

Polyethylene Market Overview: Thriving in Leaner Times

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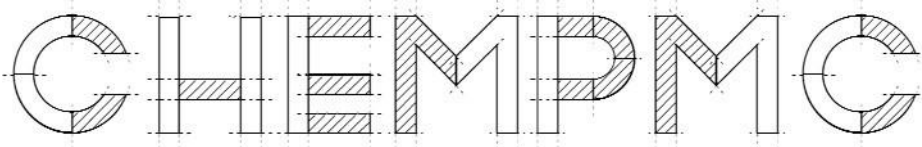
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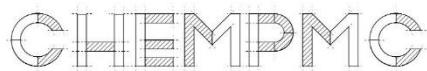
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1. Executive Summary

This report complements the presentation conducted by Esteban Sagel at FPA's Annual Meeting in Tucson, Arizona on March 22, 2024.

The themes of 2023 are getting a repeat in 2024. North American demand for polyethylene fell by 5% in 2023, driven down by changes in consumer's consumption habits, as well as rapidly expanding imports of finished and semi-finished goods like polyethylene film. Those imports, which are expanding at neck-breaking speed, are being fueled in part by North America's exports of polyethylene, ethane and ethylene. Exporting our competitive advantage is helping converters and polyethylene producers in the importing regions achieve better costs. As a result, polyethylene film imports into the U.S. from those regions are growing at a 14% average annual growth rate.

The environmentalist war against plastics is opening new fronts, this time on the potential impact of plastics in human health. We see litigation and regulation against our industry on the rise. Unfortunately, most of the measures needed to achieve the hefty goals established for our industry are outside of our control. Infrastructure investments, harmonization of standards, reduction in the complexity of plastic waste, lack of cost competitive PCR resins, regulation uncertainty, and the need to improve collaboration across the value chain are some of the roadblocks ahead of us.

ChemPMC expects total polyethylene demand to decrease by 2% this year, with production rising by 4% and exports by 12%. Those exports are feeding an already oversupplied global market, which will result in additional pressure for polyethylene producers' margins to compress. Prices in 2024, after weather-related increases in the first quarter, should moderate and even decline for the balance of the year, driven by poor supply and demand dynamics.

However, just as we witnessed in early 2024, there may be external factors that could impact this pricing outlook. Eighty percent of the North American polyethylene capacity is located in the U.S. Gulf Coast, which makes it extremely vulnerable to tropical weather. And the forecast for 2024 is for an overly active hurricane season, particularly during its tail end. We recommend caution in inventory management during late summer and early fall, or alternatively to consider risk-reducing strategies for polyethylene supplies during the second half of the year.

2. Thriving in Leaner Times

Last year, during the Flexible Packaging Association meeting in Amelia Island, we talked about how, after surprisingly good years for the polyethylene industry in North America, things were starting to change. Demand for polyethylene, which grew strongly in 2020 and 2021, saw a big decline in 2022.

The region's capacity to produce polyethylene, which had expanded non-stop since 2017, increased again in 2022 and was expected to grow in 2023. This was not just in North America; polyethylene capacity in China was also growing. The net result of declining demand and increasing capacity was to push the market into an oversupply situation.

We were also seeing an increase in the pressure against plastics, from an environmental standpoint. Consumers, consumer product companies, NGOs and even governments were turning up the heat on our industry. Rising regulatory pressures and ever-increasing negative perceptions against plastics were starting to impact the prospects for demand growth. North American producers were also sending vast amounts of polyethylene overseas, and needed to sustain record levels of exports to keep their newly minted polyethylene plants operating at high rates. And, finally, prices, which had seen record levels in 2021, were weakening, bringing down with them the record margins producers had been enjoying.

Our expectations for 2023 were pretty much for more of the same. In this document we will review how everything that we were expecting regarding demand, supplies, trade, environmental pressures, and prices, actually came to pass. We will analyze how consumer trends as well as finished goods imports are affecting demand for polyethylene in the region. We will see what producers are doing to try to compensate for declining domestic demand, and how that affects the relative competitive position of North American polyethylene transformers versus foreign competitors. We will see how market distortions (and benefits) brought about by the pandemic are fading away. We will discuss how we are losing the public relations war against plastics, and the roadblocks that affect our ability to change this outcome. And we will also see how 2024 will likely be a painful year for producers.

For consultants, being right on a forecast is usually a reason to be excited. This is one of the times that being right doesn't feel great.

So, as we review what has happened in 2023 and predict where things may be headed in 2024, we will look for the silver lining in this challenging year. We will see the power of really understanding what's going on beyond our borders. We will shed a light on your costs versus those overseas. We will review how competitive are U.S. producers of polyethylene resins. We will study how an increasingly competitive global market for polyethylene may impact converters in beneficial ways. We will look for potential sources of cheap PCR resins. In summary, we will look for ways to change our perspective.

We will look for ways to thrive during lean times.

3. The North American Polyethylene Market

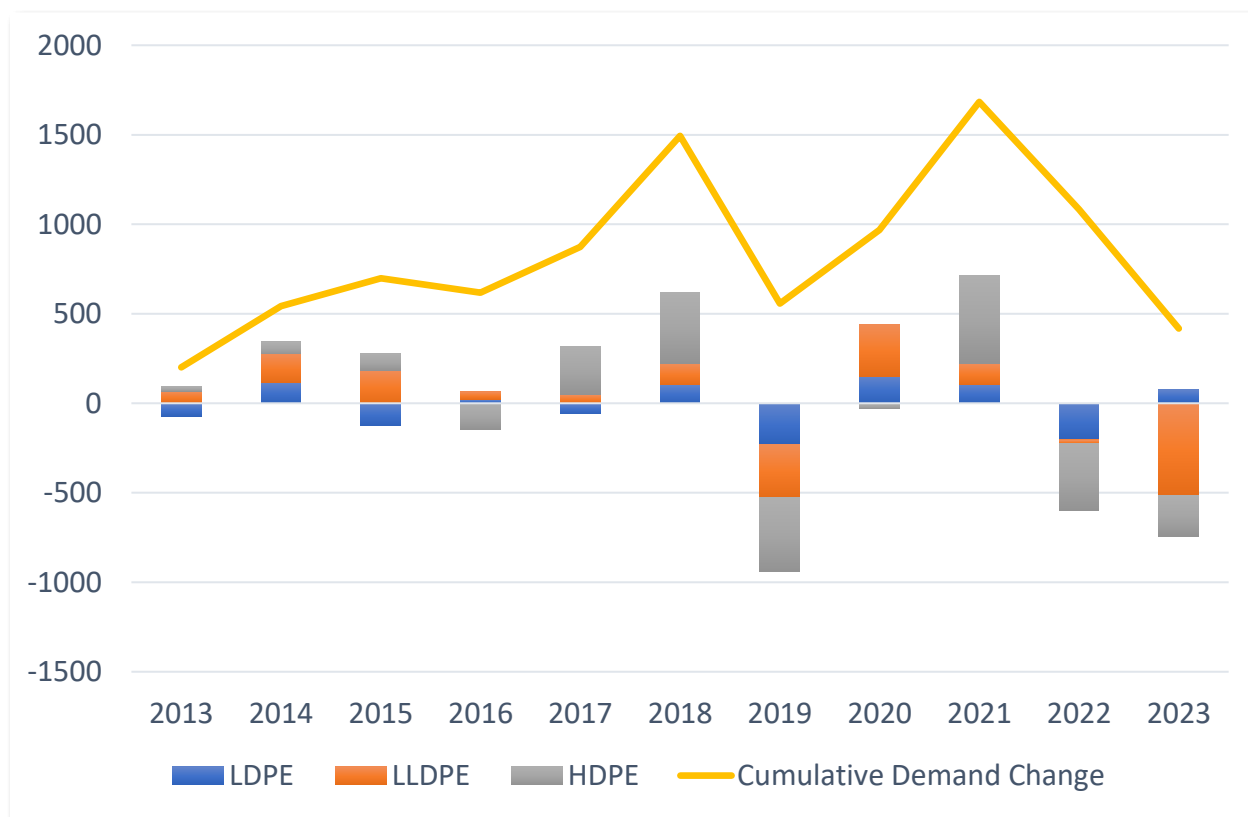
3.1 Domestic Demand

Demand in North America continued to falter in 2023. Overall demand for polyethylene decreased by 5% last year, after decreasing by 4% in 2022. The worst performing product last year was linear low density polyethylene. Demand for LLDPE decreased by 10% last year. High density polyethylene demand fell by 3%, after dropping 5% in 2022. LDPE was the only exception, increasing demand by 3% after an 8% drop the previous year (see Figure 1).

One concept we would like to clarify is what do we mean by demand. In the context of the polyethylene industry, domestic demand is the amount of polyethylene pellets that are converted to/transformed into finished or semi-finished goods. In 2023, ChemPMC estimates that the U.S. and Canada consumed 2.5 million metric tons of LDPE, 4.8 million metric tons of LLDPE and 6.8 million metric tons of HDPE. Between 2021, when polyethylene demand peaked in the region, and 2023, our region has lost 1.3 million metric tons of domestic demand. To put this in perspective, this is *equal to losing 2.5 world scale plants of demand in the region*¹.

¹ "World Scale" is a subjective measure of capacity, that takes into consideration the current technological status of the industry. Currently, world scale ranges from 500 to 600 thousand tons of capacity for LLDPE and HDPE, and 500 thousand tons for LDPE.

Figure 1 - North American (U.S. + Canada) Polyethylene Demand Change (KT)²

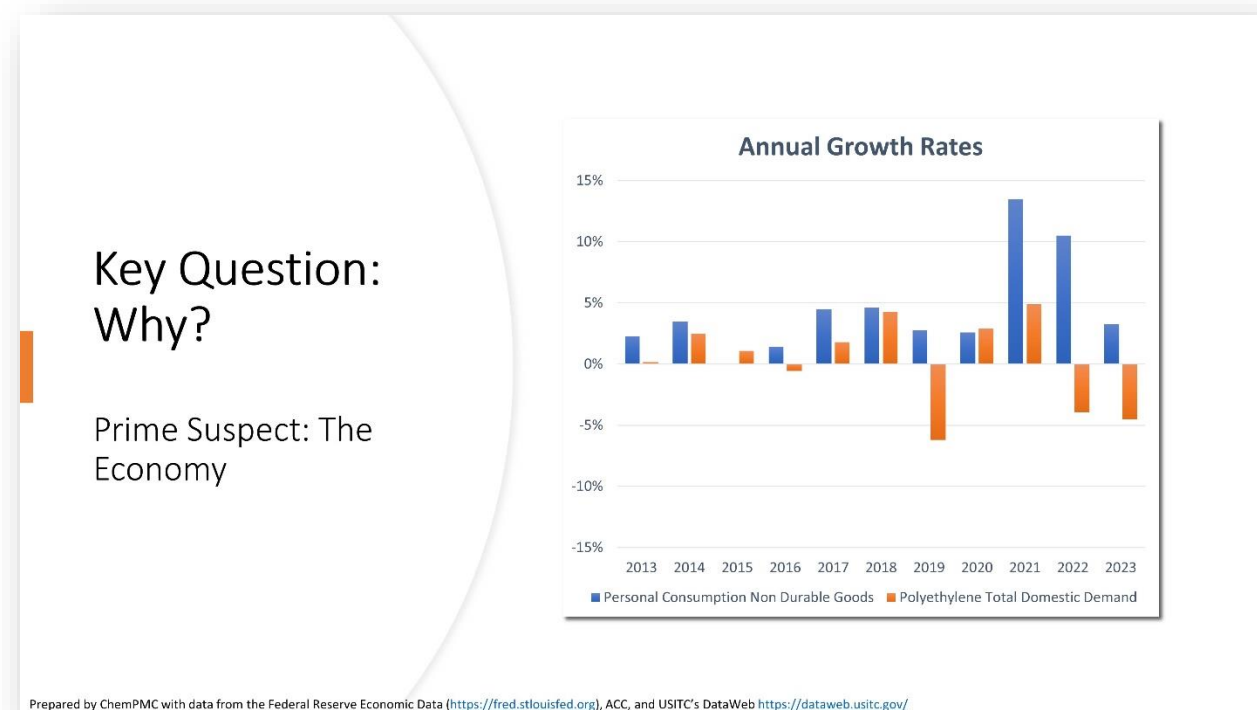


By any measure, the loss in domestic demand in North America is staggering. The key question to ask is why we are seeing such decreases in the conversion of polyethylene into finished and semi-finished goods in the region.

