

Beyond technical feasibility, institutional coordination is essential. Local authorities can support collection systems and integration into municipal waste services, while academic institutions while academic institutions can contribute to material testing and product design [2]. Recycling initiatives also create socio-economic benefits, including employment opportunities and community engagement in sustainability efforts [3].

Keywords: Humanitarian plastic waste; Polymer recycling; Circular economy; Ukraine

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