Global Economic Factors Align Favoring U.S. Based Plastic Product Manufacturing over China Operations

LONG TERM FUNDAMENTAL SHIFTS HAVE CHANGED THE PLAYING FIELD

December 2022: Executive Summary - A Report by Shale Crescent USA

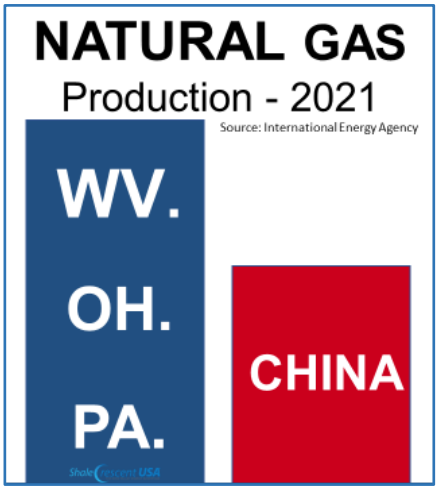
INTRODUCTION

China has lost its manufacturing competitive advantage and the annual $25 billion of exported plastic-based goods from China represent a vulnerable and accessible market share opportunity for U.S. operations. **What has been a long-held belief – *it is cheaper to import plastic based manufactured goods* – is no longer true.** The forces and trends that led to offshoring U.S. manufacturing operations have reversed course and are now favoring domestic production.

Feedstock/resin and transportation are the largest cost drivers of globally produced plastic-based goods. The Shale Crescent USA report finds that close proximity to low-cost raw materials coupled with direct access to consumer markets provide U.S. manufacturers with significant cost advantages over China-based competitors who must import raw materials and export finished goods. **The elimination of trans-continental supply chains results in cost savings that magnify a U.S. competitive advantage.** This paradigm shift favoring U.S. operations has accelerated over the past decade. **These changes are fundamental, long term, and will continue for the foreseeable future.**

WHAT HAS CHANGED? SOURCE OF ENERGY, FEEDSTOCK, AND MATERIALS

The U.S. Shale Gas revolution resulted in low-cost natural gas and natural gas liquids, which are used to produce plastic resin. Ohio, West Virginia, and Pennsylvania combined (Shale Crescent USA) now produce over one third of U.S. natural gas supply and over one and a half times more natural gas than the entire country of China. **China is energy deficient and is reliant on global supply chains to either import plastic resin or produce resin from much costlier oil-based Naphtha.**

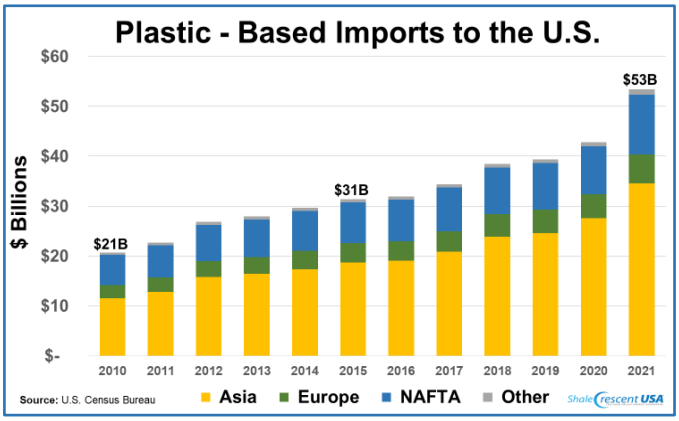


Just northwest of Pittsburgh, PA Shell Chemicals has completed a world scale ethylene cracker plant with an annual production capacity of 3.5 billion pounds of polyethylene resin. **Local plastics manufacturing operations will enjoy the benefit of regionally sourced resin eliminating long and costly logistics.** The outcomes of this regional supply are shorter transit times, decreased working capital, greater feedstock flexibility, and other cost saving factors.

