Resource Efficiency and Circular Economy Industry Coalition

FICCI | Centre for SUSTAINABILITY LEADERSHIP

ADVANCING INDIA'S SELF-RELIANCE:
ENHANCING CIRCULARITY IN USED OIL MANAGEMENT



Knowledge Partner

Deloitte.

TABLE OF CONTENTS

Foreword - Secretary MOEF&CC, GoI

Preface - Chair, RECEIC 1

Preface - Chair, Used Oil Working Group 3

Preface - Deloitte India 5

1 Executive summary 7

2 Introduction 11

3 As-Is assessment of the Indian used oil ecosystem 15

4 Systemic barriers in India's used oil ecosystem 21

5 Global leading practices in used oil management 31

6 Strategic recommendations for a sustainable used oil ecosystem 39

7 Strategic roadmap for implementation 47

8 Appendix 53

9 References 63

10 Acknowledgements 66

तन्मय कुमार
TANMAY KUMAR

सत्यमेव जयते

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GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST
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MESSAGE

India's rapid economic growth and urban expansion have underscored the urgent need to reimagine waste management. As our nation grapples with mounting resource needs, transitioning to a circular economy is imperative not only to conserve our valuable resources and reduce environmental degradation but also to drive industrial innovation and economic efficiency.

In our pursuit of sustainability, the launch of the Resource Efficiency and Circular Economy Industry Coalition (RECEIC) during India's G20 Presidency marks a transformative milestone. RECEIC unites 54 global companies and leading industry stakeholders to champion resource efficiency and embed circular practices across value chains. This collaborative platform is already paving the way for innovative approaches to resource management and is a testament to India's commitment towards shaping a sustainable future.

Central to our transformative journey is the implementation of the Extended Producer Responsibility (EPR) framework. By mandating that producers take responsibility for the entire lifecycle of their products, EPR has redefined waste management in India. This framework has already catalyzed critical interventions in sectors such as plastics, batteries, vehicle scrap, steel scrap, and e-waste. Notably, the recent introduction of the used oil EPR rules marks a significant stride in formalizing and streamlining the management of used oil. These rules are designed to curb the diversion of used oil into informal channels, reduce environmental pollution, and promote the recovery of high-quality re-refined base oil.

This position paper offers a phased roadmap for enhancing collection networks, advance re-refining capacities, and for integrating the unorganized sector. The recommendations here are more than just regulatory requirements; they are meant to inspire a collective transformation across the industry that supports our national environmental and climate goals.

I extend my sincere appreciation to RECEIC and all the organizations whose diligent efforts have contributed to the finalisation of this document. Their insights and collaborative spirit are instrumental in steering India towards a cleaner, greener future. I am confident that the strategies and recommendations set forth herein will serve as a catalyst for transformative changes towards ensuring that India's used oil-recycling ecosystem becomes a benchmark for sustainability and innovation.

(Tanmay Kumar)

Place: New Delhi
Dated: April 2, 2025

इंदिरा पर्यावरण भवन, जोर बाग रोड़, नई दिल्ली-110 003 फोन : (011)-2081-9408, 2081-9308
INDIRA PARYAVARAN BHAWAN, JOR BAGH ROAD, NEW DELHI-110 003, PH. : 011-2081-9408, 2081-9308
E-mail : secy-moef@nic.in, Website : moef.gov.in

Preface- Chair, Resource Efficiency and Circular Economy Industry Coalition (RECEIC)



As our nation confronts pressing environmental challenges and an ever-growing demand for sustainable practices, the Resource Efficiency and Circular Economy Industry Coalition (RECEIC) is dedicated to reimagining resource management. By uniting visionary leaders, forward-thinking industry pioneers, innovators and policymakers, RECEIC cultivates a framework where resource efficiency becomes integral to every stage of production and innovation. We are confident that by advancing circular strategies, we can unlock untapped potential and drive transformative change across diverse sectors.

At RECEIC, our efforts extend well beyond conventional boundaries. We strive to create an integrated platform that encourages collaboration, promotes strategic policy reforms and champions innovative approaches to resource recovery. This proactive stance is critical as we address complex challenges and seize opportunities that propel us towards a resilient and sustainable future.

This thought paper on India's used oil recycling ecosystem reflects our commitment to sustainable transformation. It outlines strategic pathways for transforming used oil management, turning a largely untapped resource into a critical asset for environmental stewardship and industrial innovation. The insights provided here are meant to spark informed dialogue and inspire action that will lead to a more sustainable future.

I extend my heartfelt thanks to all the experts, partners and dedicated teams whose valuable contributions have shaped this initiative. I am confident that the ideas presented herein will inspire transformative change and help us collectively advance our mission towards a circular, resource-efficient future.

Mr. Manish Sharma

Chair, RECEIC & Chairman,
Panasonic Life Solutions India and South Asia

Preface- Chair, Used Oil Working Group



The transition toward a circular economy is imperative for achieving sustainable development, particularly in resource-intensive sectors. Among these, the management of used oil presents both a significant environmental challenge and an economic opportunity. In India, where industrialization and vehicular growth have led to an increasing consumption of lubricating oils, addressing the lifecycle of used oil through circularity is crucial.

India's used oil ecosystem has long been marked by fragmentation and informal practices, leading to significant losses due to inefficient processes and improper disposal. In response, the Used Oil Working Group was established under the Resource Efficiency and Circular Economy Industry Coalition (RECEIC) to drive a focused and collaborative effort toward transforming the country's used oil recycling ecosystem.

The Working Group brings together industry experts and stakeholders, with dedicated sub-groups addressing key areas, including the collection ecosystem, re-refining technology and infrastructure, quality and performance of re-refined base oil, financial viability and pricing, as well as policy guidelines and public awareness.

This position paper represents the collective insights of the Working Group, providing a comprehensive examination of the entire lifecycle of used oil—from its generation in industrial and automotive sectors to its collection, re-refining, and conversion into lubricating oils. Our analysis highlights significant opportunities to optimize operations, enhance infrastructure, and strengthen policy measures. By implementing these improvements, the sector can more effectively meet rising Extended Producer Responsibility (EPR) targets, reduce reliance on imported virgin oil, and mitigate environmental impacts.

I extend my sincere gratitude to all the Working Group members and industry partners whose expertise and commitment have been instrumental in shaping this position paper. I am hopeful that the innovative strategies and practical recommendations outlined here will serve as a catalyst for meaningful change, ushering in a new era of sustainable and efficient used oil management in India.

The RECEIC Working Group remains committed to addressing the challenges and recommendations presented in this paper and will continue driving on-the-ground action through pilot initiatives and collaborative efforts with the support of all its members.

Mr. CH Srinivas

Chair, Used Oil Working Group
Executive Director, Lubes,
Hindustan Petroleum Corporation Limited (HPCL)

Preface- Deloitte India



Mr. Viral Thakker

Leader, Sustainability and Climate, Deloitte South Asia



Mr. Ashwin Jacob

Industry Leader, Energy, Resources & Industrials, Deloitte South Asia; Leader, Monitor Deloitte South Asia

India is at a critical crossroads in its pursuit of sustainable growth and environmental stewardship. In a nation where traditional resource management models are proving increasingly unsustainable, transitioning to a circular economy is both an environmental imperative and a strategic necessity. As the Knowledge Partner, Deloitte is proud to support this transformative effort aimed at optimising India's used oil recycling ecosystem, reinforcing the country's commitment to resource efficiency and economic resilience.

This thought paper analyses the lifecycle of used oil in India—from its generation in the industrial and automotive sectors to its conversion into Re-Refined Base Oil (RRBO) for producing lubricating oils. Notably, the re-refining process is remarkably efficient, one gallon (~3.8 litres) of used oil can yield nearly 2.5 quarts (~2.4 litres) of lubricating oil. In contrast, producing the same 2.4 litres through conventional refining from crude oil requires processing roughly 42 gallons (~159 litres) of crude oil.[2] This stark difference not only highlights the significant resource and energy savings achievable through re-refining but also underscores the lost potential when used oil is diverted to less efficient end-uses or improper disposal. Enhancing re-refining practices presents a substantial opportunity to reduce dependence on virgin crude oil, optimise resource utilisation and lower environmental impact across India.

At the heart of this transformation is the Extended Producer Responsibility (EPR) framework. The Indian government has established comprehensive EPR rules, effective from FY25, mandating progressively increasing recycling targets—from 5 percent in FY25 to 50 percent by FY31.[1] This phased approach is expected to drive the EPR certificates requirement from approximately 0.08–0.09 MMT in the initial phase to nearly 0.85–1.00 MMT by FY31, according to Deloitte's in-depth analysis which uses the Indian lubricant market consumption insights from the Used Oil Working Group members. By FY31, adherence to the EPR plan could lead to an estimated annual reduction of ~1.5 MMT of greenhouse gas emissions. To put this into perspective, this environmental benefit is roughly equivalent to the annual carbon absorption by ~60 million trees, considering an average mature tree absorbs ~25 kg of CO_2 annually.[3]

However, achieving these ambitious targets requires overcoming significant challenges within India's used oil recycling ecosystem which include inefficient collection and limited advanced re-refining capacities. The EPR framework's reliance on certificate-based compliance, without encouraging the use of RRBO, further limits investment in advanced re-refining technologies. Additionally, the adoption of RRBO is lagging due to its higher costs and performance concerns relative to virgin base oil.

The recommendations outlined in this paper are designed to drive the transformation of the used oil ecosystem in India by overcoming these challenges through a comprehensive approach. Key interventions include the development of robust collection networks, a significant expansion of re-refining capacities and the seamless integration of both organised and unorganised sectors into a unified, transparent system. Together, these measures form a strategic roadmap that not only supports environmental sustainability but also enhances economic resilience by optimising resource utilisation and reducing energy consumption.

We sincerely thank FICCI and all the organisations contributing to this report for their invaluable insights and collaboration in shaping this forward-looking vision for India's used oil recycling sector.

1 Executive summary



India's used oil recycling ecosystem is at an important juncture. Used oil—oil degraded by contaminants during use—can be re-refined to produce high-quality lubricants, offering significant environmental and economic benefits. However, despite its potential to reduce crude oil dependence, energy consumption and greenhouse gas emissions, the current system in India remains fragmented and largely informal. Inefficient collection and processing practices are currently leading to widespread environmental risks and lost opportunities for value recovery. In response, the government has introduced the EPR framework, which mandates that producers recycle an increasing percentage of net used oil—from 5 percent in FY25 to 50 percent by FY31.[1] This phased approach will increase the EPR certificate requirement from approximately 0.08–0.09 MMT in the early phase to about 0.85–1.00 MMT by FY31, according to Deloitte's analysis. This analysis uses the Indian lubricant market consumption insights from the Used Oil Working Group members and corroborative secondary sources. To achieve these targets and transform the used oil recycling landscape, it is essential to resolve the existing challenges ranging from inefficient collection to limited advanced processing capacities. This will help reshape India's used oil ecosystem and reduce dependence on imports of virgin oil. Figure 1.1 shows the lifecycle of used oil.

UNDERSTANDING THE CURRENT CHALLENGES & GLOBAL BENCHMARKS

The current landscape is characterised by a disjointed supply chain involving multiple actors—generators, collectors and aggregators, re-refiners and lubricant producers—whose interactions are marred by under-reporting, cash-based transactions and diversion of used oil into unauthorised channels. These inefficiencies are compounded by inadequate segregation practices, manual tracking systems and limited advanced re-refining capacities that result in the production of RRBO that does not meet quality standards. This systemic fragmentation not only elevates costs and regulatory challenges but also impedes the sustainable management of used oil, posing serious environmental and public health risks.

Global leading practices provide valuable insights for transforming India's used oil management. Countries such as South Korea, Italy, Canada and France have successfully implemented centralised legislative frameworks and established dedicated Producer Responsibility Organisations to oversee collection, quality control and recycling. Financial mechanisms such as fee-based financing and digital tracking systems have enhanced transparency and accountability, resulting in improved recovery rates and operational efficiency. These international models underscore the need for India to adopt a tailored approach that formalises the collection ecosystem, incentivises investments in advanced re-refining technologies and encourages voluntary RRBO inclusion in lubricant formulations. This helps create a robust, market-driven recycling ecosystem.

INTEGRATED STRATEGIC ROADMAP FOR TRANSFORMATION

A strategic roadmap is essential to transition from current inefficiencies to a sustainable future. Immediate actions for the short term (up to FY26) include establishing a National Used Oil Management Association to serve as the central governance body, mandating digital registration for bulk generators and deploying a robust track-and-trace system to ensure transparency. Additionally, audits of existing recyclers and the creation of a tiered collection network will help streamline operations and integrate financial incentives. Furthermore, a concerted push to encourage the voluntary inclusion of RRBO in lubricant formulations—through proactive engagement with industry

stakeholders—can stimulate market demand and foster sustainable practices.

Medium-term initiatives (FY27–FY28) should focus on expanding the formal collection framework to include the unorganised sector, using digital platforms for self-registration and building capacity through awareness and training programmes. In addition, financial support for technology upgrades and regional testing facilities are critical to enhancing re-refining capacities and ensuring product quality. Complementary efforts to enforce stricter segregation protocols at generation and collection points, sensitising the entire ecosystem and offering taxation incentives will help drive market acceptance and foster a competitive environment for RRBO-based products.

Long-term measures (FY29 onwards) will involve systemic regulatory reforms and significant infrastructure investments. These include establishing demonstration facilities for advanced re-refining technologies, providing enhanced incentives for high-grade RRBO production and continuing capacity building for formalising collection from the unorganised sector.

Through a phased, integrated approach that combines regulatory reform, technology upgrades and the formalisation of the supply chain, India can transform its used oil recycling ecosystem. By aligning domestic policies with proven international practices, the proposed roadmap aims to secure a sustainable future. This includes reducing environmental risks and ensuring a reliable supply of re-refined lubricants that support the nation's broader energy and climate goals.

