English

Sustainable Glazing

Trosifol® R3

Clear. Strong. Sustainable.



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kuraray

Trosifol®

Shaping a more sustainable future – together

WHETHER YOU'RE IN THE ARCHITECTURAL OR AUTOMOTIVE INDUSTRY, **decarbonization** has become a defining requirement for responsible manufacturing. Regulatory expectations, customer demands, and global climate commitments are accelerating the need to reduce **GHG (Green House Gas)** emissions without compromising performance or safety.

As a global leader in specialty chemicals, Kuraray is committed to reducing the environmental footprint of the operations while delivering the high performance materials our customers rely on. This commitment extends to all our businesses, including our advanced interlayers solution (AIS) segment, which produces and markets **Trosifol® PVB** and **SentryGlas® ionoplast interlayers.**

In this same spirit, AIS is dedicated to advancing a safer and more sustainable future. Acknowledging the urgency reflected in climate data and the risk of exceeding the 1.5 °C global warming threshold, we are driven by a shared mission: to mitigate environmental impact, safeguard communities, and support a resilient ecosystem.

Kuraray Advanced Interlayer Solutions (AIS) Division has launched Trosifol® R3, a new line of sustainable interlayer products that forms part of a wider and sustainable up- and downstream value chain, which includes products made from recycled materials, clean-energy fabrication practices, more efficient fabrication processes and in-life service and longevity. Every Trosifol® R3 interlayer is or will be ISO-certified, which includes detailed environmental product declarations. Best of all, you get the mechanical properties that have made Trosifol® the most trusted name in PVB interlayers for over 60 years.

Welcome to the future of interlayer technology. Welcome to sustainable, durable, and customizable glass lamination from Trosifol®.

