

PRESS RELEASE

Renewable Carbon Initiative presents the latest update of its comprehensive Carbon Flow Report

The report is a compilation of supply and demand of fossil and renewable carbon for the chemicals and derived materials on a global and European level.

Hürth, 28 October 2026: Carbon can be used in fundamentally different ways. On the one hand, it is used as an energy carrier, with the energy stored in hydrocarbon molecules being released through combustion processes for power generation or transport. On the other hand, carbon is embedded in a final product as a fundamental and structural component. This includes food and feed, as well as the material and chemical sector, where hydrocarbons are used or converted to form complex chemical molecules. Examples of materials include wood for construction, furniture and paper, as well as cotton textiles. The Carbon Flow Report 2026 by the Renewable Carbon Initiative (RCI) mainly focuses on fossil and renewable carbon for a variety of chemicals and plastics.

The report provides an up-to-date strategic analytical basis for evaluating defossilisation strategies, renewable carbon supply options, and cross-sectoral carbon management. The 2026 update is particularly timely for EU policymakers considering ongoing discussions for bio-based and renewable carbon content targets.

The concept of Defossilisation

While the energy and transport sectors can and should be decarbonised using renewable energy, electrification and hydrogen, embedded carbon cannot be replaced in chemicals and plastics. The chemical sector can only be “defossilised”, which means shifting from fossil to renewable carbon sources, to biomass, CO₂ and recycling. RCI introduced this defossilisation strategy at the European policy level in 2020. The concepts of embedded carbon, renewable carbon and the defossilisation of the chemical and plastics sector are gaining more and more awareness, recognition, political interest and support. There is a strong need for solid data to guide the transition from fossil to renewable carbon. However, many of the required data for the chemical sector are and have been unavailable in sufficient quantity or quality in databases.

The original Carbon Flow Report

The publication of the first edition of the RCI-commissioned Carbon Flow Report in 2023 with the reference year 2020 was a milestone for the renewable carbon economy, as it showed comprehensive carbon flows for the food, feed, energy and fuel sectors, as well as the material and chemical sectors, for the first time. The report provided not only a standard dataset for policymakers, NGOs and industry, but served as a strategic analytical foundation for assessing defossilisation pathways, renewable carbon supply options and cross-sectoral carbon management. The report illustrated the scale of the task.

The first version was well recognised by the academic and political communities, and even an editorial in the renowned scientific journal *Nature* (06 January 2026) highlights the growing importance of defossilisation and mentioned the Carbon Flow Report:

“Worldwide, demand for ‘embedded’ carbon — that found in chemicals — is expected to double by 2050, according to the nova-Institute, a green-energy research institute in Hürth, Germany. But this carbon cannot come from the usual sources, such as coal, natural gas and oil. These must remain in the ground, and this is where defossilization comes in. Defossilization means finding sustainable ways to make carbon-based chemicals. Alternative sources of carbon include the atmosphere and plants, as well as carbon in existing biological or industrial waste, such as used plastics or agricultural residue.”

The update 2026 and development of the ‘system approach’ method

Three years after the publication of the original report, an update was needed to ensure it remained relevant since new and more detailed data had been published, including data from several RCI projects that had filled gaps or improved quality. However, the experts from nova-Institute, commissioned by RCI, also realised that while the standard method of using official data such as PRODCOM was convenient, these data were not detailed or precise enough to calculate the embedded carbon in chemicals and plastics. Also, double counting could not be excluded. Therefore, the nova experts developed an elaborate method to trace carbon flows from feedstock to products along the entire chemical process/value chain, e.g. from intermediates and building blocks to monomers and polymers. This new 'system approach' can be described as a platform-flow/carbon-balance view, building on material flow analyses and energy balances, integrating updated global and EU dataset. In total, the update of the report covered more than 40 chemical value chains representing almost the entire market.

This method was developed and applied for the first time in the report, which resulted in the most comprehensive and reliable dataset on embedded carbon flows in the chemical sector, systematically excluding double counting. This dataset is now based on CEFIC petrochemical (EU), IEA (global) and nova/RCI bio-based (EU and global) data, referencing the year 2023, using the most recent global-level data. Accordingly, the updated carbon flow data differed significantly from those in the first edition.

Global Picture: Fossil Dominance but Substantial Bio-based and Small Recycling Shares

In the year 2023, the global demand for carbon feedstock in the chemicals and derived materials sector was 660 Mt/year, with polymers accounting for 78%. A total of 86% of the 660 Mt/yr carbon feedstock came from fossil resources (61% from crude oil, 21% from natural gas, and 4% from coal). Renewable carbon as feedstock contributed only 10% from biomass and 4% from recycling, whilst CO₂-based carbon was completely negligible.

