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Briefing Note

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Why a Production Cap on Plastics Makes Financial Sense

- *A production cap could smooth out current and structural market imbalances.*
- *Slow economic growth will reduce demand for primary plastic polymers.*
- *New technologies will reduce demand for virgin plastics.*
- *Volatility and price instability likely will persist under current market conditions.*
- *Geopolitics and trade will alter supply and demand trends.*

Introduction

The United Nations Environment Assembly passed a resolution in March 2022 establishing an intergovernmental negotiating committee (INC) to develop an international legally binding instrument on plastic pollution, including the marine environment. The goal of the instrument, referred to as the plastics treaty, is to end plastics pollution based on a comprehensive approach that addresses the full life cycle of plastic, including its production, design and disposal. Through INC's four sessions, it has become clear that current and projected levels of plastic production are severely undermining any potential solution to end plastic pollution.[1, 2]

This paper articulates the economic and financial basis to establish a cap on global plastics production. The production cap, once adopted as part of the final legally binding agreement, is expected to serve as the linchpin to end plastics pollution. Combined with a host of demand and supply initiatives, the cap will serve as a tool to reduce the production of plastics, particularly primary plastic polymers that are used for unnecessary short-lived products. The production cap proposed in the final agreement should allow production of only necessary plastics.

Background

During the COVID-19 pandemic, short-lived plastics were associated strongly with "shut-in" family and work life and urgent medical care. These plastics helped meet a public health emergency. The expansion of short-lived plastics took place as many other core functions of plastics were reduced. Producers of primary plastic polymers point to growing demand over the last 20 years from 200 million to 400 million tons for a compound annual growth rate (CAGR) of 3.8%.[3, 4] Some projections anticipate a further tripling of volume through 2050.

If realized, those projected levels of plastics production are likely to have a negative impact on the world's waterways, produce more fossil-sourced plastics, contribute immeasurably to climate change and harm the health of the planet's population.

The largely unfettered industry producing plastics is now experiencing a period of unprecedented financial risks that challenge traditional capital allocation and corporate planning processes. It is with acute awareness of these current market dynamics and the harmful effects of business as usual on the health and safety of the planet that drives this proposal for a production cap for certain primary plastic polymers that are used mostly in short-lived products.

A proposed production cap as developed by the INC is being introduced as the world's economy passes into a maturation phase of the energy transition. Policy development to reduce plastics pollution and combat climate change have passed through the articulation stage. The problem of plastics pollution and rising carbon emissions is understood . A broad range of sustainability plans have been promulgated by corporations, governments and international and regional bodies. The sustainability plans collectively provide greater granularity, defining the scope of change and suggesting options. Yet they have proven insufficient to address the plastic pollution crisis.

The articulation phase asked whether institutions were committed and whether they had a plan to contribute to solving the climate problem. The implementation phase that we are in now measures results of the planned initiatives. Operationalizing the foundational agreements embedded in the Montreal Protocols, as well as the Paris and Kyoto Agreements, the world now faces the challenge of proving the pledges—developing and implementing effective mechanisms to achieve the goals of climate policy. Effective implementation demonstrates the credibility of the sustainability plan.

The production cap is intended to be a country-by-country set of targets that progressively becomes more stringent over time and limits the production volume of a portfolio of polymer compounds and derivatives within national boundaries by a specific date. The production cap is anticipated to be part of the future plastics treaty. The cumulative impact of the cap is intended to be the main tool to ensure the achievement of a global reduction target.

Each country is responsible for creating implementation mechanisms designed to meet the goals by a certain date.

The purpose of this paper is to further articulate the financial and economic rationale for

a production cap. The essential financial case for a production cap must be understood fundamentally as part of a set of policy interventions designed to guide plastics producers and nations toward a market-based, workable plastics pollution reduction effort.

The production cap, implemented correctly, should help address critical risks facing the petrochemical industry. The production cap will help manage the declining demand for primary plastic polymers that is occurring, driven by slower economic growth, a largely oversupplied market (causing overbuilding and volatile pricing) and new competitive alternative technologies. The production cap should provide a firm, clear objective for each nation as it contends with a new set of global geopolitical realignments that are altering traditional trade flows. A production cap will answer the warnings now being sounded by credit rating agencies—specifically by Standard and Poor's and more generally by Moody's and Fitch. Finally, the production cap operationalizes the working definition of "essential use" and "non-essential use" plastics.