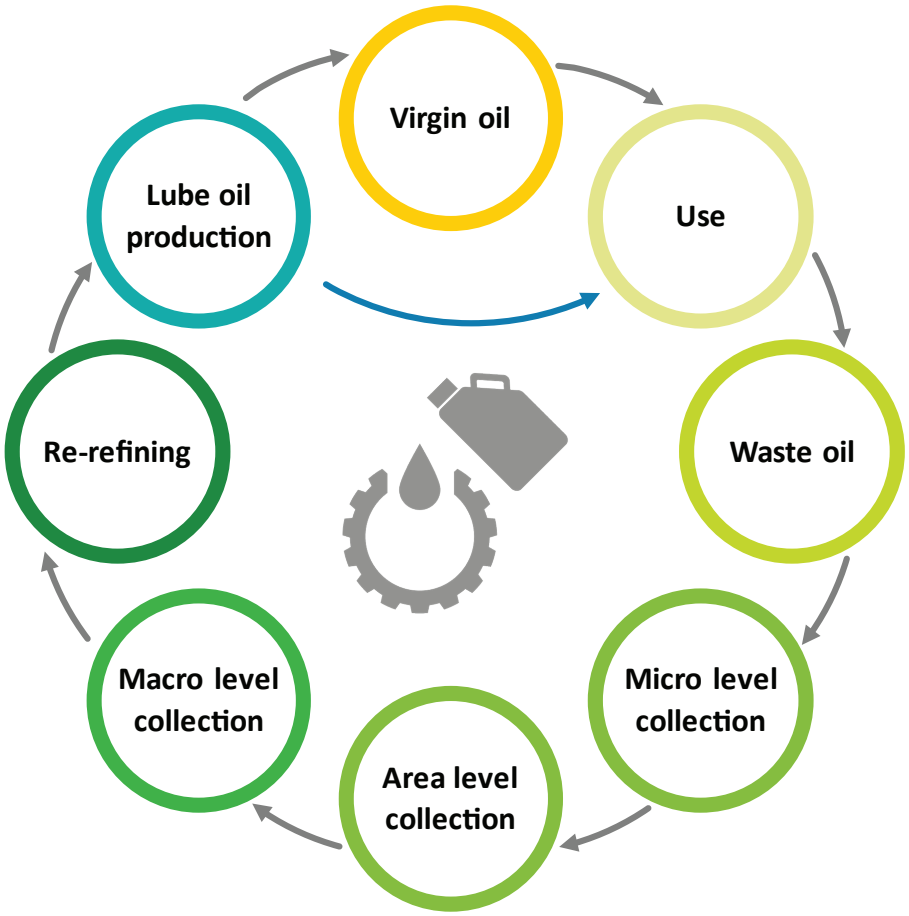
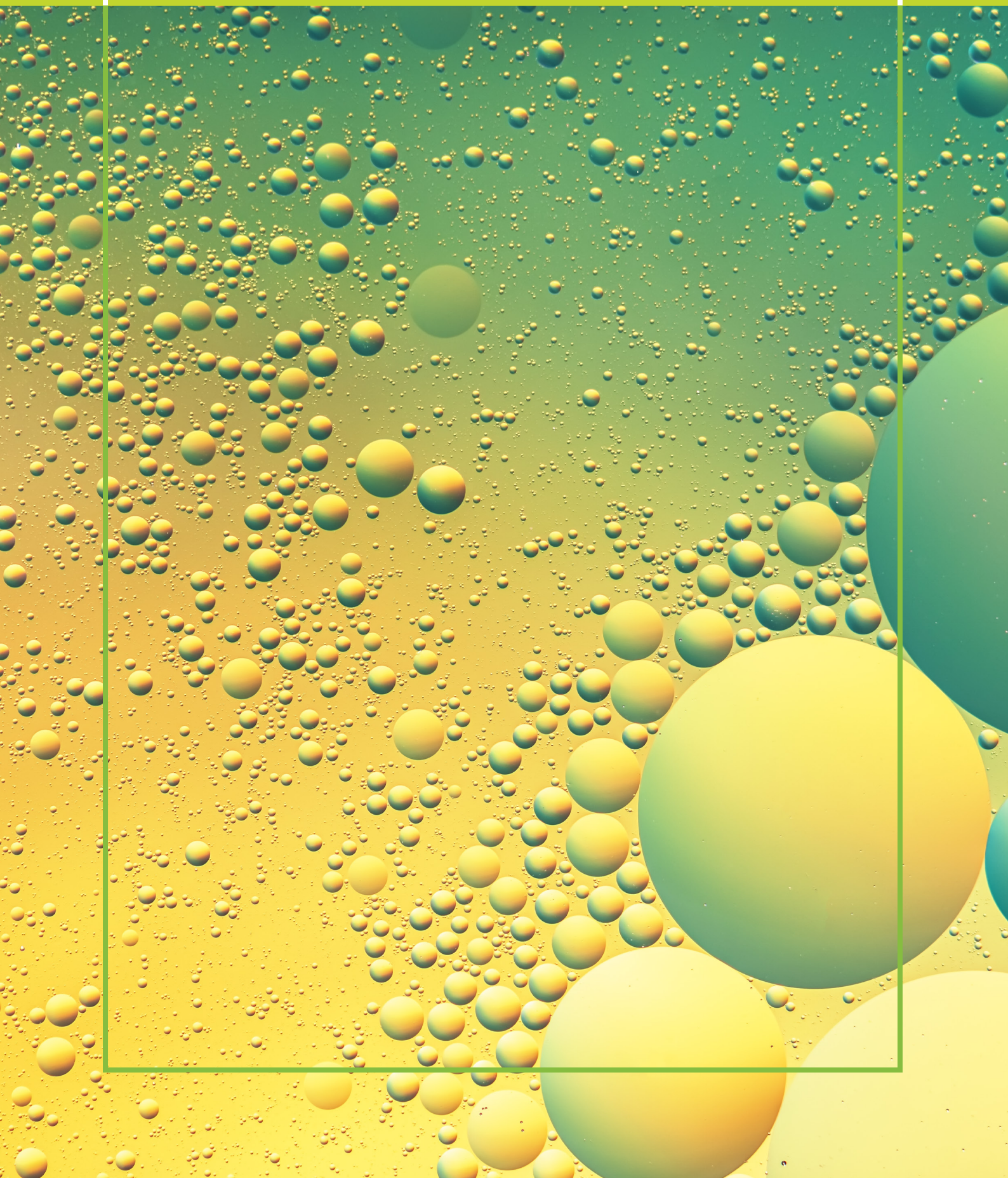


Figure 1.1: Used oil cycle [4]

2 Introduction



Used oil refers to any petroleum-based or synthetic oil that has been used and, as a result, has accumulated physical or chemical impurities, rendering it unsuitable for its original purpose.[1] During its use, contaminants such as dirt, metal shavings or chemicals can mix with the oil, reducing its effectiveness.[2] However, used oil can be recycled, offering significant environmental and economic benefits. Figure 2.1 shows the physical appearance of used oil and unused oil.[4]



Figure 2.1: Used oil versus unused oil[4]

Used oil can be recycled through several methods, including re-refining, reconditioning and processing for energy recovery. The most sustainable method, i.e., re-refining, removes impurities and restores the oil to a quality comparable to virgin base oil. This process significantly reduces the demand for crude oil extraction and lowers environmental impact. Other recycling methods include inserting used oil into petroleum refineries as feedstock or processing it into fuel for industrial operations.[5] Recycling used oil helps conserve resources, reduce pollution and minimise reliance on crude oil-based products.

Recycling used oil represents one of the most effective ways to address environmental concerns and create a sustainable loop in resource management. Globally, the recycling of used oil has environmental, economic and energy-saving benefits. Proper recycling reduces pollution, preserves natural resources and offers industrial cost savings. For instance, since base oils make up ~90 percent[4] of lubricants, their reuse reduces the need to produce virgin base oil. Other key benefits of recycling used oil include

- **Environmental protection** Proper recycling of used oil mitigates soil and water contamination, reducing risks to ecosystems, wildlife and public health. Improper disposal can result in severe environmental hazards, including groundwater pollution and toxic emissions.
- **Resource conservation** Used oil primarily consists of base oil, which can be recovered and re-refined into high-quality lubricants. Recycling reduces dependence on virgin oil extraction.

One gallon (~3.8 litres) of used oil can yield 2.5 quarts (~2.4 litres) of new lubricating oil, whereas producing the same quantity from crude oil requires 42 gallons (~159 litres) of crude oil.[2]

- **Energy efficiency** Re-refining used oil consumes approximately one-third of the energy required to refine crude oil into lubricant-grade products.[5] This results in substantial energy savings and a lower carbon footprint for the oil industry.
- **Reduction in greenhouse gas emissions** The use of re-refined base oils in lubricants contributes to lower Greenhouse Gas (GHG) emissions. Research indicates that every litre of lubricant produced from re-refined oil can reduce GHG emissions by approximately 2 kg.[6]

Re-refining ~10 percent of India's total lubricants could save ~1 MMT of GHG emissions annually, per Deloitte's analysis.

- **Reduction in foreign exchange expenditure** Approximately 60-80 percent of the base oil requirement in India is imported, underscoring the country's reliance on foreign sources.[7] By recycling used oil, India can reduce this dependency, thereby cutting down on foreign exchange expenditure and strengthening economic stability.

[1] Refer to Appendix B for detailed definition of used oil per Central Pollution Control Board (CPCB), India

The economic and environmental potential of used oil recycling is undeniable, yet its global implementation is far from ideal. Currently, only ~13 million tonnes of used oil is collected annually out of the ~40 million tonnes of lubricants consumed globally.[8]

In developed economies such as Canada, the United States and Western Europe, strong regulatory frameworks and efficient collection systems have enabled higher collection rates. Some of these nations also mandate re-refining, minimising the diversion of used oil into alternative applications such as burning for fuel. For instance, in Italy, the National Consortium for the Management of Used Oils (CONOU) ensures that nearly 98 percent of collected used oil is re-refined, leaving only 2 percent for combustion.[9][10] These comprehensive approaches highlight the potential of regulatory and financial incentives in fostering a circular economy.

In contrast, India faces challenges in managing and recycling its used oil. Despite being one of the largest consumers of lubricants, formal collection and recycling systems remain inadequate. The bulk of the used oil is diverted into informal and often environmentally detrimental uses, such as adulterating fuel. This situation emphasizes the urgent need for a structured, sustainable approach to used oil waste management.

A promising solution to these challenges is the emerging EPR. As defined by the Central Pollution Control Board (CPCB) of India, EPR mandates that producers remain accountable for the environmentally sound management of their products throughout their lifecycle—including the post-consumer stage.[11]

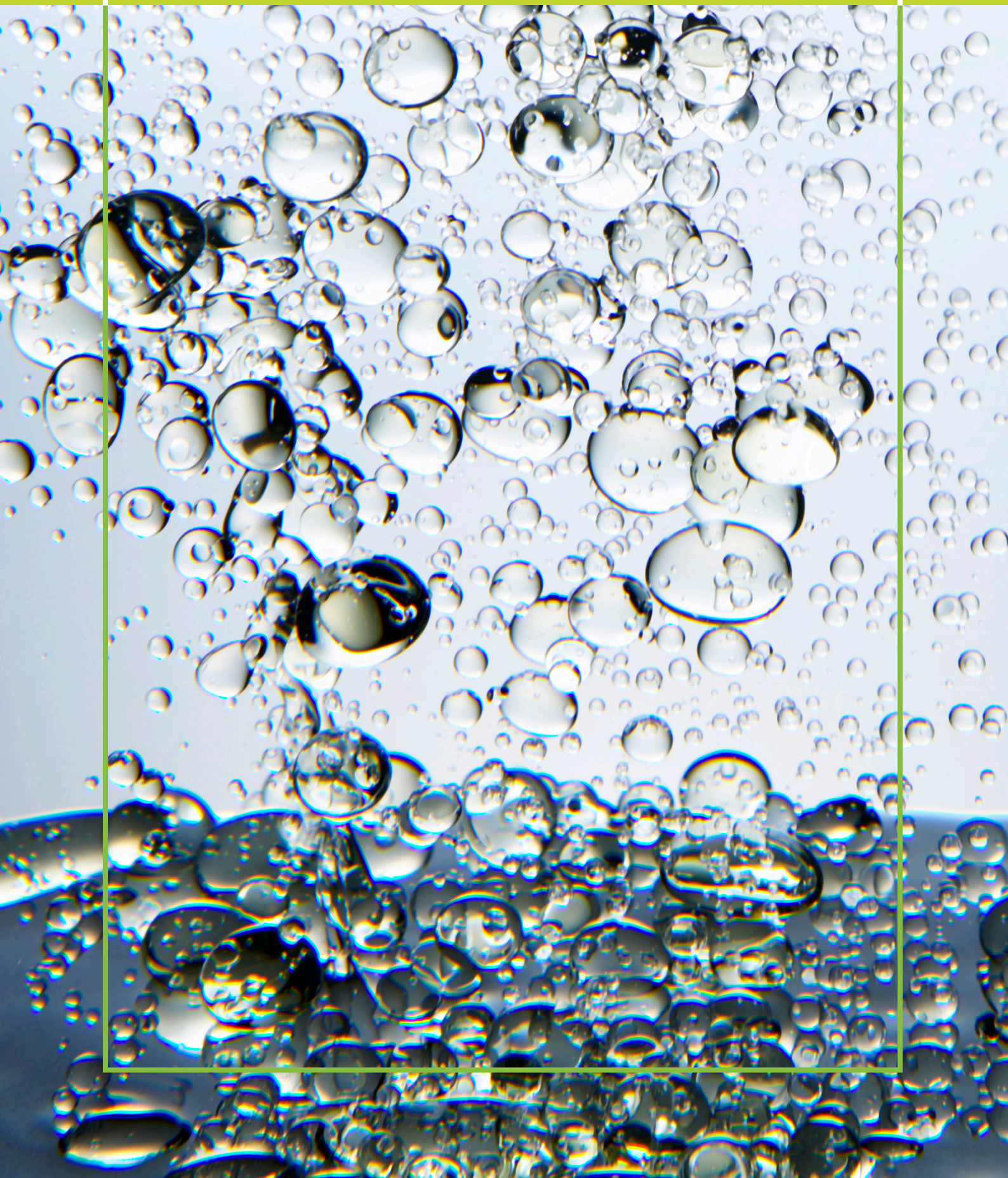
Under an EPR framework, producers generate funding that supports the collection, sorting and recycling of waste products while also creating a rich database of information on production, waste generation and treatment. This data-driven approach helps formulate targeted policies and optimise recycling processes over time.

Recognising the potential of EPR to transform the used oil recycling landscape, the Indian government has released comprehensive EPR rules that will mandate compliance from FY25. Under these rules, producers of base oil or lubrication oil are mandated to meet gradually increasing recycling targets, from 5 percent of the oil sold or imported in FY23 for FY25 to 50 percent FY31 onwards.[1] This framework is poised to streamline used oil management while reducing the environmental and economic risks associated with its improper handling.

Against this backdrop, this thought paper analyses the used oil recycling landscape in India while uncovering the barriers to its success. The paper also examines the existing industry structure and identifies the critical structural and operational challenges that impede the efficiency and scalability of the used oil recycling supply chain in India. It further highlights global leading practices—drawing from legally mandated frameworks and industry-driven initiatives—that have optimised recycling processes elsewhere. Finally, the paper presents forward-looking strategic recommendations and a roadmap aimed at reshaping India's used oil ecosystem and ensuring the country is well-equipped to meet the rising EPR targets while reducing dependence on imported virgin oil.



3 As-Is assessment of the Indian used oil ecosystem



This section presents key strategic insights guiding the Indian used oil industry, derived from Deloitte's analysis. This analysis uses the Indian lubricant market consumption insights from the Used Oil Working Group members and corroborative secondary sources. The projections for EPR certificate requirements, re-refining capacity, RRBO production (including G2 RRBO) and the used oil volumes from both organised and unorganised sectors are pivotal outcomes of this analysis, which will provide a clear foundation for the discussion that follows.

CURRENT REGULATORY LANDSCAPE

Used oil is classified as a recyclable hazardous waste and regulated under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules 2016), which outlines specifications of used oil suitable for recycling under Schedule V– Part A and fuel derived from waste oil under Schedule V– Part B.[12]

Building on this framework, the EPR regulation for used oil was released in September 2023, with mandates that come into effect from FY25.[1] Since its release, the EPR regulation has significantly reshaped the regulatory landscape for used oil in India. Under this regulation, producers of base oil or lubrication oil are required to ensure that a defined portion of the used oil generated by their products is collected and recycled.

By FY31, the total lubricants market is projected to reach 5.0–6.0 MMT, including finished lubricating oils and process oils. Given the inherent operational losses during usage where, for example, engine oil may lose about 25 percent of its volume and hydraulic oil may lose up to 70 percent, the maximum recoverable used oil by FY31 is projected to be about 1.7–2.2 MMT.

Under the phased EPR targets, producers are mandated to ensure that an increasing percentage of this net used oil is recycled. Starting from lower targets in the initial phase (beginning FY25), the recycling obligation scales up over time. By FY31, when the EPR target reaches 50 percent, the requirement will be 0.85–1.00 MMT of EPR certificates, which—after applying the weightage factors of 1 for re-refining and 0.25 for fuel burning—corresponds to the recovery of a larger volume of net used oil through proper collection and recycling processes. Table 3.1 shows the projected year-wise EPR certificate requirement from FY25 to FY31 in MMT. Figure 3.1 illustrates the consolidated, sector-by-sector calculation aggregating to the projected EPR certificate requirement for FY31 in MMT.

The regulatory landscape is designed to evolve alongside the growing lubricant market, which is anticipated to post a 2–4 percent CAGR. This phased scaling of EPR targets will not only enable all stakeholders in the used oil ecosystem to progressively help enhance the collection ecosystem and re-refining capacities but also complement ongoing advancements in technology and infrastructure. As a result, the framework remains adaptive and robust, effectively promoting the sustainable management of used oil across India. However, considering the existing collection ecosystem and re-refining capacities, increasing EPR targets may lead to a shortage of EPR certificates. Therefore, it is essential to review and reassess these targets periodically and make informed decisions on revising them based on certificate availability.