However, when expanding the scope to include all carbon-based materials besides chemicals and derived material, i.e. the heavy oil fraction, wood construction, pulp and paper, cotton and other bio-based fibres, the total demand for carbon feedstock increased to 1,400 Mt C/yr in 2023. Today, biomass and recycled biomass already contribute an impressive 640 Mt C/yr (46%).

Compared to the first edition of the Carbon Flow Report, the demand has increased significantly from 550 Mt/yr (2020) to 660 Mt/yr (2023). As global demand for carbon feedstock in the chemicals sector grew at a compound annual growth rate (CAGR) of 2–3% between 2020 to 2023, which would alone increase the demand to 600 Mt/yr. The residual increase in demand was due to application of the improved methodology, strictly accounting for carbon feedstock, and inclusion of new databases, which provide a more comprehensive overview of the global fossil, bio-based and recycling value chains.

The 2023 update also included a comprehensive and unique breakdown of biomass utilisation by the global and EU chemical industries in 2023/24. Globally, 118 million tonnes of dry biomass containing 64 million tonnes of carbon were used in the chemical industry, and 13 million tonnes of dry biomass containing 7 million tonnes of carbon were used in the European chemical industry.

The full 33-page report is available free of charge. <https://renewable-carbon.eu/publications/product/biomass-utilisation-by-the-global-and-eu-chemical-industry-2023-2024/>

The 2026 update: Scenario for a Global- Net-Zero Chemical Industry in 2050

In the latest update, a so-called explorative scenario (Figure 1) was applied that was based on plausible assumptions for the future. As this scenario is deliberately not a prediction, its realisation depends above all on political framework conditions and corresponding investments.

Compared to the net-zero scenario from 2023, the update includes a lower compound annual growth rate (CAGR; 2% instead of 2.5%), a slightly lower recycling share in 2050 (50% instead of 55%) and a slightly higher biomass contribution (20–30% instead of 20%) – and the new volumes and shares as starting point in 2023.

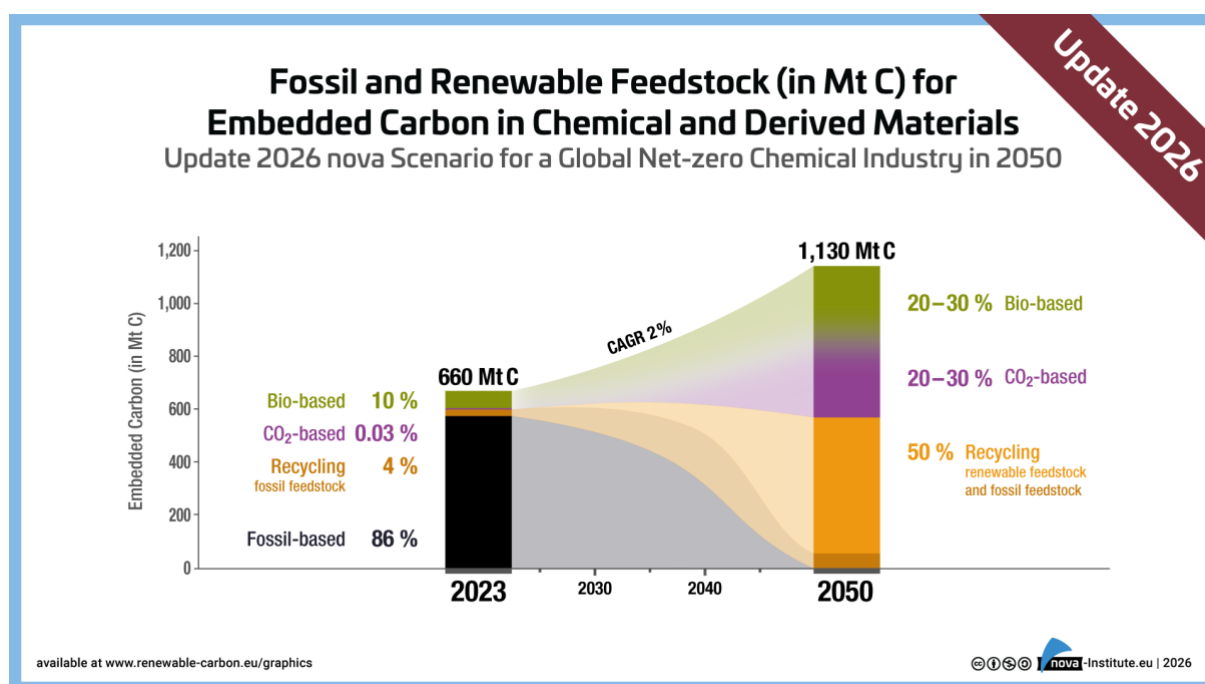


Figure 1: The 2026 update: Scenario for a Global- Net-Zero Chemical Industry in 2050

European picture: Growing Recycling Share

In 2023, the EU-27's demand for carbon feedstock in the chemicals and derived materials sector was 85 Mt/yr (Figure 2), which is only 13% of the global demand. Polymers account for 76% and organic chemicals for 24% of this demand (Figure 3).