WHAT IS THE OPPORTUNITY? CAPTURING IMPORTED GOODS MARKET SHARE

The U.S. has seen a dramatic increase in the volume of plastic-based imports from the rest of the world. These items range from toothbrushes and tackle boxes to children's car seats and plastic pallets. Of the $53 billion of plastic-based imports to the U.S. each year, **nearly half originate in Asia,** with China accounting for $25 billion, a threefold increase in just the past ten years**.**

Some of the product groupings of plastic-based imports have seen tremendous growth i.e., Tableware & Kitchenware products, a category that has experienced 8% annual compounded growth has doubled from $1.1 billion to $2.2 billion since 2010. Plastic-based imported products have become significant growth opportunities for manufactures to capture market share and onshore production.

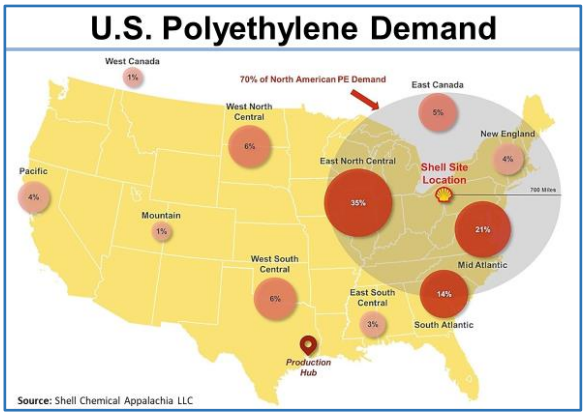


WHY OHIO? UNIQUE LOCATION - WORLD CLASS ASSETS

Ohio is one of the top producers of plastic products in the United States with over 600 operational plastic-based manufacturers. The state's manufacturing operations use a wide range of resin and processing types and service a variety of market segments. As detailed in the Shale Crescent USA study, Ohio manufacturers are well positioned to onshore production of plastic-based goods with strong supporting factors that include diversity of plastic resins, alignment of processing types, and access to consumer markets. **Their location, anchored in the state of Ohio, is the foundation of their competitive advantage.**

Within a one-day drive, Ohio boasts:

- Over one-third of U.S. natural gas production
- A well-established industry that contains 70% polyethylene (PE) and 77% polypropylene (PP) U.S. consumption
- New regional PE supply (Shell facility in Monaca, PA - 2022)
- Over 50% of U.S. population and 30% of Canadian population
- The ability to eliminate long-haul transportation and associated costs for both incoming resin supply and outgoing finished consumer products
- Environmental advantages by eliminating global supply chains resulting in calculable reduced emissions

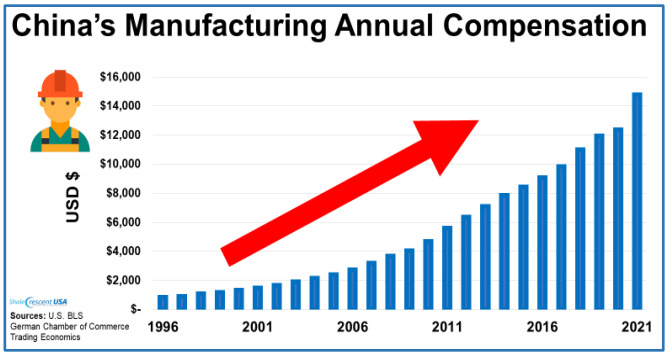


WHY NOW? SHALE CRESCENT USA COST ADVANTAGES VS. CHINA

A myriad of economic and societal forces have aligned to support the onshoring of U.S. manufacturing. Increased automation, technological advancements, the accessibility of U.S. Shale gas, and the volatility of global supply chains are all long term and fundamental shifts. As a result, the prime cost drivers in the manufacturing of plastic-based goods: **Feedstock/Resin, labor, electricity, lease rates, and transportation are pointing in favor of U.S. operations.**

