Research content for the short video Magic-Bin Utopia 2025

"IMAGINE a FUTURE...

where you can recycle even residual waste"

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Magic Bin: Revolutionary research on AI-powered sensors enables recycling of former residual waste.

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Non-recyclable waste bin in urban areas

In Styria, the amount of residual waste per capita is over 100 kg per year, but only about one-third of this actually belongs in the residual waste bin. The majority of the waste disposed of in the residual waste bin is misplaced waste—i.e., materials that should actually be collected in a different bin. In addition to organic waste, this particularly affects packaging made of plastic, metal, paper, or glass.

In Austria, the contents of residual waste bins are mostly incinerated, which means that valuable resources are lost to the recycling cycle. While biogenic waste can be processed into high-quality compost in composting plants, plastic and metal packaging can be recycled and reused. However, even the best and most innovative recycling processes are ineffective if waste is disposed of incorrectly and therefore never enters the intended recycling process.

The European Union has set itself the goal of halving the amount of residual waste by 2030 in order to promote the circular economy and conserve resources. However, current data shows that waste volumes are continuing to rise, especially in urban areas. This makes it clear that existing measures are not sufficient and that new, visionary solutions are needed.

Analyses of residual waste composition show that both the amount of residual waste produced per capita and the number of items incorrectly disposed of in residual waste bins are particularly high in densely populated urban areas. This leads to the conclusion that the more people live in a confined space, the worse their waste separation habits become. The reasons for this are anonymity, lack of knowledge, lack of incentives, and insufficient awareness of proper waste separation.
The trend toward increasing urbanization thus contradicts efforts to establish a

functioning circular economy. In order to enable closed material cycles, it is essential to drastically reduce the amount of recyclable materials in residual waste bins. However, traditional waste management is reaching its limits with its current methods—a purely technical solution does not seem to be sufficient.

Visionary approaches to solutions:

This is where the Green Utopia Project 2025 comes in: the vision of a residual waste bin free of recyclable materials should not only be defined as an abstract goal, but also underpinned by concrete research approaches and innovative solutions. In particular, the following questions should be taken into account:

• Technological innovations: What role can AI-supported systems, digital sorting aids, or smart waste bins play in minimizing incorrect disposal?

• Social and psychological approaches: How can awareness of waste separation in urban areas be sustainably increased? What incentive systems could be effective?

•Regulatory and infrastructural measures: What political and urban planning measures could bring about a reversal of this trend?

The project serves as a platform for identifying and discussing visionary solutions—from technical developments and behavioral psychology measures to experimental waste management strategies.

Research at the site:

- ***Waste Processing Technology and Waste Management Department of Environmental and Energy Process Engineering/ Technical University of Leoben: https://www.avaw-unileoben.at/en/***
- ***Project ReWaste F: https://www.avaw-unileoben.at/en/research/projects/rewaste-f***