This updated demand is substantially lower than the figure calculated in the first edition of the report (110 Mt C/yr) in 2020. There are two reasons for this: First, chemical production in Europe decreased by around 10 to 15% between 2020 and 2023. Second, the improved methodology strictly ensured avoidance of double counting of fossil fuels, unlike the methodology of the first edition which relied on PRODCOM and was susceptible to double counting. In the 2026 update, the petrochemical database of CEFIC was used as a basis.

The EU-27's feedstock mix differs from the global average with bio-based and recycling shares of 8% and 9%, respectively (Figure 3). The bio-based share is lower than globally, and the recycling share is significantly higher. The primary reason for the higher shares is the more realistic, lower fossil volume. This automatically leads to higher bio-based and recycling shares. In addition, the recycled volume increased from 2020 to 2023 by 14%. Compared to 2022, the recycled volume in 2023 decreased again

by 6%, which shows the crisis of the European recycling sector. This corrected baseline from the 2026 update is essential for setting realistic content-targets for renewable carbon.

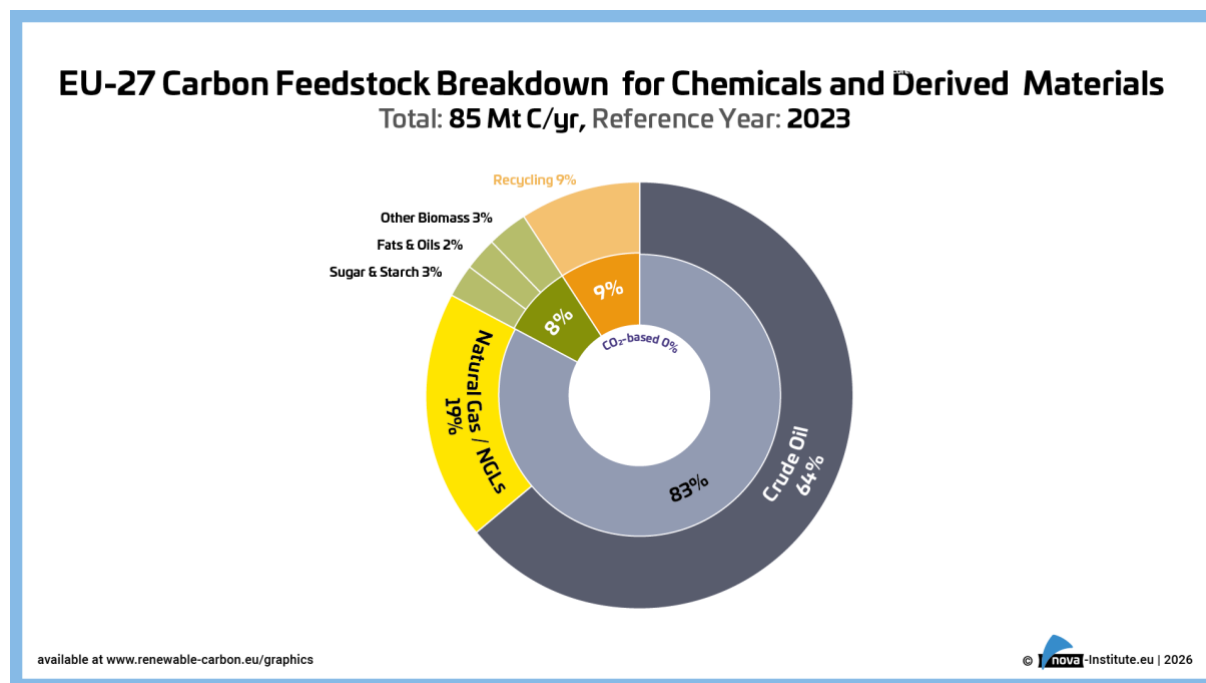


Figure 2: EU-27 Carbon Feedstock for Chemicals and Derived Materials

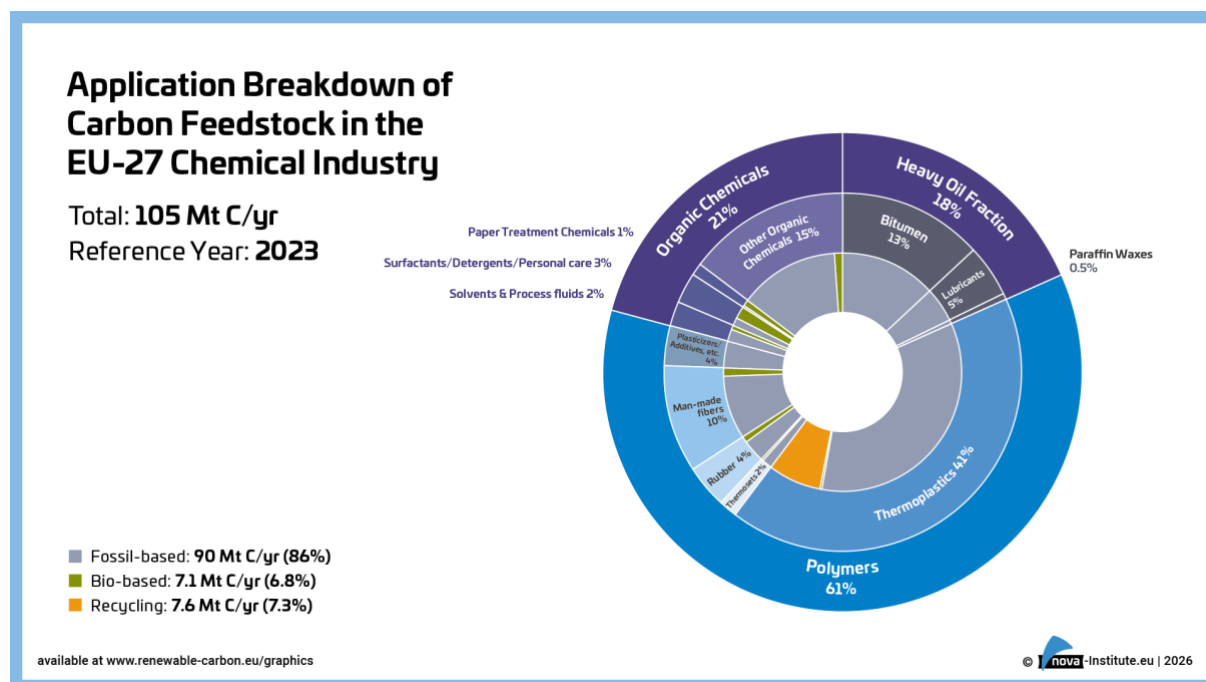


Figure 3: Application Breakdown of Carbon Feedstock in the EU-27 Chemical Industry

Background and Outlook

The full 2026 Carbon Flow Report contains detailed additional information on feedstock breakdown, key chemical building blocks and intermediates, and application sector splits. The 80 pages contain more than 30 graphics and tables, as well as corresponding descriptions of methodology, source material, data and literature sources. The report's presentation format allows the graphics to be easily presented to any audience.