EPR year (Y)	Used oil recycling target (based on Y-2)	Market of lubricants in (Y-2), MMT	Net used oil generated, MMT	EPR certificate requirement targets, MMT
2024–2025	5% of 2022-2023	4.2–4.4	1.50–1.55	0.08–0.09
2025–2026	10% of 2023-2024	4.3–4.6	1.50–1.60	0.15–0.17
2026–2027	20% of 2024-2025	4.4–4.7	1.55–1.70	0.31–0.34
2027–2028	20% of 2025-2026	4.5–4.9	1.60–1.75	0.32–0.36
2028–2029	40% of 2026-2027	4.6–5.1	1.60–1.80	0.65–0.73
2029–2030	40% of 2027-2028	4.7–5.3	1.65–1.90	0.67–0.76
2030–2031	50% of 2028-2029	4.8–5.6	1.70–2.00	0.85–1.00

Table 3.1: Projected year-wise EPR certificates requirement, MMT

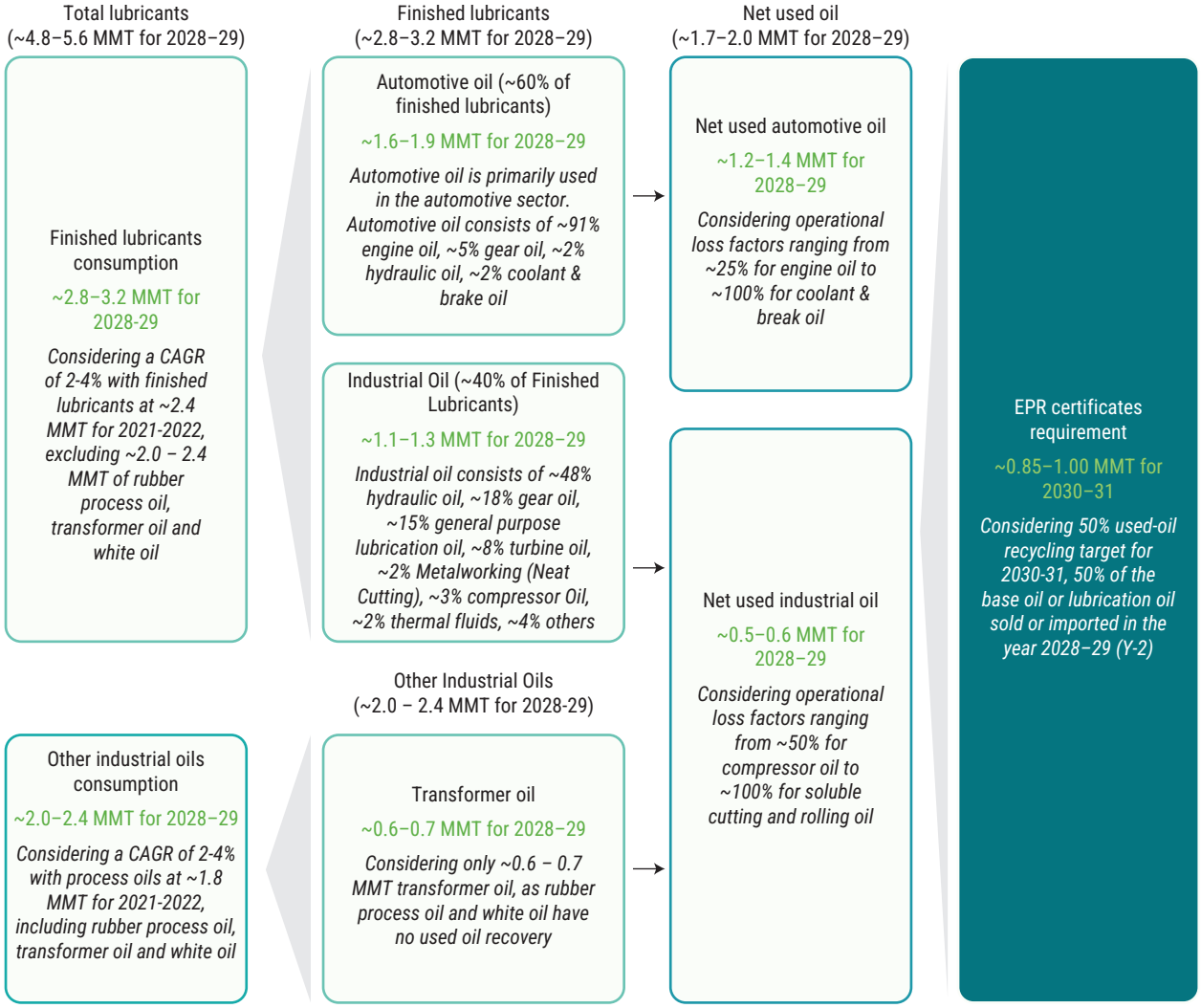


Figure 3.1: Projected EPR certificates requirement for 2030-31, MMT

OUTLOOK- KEY IMPERATIVES FOR ACHIEVING ESCALATING EPR TARGETS

The strategic imperatives required to meet the rising EPR targets have been outlined. It helps understand the necessity of enhancing existing re-refining capacities and integrating advanced processing technologies, while progressively formalising collection from both organised and unorganised channels. These measures will fundamentally transform India's used oil management landscape.

1. EPR certificate requirement

The landscape of India's lubricants market is projected to show a steady increase from ~4.2 MMT in FY22 to 4.8–5.6 MMT by FY29, with finished lubricants accounting for 55–60 percent of the total, while rubber process oils, transformer oils and white oils/light liquid paraffin constituting 40–45 percent. The automotive segment accounts for 55–60 percent of finished lubricants, while the industrial segment contributes 40–45 percent. Correspondingly, the net used oil volume rises from 1.4–1.5 MMT in FY22 to 1.7–2.0 MMT by FY29. EPR targets ramp up from 5 percent in FY25 to 50 percent in FY31, increasing the EPR certificate requirement from 0.08–0.09 MMT early on to 0.85–1.00 MMT by FY31. Table 3.1 shows the projected year-wise EPR certificate requirement from FY25 to FY31 in MMT. Figure 3.1 illustrates the consolidated, sector-by-sector calculation aggregating to the projected EPR certificate requirement for FY31 in MMT.

EPR certificates requirement for 2030-31 would be 0.85–1.00 MMT.

2. Minimum re-refining capacity requirement

The EPR certificate requirement of 0.85–1.00 MMT for FY31 necessitates a minimum re-refining capacity requirement of 600–700 KT by FY31. The required re-refining capacity could potentially reach 850–1,000 KT by FY31. Table 3.2 shows the projected re-refining capacity requirement from FY25 to FY31 in KT.

Minimum re-refining capacity requirement for 2030-31 would be 600–700 KT.

3. Minimum RRBO production

The minimum re-refining capacity requirement of 600–700 KT would yield a minimum RRBO production of 400–500 KT by FY31, making RRBO inclusion in product formulations essential. Table 3.2 shows the projected RRBO production from FY25 to FY31 in KT.

Minimum re-refined base oil (RRBO) production for 2030-31 would be 400–500 KT.

4. Group 2 (G2) RRBO production

In parallel, the product mix is shifting, with the Group 1 (G1) share of the base stocks market declining from the current 35–40 percent to 15–20 percent by FY30 and the G2 share increasing from the current 55–60 percent to 65–70 percent by FY30. This trend necessitates enhancement in G2 processing capacity. For example, while early requirements may demand minimal G2 output, the evolving market conditions indicate that by FY31, up to 100–200 KT of G2 RRBO might be required, underscoring the importance of building substantial G2 capacity as overall recycling volumes increase. Table 3.2 shows the projected G1 and G2 RRBO production requirement from FY25 to FY31 in KT.

G2 RRBO production requirement for 2030-31 would be up to 100–200 KT.

5. Used oil requirement from the unorganised sector

Within the overall lubricants market, used oil is generated from both automotive and industrial segments, and its generation is distributed across organised and unorganised channels. Organised channels—such as Original Equipment Manufacturer (OEM) service stations and industrial bulk generators—offer a relatively more formalised framework, but they are not yet fully structured. They require further optimisation and standardisation to reliably meet future feedstock demands. Besides, unorganised automotive channels, such as independent garages contribute 35–45 percent of the total used oil volume that remains outside the formal collection system. Projections for FY31 indicate that organised channels could potentially supply 1.0–1.3 MMT of used oil. If a re-refining–dominant strategy is pursued to meet rising EPR targets, this organised feedstock may be largely sufficient for several years, delaying the need to formalise the unorganised sector by 4–5 years. However, if a larger share of the EPR obligation is met through fuel burning, the EPR targets would require an additional 0.6–0.7 MMT of used oil by FY31, and this additional volume must be sourced from the unorganised segment—making early formalisation of unorganised channels essential, potentially as early as FY27. This overall picture underscores the importance of a flexible, phased approach to formalising the used oil collection system—initially strengthening organised channels and then progressively integrating the unorganised ones in line with the evolving operational strategies to meet rising EPR requirements. Table 3.4 shows the projected quantity of used oil requirement from both organised and unorganised channels from FY25 to FY31 in MMT.

Used oil requirement from the unorganised sector for 2030–31 would be up to 0.6–0.7 MMT.

In summary, the data indicates a future in which enhancing existing G1 re-refining capacities and adding G2 capacities will be crucial for meeting burgeoning EPR targets. Additionally, a phased approach to formalising collection, beginning with organised channels and later extending to the unorganised sector, will help secure a consistent supply of used oil. These combined measures lay the foundation for a strong and sustainable used oil recycling ecosystem, positioning India's used oil management landscape for long-term success.



	FY25	FY28	FY31
Re-refining capacity required, KT	Up to 70–80	Up to 320–350	550–1,000
RRBO production, KT	Up to 50–60	Up to 230–250	400–700
G1 RRBO production, KT	Up to 50–60	Up to 230–250	390–570
G2 RRBO production, KT	–	–	Up to 100–200

Table 3.2: Projected re-refining capacity requirement from FY25 to FY31, KT

	FY25	FY28	FY31
Organised used oil available, MMT	0.95–1.05	1.00–1.15	1.05–1.30
Unorganised used oil available, MMT	0.60– 0.70	0.65–0.75	0.65–0.85
Total used oil available, MMT	1.55–1.70	1.65–1.90	1.75–2.20

Table 3.3: Projected quantity of used oil available from FY25 to FY31, MMT

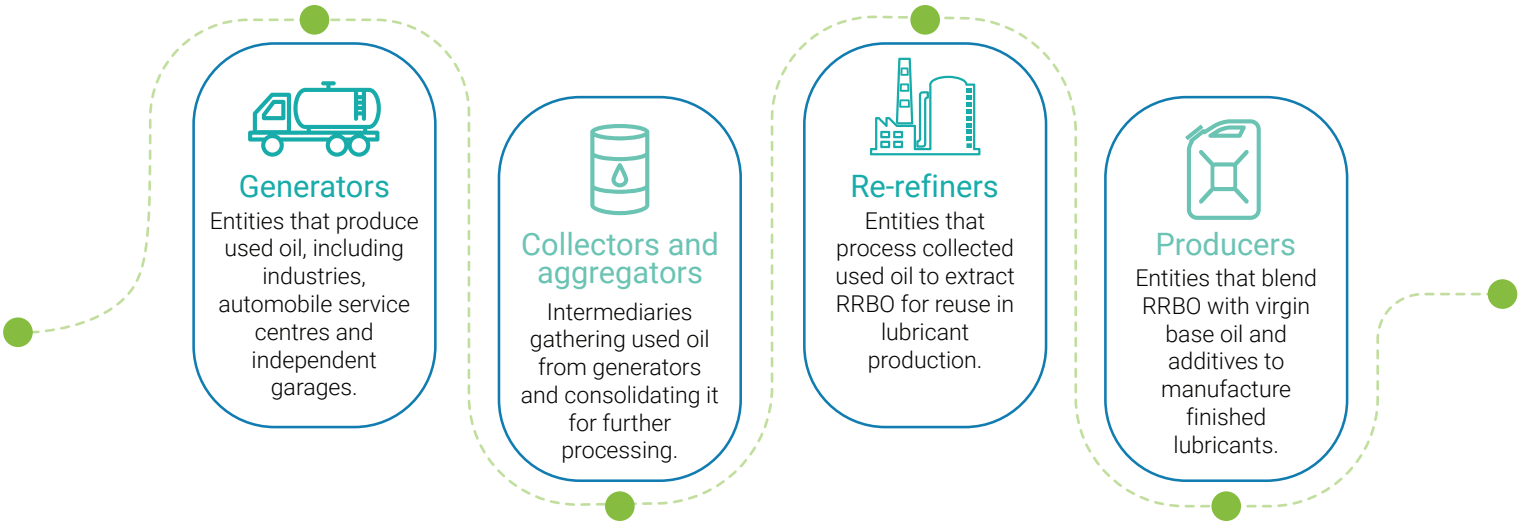
	FY25	FY28	FY31
Organized used oil requirement, MMT	0.08–0.31	0.32–1.15	0.85–1.30
Unorganized used oil requirement, MMT		Up to 0.24–0.27	Up to 0.62–0.66

Table 3.4: Projected quantity of used oil requirement from organised and unorganised channels from FY25 to FY31, MMT



4 Systemic barriers in India's used oil ecosystem





The used oil supply chain comprises four key players, each performing a distinct role in the collection, processing and reuse of used oil. Generators are entities that produce used oil, including industries, automobile service centres and independent garages. Collectors and aggregators act as intermediaries, gathering used oil from generators and consolidating it for further processing. Re-refiners process collected used oil to extract RRBO for reuse in lubricant production. Lubricant producers use RRBO, blending it with virgin base oil and additives to manufacture finished lubricants. The interactions between these value chain players determine the efficiency, sustainability and economic viability of the used oil supply chain. Figure 4.1 shows the value chain view of used oil in India.

The used oil supply chain in India operates as a fragmented and complex system involving generators, collectors and aggregators, re-refiners and lubricant producers. Despite a growing awareness of the environmental and economic benefits of recycling used oil, the current system remains heavily reliant on informal networks, presenting significant challenges to efficiency, compliance and sustainability.

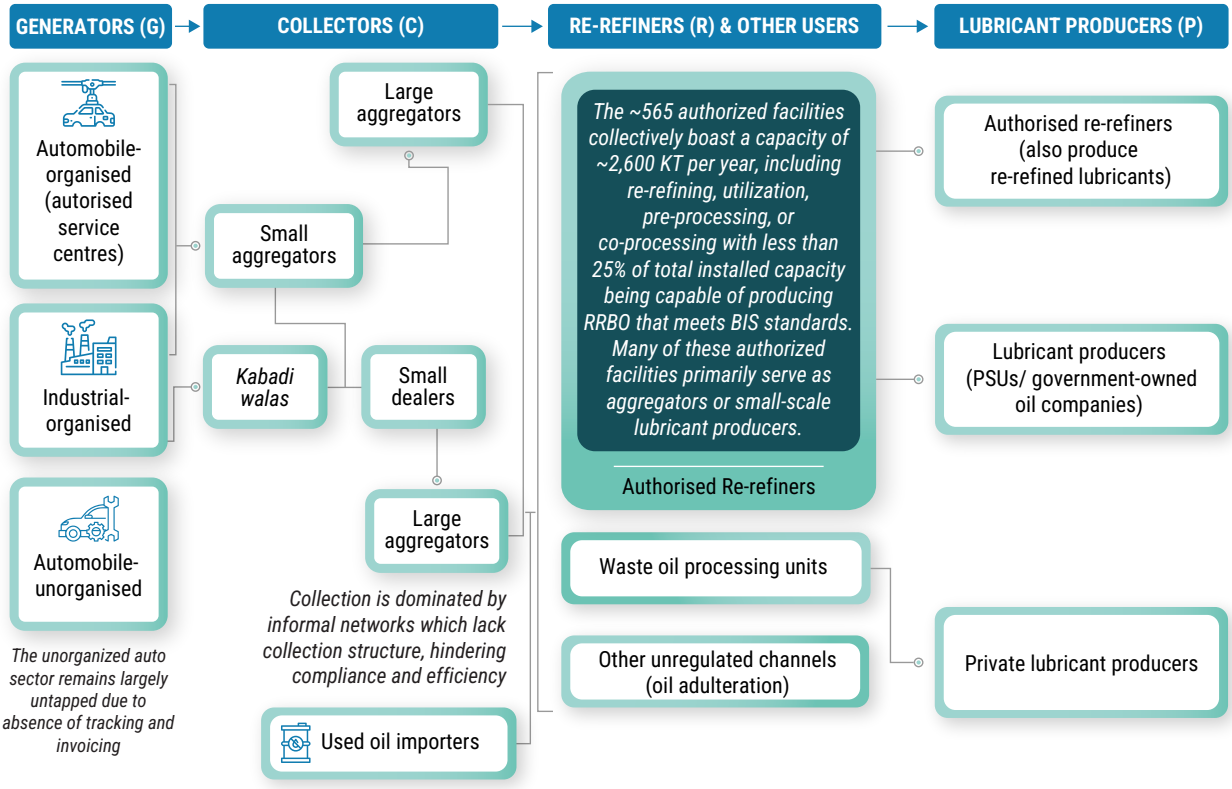


Figure 4.1: Used oil value chain view in India

GENERATORS

The primary sources of used oil generation in India can be categorised into three groups- the organised automobile sector (OEM service centres), the organised industrial sector and the unorganised automobile sector (independent garages and roadside mechanics). While the organised automobile and industrial sectors contribute predictable quantities of used oil, collection from these channels remains informal, inefficient and inadequate. Besides, the unorganised automobile sector remains largely untapped due to the absence of formal invoicing, tracking mechanisms and awareness. According to Deloitte's analysis, this unorganised segment accounts for 35–45 percent share of total used oil volume. Hence, its lack of integration into the formal supply chain hampers effective collection.

