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Use of Non-fossil-based Ingredients

Personal and Home Care Products

March 2025

Non-fossil-based ingredient market for personal and home care is booming and is driven by regulations, corporate commitments, and consumer demand for sustainable products

"Non-fossil-based ingredients are renewable, biodegradable, and sustainable alternatives to petroleum-based compounds, commonly used in personal care and home care industry"

Sustainable Personal Care[1]

Market Value (2024)	CAGR (2024-2032)	Market Value (2032)
USD 54.36 billion	**6.96%**	**USD 90.40 billion**

Organic Segment

Market Value (2024)	CAGR (2024-2032)	Market Value (2032)
USD 37.9 billion	**9.8%**	**USD 81.35 billion**

Natural Household Cleaners[2]

Market Value (2024)	CAGR (2024-2032)	Market Value (2032)
USD 7 billion	**11.3%**	**USD 15.72 billion**

Surfactant Segment[3]

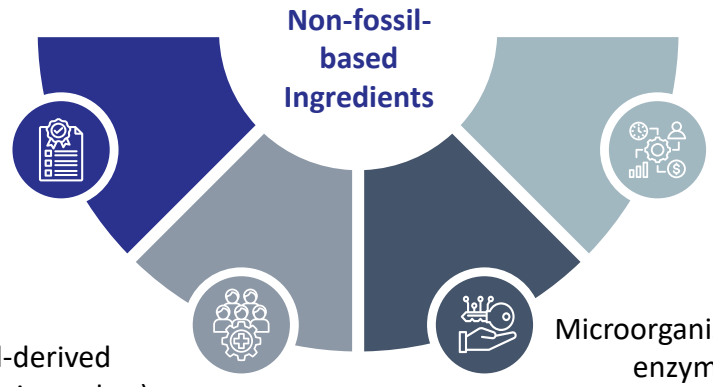
Market Value (2024)	CAGR (2024-2032)	Market Value (2032)
USD 21.22 billion	**3.9%**	**USD 28.71 billion**

Key Drivers[4]

- Regulatory compliance to reduce carbon footprints
- Corporate commitments
- Consumer demand and awareness

Source: 1. FortuneBusinessInsights, 2. HomeCare.3. SkyQuestt 4. OGAnalysis

Diverse non-fossil-based ingredients (plant/bio-based, captured carbon utilization) are used in commercial surfactants, polymers, fragrances, and colorants, proving their viability



Plant-derived (oils, carbs, proteins, fibers)

Carbon Capture and Utilization (CCU)-based materials

Animal-derived (fats, proteins, other)

Microorganism-derived (probiotics, enzymes, fermentation products, algae)

Applications

Surfactants

Polymers

Fragrances

Color

Commercial Products (Examples)

Zybax

[Zybax Elite EcoDose] features bio-based ingredients – **Enzymes, Probiotics, Cucurbiturils, replacing petrochemical-based cleaners**

Nouryon

[Amaze xt] **has dehydroxanthan gum** from renewable plant-based sources, primarily used as a thickener, stabilizer, and film-former in personal care formulations

COTY SINCE 1904

[Coty's new fragrance] is the first to be made with **100% carbon-captured alcohol derived from recycled industrial emissions,** reducing reliance on fossil fuels

Unilever

[Unilever's Coral Optimal Color+ detergent] **utilizes purple carbon, which is captured from industrial emissions** to replace fossil-based petrochemicals

[Captured Carbon] – Fragrance; [Captured Carbon] - Color

Leading players are actively incorporating non-fossil-based ingredients by developing bio-based alternatives or utilizing sustainable sourcing and extraction

Key Players Using Non-fossil-based Ingredients

Unilever, L'ORÉAL, Colgate-Palmolive, COTY SINCE 1904, ESTĒE LAUDER, P&G, SC Johnson A family company at work for a better world, Natura &CO, HONEST, reckitt, Midea, 3M, Godrej, KAO, The Clorox Company, SYENSQO, BASF We create chemistry, Merck KGaA Darmstadt, Germany, Henkel

Recent Activities

Unilever

Unilever and the University of Nottingham are testing a project to turn waste flowers into sustainable fragrances using ultrasonication to extract essential oils.[9]

P&G

P&G patented an oil-based cleansing balm using natural waxes instead of synthetic or petroleum-based structurants.[11]

SYENSQO

Syensqo and Singapore-based enzyme engineering start-up Allozymes have signed an MoU to develop advanced biotech solutions for skincare and home care.[7]

BASF

BASF and Acies Bio are developing a fermentation platform using CO_2-derived methanol to produce fatty alcohols, a sustainable alternative for personal care products.[10]

Source: 1. IFF, 3. Inolex, 4.Sun, 5. Lemonade, 7. Partnership, 8. Startup, 9. Unilever, 10. BASF, 11. P&G

Emerging companies developing ingredients such as surfactants, polymers, and fragrances using upcycled materials, fermentation, or plant-based sources to replace petrochemicals

