

2015 Global Business Trends

Published December 2015



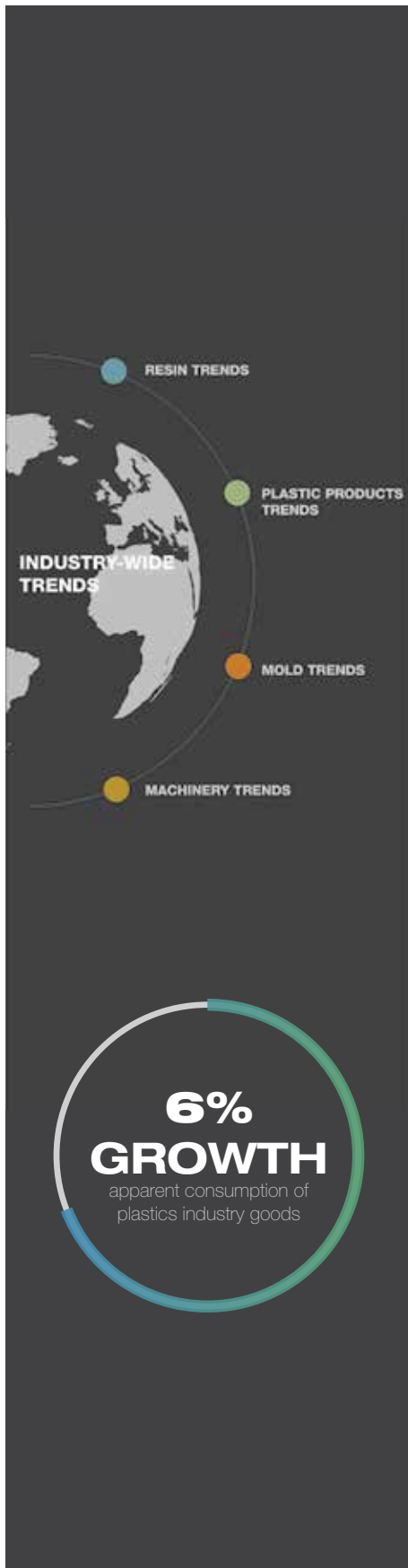
the plastics industry
trade association
plasticsindustry.org/trends



Contents

Executive Summary	2
I. PLASTICS INDUSTRY TRADE FLOWS	4
A. Industry-Wide	4
B. Resins	4
C. Plastic Products	5
D. Molds	5
E. Machinery	6
F. Trade Flows as a Percentage of Domestic Shipments	6
G. Trade Flow Summary	6
II. PLASTICS CONSUMPTION AND MARKET SHARE	7
A. The Concept of Apparent Consumption	7
B. Plastics Industry Apparent Consumption	7
C. Apparent Consumption of Resins	7
D. Apparent Consumption of Plastic Products	7
E. Apparent Consumption of Molds	8
F. Apparent Consumption of Plastics Machinery	8
G. Apparent Consumption Summary	8
H. Import Share	8
III. CONTAINED TRADE IN RESINS AND PLASTIC PRODUCTS	9
A. Methodology	9
B. U.S. Trade in Resins and Plastic Products, All Countries Combined	11
C. The “True” Consumption of Resins and Plastic Products	12
D. The Kinds of Goods that Contain Resins and Plastic Products	13
E. Key Countries for Contained Resins and Plastic Products Trade	13
F. U.S. Resin Trade Flows	14
G. Plastics Trade from a Broader Perspective	14
IV. IMPLICATIONS FOR THE U.S. PLASTICS INDUSTRY	16
FIGURES 1-30	19
TABLES 1-41	34

Executive Summary



In 2014, for the third year in a row, apparent consumption of plastics industry goods hit record-setting levels in 2014, growing 6 percent from 2013, from \$281.5 billion to \$298.3 billion. We anticipate in 2015 that the industry will surpass \$300 billion.¹¹

This consumption will be driven by growth in key end markets like transportation, healthcare, and packaging. There are at present an estimated 250 million vehicles on the road in the U.S., of which the average vehicle is 11.4 years old projected to rise to 11.7 by 2019, suggesting they will soon need to be replaced. In the U.S., Canada and Mexico light vehicle sales are expected to hit 20.3 million in 2016 rising to 20.6 million by 2017.

Lightweighting is almost an imperative as more and more metal parts of automobiles are being replaced with plastics even in the engines themselves. Even with some reduction in automobiles produced, many other current transportation modes utilize large amounts of plastics, aviation for example. Given the inherent advantages that plastics represent, it is extremely likely that the transportation choices of the future will use more, not less, plastics.

Over the past generation, the medical device industry has provided growing demand for plastics that have gradually displaced traditional reliance on devices made of metal, ceramics and other substances. Expanding populations here and abroad, enhanced by rapidly growing middle class income populations, and aging populations in developed countries, promise continued reliance on medical devices containing plastics in the near future – meaning more business for the plastics industry.

The packaging industry is the biggest single market for plastics in the U.S. and the market is growing. Advancing technology is paving the way for new, more efficient plastics packaging products and more sophisticated manufacturing processes to produce them.

