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Tom Sanzillo || Director of Financial Analysis

Suzanne Mattei || Energy Policy Analyst

Abhishek Sinha || Energy Finance Analyst

Impact on Virgin vs. Recycled Plastics Prices and Implications for a Production Cap

- *Recycled materials are a key factor in the oversupply of fossil-based virgin plastics.*
- *Sustainable alternatives to virgin fossil fuel-sourced plastics are becoming increasingly reliable.*
- *Although price trends are complex, global virgin plastics prices are on a downward path.*
- *A global production cap would support a more robust adoption of recycling and other interventions, spurring a decrease in the production of virgin plastics.*

The market share growth in alternative materials, including recycled resins, is a permanent part of the petrochemical landscape and a contributing factor to the oversupply of fossil-based virgin plastics. The current oversupply of virgin plastics for most countries and brand producers is also driving the rapid decline in virgin prices.¹

Going forward, what is the role of a production cap on these market dynamics, especially its impact on prices of recycled resin? The answer requires stakeholders at the upcoming International Negotiating Committee (INC5) in Busan, South Korea, to view the risks and opportunities embedded in this dynamic on a legally binding plastics treaty.

The introduction of a plastics production cap comes at a time when sustainable alternatives to virgin fossil fuel-sourced plastics offer increasingly reliable choices for producers and consumers. A cap would most certainly decrease the volume of virgin plastics that enters the market. Although quite volatile, pricing today tells us that both virgin fossil-sourced plastics and sustainable alternatives are profitable short term, under various circumstances and locations.

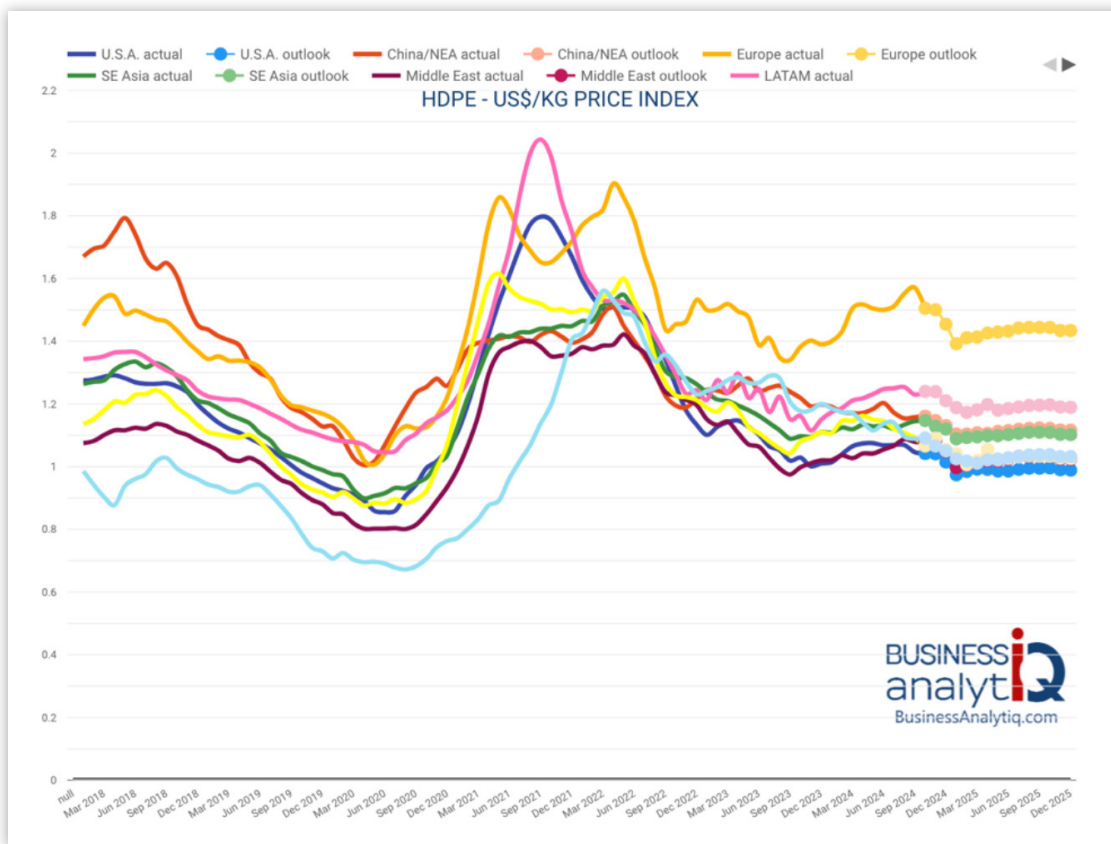


This profitability picture is taking place as relative fossil fuel production and associated uses are in decline and sustainable innovation is on the upswing. The adoption of a production cap is designed to support the gradual reduction of virgin fossil-sourced plastics to nurture a growing part of the economy and simultaneously support climate and environmental policy goals.

