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عنوان مقاله

A model to assess the environmental and economic impacts of municipal waste management in Europe

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The Monitoring Framework proposed in the EU27 New Circular Economy Action Plan comprises two mass-based indicators, namely overall recycling rate and recycling rate for specific waste streams. Yet, to monitor and assess the impacts of circular economy, indicators cannot be limited to mass-based indicators; we argue assessments should also include environmental and economic effects. Towards this end, these impacts can be quantified by an advanced model based on life cycle thinking, entailing the use of life cycle assessment and costing (LCA/LCC). Calculating these effects for municipal waste management is challenging due to gaps in available data for estimating generated waste. We propose a methodology to estimate more finely the amounts of waste generated in the Member States, complemented with LCA/LCC. The results highlight that important inconsistencies in municipal waste data reporting exist and that recycling rates calculated from these are lower than hitherto estimated. The impacts quantification shows great performance variation across EU27, with C-footprint ranging from -490 to 539 kg CO₂-eq. t⁻¹. Potentials for improvement are substantial and can bring up to 103 Mt CO₂-eq. additional annual saving, reducing costs (calculated as Full Environmental LCC) of waste management by 8.4 billion EUR and bringing 206,100 new jobs in the sector. The approach presented highlights the rationale for improved data management on waste statistics and the potential for harmonised models. It also paves the way for more sophisticated impact analyses relevant for policymaking, by bringing a richer perspective to the environmental and economic impacts of waste management on top of tracking generated, collected and recycled waste flows.