The analysis is based on a wide range of sources, including scientific literature, statistical databases, and industry data (all listed in the report's annex). This is complemented by extensive expert consultation, with experts from nova-Institute applying a consistent material flow approach to compile a comprehensive inventory of carbon stocks and flows. The analysis focuses on the chemicals and derived materials sector, including detailed assessments of current carbon demand and scenarios for full defossilisation by 2050.

Given the rapidly evolving landscape of data, policy developments and market dynamics, regular updates to the Carbon Flows Report are essential to maintain its relevance and robustness. The report is therefore designed as a living document that will be updated periodically, facilitated by application of the new methodology. By continuously refining the database, methodology, and visualisations, the report provides policymakers, industry stakeholders, and researchers with up-to-date reliable and transparent evidence.

The full 80-page report is available free of charge at <https://renewable-carbon.eu/publications/product/carbon-flows-update-2026-compilation-of-supply-and-demand-of-fossil-and-renewable-carbon-for-chemicals-and-derived-materials-on-a-global-and-european-level/>

Disclaimer

RCI members are a diverse group of companies addressing the challenges of the transition to renewable carbon with different approaches. The opinions expressed in these publications may not reflect the exact individual policies and views of all RCI members.

About RCI

The Renewable Carbon Initiative (RCI) is a global network of more than 60 prominent companies dedicated to supporting and accelerating the transition from fossil carbon to renewable carbon (bio-based, CO₂-based and recycled) for all organic chemicals and materials. Its work focuses on scientific background reports, position papers, advocacy and networking.

Find all press releases of the Renewable Carbon Initiative (RCI), visuals and more free-for-press purposes at www.renewable-carbon-initiative.com/media/press

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