One potential suspect that may be driving this trend is the economy. Polyethylene is a commodity product that goes into many applications. But, for the most part, polyethylene is consumed in non-durable applications, such as packaging. Non-durable end uses are very sensitive to consumer's, well, consumption. In order to evaluate how much personal consumption of non-durable goods may be affecting polyethylene, we analyzed the growth trend in this economic measure (personal consumption, non-durable goods) versus the growth (or lack thereof) in polyethylene demand (Figure 2).

²² Prepared by ChemPMC with data from ACC & from USITC's DataWeb <https://dataweb.usitc.gov/>

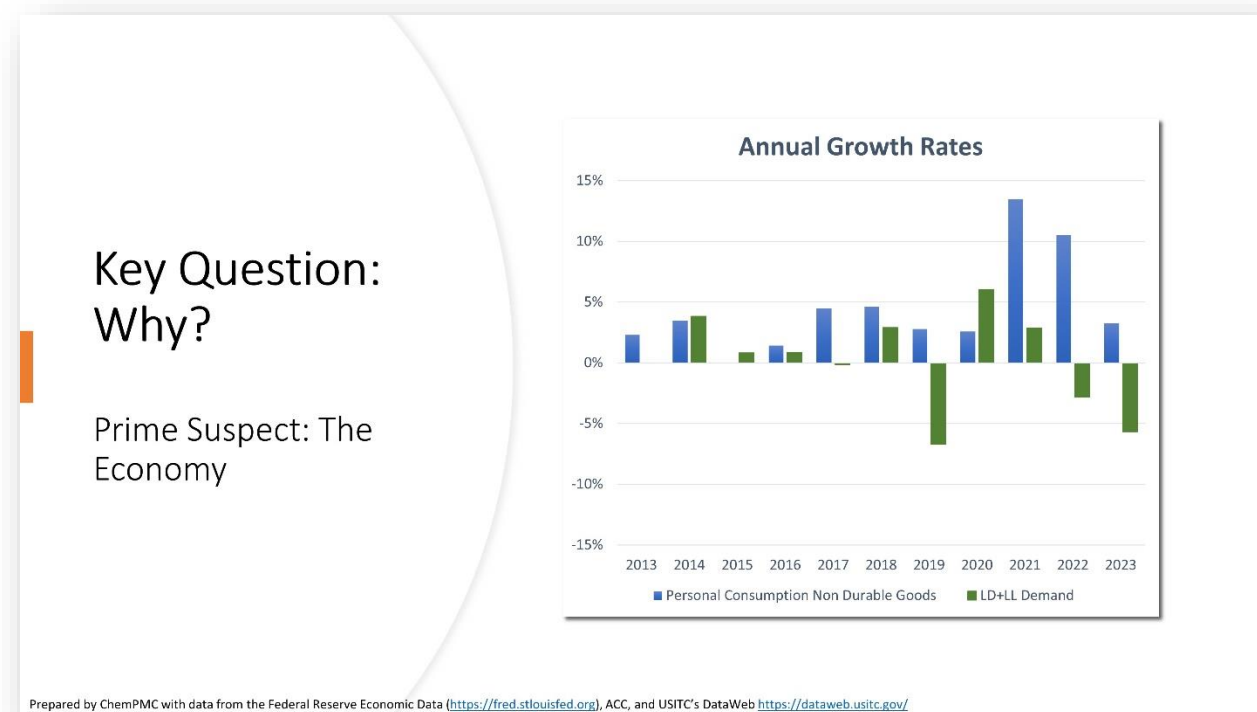
Figure 2 – Growth Rate Comparison - Personal Consumption, Non-Durable Goods Vs. Polyethylene Demand



At first sight, this chart does not show a great correlation between these two variables. There are several instances when personal consumption of non-durable goods increases and polyethylene demand decreases. The intensity of the change is also different; only in a couple of instances (2018 and 2020) the growth in both variables match. In other instances when both variables grow, personal consumption growth is stronger than polyethylene demand growth.

Those of you that may know polyethylene a little bit better, might be saying right now that this may be because *not all polyethylene goes into non-durable applications*. And you are not wrong! High density polyethylene is the one type of polyethylene that goes well beyond non-durable end uses. We see HDPE consumed in automotive parts, building and infrastructure products, and even in electric and electronic applications. So, the logical next step would be to run this same analysis again, but now just focusing on LDPE and LLDPE, which are for the most part used in non-durable applications (Figure 3).

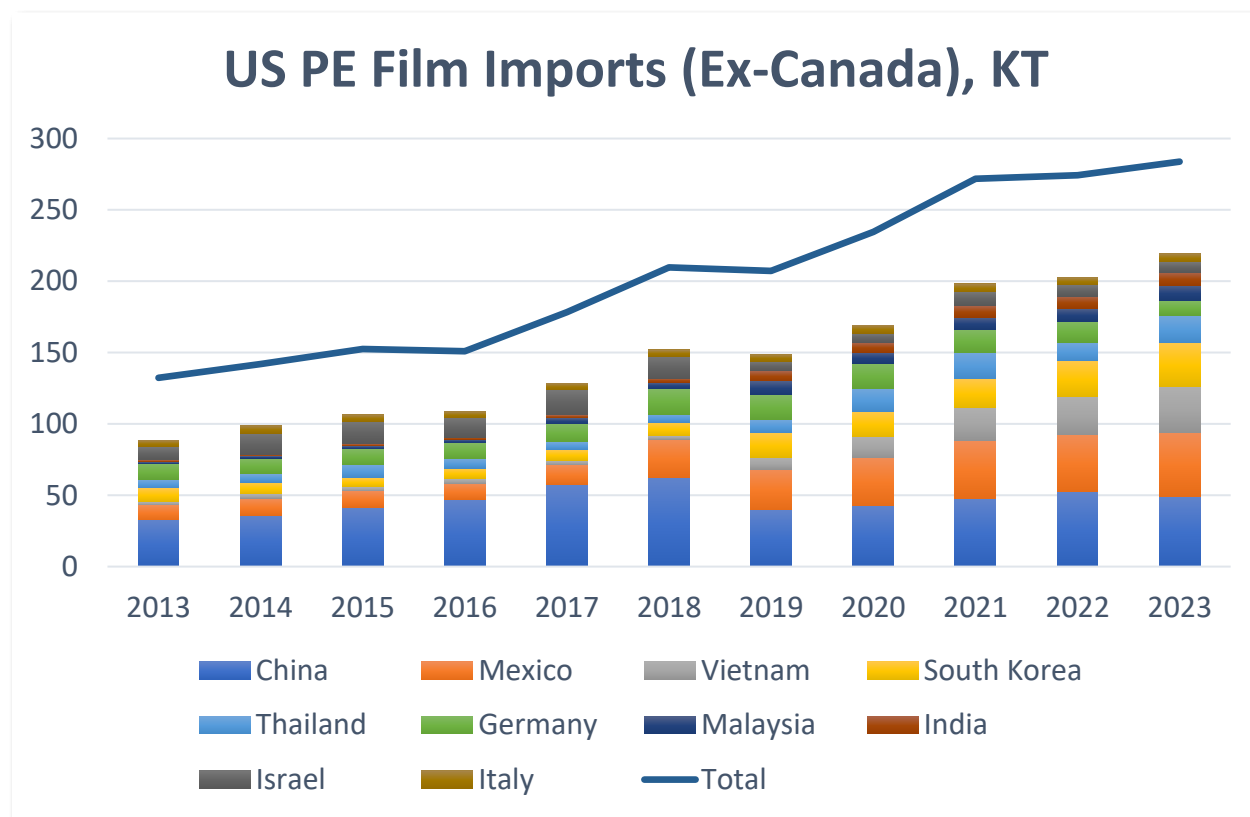
Figure 3 - Growth Rate Comparison - Personal Consumption, Non-Durable Goods Vs. LD+LL Demand



Unfortunately, as you can see in Figure 3, the correlation doesn't really improve. This is not terribly surprising. As I mentioned earlier, demand in the context of the polyethylene industry is the amount of resin that is converted into finished or semi-finished goods. But those goods may be produced in other regions and shipped into North America. Therefore, what is our analysis missing? Imports. The addition of domestic conversion plus finished or semi-finished goods imports may result in a demand figure which correlates better with trends in personal consumption of non-durable goods.

This gives us a clue of something else we need to consider, and another suspect to look into - imports of articles made out of polyethylene. What is going on with competition from abroad? And, particularly for the flexible packaging industry, what is going on in terms of polyethylene film and sheet imports into the U.S.?

Well, we looked at it, the picture ain't pretty (Figure 4). Between 2013 and 2016, U.S. imports of polyethylene film and sheet were increasing by 4% on average. That average annual growth rate rose to 9% for the 2016 to 2023 period.

Figure 4 – U.S. Polyethylene Film & Sheet Imports (Excluding Canadian Imports), KT³

We estimate that, by 2023, film and sheet imports represent 4% of the domestic demand for these products. Not resin demand, *but actual demand for film and sheet in the region*. There are a few countries that take the lion's share of imports into the country. They include China, Mexico, Vietnam, South Korea, Thailand, Germany, Malaysia and India. One thing to note is that some of those countries (Asian countries as well as Mexico) tend to have more competitive polyethylene prices than prices in North America. In addition, other factors that impact film production costs, such as salaries, are much lower in those countries than in the U.S.

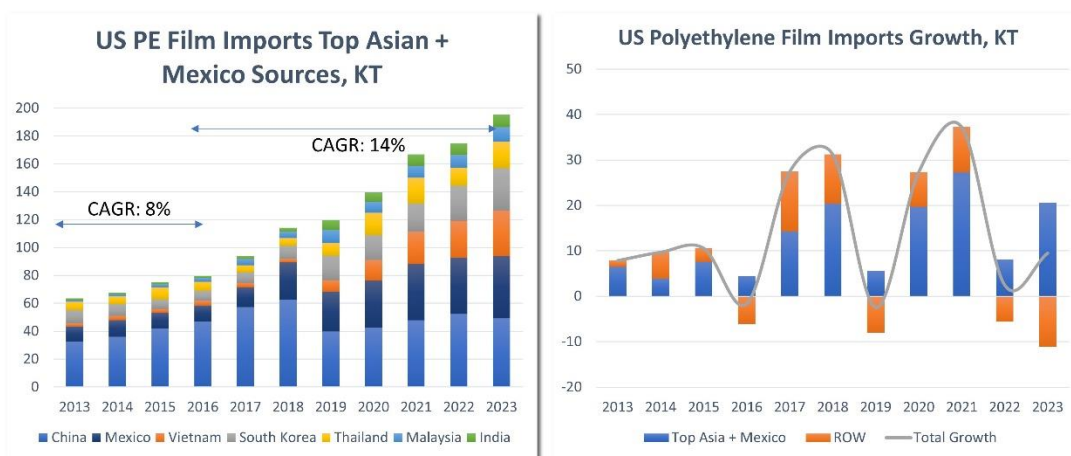
When we drill down this analysis, concentrating in the imports from competitive regions, we can see that they are accelerating (Figure 5). Film and sheet originating from the top Asian sources and Mexico were already growing at fast rates in the years prior to 2016. Between 2016 and 2023, polyethylene film and sheet imports from those countries have experienced a 14% average annual growth rate. In fact, the second chart in Figure 5

³ Prepared by ChemPMC with data from USITC's DataWeb <https://dataweb.usitc.gov/>

compares the annual growth in imports from Top Asian & Mexico sources versus imports from the rest of the world. As you can see, imports Asia and Mexico have consistently grown in the period of analysis.