The global polymer industry is expected to grow with a compound annual growth rate (CAGR) of 3.9 percent over 2015-2020. Historically, the middle class has been a major consumer of polymers, and with global population set to include over 60 percent of people within this demographic by 2030, demand for commodity plastics will grow. Polymer is continuously substituting other materials in various applications due to its lightweight and strength and the design flexibility they offer brand owners along with low-cost.

In spite of a highly competitive and internationalized U.S. market, the plastics industry still maintains a significant domestic market share. The low cost of natural gas, and to a lesser extent, oil in the U.S. compared to other regions, has driven down the cost of doing business in the U.S. for the plastics industry.

The development of unconventional oil and gas technologies – particularly shale – in the U.S. has made the country more competitive in the production of chemicals and resins. As a result, there is a new wave of resin capacity expansion. Whereas U.S. resin exports were once expected to decline as the domestic demand for those resins grew, the new resin capacity makes it likely that resin export levels will remain at higher levels than before. The shale phenomenon has proven to be a game changer, further strengthening our competitive position globally.

Plastics' trade balance is good – over \$10 billion – but it is even better with countries with whom we have trade agreements. The passage of the Trans-Pacific Partnership (TPP) in the U.S. Congress would further improve those positions and trade balances.

SPI's annual Global Business Trends study that follows analyzes U.S. trade data on an industry-wide and segment-specific basis for 2014.

INDUSTRY-WIDE TRENDS

- ▶ The industry's trade surplus fell 14.9 percent to \$10.4 billion in 2014 from \$12.2 billion in 2013.
- ▶ Industry exports rose 3.1 percent, but imports rose 7.7 percent thanks to an improving U.S. economy and a weak economy in Europe.
- ▶ Mexico and Canada remain the U.S. plastics industry's largest export markets.

¹¹ The methodologies and data used to estimate the value of domestic shipments and contained trade values were provided by Probe Economics LLC.

- ▶ In 2014, the industry exported \$15.8 billion to Mexico and \$13.2 billion to Canada.
- ▶ The industry had its largest trade surplus with Mexico in 2014 – \$11.1 billion.
- ▶ China is the industry's third largest export market. However, the industry, overall, had its largest trade deficit with China — \$9.2 billion in 2014.
- ▶ The estimated value of domestic shipments increased by 5.1 percent in 2014, to \$308.7 billion.
- ▶ Exports were at 20.1 percent of domestic shipments in 2014, down from 20.5 percent in 2013, as the domestic market grew faster than the overseas market.
- ▶ Reflecting the improving U.S. economy, apparent consumption of plastics industry goods grew 6.0 percent, from \$281.5 billion in 2013 to \$298.3 billion in 2014.
- ▶ “True” consumption includes all the resins and plastic products that U.S. residents consume, including those that are contained in imported goods. The “true” consumption growth rates computed in this study show that underlying U.S. plastics demand remains solid.

RESIN TRENDS

- ▶ The U.S. resin industry had a \$19.5 billion surplus in 2014, down 5.4 percent from the \$20.6 billion surplus in 2013. On a real, tonnage basis, the resin surplus decreased 8.1 percent. U.S. resin producers lost some of their competitive advantage because of the high value of the dollar and the fall in the price of oil.
- ▶ U.S. wellhead natural gas costs rose 17.9 percent in 2014, while the average crude oil price paid by U.S. refiners fell 8.2 percent. The crude oil price slide accelerated at the end of 2014. This significantly reduced the cost advantage that U.S. resin producers, which rely primarily on gas-based feedstocks, now enjoy over overseas resin producers, which mostly use crude oil-based feedstocks.
- ▶ Resin exports increased 1.8 percent, while imports increased 12.4 percent.
- ▶ The resin industry had a \$6.7 billion surplus with Mexico, followed by a \$2.8 billion surplus with China.
- ▶ The resin industry had its largest trade deficit with Germany, at \$1.0 billion.
- ▶ Resin exports accounted for 36.5 percent of domestic shipments, while imports were 16.3 percent.
- ▶ Apparent consumption of resins rose 4.6 percent, from \$73.5 billion in 2013 to \$76.8 billion in 2014. Domestic resin prices rose by 5.0 percent, as measured by the Producer Price Index, which suggests that apparent consumption decreased 0.4 percent in real, tonnage terms.
- ▶ U.S. resin producers held a 79.6 percent market share (percent of apparent consumption) in 2014, down from 81.0 percent in 2013.
- ▶ The estimated value of resins contained in exported goods was \$21.2 billion, and the estimated value of resins contained in imported goods was \$42.8 billion, which meant that the segment had a \$21.6 billion deficit in contained resin trade.

