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Briefing Note

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Single-Use Plastics (SUP): Impact of a 70% Reduction Findings, Market Dynamics, and Methodology

- *A 70% reduction in SUP would reduce demand by approximately $138 billion per year, within an estimated $197 billion global market.*
- *A 70% reduction in SUP would avoid roughly 3.85 million barrels per day of oil consumption almost as much oil as Exxon produces per day.*
- *Under this scenario, Dow's operating income could decline by 30% or more before mitigation efforts—based on a linear revenue-to-EBIT (earnings before interest and taxes) relationship and expected negative operating leverage.*

Executive Summary

This report provides a strategic analysis of the financial and operational implications of a potential 70% reduction in global single-use plastic (SUP) consumption. Our findings indicate a significant structural shift. A large reduction in SUP use would substantially lower plastics demand, reshape oil consumption patterns, and compress earnings for major producers. The estimates are designed to show order-of-magnitude effects, not precise forecasts.

Introduction

Globally, the oil and gas industry is feeling the pinch as demand growth slows, returning to pre-pandemic levels due to factors such as the adoption of EVs and slower-than-anticipated industrial expansion.[1] In this environment, producers have sought out other revenue streams.

One such avenue, thought to be a viable alternative, had been the production of petrochemicals. In reality, the economics of the petrochemical industry have been shown to be far more fragile than originally believed. Indeed, its economics are so fragile that a reduction in demand of any amount, or the oversupply of basic compounds, would cause major structural shifts.

As this report makes clear, the petrochemical industry faces both oversupply and decreasing demand problems. The scenario envisioned by the recent Pew report, Breaking the Plastic Wave, would have a profound effect on the profitability of the petrochemical industry broadly and specifically on single-use plastics.[2]

Market Dynamics and Industry Implications

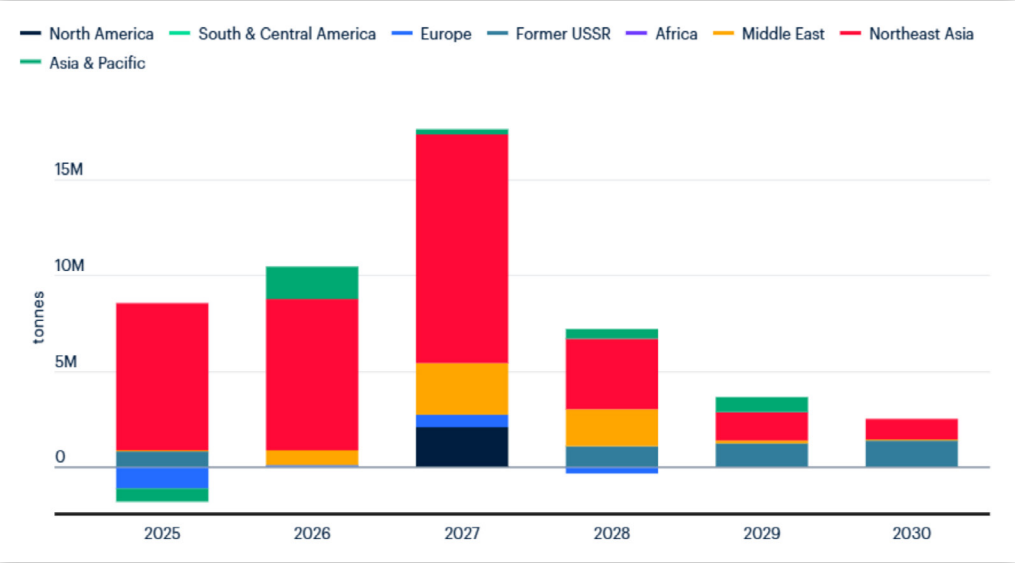
The plastics industry has experienced consistent growth, with the global market valued at approximately $640 billion in 2024 and forecasted to grow at a compound annual growth rate (CAGR) of 4.1%.[3] However, the growth has occurred in tandem with chronic oversupply, particularly in commodity plastics.