R3 use duce cycle

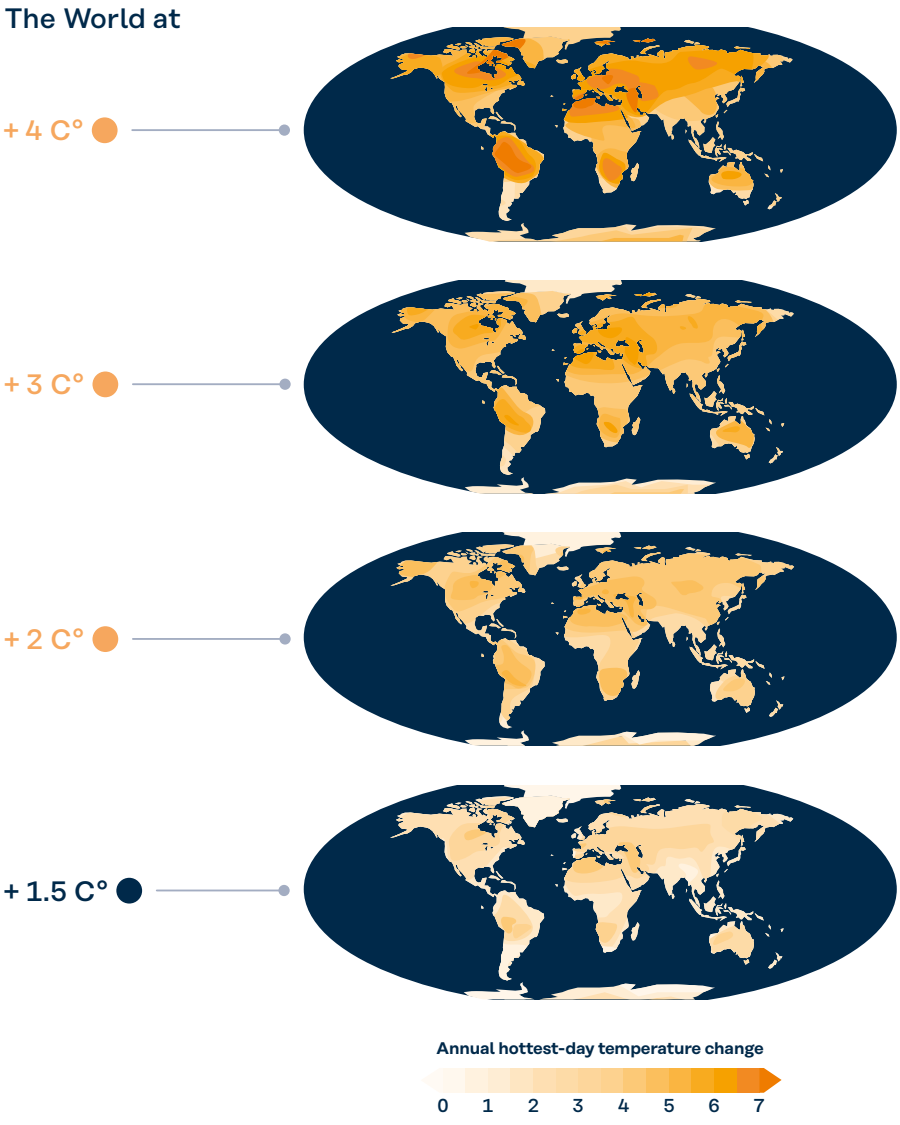


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The impact of climate change is already here

GLOBAL WARMING LEVEL (GWL)

Temperature increase scenarios



GRAPH 1

Annual hottest day temperature is projected to increase most (1.5-2 times the GWL) in some mid-latitude and semi-arid regions, and in the South American Monsoon region.

A +3°C WORLD IS NOT AN OPTION

Global projections indicate that a 3 °C increase in temperature will lead to extreme annual temperature spikes, especially in mid-latitude and semi-arid regions, with urban areas exacerbating these effects. This scenario would result in severe heat extremes, uninhabitable areas, failing food systems, and increased climate-driven migration.

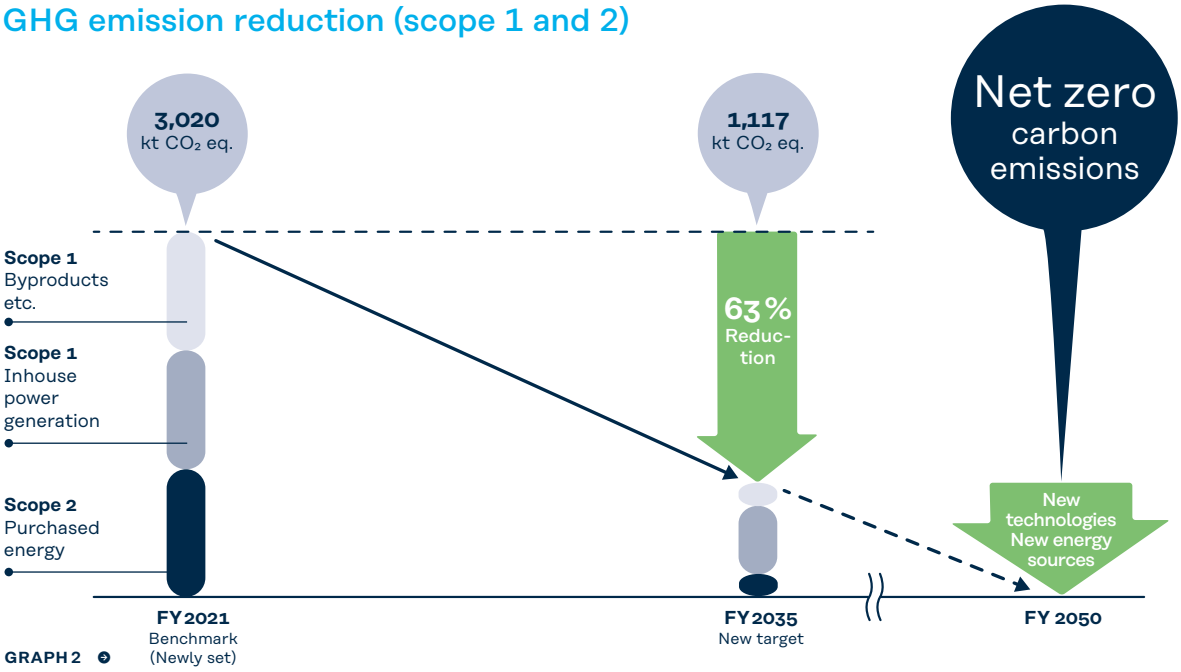
Kuraray commitment to a sustainable future

WE ARE CONSCIOUS THAT A CERTAIN AMOUNT OF GREENHOUSE GASES RESULTS FROM THE INDUSTRY WE WORK IN. We as a corporation accept responsibility for this and work to increase our productivity across the board.