PLASTIC PRODUCTS TRENDS

- ▶ The country's deficit in plastic products increased from \$6.1 billion in 2013 to \$6.8 billion in 2014, an increase of 12.1 percent — mostly because of the improving economy in the U.S. compared to the rest of the world.
- ▶ Exports of plastic products grew by 5.1 percent, while imports grew 6.6 percent.
- ▶ The U.S. had its largest plastic products surplus with Mexico, at \$4.0 billion.
- ▶ China accounted for the largest plastic products trade deficit, at \$11.5 billion, up 5.9 percent from 2013.
- ▶ Exports of plastic products were 12.1 percent of domestic shipments, and imports were 15.4 percent.
- ▶ Apparent consumption of plastic products grew by 6.6 percent, from \$199.7

billion in 2013 to \$212.9 billion in 2014. As measured by the Producer Price Index, domestic plastic products rose 1.7 percent in 2014, suggesting that apparent consumption growth was 4.9 percent in real terms.

- ▶ U.S. producers of plastic products held an 85.1 percent market share (percent of apparent consumption), the same as 2013.
- ▶ The estimated value of plastic products contained in exports was \$27.6 billion, and the estimated value contained in imports was \$50.4 billion, giving the U.S. a \$22.8 billion deficit in contained plastic products trade.

MOLDS TRENDS

- ▶ The U.S. moldmaking industry had a \$1.1 billion trade deficit in 2014, which was 4.5 percent more than the \$1.0 billion deficit in 2013.
- ▶ Mold exports fell 10.1 percent, while imports fell 0.8 percent.
- ▶ The U.S. moldmaking industry had its largest surplus with Mexico at \$283 million. It had its largest deficit with Canada at \$576 million.
- ▶ Exports of molds were 18.3 percent of domestic shipments, and imports were 55.1 percent.
- ▶ Apparent consumption of molds for plastics rose 4.9 percent, from \$3.8 billion in 2013 to \$4.0 billion in 2014.
- ▶ U.S. moldmakers held a 59.7 percent market share (percent of apparent consumption) in 2014, up from 57.4 percent in 2013.

MACHINERY TRENDS

- ▶ The U.S. plastics machinery industry registered a \$1.2 billion trade deficit in 2014, a 5.2 percent decrease from 2013.
- ▶ Exports rose 7.7 percent, and imports rose only 1.5 percent, resulting in an improved trade balance.
- ▶ The industry had its largest surplus with Mexico at \$215 million, and its largest deficit with Germany at \$540 million.
- ▶ Exports of machinery were 44.3 percent of domestic shipments, and imports were 80.2 percent.
- ▶ Apparent consumption of plastics machinery rose 0.7 percent, from \$4.56 billion in 2013 to \$4.59 billion in 2014. Because of the improved trade balance, domestic shipments rose by a greater 3.0 percent.
- ▶ U.S. machinery producers held a 41.0 percent market share (percent of apparent consumption), down slightly from 41.4 percent in 2013.

I. PLASTICS INDUSTRY TRADE FLOWS



The U.S. plastics industry is a major participant in world trade. This section reports U.S. exports, imports and trade balance for the major plastic industry segments — resins, plastic products, molds for plastics, and plastics machinery. The data are based upon official U.S. trade statistics collected by the U.S. Census Bureau. The Bureau tracks and collects data on the movement of goods according to categories enumerated under the Harmonized Tariff Schedule (HTS) of the U.S. HTS data are available at a 10- digit level of detail, which distinguish, for instance, between low density polyethylene and linear low density polyethylene, and between injection-type molds and compression-type molds.

In this study, exports are valued on a Free Alongside Ship (FAS) basis, i.e., the value of the product before it is loaded onto the shipment vessel at the U.S. port.¹¹ Imports are on a customs value basis, which is the “price actually payable for merchandise, excluding U.S. duties, freight, insurance and other charges.” The trade statistics capture movements of goods across U.S. borders, including intra-company transfers. The official U.S. trade statistics do not identify, or in any way isolate, transactions between companies in the U.S. and their foreign subsidiaries. This is an important consideration because, as discussed further below, the globalization of the plastics industry has likely increased the volume of related-party trade.

A. INDUSTRY-WIDE

The plastics industry is defined here to include the manufacture of resins, plastic products, molds for plastics and plastics processing machinery. Total plastics industry exports were \$62.1 billion in 2014, up 3.1 percent from 2013 (see Table 1). Plastics industry product imports were \$51.7 billion in 2014, up 7.7 percent from 2013 (see Table 3).

As indicated in Table 2, the top plastics industry export category was HTS 392690, “Articles of Plastics, NESOI.”¹² This is a catchall category that includes a vast array of products made from resins. Other top-10 plastics industry exports included mostly resins such as polyethylene and polyvinyl chloride. The fact that resins comprise a large portion of top plastics industry exports is indicative of the country’s role as a large petrochemical and resin producer, exporting significant quantities to satisfy worldwide demand. That role is currently being augmented by the discovery of new shale-based oil and natural gas reserves in the U.S.

The catchall category, HTS 392690, “Articles of Plastics, NESOI,” also ranked first in terms of imports (see Table 4). There are some resin categories in the top 10, but most are plastic products made from resins. This is consistent with the fact that the U.S. is a large exporter of resin and a large importer of things made from resin. No mold or machinery category made the top 10 in 2014.

