

From Mixed Plastic Waste to Recycled Chemicals: De-Risking Gasification at Real Scale

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Gasification is one of the key thermochemical recycling technologies for closing the loop on plastic waste, valorizing plastic-rich waste streams into syngas that can be upgraded into recycled chemicals through catalytic synthesis. As such, it offers a direct pathway to help meet recycled-content targets for plastic packaging under the EU Packaging and Packaging Waste Regulation (PPWR). However, **feedstock characteristics and heterogeneity remains** the main technical barrier to scaling these projects: physical and chemical characteristics directly affects carbon conversion efficiency, syngas quality and operating costs, and can trigger issues such as bed sintering, feeding malfunctions and deposit formation.

CENER addresses this risk through demonstration-scale testing at its 2 MW BIO2C bubbling fluidized-bed gasifier, coupled with a dedicated syngas cleaning pilot (up to 100 Nm³/h) removing tars, particulates, and contaminants such as NH₃, HCN, H₂S, COS, HCl and HF. Refuse-derived fuel (RDF), available within CENER's tested feedstock range to plastic-rich mixed waste, has been evaluated alongside other demanding feedstocks (bulk density 130–500 kg/m³, moisture up to 20–30%, ash 13–20% d.b.). Results show that is not required to pelletize the raw material and that is possible to feed the fluff RDF reaching high carbon conversion and syngas yield.



This talk will present how real-scale feedstock and gas-cleaning validation reduces technological risk and provides industrial partners and technology developers with the data they need to confidently scale gasification of plastic-rich waste streams.