

The Lubricants Industry Outlook

Key Sustainability Trends Ahead

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Lubricants constitute an essential element of the industrial sector and everyday operations. They play a critical role in automotive systems and are integral to the machinery across various sectors, including construction, metalworking, shipbuilding, power generation, metallurgy, and mining. Ensuring precise and efficient lubrication is paramount to maintaining optimal operational performance while mitigating wear and tear. Moreover, optimal lubrication contributes to extending the lifespan of machinery, thereby minimizing the frequency of maintenance interventions and repair costs.

As the global economy evolves, the demand for high-performance lubricants continues to grow, driven by advancements in technology, stringent environmental regulations, and the shift toward sustainable solutions. The market for lubricants is projected to expand, with increasing adoption of synthetic and bio-based lubricants contributing to market growth. According to the **'Global Lubricants Market'** report published by

The Insight Partners, the global lubricants market is expected to reach US\$ 230 billion by 2031. Increasing vehicle ownership and rapid industrial growth in emerging economies are expected to drive growth. Major growth during the forecast period is expected from countries such as China, India, Brazil, and Saudi Arabia. Increasing investments in the industrial sector and the focus on expanding manufacturing capabilities will fuel the consumption of lubricants, particularly from the industrial sector.

A diverse array of lubricants is utilized across industries, including engine oils, greases, hydraulic fluids, metalworking fluids, industrial oils, driveline lubricants, compressor oils, gear oils, turbine oils, and transmission fluids. These lubricants primarily consist of a base oil combined with specialized additives, while greases incorporate base oils, additives, and thickeners. The differentiation of these lubricants largely hinges on the specific type of base oil used. Base oils are classified into three principal categories, as outlined below:



Synthetic

The synthetic base oils are made using Polyalphaolefins (PAO), Polyalkylene Glycol (PAG), or fluorinated hydrocarbons. They are completely man-made and fall under the Group 4 and 5 categories defined by the American Petroleum Institute (API).



Mineral

Mineral base oils are paraffinic, naphthenic, or aromatic and are refined from crude oil. Currently, they are the most commonly used base oil and cost less than the other types of base oil. They fall under the Group 1, 2, and 3 categories the American Petroleum Institute (API) defines.



Bio-based

Bio-based base oils are derived from renewable resources such as vegetable oil or animal fats. These base oils are biodegradable and are much more environmentally friendly than synthetic or mineral base oils. However, they are quite expensive as compared to their counterparts and fall under Group 5 of the base oil category.

Despite the critical role of lubricants in maintaining the efficiency and longevity of industrial machinery, improper disposal can lead to significant environmental hazards. Nearly 50% of all lubricants used in vehicles ultimately contaminate land or water bodies. It is estimated that just 1 kg of acids present in mineral oils can pollute up to 1 million liters of drinking water. The table below illustrates the emission values of conventional engine oils, along with coconut and palm oils utilized as alternative lubricants:

	Engine Oil	Coconut Oil	Palm Oil
Hydrocarbons - HC (ppm)	104	99	102
CO (%)	0.92	0.67	0.73
CO ₂ (%)	4.5	2.9	3.4
O ₂ (%)	14.02	15.82	15.66
Nitric Oxide - NO (ppm)	12	11	14

Source: The Insight Partners Analysis

These stats show a reduction in hydrocarbons, carbon monoxide, and carbon dioxide, thereby highlighting the importance of looking for sustainable alternatives to synthetic and mineral oil-based lubricants.