Table 5 shows the U.S. plastics industry trade balance and identifies the five countries that generated the largest surpluses and deficits in 2014. The industry had a \$10.4 billion surplus, which was a 14.9 percent decrease from 2013. This surplus is still way up from past years. For example, the surplus was only \$3.7 billion in 2005.

In 2014, as in previous years, the U.S. plastics industry had its largest surplus with Mexico.

¹¹ The FAS value does not include loading and other costs of shipping the merchandise.

¹² “Not Elsewhere Specified or Included.”

The surplus with Mexico is attributable to the North American Free Trade Agreement (NAFTA). U.S. plastics companies are taking advantage of duty-free access into Mexico’s market given the country’s close proximity.

Despite its overall trade surplus, the industry had a large, \$9.2 billion deficit with China. The growing bilateral deficit with China can be attributed to low Chinese wages, which are rising but are still low, and the slowdown in the Chinese economy — they are not buying as much.

Figure 1 shows the U.S. industry’s trade balance since 1992. The trade balance has fluctuated with overall economic conditions and movements in the U.S. dollar. The flat trend in the industry’s trade balance significantly improved from 2005 to 2011. Some of the gain was from the recession of 2008-2009, which reduced all U.S. imports. Now that the economy is improving and imports are rising, some of the trade balance improvement has been reversed.

B. RESINS

Resins are the polymeric materials, such as polyethylene and PVC, which are the industry’s principal raw materials. In the trade statistics, resins are categorized under HTS 3901 through 3915.

The value of U.S. resin exports increased 1.8 percent in 2014, to \$35.2 billion. In physical terms, exports fell 1.2 percent in 2014, to 16.9 million metric tons.

Polyethylene is the top export resin, followed by polyvinyl chloride (PVC), see Table 6. Because of shale oil and gas, the U.S. has very strong cost positions in both of these polymers. The U.S. also has had extra PVC to export because of the slowdown in housing construction — one of PVC’s main end uses.

Resin imports rose 12.4 percent during

2014. [Table 7](#) shows that polyethylene is also an important import resin. The lion's share of U.S. polyethylene imports come from nearby Canada, a country with rich hydrocarbon resources that can be converted into chemicals and resins.

The U.S. resin surplus was \$19.5 billion in 2014, down 5.4 percent from 2013. Because of its proximity and close trading relationship, the resin industry had its largest surplus with Mexico at \$6.7 billion. Despite its possession of abundant feedstocks, [Table 8](#) shows the U.S. resin trade balance and identifies the five countries that generated the largest surpluses and deficits in 2014. Mexico has lagged behind in the construction of key production facilities, particularly ethylene plants. As a result, Mexico is a major importer of resins like polyethylene. The Mexican polyethylene shortage will be mitigated by a 1 million metric ton per year ethylene plant that Braskem (of Brazil) and Idesa are building on the Mexican Gulf Coast.

Given the rapid expansion of its manufacturing sector, China has become the world's largest resin consumer — making it a major export market for U.S.-produced resins.

Belgium generates a significant surplus because Antwerp is a major port of entry and river system access for resins and other chemical products consumed throughout Europe.

As [Figure 2](#) shows, the U.S. resin trade surplus has grown strongly in dollar terms, falling off a little during the 2008-9 recession, and then in 2012-2014 because of strength in the U.S. economy relative to the rest of the world. The development of unconventional (shale) oil and gas technologies in the U.S. has made the country more competitive in the production of chemicals and resins. As a result, a new wave of resin capacity expansions is happening in the U.S. Whereas U.S. resin exports were once expected to decline as the domestic demand for those resins grew, the new resin capacity makes it likely that resin export levels will remain at higher levels than before.

C. PLASTIC PRODUCTS

Plastic products are items made from resins — items such as film, sheet, pipes, tubes, bags, toys and kitchenware. In the trade statistics, plastic products are categorized under the HTS 3916 through HTS 3926.

The value of U.S. exports of plastic products rose 5.1 percent in 2014. According to the U.S. Bureau of Labor Statistics, the average producer price of plastic products rose 1.7 percent in 2014. Considering this inflation,

