August 14, 2025

Proper Waste Management Can Significantly Reduce Greenhouse Gas Emissions in the EU

Key policies: *EU Waste Framework Directive, Packaging and Packaging Waste Regulation (PPWR), Single-Use Plastics Directive, European Green Deal, EU Circular Economy Action Plan, Circular Economy Act, EU Climate Law, EU Climate Neutrality Objective 2050, EU 2030 Climate and Energy Targets, EU Biodiversity Strategy*

While the European Union already performs **significantly better than the global average in waste management**, new scientific evidence shows that there remains **substantial untapped potential to further reduce greenhouse gas (GHG) emissions, lower societal costs and strengthen economic security** through improved waste collection, sorting and recycling.

These findings are presented in the study *"Comprehensive assessment of environmental and economic impacts of the entire EU waste management system"*, conducted by the **Joint Research Centre (JRC)** of the **European Commission** in collaboration with the **Technical University of Denmark**.

Waste management already delivers climate benefits – but more is possible

According to the study, waste management in the EU currently **reduces annual GHG emissions by around 1%**, equivalent to approximately **34 million tonnes of CO_2-equivalent per year**. This corresponds to an average saving of **17 kg CO_2-eq per tonne of waste managed**.

By contrast, waste management at the global level remains a **net emitter**, with the United Nations estimating around **250 kg CO_2-eq emitted per tonne of municipal waste** worldwide.

A striking **83% of the EU's emissions savings** from waste management are driven by the **highly effective recycling of metal waste**, which more than compensates for emissions arising from other waste streams.

Misallocation of recyclable waste remains a key challenge

The study highlights that **plastics, textiles and biowaste** often have **low separate collection and recycling rates**, leading to large volumes being misallocated to mixed waste streams. Mixed waste is a significant source of emissions, as it is largely disposed of via **landfilling and incineration**.

Key findings include:

- Around **50% of household waste** in the EU still ends up in mixed waste bins
- Only **41% of plastic packaging waste** is separately collected and recycled
- About **22% of post-consumer textile waste** is separately collected
- Less than **half of biowaste** generated in the EU (as of 2017) was separately collected

This gap between **waste generated and waste correctly collected** limits the climate and economic benefits of recycling.

This project is supported by the Interreg Danube Region Programme co-funded by the European Union.

Critical waste streams requiring policy attention

From a climate perspective, the study identifies several waste streams where **GHG emissions from management exceed savings from recycling or recovery**, including:

- Plastic waste
- Biowaste
- Mineral waste
- Textile waste
- Sludge
- Hazardous and non-hazardous chemical waste
- Soil

Low collection rates for plastics, textiles and biowaste lead to higher emissions from mixed waste treatment. Improving **separate collection and sorting** is therefore a priority for reducing emissions.

Societal costs of waste management

The analysis shows that waste management in the EU currently entails a **net societal cost**, despite its environmental benefits.

- Average societal cost: **€68 per tonne of waste managed**
- Total annual cost: **€136 billion**, or **€304 per EU citizen**

Only **metal waste** delivers a net societal benefit, although further improvements are still possible, particularly in scrap quality management.

For comparison, the UN estimates global municipal waste management costs at around **€149 per tonne**, more than double the EU average. While the EU performs better than most regions, the findings underline that a **fully circular system should generate positive net societal benefits**, with materials continuously reused and their value preserved.

A comprehensive life-cycle approach

The study applies **Life Cycle Assessment (LCA)** and **Life Cycle Costing (LCC)** methodologies across the entire waste lifecycle — from generation and collection to transport, sorting, recycling, incineration and landfilling.

Crucially, it also accounts for **avoided emissions and costs**, such as:

- Substitution of virgin materials through recycling
- Energy recovery from waste

This integrated approach allows policymakers to assess scenarios, guide investments and prioritise interventions that deliver the greatest environmental and economic returns.

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EU legislation and the path towards circularity

Waste management is a cornerstone of EU environmental policy. Key legislative instruments include:

- The **Packaging and Packaging Waste Regulation (PPWR)**
- The **Single-Use Plastics Directive**
- The **Waste Framework Directive**, which mandates separate collection of **biowaste and textiles** and sets a **65% municipal waste recycling target by 2035**

Looking ahead, the forthcoming **Circular Economy Act** aims to establish a **Single Market for secondary raw materials**, increase the supply of high-quality recyclates and stimulate demand across EU industries.

Supporting the green transition

The study provides strong evidence that **improving waste collection, sorting and recycling**, particularly for plastics, textiles and biowaste, can deliver **significant climate benefits**, reduce costs and support the EU's transition to a **competitive, resource-efficient and climate-neutral economy**.

By closing the gap between waste generation and effective recycling, waste management can play a far more prominent role in **cutting emissions, strengthening circularity and enhancing Europe's economic resilience**.

Source: https://joint-research-centre.ec.europa.eu/jrc-news-and-updates/proper-waste-management-can-significantly-reduce-greenhouse-gas-emissions-eu-2025-08-14_en