The price differential between virgin and recycled plastics today is driven by oversupply and declining prices of virgin plastics. The trends are complex. All virgin fossil fuel-sourced plastics are facing price declines. (See Figure 1). The trends show virgin plastics prices substantially lower than recycled plastics in the United States and basic price parity between the two markets (recycled and virgin) in Europe. In China, the price dynamics are reversed. (See Table 1). However, the price trend for virgin plastics is on a downward path globally,² and the viability of mechanical recycling improving.³

The winners and losers of the energy transition are still being sorted out.

Figure 1: Business Analytiq Historic Price Comparison of HDPE Across Geographic Sectors, 2017-25



The rate of adoption of recycling and other sustainable initiatives is being hindered by the market and price imbalance that favors virgin plastics. A global production cap is a starting point for public policies that support a more robust adoption of recycling and other interventions and favor a decrease in the production of virgin plastics.



Changing Nature of Markets in the Energy Transition

The price of virgin plastics is coming down now, due in large measure to overcapacity. Any rebound in virgin markets is unlikely to reestablish its former market dominance.⁴ A slow-growth economy and changing markets will slow the absorption of virgin plastics. Contributing to this trend are substantial demographic shifts in China as the aging population grows in relative size and falls into poverty.⁵ The forthcoming plastics build-out, still dominated by fossil fuel feedstock, is ill-advised.

Recycling prices are low. The prices have been typically lower than the price of virgin plastics but with the current overcapacity and oversupply, especially within North American markets, this trend is being reversed. And the terms and condition of the marketplace in many areas contain technical, logistical and political forces that undermine recycling scalability and reliability, notwithstanding relative price competitiveness.⁶ The price of recycling will also vary by the final use of the recycled product.⁷

A cap can be expected to increase the short-term price and profitability of the virgin plastics. It is thought that this price support, which lifts short-term virgin plastics prices. will serve to improve recycling’s competitive position.⁸

Looking at price dynamics, the trajectory of the markets is uncertain. A cap alone is likely to produce the positive result of diminished production. Nonetheless, it needs intelligent introduction of the policy, along with other initiatives that may differ in each country to work predictably.

Table 1: Recent Prices High-Density Polyethylene (Cents per Pound)

Country	Virgin HDPE ⁹	Recycled HDPE ¹⁰
Asia	\$0.46	\$0.35
North America	\$0.58	\$0.72
Europe	\$0.60	\$0.56

IEEFA uses HDPE as a proxy for all other polymers. Prices vary widely by product, country, and company, as well as over time. Price variations alternately improve or impair market conditions that support greater consumption levels of recycled and other sustainable products. (See Appendix 1: North America Comparison of recycling and virgin polymer pricing.)

Table 1 shows that prices for virgin and recycled markets vary by geography. The industrial quality of recycled plastics that producers need also alters the pricing of both recycled and virgin products (Appendix 1). What often appears as analytically contradictory trends between virgin and recycled prices are actually a series of price opportunities for industrial intermediate and end use consumers of plastics resins. Careful choices and timing by these producers spell the difference between profit and loss.

An accurate formulation of the recycling/virgin price dynamic is: Recycling price trends are largely competitive. Other market factors also have an impact on producer choices as they assess whether to use recycled or virgin materials.



These factors include the following:

- Competitive pricing by recyclables is often offset by other market factors such as costs of collection, sorting and repackaging.
- Oil price volatility that triggers periods of price spikes or collapses, making recyclables more or less competitive.
- Quality issues can be significant concerns—recycled plastics are often not as durable.
- Geographic location of infrastructure may be incompatible with markets, adding transport and other costs.
- Lack of transparency in plastics recyclables content.

China grew from the later 1990s through early 2020s—and that was the global story.¹¹ Now, the world is more complex. The overall price picture tells us:

- A global production cap has a macro impact that is likely to lower the volume of targeted polymers entering the market.
- The implementation will take place at the nation, state, and community levels, where supply, demand and regulatory factors can enhance or undermine the impact on recycled resin.
- The implementation of a cap does not create a straight line that ensures that recycling prices will always be price-competitive vis-à-vis virgin prices.
- Prices are influenced by an array of factors beyond supply and demand (see factors discussed above). Regional markets play a significant role.
- It is premature to assert if and how a cap will influence prices since it will serve as a market signal that restricts volume. Further, the message is clear that replacements for virgin plastics are preferable and require careful planning and cost control measures. A cap will also be taking place as other supply-and-demand-side initiatives are introduced.
- A cap is being introduced at a time of secular decline in the plastics industry. A cap can support companies navigating and adapting to new market conditions.

