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White Paper

The 28 million Ton Question: Closing Europe's Fossil-Free Polymers Gap

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State-of-the-art bio-based technologies, such as fossil-free polymers (FFP)[1], can strengthen the European Union's competitiveness and strategic autonomy while accelerating industrial decarbonisation and supporting its climate-neutrality objective. However, unless the EU creates a viable market for fossil-free materials now, Europe will remain dependent on fossil-based polymers, while future investment, production capacity and supply chains will develop elsewhere.

Three interconnected barriers currently prevent this market from developing at scale:

- EU legislation does not adequately distinguish fossil-based polymers from polymers made with certified non-fossil carbon, leaving their climate value largely unrecognised.
- The green premium is concentrated on producers, although its effect on the final price of many consumer products is marginal.
- Premature "Made in Europe" requirements could restrict access to the renewable feedstocks and initial supply volumes needed to establish a functioning market before sufficient European capacity exists.

The European Union should therefore recognise certified non-fossil carbon as a distinct legal category; create predictable demand through targeted market-pull measures; distribute the green premium through existing regulatory and financial instruments; and introduce European-origin preferences only when verified EU production capacity can support them.

The common objective should be to establish a viable European market first, reduce fossil dependence immediately and create the conditions under which innovative European companies can subsequently scale.

[1] In this paper, fossil-free polymers (FFP) refer to polymers derived from non-fossil carbon, including bio-based, bio-attributed, carbon dioxide-derived and renewable-energy-derived polymers

1 Recognise the structural role of fossil-free polymers

Europe's plastics framework remains largely blind to feedstock origin. Fossil-based polymers and FFP are generally treated as legally identical across production incentives, product requirements and end-of-life obligations, despite their fundamentally different carbon origins.

According to Systemiq's 2025 report, Fossil-Free Plastics: Driving Clean Industrial Leadership in Europe, Europe will still require approximately 28 million tonnes of new virgin plastics annually by 2050, even under ambitious circularity scenarios. Mechanical and chemical recycling will remain essential but cannot fully replace virgin polymer demand. Recycling and FFP must therefore be treated as complementary pathways.

Drop-in FFP provide equivalent performance, processability and recyclability to their fossil-based counterparts. They can decarbonise established applications without requiring extensive changes to converter lines, product specifications or recycling systems. However, because the distinction lies in the origin of the carbon rather than the physical characteristics of the finished polymer, existing product-based legislation does not recognise the associated climate benefit.

European law has already addressed an equivalent issue through recycled-content requirements. Recycled and virgin polymers may be chemically indistinguishable, but the law differentiates between them through certification, calculation and verification. The same principle should apply to certified non-fossil carbon.

The EU should therefore establish a crosscutting, technology-neutral definition of FFP encompassing bio-based, bio-attributed, carbon dioxide-derived and renewable-energy-derived pathways.

The political question is whether Europe will translate its bioeconomy and competitiveness objectives into an investable market before production and supply decisions are taken elsewhere. The strategic question is whether Europe will retain access to the materials, expertise and value chains required for industrial decarbonisation.

2 Close the green premium gap

The green premium is real at the point of production but marginal at the point of consumption. Available evidence, including the recently launched Eunomia report (Phase 1), indicate that the transition to sustainable plastics would increase the price of many consumer products by less than 1 per cent. By contrast, feedstock costs for bio-based polyethylene are currently approximately 1.8 to two times those of fossil-based equivalents.

The premium is therefore concentrated on producers at the point of final investment decision. Producers must absorb higher feedstock and financing costs, first-of-a-kind risk and the absence of an established forward market, often years before the first tonne is sold. Downstream buyers, for whom the effect on the final product price may be limited, face neither an obligation nor a sufficient commercial incentive to contribute.

The climate benefit also remains inadequately recognised. An FFP can avoid approximately five to six tonnes of carbon dioxide per tonne of polymer produced. Much of this benefit is embedded in feedstock origin and falls outside installation-level emissions accounting. A framework focused only on production-site emissions therefore fails to recognise the principal climate value of the material.

In addition, FFP can support a more stable and resilient price and cost outlook by diversifying feedstock sources and reducing dependence on traditional oil and gas.

Closing the green premium requires a coherent package combining minimum non-fossil content requirements, appropriate recognition of biogenic carbon, eco-modulated Extended Producer Responsibility fees and mandatory green public procurement criteria. The necessary tools and precedents already exist; the priority is to apply them coherently and recognise certified non-fossil carbon across EU legislation.

3 Made in EU could mean not made at all

The immediate industrial-policy risk is that the EU attaches European-origin conditions to demand-pull measures before Europe can supply sufficient FFP or renewable precursors at competitive scale.

EU production currently accounts for approximately 14 per cent of global bio-based polymer capacity, compared with 55 per cent in Asia. Renewable precursors and much of the existing FFP production capacity are therefore located outside the European Union.

Premature origin requirements would create two unintended consequences. First, European first-of-a-kind plants may depend on imported renewable precursors, including green methanol, renewable hydrogen, bio-naphtha and certified residue-derived feedstocks. Upstream origin requirements could consequently disqualify output from European plants supported by EU financing instruments.

Second, restricting eligible supply before sufficient market volume exists would delay the development of scale economies, converter experience, transparent pricing and the offtake commitments required to finance subsequent European facilities.

The result would not necessarily be more European FFP production. Where non-fossil content targets can only be met with European-origin materials that are not available in sufficient quantities, the targets may be delayed or diluted. Alternatively, converters may continue using fossil-based polymers supported by established European production and supply chains.

Regulatory differentiation should therefore initially be based on certified carbon origin and environmental performance, not geography. Whether a polymer contains fossil or non-fossil carbon is a verifiable material characteristic with a measurable climate consequence. Its place of manufacture is a separate industrial-policy consideration.

The EU has already applied this sequencing to recycled content, allowing material recovered outside the Union to count towards EU targets where equivalent conditions are demonstrated. FFP should follow the same approach: initial requirements should be based on certified carbon origin and environmental performance, without European-origin restrictions on FFP or renewable precursors. Origin preferences should be introduced only once verified EU capacity can meet a defined share of demand, while the use of imported renewable precursors should not disqualify polymers produced in European plants from EU support.

4 We need to deliver together

Europe has experienced the consequences of acting too slowly in strategic industrial transitions. The solar sector demonstrated that technological expertise is insufficient when industrial policy, investment conditions and market development are not aligned in time. A similar risk now arises for FFP, which as a strategically important sector can support the transition across material-intensive sectors.

The political mandate already exists in the Clean Industrial Deal and the EU Bioeconomy Strategy. What is missing is a coherent legislative package and action that recognises non-fossil carbon, creates predictable demand and closes the green premium across the value chain.

Europe already has the mandate and policy tools required to close the fossil-free polymer gap. What is now required is a coherent decision to use them before investment, infrastructure and expertise become established elsewhere.