



Life Cycle Assessment

2021

All about our Polyvinyl Alcohol (PVOH) Life Cycle Assessment



1

What is a LCA?

The European Committee for Standardization defines life cycle assessment as a method for quantifying environmental impacts based on an inventory of environmental factors for a product, process or activity from raw material extraction to final disposal.

2

What is a CO₂ Footprint?

A carbon footprint is the amount of greenhouse gases – primarily carbon dioxide – released into the atmosphere by particular human activity. It is measured as tons of CO₂ emitted per year / per ton / per m² of product. It is a number that can be supplemented by tons of CO₂ - equivalent gases, including methane, nitrous oxide, and other greenhouse gases.

3

Cradle to Gate

From raw material extraction to the factory gate. Since PVOH is used in numerous applications, a cradle to gate analysis was performed. This includes all production steps, from the production of raw materials and chemical precursors to energy production and consumption, transport and processing.

4

Why do we have an LCA?

We are aware that we come from an industry that is responsible for a certain proportion of greenhouse gases. As a company, we take responsibility for this and have always been improving our efficiency in all areas of our production. With the calculation of our LCA, we want to make a further contribution to making our product more sustainable in the multitude of its applications.



»For the people and the planet – to achieve what no one else can.«

Therefore, we believe in transparency and honesty.

Life Cycle Assessment: Data & Scope

- Calculated in 2023 with data from 2021
- The result includes the data from our production site in Frankfurt, Germany
- Cradle-to-Gate
- Includes raw materials, including transport, energy and utility supply, the production process in Frankfurt and distillation, as well as waste and wastewater treatment
- Climate Change was calculated
- The total GHG emission of Frankfurt plant was mass-allocated between main product (PVOH) and a co-product.
- Reference Standards: ISO14040, ISO14044 and ISO14067

**Disclaimer: The calculation was conducted based on the amount of activity and GHG emission factor information available at the time of the calculation, and the CO₂ footprint values are subject to revision in a timely manner.*

Climate Change

A measure of greenhouse gas emissions, such as CO₂ and methane. These emissions are causing an increase in the absorption of radiation emitted by the earth, increasing the natural greenhouse effect. This may in turn have adverse impacts on ecosystem health, human health and material welfare.

Kuraray Poval™

CO₂ Footprint comparison

Sustainability means transparency!

LCA Results: Kuraray Poval™ produced in Frankfurt a.M., Germany

Climate
Change

2.43

The Climate Change for a period of 100 years is 2,43kg CO₂-eq per kg Kuraray Poval™



Kuraray Poval™



Coal-based PVOH

The smaller
our footprint,
the better
yours!

The carbon footprint of our PVOH produced in Germany is 30% lower than the average of a renowned database. This data also shows that the carbon footprint of our oil/natural gas based PVOH is several times lower than that of coal-based PVOH.

PVOH
End of
Life

Kuraray Poval™ can contribute to the sustainability of your product as it is inherently biodegradable in aqueous solution form. Be informed that the biodegradability of PVOH is associated with a renewed CO₂ emission of 2 kg CO₂ per kg PVOH, regardless of which PVOH it is.

Our Sustainability Activities

Improve energy efficiency

We have always worked to increase our efficiency and reduce our energy consumption. A major investment in 2012 and 2013 contributed to energy savings of 20% in our production process. This resulted in a 6% reduction in our carbon footprint. Our production has been ISO 50001 certified for many years.

A few years ago, these measures were cost-driven, but today we are also driving energy-saving projects in awareness of our environmental and social responsibility.

Our past & present

In addition to transparency, we believe that dialog is also an important component of sustainable development. We want to share our experience and knowledge in the field of energy efficiency and become more sustainable and environmentally friendly together with other companies in the region. Since the beginning of 2020 we have been a member of the 3rd Rhine-Main Energy Efficiency network. We have been awarded the AGEEN seal of approval for our efforts towards more efficient use of energy resources.

... now looking to our future!

Our Sustainability Taskforce is continuously working to reduce our energy consumption and improve our sustainability performance. It is important to note that the largest part of our carbon footprint comes from our raw material vinyl acetate. We take responsibility for our share by continuously working on optimization and innovation. Sustainability must be viewed holistically, therefore we are a member of the Process4Sustainability initiative at our production site in Frankfurt-Höchst. It is a cooperative effort with other local companies and the site operator Infracore to work on future-oriented, green solutions to make our industry fit for the future.



**Process⁴
Sustainability**



Adding value to your products – worldwide

Kuraray Poval™, Exceval™, Elvanol™ and Mowiflex™ are the trademarks for polyvinyl alcohols made by Kuraray. Their key characteristics — outstanding film-forming properties and high binding strength — add real value to your products. Our polymers are water-soluble, highly reactive, crosslinkable and foamable. They have high pigment binding capacity, protective colloid characteristics and thickening effects. The physical and chemical properties of Kuraray Poval™ make it ideal for a wide variety of applications, ranging from adhesives through paper and ceramics to packaging films. Many of our polymers are food contact-approved and thus suitable for food applications.

Kuraray produces its wide range of Kuraray Poval™ grades in Japan, Singapore, Germany and the USA. Kuraray's global production and service network make us your partner of choice for innovative high-quality PVOH resins.



Kuraray Poval™

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