Figure 5 – U.S. Polyethylene Film & Sheet Imports, KT

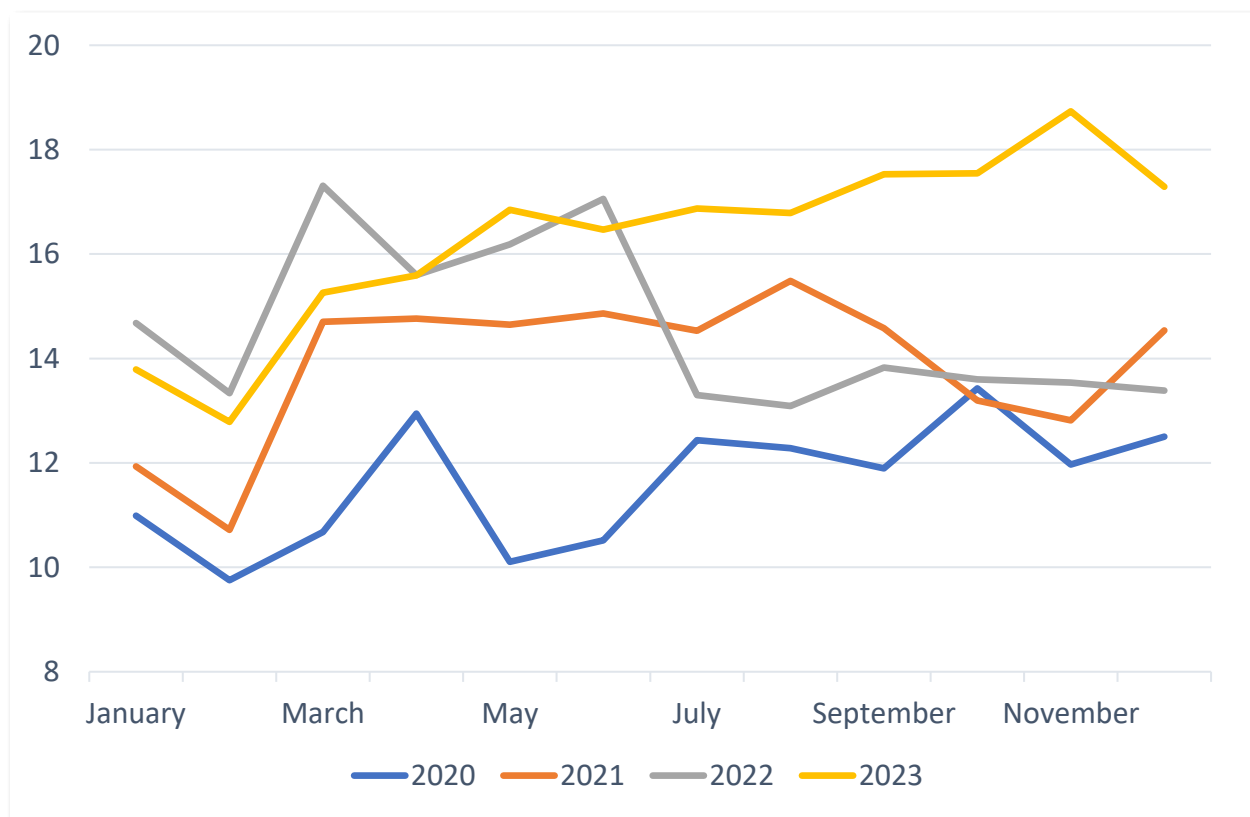
Imports from Competitive Regions Accelerating



Prepared by ChemPMC with data from USITC's DataWeb <https://dataweb.usitc.gov/>

If trends were to continue, we estimate that, in 10 years, film and sheet imports into North America may represent anywhere from 9 to 15% of the domestic film demand. And you could say this analysis is conservative, as it assumes that polyethylene conversion into film and sheet remains stable at current levels. Only in 2023, we estimate that North American polyethylene conversion into film and sheet decreased by 6% versus its level in 2022.

What's more concerning is that the trend for rising imports from cost competitive regions is accelerating. Figure 6 shows the U.S. monthly polyethylene film and sheet imports from competitive Asian sources and Mexico. As you can see from the yellow line, monthly imports from those countries accelerated in July of last year, and reached levels not seen in any of the three prior years.

Figure 6 - U.S. Monthly PE Film & Sheet Imports from Top Asian & Mexico, KT

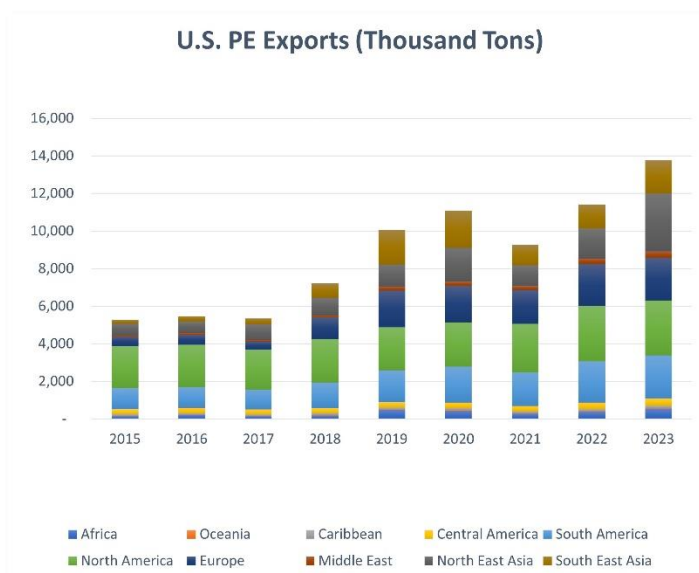
As you already know, what I think is relevant for you is not so much the recognition of the trend, as it is understanding why. Why is this happening? What is driving the accelerated imports of polyethylene film into North America? To understand that, we need to look at a couple of trends that are taking place in our region, concerning the trade of polyethylene and of its raw materials.

3.2 Polyethylene Exports

For the year 2023, ChemPMC expects U.S. polyethylene annual exports to reach 14 million metric tons. This unprecedented level of exports is approximately 2.5 times its level in 2016, right before the wave of new capacity started to hit our country (Figure 7). Before those investments were completed, there was much concern about the ability of North America's logistical infrastructure to handle such large increase in polymer exports. The results speak for themselves.

Figure 7 - U.S. Polyethylene Exports

PE Exports:
2.5 Times
What They
Used To
Be...



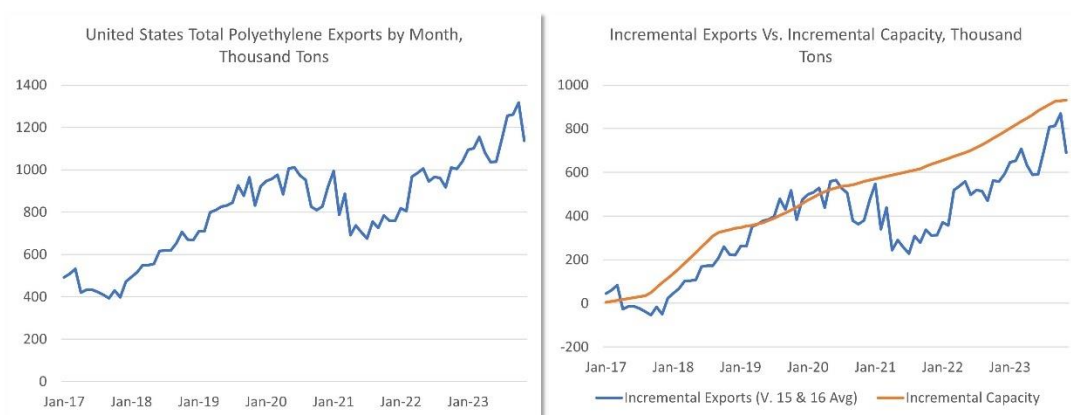
Prepared by ChemPMC with data from the USITC's DataWeb <https://dataweb.usitc.gov/>

During our presentation last year, we commented how at the beginning of 2023 monthly exports had broken again the 1 million metric tons level. Boy, have we left that record behind! For most of the year, monthly exports out of the U.S. continued to expand, reaching a new record of 1.3 million metric tons by October of last year (Figure 8). Continuing with the idea of perspective, this is the equivalent of 2.5 world scale plants being exported in a month! Do you remember when we mentioned this relative figure just before? It was when we talked about the overall decrease in demand in the region between 2021 and 2023. So, in a single month, polyethylene producers exported the equivalent of the lost domestic demand in the region.

Exports are slowly achieving the objective they had, which was to help run the new polyethylene capacity at high operating rates. The chart on the right of Figure 8 compares the incremental monthly exports (versus the 2015 and 2016 average), against the incremental capacity. As you can see, once the issues brought about by freezes in 2021 and pandemic-related logistical logjams were solved, exports slowly got closer to the level required to run plants at high operating rates.

Figure 8 – United States Monthly Polyethylene Exports (KT)

Breaking Records (and Achieving Objectives)



Prepared by ChemPMC with data from the USITC's DataWeb <https://dataweb.usitc.gov/> as well as ChemPMC Capacity Database

ChemPMC estimates that, in 2023, average operating rates for polyethylene increased from 80% in 2022 to 84%. They are still well below their level in 2016, but, without exports, operating rates would be dramatically lower (Figure 9). This further demonstrates the relevance of exports for producers these days.

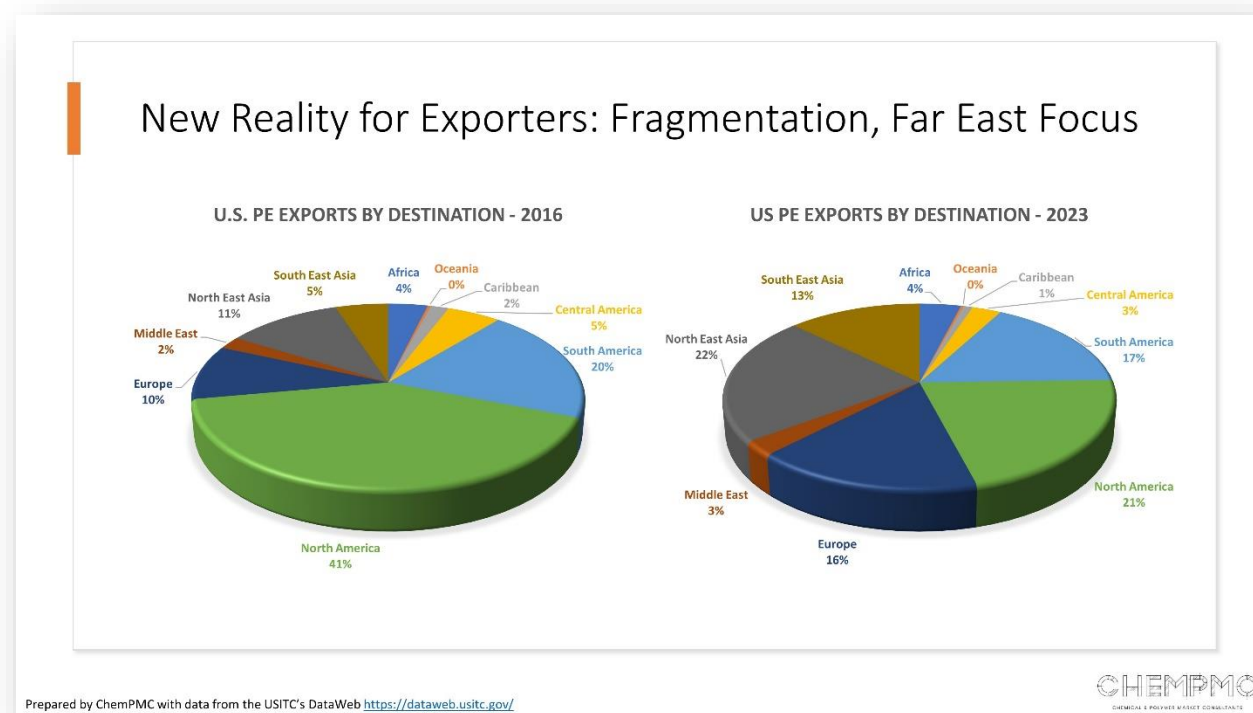
Figure 9 – North American Polyethylene Operating Rates⁴

	2016	2022	2023	2016 (w/o Exports)	2023 (w/o Exports)
LDPE	90%	81%	85%	69%	49%
LLDPE	94%	81%	88%	71%	37%
HDPE	93%	78%	81%	70%	49%
Total PE	93%	80%	84%	70%	44%

⁴ Prepared by ChemPMC with data from ACC & from USITC's DataWeb <https://dataweb.usitc.gov/>