Opponents argue that a production cap would artificially curtail the manufacturing of intermediate and end-use final products. Such a policy, they contend, would have deleterious impacts on the market's ability to serve the needs of the public. The cap, opponents assert, would create market bottlenecks that will result in inflationary price increases. A cap, it is argued, would leave the world unable to provide the production volume increases needed during pandemics and other emergencies. A further argument is that a cap would lead to the total demise of the petrochemical producer network.

Quite the opposite. The current market for petrochemicals is in decline and the industry is ill-prepared to handle the new market formations driven by the energy transition. The cap does not seek the elimination of plastics. Rather, it seeks to ensure production of all the plastics the world needs and ***only*** the plastics the world needs.

Current Risks, Outlook and Implications for a Production Cap on Primary Plastic Polymers

The production cap is being introduced at a time when petroleum-sourced and petroleum-free economic activities are developing at the same time. Development patterns compete, conflict and cooperate as petroleum-sourced economic activity is eroding, and petroleum-free economic activity is rising broadly as a replacement.

The cap is being introduced as the production mechanisms that produce the world's primary plastic polymers are experiencing a series of financial risks and market imbalances. The implementation goals for the production cap are to be introduced at a rate to which markets can properly adjust. The production cap can serve to modulate and stabilize growing supply and demand imbalances and smooth the way for integration of sustainable products and business models into regional and global markets.

Although market analysts project steady, upward growth of plastics volumes through at least 2050, the market outlook for the industry is troubling. A slower global economic outlook, emerging sustainable alternatives, new geopolitics and trade patterns, as well as opposition to plastics growth on environmental and climate grounds, tells us that the next 10 to 20 years are likely to be very different economically than the last 10 to 20 years.

Traditional plastics production businesses that rely upon fossil fuel feedstocks and continue to rely on fossil fuel-generated electricity for production are on notice that significant change is coming. As progress is made to decrease the number of plastics produced, the subsequent amounts of plastics disposed of in environmentally destructive ways would also decrease. A production cap—and its attendant administrative processes that regulate the size and other critical elements of plastics production—is integral to a successful energy transition and to end plastics pollution.

Slow Economic Growth Going Forward Will Reduce Demand for Primary Plastic Polymers. Past Growth Will Not Be Repeated.

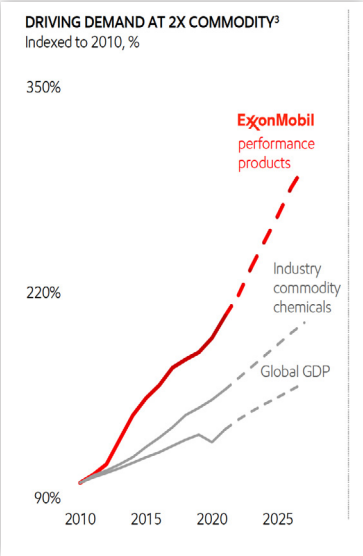
The large volume of polymer products and their derivatives produced during the first decades of the 21st century is unlikely to be repeated over the next 20 years at the same level.

The production of plastics doubled between 2002 and 2022. At that time, the global annual gross domestic product (GDP) growth rate was 2.9%. During this same period, China's annual GDP growth rate was 8.4%, and the United States GDP growth rate was 2.0%.

The United States Energy Information Administration (EIA) projects worldwide annual GDP to increase by 2.2% from 2022-50. China's growth is projected at a much slower pace, only 3.0%, and the United States is projected to increase by 1.9%. Analysts expect the next round of GDP estimates to be even lower.

The oil, gas and petrochemical industry historically has planned production rates in relation to GDP. (See Figure 1.) Petrochemical companies anticipate growth of specific commodities as multiples of GDP. Revenue estimates by companies are also driven in part by GDP growth. When a pullback in the growth rate of 25% over the next 25 years becomes the starting point for investment discussions, then investors must carefully review specific chemicals, volume, price, margins and market trajectory. Some analysts are looking at significant pullbacks in ethylene, polypropylene, and polyethylene.