We are committed to developing new fields of business using pioneering technology that improves the environment and enhances the quality of life throughout the world.

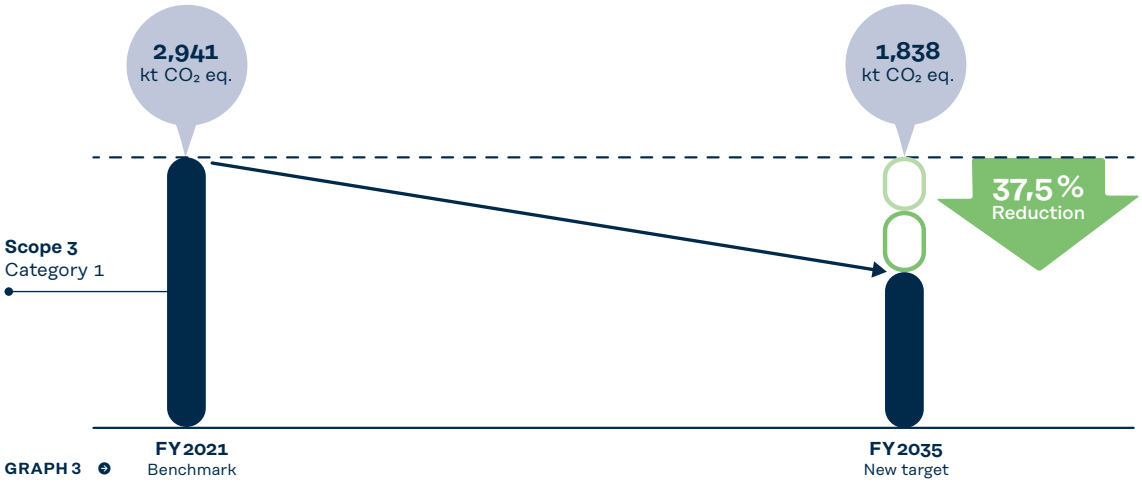
Growth and responsibility towards people and the environment are fundamental principles of all Kuraray employees' actions worldwide.

GHG emission reduction (scope 1 and 2)



GRAPH 2

GHG emission reduction from the supply chain (scope 3)



GRAPH 3

We are actively promoting the growth and marketing of low carbon footprint (CFP) PVB interlayers to help reduce carbon dioxide emissions (scope 3), which is a significant driver of climate change.

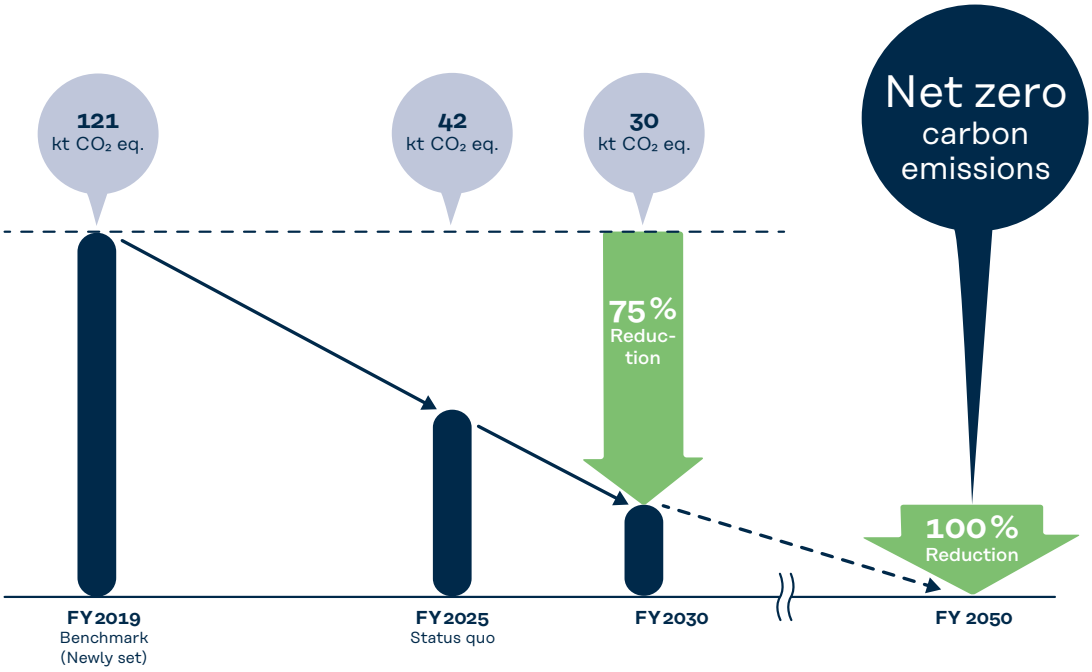
Our long-term vision for our Advanced Interlayer Solutions Division includes a commitment to sustainability that extends far beyond just responsible production practices.