Feedstock/Resin: Currently, U.S. and China commodity resin prices are comparable, but the forces of supply and demand are positioned to positively impact U.S. resin prices. The U.S. is a net exporter of polyethylene and China is a net importer. In addition, the U.S. uses low-cost natural gas to produce resin while China uses more expensive oil-based naphtha. Since more than 80% of PE production costs are dependent on the type of feedstock and energy used, **U.S. resin producers experience greater margins and higher overall profits compared to overseas producers.**

Labor Rates: Over the past 25 years, China's manufacturing wages have increased more than ten-fold and continue to rise. China's manufacturing industry averages annual compounded wage rate increases of more than 10 percent. Furthermore, in terms of productivity output, U.S. Gross Domestic Product in 2021 was $141,200 per person, versus China's average at just $27,600 per person. **Increased use of automation and productivity enhancements have decreased the labor cost input of manufacturing and increasing wages in China have eroded** China's historical labor cost advantage.



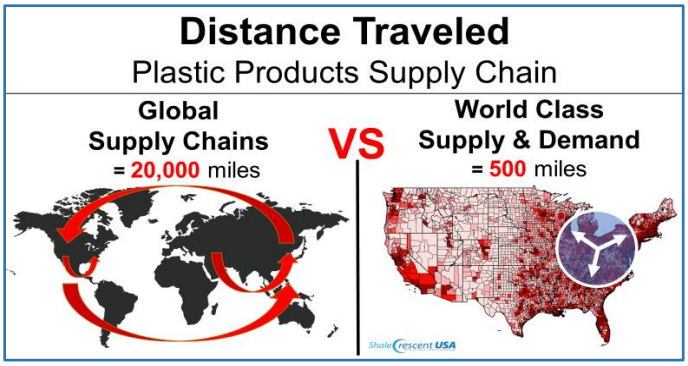
Electricity: U.S. electric prices have shown relatively stable or downward trending rates over the last eleven years. This can be attributed in part to a newly abundant and accessible fuel source, natural gas, used for power generation. Between 2010 and 2021, industrial consumers in the state of Ohio have experienced nationally competitive rates around 6.50¢ per kilowatt-

hour (kWh). **In China, industrial electric rates averaged 10.00¢ (kWh) over the same period and have shown volatility and intermittent outages.** Projections show that electric prices will continue to trend in favor of the U.S.

Manufacturing Lease Rates: China has experienced exponential growth in its manufacturing sector since the turn of the century and the decreased availability of industrial space has driven demand resulting in increased lease rates. Lease rates in the industrial provinces of **China range from $6 – $7 per sq./ft. compared to Ohio's average of $4-$5 per sq./ft.**

Transportation: Ohio based operations have both resin supply and consumer demand for finished products inside a geographic radius that can be reached in a one-day drive. The elimination of complex supply chains creates an enormous transportation advantage.

China operations are required to import raw materials and export finished products. **The transport of feedstock/resin to China based manufacturers coupled with the transport of finished products to the U.S. is an estimated 20,000 miles.**



The cost to ship finished plastic based goods is a significant factor in the overall supply chain. A standard 40' cargo container traveling from China to the U.S. west coast has historically averaged from $2,500 to $3,500. **In 2021, container rates rose to over $20,000, an expense that is eliminated for U.S. based manufacturing and sales.**

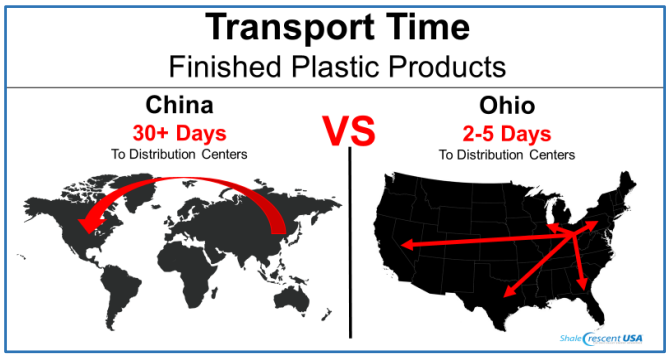
WHY NOW? SIGNIFICANT ESG ADVANTAGES OVER CHINA