Figure 1: Short-term commodity chemical growth as a function of GDP



Source: ExxonMobil. Investor Day Presentation. 2022, p. 8.

Dramatically lower feedstock prices for natural gas since 2007 created a U.S. cost advantage for new ethylene crackers and new plastics production.[5] China's expansion of crackers followed a similar path. Today, new construction plans for ethylene, polyethylene and polypropylene will exacerbate the existing oversupply and overcapacity conditions. For example, operating rates for some polypropylene precursor facilities (PDH) in China are as low as 50%, which increases operational costs and reduces profit margins. The slow-growth economy will lower absorption rates, and the conditions are likely to continue unabated through 2030, if not longer. Yet analysts have identified continued buildout.

The production cap is a management tool consistent with decreasing demand from slower economic growth and integral to reducing the environmentally dangerous, wasteful and unprofitable tendency of an unfettered market to overproduce. A production cap in the current market should turn the current disruptive trend of new plant delays and cancellations and other rationalization steps taken by market actors to bring supply and demand into balance.[6]

New Technologies Will Reduce Demand for Virgin Plastics

Oversupply and slow growth will combine with increased amounts of sustainable substitution products to further erode the need for virgin production growth. The rise of non-petroleum feedstocks for plastics will increasingly replace the market for plastic feedstocks derived from oil and gas. For example, recent estimates project that renewable methanol will comprise 12% of the market by 2030. New renewable methanol projects are substituting bio-feedstock for current fossil-based feedstock. Further to the point, fossil-based power generation for methanol production is increasingly being replaced by new quantities of renewable energy. This, like the use of bio-feedstock, will reduce the amount of oil and natural gas needed to produce methanol.

Companies and governments moving forward with new petrochemical facilities that continue to rely upon fossil fuel feedstock and power sources are likely facing negative questions

from credit raters (See Formosa discussion below). Since 2022, Standard and Poor's has informed Formosa that its Louisiana petrochemical plant is ill-advised and that other plants that are transition-ready are financially more viable. Standard and Poor's has expanded its credit opinion beyond Formosa to cover all petrochemical companies planning new facilities. Recently, Standard and Poor's and Moody's downgraded the company's outlook.[7]

Volatility and Price Instability Is Likely To Persist Under Current Market Conditions

Those opposed to production caps argue that restricting supply will lead to higher prices. The price increases presumably will trickle through the economy, driving inflationary pressures.

How petrochemical commodity prices react to a production cap during a period of oversupply and declining demand from slow growth and unprecedented competition is not at all clear. An unfettered market facing this confluence of factors could just as likely develop into a precarious downward spiral, harming profitability and investment.

If price increases from a production cap occur, then product demand for emerging sustainable alternatives should increase. Innovation in product design benefiting from lower production costs (relying in part on cheap renewable energy), subsidies and consumer demand can compete with petroleum-based plastics.

Despite the increase in anti-inflationary wind and solar power in industrial processes, few commodities survive without price increases over time. The market tends to manage such changes through competition. If pricing problems become more severe, regulation can be employed.

The energy transition is requiring new ways of looking at old problems. Market changes taking place during a time when policy interventions are robust could answer critical questions with more innovative approaches. For example, would a production cap be a cost driver when compared with petroleum-based vs. bio-based feedstocks using renewable energy? Would a production cap be a significant cost driver after a determination was made regarding essential and non-essential adjustments to production targets?

These matters are largely left to unregulated markets at present. Time and urgency have progressed to the point where a comprehensive regulatory intervention into the production, sale and distribution of plastics has become a necessity.[8] The regulation of the financial elements of plastics production can be developed to smooth out the profit and loss dynamics of the industry. Regulatory processes can be designed to manage related market volatility experienced by producers. Regulation can also modulate other cost factors that produce affordable products in reliable quantities for surrounding communities and global markets.

A production cap can serve as a starting point for countries to consider as they prepare to meet the shifting operational implications of the treaty.