For more information about our extensive sustainability activities and our corporate commitment for wider and further improvement, please follow this link:

www.kuraray.com/csr

AIS scope 1 & 2 Green House Gas (GHG) emissions

By optimizing our production processes and minimizing our scope 1 (direct) emissions, coupled to more rigorous energy management and control of our scope 2 (indirect) emissions, we are already well established on our sustainability journey.



GRAPH 4 ➔

LIFE CYCLE ASSESSMENT (LCA)

A life cycle assessment is a method of quantifying a product's environmental impact based on an array of materials, products, processes or activities from raw-material extraction to the product's final disposal.

Kuraray is using LCA is an internationally accepted (standards ISO 14040 & ISO 14044) and scientific tool to quantitatively evaluate the environmental impacts of our Kuraray interlayer products. To ensure transparent, accurate and reliable environmental impact data all LCAs are critically reviewed in accordance with ISO 14071.

TROSIFOL® AND SENTRYGLAS® LCA METHODOLOGY AND SCOPE:

Goal

- Our LCA results reflect a site-based Trosifol® and SentryGlas® production at the respective interlayer manufacturing sites of Kuraray.

System Boundary

- The system boundaries of the LCA cover the cradle to gate production of Trosifol® and SentryGlas® interlayers at each manufacturing site.

Time Coverage

- Every LCA is based on annual production and consumption data representative of an operational year of the chosen reference year at the respective manufacturing site of Kuraray.

Software & Database

- LCA modelling was conducted using LCA for Experts (formerly GaBi software) and Managed LCA Content (formerly GaBi databases)

