



Creating more sustainable powder coating resins with alternative raw materials

Powder coatings often have a lower environmental impact than liquid coating systems. Resins made using mass-balanced raw materials, recycled PET (rPET), or bio-based raw materials offer new opportunities to further reduce the carbon footprint of powder coating resins.



Enabling durable, versatile, and easy-to-adopt powder-coating resins with lower CO₂ emissions

The powder coating industry is keenly aware of the climate challenges facing the planet. In response, many are actively seeking new ways to transform their processes and reduce their environmental impact. Evidence suggests that solutions such as powder-coating resins will play a pivotal role in enabling this journey to lower-carbon-footprint powder coatings.

A Covestro lifecycle analysis (LCA) study on powder coating systems revealed that powder coating resins can support carbon footprint reductions of between 10% and 55% compared to conventional solvent-borne coating systems. However, powder paint producers can further reduce CO₂ emissions by harnessing powder coating resins that are partly derived from alternative raw materials.

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Choosing alternative raw materials

To help companies accelerate these carbon reductions, Covestro offers a range of powder coating resins created from three main categories of alternative raw materials: **mass-balanced**, **bio-based**, and **recycled polyethylene terephthalate (rPET)**.

Typically, implementing a mass-balanced raw material offers a rapid, non-disruptive approach with wide applicability, improving environmental impact compared to rPET or bio-based raw materials. Furthermore, each alternative raw material incurs an additional cost because it is newly produced.



Mass-balanced raw materials

Mass-balanced feedstocks combine fossil and alternative inputs processed together in existing chemical plants. Alternative sources include bio-based materials such as plant oils, bio-naphtha, and biogas, as well as recycled feedstocks like pyrolysis oil from plastic waste and biomethane. Through certified accounting systems, a portion of these sustainable inputs is allocated to the resin.

Current mass-balanced raw materials are suitable for hybrid, general-industry, architectural, and super-durable resins, enabling a gradual transition toward more sustainable production.

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Bio-based raw materials

A diverse range of renewable, plant-derived feedstocks can be used to produce bio-based monomers that can partially replace fossil-based inputs in resin systems.

These feedstocks fall into several key categories:

- Sugars obtained from crops such as sugarcane, corn, and beets serve as versatile sources for the synthesis of bio-based monomers.
- Vegetable oils, including soy, rapeseed, and sunflower oils, provide fatty acids and glycerides as precursors for polymers.
- Lignin and cellulose derived from wood and agricultural residues, offering renewable pathways to aromatic and fibrous bio-components.

Currently available bio-based raw materials for powder coating resins are particularly well-suited for hybrid and general industry resins, supporting the transition toward more sustainable materials without compromising on performance or processing efficiency.



rPET

Post-consumer and post-industrial recycled polyethylene terephthalate (rPET) is sourced from used plastic bottles, packaging materials, and recycled polyester fibers. rPet can be used as a raw material for powder polyester resins and is well-suited for indoor applications. When used at levels above 20% it can affect the durability of outdoor resins, contributing to the circular use of materials and reduced dependence on virgin resources.



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¹Please see the "Guidance on Use of Covestro Products in a Medical Application" document.

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