ESG (Environment, Social, and Governance) performance has become an integral part of business operations and investment decisions. The Shale Crescent USA report highlights why **Ohio-based manufacturers have a tremendous ESG advantage founded on location that supports reduced environmental impact.** Manufacturing in Ohio eliminates significant transportation emissions that burden China-based manufacturers who must import raw materials and export finished goods via transcontinental supply chains. China-based manufacturers cannot avoid global transportation. **Ohio plastic product manufacturers are already natural leaders in ESG without changing core business practices.** Manufacturers in Ohio have a timely opportunity to capitalize on this existing advantage through education and promotion of environmental benefits to their partners and consumer base.

WHY NOW? CUSTOMER ADVANTAGES

In the 1990's and 2000's large-scale distributors and retailers such as Walmart led the offshoring manufacturing movement to capitalize on low-cost China labor. At the peak of offshored U.S. manufacturing, it is estimated that 70-80 percent of Walmart's merchandise was sourced from China.

The Covid supply chain crisis has challenged the use of distant and slow to respond supply lines. Wallstreet has evaluated long supply chains in light of unreliable product supply as a significant risk and cost. **Shorter supply chains are being recognized as financially beneficial.**



Products manufactured in the U.S. versus China conservatively eliminate 30 days in the supply chain process. For retailers, this means greater inventory flexibility and working capital savings. In early 2021, Walmart announced plans to spend **$350 billion over the next decade on items made, grown, or assembled in the U.S. Plastic products are specifically identified as a priority in their plan.** The company has cited **reduced global emissions tied to the elimination of transcontinental transportation as a motivating factor.**

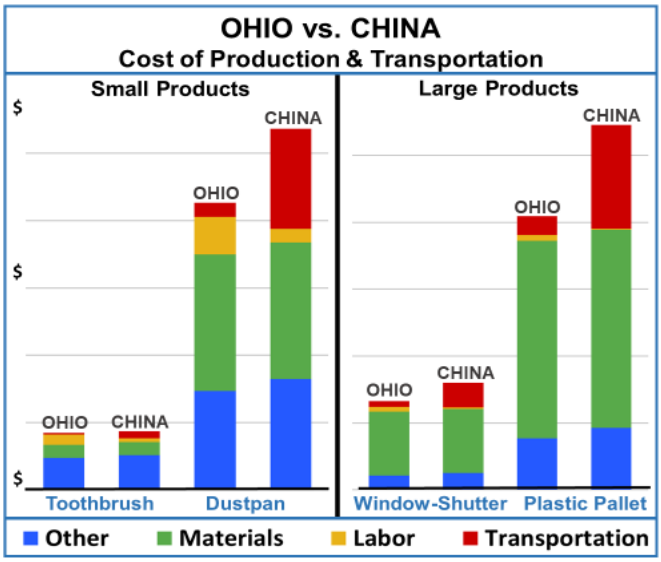
WHAT ARE THE ECONOMICS? OHIO: LOWER COST MANUFACTURER VS. CHINA

Utilizing the findings on manufacturing cost drivers, the Shale Crescent USA report includes a production cash flow cost model that compares the cost of manufacturing plastic-based products in Ohio versus China. The model leverages findings associated with each of the locations prime cost drivers and analyzes large volume import products, that vary in size, resin type, processing type, and end market. **Milacron, a leading global manufacturer of plastic processing equipment, assisted in developing the model.** Milacron's expertise and real-world experience was critical in ensuring a realistic and reliable cost model.

The specially designed cost model is available to processors. Processors can **tailor the model to their operation specifications** including products, equipment, resins, and other factors allowing for a deep understanding of cost comparisons specific to a processor's unique situation.