Conclusion

A global production cap on virgin plastics emphasizes that petrochemical, oil and gas production and use, which are lagging, will play a more limited role in the future. Perhaps the primary benefit is that a harmonized reduction in plastics production decreases the potential for disruption from floods of virgin plastics driven by oversupplied producers. The broad, volume-reducing impact of a production cap will be played out against the sustainability and circulatory blueprints of each nation.



Appendix 1: Price of Selected Industrial and Consumer North America Grade Polymers: Virgin vs. Recycle (USD Cents per Pound)

Product	Virgin Five Year Average	Virgin Five Year Average - ex Covid	Recycle Five year Average	Recycled Five Year Average -ex COVID
Polystyrene				
Crystallized	1.39	13.3		
High Heat Post Consumer Grind			0.1	0.09
High Heat Post Consumer Pellets			0.56	0.53
Polypropylene				
Film	0.88	0.79		
Post Consumer Grind			0.35	0.39
Post Consumer Pellets			36	0.32
Polyethylene Teraphthalate				
PET Pellets	0.87	0.69		
PET Clear Pellets			0.9	0.075
PET Grind			0.59	0.49
High Density Polyethylene				
Extrusion Film MMW	0.79	0.72		
Mixed Color Post Consumer Pellets			0.64	0.6
Mixed Colors Consumer Regrind			0.32	0.3



Endnotes

1 Businessanalytiq.com. [HDPE Price Index](#). Last viewed November 13, 2024. (“[HPDE Price Index](#)”).

2 [HPDE Price Index](#).

3 MacroMolecular Materials and Engineering. [Mechanical Recycling of New and Challenging Polymer Systems: A Brief Overview](#). November 5, 2024.

4 While analysts like ICIS point to some recovery of the markets post 2030, they do not envision fossil-sourced plastics production reaching the robust utilization rates of 90%+ until 2050, if then.

5 ICIS. [Stop Wasting time expecting the end of the downcycle](#). Asian Chemical Connection (Richardson Blog). August 19, 2024.

6 [HPDE Price Index](#).

7 Climateofourfuture.org. [Exploring the economic costs of plastic recycling](#). December 2022.

8 In Daniel Yergin’s *The Quest* (2011), he noted that protective policies supporting the coal industry developed over more than twenty years. The policies were now being challenged. He noted the deterioration of the consensus that supported coal development and the need to find other alternatives.

9 [HPDE Price Index](#). September 2024.

10 Chemanalyst. [Recycled High-Density Polyethylene – 1264, Pricing Data](#). September 2024.

11 ICIS. [China’s Demographic Crisis: Implications for Polymer Demand](#). August 2024.



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 Authors

Tom Sanzillo

Tom Sanzillo, director of financial analysis for IEEFA, is the author of numerous studies on the oil, gas, petrochemical and coal sectors in the U.S. and internationally, including company and credit analyses, facility development, oil and gas reserves, stock and commodity market analysis and public and private financial structures. Sanzillo has experience in public policy and has testified as an expert witness, taught energy industry finance and is quoted frequently in the media. He has 17 years of experience with the City and the State of New York in senior financial and policy management positions. As the first deputy comptroller for the State of New York Sanzillo oversaw the finances of 1,300 units of local government, the annual management of 44,000 government contracts, and over \$200 billion in state and local municipal bond programs as well as a \$156 billion global pension fund.

Suzanne Mattei

Suzanne Mattei, an attorney (Yale Law School) and consultant with Lookout Hill Public Policy Associates, has over 30 years' experience in environmental policy. As Regional Director for the NYS Department of Environmental Conservation for four years, she led permitting and enforcement in New York City. Her widely cited recent report on a proposed fracked gas pipeline in New York found flaws in proponents' arguments. As NYC Executive for the Sierra Club, her research exposed federal mismanagement of the 9/11 response; her testimony to Congress helped lead to passage of the James Zadroga Act, providing healthcare to Ground Zero workers.

Abhishek Sinha

Abhishek Sinha is an energy finance analyst at IEEFA. He analyzes petrochemical industry trends, regulations and company data. Abhishek covered the energy and chemicals sectors at Thrivent Asset Management for five years. He has a mechanical engineering degree from Bangalore University, a master's in management information systems from Texas Tech University and an MBA from Columbia University.



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