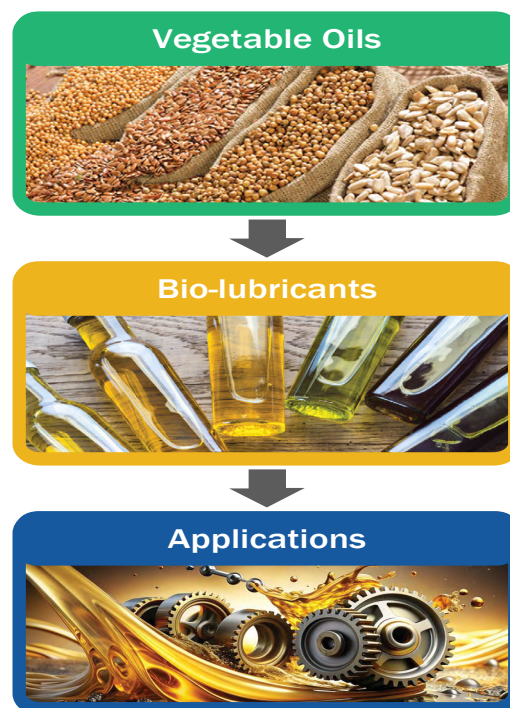
The growing emphasis on sustainability has compelled lubricant manufacturers to integrate bio-based base oils into their formulations, alongside developing

products that comply with global regulatory standards. Additionally, re-refining has gained significant traction within the industry, with numerous leading players committing to incorporating re-refined base oils into their product lines, thereby enhancing environmental responsibility and aligning with circular economy principles.



Biolubricants: The Emerging Segment Within the Lubricants Market

Lubricants derived using bio-based base oils have gained significant popularity in recent years. Currently, North America and Europe lead in the utilization of bio-based base oils, a trend largely driven by stringent regulations and a strong emphasis on sustainable practices within the industrial sector. In Europe, the implementation of rigorous legislative frameworks, alongside mandatory procurement mandates and eco-labeling programs such as the European Eco-label (EEL), has significantly facilitated the widespread adoption of biolubricants. These initiatives underscore a broader commitment to environmental responsibility and regulatory compliance. European standard EN 16807 sets the criteria for biolubricants. The European Commission's EU Ecolabel specified a minimum bio-based carbon content of 25% for lubricants using the terms "bio-based" or "biolubricant." The bio-based carbon content is measured according to EN 16807, ASTM D6866, CEN/TS 16137 (SPEC 91236), EN 16640 or EN 16785-1. In Germany, the Blue Angel label sets the standards for eco-friendly products. The US government's BioPreferred label identifies bio-based products and mandates that the product should contain at least 25% bio-based content to achieve the BioPreferred label on the packaging of their products. Along with this, mandatory purchasing requirements for government agencies and contractors have also fueled the adoption of biolubricants in the US.



As per The Insight Partners' analysis, the Global Lubricants Market for the bio-based base oil segment stood at US\$ 6.5 billion in 2024 and is expected to register a CAGR of over 5% from 2025 to 2031. The bio-based base oil segment is anticipated to be the fastest-growing, outpacing the growth of mineral oil- and synthetic oil-based lubricants. The surge in demand can be attributed to heightened concerns regarding climate change and the imperative to mitigate emissions within the industrial sector, driving a shift toward lubricants derived from renewable resources. Countries have begun adopting biolubricants owing to their commitment to international initiatives such as United Nation's Sustainable Development Goals and the Paris Climate Agreement.