Impact indicator

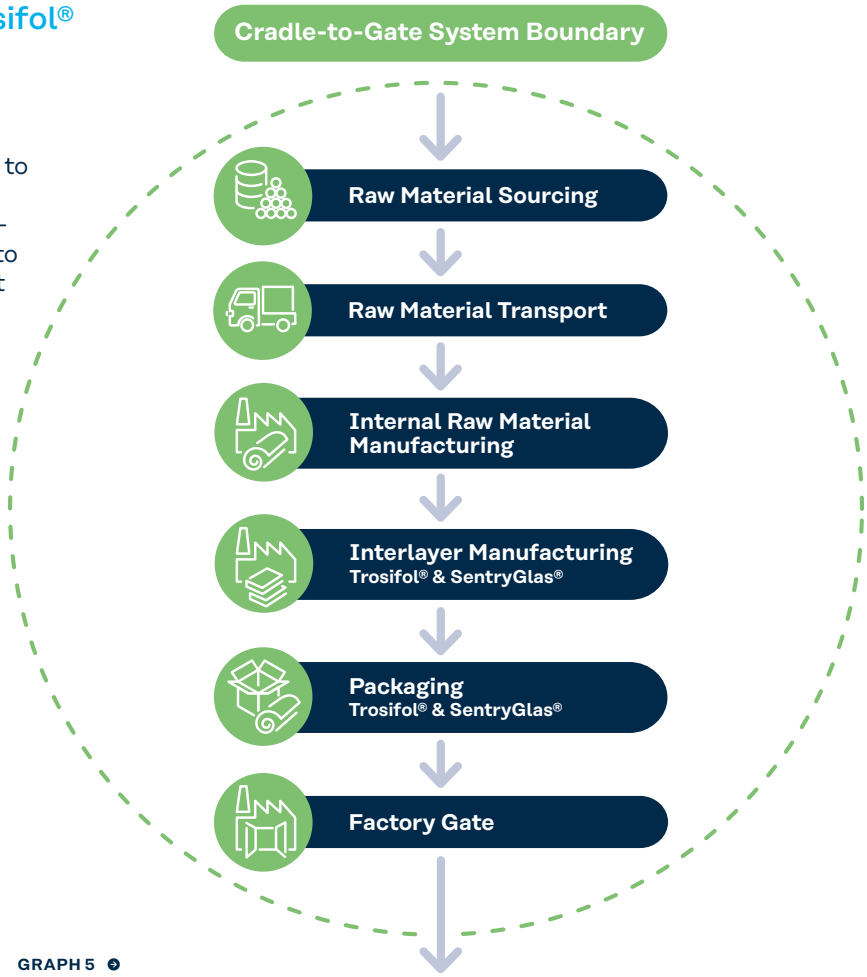
- The Global Warming Potential (GWP total, 100 years) is calculated using the Environmental Footprint (EF 3.1) methodology in accordance with EN 15804+A2 and it is based on IPCC characterization factors (IPCC AR5)

Functional unit

- 1 kg of Trosifol® or SentyGlas® at the respective manufacturing sites of Kuraray.

Cradle-to-Gate production of Trosifol® and SentryGlas® interlayer

Since our PVBs are used in numerous applications, a cradle-to-gate (raw material extraction to the factory 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.



GRAPH 5

KURARAY ENVIRONMENTAL PRODUCT DECLARATION (EPD) JOURNEY

An Environmental Product Declaration (EPD) is a standardized and transparent way of communicating science based, third-party verified and comparable environmental information.

At Kuraray, EPDs provide a clear and credible disclosure of the environmental performance of our Trosifol® and SentryGlas® products, based on comprehensive LCAs. For construction products, the methodology follows EN 15804, ensuring consistency, comparability, and acceptance within the building and construction sector complemented for glass products by the product category rule EN 17074:2019.

Kuraray's EPD journey began in 2023 with the publication of its first Environmental Product Declarations for Trosifol® and SentryGlas® products used in laminated safety glass. With the growing demand for low embodied carbon solutions, Kuraray continues to enhance its EPD portfolio and supports the net zero strategy of the construction sector through its R3 low carbon interlayers.

EPD portfolio of AIS

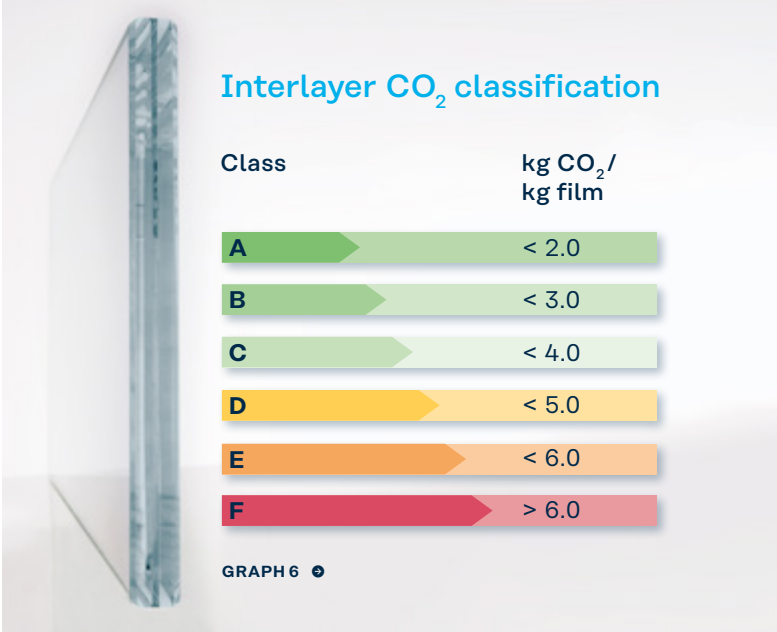
Interlayer	Troisdorf Trosifol®	Ulsan Trosifol®	Holesov Trosifol® R3 CA	Troisdorf Trosifol® R3 CB	Holesov SentryGlas®	Fayetteville SentryGlas®
EPD						
Product code	B2XX V2XX	B2XX V2XX	B205 CA	B205 CB	SG(R) 5000 SG(R) 6000 NUV(R) 5000	SG 5000 SG 6000