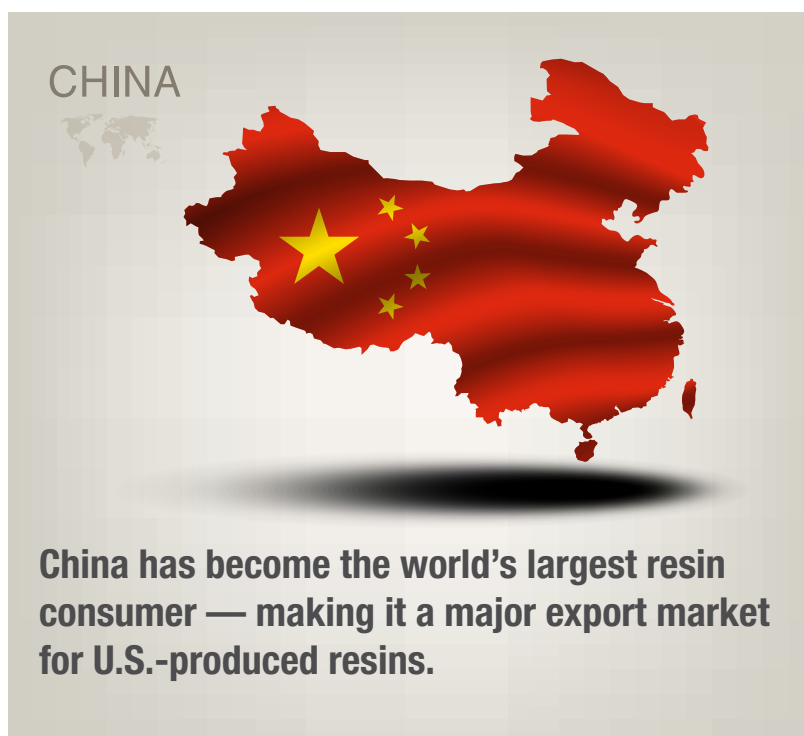
the value of plastic product exports rose approximately 3.4 percent in real terms.

As indicated in [Table 9](#), products in the broad catchall tariff category “Articles of Plastics, NESOI” (HTS 392690) made up the largest export category. Plastic products imports rose 6.6 percent in 2014. The same “NESOI” category accounts for the most imports (see [Table 10](#)).

[Table 11](#) identifies the five countries that generated the largest plastic product surpluses and deficits in 2014. The industry had by far its largest surplus with Mexico at \$4.0 billion. Despite this fairly large and stable surplus with Mexico, the overall plastic products trade balance remained in deficit. The deficit increased from \$6.1 billion in 2013 to \$6.8 billion in 2014.

Trade with China overwhelmingly drives the overall deficit in plastic products trade. The Chinese deficit rose from \$10.9 billion in 2013 to \$11.5 billion in 2014. The trade deficit with China is more than 10 times larger than the plastic products deficit with Taiwan, the second largest. But for the deficit with China, the U.S. plastic products industry would be running a sizeable trade surplus.

As [Figure 3](#) shows, the U.S. plastic products segment of the market has a significant and growing trade deficit. This deficit recovered a little during the recent recession, as the country cut back on all imports, but the decline has now resumed.



D. MOLDS

The data presented in this section cover exports and imports of molds for plastics categorized under HTS codes 848071 and 848079. Because plastic molds are such a small trade category, the data are presented here at the 10-digit level of detail.¹³ Mold exports fell 10.1 percent in 2014, while imports fell 0.8 percent. Injection type molds account for a significant portion of imported and exported molds.

Shows the U.S. trade balances with countries that generated the largest surpluses and deficits in 2014. The U.S. had an overall mold trade deficit of \$1.1 billion. The U.S. trade surplus with Mexico, by far the most important, decreased to \$283 million in 2014. The U.S. had its largest deficit with Canada, a deficit that decreased to \$576 million in 2014 (see [Table 14](#)). [Figure 4](#) shows the volatility and recent drop of the U.S. molds trade balance.

¹³ Note that even at the 10-digit level, the tariff categories include molds for rubber because the U.S. tariff nomenclature does not separate molds for rubber from molds for plastics.

E. MACHINERY

Plastics machinery and equipment includes various kinds of molding, extruding, calendaring and forming machinery, as well as auxiliary equipment like driers and conveyors. The data presented in this section cover exports and imports categorized under HTS 8477. As with the trade flow data for molds, the export and import statistics for plastics machinery are presented here at the 10-digit level of the HTS category. Exports of plastics machinery increased 7.7 percent in 2014, while imports increased only 1.5 percent.

[Table 17](#) shows the U.S. plastics machinery trade balance with the countries that generated the largest surpluses and deficits in 2014. Overall, the machinery segment had a \$1.2 billion deficit, down 5.2 percent from the \$1.3 billion in 2013.

The U.S. had substantial surpluses with Mexico, Brazil and Hong Kong.

The segment had its largest deficits with Germany, Japan and Canada. Related company transactions/transfers also likely account for a portion of imports from these countries.

F. TRADE FLOWS AS A PERCENTAGE OF DOMESTIC SHIPMENTS

The relationship between exports or imports and domestic shipments is an indication of the impact of trade on domestic producers. For example, a high level of exports in relation to domestic shipments can signal a weak domestic market, a competitive advantage possessed by domestic producers, or strong export promotion efforts by those producers. High imports may indicate an industry with strong domestic demand. It also indicates an industry that is losing share in its domestic market.

[Table 18](#) shows plastics industry exports and imports as a percentage of the estimated value of domestic shipments.¹⁴ On an industry-wide basis, exports decreased slightly, from 20.5 percent of domestic shipments in 2013 to 20.1 percent in 2014. This export slippage may be attributed mostly to a stronger U.S. economy, which left less product available for export, and a weaker overseas economy, which reduced the need for U.S. exports.

The relationship between exports or imports and domestic shipments reveals different trends when analyzed on a segment-specific basis. Resin exports represented a significant percentage of domestic resin shipments — 36.5 percent in 2014. Resin imports were a smaller 16.3 percent of domestic shipments.