In an oversupplied environment, operating rates fall, margins compress and inter-regional arbitrage narrows as exporters compete for a smaller pool of demand. Producers with access to low-cost feedstock (e.g., ethylene in North America and the Middle East) maintain a relative advantage but their absolute earnings still decline as global utilization rates fall. As a result, company balance sheets become more sensitive to even the most modest shift in demand.

Capacity Trends

Between 2025-30, global ethylene capacity is forecasted to expand significantly, rising 31% in Northeast Asia (China) by the end of the decade. Meanwhile Europe is expected to see significant reductions in 2025 and 2028 (see Figure 1).[4] Although several companies have announced plant closures and "rationalizations," these steps appear insufficient to offset capacity growth particularly in China, which continues to add large-scale polyethylene (PE) polypropylene (PP) capacity. Additionally, the Middle East will also provide additional capacity over the same period. As a result, the industry is likely to face another down cycle until at least 2028.[5]

Figure 1: Global Ethylene Capacity Additions by Region



Source: ICIS Supply & Demand Database

The Inevitable Shift: Strategic Implications of Single-Use Plastic Reduction

If countries worldwide truly lean into cutting single-use plastics, the numbers tell a clear story of what would occur. A 70% reduction in SUP would shift about $138 billion out of a 2024 market size of roughly $197 billion. That hit lands where it matters most, because our analysis shows SUP has been the fastest-growing part of the sector. Between 2021 and 2024, global plastic demand rose at a 2.2% CAGR, while SUP grew at 2.7% CAGR, making it the key growth driver for producers.

The scale is consistent with what we already know from 2021: The world generated about 139 million tonnes of virgin SUP waste,[6] essentially in line with IEEFA's estimate of 137 million tonnes that doesn't include recycled streams. On the value side, plastic packaging accounted for about $265 billion in 2021.[7] Within that broader packaging market, Verified Market Research (VMR, 2022) estimated global PE packaging at about $110 billion,[8] which aligns closely with IEEFA's estimate of $113 billion (roughly a 3% difference).

Feedstock Linkages and Oil Demand

Plastics production is tightly linked to oil via naphtha and the natural gas liquids (NGLs), primarily ethane and propane. Plastics consumption has been the last major prop for long-term oil demand. With decarbonization accelerating, dependence on petrochemicals is becoming increasingly untenable as policies and markets move to cut single-use plastics.[9]

A significant reduction in SUP demand would not only eliminate millions of barrels of daily oil consumption but also send a clear signal that the long-term demand for oil is more susceptible to change than previously assumed. Such a shift would send a powerful signal for the need to re-evaluate long-term oil consumption forecasts and plans.

While some companies have leveraged their plastics divisions to sustain earnings through recent market cycles, any potential reduction in SUP portends a fundamental change that will need to be addressed by a company. Below, we look at one company as an example of the choices that a reduction in SUP would portend.

