



# **Powder coating resins from more sustainable alternative raw materials**

Frequently asked questions (FAQs)

**According to our lifecycle assessment, powder-based coating systems showed carbon footprint reductions of between 10% and 55% compared to specific liquid systems under defined testing conditions. Given this potential reduction, more companies are interested in adopting powder-based coating systems to support their efforts to reduce their carbon footprint. With the development of more sustainable powder coating systems, manufacturers can accelerate CO<sub>2</sub> reduction while maintaining quality and versatility.**

Many companies are unsure where to start in adopting powder coating systems. We've created this FAQ paper to address common questions about powder coating systems and alternative raw materials. If you still have any further questions after reading this page, please get in touch, and we will be happy to help you find a solution that fits your needs.



"Powder-based coating systems showed carbon footprint reductions of between 10% and 55% compared to specific liquid systems"

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## Key factors

Key factors to reduce the carbon footprint of a powder coating



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### **What makes powder coatings more sustainable compared to liquid coatings?**

When I look at the furniture industry today, I'm excited by the huge opportunities available to adapt and meet the evolving needs of consumers. Over the past few years, we've noticed a growing demand for furniture and flooring products with low environmental impact, alongside high-quality and aesthetically pleasing designs.

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### **Are powder coatings reusable?**

Yes! Overspray from powder coatings can be collected and reused, resulting in nearly 100% material utilization and significantly reducing waste. Waste powders are also increasingly being reused in paints or other products. Covestro is also working on chemical recycling processes for powder coatings.

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### **Do powder coatings contribute to energy savings?**

Yes. Many modern powder coatings are formulated to cure at lower temperatures and in shorter times than conventional powder coatings, reducing the energy required during curing.



"When I look at the furniture industry today, I'm excited by the huge opportunities available to adapt and meet the evolving needs of consumers"

#### 4 **What is a partly bio-based resin?**

A partly bio-based resin is formulated by replacing a portion of fossil-based raw materials with plant, animal, marine, and/or forestry-derived raw materials. The resulting resin contains both fossil- and bio-based carbon, which can help reduce the overall carbon footprint while maintaining its properties in line with conventional alternatives.

#### 5 **What is the difference between conventional powder coating resins and powder coating resins made from alternative raw materials?**

Conventional powder coating resins are typically derived from fossil-based feedstocks. In contrast, powder coating resins made from alternative raw materials replace part of these fossil-based inputs with renewable, recycled, or partly bio-based sources like biomass and recycled plastics.

In most cases, this substitution can help to lower carbon emissions and reliance on nonrenewable resources, while often maintaining comparable performance. It is always good to check beforehand if the expected carbon footprint reduction can be achieved, especially with new partly bio-based raw materials that are not yet produced on a large scale. Mass-balanced raw materials are specifically formulated to function as drop-in replacements for conventional resins, with the same performance as their fossil-based counterparts.



## 6 What is a mass-balanced resin?

A mass-balanced resin is produced using a certified process in which renewable or recycled feedstocks are introduced into an existing petrochemical production system. Through third-party certification, a proportional share of the resin can be attributed to these more sustainable inputs.

This approach enables large-scale adoption of more sustainable raw materials without the need to build entirely new production infrastructure, obtain new approvals, or compromise coating properties. For mass-balanced resins, third-party certification is required for every step in the value chain.

## 7 What is a resin made from rPET?

An rPET resin is manufactured by incorporating raw materials derived from recycled polyethylene terephthalate (PET), such as discarded plastic bottles. Using rPET can reduce plastic waste, give materials a second life, and lower the dependency on virgin fossil-based feedstocks. Currently, rPET is used to create powder polyester resins.



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### **Which type of alternative raw material currently delivers the largest carbon footprint reduction?**

Generally, resins derived from partly bio-based or recycled feedstocks, such as rPET, offer lower carbon footprint reductions than currently available mass-balanced raw materials when used at the same concentration in resins.

The exact impact depends on the source of the raw material, its production location, and overall production efficiency. Because of this, it is advisable to perform carbon footprint reduction calculations before beginning a project to avoid any surprises.

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### **Do powder coating resins sourced from alternative raw materials reduce quality or impact the physical properties of coatings?**

It is possible to replace fossil-based raw materials with the same raw materials derived from renewable feedstocks, without reducing quality or impacting the final coating's properties.

High-quality alternative raw materials can be designed to match the performance of conventional fossil-based resins. When adequately formulated, coatings made using these alternative raw materials can retain their durability, corrosion resistance, mechanical strength, and aesthetic properties. This performance can be validated through rigorous testing.

Alternative raw materials that have never been used in powder coating resins should be tested extensively to determine whether they impart new properties to a coating.



**10 Are powder coating resins based on alternative raw materials compatible with existing processes and technologies?**

Yes! Our mass-balanced powder coating resins are specifically formulated to function as drop-in replacements for conventional resins. This means that, in most standard applications, they require no modifications to existing application equipment or curing processes. This compatibility supports manufacturers and applicators to improve sustainability performance without significant adjustments.

**11 Can powder coatings help companies achieve sustainability certifications?**

Absolutely! Powder coatings can support compliance with LEED certification, Green Seal certification, and other sustainability standards due to their lower emissions and wastereduction benefits.

"This compatibility supports manufacturers and applicators to improve sustainability performance without significant adjustments."



## Key factors to reduce the carbon footprint of a powder coating

### Choice of raw materials

- **Resin selection:** Using resins made from mass-balanced, partly bio-based, or recycled feedstocks can significantly lower carbon footprint compared to fossil-based resins. It is advisable to check the actual carbon footprint reduction at an early stage, especially with new partly bio-based raw materials, because the actual reduction may be lower than expected due to small-scale production. Covestro can supply all feedstock options.
- **Pigments and additives:** Choose pigments with lower environmental impact (e.g., alternatives to heavy-metal-based pigments).
- **Supply chain proximity:** Locally sourced materials reduce transport-related emissions.

### Formulation efficiency

- Design formulations that require less raw material per square meter of coated surface; Covestro already has developments in this area.
- Use catalysts and crosslinkers that enable lower-temperature or faster curing without compromising coating properties. Covestro offers a comprehensive product portfolio for low-temperature or fast-cure resins suitable for metal and heat-sensitive substrates.

### Production process

- Choose resins and formulations that are compatible with more energy-efficient curing (e.g., low-temperature curing powders).
  - Minimize waste by improving milling and classification efficiency.
  - Use renewable energy in manufacturing facilities where possible.
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### Application efficiency

- Powder coatings already allow for high transfer efficiency (>95%) and overspray recovery; it is possible to maximize this with well-adjusted equipment.
- Ensure proper grounding and spray gun settings to reduce overspray and wasted energy.

### Durability and lifetime

- A longer-lasting coating means fewer recoating cycles, saving resources and energy over the product's lifetime. Covestro offers a broad portfolio of superdurable and super-durable-plus resins.
- Prioritize formulations that deliver strong weathering resistance, corrosion protection, and mechanical durability. Covestro offers super-durable, corrosionresistant resins that deliver reliable, long-lasting outdoor performance.



Covestro Deutschland AG  
Kaiser-Wilhelm-Allee 60  
51373 Leverkusen  
Germany

[solutions.covestro.com](https://solutions.covestro.com)  
[info@covestro.com](mailto:info@covestro.com)

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

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