Bulk generators in the organised automobile and industrial sectors often segregate and dispose of used oil through authorised recyclers. However, a significant portion of used oil still gets diverted to unauthorised or inefficient disposal channels. Smaller generators and those in the unorganised sector face additional challenges, such as inadequate segregation, improper storage and lack of awareness about the value of used oil, leading to inefficiencies and contamination. Contaminated and mixed oils, resulting from improper segregation or improper storage and handling, are either sold to re-refiners or diverted to alternate channels. These channels include waste processing units or unauthorised channels for purposes such as adulterating diesel, furnace oil and light diesel oil. These practices, involving unauthorised diversions, compromise environmental safety and undermine market transparency.

Here is a concise overview of the primary challenges in the generation stage of the used oil supply chain ("G" stands for generators)

G1- Under-reporting and cash transactions

Used oil generation is often under-reported, with cash transactions inflating prices, enabling tax evasion and perpetuating informal practices.

G2- Untapped, unorganised automotive sector

According to Deloitte's analysis, the unorganised automotive sector accounts for 50 –60 percent of used oil volume from the automotive sector. However, it remains largely untapped due to the absence of tracking, invoicing and formal network integration. This gap enables used oil diversion to alternate channels.

COLLECTORS AND AGGREGATORS

Collection is a critical yet inefficient link in the used oil supply chain. It is dominated by informal networks of *kabadi walas* (Hindi word for "scrap dealers"), who purchase used oil from generators, often via cash transactions, and sell it to small dealers or aggregators. While organised aggregators are beginning to emerge, their presence remains limited due to the dominance of informal intermediaries.

Small aggregators typically collect used oil in fragmented quantities and consolidate it for sale to larger dealers. However, these transactions are rarely documented, making it difficult to track the movement of used oil. The absence of a formal collection structure and the prevalence of cash transactions contribute to non-compliance with environmental regulations, drive up used oil prices and facilitate tax evasion, ultimately discouraging formal collection practices.

The logistical complexities of collection further exacerbate the problem. State-specific No Objection Certificates (NOCs), transporter registration requirements and the inability to streamline multiple collection points in a single vehicle load hinder efficiency. Currently, form 10 regulations mandate one consignment per

vehicle, restricting flexibility and increasing transportation costs. Addressing these inefficiencies require regulatory simplifications and the development of an integrated collection network to formalise the collection process.

Here is a concise overview of the primary challenges in the collection stage of the used oil supply chain ("C" stands for collectors).

C1- Offline tracking systems

Form 10, as outlined in the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, serves as a manifest for tracking the movement of hazardous and other wastes within India.[12] Reliance on a manual, paper-based form 10 across multiple states creates inefficiencies, as manual processes are prone to errors, delays and non-compliance.

C2- Diversion for oil adulteration

The lucrative arbitrage opportunity—where diesel price per kcal is ~75 percent higher than that of used oil—encourages diversion for adulteration. Similarly, used oil is also diverted for light diesel oil (LDO) and furnace oil adulteration.

C3- Multiple intermediaries escalating prices

The used oil collection process is dominated by informal intermediaries, including *kabadi walas* and small dealers who purchase used oil from generators and resell it to larger dealers or re-refiners. These intermediaries operate in an unregulated manner, using cash transactions and undocumented sales, with each intermediary elevating the used oil price.

C4- Tax evasion through cash transactions

The prevalence of cash transactions in the unorganised sector enables widespread tax evasion, allowing informal collectors and aggregators to generate an additional ~20–30 percent of income by avoiding Goods and Services Tax (GST) and other levies. This creates an uneven playing field as legally compliant businesses struggle to source used oil at competitive prices.

C5- Lack of used oil price standardisation

Used oil pricing across India remains inconsistent due to the lack of a standardised benchmark, regional price disparities and the dominance of informal transactions. Unlike virgin base oil, which follows market-driven pricing, used oil is subject to arbitrary rates dictated by intermediaries, varying significantly based on location, demand and collection challenges.

C6- Inaccessible collection networks

The 90-day rule for hazardous wastes, including used oil, requires large quantity generators to dispose of hazardous waste within 90 days of accumulation to comply with environmental regulations.

The lack of formal networks makes used oil disposal challenging as it is bound by the 90-day disposal requirement, particularly for OEMs in remote areas.

C7- Complex collection processes driving costs

Processes such as state-specific NOCs, transporter registration and other requirements during collection drive up costs and extend timelines.

C8- Lengthy working capital cycles

The tender participation to the used oil delivery cycle lasts for 40–50 days, per insights from the Used Oil Working Group members. In turn, it extends the working capital cycle to 75–90 days for re-refiners, posing significant challenges, especially for Micro, Small and Medium Enterprises (MSME).

C9- Interstate transport restrictions limiting efficiency

State-level prohibitions in Karnataka, Maharashtra, Gujarat, Orissa, etc. on interstate

transport of used oil prevent efficient cross-border collection, hindering formal collection efforts.

C10- Contaminated barrels reducing feedstock quality

Despite existing guidelines under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, for properly handling, transporting and storing hazardous wastes, non-compliance by generators and collectors leads to significant contamination of the used oil. Improper storage in unclean or previously contaminated barrels, along with inadequate sealing, results in leaks and the introduction of impurities. Such practices not only degrade the quality of the used oil but also pose environmental hazards due to potential spills.

RE-REFINERS AND OTHER ALTERNATE USERS

India has ~565 authorised facilities for processing used oil,[13] which includes re-refiners and units engaged in alternative processing methods—such as co-processing, utilisation and energy recovery—for used oil.

These ~565 authorised facilities collectively boast a capacity of ~2,600 KT per year, including recycling, utilisation, pre-processing or co-processing.[13] Many of these authorised facilities primarily serve as aggregators or small-scale lubricant producers. Most re-refining operations are concentrated in the MSME sector, with most plants typically operating at capacities of less than 10 KT per year.[4] This limited scale, combined with an inconsistent supply of used oil and lack of advanced technology and testing infrastructure, hampers their ability to process the oil effectively, resulting in less than 25 percent of total installed capacity being capable of producing re-refined base oil that meets Bureau of Indian Standards (BIS) specifications. Hence, consolidation, channelisation and enhancement of these capacities are essential to enhancing overall efficiency and product quality.

Under the EPR framework, a clear distinction is made between processing pathways, i.e., producing high-quality re-refined base oil or lubrication oil is rewarded with a weightage of 1.0, whereas alternative processing methods receive a weightage of 0.25. This differentiation reflects the premium placed on high-quality outputs and underscores the challenges faced by facilities that predominantly act as aggregators.



Figure 4.2: Typical used oil recycling units in India[4]

Re-refiners procure used oil through three primary channels- tender-based systems (via online portals such as the MSTC platform), organised automobile sectors, and, to a minimal extent, unorganised sectors. However, the tendering process is fraught with challenges, such as advance payment requirements and lengthy tender participation to used oil delivery cycles (up to 40–50 days). These issues discourage MSME re-refiners from participating, forcing them to rely on informal and sporadic supplies.

The quality of used oil collected remains a significant concern for re-refiners. Contamination during collection, inadequate segregation and high trace metal content impede the production of high-quality RRBO. Many re-refiners lack testing infrastructure and hence fail to meet consistent specifications, further limiting the acceptance of RRBO by lubricant producers.

Here is a concise overview of the primary challenges in the recycling stage of the used oil supply chain ("R" stands for recyclers)

R1- Tender-based procurement challenges for re-refiners

Re-refiners face significant hurdles with tender-based procurement, including advance payment requirements and lengthy processes, driving spot bids and used oil diversion to alternate channels.

R2- Quality concerns hindering RRBO acceptance

Issues such as burning smell, inconsistent colour, higher trace metal content and inconsistent specifications reduce RRBO acceptance.

R3- Inadequate segregation limits feedstock quality

Failure to segregate used oil grades during collection limits the re-refining feedstock quality, reducing the quality of RRBO and its usability for lubricant producers.

R4- Lack of testing facilities impairing quality control

Most re-refiners lack in-house testing setups to evaluate quality per BIS specifications, while third-party labs are costly and metro-centric. This creates a gap in ensuring reliable RRBO quality.

R5- High investment barriers for advanced technologies

Transitioning to advanced technologies such as solvent extraction and hydrogenation demands substantial capital investment. Per insights from the Used Oil Working Group members, a 50 KTPA solvent extraction facility requires approximately INR400–500 crore, while hydrogenation for the same capacity requires about INR700–900 crore, making it higher by INR300–400 crore and INR600–800 crore, respectively, than the capital investment required for the technologies currently in use in India. The existing technologies are limited to producing only G1 grade RRBO for a unit of the same capacity. Additionally, these advanced processes require a consistent supply of used oil, which remains limited in India due to the absence of a formal collection ecosystem, making these high-capacity technologies currently unviable. Consequently, transitioning to G2 or higher grades of RRBO remains a challenge, as it hinges on the adoption of these advanced technologies.

R6- Underutilisation of bottom residue

The bottom residue is not effectively converted into value-added products, limiting re-refiners' ability to increase re-refining margins.

PRODUCERS

Lubricant producers, including public-sector oil marketing companies (OMCs), as well as private players, procure RRBO through reverse auctions, spot markets or long-term relationships with re-refiners. While demand for

RRBO is globally driven by its cost-effectiveness compared with virgin base oil. This dynamic does not hold true in India, where, on an average, RRBO procurement cost is 5–10 percent higher than that of virgin base oil, per insights from the Used Oil Working Group members. The higher cost in India is primarily due to elevated used oil prices and inefficiencies in the supply chain.

Public-sector OMCs rely heavily on reverse auction tenders, which ensure transparency but limit flexibility for re-refiners. Private players, on the other hand, negotiate spot prices or establish direct relationships with re-refiners to secure consistent supply.

Here is a concise overview of the primary challenges in the lubricant production stage of the used oil supply chain ('P" stands for producers)

P1- Pressure on producers to secure EPR certificates

Producers will face pressure to secure EPR certificates amid an evolving recycling landscape. As they bear the upfront cost burden for acquiring these certificates—which will be eventually transferred to consumers—they will need to adapt to the shifting industry dynamics. Assuming an EPR certificate cost of INR20 per kg, the end-product price would rise by approximately INR1.00–1.20 per litre at a 10 percent recycling target and by about INR5.00–6.00 per litre at a 50 percent target. This would potentially discourage the broader adoption of RRBO and RRBO-based products.

Table 4.1 shows the additional cost per litre of lubricant sold for varying EPR certificate prices at 10 percent and 50 percent recycling targets, per Deloitte's analysis.

EPR certificate cost (INR/kg)	Impact at 10% recycling target (INR/L)	Impact at 50% recycling target (INR/L)
10	~0.50–0.60	~2.00–3.00
20	~1.00–1.20	~5.00–6.00
30	~1.50–1.80	~8.00–9.00

Table 4.1: Additional cost per litre of lubricant sold for varying EPR certificate cost

OTHER REGULATORY CHALLENGES

Beyond the challenges tied directly to supply chain players, the following broader regulatory concerns further complicate the ecosystem ("E" stands for EPR Regulation)

E1- Exemption of generators from the EPR portal

Generators, currently exempt from CPCB's EPR portal registration, are not required to formally track lubricant usage and used oil disposal, limiting the effectiveness of initial tracking efforts under the EPR framework.

E2- Over-reliance on certificate-based compliance

EPR compliance relies exclusively on certificate trading, with no requirement for using RRBO in product formulations. This undermines its ability to drive genuine re-refining investments.

If the above challenges across the used oil ecosystem are aggregated into broader themes, they can be subsumed under six key thematic categories as follows





1. Absence of a formal collection ecosystem

India's used oil collection system remains fragmented and dominated by informal players, leading to inefficiencies and higher costs. The lack of a formal collection ecosystem results in limited used oil being formally channelled into re-refining, restricting the overall volume available for re-refiners.

2. Limitations in EPR compliance

While EPR has been introduced, its emphasis on certificate trading provides limited incentives for meaningful investments in re-refining technologies.

3. Inadequate tracking and accountability

The absence of an integrated digital tracking system and robust accountability mechanisms in the used oil supply chain leads to significant volumes of used oil being diverted to unregulated channels. These challenges compromise transparency, enable tax evasion and elevate used oil prices.

4. High used oil prices caused by diversion to alternative products

Used oil prices in India remain elevated due to its diversion into alternative products such as diesel, furnace oil, and light diesel oil (LDO), which are driven by higher realisations in these applications.

5. Technology and infrastructure gaps in re-refining

The absence of robust testing facilities and advanced re-refining technologies hampers the scalability, efficiency and quality of RRBO production.

6. Degraded RRBO quality

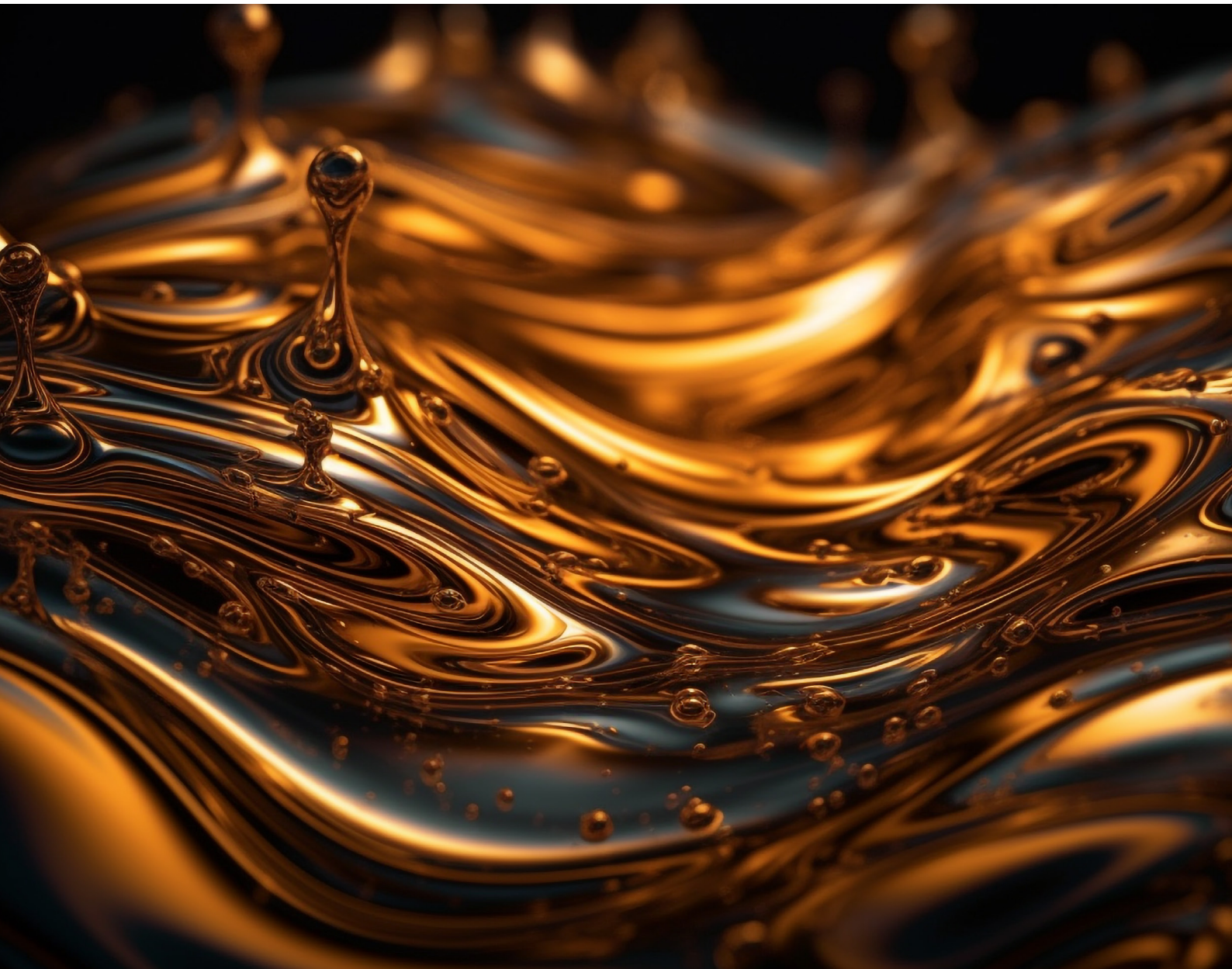
Poor handling, storage and segregation of used oil during collection and transportation reduce the quality and acceptance of RRBO, while re-refining practices that do not meet industry standards further degrade its quality.