Plastic product exports were only 12.1 percent of domestic shipments in 2014, while imports represented 15.4 percent. Given that a significant portion of plastic products tend to be produced near the point of use to meet “just in time” supply chain requirements, plastic product exports are characteristically a smaller percentage of domestic shipments than are the exports of other plastics industry segments.

Mold exports were 18.3 percent of domestic shipments in 2014, and machinery exports were 44.3 percent. Mold imports were 55.1 percent of domestic shipments in 2014, and machinery imports were 80.2 percent. These sizeable percentages illustrate the impact of globalization on these segments — significant export activity and a high reliance on imported plastics machinery. Moreover, many producers in these segments move molds and machines between subsidiaries in the U.S. and overseas markets. These intracompany transfers likely boost export and import figures.

In past years, the U.S. had large surpluses in resins and almost offsetting deficits in plastic products, molds and machinery. Now, the resin surplus more than offsets the other deficits, so that there is an industry surplus. Net exports represented 3.4 percent of plastics industry shipments in 2014, down from 4.2 percent in 2013. [Section II-B](#), which analyzes import market shares, provides an additional perspective on trade flows.

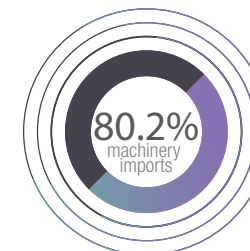
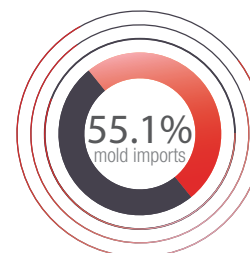
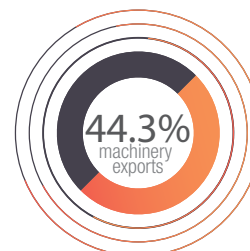
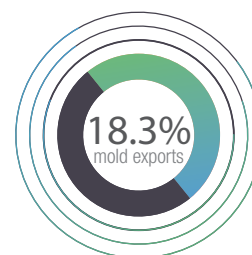
G. TRADE FLOW SUMMARY

Plastics industry exports accounted for 4.4 percent of all U.S. merchandise exports in 2014. [Table 19](#) indicates exports, imports and trade balance (net exports) for the four industry segments for 1992 through 2014. The industry as a whole had a trade surplus of \$10.4 billion. The value of exports increased last year in every industry segment except molds. Resin was the

only sector with a surplus — \$19.5 billion. This surplus more than offset the deficits in plastic products, molds and machinery.

[Figure 6](#) illustrates the segment-specific surpluses and deficits from 2000 through 2014. The resin trade surplus dominates. [Figure 7](#) shows the segment balances for just the 20 countries with which the U.S. has a free trade agreement. Note that, unlike the world situation, the U.S. has a growing trade surplus in plastic products with these countries.

DOMESTIC SHIPMENTS IN 2014



¹⁴ Data on the value of domestic shipments were obtained from establishment data collected by the U.S. Census Bureau. These data are published every five years in the *Census of Manufactures*, and in the *Annual Survey of Manufactures* during the intervening years. Because these data are currently only available through 2013, Probe Economics estimated 2014 figures using statistical correlations with data on Industrial Production and Producer Prices that are available for more recent periods.

II. PLASTICS CONSUMPTION AND MARKET SHARE



Trade statistics help illustrate the globalization of the plastics industry, but do not measure globalization's impact on the domestic market. One way to examine this impact is by measuring the extent to which imports have penetrated the U.S. market. Such an analysis entails quantifying the size of the market and determining the relative market shares of domestic shipments and imports. The first step in this analysis involves calculating “apparent consumption.”

A. THE CONCEPT OF APPARENT CONSUMPTION

Apparent consumption is a widely used measure of the size of a domestic market and is often used as a measure of demand. Apparent consumption is calculated using the following formula:

$$\text{Apparent Consumption} = \text{Shipments} - \text{Exports} + \text{Imports}$$

In the plastics industry, apparent consumption measures consumption at the first stage of processing, i.e., resins purchased by a plastic processor in the U.S. [Section III](#) discusses a second measure of consumption, identified as “true consumption.” True consumption is an estimate of the total amount of resins or plastic products that are consumed by U.S. households, businesses or government agencies, whether those resins or plastic products were processed in the U.S. or in another country. In the latter case, the resins or plastic products entered the U.S. as a component of imported goods.

B. PLASTICS INDUSTRY APPARENT CONSUMPTION

The estimated value of the “plastics industry’s” domestic shipments was \$308.7 billion ([see Table 20](#)).¹¹ To calculate apparent consumption, the \$62.1 billion in plastics industry exports were subtracted, and the \$51.7 billion in imports were added, resulting in the 2014 apparent consumption figure of \$298.3 billion. Apparent consumption increased 6.0 percent in 2014.

