

# Introducing **+LC** (Low Carbon) Solutions



## What is **+LC**?

**+LC** solutions represent a new sustainable offering from LyondellBasell, encompassing a range of Intermediates and Derivatives (I&D) chemicals produced under an International Sustainability and Carbon Certification (ISCC) PLUS certified mass balance methodology.

Sourced from recycled or renewable feedstocks, these **+LC** solutions are designed to support businesses in their efforts to meet greenhouse gas (GHG) emissions reduction goals, all while maintaining the high-quality applications essential for modern, sustainable living by offering a lower carbon footprint than fossil-based alternatives.

## Why Choose **+LC**?

- **Sustainable Certification:** Each **+LC** solution is backed by an ISCC+ mass balance certificate, ensuring sustainable sourcing and production practices.
- **Reduced Carbon Footprint:** **+LC** products are created from recycled or renewable feedstocks, offering a lower carbon footprint compared to conventional fossil-based alternatives.
- **Supports GHG Reduction Goals:** Tailored to assist businesses in achieving their greenhouse gas (GHG) emissions reduction targets, particularly Scope 3 emissions.
- **Wide Range of Applications:** From insulation materials to automotive and consumer goods, **+LC** offers versatile applications across various sectors.
- **Global Availability:** Already available in Europe and the Americas, with expansion into Asia planned for 2024.

**Join us in leading the sustainability transformation with **+LC** – where our proven low carbon solutions can help meet your business’s emissions reduction goals.**

For more information, please visit [www.lyondellbasell.com](http://www.lyondellbasell.com) or follow @LyondellBasell on LinkedIn.



## +LC Product Carbon Footprint Summary - PO&D

[kg CO<sub>2</sub>eq per Metric Ton of product]

I&D Products from LyondellBasell	Fossil-based		Bio-attributed (mass balancing)	
	Naphtha/NGL's		Bio-based feedstock	CO <sub>2</sub> emission reduction potential of bio-based feedstock compared to fossil-based feedstock
	EF 3.0	ISO 14067	ISO 14067 (incl. carbon removals)	
Propylene Oxide (PO)	1,777	1,787	-873	2,660
Styrene (SM)	2,280	2,325	-879	3,204
Monopropylene Glycol (MPG)	1,829	1,827	-184	2,011
Dipropylene Glycol (DPG)	1,948	1,945	-341	2,286
Tripropylene Glycol (TPG)	1,998	1,996	-382	2,378
Propylene Glycol Monomethyl Ether (PM1)	1,782	1,780	89	1,691
Dipropylene Glycol Monomethyl Ether (DPM)	1,905	1,903	-156	2,059
<b>+LC solutions</b>				

Global blend basis.

Cradle to Gate (LyondellBasell)

Per Metric Ton of product basis

EF 3.0 does not cover biogenic carbon emissions or removals. Therefore, the PCF results are also presented according to ISO 14067, which is used in the TfS scope 3 guidance.

## +LC Product Carbon Footprint Summary - BDO&D

[kg CO<sub>2</sub>eq per Metric Ton of product]

I&D Products from LyondellBasell	Fossil-based		Bio-attributed (mass balancing)	
	Naphtha/NGL's		Bio-based feedstock	CO <sub>2</sub> emission reduction potential of bio-based feedstock compared to fossil-based feedstock
	ISO 14067 (incl. carbon removals)		ISO 14067 (incl. carbon removals)	
Allyl Alcohol (AA)	2,524		-392	2,916
1,4-Butanediol (BDO) (*)	3,183		1,252	1,930
2-Methyl-1,3-Propanediol (MPD) (*)	3,183		1,252	1,930
Tetrahydrofuran (THF)	4,761		2,301	2,460
N-Methyl-2-Pyrrolidone (NMP)	4,673		2,834	1,839
<b>+LC solutions</b>				

(\*) BDO & MPD have the same PDV because a mass allocation is applied to that sub-process

Global blend basis.

Cradle to Gate (LyondellBasell)

Per Metric Ton of product basis

EF 3.1 does not cover biogenic carbon emissions or removals. Therefore, the PCF results are also presented according to ISO 14067, which is used in the TfS scope 3 guidance.



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In general, reference to low carbon solutions or products with the **+LC** label indicates products sourced from bio-based feedstocks using a mass balance approach with a lower Product Carbon Footprint (PCF) compared to equivalent products from LyondellBasell that are sourced from fossil feedstocks. This conclusion is based on a critically reviewed cradle-to-gate life cycle assessment study commissioned by LyondellBasell. It's important to note that the cradle-to-gate methodology excludes emissions that occur after manufacturing. The PCFs provided are estimates and rely on current, relevant data and methodologies. These may be updated or refined as we continue to evolve our approach to identifying, measuring, and addressing emissions. For further information regarding the life cycle assessment methodology, including all underlying assumptions and results, please contact your LyondellBasell sales representative.

The Product Carbon Footprints (PCFs) displayed in this presentation are calculated in accordance with general standards for life cycle assessment (ISO 14040 and ISO 14044) and the carbon footprint of products (ISO 14067). However, these standards do not provide specific guidelines on how the PCF should be determined for individual products. In the absence of industry-specific guidelines for calculating PCFs in the chemical sector, it is not yet possible to make accurate comparisons of the same products from different companies. The calculations for PCF are based on greenhouse gas (GHG) emissions from LyondellBasell plants and utilize high-quality average data for purchased feedstocks and energy.

ISCC+ certified bio-based raw materials, which include bio-based wastes and residues such as used cooking oil (UCO) and palm fatty acid distillates (PFAD), are allocated to **+LC** products using a mass balance approach. Use of a mass balance approach means that we mix fossil feedstocks with bio-based feedstocks in our traditional production processes and allocate bio-based feedstock to final product via mass balance certificates; individual products may or may not physically contain bio-based material. In the life cycle assessment, all bio-based raw materials in the feedstock, including PFAD, are treated using a waste-like approach. For more information on alternative feedstock scenarios, please consult your LyondellBasell sales representative.

While PCFs provide transparency about the greenhouse gas emissions associated with products, they should not be viewed as a comprehensive assessment of a product's sustainability.

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