Company Implications: Dow — Background and SUP Reduction Impact

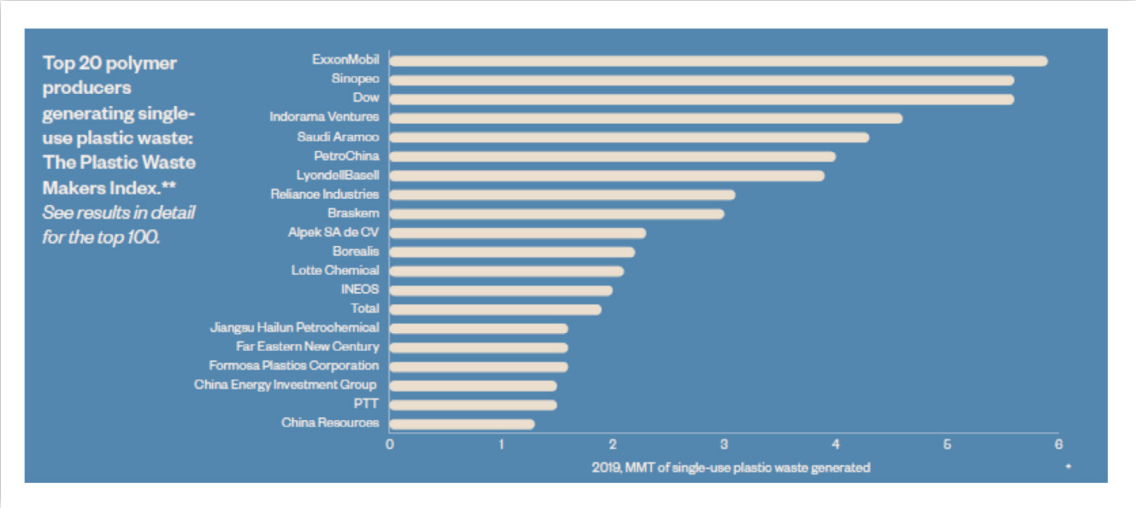
Dow Inc. is a global materials science company serving customers in markets such as packaging, infrastructure, mobility and consumer applications. The company is organized into three operating segments: Packaging & Specialty Plastics (P&SP), Industrial Intermediates & Infrastructure (II&I), and Performance Materials & Coatings (PM&C). The P&SP segment is the company's main profit engine.

Recent Performance Underscores P&SP's Importance

Despite challenging market conditions, the P&SP segment delivered positive operating margins of 11.7% (2023) and 10.9% (2024).[10] Overall, P&SP contributed just over half of Dow's revenue, providing more than 90% of total operating income in 2023–24 after subtracting corporate expenses.[11]

Using data provided by the Minderoo Foundation, we estimate that Dow produced about 5.75 million tonnes of SUP waste.[12] Extrapolating that result and using a regression analysis of operating income vs. revenue, we estimate that a 70% drop in SUP could reduce P&SP revenue by approximately 25% and cutting operating income by roughly 30%. Given P&SP's outsized contribution to total operating earnings, such a shock would likely keep the sector unprofitable at the consolidated level, absent mitigating actions such as capacity curtailments, cost savings, mix upgrades, and internal feedstock reallocations.

Figure 2: Dow Is One of the Leading Companies To Generate SUP Waste



Source: Minderoo. The plastic waste makers index. November 22, 2021.

Conclusion

The findings of this analysis, which are intended to be order-of-magnitude and decision-useful rather than a forecast, indicate that a 70% reduction in global SUP consumption would result in a substantial shift in the petrochemical and oil and gas industries. Such a shift would place serious pressure on any single company, as indicated by the Dow example. These findings underline the strategic urgency for companies to diversify away from single-use plastics, accelerate investments in recycling and circular materials management, reassess petrochemical capacity, and prepare for a structural reset in the global oil and gas market.

Appendix

The findings in this report were derived from a multi-faceted analytical approach.

Market Sizing

IEEFA calculated the estimated impact on the plastics market of ~$138 billion of demand reduction by applying a 70% reduction to the estimated global market size of ~$197 billion for single-use plastics. IEEFA also compared its estimate with global plastics-packaging value estimates and producer-level disclosures.

To arrive at its 2024 figures, IEEFA first conducted a correlational analysis using historical data from 2021. The Minderoo Foundation estimated that the world generated 139 million tonnes of virgin single-use plastic waste in 2021. Comparing this to IEEFA's estimate of 137 million tonnes for the same period (excluding recycled plastics) reveals a variance of only 1.7%. This strong correlation in volume supports IEEFA's market size estimates.

Similarly, IEEFA validated its analysis on the revenue side. While IEEFA's 2021 estimate for the SUP sector ($236 billion) was 12% lower than the broader plastic packaging sector's value ($265 billion), its analysis of a key market segment—PE packaging—showed a much closer alignment. PE packaging alone is roughly $110 billion (VMR, 2022), essentially in line with IEEFA's estimated $113 billion—roughly a 3% difference. This historical consistency in both volume and value metrics provides strong support for IEEFA's 2024 numbers, including its finding that the global single-use plastics market is valued at approximately $197 billion.