Note the relationship between the value of domestic shipments and apparent consumption. Domestic shipment levels and apparent consumption will track closely if the industry’s trade is in balance. This is because apparent consumption is derived by subtracting net exports from shipments. The industry’s net exports represented only 3.4 percent of domestic shipments in 2014. This meant that the industry’s apparent consumption level of \$298.3 billion was close to the estimated \$308.7 billion value of domestic shipments.

In short, the plastics industry has not been a huge net exporter, most likely because of nearby, “just in time” delivery requirements and the fact that many plastic products are expensive to ship. The latter make up the plastics industry’s largest sector. So, the apparent consumption of plastics (or the size of the U.S. plastics market) tends to move in tandem with domestic shipments — as shown by [Figure 8](#). It shows plastics consumption decreasing during the 2001 and 2008-9 recessions. Outside of the recessions, plastics industry consumption has

been growing.

As is discussed in [Section III](#), however, the off-shoring of manufacturing has been restraining industry growth. Manufacturers are the main customers of plastics companies.

C. APPARENT CONSUMPTION OF RESINS

[Table 21](#) shows the apparent consumption calculation for the U.S. resin industry, which had \$96.3 billion in shipments during 2014. Subtracting exports of \$35.2 billion from resin shipments and adding imports of \$15.7 billion yields an apparent consumption level of \$76.8 billion in 2014. U.S. apparent consumption of resins increased 4.6 percent from 2013. Given the higher prices of resins in 2014, the apparent consumption of resins actually decreased in real terms, by an estimated 0.4 percent.¹²

U.S. resin producers sell significant volumes of product abroad, so there is a noticeable difference between apparent consumption and domestic shipments — apparent consumption is less. Apparent consumption and domestic shipment levels follow similar trends, with a similar looking spread between the two ([see Figure 9](#)). This reflects the fact that the U.S. resin industry has consistently maintained an export surplus.

D. APPARENT CONSUMPTION OF PLASTIC PRODUCTS

Subtracting exports of \$25.0 billion from plastic products shipments and adding imports of \$31.8 billion yields an apparent consumption level of \$212.9 billion in 2014, up 6.6 percent from 2013 ([see Table 22](#)).

Since 1992, apparent consumption and domestic shipments have tracked closely, as

¹¹ In the SPI study titled *Size and Impact of the U.S. Plastics Industry on the U.S. Economy*, the “Plastics Industry” is defined to include plastics wholesale trade. Wholesale trade could not be included in industry definition here because of the difficulty defining the apparent consumption of a service. The source of the shipments data is discussed in Footnote 5 above. Note that some of the changes in the value of domestic shipments are due to inflation and deflation. A thorough analysis of domestic shipments is presented in SPI’s *Size and Impact* study.

¹² From the 4.6 percent nominal increase, the authors subtracted the 5.0 percent increase in the Producer Price Index for Plastics Materials & Resin Manufacturing (NAICS 325211).

seen in [Figure 10](#). A small divergence between the two lines started in 2001, when the U.S. began, after many years of balance, to develop a deficit in plastic products trade.

E. APPARENT CONSUMPTION OF MOLDS

Subtracting exports of \$0.5 billion from plastic products shipments and adding imports of \$1.6 billion yields an apparent consumption level of molds of \$4.0 billion in 2014, up 4.9 percent from 2013 (see [Table 23](#)).

Domestic shipments and apparent consumption of molds both trended downward before rebounding after the 2008-9 recession (see [Figure 11](#)). The rebound indicates a recovery in U.S. manufacturing. The molds data presented here are estimated and subject to revision.¹³

F. APPARENT CONSUMPTION OF PLASTICS MACHINERY

Subtracting exports of \$1.5 billion from plastics machinery shipments and adding imports of \$2.7 billion yields an apparent consumption level for plastic machinery of \$4.6 billion in 2014, up 0.7 percent from 2013 (see [Table 24](#)).¹⁴

Apparent consumption of plastics machinery has recovered from the deep 2008-9 recession. Discretionary expenditures, like those for machinery and plant expansions, are easily put off during recessions. [Figure 12](#) shows domestic shipments and apparent consumption since 1992. The divergence between the lines illustrates the strong role of imports in this industry segment.

G. APPARENT CONSUMPTION SUMMARY

Plastics industry apparent consumption remains on an up-trend and exceeds levels achieved before the 2008-9 recession. The segment-specific calculations of apparent consumption are summed up in [Figure 13](#), which shows apparent consumption from 2000 through 2014.¹⁵

H. IMPORT SHARE

As discussed above, apparent consumption measures the size (or demand level) of the U.S. market based upon delivery of goods at the first channel of distribution. The ratios of imports to apparent consumption measure the share of the domestic market that foreign producers enjoy in each plastics industry segment.

On an industry-wide basis, [Table 25](#) shows that imports accounted for 17.3 percent of the U.S. market in 2014. This share has increased considerably since 1989, when the share was 6.7 percent. Imported resins accounted for 20.4 percent of the U.S. market in 2014, up from 5.7 percent in 1989. Imported plastic products held 14.9 percent of the U.S. market in 2014, up from 5.8 percent in 1989.