Figure 4.3 showcases the mapping of each issue to its corresponding theme, providing a clear overview of how these challenges interconnect and impact the broader ecosystem.

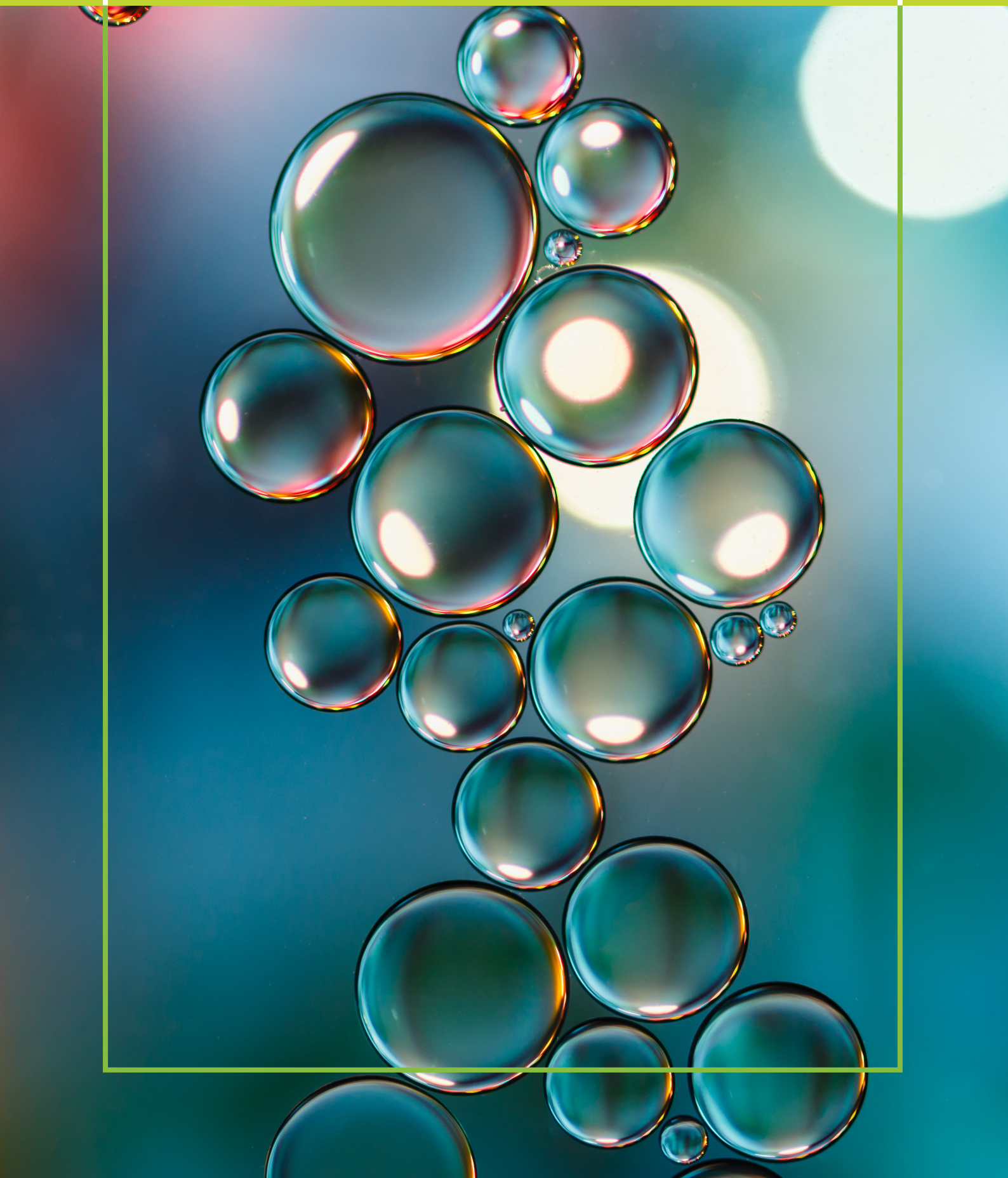
Addressing these challenges demand a multi-pronged approach that strengthens regulatory enforcement, enhances formal collection mechanisms and drives investment in advanced re-refining technologies. Systemic reforms must improve tracking, minimise price distortions and formalise market operations to prevent unregulated activities. Additionally, aligning India's policy framework with global leading practices will be crucial in building a transparent, efficient and sustainable used oil management ecosystem.

	Generators (G)	Collectors (C)	Recyclers (R)	Producers (P)	EPR regulation (E)
1 Absence of a formal collection ecosystem		C6 C7 C8 C9			
2 Limitations in EPR compliance				P1	E2
3 Inadequate tracking and accountability	G1 G2	C1	R1		E1
4 High used oil prices due to diversions to alternate products		C2 C3 C4 C5			
5 Technology and infrastructure gaps in re-refining			R4 R5 R6		
6 Degraded RRBO quality		C10	R2 R3		

Figure 4.3: Mapping of issues/challenges across the six thematic categories

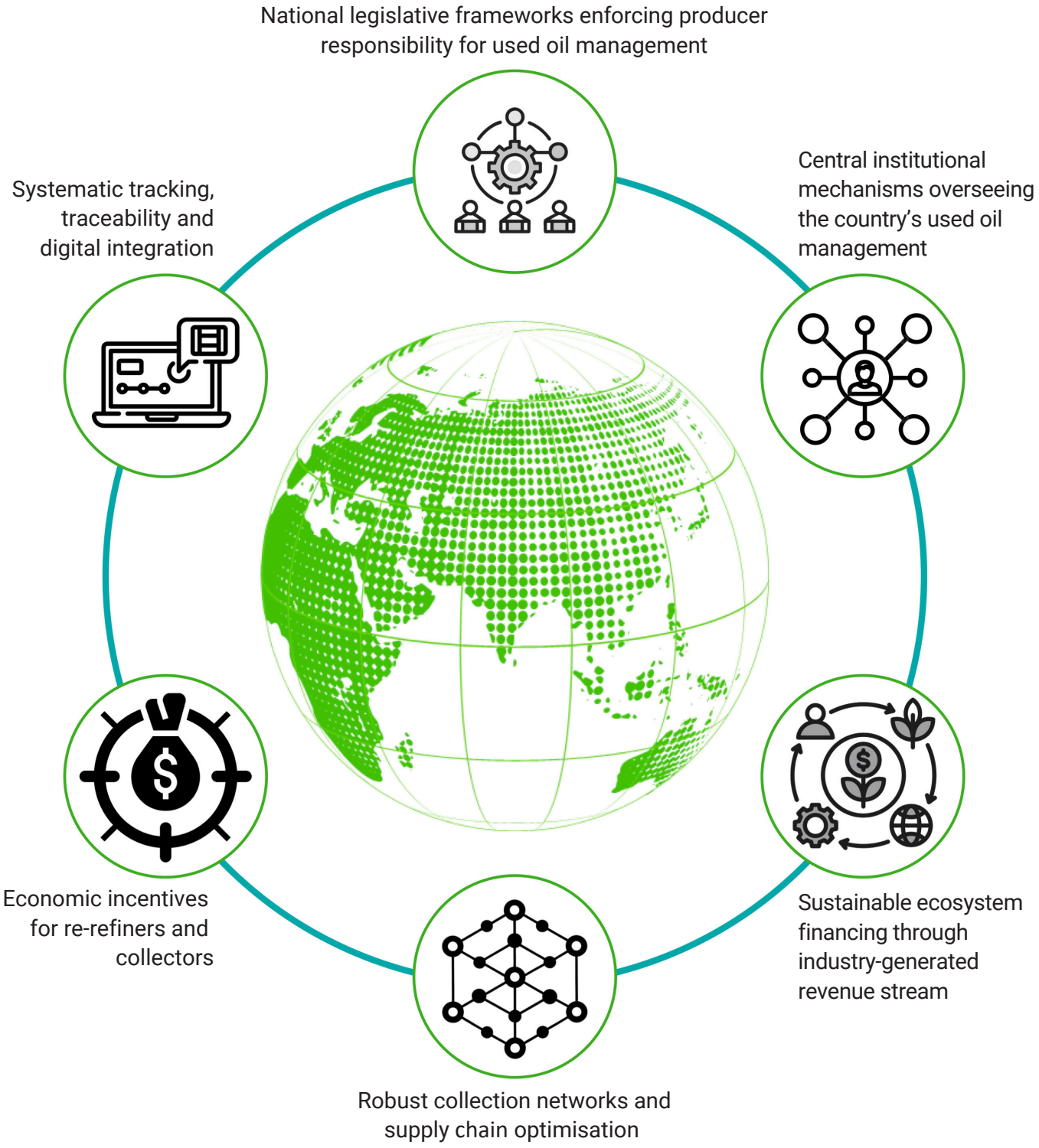


5 Global leading practices in used oil management



As multiple countries intensify their focus on sustainability and the circular economy, used oil recycling has emerged as a critical component of environmental management. Global leading practices demonstrate that centralised oversight, robust collection networks, financial incentives and advanced tracking systems can drive significant improvements in recovery rates and recycling efficiency. By adapting these proven strategies, India can tackle its dual challenges of an inefficient collection network and limited re-refining capacity—ensuring compliance with escalating EPR targets.

This section categorises global leading practices into broad themes, highlighting successful approaches adopted by different countries. The following practices demonstrate effective strategies for improving used oil collection, recycling and compliance.



1. NATIONAL LEGISLATIVE FRAMEWORKS

Overview

A strong, centralised legislative framework places the responsibility for used oil collection, recycling and safe disposal squarely on producers. These regulations not only set clear recycling targets and penalties for non-compliance but also stimulate investments in advanced re-refining technologies.

Global examples[2]



South Korea- In 2003, waste lubricating oil was included in the EPR system to improve used oil management.(14) The government sets annual recycling targets and imposes take-back requirements to ensure compliance.(15)



Chile- Law 20.920 (2016) enforces EPR for waste management, with implementation from 2023.(16) A Supreme Decree (issued in Nov 2024) extends EPR to lubricant oil producers producing over 66 litres of lubricant oils annually, mandating collection, recycling and disposal.(17) Consumers, including industrial users, must return used oils to authorised systems, with penalties for non-compliance.(17)



Spain- Royal Decree 679/2006 establishes a robust, centralised framework that imposes responsibility on industrial oil manufacturers. Under this decree, producers are mandated to finance the collection, recycling and environmentally sound disposal of used industrial oils.(18)

Relevance for India

Implementing a similar centralised legislative framework ensures that all producers are accountable for used oil management–India employs an EPR framework to enforce accountability measures. Besides, in a few countries, such as Chile, generators are legally required to return used oil to authorised systems, with penalties imposed for non-compliance. This approach can curb environmental leakage and drive significant improvements in recycling efficiency.

2. CENTRAL INSTITUTIONAL MECHANISMS

Overview

Centralised associations play a vital role in coordinating the entire used oil management process—from collection to re-refining to re-distribution. They set uniform quality standards, streamline operational processes and serve as a single point of contact for all stakeholders.

Global examples[2]



Italy- The country's centralised organisation, CONOU, oversees the collection, quality control and treatment of used oils.(10)



Canada- The country's provincial associations are part of the Used Oil Management Association (UOMA), which is an industry-led stewardship model that facilitates collaborative recovery, recycling and reuse of used oil across its member provinces.(15)

[2] Refer to Appendix A for detailed Global Case Studies



South Korea- Producers formed the Korea Lubricant Oil Industrial Association (KLOIA), a Producer Responsibility Organisation (PRO), to manage collection and recycling across the country.(15)



Spain- SIGAUS, a centralised non-profit organisation, oversees Spain's used oil management, with 248 member companies as of 2022.(19)



France- The country's used oil management is overseen by CYCLEVIA, which is a Producer Responsibility Organisation (PRO). As of January 2024, it included 287 companies—22 of which represent 80 percent of the French lubricants market. CYCLEVIA ensures free waste oil collection and finances transport, regeneration and recycling efforts.(20)



South Africa- The Recycling Oil Saves the Environment (R.O.S.E.) Foundation, a non-profit organisation funded by member oil companies, manages used oil collection and recycling in South Africa.(15)



New Zealand- Like South Africa, the R.O.S.E. Association—a collaboration between multiple oil companies—oversees used oil collection and recycling in New Zealand.(15)



Portugal- SOGILUB, a centralised PRO, manages the entire used oil value chain, ensuring efficient collection, recycling and compliance with EPR obligations.(15)

Relevance for India

A National Used Oil Management Association—modelled on these examples—can integrate, standardise and streamline used oil management across India. It will be instrumental in enforcing quality standards, facilitating stakeholder coordination and driving public awareness campaigns.

3. SUSTAINABLE ECOSYSTEM FINANCING

Overview

Several countries use a fee-based financing mechanism in used oil recycling. A small fee levied on lubricating oil sales covers environmental costs and creates a dedicated revenue stream. These funds are reinvested into collection networks, re-refining facilities, public awareness and R&D, making the system self-sustaining and aligning industry profits with environmental accountability.

Global examples[2]



Canada- The used oil recovery system is funded through an Environmental Handling Charge (EHC), applied to all lubricant oil sales, typically at CAD0.03–0.08 per litre as of January 2025.(21) The revenue generated is allocated to the provincial associations to support the collection, transportation and processing of used oil.(15)



Portugal- Lubricant producers are required to pay a set fee (EUR63 per cubic metre as of 2020) per cubic metre of lubricants sold,[15] funding SOGILUB's operations.



United States- In California, a fee of US$0.24 per gallon is imposed on new lubricating oil products sold in the state. At the same time, a reduced fee of US$0.12 is levied on re-refined lubricative oil products to promote re-refining.[22] Revenue from these fees helps offset collection costs and incentivises participation across the supply chain, ensuring a steady flow of used oil into recycling processes.[15]



Italy- EUR90 per tonne fee levied on lubricating oil sales (as of 2024), contributed by producers and sellers, primarily funds CONOU's activities per insights from Used Oil Working Group members.

Relevance for India

In India, the EPR framework serves as an alternative to the fee-based financing model by indirectly converting compliance costs into fees. While a fee-based regulation can offer a steady funding source to expand collection networks, enhance recycling efforts and bolster tracking and awareness initiatives, it remains an alternative to the EPR certificate-based regime. The EPR framework internalises environmental costs and fosters a self-sustaining recycling ecosystem, reinforcing India's commitment to responsible waste management practices.

4. ROBUST COLLECTION NETWORKS AND SUPPLY CHAIN OPTIMISATION

Overview

A well-organised collection network is essential to prevent used oil from diverting into unregulated channels. It also helps ensure that oil is collected efficiently, transported safely and delivered to re-refining facilities while maintaining high quality.

Global examples[2]



United States- California's comprehensive state-run programme administered by the California Department of Resources Recycling and Recovery (CalRecycle) has established over 2,600 collection sites[15] and runs targeted public awareness initiatives to encourage participation. Many states also support collection through retail drop-off points and service stations and organise household pick-ups to improve accessibility.



Italy- The CONOU consortium operates a vast network, collecting used oil from over 103,000 workshop and factory sites distributed throughout Italy.[10]



New Zealand- Established in October 2010, the Recovering Oil Saves the Environment (R.O.S.E.) programme uses members' fleets and storage facilities for nationwide collection without direct government intervention[23].

Relevance for India

Establishing a collection network will reduce contamination, standardise pricing and ensure a steady supply of high-quality feedstock for re-refining.

5. ECONOMIC INCENTIVES FOR RE-REFINERS AND COLLECTORS

Overview

Financial incentives are crucial for driving participation throughout the used oil recycling chain. By aligning economic rewards with environmental goals, these mechanisms help make legal recycling competitive compared with informal disposal.

Global examples[2]



Canada- Return incentives are provided to private collectors for delivering used oil to approved recycling facilities, ensuring proper reprocessing into new products. These return incentives account for geographical factors, such as increased transportation costs in larger provinces.[15]



United States (California)- Revenue from the fees levied on lubricating oil sales fund return incentives of US$0.40 per gallon for certified curbside collectors and US$0.16 per gallon for industrial collectors, offsetting collection costs as of 2020.[15]



France- CYCLEVIA provides financial support of EUR10 per tonne of waste oils received by registered European regeneration units and EUR15 per tonne for G2 and G3 regenerated base oils produced in France as of 2024.[20]



Italy- ~16 percent of CONOU's revenue is allocated for incentivising collectors, including micro-collection efforts, and ~42 percent is allocated to support regenerating activities in Italy's lubricant market as of 2024, per insights from Used Oil Working Group members.