Oil Attribution

To estimate the amount of oil tied to single-use plastics (SUP), IEEFA started from published polymer and purified terephthalic acid (PTA) volumes and mapped them to refinery naphtha using industry-standard steam-cracking and aromatics conversion factors, with a standard mass-to-barrels conversion. For olefins, IEEFA applied typical cracker yields to the portion of output produced on oil-derived feed (as opposed to gas-based feeds) and converted the resulting naphtha requirement to barrels per day. Co-produced propylene from those same crackers is counted within that naphtha draw, while on-purpose/non-naphtha routes are excluded to avoid double counting. For polyethylene terephthalate (PET), IEEFA translated plastics-grade PTA into paraxylene (PX) and then into naphtha using commonly referenced aromatics yield relationships. Summing the olefins and PET chains provides an order-of-magnitude view of naphtha attributable to SUP today, which is about 5.5 million barrels per day (mb/d). A 70% reduction in SUP therefore implies roughly 3.85 mb/d less oil-derived feedstock demand over time.

The result sits comfortably within published ranges for plastics-linked oil demand and remains directionally robust across reasonable variations in the underlying parameters. Confidence in the estimate is bolstered by its correlation with a 2019 global consumption estimate.[13]

Earnings Regression (Dow)

The revenue and earnings impact on Dow Chemical's operating income was based on the mechanical approach. This involved assuming 5.75 million tonnes of SUP waste generated by Dow in 2019, a 3% CAGR and modeling a 25% revenue decline in the P&SP business and projecting a corresponding margin compression. The calculation resulted in an estimated 40% decline in P&SP's operating income, with a 30% or greater impact on the company's total operating income.

IEEFA modeled operating income (y) as a linear function of revenue (x): $y = a \cdot x + b$, estimated from reported results. For a proportional revenue change p, EBIT transforms to $y' = (1–p) \cdot y + p \cdot b$, capturing negative operating leverage via the intercept term (b). Applying a 70% reduction to SUP-linked revenue yields a 30% or greater decline in consolidated operating income.

Endnotes

1 IEA (2025), Global Energy Review 2025, IEA, Paris https://www.iea.org/reports/global-energy-review-2025. Accessed October 2025.

2 Pew. https://www.pew.org/en/research-and-analysis/reports/2025/12/breaking-the-plastic-wave-2025 December 2025.

3 GMI Research. Plastics Market Size, Share, Trends and Growth Report-Global Opportunities & Forecast, 2025-2032. May 2025.

4 ICIS. INSIGHT: Global ethylene and PE cycle to bottom by 2028/2029 even with capacity closures. September 10, 2025. (proprietary)

5 Ibid.

6 Minderoo Foundation. Plastic Waste Makers Index 2023. 2023.

7 STATISTICA. Annual production of plastics worldwide from 1950 to 2023. Accessed September 13, 2025.

8 VMR. VMR. 2022. Polyethylene Packaging Market Size And Forecast. Accessed September 13, 2025.

9 BP. BP Energy Outlook, 2024 edition.

10 Dow Inc. Form 10K, 2024. February 4, 2025, p. 39.

11 Dow Inc. Form 10K, 2024. February 1, 2023, p. 133.

12 Minderoo. The plastic waste makers index. November 22, 2021.

13 Statista. Oil demand for plastics production worldwide in 2019, 2050, and 2060. July 1, 2025.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

About the Author

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Todd has worked in a variety of roles in academics, the nonprofit, and government sectors. Most recently, he was the Deputy Cabinet Secretary for the New Mexico Energy, Minerals and Natural Resources Department, but has also managed the New Mexico affiliate of the National Wildlife Federation, worked as an attorney for the Missouri Department of Natural Resources, and in a prior life was a college history professor.

He has a JD from the University of Missouri-Kansas City and a PhD in Native American history from Oklahoma State University. He is the author of four books, a handful of articles, and numerous book reviews on Native American history.

When not working, you can find Todd with his nose in a book—either one that he is reading or writing.