Major Players Operating in the Global Biolubricants Market

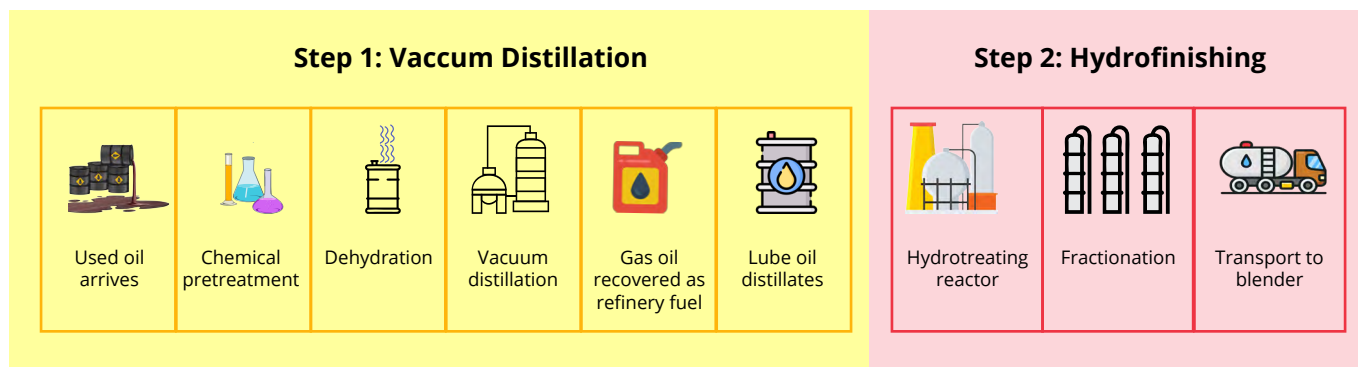


Source: The Insight Partners Analysis

Re-Refining of Used Base Oils: A Step Toward Sustainability and Circular Economy

Used oils can be collected and re-refined, restoring them to a high-quality base oil suitable for reuse. Following usage, lubricants experience additive depletion and an increase in viscosity, resulting in thickening. Nevertheless, a substantial proportion of the base oil remains in relatively good condition and can be reprocessed for

future use. The re-refining process involves several key steps, including chemical pretreatment, dehydration, vacuum distillation, hydrotreatment, and fractionation, which collectively ensure the regeneration of the oil to meet industry standards for performance and quality.



Following re-refining, approximately 80% of the original base stock is recovered, which can then undergo additional blending and refining processes to incorporate additives and produce finished lubricants. Re-refined base oils offer a sustainable solution to better utilize the substantial quantities of used lubricants that are typically discarded in landfills or incinerated. The application of one liter of re-refined base oil can effectively replace the equivalent volume of virgin oil in both automotive and industrial sectors. Under similar operational conditions, utilizing re-refined base oil instead of virgin oil can result in a significant reduction of approximately 50% in emissions.

As per the 'Global Re-Refined Paraffinic Base Oils Market' report, published by The Insight Partners, the market surpassed US\$ 2 billion in 2024 and is expected to register a CAGR of around 6% between 2025 and 2031. Regulations and initiatives by governments have been the major driving force fueling the growth of re-refining of base oils across the globe. Geographically, Europe and Asia Pacific collectively account for 60% of the global market. Below is a list of regulations that have facilitated the advancement of re-refining practices for base oils:

Europe's green deal launched in 2019, includes a set of policy initiatives aimed at making Europe climate neutral by 2050. The Circular Economy Action Plan legislation includes a Sustainable Products Policy that mandates the inclusion of recycled content in products to reduce environmental footprints.

In 2020, Turkey mandated the recycling of lubricants and set collection targets for the companies operating in the country

In 2022, China updated the regulations T/CNRRRA 0901 and national standard GB/T 17145, which mandated all waste oil to be collected and treated by licensed companies

In 2023, India broadened the scope of its Extended Producer Responsibility (EPR) scheme to include used oil. Implemented in 2024, this regulation mandates that 10% of all base oil used within the country—whether domestically produced or imported—must be derived from re-refined base oil. This 10% threshold is set to increase annually, with the target reaching 60% by 2029.

Recent Developments by Manufacturers in Re-Refined Base Oil:

Company		Development
	TotalEnergies SE	TotalEnergies SE acquired Tecoil, a Finnish company specializing in the production of re-refined base oils (RRBOs). This acquisition enables TotalEnergies SE to strengthen its circular economy network by collecting used lubricants in Europe and supplying them to its plant.
	ExxonMobil	ExxonMobil commissioned a re-refined base stocks project in Europe as part of an initiative to promote circularity within the lubricants industry.
	GFL Environmental Inc.	GFL Environmental Inc. announced that it has entered into a definitive agreement to sell its Environmental Services business for an enterprise value of US\$ 8.0 billion. The transaction allows GFL Environmental Inc. to monetize the Environmental Services business tax efficiently.
	Clean Harbors Inc.	Clean Harbors Inc., through its global lubricant brand Castrol, announced the launch of Castrol MoreCircular, designed to reduce the carbon footprint of business lubricants in the US. Castrol MoreCircular encompasses collecting used oil from business customers, refining it, and integrating re-refined base oil into premium lubricants for businesses to supply.
	Clean Harbors Inc.	Clean Harbors Inc. unveiled KLEEN+, a new family of base oil grades aimed at redefining the market and lowering the environmental impact of automotive and industrial lubricants by reducing their carbon footprint.
	ExxonMobil	ExxonMobil, through its subsidiary Esso SAF, announced an initiative to produce re-refined base oils at its refinery in Gravenchon, France.
	Neste	Neste introduced Neste ReNew™ lubricant product family in Finland, Sweden, the Baltic countries, and Poland during the first quarter of 2023. The new lubricants are produced with renewable or re-refined base oils and high-quality additives.

Source: The Insight Partners Analysis





End-User Insights: Adoption Trends and Challenges for Bio-Based and Re-Refined Oil Lubricants

Although numerous manufacturers have made substantial investments in research and development as well as re-refining capabilities, the adoption by end-user sectors remains crucial for the growth of sustainable lubricants. At present, some resistance persists among

lubricant consumers regarding the shift from traditional lubricants to sustainable alternatives. A key barrier to adoption is cost, as bio-lubricants tend to be priced higher than their conventional counterparts, limiting their widespread acceptance among end users.

Below are a few applications of different types of biolubricants derived from vegetable oils:

	Vegetable Oil	Major Applications	
	Canola Oil	Hydraulic oils, tractor transmission fluids, and metalworking fluids	
	Coconut Oil	Gas engine oils	
	Palm Oil	Grease and rolling lubricant	
	Rapeseed Oil	Air compressor-farm equipment and chain saw bar lubricant	
	Soybean Oil	Hydraulic oil	
	Castor Oil	Gear lubricants and greases	
	Jobba Oil	Hydraulic fluid	
	Sunflower Oil	Grease	
	Cuphea Oil	Motor oil	
	Tallow Oil	Lubricants	
	Olive Oil	Automotive lubricants	

Source: *The Insight Partners Analysis*

As the US government has mandated all federal government contractors to purchase bio-based products, several leading manufacturers have started using biolubricants. For example, SKF Group, a leading manufacturer of seals and bearings, developed a range of biolubricants for its bearings. Another example is Interface Inc., a construction company that provides modular flooring solutions announced the switch to biolubricants derived from vegetable oils in its manufacturing as part of its mission to become a negative carbon enterprise by 2040.

Several companies that switched from traditional lubricants to biolubricants have observed a 40% reduction in emissions with 20% energy savings. Industries such as agriculture and forestry, and the food industry have greatly benefited from the use of biolubricants. Agriculture and forestry sectors have been able to keep their operations safe due to the low impact of the general spills that occur during operations. The food industry has benefited from not only the reduced emissions and energy savings from switching to biolubricants, but also from avoiding petroleum contamination of the food products.

Way Forward

Transitioning to bio-lubricants has proven to offer substantial long-term benefits. With a growing emphasis on sustainability and an increasing number of consumers making environmentally conscious purchasing choices, the 'eco-friendly' designation has become a pivotal factor influencing decision-making. Lubricants are integral to enhancing a company's sustainability efforts, and a variety of factors are anticipated to drive higher adoption rates in the future, including:

Regulations:

As governments across the world implement stringent regulations on promoting sustainability to mitigate the impacts of climate change and conserve natural resources, biolubricants can help companies operate within the regulatory framework and avoid hefty penalties and other legal repercussions.

Collaborative efforts:

Switching from traditional lubricants to biolubricants comes with challenges that can be tackled with effective collaboration among the players across the entire value chain.

Research and Developmen

With advancements in technology, extensive goal-oriented research is expected to help make biolubricants more efficient and economically viable for end users.

To explore more details about the market, visit

<https://www.theinsightpartners.com/reports/lubricants-market>

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