Relevance for India

In India, under the EPR framework, economic incentives for re-refiners will be delivered through EPR compliance costs borne by producers (EPR credits). A portion of these compliance costs could also be earmarked for enhancing the collection network. Linking these incentives to collection efficiency and re-refining quality can stimulate investments in infrastructure. This approach will help stabilise market prices, reduce diversion into informal channels and enhance the economic viability of re-refining.

6. SYSTEMATIC TRACKING, TRACEABILITY AND DIGITAL INTEGRATION

Overview

Advanced digital tracking systems provide end-to-end visibility—from oil generation to re-refining to re-distribution—ensuring compliance, quality control and transparency throughout the supply chain.

Global examples[2]



France- CYCLEVIA maintains a traceability and reporting system where registered regenerators and collection-transfer station operators declare used oil volumes monthly and report regenerated base oil output annually, ensuring systematic

monitoring.[20] CYCLEVIA also asks its partner collection-transfer station operators for information on the quantities collected and how they are processed to monitor the achievement of its objectives.[20]



Spain- SIGAUS exemplifies leading practices in systematic tracking and digital integration for used industrial oil management. Since 2007, its dedicated information technology system has provided end-to-end visibility for every stage of the oil's journey, from generation and collection to final treatment. This advanced platform, which automates and records roughly 160,000 waste management operations annually via standardised declarations, delivers precise insights into the quantities generated, collected and processed. Regular independent audits further guarantee the accuracy of these data, reinforcing robust transparency and quality control throughout the supply chain.[24]

Relevance for India

In India, implementing mandatory portal registration along with a digital manifest and tracking system will reduce underreporting, prevent cash-based transactions and ensure used oil is tracked reliably from source to re-refining. This digital integration is a cornerstone for achieving operational efficiency and regulatory compliance.

Global leading practices provide valuable insights that can inform India's approach to used oil management. However, directly replicating international models may not yield optimal results due to India's unique regulatory landscape and market dynamics. Instead, India must tailor solutions by integrating relevant global strategies with localised frameworks. A balanced approach—using international experience while ensuring India-specific adaptation—will be key to building an efficient and sustainable used oil recycling ecosystem in India.



6 Strategic recommendations for a sustainable used oil ecosystem



India's used oil recycling landscape faces two fundamental challenges—inefficiencies in the collection ecosystem and the lack of advanced re-refining capacity and infrastructure. This has led to significant diversion of used oil into unregulated sectors, high levels of contamination and underutilisation of RRBO.

To overcome these obstacles and meet escalating EPR targets from FY25 to FY31—and to ensure that high-quality RRBO finds a stable market—the following integrated approach is proposed

1. Supply chain optimisation– Strengthen and formalise the entire used oil collection network—initially focusing on the organised sector and then expanding to incorporate the unorganised segment (starting FY27)—to ensure a consistent, high-quality feedstock for re-refining.
2. Production capacity enhancement– Prioritise rapid scaling of re-refining capacities—especially by enhancing existing G1 capabilities and integrating new G2 capacities—to meet the evolving product mix and higher EPR obligations while relying on a reliable feedstock from formal organised channels.

Following key recommendations are proposed to effectively address the challenges in India's used oil recycling sector and meet future EPR targets.



A structured, phased execution strategy—supported by a centralised voluntary association—will ensure the successful transformation of India's used oil recycling sector, aligning with global leading practices while addressing domestic regulatory and infrastructural gaps.

6.1 ESTABLISHING A NATIONAL USED OIL MANAGEMENT ASSOCIATION

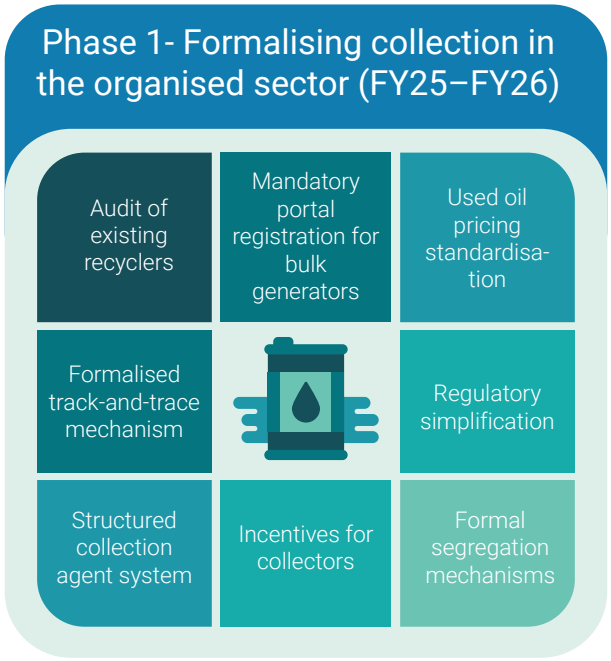
To address persistent inefficiencies in used oil collection and management, India must establish a centralised, voluntary association that oversees and manages the entire used oil ecosystem. Modelled on successful organisations such as Italy's CONOU, Canada's UOMA and France's CYCLEVIA, this will serve as the umbrella organisation to integrate, standardise and streamline all processes from used oil collection to re-refining to inclusion of RRBO in lubricant formulations.

The association will lead the establishment of a nationwide network of collection agents and provide targeted incentives to re-refiners, collectors and other stakeholders to streamline the entire used oil management ecosystem. In addition, it will actively track and monitor used oil and re-refined base oil movement, thereby enhancing transparency, ensuring compliance and preventing diversion into alternate channels. Beyond this, it will lead the enhancement and optimisation of collection, re-refining and re-distribution processes, enforce quality and compliance standards, facilitate R&D for improved technologies and engage with policymakers to shape progressive regulations in this industry. It will also drive public awareness and educational campaigns, drawing on leading practices from global models to ensure efficient, transparent and sustainable operations across the entire value chain.

Table 6.1 shows challenges across six thematic categories that are addressed by establishing a national used oil management association.

6.2 STRENGTHENING THE COLLECTION ECOSYSTEM AND SUPPLY CHAIN

To prevent used oil from being diverted into unregulated and environmentally harmful channels, a structured, phase-wise approach is required to formalise collection from both the organised and unorganised sectors. The organised sector's used oil supply can meet EPR requirements through FY26, even if a higher proportion is met via fuel burning, which means formalising the unorganised sector is not a priority before FY27.



A) Phase 1- Formalising collection in the organised sector (FY25–FY26)

1. Mandatory portal registration for bulk generators

Industrial and automobile generators producing more than 10 MT of used oil annually, along with OEM service centres, must register on the CPCB EPR portal. With ~36,000 OEM service stations generating ~17 percent of total used oil (~0.2–0.3 MMT),[4] each producing an average of 7–10 MT annually, the threshold for classification of bulk generators should drop from 100 MT to 10 MT.

2. Formalised track-and-trace mechanism

Introduction of a tracking mechanism to link lubricant input with used oil output will ensure a minimum expected yield of ~70 percent. While plans exist, effective implementation and widespread adoption remain critical. The National Used Oil Management Association will support implementation by facilitating stakeholder coordination and ensuring adherence to monitoring standards. Additionally, a forward-looking recommendation is to integrate AI capabilities into the system to proactively detect anomalies and enhance overall integration.

3. Audit of existing recyclers

Conduct an audit of ~565 registered facilities to verify their actual operations—whether they engage in re-refining, divert used oil to alternative disposal methods or operate as used oil aggregators.

4. Structured collection agent system

Organise the existing small (CA1) and large (CA2) collection agents to ensure seamless collection, transportation and (where applicable) storage of used oil. The National Used Oil Management Association will lead the establishment and optimisation of the network of collection agents to enhance efficiency and compliance.

- **CA1 (smaller collection agents)** Authorised to collect directly from generators and hand over the collected used oil to authorised recyclers or CA2. They are not required to maintain storage facilities.
- **CA2 (larger aggregators)** Licensed to collect used oil from generators and CA1, segregate, store and hand over the collected used oil to authorised recyclers, co-processors or producers.

5. Incentives for collectors

Allocate a portion of the EPR compliance costs borne by producers (EPR credits) to collectors as financial incentives, ensuring they have a financial stake in supporting procurement and streamlining collection efforts. The National Used Oil Management Association will work with policymakers to integrate financial incentives and monitor their effectiveness.

6. Formal segregation mechanisms

- Mandate clear categorisation of used oil at collection points to prevent cross-contamination, thereby improving the quality of input material for re-refining.
- Additionally, brake fluids and coolants should be stored separately at generation points. OEMs should ensure that their workshops have dedicated storage for these waste streams to avoid any inadvertent mixing with used oils.

7. Regulatory simplification

- Implement a digital manifest system to replace manual form 10 for real-time tracking and roll out a digital passbook.
- Standardise transportation regulations across states to eliminate inefficiencies such as separate NOCs and individual vehicle consignment restrictions.

8. Used oil pricing standardisation

Establish a national benchmark index for used oil pricing to prevent price manipulation by intermediaries, ensuring used oil is priced lower than virgin oil based on conversion costs, collection costs and policy incentives. For instance, if virgin oil is priced at INR62 per litre, and considering conversion cost of INR20–25 per litre, collection cost of INR6–9 per litre and re-refining margin of INR4–5 per litre —totalling INR30–40 per litre in overall supply chain cost—used oil should be priced at about INR20–30 per litre or even lower when further accounting for EPR compliance costs and discount factor for RRBO compared with virgin base oil. Maintaining this cost advantage is crucial for ensuring the economic viability of the used oil ecosystem and driving investments in used oil recycling.



B) Phase 2- Expanding to the unorganised sector (FY27 onwards)

1. Self-registration and simplified compliance for the unorganised auto sector

Introduce a self-registration system with simplified compliance norms for independent garages and mechanics. A digital app can be developed for registration that allows independent garages, mechanics and informal collectors to register easily. Once registered, they can receive a formal identity card—mirroring the approach used in the plastics sector, for example, under the NAMASTE scheme. (25) The National Used Oil Management Association will support the digital integration and onboarding of informal sector participants into the formal system.

2. Awareness, training and capacity building

- Deploy government-backed awareness campaigns to educate stakeholders on the environmental and financial benefits of formal collection.
- Provide regular training sessions on safe handling, storage and basic maintenance of used oil. Supply Personal Protective Equipment (PPE) and develop clear Standard Operating Procedures (SOPs) — like those used for plastic waste pickers in the Solid Waste Management (SWM) Rules, 2016.[26] The National Used Oil Management Association will drive awareness campaigns and training initiatives, ensuring alignment with global leading practices.

3. Unorganised sector integration via established collection agents

CA1 and CA2 networks, established in phase 1, will facilitate the seamless onboarding of informal collectors into the formal collection system. These collection agents can be tasked with onboarding informal collectors, ensuring that used oil collected from unorganised sources is digitally tracked and documented—an approach also successfully applied in plastic waste management. The National Used Oil Management Association will lead the expansion of the network of collection agents and streamline digital tracking for informal collectors.

4. Incentivisation and financial inclusion

- Offer incentives such as reduced licensing fees, tax credits or financial subsidies for informal collectors transitioning to the formal system.
- Facilitate access to formal banking, credit facilities and health insurance for registered informal collectors, enabling them to invest in better equipment and safer storage practices, as seen in successful models of informal sector integration in other waste streams. The National Used Oil Management Association will champion financial inclusion by collaborating with financial institutions and policymakers to implement these measures, ensuring streamlined access to targeted incentives, affordable credit and comprehensive support services for informal collectors.

Table 6.1 highlights the challenges across six thematic categories which are addressed by strengthening the collection and supply chain.

6.3 INCENTIVISING INCLUSION OF RRBO IN LUBRICANT FORMULATIONS

Currently, EPR compliance focuses solely on certificate trading and does not promote the use of RRBO in new lubricant formulations. This approach provides minimal incentive for lubricant producers to integrate RRBO into their supply chain, resulting in an undefined market. Without a guaranteed market, even improved RRBO quality and expanded capacity will be underutilised. Incentivising RRBO inclusion will create direct demand, justify investments in re-refining capacity and secure a stable off-take market.

1. Voluntary inclusion of RRBO through collaboration with lubricant producers

- Facilitate voluntary RRBO inclusion in lubricant formulations through collaboration with all lubricant producers, with the help of the National Used Oil Management Association.
- Allow lubricant producers to incorporate RRBO in product formulations to offset EPR compliance obligations.

Table 6.1 highlights the challenges across six thematic categories which are addressed by incentivising the inclusion of RRBO in lubricant formulations.

6.4 ENHANCING G1 RE-REFINING CAPACITY AND ADDING G2 CAPACITY

For India to meet its EPR-driven recycling targets, significant investment in re-refining capacity is required. It is imperative to process collected used oil into high-quality base oil rather than diverting it to fuel blending or alternative disposal routes.

1. Incentivising re-refiners through grants and soft loans

- Government-backed funding for technological upgrades, including enhancing G1 re-refining capacity and adding G2 capacity, similar to the 2G Ethanol model. Adding G2 RRBO capacity will require significant investment, necessitating funding support for the re-refiners (beyond EPR credits). Advanced processes such as hydro-processing, required for G2 RRBO production, also demand steady used oil supply, which necessitates formalising collection.
- Support for MSME re-refiners to adopt advanced solvent extraction and hydrogenation technologies.

2. Demonstration and commercial facilities

Establish pilot plants showcasing solvent extraction and hydro-processing technologies to improve re-refining viability.

3. Incentives for re-refiners

- Offer higher-value EPR certificates for high-quality and high-grade RRBO production over lower grades, driving investments in advanced re-refining.
- Promote usage of bottom residue in bitumen blending, rubber process oil, open gear oil, cement manufacturing or other alternate usages to improve re-refining margin.

Table 6.1 highlights the challenges across six thematic categories which are addressed by enhancing G1 re-refining capacity and adding G2 capacity.

6.5 IMPROVING RRBO QUALITY AND MARKET ACCEPTANCE

One of the major barriers to increased RRBO adoption is the lack of quality consistency and testing infrastructure. The following interventions can improve RRBO market acceptance

1. Testing infrastructure development

Establish regional third-party testing centres to reduce reliance on metro-based labs, ensuring faster quality validation of RRBO.

2. Standardised RRBO specifications

- Mandate BIS enforcement and certification requirements to enhance RRBO credibility among lubricant producers.
- Conduct regular audits of re-refiners to ensure that only those meeting BIS specifications remain authorised on the CPCB EPR portal. This process will verify adherence to quality benchmarks, fostering confidence in RRBO-based products.
- Develop BIS specifications for higher grades of RRBO to expand its acceptance and application. Support this initiative by developing technology white papers for higher grades of RRBO to guide future advancements in re-refining technologies and quality standards.

3. Taxation incentives

- Reduce GST on finished lubricants with at least 5 percent RBRO content (threshold can be increased gradually) from the current 18 percent to incentivise RRBO inclusion in lubricant formulations.
- Include used oil and waste oil transactions under reverse charge mechanism (RCM)

under GST to accelerate the formalisation of the collection ecosystem.

4. Sensitisation of the entire ecosystem

- Implement targeted awareness and sensitisation programmes for used oil collectors and aggregators, lubricant producers and consumers to communicate the benefits of RRBO, improvements in testing infrastructure and leading practices in collection and recycling. This ecosystem-wide initiative will boost market confidence and drive the adoption of RRBO-based products, with the National Used Oil Management Association leading efforts by using global leading practices.

Table 6.1 highlights the challenges across six thematic categories which are addressed by improving RRBO quality and market acceptance.

In conclusion, addressing the twin challenges of inefficient collection system and insufficient re-refining capacity requires an integrated approach—both optimising the supply chain and enhancing production capacity are essential. By formalising used oil collection from the organised sector first and subsequently integrating the unorganised sector while simultaneously investing in advanced re-refining technologies, India can secure a consistent, high-quality feedstock for re-refining and meet its escalating EPR targets. Central to this transformation is establishing a National Used Oil Management Association, which will drive coordinated efforts in standardising processes, enforcing quality norms and promoting RRBO inclusion in lubricant formulations. Supported by a robust pricing mechanism and phased execution, these comprehensive measures will unlock substantial environmental and economic benefits, paving the way for a sustainable used oil ecosystem.