TAB 1 ➔

Our EPDs: www.trosifol.com/about-us/sustainability

Our AIS product specific EPDs support architects and designers in achieving sustainable building certifications for façade and balustrade applications. They contribute to BREEAM (Mat 01 – Life Cycle Impacts; Mat 02 – Environmental Impacts of Materials), LEED (MR: Building Product Disclosure & Optimization – EPDs), and DGNB (ENV1.1 – Building Life Cycle Assessment) to increase the higher weighting within the assessment of construction projects.

Without an EPD, laminated safety glass products are often modeled with generic datasets, which can worsen the overall environmental impact performance of laminated safety glass compared to the available market solutions with Trosifol® and SentryGlas® products.
Our verified data enable customers to assess and compare the environmental performance of their laminated safety glass solutions.



GRAPH 6 ➔

INTERLAYER CLASSIFICATION

To give users of our products an easy-to-understand point of reference, we have created a carbon footprint classification system that allows them to compare the relative Global Warming Potential (GWP) of our materials:

Carbon footprint classification (cradle-to-gate)

Global Warming Potential (GWP) AIS products for Architectural Glazing

Product	Origin	CO_2 classification [A-F]	GWP [kg CO_2/ kg film]
Trosifol® R3 Clear	CZ DE	A B	0.10 *3 2.44 *3
SentryGlas®	Rolls CZ Rolls US Sheets	C n.a. E	3.58 *2 - 5.25 *2
SentryGlas Xtra®	Rolls CZ Rolls US Sheets	C n.a. E	3.58 *2 - 5.25 *2
SentryGlas® Natural UV	Rolls CZ Rolls US Sheets	C n.a. E	3.58 *2 - 5.25 *2
SentryGlas® Translucent White	Rolls CZ Rolls US Sheets	C n.a. E	3.58 *2 - 5.25 *2
Trosifol® Extra Stiff Pro		D	4.21 *2
Trosifol® HR		D	4.21 *2
Trosifol® Natural UV		D	4.21 *2
Trosifol® SC Monolayer		D	4.21 *2
Trosifol® SC Multilayer		D	4.21 *2
Trosifol® Spallshield® CPET		n.a.	-
Trosifol® UltraClear		D	4.21 *2
Trosifol® UV Extra Protect		D	4.21 *2
Trosifol® XT UltraClear		D	4.21 *2
BirdSecure® Pro		n.a.	-
Trosifol® Black & White	DE CZ	D D	4.21 *2 5.26 *1
Tints	DE	D	4.21 *2
Trosifol® Clear	DE DE B300 US KR	D E n.a. E	4.21 *2 5.33 *2 - 5.03 *2

TAB 2 *1 According to ISO 14040/44 standards and ISO 14071
*2 According to EN 15804 standards
*3 not verified yet

