

Renewable chemistry on the rise: What bio-based innovation means for the European adhesive-tape value chain

The global drive to replace fossil-based raw materials with renewable and circular carbon sources is reshaping the very foundations of the chemicals sector—and by extension, the adhesive tape industry. In her recent webinar hosted by the Adhesive & Sealant Council (ASC), Doris de Guzman, principal of Green D Market Analytics, presented a clear overview of the emerging bio-based chemicals landscape, highlighting the technological, economic and policy forces now redefining material sourcing and formulation.

From fossil to renewable carbon

Ms. de Guzman emphasised that ‘renewable’ is no longer limited to plant-based feedstocks. Modern renewable chemistry draws on three carbon pathways:

- **Biosphere** – biomass-derived feedstocks such as agricultural residues, lignocellulosics and vegetable oils
- **Technosphere** – recycled and waste-based sources including used cooking oils, municipal waste and chemically recycled plastics
- **Atmosphere** – captured CO₂ and other carbon-recovery technologies.



For Europe’s adhesive tape producers, these pathways point to a gradual re-engineering of supply chains away from virgin fossil inputs and toward mass-balance integration of renewable carbon. In practice, this means polymers, films and resins produced with partial renewable content—traceable through certification—are already entering the European market.

Innovation across chemical building blocks

The presentation identified significant progress in renewable olefins, diols, diacids, aromatics and hydrocarbons—all relevant to pressure-sensitive and coated products:

- **Renewable polyols and diols** (e.g. 1,4-butanediol, propylene glycol, succinic acid, isosorbide) are expanding opportunities for bio-based polyurethane and polyester adhesives.
- **Bio-olefins** such as ethylene and propylene enable lower-carbon BOPP and PE films central to many tape constructions.
- **Lignin- and furan-based aromatics** support the development of renewable tackifiers, resins and plasticisers.
- **Bio-hydrocarbons**, particularly **bio-naphtha** and **renewable methanol**, are increasingly available under mass-balance systems linked to Europe’s sustainable-aviation-fuel (SAF) capacity growth.

These incremental innovations reinforce that the path to bio-based adhesives will be evolutionary, not revolutionary: partial substitution and hybrid formulations rather than wholesale system change.

A snapshot of global momentum

Ms. de Guzman's global project overview revealed over 50 notable bio-based chemical investments worldwide, with Europe remaining an active though selective player. Regional highlights include:

- **Europe/UK:** new and expanding capacity in bio-based ethylene, propylene, methanol, furanics, carboxylic acids and PHA.
- **Asia:** rapid growth in renewable propylene, epichlorohydrin, lactic acid, and bio-based polyesters.
- **The Americas:** ongoing build-out of renewable diols, alcohols and acetic acid chains.

Europe's "Green Agenda recalibration"—noted in the presentation—reflects both policy delays and pragmatic defossilisation challenges. Yet companies such as UPM, Avantium, Verbio, Futerro and Michelin are now entering or expanding in this space, signalling confidence in renewable-carbon chemistry as a growth strategy.

Adhesives and sealants: incremental but strategic change

According to Ms. de Guzman, most bio-based formulations in adhesives and sealants today are incremental replacements rather than full-system shifts. While market growth is steady, total bio-based volume remains a small fraction of global production. Still, the technological pipeline is widening:



- **Polymers & resins:** lignin, bio-based acrylics, natural rubber, furanic monomers and bio-polyurethanes
- **Plasticisers:** epoxidised oils, cardanol, citrates, isosorbide esters
- **Curing agents and crosslinkers:** bio-based isocyanates and polyamides
- **Tackifiers:** pine-chemical derivatives, biotech-derived terpenes, and alternatives to phenolic resins.

Packaging remains the largest target market for bio-based adhesives, driven by regulatory pressure, brand commitments and a global packaging market worth more than \$360 billion and growing at about 4 % annually. For the adhesive-tape industry, deeply embedded in packaging applications, this presents a tangible near-term opportunity.

Economic and strategic realities

Despite technical progress, barriers persist. Bio-based materials continue to carry price premiums two-to-three times higher than fossil equivalents, and scalability is constrained by limited producers, funding challenges and feedstock logistics. Europe's ongoing chemical-sector restructuring—itsself referenced in the presentation as both a weakness and an opportunity—could paradoxically accelerate renewable adoption as legacy assets are retired and new integrated biorefineries emerge.

As Ms. de Guzman noted, achieving sustainable economics “will take dialogue, partnerships, long-term strategies and bankable policies.” Collaboration between technology developers, feedstock suppliers, converters and policymakers will be essential to make renewable adhesives viable at industrial scale.

What this means for the European adhesive-tape value chain

For Afera Members and their partners, the key takeaways are clear:

1. **Renewable-carbon sourcing is becoming central** to long-term competitiveness, regulatory compliance and brand alignment.
2. **Mass-balance and certification frameworks** will dominate the near-term transition, providing verifiable claims while scaling up renewable content.
3. **Partnerships and co-development** across the supply chain, from chemical producers to converters, will be decisive in bringing bio-based polymers, films and adhesives to market.
4. **Packaging and mobility** segments will lead early adoption, creating reference cases and volumes that can spill over into broader industrial and consumer-tape applications.

From contraction to transition

For an industry currently challenged by contraction in Europe’s conventional chemical base, the rise of renewable chemistry offers a blueprint for transition rather than retreat. As new projects mature and cost curves flatten, bio-based building blocks are expected to move from niche to norm, gradually reshaping the materials that define adhesive tapes—making them not only functional, but increasingly circular and climate-neutral.

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