Primary conclusions of cost drivers in the 'OHIO vs. CHINA Manufacturing Model' can be summarized as follows:

- Transportation is a major cost driver in the overall per unit cost for overseas production
- Resin prices are a significant cost factor
- Other costs: Electricity/energy, maintenance, working capital, and lease rates are important but relatively minor
- With an increase in automation, labor costs become less of a contributing factor
- Capital equipment costs are important but have trade-offs in terms of productivity and require a case-by-case basis evaluation
- Part size has a major impact on operational costs. As part size increases, the following changes occur:
    - Relative labor costs decrease
    - Transportation costs and resin costs increase
    - Capital equipment costs increase



In comparing manufacturing in Ohio versus China, transportation emerges as the major differentiator, with growing significance as part size increases. The upward trends of labor, energy, and transportation costs associated with China defines a long-term shift. **The trend of individual cost drivers can be considered long term, fundamental, and protected from volatility for a timeframe measured in decades.** While this report is focused on China, it can be deduced there is U.S. competitiveness versus other regions of the world. **Ohio's unique location advantage cannot be overlooked.** Ohio manufacturing operations are well positioned to capture a significant share of the annual $25 Billion of imported plastic products.

NEXT STEPS

*This research **"Global Economic Factors Align Favoring U.S. Plastic-Product Manufacturing over China-Based Operations"** is available to all manufacturing operations.*

Supporting materials **available at www.shalecrescentusa.com:**

- *Executive Summary*
- *Complete 120 Page Report*
- *How to Capture Market Share - Utilizing the U.S. Census Bureau Import Data*
- *Ohio vs China Manufacturing Detailed Excel Cost Model Comparison*

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ABOUT SHALE CRESCENT USA

*Shale Crescent USA (SCUSA) has recently expanded its research and prospect development to include downstream plastics manufacturing, to support data-driven investment decisions and attract manufacturing operations to the region. **Shared proximity to raw materials and consumer markets make Shale Crescent USA one of the most economic and sustainable petrochemical and manufacturing hubs in the world.** Eliminating global transportation and significantly decreasing national transportation results in reduced costs, reduced global emissions, energy efficiency and inventory advantages.*

*Since 2016, SCUSA has designed and commissioned industry research that examines key indicators for potential investment in the energy and manufacturing supply chain. **This investigation – that examines factors related to supply & demand, manufacturing operations, international imports, logistics, and labor - has produced data that show Shale Crescent USA is one of the most profitable & resilient locations to manufacture energy intensive products.** SCUSA research for manufacturers and associated industries include:*

- ***(2016) The Resource Advantage of the Shale Crescent USA***
- ***(2017) Understanding U.S. Chemical Industry Investments***
- ***(2018) Benefits, Risks, & Estimated Cash Flows: Ethylene Project in the SCUSA vs the Gulf***
- ***(2019) Estimated Logistics Benefits of the SCUSA vs. Gulf for Natural Gas, Propane, & Butane***
- ***(2020) Natural Gas Savings to U.S. End-Users***
- ***(2020) Manufacturing Jobs tied to Oil and Gas Production***
- ***(2021) Extreme Weather Impacts on the Industrial U.S. Gulf Coast. SCUSA advantaged***
- ***(2022) Global Economic Factors Favor U.S. Plastic-Product Manufacturing over China***

*Shale Crescent USA (SCUSA) is a tax exempt 501(c)4 organization with leadership that includes a network of senior level management and experts in the energy industry, manufacturing industry, economic development, academia, and private investment. **SCUSA was established to promote the region of Ohio, Pennsylvania, and West Virginia that sits atop two of the most prolific natural gas fields (the Marcellus & Utica) in the United States. This new energy supply is disrupting traditional value chains and prompting domestic manufacturing operations to reexamine their competitive advantage.***