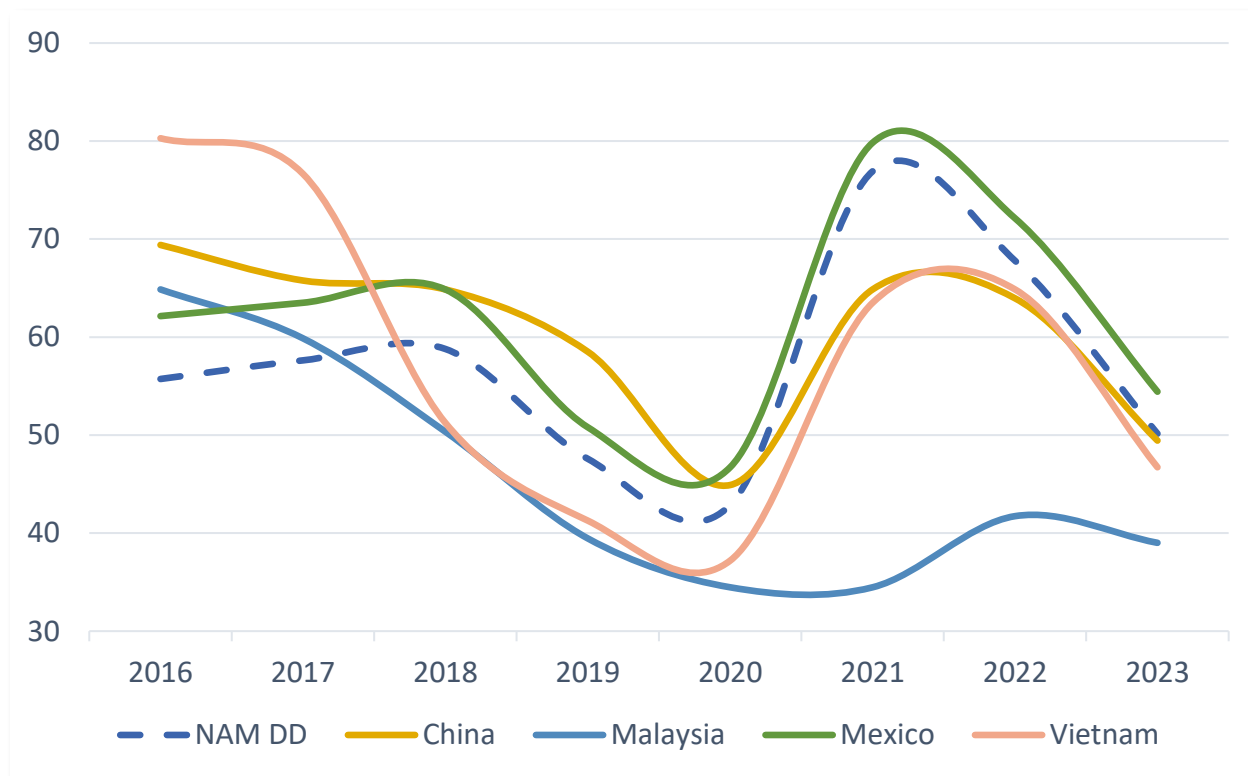
Right before the expansions in capacity in North America started in earnest, most polyethylene exports out of the U.S. were destined to North and South America (left chart, Figure 10). These regions had similar price dynamics as the U.S., ensuring that the realized export prices were somewhat close to domestic prices in the country. Now, fast forward to 2023; U.S. producers have had to find new markets for their products. As a result, in 2023 Northeast Asia became the number one destination of polyethylene exports, surpassing exports into Canada and Mexico. Exports to Southeast Asia more than doubled, and exports to Europe increased their share by 6%.

Figure 10 – U.S. Polyethylene Exports by Destination, %



Now producers must address a more fragmented export market, with destinations increasingly far, and market dynamics that tend to be very competitive. This is noticeable, when we compare our estimate of the average domestic discounted price for LLDPE, versus the average U.S. export price to some of the countries that are increasing their imports of polyethylene film into the U.S. (Figure 11).

Figure 11 - LLDPE US Average Export Prices Vs. US Domestic Discounted Price - CPP⁵



In 2016, the average U.S. domestic price was the lowest of them all. Fast forward to 2023, and, except for Mexico, U.S. exports into Malaysia, China and Vietnam were priced below domestic prices. These are actual average prices of U.S. LLDPE exports to those countries. And, in case you have doubts on the domestic price estimate, it is based on U.S./Canada trade (representing actual transactions between both countries, which enjoy tariff-free status and can be considered domestic sales for the purpose of this analysis).

Well, now you know it (*that U.S. exports to some destinations are priced at lower levels than domestic sales*). The question is, can you do anything about it?

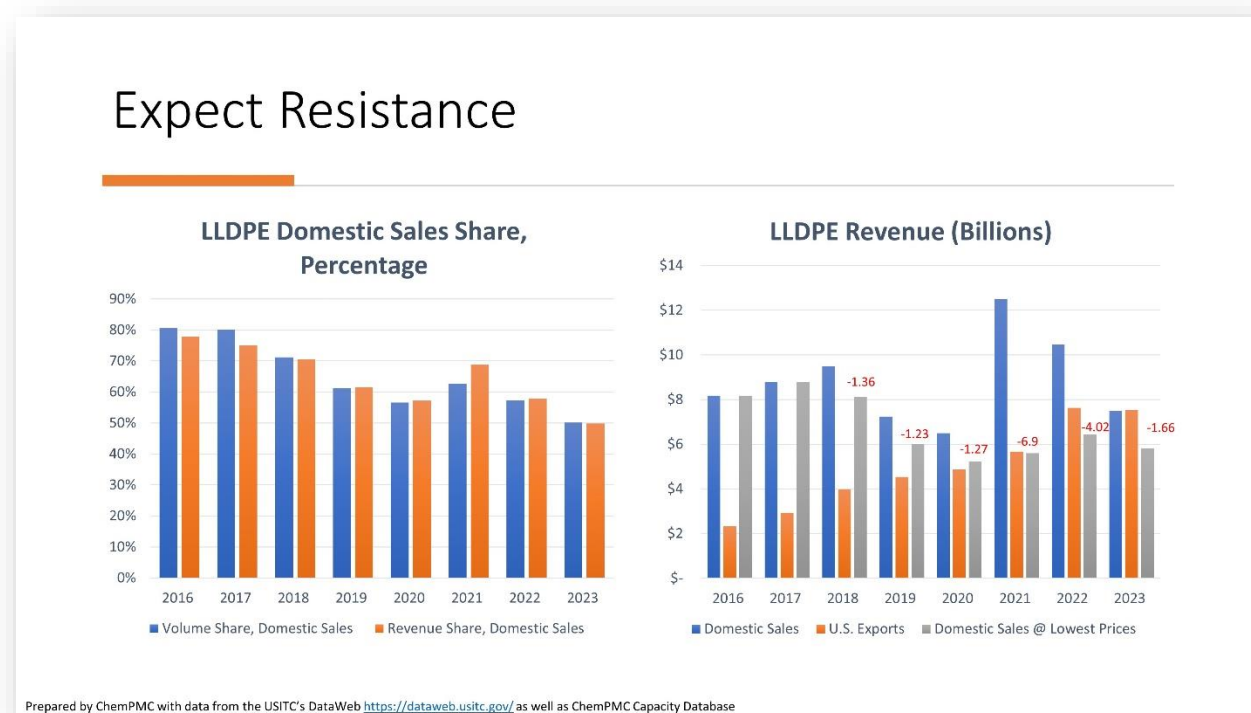
First, knowledge is power. You need to really understand the price dynamics, not just in the U.S., but in those markets from which you are starting to face competition. And you should also analyze the pricing of U.S. exports into those markets that are competing with you. And compare those prices to whatever it is that you are paying for your polyethylene

⁵ Prepared by ChemPMC with data from USITC's DataWeb <https://dataweb.usitc.gov/> and ChemPMC Price Database

within the region. If your prices are higher, you should ask the hard questions – why is my price higher than export prices to Malaysia? To China? To Vietnam? If you don't ask those questions, what is the alternative? You may witness overseas converters take market growth away from you, using to some extent North American polyethylene...

Expect a lot of resistance from suppliers. See Figure 12, which analyses the LLDPE sales in North America, both from a volume and revenue standpoint. As the chart on the left shows, except for 2021, the revenue and volume share for domestic sales have been close to one another. Further analysis shows that the average domestic price was close to the average price of exports for the 2018 to 2023 period (excluding 2021). That said, average prices obscure the whole story. We already saw that U.S. export prices to some destinations are lower than domestic prices (Figure 11).

Figure 12 – North American LLDPE Sales & Revenue⁶



⁶ To simplify this analysis, Domestic Sales = US & Canada Domestic Demand (as estimated by ChemPMC), and Exports = US Exports. Most of Canada's exports are destined to the U.S., so excluding Canadian trade revenues and volume doesn't have a material impact on the conclusions presented here.

What would happen if domestic sales had been priced at the lowest export price? That is what you see in the right chart in Figure 12. Between 2018 and 2023, producers' revenue would have been \$16.5 billion lower than what it was. Or another way to put it, your polymer expenses during that period would have been \$16.5 billion lower than what they were. It is up to you to figure out which way is which...

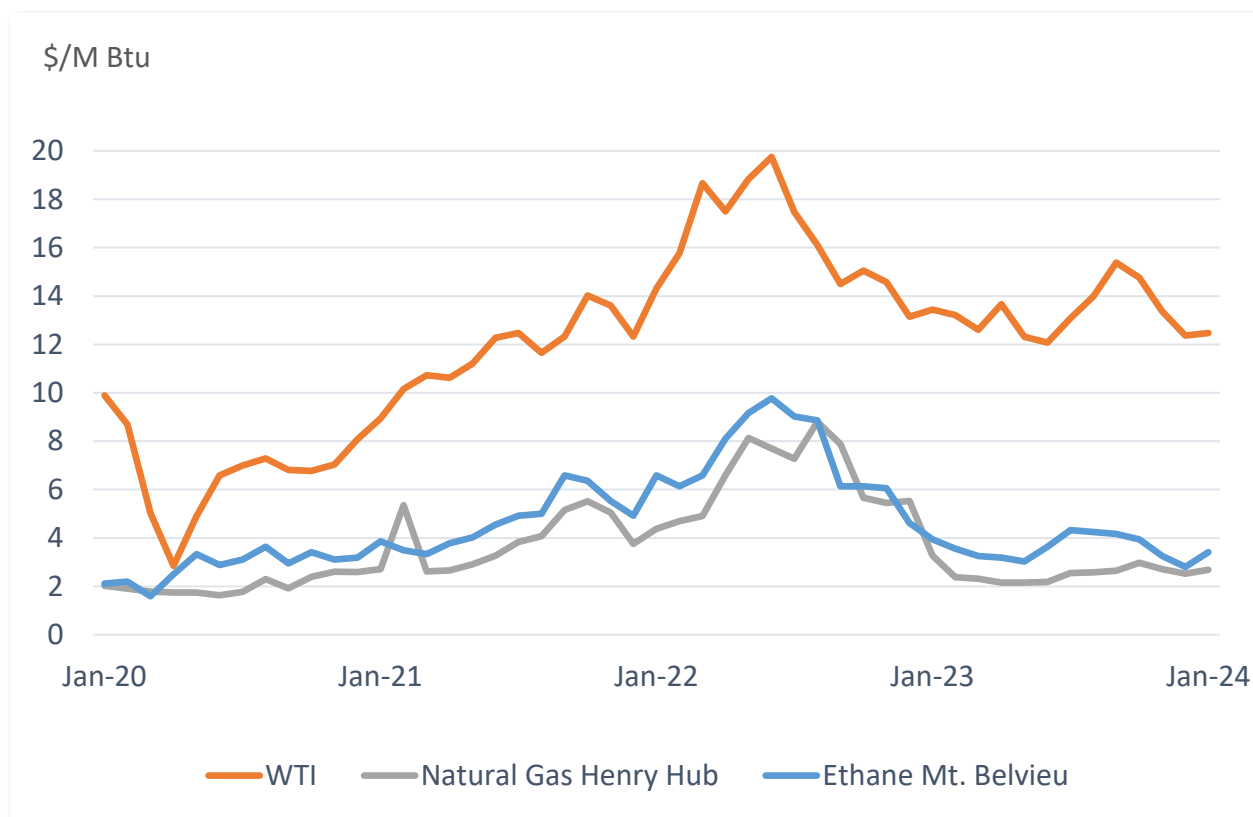
3.3 North American Polyethylene Production Cost Advantage

In prior presentations and reports, we have discussed how polyethylene production in North America enjoys a cost advantage versus production in other regions. Let's once more review the reason why.

Polyethylene's main raw material is ethylene. In (very) simple terms, to produce ethylene, you take hydrocarbons such as naphtha (oil derivative) or ethane/propane/butane (also called natural gas liquids) and you "crack" them into smaller hydrocarbons. The process is called cracking, and the facilities where you make ethylene are called ethylene crackers.

In our 2022 report for the Flexible Packaging Association "*Polypropylene: What's Going On?*", we addressed how hydraulic fracturing technology and the advent of the shale revolution in the region caused a vast increase in the amount of "light" hydrocarbons, particularly ethane. This resulted in low prices for ethane (when compared to the price of oil-related feedstocks such as naphtha). Consequently, ethane became the preferred feedstock for ethylene production in North America. And it continues to be so.