Geopolitics and Trade Will Alter Supply and Demand Trends

Oversupply in the petrochemical sector is global in scope with very specific local and regional implications. The oversupply phenomenon is also occurring at a time of geopolitical re-alignment as new, fragile power blocs are emerging.

The new power alignments will disrupt traditional petrochemical trade patterns. The changed configurations will create a new set of market winners and losers. What emerges is at best confusing, such as China's attempts to address its oversupply issues (and solidify regional power) by selling into regional markets and undermining local economies in Vietnam, Malaysia and Thailand, as well as the U.S. and Europe.

A strained relationship between the United States and China is likely to continue, if not accelerate. Such changes would affect U.S. trade with Europe, Japan, South Korea, India and other Asian countries. The push-and-pull of tendencies to nationalize on the one hand while taking advantage of global opportunities on the other creates a destabilizing environment.

Finally, war and the fear of war are now driving economic decision-making. Whatever the outcome of the war in Ukraine and turmoil in the Middle East, geopolitical tensions and military spending are on the rise. Military budgets are expanding in most countries to address the "new Cold War" environment. Increased emphasis on military spending is likely to disrupt markets generally. Bain Capital, for example, has identified the specific effects of the Ukraine invasion on Europe's chemical sector. Broad changes in the structure of capital allocation are occurring.

These geopolitical realities create uncertainty and destabilized markets. Price shocks are a destructive corollary to geopolitical conflict. Production caps on plastics can offer a degree of certainty during periods of rapidly changing geopolitical conditions. The stabilizing impact of a national agreement is likely to mitigate shocks.

Credit Warnings Are Beginning To Sound Regarding Fossil Fuels, Petrochemicals and Political Opposition

An October 2021 credit opinion issued by Standard and Poor's found that a Formosa Plastics plan to build a new petrochemical mega-project in Louisiana was ill-advised due to market changes stemming from climate change and growing political opposition from local communities. The importance of the opinion is that the risks faced by Formosa were systemic, worldwide phenomena that would make any new petrochemical mega-project, by any company, highly unlikely to meet investment standards. Standard and Poor's reiterated the warning about petrochemicals in an October 2023 opinion, downgrading Formosa's outlook to negative.[9]

In a September 2020 commentary, Moody's issued a warning identifying eight oil and gas infrastructure projects that had been cancelled or substantially delayed. The agency said it was tightening its monitoring and review of these project types as companies were effectively tying up investor capital on speculative projects. The resulting negative outcomes had become a pattern. Since Moody's opinion was issued, IEEFA has identified nine more petrochemical plants that have proceeded and are now suffering delays, cancellations or weak financial performance.

Plastics Are an Essential Business—a Production Cap Is a Proper Management Tool To Guide the Industry During a Period of Transformation

Supply and demand trends indicate long-term oversupply in key petrochemical markets– including with respect to primary plastic polymers. New sustainable and technological pathways are altering fossil fuel demand and use in the petrochemical field. Trade patterns are changing, with critical impacts on traditional trade arrangements.

During the COVID-19 pandemic, the United States established a list of "essential" businesses. A look at the list reveals the government was most concerned with the supply of basic necessities: food, water, electricity and transportation. The list included the chemical industry and most of the sectors along the value chain of petrochemicals, due to their importance to the economy—particularly health care, food security, power generation, and transportation. Reviews of economic activity during the pandemic showed the impact on petrochemicals was mixed, with many product lines gaining and others losing.

There is a widespread presumption that petrochemicals, particularly certain plastics, are among the elements that a modern society considers basic necessities. The discussion during the pandemic highlighted that presumption more clearly. Unlike water, natural gas, electricity and other basic necessities that appear as items with separate and discrete costs, petrochemicals are woven into each item in the household's or business's market basket. A separate bill for "plastics" never reaches the kitchen table or corporate balance sheet—yet when increases in plastics prices occur, the impact is widely felt.