	THEME 1 Absence of a formal collection ecosystem	THEME 2 Limitations in EPR compliance	THEME 3 Inadequate tracking & accountability	THEME 4 High used-oil prices due to diversions to alternate products	THEME 5 Technology and infrastructure gaps in re-refining	THEME 6 Degraded RRBO quality
1 Establishing a national used oil management association	●	●	●	●	●	●
2 Strengthening the collection & supply chain	●		●	●		●
3 Incentivising inclusion of RRBO in lubricant formulations		●				
4 Enhancing G1 re-refining capacity & adding G2 capacity					●	
5 Improving RRBO quality & market acceptance						●

Table 6.1: Visual mapping of recommendations helping address challenges across six thematic categories

7 Strategic roadmap for implementation



The recommendations outlined in the previous section represent a comprehensive strategy for transforming India's used oil recycling ecosystem. However, not all interventions can be implemented simultaneously. A phased approach is necessary, prioritising initiatives based on their potential impact and ease of implementation. Quick wins—those with higher impact and higher ease of execution—will be rolled out first, followed by medium- and long-term initiatives that require structural changes, regulatory reforms, or significant investment.

Figure 7.1 categorises recommendations based on their impact and ease of implementation. Initiatives in the top-right quadrant (high impact, high ease of implementation) will be prioritised in the short term, while those requiring greater effort or systemic shifts will be phased into medium- and long-term plans.

STRATEGIC ROADMAP FOR IMPLEMENTATION

Short-term initiatives (till FY26)

These initiatives focus on creating a governance body, formalising the collection ecosystem in the organised sector, ensuring traceability and introducing financial mechanisms to support compliance and incentivisation.

Establishment of a national used oil management association Form a centralised voluntary association to oversee, standardise and streamline all processes from used oil collection to re-refining to inclusion of RRBO in lubricant formulations.

Mandatory portal registration for bulk generators Lower the threshold for bulk generator classification and ensure all major generators register on the CPCB EPR portal.

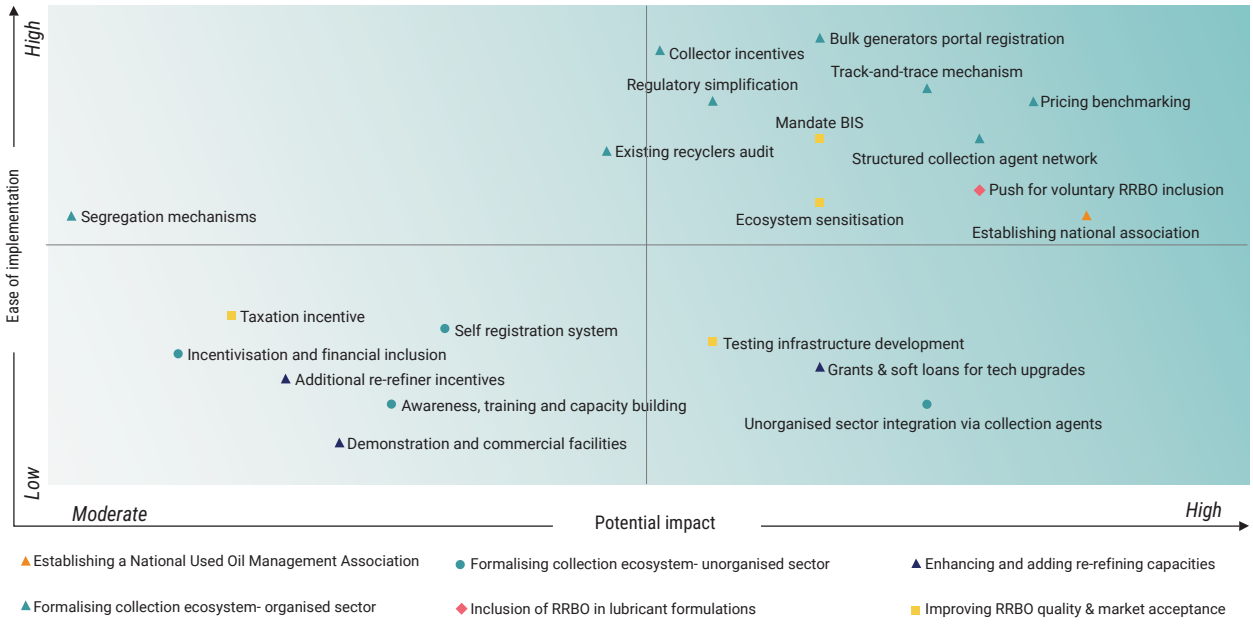


Figure 7.1: Matrix indicating impact and ease of implementation of recommendations

Track-and-trace mechanism Implement digital monitoring to link lubricant input with used oil output, ensuring transparency, with the support of the National Used Oil Management Association.

Audit of existing recyclers Conduct a nationwide review of registered recyclers to validate their operational status and ensure compliance.

Structured collection agent network Organise the existing small and large collection agents to establish a tiered collection agent network (CA1 for direct collection, CA2 for storage and aggregation) to improve supply chain efficiency, with the support of the National Used Oil Management Association.

Collector incentives Allocate a portion of the EPR compliance costs borne by producers (EPR credits) to collectors as financial incentives, aiming to streamline procurement processes and formalise used oil collection, with the support of the National Used Oil Management Association.

Pricing benchmarking Develop a national benchmark index for used oil pricing to prevent price manipulation by intermediaries.

Regulatory simplification Implement a digital manifest system and digital passbook, standardise transportation regulations and streamline compliance for interstate transport.

Push for voluntary RRBO inclusion Advocate for lubricant producers, with the support of the National Used Oil Management Association, to integrate RRBO in formulations, creating market demand.

Ecosystem sensitisation Drive targeted sensitisation initiatives to onboard collectors and aggregators onto the EPR portal and educate them on leading practices in formal collection.

Medium-term initiatives (FY27–FY28)

Medium-term initiatives will focus on expanding formalisation to the unorganised sector, incentivising infrastructure development and driving ecosystem sensitisation.

Unorganised sector integration via collection agents Expand CA1 and CA2 networks to include informal collectors, with the support of the National Used Oil Management Association, improving digital tracking and compliance.

Self-registration system for the unorganised sector Enable independent garages, mechanics and informal collectors to register through a simplified digital platform with the support of the National Used Oil Management Association.

Awareness, training and capacity building for unorganised collectors Conduct training programmes and awareness campaigns to improve collection practices and promote compliance in the unorganised sector, with the support of the National Used Oil Management Association.

Incentivisation and financial inclusion Provide tax credits, financial subsidies and formal banking access for informal collectors to enhance sectoral participation with the support of the National Used Oil Management Association.

Grants and soft loans for technology upgrades Ensure government-backed funding for technological upgrades, including enhancing G1 re-refining capacity and adding G2 capacity. Also, ensure support for re-refiners in adopting advanced solvent extraction and hydro-processing technologies to enhance RRBO quality.

Testing infrastructure development Establish regional third-party testing centres to improve RRBO quality validation.

Segregation mechanisms Mandate clear categorisation of different grades of used oil at collection and generation points to prevent cross-contamination, improving feedstock quality.

Taxation incentives Lower GST for companies adopting RRBO to create a more competitive market.

Ecosystem sensitisation Drive continuous, ecosystem-wide awareness programmes for used oil collectors and aggregators, lubricant producers and consumers to communicate the benefits of RRBO, improvements in testing infrastructure and leading practices in collection and recycling.

Long-term initiatives (FY29 onwards)

These initiatives require regulatory changes, infrastructure investments and large-scale behavioural shifts to optimise the industry's functioning.

Demonstration and commercial facilities Develop pilot plants showcasing best-in-class re-refining technologies to attract investment.

Additional re-refiner incentives Provide high-value EPR certificates for high-grade RRBO production and promote alternative usage of bottom residue to improve economic viability.

Awareness, training and capacity building for unorganised collectors Building on the medium-term initiative, continue conducting training programmes and awareness campaigns to improve collection practices and promote compliance in the unorganised sector, with the support of the National Used Oil Management Association.

India's used oil recycling ecosystem is at a pivotal juncture. A structured, phased approach—starting with formalising collection in the organised sector, followed by unorganised sector integration and culminating in infrastructure and policy enhancements—will ensure sustainable and efficient management of used oil. The establishment of a National Used Oil Management Association will catalyse these reforms, driving coordination among stakeholders and aligning India's used oil management practices with global leading practices. Through collaborative efforts among regulators, industry players and financial institutions, the proposed roadmap will foster a dynamic, resilient and future-ready used oil recycling sector in India.

To advance this roadmap, pilots in key areas are recommended over the next six months to drive immediate, high-impact interventions. As outlined in Table 7.1, these recommended pilots will formalise the collection network for the organised sector in a targeted city or region through mandatory portal registration, robust digital track-and-trace systems and an optimised collection agent network while also incorporating a national pricing benchmark for used oil to ensure RRBO remains cost-competitive. Additionally, the recommended pilots will implement targeted sensitisation and onboarding initiatives for collectors and aggregators in the selected city or region, establishing a robust foundation for sustained medium- and long-term transformation of India's used oil recycling ecosystem. In parallel, it is recommended that the National Used Oil Management Association be established, with founding support from lubricant producers in the Used Oil Working Group, to integrate collection, re-refining and market re-distribution processes. Together, these initiatives will lay the groundwork for a more transparent, efficient and sustainable used oil recycling industry in India.



Pilot recommendations	Focus areas
Formalisation of collection network for collection from organised sector	• Implement a structured collection agent system • Implement track-and-trace mechanisms • Implement mandatory portal registration for generators

Partner selection process

1. Evaluate and select partners with proven expertise in government portal integrations (like the CPCB EPR portal), robust track-and-trace system development and managing tiered logistics networks.
2. Invite and assess proposals from firms with a strong public–private collaboration record and assess their ability to support portal integrations and design a robust digital track-and-trace mechanism.
3. Shortlist candidates for a proof-of-concept phase, testing system interoperability, data accuracy and user-friendliness with a subset of bulk generators.
4. Prioritise cost-effective solutions with clear KPIs and scalability for nationwide rollout

Pilot recommendations	Focus areas
Onboarding and sensitisation of collectors and aggregators, and establishing pricing benchmark	• Onboarding of collectors & aggregators on the EPR portal • Sensitisation of collectors & aggregators • Establishing pricing benchmark index for used oil

Partner selection process

1. Identify partners with proven experience in onboarding informal stakeholders to digital platforms, especially government portals like the CPCB EPR portal.
2. Evaluate firms with a strong track record in capacity-building, user training and awareness campaigns targeted at informal and semi-formal stakeholders.
3. Select partners who have developed or managed pricing indices in similar sectors, ensuring their ability to establish transparent and cost-competitive used oil pricing benchmark index.
4. Shortlist candidates for a pilot phase to assess the ease of portal integration, the clarity of training modules and the effectiveness of pricing data management.
5. Prioritise proposals offering scalable, sustainable solutions with clear performance KPIs and a competitive cost structure.

City/region selection process

1. Select regions with high industrial density and substantial used oil volumes, focusing on areas with numerous OEM service stations (e.g., Mumbai or Pune) and a concentrated network of collectors and aggregators.
2. Shortlist regions that offer strong IT networks and high mobile penetration for seamless onboarding of collectors onto the CPCB EPR portal and real-time data exchange, along with efficient logistics corridors to support a tiered collection agent system.
3. Prioritise areas where local authorities have demonstrated proactive environmental compliance and are willing to collaborate with RECEIC initiatives.
4. Conduct targeted feasibility studies of the prioritized regions, involving local industry associations, service station operators, logistics providers, and collector/ aggregator cooperatives to validate readiness, scalability and foster collaborative partnerships.
5. Select a region that reflects broader market dynamics and can serve as a template for future pilots across other industrial clusters.

In parallel, the establishment of the National Used Oil Management Association, with founding support from lubricant producers in the Used Oil Working Group, will oversee, standardise and streamline all processes from used oil collection to re-refining to inclusion of RRBO in lubricant formulations

Table 7.1: Pilot recommendation areas

8 Appendix



Appendix A- Global Case Studies

Case study– USA (Decentralised scheme)



Overview

The United States follows a decentralised approach to used oil management, with state and local governments implementing product stewardship laws rather than a nationwide EPR framework. In the US, recyclers handle ~380 million gallons (~1.2 MMT) of used oil annually (U.S. EPA, 2019).[27] 30 percent of collected used oil is converted into RRBO in the US as of 2020.[28] Many states have enacted funding mechanisms and incentive programmes to promote collection and recycling. California leads this with its Oil Recycling Enhancement Act, under which it has established an extensive network of 2,600+ collection points.[15]

Industry structure

The US operates through a mix of local-level collection models, including

- **Collection facilities** Used oil drop-off points at service stations, recycling centres, auto parts stores and quick lube locations.[27]
- **Curbside collection** Some municipalities offer curbside used oil collection on designated days or by request, increasing accessibility for residents.[27]

These programmes are financed through environmental handling fees and business contributions, such as

- **California (2024)** Under Senate Bill 545, the fee levied on the production of new lubricative oil products is US$0.24 per gallon of oil sold in the state. At the same time, a reduced fee of US$0.12 is levied on re-refined lubricative oil products to promote re-refining. The revenue generated funds state-wise collection and incentives.[22]
- **Boulder County, Colorado (as of 2020)** Businesses paid US$0.11 per pound to drop off used oil at hazardous waste facilities.[27]

California provides return incentives of US$0.40 per gallon to certified curbside collections and US$0.16 per gallon to industrial collectors, encouraging participation as of 2020.[15]

Key considerations

Despite a well-structured collection and funding ecosystem, several gaps remain

- **Contamination risks** Improper disposal or mixing with other chemicals complicates processing and requires specialised handling.
- **Public awareness challenges** Limited knowledge of drop-off locations reduces participation. Some states use utility bills, websites and newspaper ads to address this.

Example of a successful programme The California Used Oil Programme is legislated by the California Oil Recycling Enhancement Act[27] and delivered by the California Department of Resources Recycling and Recovery (CalRecycle). The CalRecycle programme provides monetary incentives and grants to local collection programmes and research, supports a statewide network of collection sites with a network of more than 2,600 collection points[15] and conducts extensive outreach to publicise and encourage used oil recycling.

Case study– Canada (Decentralised scheme)



Overview

Canada employs a decentralised product stewardship model for used oil management, with each province responsible for collection and recycling. The Used Oil Management Association (UOMA) oversees collection and reuse programmes across participating provinces, achieving an 81.5 percent recovery rate of used oil available for collection in 2023.[29] Of the used oil collected, ~45 percent got converted into RRBO as of 2020.[28]

The National Oil Material and Antifreeze Advisory Council (NUOMAAC) coordinates provincial associations and promotes national standards and integrated programmes. Currently, 9 out of 13 provinces and territories (Yukon is developing an EPR plan and will implement its programme by July 2025, making it an additional territory to adopt used oil management initiatives) have mandatory used oil recovery schemes, ensuring structured collection and processing across most of Canada.[15]

Industry structure

Canada's used oil recycling industry is led by provincial associations, established through provincial legislation and governed by retailers, wholesalers and first sellers of lubricants. These associations are part of UOMA, which is an industry-led stewardship model, facilitating collaborative recovery, recycling and reuse of used oil across its member provinces.

The management of used oil is funded by an Environmental Handling Charge (EHC) applied to lubricant oil sales, which is reinvested into provincial recycling programmes. It is typically between CAD0.03–0.08 per litre as of January 2025.[21] The EHC finances collection, transportation and processing while supporting infrastructure expansion and public awareness initiatives.

Key incentive mechanisms ensure the financial sustainability of private-sector participation

- **Return incentives (RI)** compensate private sector collectors for transporting used oil to government-approved recycling facilities.[15]
- **RI rates vary by province** to account for regional transport costs, particularly in geographically large provinces such as Alberta.[15]

Some unique aspects of Canada's approach include

- **Decentralised governance**, allowing for tailored regulations based on provincial needs.
- **The combination of EHC and RI** ensures a stable revenue model for industry stakeholders.
- **NUOMAAC's coordination**, promoting inter-provincial collaboration and integrated recycling efforts.

Key considerations

- **High transport costs** remain a challenge, especially in remote regions where logistics are more complex.
- **Uniform implementation** across all provinces and territories is still evolving, with some regions lacking consistent recovery mandates. Regulatory alignment between provinces is needed to enhance nationwide recycling efficiency.