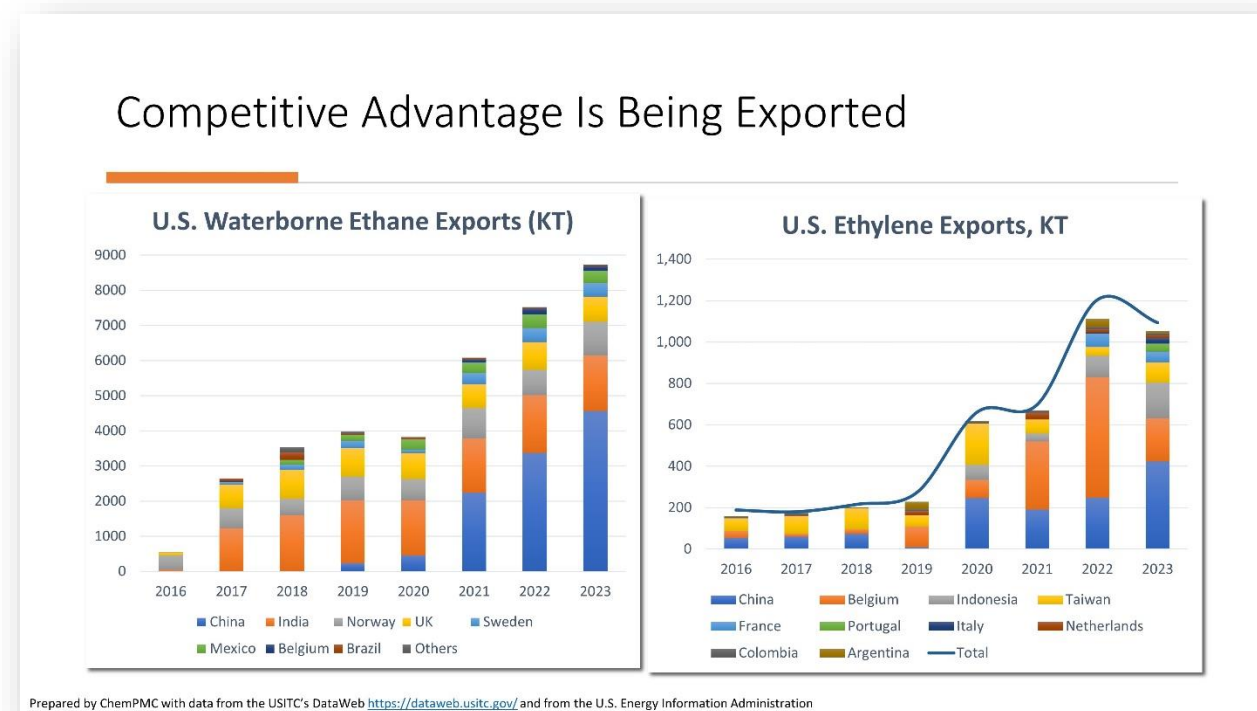
As you can see in Figure 13, ethane prices in early 2024 were 66% lower than oil prices (when valued in \$/MMBTU, or dollars per energy content, which allows for apple-to-apple comparisons). In North America, we can confidently say that most, if not all, polyethylene producers are integrated into ethane. What this means is that virtually all polyethylene produced in the region uses ethylene that was manufactured using ethane. And that ethane is vastly cheaper than the naphtha that many producers overseas, particularly in Northeast Asia, use for the production of ethylene and polyethylene.

Figure 13 – Energy Feedstocks Prices, \$/MMBTU

This confers U.S. polyethylene producers with a comfortable cost advantage, and a safe margin cushion, as polyethylene prices are set by the highest-cost producer, in this case naphtha-integrated producers located in China. As a result, U.S. producers can access virtually any market globally and be competitive versus local producers as well as with imports from other regions. The record exports that we saw earlier in Figure 7 are a testament to that cost advantage.

However, that same abundance of ethane, as well as an oversupply of ethylene in the region, is driving other changes that are impacting you now, and may impact you even more in the future. Figure 14 shows the exports of ethane and ethylene out of the U.S.

Figure 14 – U.S. Ethane and Ethylene Exports, KT



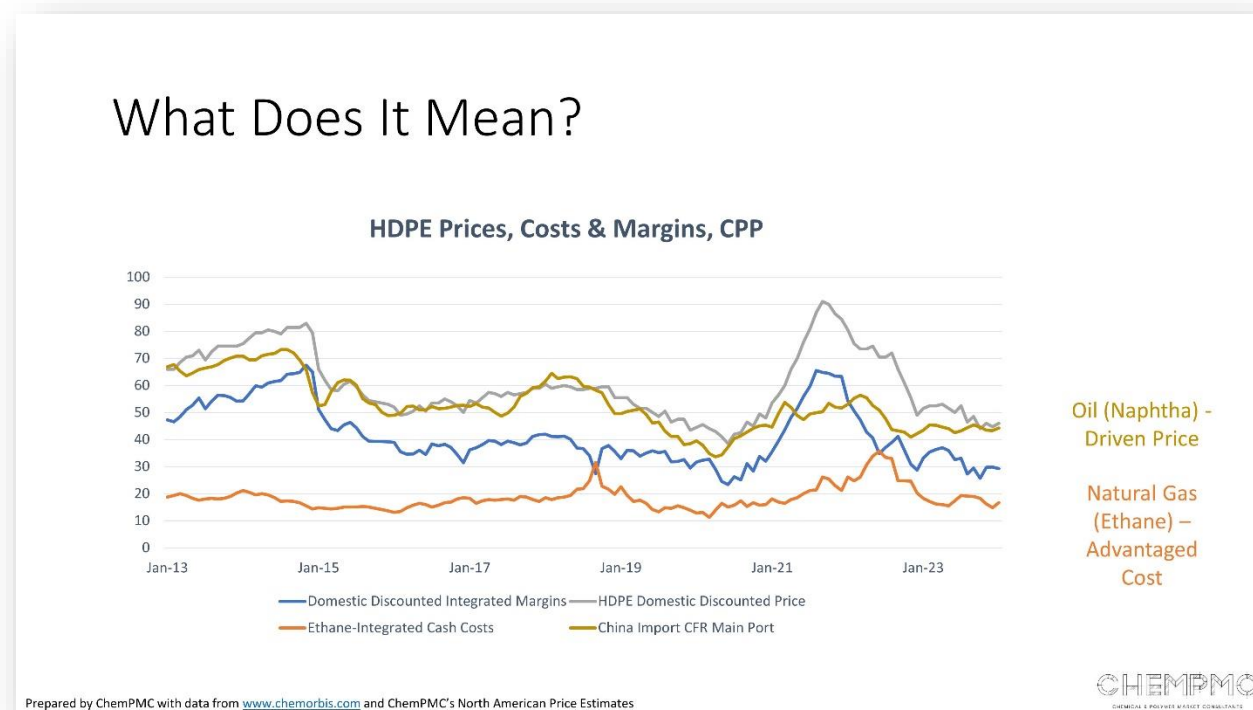
Waterborne exports of ethane began in 2016, after the opening of [two waterborne ethane export facilities](#) in Marcus Hook (PA) and in Morgans Point (TX). A third facility was opened in Nederland (TX) in 2021. On the other hand, before 2020 there was only one ethylene exporting facility, operated by Targa Resources. In 2020, Enterprise Products and Navigator started up a 1 million metric ton per year export terminal.

As you can see from the charts in Figure 14, exports of these products have taken off. In 2023, the U.S. exported 8.7 million metric tons of ethane and one million metric tons of ethylene. Of those, 4.5 million metric tons of ethane and 400 thousand metric tons of ethylene were exported to China. Why is this relevant? Because *our cost competitive advantage is being exported*.

As we mentioned earlier, polyethylene prices are set by the highest cost producing region, which historically had been China (due to its naphtha-based ethylene/polyethylene production). It appears that it continues to be the case, as we see in Figure 15. But, since we exported 4.5 MMT of ethane to China in 2023, potentially *4.5 million metric tons of*

polyethylene produced in China now enjoy a cost advantage that is closer to the one we have in the U.S. My colleague [Mark Woods from Ethylene Strategies International](#) tells me that as much as 11% of China's crackers are now fed with low-cost ethane sourced from the U.S.

Figure 15 – HDPE Price, Costs & Margins (Cents Per Pound)



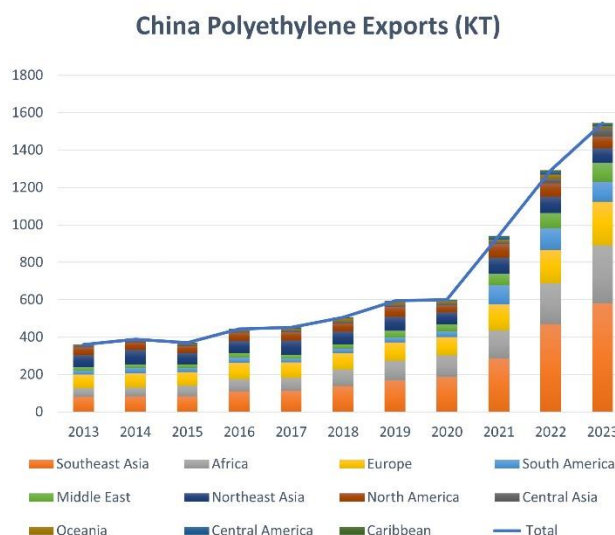
It is not easy to venture how this competitive advantage is being used. What I can tell you is that, since 2021, polyethylene exports out of China have taken off (Figure 16). And what are the top destinations of those exports? Vietnam, Russian Federation, India and Bangladesh. And do you remember one of the top countries exporting film into the U.S.? Vietnam, of course. And China too. I could not find any evidence of China exporting polyethylene at below-market prices (and, believe me, I looked). That said, its increasing use of ethane for ethylene production reduced the average cost for Chinese polyethylene production, allowing the country to be competitive versus other exporters of pellets. And that cost advantage may be making its way to China's converters, helping them sustain their position as the largest exporter of film into the U.S.

Figure 16 – China Polyethylene Exports, KT

Finished Goods From China Not Our Only Worry

Top Export Destinations: Vietnam, Russian Federation, India, Bangladesh

Source: Trade Map, International Trade Centre & ChemPMC Estimates



And be aware that the trend of exporting our cost advantage is only going to expand further. There are plans by Enterprise and Energy Transfer that, by 2026, would [double the country's ethane exporting capacity from what it is today](#).

3.4 What Does It All Mean?

Now you know that polyethylene demand in North America is retreating. With that we mean that *conversion of polyethylene into finished and semi-finished goods* is retreating. Economic trends, such as changing consumer habits, are affecting demand for our products. But now you also know that imported finished products are another big factor affecting demand trends in the region.

Where are those imports coming from? China, Southeast Asia, and Mexico primarily. What do those regions have in common? Competitively priced exports out of the U.S., including exports of polyethylene, ethane and ethylene. Those exports, particularly of ethane, are providing China with a better cost position for ethylene and polyethylene production.

Now you *also* know that the price you pay for polyethylene may not be the lowest price, when compared to prices in other regions and *when compared to export prices out of the U.S.* That is a knowledge that cannot be undone. But knowledge is power. You must *regularly* track and understand the price and cost dynamics not just in the U.S., but also in regions competing for your business (China and Southeast Asia). And you should also track the export prices out of the U.S. into those regions. And, armed with that information, ask the hard questions. Why are you paying more? And ask for competitive prices in North America. Your future depends on that.

4. The Fight of Our Lives

4.1 Plastics: Losing the Public Relations War

For years, our industry has been confronted with terrible pictures of wildlife being impacted by plastic products in the environment. This was the original issue that got environmentalists and the public in general in an adversarial position against our industry.

However, nowadays that's not the only issue at play.

In January of this year, a [study published by the Proceedings of the National Academy of Sciences](#) indicates that “the exposure to the micro-nano plastics from regular bottled water was at the level of 105 particles per liter, which is two to three orders of magnitude more than the previously reported results” . Around that same time, [a study by the Journal of the Endocrine Society](#) estimated that endocrine-disrupting chemicals in plastics “cost the U.S. an estimated \$250 billion in increased health care costs in 2018” .