Fortunately, the world has a host of regulatory models that can form the basis of accounting protocols that allow for both regulation and competition.[10] Those models are sufficiently granular to allow consideration of local customer preferences and needs, as well as varying economic mixes in a service area. There is nothing inherently different about the financial structures of petrochemical business that would prevent well-designed regulatory systems to be created. A look at petrochemical company filings shows that balance sheets, income and expense statements, and debt management treatments for petrochemical structures are not all that different from regulated utilities. The integration of the host of energy transition changes taking place into traditional accounting structures is an important next step.[11]

The energy transition is setting in motion various governance frameworks to ensure stable markets that achieve economic and climate goals at the local and national levels. A regulatory model for plastics that prioritizes a cap on plastics production should be established at a global level.[12]

Consider, for example, the matter of short-lived plastics. Many uses of plastics, such as certain medical instruments or respiratory protection, are important and difficult to replace for health and safety reasons. At the same time, much of the short-lived market in packaging is unnecessary—adding substantial burdens to the world's health, oceans, landfills and air supply. No uniform definition for avoidable and unnecessary plastics has been adopted globally. This lapse has been acknowledged by the UN treaty negotiations. Those definitions and the implied policy mechanism to properly order them requires an ordering paradigm, and the production

cap is one such mechanism that can be adopted to achieve the broader goals of the treaty negotiations.

Conclusion

Given that the energy transition is likely to become a theatre of innovation, the changes required in product design and implementation all raise questions better suited for ongoing regulatory treatment. A proper system of regulation is needed that differentiates regulated products from unregulated products, and sets out broad parameters that help national entities to establish and maintain "Plastics Transition Commissions." A production cap can be easily accommodated using a framework capable of deciding what should and should not be regulated. For example, single-use plastics generally involve only a small set of actual petrochemical markets, but they comprise a portion of the market with a significant volume that must be managed. If a regulatory system is capable of regulating that market alone, it is likely to be a success.

To date, the industry has opposed most forms of oversight and regulation. This is no longer a practical path if industry leaders are seeking a stable investment rationale. The current state of affairs—substantial petrochemical oversupply with clear downward pressure on demand for virgin plastics—requires a remedial agreement among the parties to turn what is a problem into an operationally sound opportunity for achieving market stability and the goal to end plastics pollution.

Endnotes

1 The Institute for Energy Economics and Financial Analysis (IEEFA.org) will make available to any member of national delegations participating in the UN Plastics Treaty Negotiation, or other official participants in the UN Plastics Treaty Negotiation, specially prepared data: 2023 Estimated Production of Six Selected Plastics by Country. This data has been obtained by IEEFA under a contract with the Independent Commodity Intelligence Services (ICIS). Requests for the data should be made here.

2 Center for International Environmental Law. Legal Models to Control Primary Plastic Polymer. April 2024.

3 Baztan J,et al. Primary plastic polymers: Urgently needed upstream reduction. Cambridge Prisms: Plastics. 2024;2:e78.

4 Statista. Global Production of Plastics since 1950. Last visited August 19, 2024.

5 Daniel Yergin, *The New Map* (New York: Penguin Books, 2022).

6 For a discussion of new plant delays and cancellations see discussion in IEEFA. Mitsubishi's bad bet. July 2024.

7 Moody's. Moody's revises outlook of four Formosa companies to negative; affirms A3 ratings. February 29, 2024.

8 Charles Phillips, *The Regulation of Public Utilities*, Third Edition (PUR Books, 1993).

9 Standard and Poor's. Formosa Credit Opinion, October 2021. Also see: Standard and Poor's. Formosa Outlook Revised to Negative,October 2023.

10 Regulatory Assistance Project. Electricity Regulation in the United States. Last visited July 2024. Also see: CSIS. Indian Regulation. Last visited July 7, 2024.

11 There is general awareness of the changes needed in business models. See: UNEP. The New Plastics Economy Global Commitment. More specifically, Moody's recent Net-Zero Assessment analytic tool raises the questions of how sustainability investments alter capital allocation, revenue mixes and profitability. See: Moody's. Net Zero Assessment. 2023.

12 The Center for International Environmental Law has provided a broad outline of the political consensus needed to address the legal and regulatory tenets of an international agreement that identifies the basic definitions of primary polymer plastics.

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

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