Global Warming Potential (GWP) AIS products for Automotive Glazing

Product	Origin	CO_2 classification [A-F]	GWP [kg CO_2/ kg film]
SentryGlas®	Rolls CZ	C	3.58 *2
	Rolls US	n.a.	-
	Sheets	E	5.25 *2
SentryGlas Xtra®	Rolls CZ	C	3.58 *2
	Rolls US	n.a.	-
	Sheets	E	5.25 *2
Trosifol® Acoustic	DE	D	4.21 *2
	KR	E	5.03 *2
Trosifol® Acoustic Shadeband	DE	D	4.21 *2
	KR	E	5.03 *2
Trosifol® Shadeband	DE	D	4.21 *2
	KR	E	5.03 *2
Trosifol® Spallshield CPET		n.a.	-
Trosifol® The Wedge Monolayer	DE	D	4.21 *2
	KR	E	5.63 *1
Trosifol® The Wedge Shadeband	DE	D	4.21 *2
	KR	E	5.63 *1
Trosifol® Clear	DE V2XX	D	4.21 *2
	CZ	D	5.26 *1
	KR	E	5.03 *2
	KR V5XX	E	5.63 *1
Trosifol® Color	DE	D	4.21 *2
	CZ	D	5.26 *1
	KR	E	5.03 *1

TAB 3 ➔

*1 According to ISO 14040/44 standards and ISO 14071

*2 According to EN 15804 standards

R3 – it's all in the name

Reuse → Reduce → Recycle

CONSUMER PACKAGING IS UNDERGOING A PARADIGM SHIFT in terms of materials, volume and design, and much of industry needs to catch up.

We are a leader in the field in this respect and have already made significant strides in our packaging practices by introducing several more-sustainable initiatives and solutions that are positively impacting the sustainability value chain.

REUSE

Returnable and reuseable assets will always be more sustainable, and many can be reused multiple times, boosting their sustainability credentials even more

- **In 2026 our returnable packaging usage climbed to 41 %, more than doubling the 2020 figure of 17 %.**
- **Implemented asset tracking software in North America, enhancing visibility, control, and utilization of returnable assets in the region.**
- **Introduced returnable packaging solutions at our Holesov and Korea production sites, expanding the program to two facilities that previously did not utilize returnable assets.**

REDUCE

For customers: In addition to the extensive tools available on our website, we have introduced our **Carbon Reduce AI** tool, which uses the power of artificial intelligence to help you determine the carbon footprint of glass structures such as laminated safety glass and insulating glass.

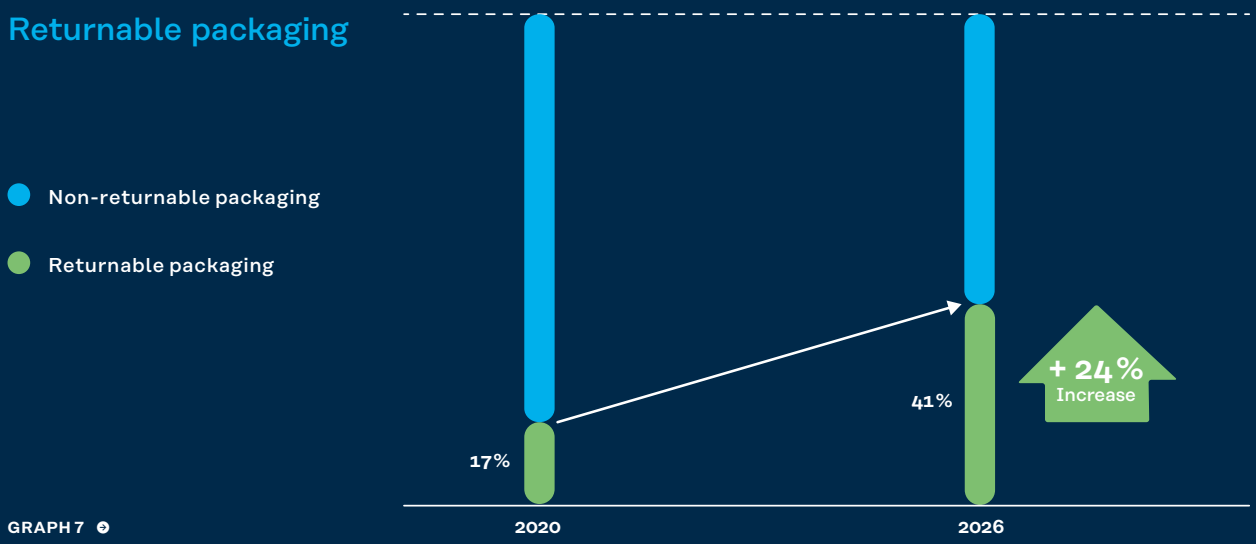
RECYCLE

In line with reuseable packaging concepts, we are also investigating recyclable materials for use in components that cannot be easily redeployed, this includes wider usage of wood, cardboard, and paper and the adoption of more easily / widely recyclable plastics.