Case study– Italy (Outcome-based scheme)

Overview

Italy has an average lubricants market of 400 KT[3] , and it follows an outcome-based scheme for used oil management, ensuring high recycling rates. The country's centralised organisation, CONOU, oversees the collection, quality control and treatment of used oils.(10)

Industry structure

Italy's used oil recycling system is highly efficient due to

- **CONOU's central role** in coordinating the collection, transportation and treatment of used oil across the country.(10) The consortium operates a comprehensive network that collects used oil from about 103,000 workshop and factory sites across Italy.(10)
- **Micro-collection efforts,** which contributed 47 percent of total used oil collected in 2022.(10) These programmes involve collecting small quantities of used oil that are typically not profitable to gather, ensuring used oil that would otherwise go uncollected is properly recycled.

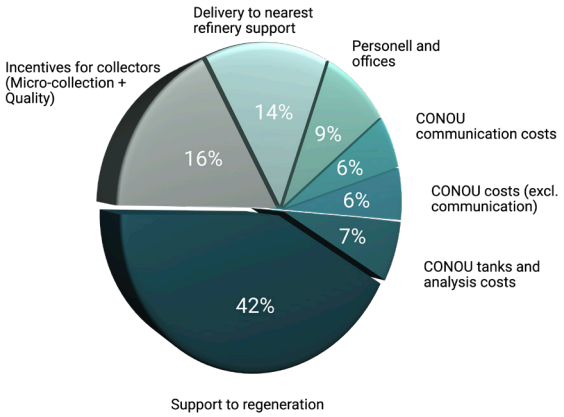


Figure 8.1: Distribution of CONOU revenue (2024)[3]

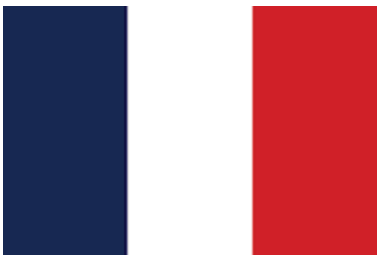
- **High recycling efficiency,** with 98 percent of collected lubricating oil being recycled in 2022.(9)
- A key economic incentive for recycling, where producers of re-refined oil products paid 50 percent of the excise duty applied to virgin lubricant oils as of 2020.(15)
- CONOU's activities are primarily funded by a fee of EUR90 per tonne for lubricating oil sales, which are contributed by producers and sellers. With total global revenue of ~EUR36 million, about 42 percent is allocated to support regenerating activities in Italy's lubricant market.

Key considerations

- **Optimising micro-collection** Adopting innovative solutions for cost-effective small-scale used oil collection.
- **Strengthening compliance** Ensuring all producers, especially small businesses, meet EPR requirements.

[3] As per insights from the Used Oil Working Group members

Case study– France (Outcome-based scheme)



Overview

France's used oil management operates under an outcome-based scheme for used oil management, overseen by CYCLEVIA, a PRO approved by the Ministry for Ecological Transition. CYCLEVIA was granted approval on 24 February 2022 for a six-year period until 31 December 2027. By 15 January 2024, 287 companies had joined CYCLEVIA, including 22 firms covering 80 percent of the French lubricants market. France has two black oil regeneration units, producing G1 regenerated base oils. However, demand for G2/G3 base oils exceeds domestic supply, forcing formulators to source from other European countries. To increase local regeneration capacity and reduce reliance on imports, France aims to establish a G2/G3 regeneration facility.[20]

Industry structure

France follows a financial EPR model, where eco-contributions from member marketers fund CYCLEVIA's initiatives. CYCLEVIA's responsibilities include

- **Collection and recycling support** Ensuring free waste oil collection and financing transport, regeneration and recycling efforts.
- **Regeneration incentives**
  - EUR10 per tonne for waste oils entering regeneration units registered with CYCLEVIA.[20]
  - EUR15 per tonne for G2/G3 regenerated base oils placed on the market in France, once a domestic facility is established.[20]
- **Traceability and reporting** Regenerators must register with CYCLEVIA and submit monthly and annual declarations on waste oil input and regenerated oil output, respectively.[20]
- **Public awareness** Funding studies, awareness and communication campaigns to improve the collection and processing of used oil.
- **Data-driven performance monitoring** CYCLEVIA asks its partner collection-transfer station operators for information on the quantities collected and how they are processed, to monitor achievement of its objectives.

The system resembles a product stewardship model, where responsibility is shared across stakeholders.

Key considerations

- **Capacity for high-quality base oil regeneration** Expanding domestic capabilities for G2/G3 base oil regeneration will enhance self-sufficiency and reduce reliance on imports.[20]
- **Optimising cost efficiency** Continuous improvements in collection and processing operations can further enhance financial sustainability.
- **Strengthening compliance and traceability** Streamlining reporting mechanisms and fostering industry-wide collaborations to ensure adherence and transparency.

Case study– France (Outcome-based scheme)



Overview

Brazil has been a regional leader in implementing EPR for used lubricating oils. The National Solid Waste Policy (NSWP), enacted in 2010 under Federal Law 12,305, established a robust framework for waste management, emphasizing recycling, sustainability and shared responsibility.(30)

Industry structure

- **Regulatory framework** The NSWP builds on CONAMA Resolution No. 362/2005, which mandated eco-friendly disposal, prioritised re-refining and set minimum collection targets (starting at 30 percent). The law also introduced shared responsibility across producers, importers, collectors and re-refiners.(30)
- **Cost allocation** Both consumers and producers fund waste oil management. Consumers indirectly cover costs through lubricant pricing, while producers/importers bear the direct costs of collection and disposal.(30)
- **Collection and enforcement** In 2017, effective[4] collection of waste lubricant oil (OLUC) was 40.85 percent, highlighting gaps in enforcement and compliance. The policy set a minimum collection target of 30 percent, with periodic increases. Federal agencies enforce compliance through the members of permanent monitoring group (GMP), tracking collection rates and industry adherence to regulations.(30)

Key considerations

- **Enforcement** Strengthening monitoring and compliance mechanisms is critical to reducing illegal disposal and increasing collection rates.
- **Economic incentives for recycling** Unlike some global EPR models, Brazil does not offer direct financial incentives for recyclers, which may limit investment in advanced re-refining infrastructure and reduce collection efficiency.
- **Environmental and sustainability concerns** While the prohibition on waste oil burning is a major environmental safeguard, high illegal disposal rates pose pollution risks, highlighting the need for stronger penalties, better infrastructure and industry collaboration.
- **Public awareness** Expanding education and outreach can improve participation in formal collection systems, reduce illegal dumping and enhance environmental outcomes.

[4] Effectiveness calculated on the net volume sales of finished lubricants in the domestic market (total sales less volume of non-collectable lubricating oils)

Case study– Australia (National legislative scheme)



Overview

Australia's Product Stewardship for Oil Scheme (PSO), established under the Product Stewardship (Oil) Act 2000, aims to promote sustainable management of used oil.

The scheme operates through a two-part framework, a product stewardship levy collected from oil producers and importers and product stewardship benefits, which are volume-based benefits paid to oil recyclers. By internalising externalities, the system ensures that waste oil recycling costs are borne by industries benefitting from oil consumption. Through the PSO scheme, Australia collects 350 million litres of used lubricating oil every year, which is 50 percent of oil used. Of this 50 percent, 17 percent is recycled, while 33 percent is consumed by the explosives industry (as of 2021).[4]

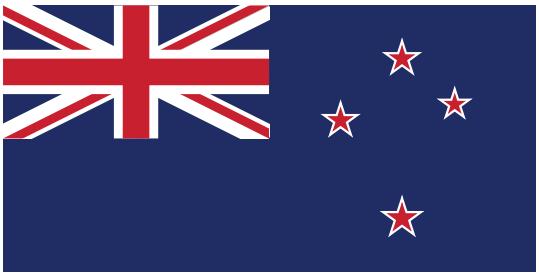
Industry structure

- **Regulatory and financial mechanism** The Product Stewardship Levy, imposed on all petroleum-based oils and their synthetic equivalents produced or imported into Australia, funds recycling incentives. Oil incorporated into exported products is exempt from the levy.[4]
- **Incentives for oil recyclers** Under Product Stewardship Benefits, oil recyclers receive volume-based incentives of AUD0.62 per litre (as of 2021),[4] encouraging increased collection and re-refining of used oil. This supports diverse recycling options, ensuring sustainability.
- **Market-based cost allocation** The PSO offsets recycling costs through the market, rather than relying on public funds, creating a self-sustaining economic model, where industries that gain the benefit from the production and use of the oil, finance its end-of-life management.

Key considerations

- **Limited recycling rates** Only 34 percent (as of 2021) of collected used oil is recycled,[4] indicating potential inefficiencies in re-refining capacity, market incentives or collection systems.
- **Unequal distribution of collected used oil** The explosives industry consumes 66 percent of the used oil collected (as of 2021),[4] raising concerns about whether this aligns with the scheme's sustainability goals and if more should be diverted to high-value re-refining.
- **Regulatory and economic challenges** While the scheme incentivises recycling, challenges remain in ensuring long-term financial viability, improving infrastructure and enhancing enforcement to maximise used oil recovery and minimise environmental risks.

Case study– New Zealand (Industry-led scheme)



New Zealand undertakes used oil recycling through the R.O.S.E. scheme. Launched in October 2010, it operates as a voluntary, accredited product stewardship programme, facilitating nationwide used oil collection and recycling without direct EPR legislation.[23]

Industry structure

- **Collaborative model** A collaboration between multiple oil companies for used oil recovery featuring a take-back requirement system.[15]
- **Collection infrastructure** Uses R.O.S.E. scheme operators' collection fleet and storage facilities to establish a robust collection network.[23]
- **Voluntary framework** Operates under one of New Zealand's 10 accredited product stewardship schemes, emphasizing industry-driven accountability.[31]

Key considerations

- **Scalability** The voluntary nature of R.O.S.E. may limit its reach compared to mandatory EPR systems.
- **Industry commitment** Success relies on sustained collaboration and investment from participating oil companies.
- **Public awareness** Expanding consumer participation is critical for maximising collection rates.

Case study– Spain (Outcome-based scheme)



Spain employs an outcome-based scheme for used oil management overseen by SIGAUS, a centralised non-profit organisation. The scheme mandates target recovery, valorisation and re-refining rates to ensure sustainable used oil handling.[15] At the end of 2022, 248 companies were members of SIGAUS.[19]

Industry structure

- SIGAUS member companies contribute EUR0.06 per kg of lubricants sold to fund collection and recycling efforts following SIGAUS's reduction of the waste oil management fee by 17 percent from January 2024.[19]
- The scheme integrates mandatory waste prevention plans,[15] reinforcing Spain's commitment to circular economy principles. In 2022, SIGAUS managed 129,509 metric tonnes of used oil, regenerating 79 percent into new lubricants—well above the 65 percent legal minimum.[19]

Key considerations

- **Efficiency in recovery and valorisation** A structured framework enables high levels of recycling and reuse.
- **Cost optimisation** Fee adjustments reflect market dynamics, balancing sustainability with economic viability.
- **Proactive waste management** Preventative measures drive long-term reductions in environmental impact.

Case study– South Korea (National legislative scheme)



South Korea has maintained a comprehensive EPR framework for over two decades. In 2003, waste lubricating oil was included in the EPR system,[14] to improve used oil management. The government sets annual recycling targets and imposes take-back requirements to ensure compliance.[15]

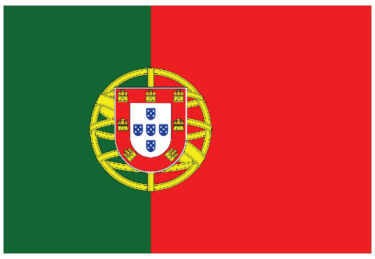
Industry structure

To manage obligations efficiently, South Korean oil producers formed the KLOIA, which operates as a PRO.[15] Producers and importers must also pay an advance disposal fee for products that are difficult to recycle, ensuring financial sustainability of the system.[32]

Key considerations

- **Structured compliance** Annual recycling targets drive continuous improvement.
- **Industry collaboration** KLOIA enables streamlined producer participation.

Case study– Portugal (Outcome-based scheme)



Portugal's used oil management is overseen by a PRO, SOGILUB, which operates under the Community Eco-Management and Audit Scheme (EMAS). This centralised system ensures efficient collection, recycling and compliance with EPR obligations.[15]

Industry structure

- **Producer contributions** Lubricant producers pay EUR63 per cubic metre of lubricants sold (as of 2020), funding SOGILUB's operations.
- **Centralised PRO** SOGILUB manages the entire used oil value chain, from collection to recycling.
- **Budget allocation** SOGILUB dedicates 5 percent of its budget to communication and awareness-raising activities and 3 percent to R&D (as of 2020), fostering innovation and public engagement[15]

Key considerations

- **Efficiency** The centralised PRO model ensures streamlined operations but necessitates robust governance.
- **Innovation** Investment in R&D drives advancements in recycling technologies.
- **Public engagement** Awareness campaigns are critical to increase participation and used oil collection.

Appendix B– Common definitions

BASE OIL

Base oil is a primary component of lubricant oils, obtained from either crude oil during the refining process or from synthetic sources. Further, base oils are also used for the production of oils suitable for transmitting force (hydraulic oils, etc.) and facilitating heat transfer (transformer oils, thermic fluids, etc.) or surface cooling. After their intended use, these oils may become used oils or waste oils that may require environmentally safe handling, re-refining, energy recovery or disposal.[34]

LUBRICATION OIL

Lubricating oils are commonly used in transport and industrial machinery to reduce friction between interacting surfaces, thereby minimising the heat generated during their contact. After their intended use, the lubrication oils may become used oils or waste oils that may require environmentally safe handling, re-refining, energy recovery or disposal.[34]

USED OIL

Any oil derived from crude oil or mixtures containing synthetic oil including spent oil, used engine oil, gear oil, hydraulic oil, turbine oil, compressor oil, industrial gear oil, heat transfer oil, transformer oil and their tank bottom sludge; and suitable for reprocessing, if it meets the specification laid down in Part A of Schedule-V of Hazardous and Other Wastes (Management & Transboundary Movement) [HOWM] Rules, 2016 but does not include waste oil as defined in HOWM Rules, 2016.[34]



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Deloitte.

Viral Thakker
(Partner, Deloitte India)
vthakker@deloitte.com

Ashwin Jacob
(Partner, Deloitte India)
ashwinjacob@deloitte.com

Harsh Kapoor
(Partner, Deloitte India)
harshkapoor@deloitte.com

Ayush Rungta
(Director, Deloitte India)
rayush@deloitte.com

Aradhana Bhattacherjee
(Consultant, Deloitte India)
abhattacherjee@deloitte.com

Resource Efficiency and Circular Economy Industry Coalition

RECEIC Secretariat

Mritunjay Kumar
(Director, FICCI)

Tanya Khanna
(Assistant Director, FICCI)

Bhavya Negi
(Research Associate, FICCI)

RECEIC Working Group Members

Hindustan Petroleum Corporation Limited | Indian Oil Corporation Limited
Bharat Petroleum Corporation Limited | Castrol | Veedol
Green Gene Enviro Protection & Infrastructure Ltd | Aditya Birla Group
Rosefield Energy Tech Pvt.Ltd | ArcelorMittal Nippon Steel
Petroleum Re Refiners Association of India | Mahindra Group | IFP Petro Recykal | JSW Cement

Contact
Mr. Mritunjay Kumar
Director, FICCI & In-charge, RECEIC Secretariat

mritunjay.kumar@ficci.com, receicsec@ficci.com

About Centre for Sustainability:

The FICCI Centre for Sustainability Leadership is an initiative of Federation of Indian Chambers of Commerce & Industry (FICCI), launched in June 2023 with Hindustan Unilever Limited (HUL) and The Hongkong and Shanghai Banking Corporation Limited (HSBC) as Centre's founding members, FICCI Centre for Sustainability Leadership is a transformative initiative driving climate action in alignment with India's net-zero ambitions and the Panchamrit framework. It aims to accelerate the sustainability journey of businesses—spanning SMEs, startups, and large corporates—by institutionalizing sustainable practices and promoting climate solutions focused on circular economy, sustainable consumption, and climate tech innovation. The Centre aligns with the Government's Mission LiFE, encouraging businesses to adopt sustainable production and consumption practices while actively contributing to climate action.

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G20 New Delhi Leaders' Declaration acknowledges the critical role being played by circular economy, extended producer responsibility and resource efficiency in achieving sustainable development.

The Resource Efficiency Circular Economy Industry Coalition (RECEIC) is a global industry coalition, launched under India's G20 presidency with a focus on promoting resource efficiency and circular economy practices. It aims to facilitate and foster greater company-to-company collaboration, build advanced capabilities across sectors and value chains, bring learnings from diverse and global experiences of the coalition members, and unlock on-ground private sector action to enhance resource efficiency and accelerate circular economy transition.

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