- **Offering:** Developed a **fermentation platform** to produce a high-performance **dry cellulose, EcoFlexy**
- **Application:** Cosmetic formulations

- **Offering:** Developed **AmphiCare**, a **biobased surfactant** derived from **upcycled organic waste**
- **Application:** Personal care products

- **Offering: Eosix**, a patented method that produces **non-toxic, sustainably sourced surfactants**
- **Application:** Cleaning and personal care product formulations

- **Offering**: Uses bio-based surfactants in products
- **Application**: Soaps and cosmetics

- **Offering:** Leveraged **upcycled coffee grounds** into sustainable ingredients
- **Application:** Cosmetic and personal care formulations

- **Offering:** Uses **fermentation to produce bio-based alternatives to palm oil**
- **Application:** Personal care and cleaning product formulations

- **Offering:** Developed a **patented process** to produce **renewable propylene glycol from glycerin**
- **Application:** Personal and home care product formulations

- **Offering:** Converts **lignin waste** (a by-product of paper production) into **small aromatic molecules**
- **Application:** Fragrance formulations

- **Offering:** Develops **plant-based preservative systems** using **bio-fermentation**, creating formulations without fossil-based solvents or additives
- **Application:** Cosmetic formulations

Source: Kaffe Bueno, NorFalk, C16 Biosciences, Ayas Renewables, Bloom, Codex, AmphiStar, Sironix Renewables , Cellugy

Non-fossil ingredient innovation offers opportunities in biotech, microbiome formulations, resource efficiency, and sustainable sourcing but requires overcoming challenges

Limited Commercialization of Biotech Ingredients[1]

01

Production costs and scaling remain challenges

Zero-Waste and Waterless Formulations[3]

02

Need to overcome consumer perception and formulation challenges

Scaling Regenerative Agriculture[3]

03

Limited due to scalability and cost factors

Underutilized Upcycling Opportunities[3]

04

More research and innovation are needed to extract valuable non-fossil materials from waste

Opportunities in Developing Non-fossil-based Ingredients

Early Stages of Microbiome-focused Formulation[2]

05

Non-fossil-based ingredients for microbial balance remain in early development

Limited Availability of Multifunctional Ingredients[3]

06

Identifying and sourcing these ingredients with the desired combination of properties can be challenging

Need for Greater Transparency and Traceability[2]

07

Still need more transparency and traceability in the supply chain of non-fossil ingredient

Hyper-Personalization by leveraging non-fossil ingredients[1]

08

Data collection, formulation complexity, production logistics

Source: 1. ExplodingTopics, 2. Maha, 3. ZeroWasteBeautyReport

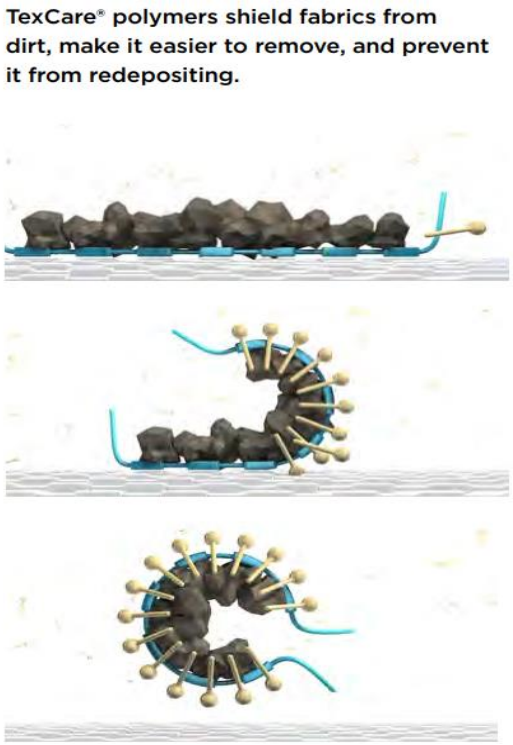
Clariant launched TexCare Gemini SG Terra, a dual-purpose soil release polymer specifically designed for liquid laundry detergents