kuraray **CARBON REDUCE AI**

Activate Genius Mode

Returnable packaging



GRAPH 7

IMPROVEMENTS ALREADY IMPLEMENTED

Emission reduction – 16.7% of CO_2-eq kg/kg-mile

We are excited to share that, as part of our initiative to improve the sustainability of our internal transfers, we've achieved a 16.7% reduction in CO_2 emissions on one of our routes. This progress highlights our commitment to reducing our environmental footprint, with plans to extend these improvements across all internal logistics operations.

IMPROVEMENTS UNDER INVESTIGATION

Finished product – Internal transfer

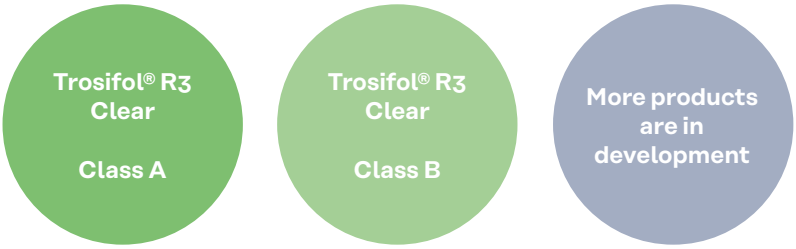
As part of our ongoing efforts, we are actively investigating shifting more of our shipments from rail back to ocean transport. This transition leverages the lower emissions per ton-mile that ocean freight offers, helping us minimize our environmental impact while continuing to deliver high-quality products efficiently.



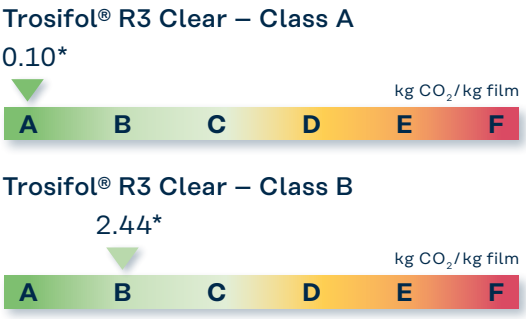
Photo: © Lena - stock.adobe.com

Technical data

Trosifol® R3 – Products available



Trosifol® R3 Clear classification



GRAPH 8 ➔ *not verified yet

Trosifol® R3 – Physical properties

Type	Adhesion	Film thickness [mm]	[mil]	Color	Light transmittance* [%]	UV transmittance* [%]	Solar absorption* [%]
Trosifol® R3 Class A	high	0.76	30	Clear	88	< 1	19
Trosifol® R3 Class A	high	1.52	60	Clear	88	< 0.5	21
Trosifol® R3 Class B	medium	0.38	15	Clear	88	< 4	18

TAB 4 ➔ * LSG with 2 x 4 mm Floatglass according EN 410/ISO 9050

Trosifol® R3 – Dimensions

Product	Thickness [mm]	[mil]	Roll widths [mm]	[in]	Roll lengths PE interleaved [m]	[ft]	Roll lengths refrigerated [m]	[ft]
Trosifol® R3 Class A	0.76	30	≤ 2400	≤ 94	60 / 250	197 / 820	-	-
Trosifol® R3 Class A	1.52	60	≤ 2400	≤ 94	125 / 250	410 / 820	-	-
Trosifol® R3 Class B	0.38	15	≤ 3210	≤ 126	-	-	500	1640

TAB 5 ➔

Not all products are available in all regions.

Contact



FOR FURTHER INFORMATION
on products from Kuraray, please visit www.kuraray.com.
You can find further information on our Trosifol® and SentryGlas® products at www.trosifol.com.

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10/2026

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WORLD OF INTERLAYERS

The most recognized interlayer brand is now the most sustainable interlayer solution.

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