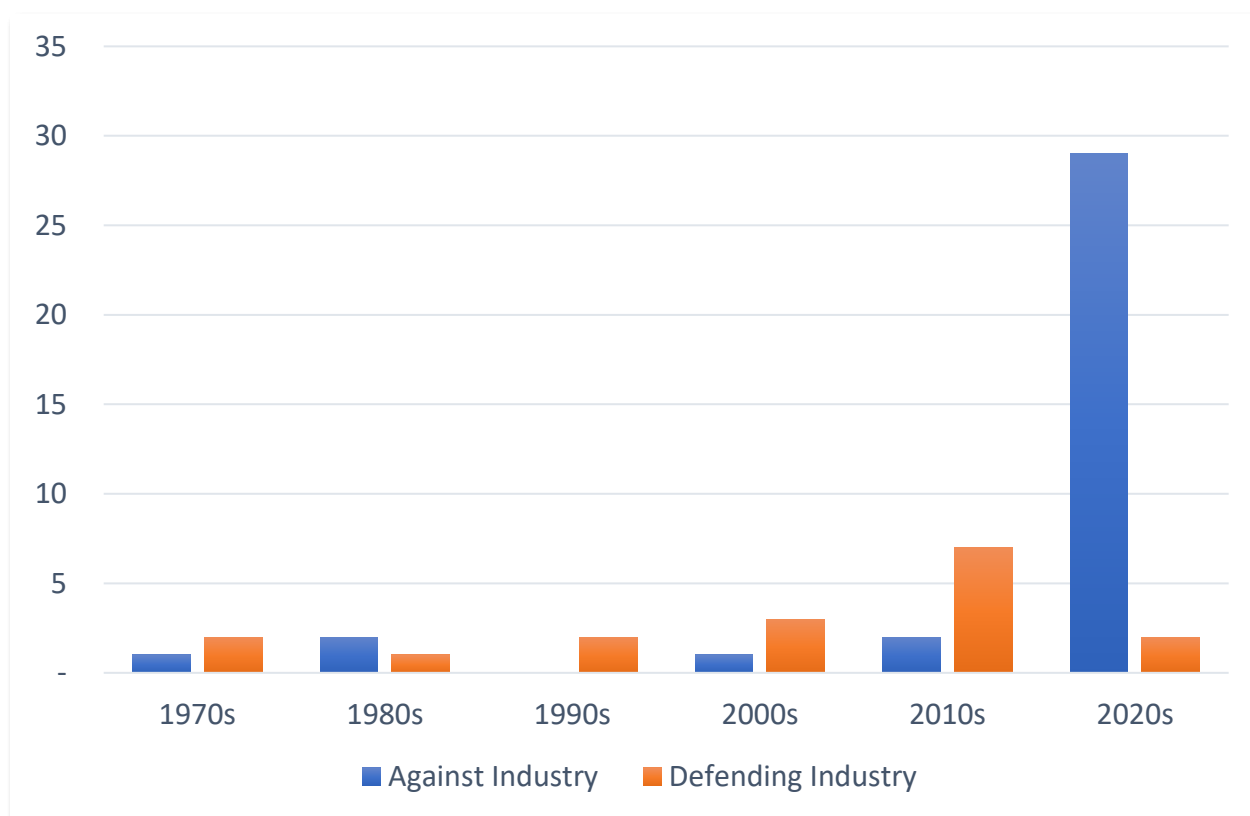
And, as I was literally putting the final touches to my presentation (March 7, 2024), [the New England Journal of Medicine published a study](#) that indicated that “Microplastics and nanoplastics (MNPs) are emerging as a potential risk factor for cardiovascular disease in preclinical studies”.

So, in 2024, plastics are no longer just “bad for the environment”; now they are also a peril to human health... It appears to me that we are not losing the PR war against us, we may have lost it already.

Activism against our industry is on the rise. In July of 2022, NYU's School of Law launched the [Plastics Litigation Tracker](#), which tracks cases addressing plastics across federal and state courts. Figure 17 shows the number of cases for or against the industry, grouped by decade. In the prior five decades, only 6 cases were brought against the plastics

industry. Most cases were centered around the Clear Water Act, but some also dealt with Plastic Bans and False Advertisement. In the first four years of this decade, 29 cases have been brought against the plastics industry. And the focus of these actions has broaden significantly. Now, in addition to the categories mentioned before, cases are also brought under the categories of the National Environmental Policy Act, Environmental Protection, Unfair Competition, Consumer Protection, Public Nuisance, Greenwashing, States Codes, Tax, and Securities.

Figure 17 – Plastic Litigation⁷



There are 10 class actions currently in place. In addition, the following organizations are actively litigating with the plastics industry: Earth Institute (3 cases), Last Beach Cleanup (3), Center for Biological Diversity (2), and with one case each we have the Center for Environmental Health, Charleston Waterkeeper, City of Philadelphia, Coalition to Protect

⁷ Prepared by ChemPMC with data from the Plastics Litigation Tracker <https://plasticslitigationtracker.org/>

Puget Sound, Connecticut AG, Greenpeace, Natural Resources Defense Council, San Antonio Bay Waterkeeper, Sierra Club, State of Minnesota AG, and State of NY AG.

It is not only litigation that the industry must contend with. Regulations are on the rise, on a global basis. ChemPMC research indicates that there are 16 countries, plus the European Union and several provinces and States in the U.S. and Canada, that have enacted Packaging Extended Producer Responsibility (EPR) legislation. And, on March 6, [the U.S. Senate Environment and Public Works Committee](#) led a hearing to examine EPR policies. On that hearing, industry participants such as S.C. Johnson & Son and Ameripen told the Committee that “they wanted to see more EPR programs in the U.S. to help fund better infrastructure to recycle plastics and other packaging”. And EPR regulations are not the only ones the industry needs to contend with; negotiations on an international plastics treaty continue, with [varied degrees of success](#).

Our message to you is simple: time is running out for the polymer industry to get ahead of the trends and show advancements in its efforts to improve the circularity of plastics and its commitment to lessen any environmental impacts its products may cause.

However, the road to get the industry to achieve some of the goals it (*or others*) has (*have*) set is rough. Some of the roadblocks the industry faces when trying to increase sustainability include:

- The required investments in collection, sorting and recycling infrastructure.
- The lack of harmonized standards and/or regulations, of everything related to sustainability/circularity.
- The complexity of plastic waste.
- The lack of cost competitiveness of recycled products.
- The regulation uncertainty for advanced recycling solutions.
- The need to improve collaboration across the value chain.

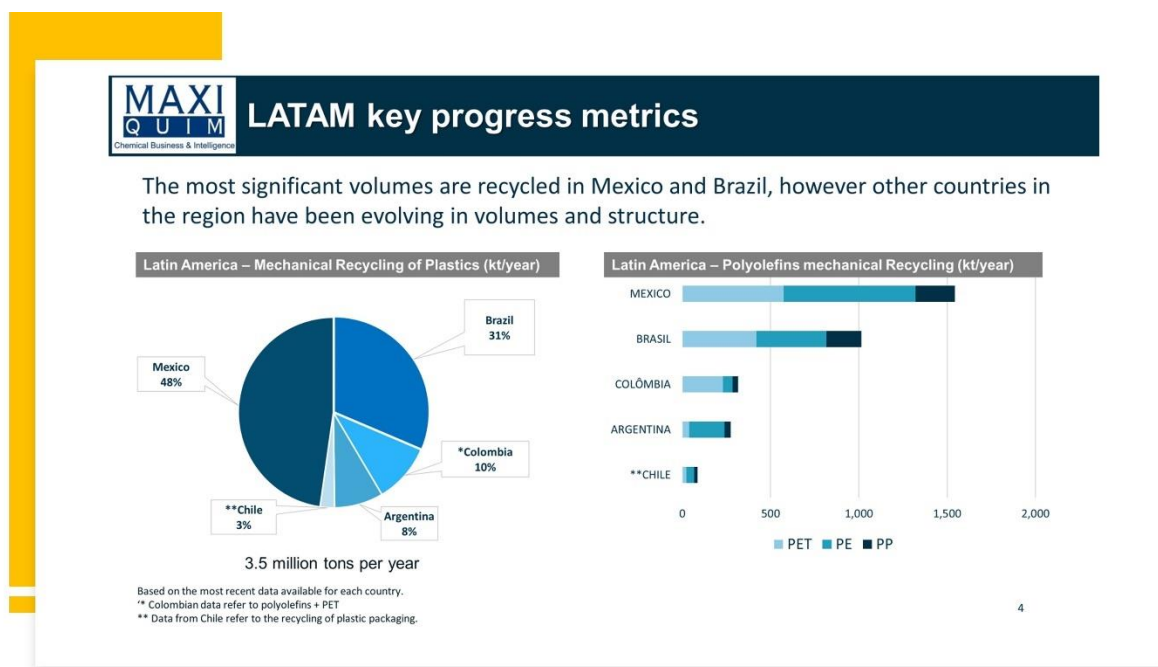
Of those, only two (complexity of plastic waste and the need to improve collaboration throughout the value chain) are within the industry control. For almost everything else, it is at the mercy of external forces.

4.2 Latin America: Potential Source of Competitive PCR Resins

Now, in terms of finding competitive recycled materials, there is one source you may not be aware of. My colleagues at Maxiquim (<https://www.maxiquim.com.br/>) have been tracking the recycling industry in Latin America for quite a few years. As you can see in Figure 18, Mexico, Brazil, Colombia, Argentina and Chile are large markets form the

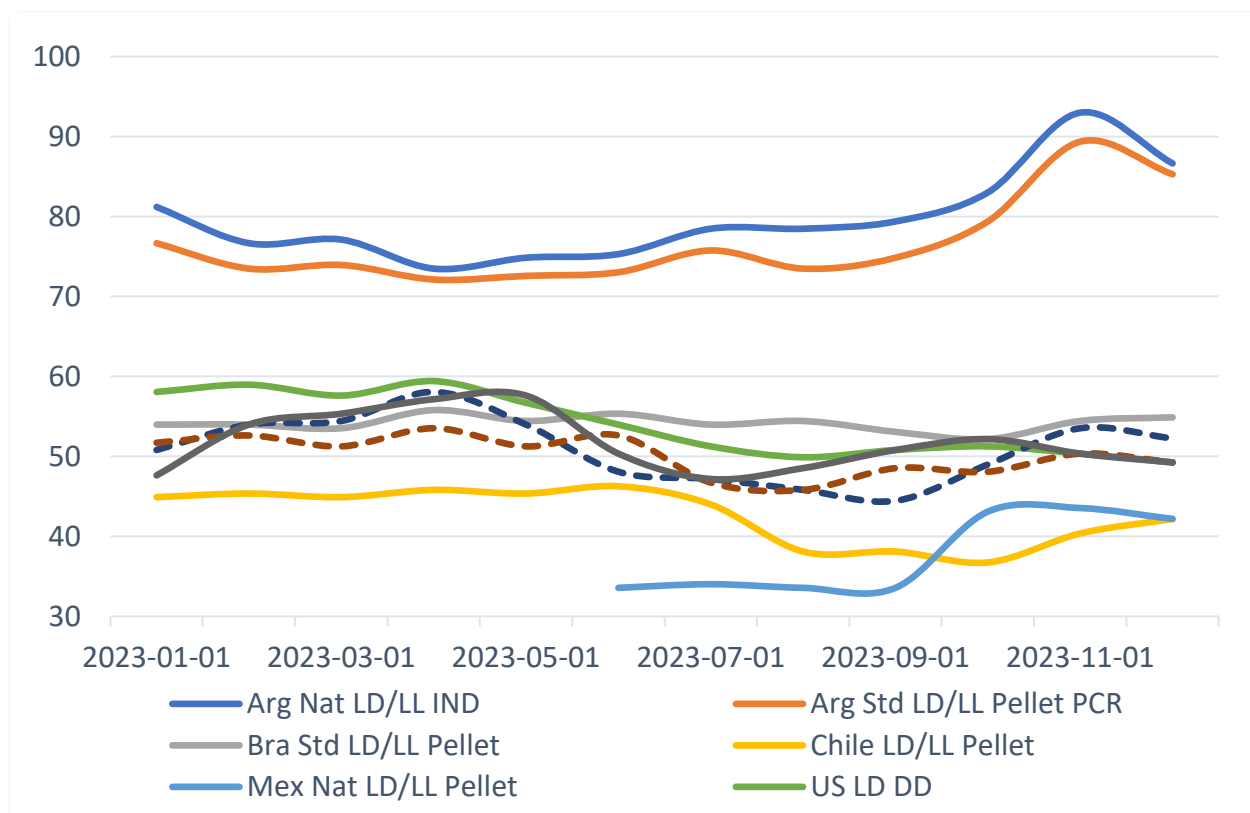
standpoint of mechanically recycling plastics. Mexico recycles a little over 1.5 million metric tons of PET, polyethylene and polypropylene, and Brazil approximately 1 million metric tons of those resins.

Figure 18 – Latin American Mechanical Recycling Statistics



What's even more interesting is that the price for recycled natural pellets in the region is similar and sometimes lower than the price for virgin resins in North America. Figure 19 compares the price of virgin LDPE and LLDPE in North America versus the price for LD/LL natural and standard PCR pellets in different Latin American locations. As you can see in the chart, the price for PCR pellets is cheaper than virgin polyethylene in the United States. Even in Brazil PCR prices are aligned with U.S. virgin prices.