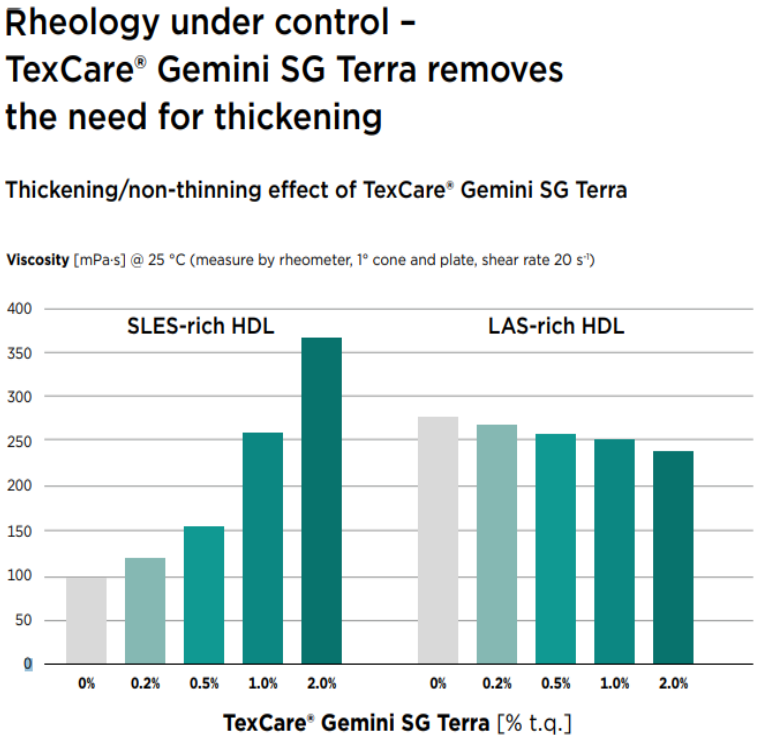
CLARIANT

- Introduced **TexCare Gemini SG Terra**, a dual-purpose soil release polymer specifically designed for liquid laundry detergents in 2023
- Offers formulators a one-product, double-function solution that helps control the rheology (viscosity) of detergents while enhancing cleaning performance

Key Points

- **Sustainability**: The polymer has a **Renewable Carbon Index** of 80%
- **Performance**: Effective for washing polyester-containing fabrics and allows for colder and shorter wash cycles, which reduces water usage and energy consumption
- Aimed to **eliminate the need for additional thickeners**, simplify formulations, and reduce costs





Source: Clariant

Clariant launched the VITA range, a collection of 100% bio-based surfactants and polyethylene glycols suitable for various applications

CLARIANT

- Global launch of **VITA range** including 100% bio-based surfactants and polyethylene glycols (PEGs) in 2022
  - Designed to address climate change by removing fossil carbon from the value chain
  - VITA range claimed to significantly reduce CO_2 emissions (up to 85%) compared to fossil counterparts
- Recent activity in India - Range was showcased by **Clariant IGL Specialty Chemicals (CISC)** at ChemExpo in 2023

Key Points

- **Bio-based Composition:** The VITA range includes surfactants and PEGs made from 100% bio-ethanol derived from sugar cane or corn, with a **Renewable Carbon Index of at least 98%**
- **Environmental Impact**: Helps save up **to 85% in CO_2 emissions** compared to traditional fossil-based alternatives
- **Versatile Applications**: Suitable for various consumer goods, including detergents and personal care products (such as shampoos)
- **Recent Activity in India -** Highlighted Clariant's commitment to expanding its presence in the Indian market and supporting local manufacturing capabilities

Source: Clariant's VITA range

CleanO2, a startup converting carbon emissions into cleaning agents, exemplifies technology that can inspire the development of sustainable cleaning products

CleanO2

- **CleanO2 Carbon Capture Technologies** is an innovative **startup** based in Calgary that focuses on reducing carbon emissions through its unique technology
- Utilizes CarbinX units to capture carbon dioxide emissions, converting it into pearl ash, a key ingredient in their premium soaps and cleaning products

Key Points

- **Carbon Capture Technology**: Developed CarbinX unit to capture carbon dioxide emissions produced by natural gas heating appliances in commercial buildings
- **Upcycling Carbon**: The captured CO_2 is converted into a non-toxic compound known as pearl ash (potassium carbonate), which is then used as a key ingredient in their line of products
- **Product Offerings:** Natural soaps

The proceeds from soap sales fund the installation of additional CarbinX units, ensuring that the captured carbon is permanently sequestered and not re-released into the atmosphere

Source: CleanO$_2$

CEPSA launched a sustainable linear alkylbenzene (LAB) for detergents

- Cepsa Química introduced **NextLab-R**, the world's first sustainable linear alkylbenzene (LAB) produced from renewable raw materials in 2023
- Claims to obtain a sustainable laundry detergent while keeping the same efficiency and outstanding performance as the fossil-based LAB but with a much lower carbon footprint

Key Points

- **Sustainable Sourcing**: Raw materials used in NextLab-R are obtained from renewable sources that do not contribute to deforestation or land use changes
- **No Fossil Inputs**: The production process for NextLab-R is designed to eliminate the need for fossil-based inputs, focusing solely on renewable raw materials
- **Mass Balance Approach**: While this method typically allows for blending fossil and renewable materials, NextLab-R specifically utilizes sustainable ingredients throughout its production while ensuring traceability throughout the manufacturing process
  - Projected to achieve a **25-35% reduction in CO2 emissions** compared to traditional fossil-based linear alkylbenzene (LAB)
  - When incorporated into final detergent formulations, the overall reduction in **GHG emissions could reach up to 10%**

Source: Cepsa

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