Figure 19 – Comparison U.S. Virgin Prices Vs. Latin American Recycled PCR Resins, CPP⁸



To put these figures in perspective, in July of 2023 Plastic News reported a price range for natural, post-consumer HDPE pellets of 99 to 103 cents per pound. At that time, ChemPMC estimated the domestic discounted HDPE blow molding price in the U.S. to be 52 cents per pound (cpp). The price of natural, post-consumer HDPE pellets in Latin America that month was 42 cpp in Mexico, 46 cpp in Chile, 61 cpp in Brazil and 87.5 in Argentina (92 cpp for post industrial pellets).

These deeply discounted PCR pellet prices in Latin America represent an opportunity for converters in North America, that may be looking for PCR resin at competitive prices to meet their recycled content requirements, without breaking the bank.

⁸ Prepared by ChemPMC with data from Maxiquim's MXQ Recycled Plastics LATAM monthly report (<https://mxqinsight.com.br/#>) and ChemPMC's North American Price Estimates

4.3 What Else Can Be Done?

There are very many challenges ahead of the industry, as we work to improve our environmental record, increase circularity, and try to change the narrative about plastics. During the most recent AMI's Polyethylene Film Conference in Tampa, [an expert panel that included brand owners and converters](#) shared their thoughts about what we can do as an industry in order to tackle the challenges we are facing.

These are the most salient points shared during the discussion (*with my commentary in italics*):

1. Collaboration across companies in the value chain is essential to provide circular-positive solutions. As one panelist put it, "If we don't do it together, it's not going to get done."
2. The industry needs better ambassadors to tell its story and highlight the benefits of plastics. *The other side has [Chris Hemsworth, Morgan Freeman, William Shatner and Fran Drescher](#). Who do we have on our side?*
3. Investments in infrastructure are required for the industry to reach ambitious circularity goals. *And it isn't clear yet who's going to pony the funds required...*
4. Reconsidering some packaging performance requirements, such as extended shelf life, may help achieve circularity goals. [Food product dating is not regulated in the U.S.](#); *the question is if cereal or cookies really need a 12-month shelf life?*
5. The whole value chain is responsible for driving the message that plastics are good. *It is not a producer, or converter, or consumer product company issue; it is an issue for all!*
6. Sometimes, what consumers think is more sustainable may not really be the case. *However, changing their perception is not easy. Science does not trump emotion; the industry's message should be shared in terms that appeal consumers on a personal level.*
7. There is not enough paper to replace all flexible poly packaging.
8. Waste management starts with individuals. As one panelist asked, "If we as individuals don't know how to manage waste, how can we expect consumers to do so?"
9. We need to get our story out in a simple and straightforward way (*see 6 above; if it cannot be said and understood in a TikTok minute, it won't be effective*).

Finally, the panel asked, "What is each one of us doing on a personal level" to get the message out about the benefits of plastics? The Flexible Packaging Association is an excellent ambassador for all of us, [producing outreach materials that we can use](#) and conducting an [effective advocacy program](#). But I believe the challenge issued by the

panel went beyond what our association, or our companies, can do. It is up to each one of us, leading by example (going through the challenges of making sure each packaging that comes into our household gets properly managed) and sharing our experience with others, to make a difference. The U.S. flexible packaging industry directly employs 79,000 people; that's 79,000 advocates for our industry!

4.4 What does it all mean?

The goalposts in the relentless war against plastics are constantly moving. If before the number one issue was our environmental impact, now the impact plastics may have on human health is coming to the front. The result: litigation and regulation are on the rise.

As an industry, we are running out of time to show results in our efforts to improve circularity, reduce environmental impacts and meet lofty goals set by us (or by others). The road to success is riddled with many roadblocks, most of them outside our industry's control. What's in our control? Reducing the complexity of plastic waste, and improving the cooperation across the value chain.

On the positive side, there is an opportunity to source competitive PCR resins in Latin America. Besides that, we need to be prepared for a never-ending need to improve. Finding better ambassadors and making our case to consumers in a way that is simple and easy to understand can be quite helpful to all of us.

5. The Year Ahead

5.1 2024 Outlook

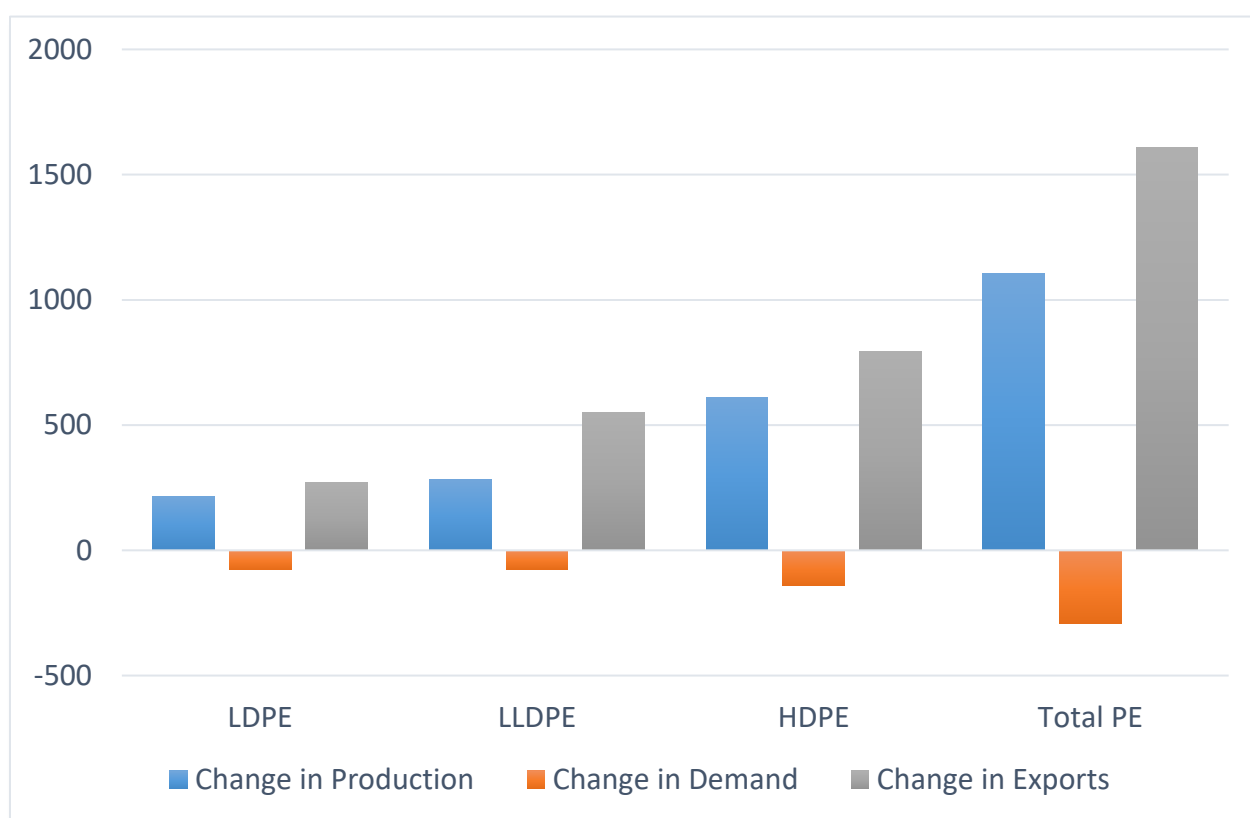
If we needed to summarize in a few words our expectations for 2024, these would be as follows: polyethylene asset utilization in the region is going to increase; exports are going to continue to grow; and demand will continue to fall.

The most recent capacity investment wave has run its course. The only firm project in the horizon is the ChevronPhillips/Qatar Energy Golden Triangle project, which is expected to add 1 million metric tons of HDPE capacity in Texas by 2027. Since capacity totals are expected to remain stable, we expect producers to continue increasing their operating rates in 2024, aiming for a 90% OR level by the end of the year. The result of this will be an increase in production, that will range from 2% to 6% depending on the product.

The pressure from finished and semi-finished goods imports (polyethylene film, for example), as well as changes in consumer behaviors, will continue to affect the industry. We expect total polyethylene demand in North America to drop by 2% this year, driven down by decreases in LLDPE and HDPE demand.

The combination of increased production and decreasing demand will require exports to grow, in order to compensate. We are forecasting an increase in exports of 12% this year, with HDPE and LDPE leading the growth (from a percentage standpoint).

Figure 20 – 2024 Production, Demand and Exports Forecasted Change, KT⁹



From a global perspective, we expect the supply and demand balance for polyethylene to be oversupplied. The pandemic-driven heightened demand growth for polyethylene is mostly over. In addition, global economic growth is subdued. The world is going through a deep realignment of economic and political blocks, which together with an underwhelming economic situation, is expected to negatively impact polyethylene

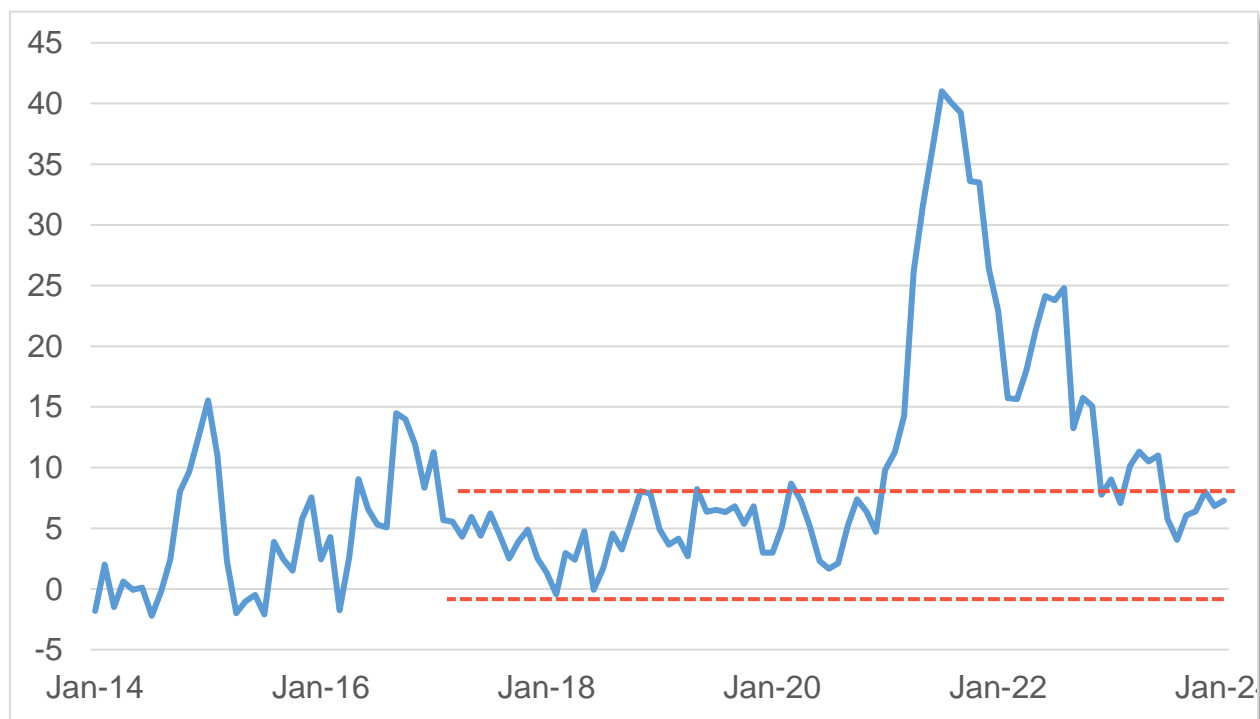
⁹ Prepared by ChemPMC with data from ACC & from USITC's DataWeb <https://dataweb.usitc.gov/>

demand growth. At the same time, China continues to add polyethylene capacity. This fact, which adds up to the buildup from earlier years, and the subdued demand growth picture, will result in a global oversupply situation.

Continuing on the subject of global markets, one of the biggest price distortions from the COVID era is finally over. U.S. domestic prices, which for the better part of three years were out of line with prices in the rest of the world, have finally come closer to global prices.

As you can see Figure 21, the regional price spread has historically been volatile, and short-term arbitrage opportunities may arise in 2024. But we certainly don't expect the big and sustained spreads in prices to continue in the future, at least not for polyethylene. This does not account for weather events, which may impact the Gulf Coast and cause our prices to get out of line again (more on that later). Still, the U.S. to China spread is on the upper end of the pre-pandemic band. Further compression of this spread is to be expected.

Figure 21 – U.S. Spot Domestic to China CFR HDPE BM Spread, CPP¹⁰

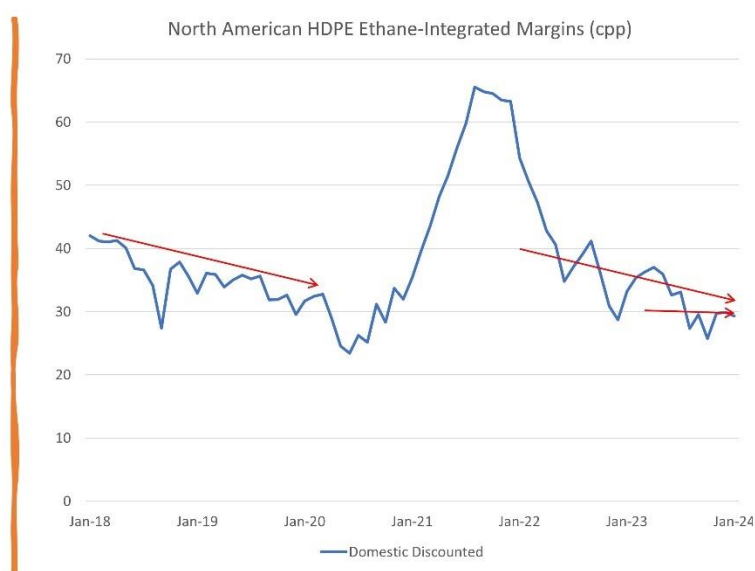


¹⁰ Prepared by ChemPMC with data from www.chemorbis.com and ChemPMC's North American Price Estimates

For producers, all these changes in demand trends, increases in exports, and global price alignments, have resulted in a massive reduction of margins (Figure 22). Before the pandemic, margins were slowly eroding, due to the increase in production capacity in the region. The question going forward is whether you believe that the trend going forward is one of moderating margins, or if margins will move sideways.

Figure 22 – North American HDPE Ethane-Integrated Margins (CPP)

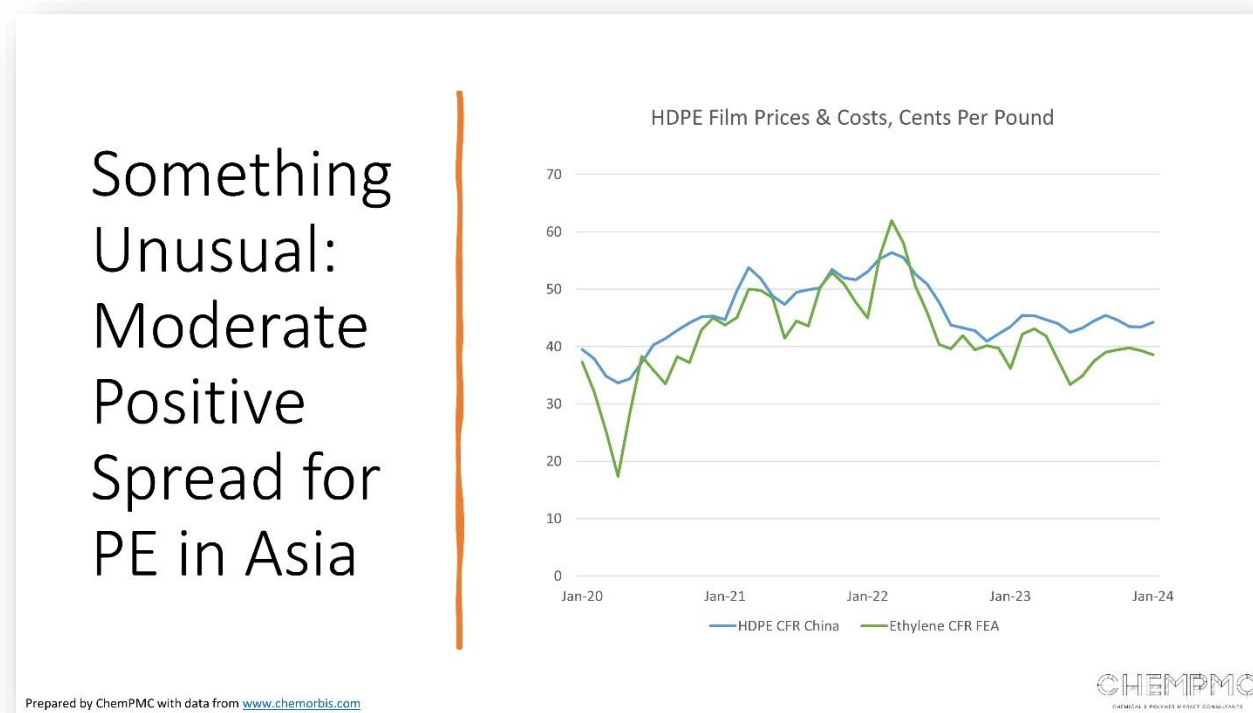
Margins:
Moderated,
But Still
Attractive



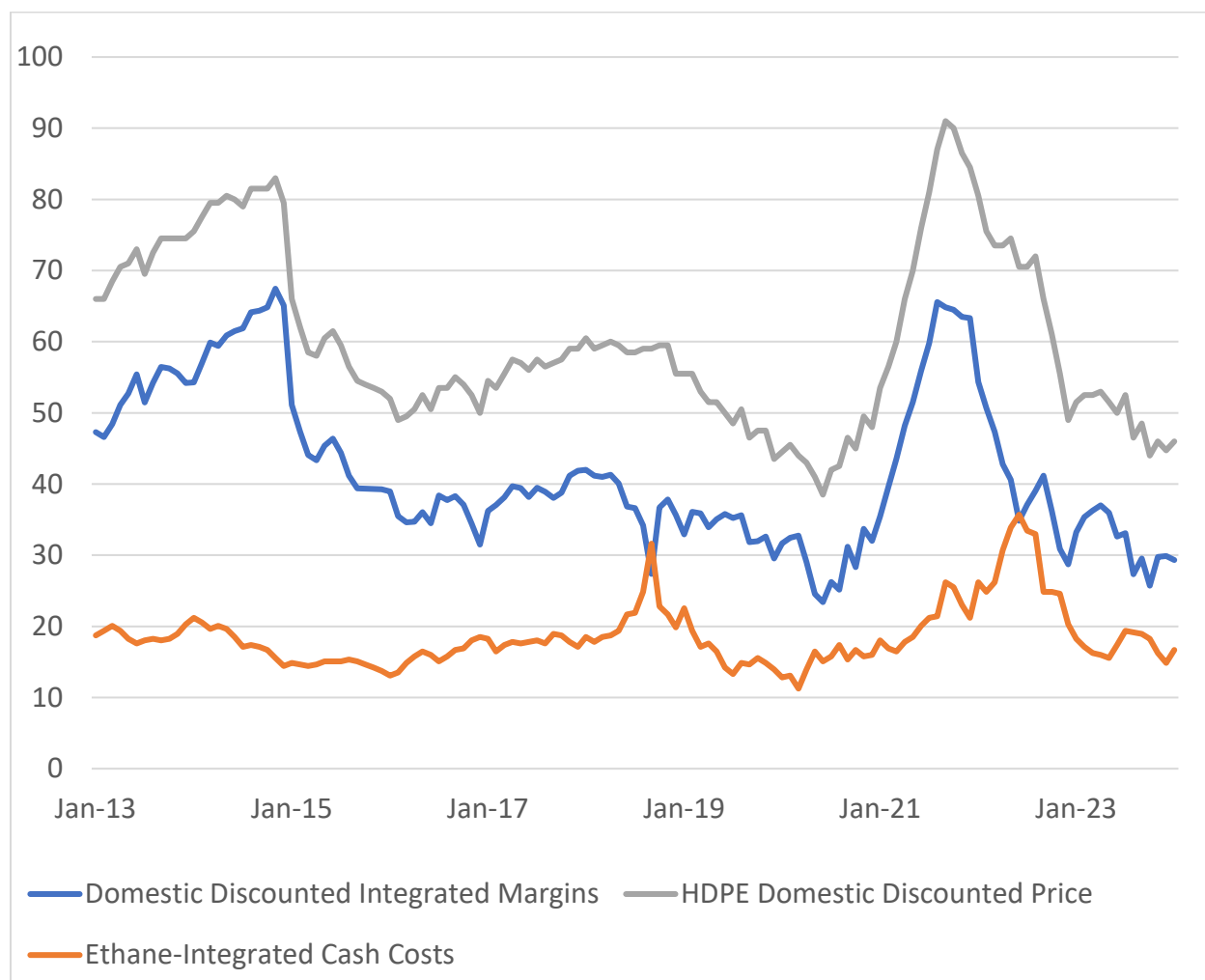
Source: ChemPMC's North American Price Estimates

One last thought, before looking into our polyethylene-prices crystal ball. For the better part of 2023 and the beginning of 2024, polyethylene in Asia has enjoyed a moderate spread over ethylene (Figure 23). This is very unusual. Polyethylene in Asia tends to have near zero or negative spreads versus ethylene, as producers try to protect margins by keeping them on the olefin (ethylene) side of the value chain. What you see in the chart, with HDPE prices consistently higher than ethylene prices since June of 2022, is very unusual. This leads me to believe two things. First, that maybe, just maybe, the polyethylene market in Asia is better for producers than what we hear. And second, that there is some room for polyethylene prices in the region to collapse, bringing them closer to ethylene prices.

Figure 23 - PP to HDPE Price Ratios



Now, let's try to look into the future of prices. Figure 24 shows you the North American HDPE prices, ethane-integrated cash costs, and margins through January of this year. From a cost standpoint, we expect ethane prices to be stable to increasing in 2024. Prices, which moved higher in the first three months of this year due to [the impact of a freeze in Texas in January](#), should correct in the near term. For the remainder of the year, we expect prices to be flat to slightly decline, impacted by soft demand, increasing reliance on exports, and the potential for a reduction in the spread between polyethylene and ethylene in Asia. Stable to increasing costs and stable to decreasing prices means stable to decreasing margins for U.S. producers. This will be a complicated year for those producers, which rely on exports and may see some erosion in their margins.

Figure 24 – North American HDPE Prices, Costs & Margins, CPP¹¹

One word of caution: there is the possibility of major weather events this year, which may disrupt the industry and impact this outlook. We are not weather experts, but the forecast for this year is for a very active season, with [activity 30% above the 1991 to 2020 30-year norm](#). A combination of [expected historically warm water across the Atlantic Ocean, and the return of La Niña](#), are key factors driving the concerns of forecasters. The expectation from AccuWeather is that the season may be back-loaded, because La Niña is not expected to develop until late summer or early autumn. I am not a betting person, but I would keep an eye on the tropical weather and try to avoid depleting inventories during

¹¹ Source: ChemPMC's North American Price Estimates

the middle to late part of the hurricane season. Eighty percent of North America's polyethylene capacity is located in the Gulf Coast, and it only takes one hit to push prices through the roof. Alternatively, try to work on risk-reduction strategies for your polymer prices during that period.

5.2 What does it all mean?

As capacity growth tapers off and domestic demand falters, producers will become increasingly reliant on exports to run their assets at full capacity. This product is being exported to a global market that is already oversupplied, with demand affected by a subdued economic picture and supplies relentlessly increasing.

U.S. prices have finally become better aligned with global prices, but the spread over Asia is still at the high end of its historical band. Asian prices, on the other hand, have been enjoying a positive spread over ethylene, which is unusual. With global demand growth under pressure and supplies expanding, there will be pressure for margins and prices to slide this year. This could result in better pricing for U.S. polyethylene converters.

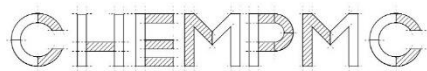
However, you should not let your guard down, particularly during this year's hurricane season. Don't get caught with low inventories, and explore avenues to decrease your exposure to excessive volatility in the polyethylene market.

6. In Summary

Last year's ChemPMC's outlook for the industry came to pass, something that does not bring us joy as it meant faltering demand in North America, increasing environmentalist pressure against plastics, and weak prices and margins. Our outlook for this year is not much better than last year's.

By now you understand how pressure from imported finished goods may be affecting your business in the region. And how some of that pressure may be caused by North America's export of its competitive cost advantage, be it as polyethylene, ethane or ethylene exports. Your call to action? Be diligent in understanding what is happening overseas, and what are the export policies of your U.S. suppliers. And ask the tough questions that you need to ask to protect your domestic business.

The relentless war against plastics continues, with a new front (plastics impact on human health) being opened. Regulations and litigation are on the rise, and you should expect a lot of roadblocks ahead of you in order to achieve the goals (self or externally) imposed



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to the industry. Again, knowledge is power; now you know there are sources out there for competitive PCR resins; don't wait for your competitor to take advantage of them.

Since our outlook for this year is not different than last's, you should be remain vigilant. Monitor imports of finished products, Asian prices, and export prices out of North America. Billions of dollars in raw material expenses depends on it. And, finally, become the weatherman or weatherwoman best friend; volatility and exceedingly high prices are just one hurricane away!

7. Disclaimer

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