Imports command a much higher share of the markets in molds and plastics machinery. The 2014 import market share for molds was 40.3 percent. It was 59.0 percent for plastics machinery. The shares were 13.8 percent and 45.6 percent respectively in 1989. To some degree, the growth in mold and machinery imports (and exports), and the resulting higher market shares held by imports, reflects increased industry globalization and intra-company transfers across the U.S. border.

[Tables 26](#) through [30](#) and [Figures 14](#) through [18](#) give different perspectives on the role of imports in U.S. plastics markets. The tables identify the countries that have increased their exports to the U.S. the most over the last two years, and their impact as a share of U.S. apparent consumption. China was able to gain the most market share in plastic products and plastics overall. Canada made the largest share gain in resins and molds. Germany made the largest gain in plastics machinery.

[Figure 14](#) show the trends in import shares. Since 1992, those shares have trended upward for all plastics industry categories. The import shares for the mold and machinery markets have been volatile.

¹³ The data separating plastic molds from other types of molds is available only every five years when the *Economic Census* is published. The data for intervening years are Probe Economics estimates.

¹⁴ Plastics machinery data had to be estimated by Probe Economics on a best efforts basis, because these data are reported in the *Economic Census* as part of a larger category – a much larger category starting in 2012

¹⁵ See Footnote 6 — the “Plastics Industry” definition used here does not include the plastics wholesale trade sector.

FIGURE 14
DOMESTIC AND IMPORT SHARES OF
U.S. TOTAL PLASTICS INDUSTRY

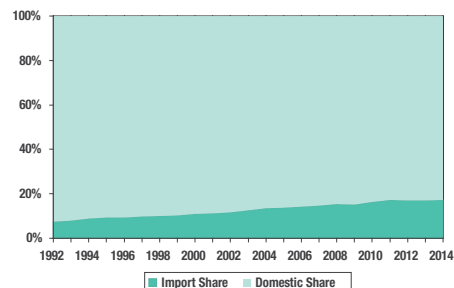


FIGURE 15
DOMESTIC AND IMPORT SHARES OF
U.S. RESIN MARKET

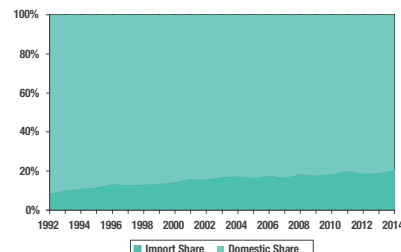


FIGURE 16
DOMESTIC AND IMPORT SHARES OF
U.S. PLASTIC PRODUCTS MARKET

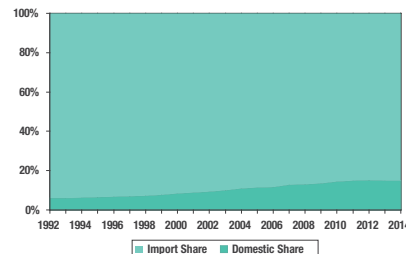


FIGURE 17
DOMESTIC AND IMPORT SHARES OF
U.S. MOLDS FOR PLASTICS MARKET

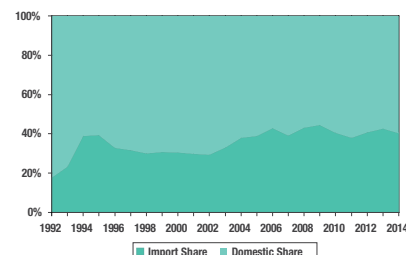
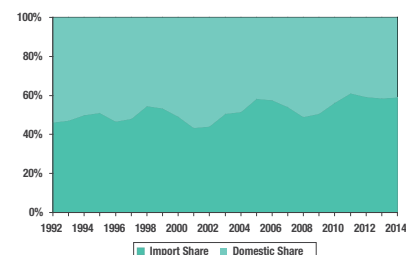


FIGURE 18
DOMESTIC AND IMPORT SHARES OF
U.S. PLASTICS MACHINERY MARKET



III. CONTAINED TRADE IN RESINS AND PLASTIC PRODUCTS



The previous section analyzed and discussed plastics industry trade based on data collected in official U.S. trade statistics. These data show the movement of goods across the border as categorized under the Harmonized Tariff Schedule of the U.S. The report refers to this as “regular trade.” A second analysis for the plastics industry examines trade in goods that contain, or have been made with, resins and plastic products. This second analysis, called “contained trade analysis,” reveals another channel of movement for resins and plastic products — resins and plastic products that are embodied in goods that the U.S. exports and imports. A “contained trade” analysis is analogous to a “mass balance” of resin products in the U.S. — everything that is produced, leaves, enters and used is quantified.¹¹ A contained trade analysis can be used to help find new plastics markets, pinpoint the true size and growth of the plastics market, show the impact of the off-shoring of manufacturing operations on the U.S. plastics industry and gauge the competitiveness of industries that use plastics.

The results of the analysis in this section indicate that:

- ▶ Almost as much resin, and far more plastic products, are entering the country contained in other goods and services as are leaving the country “as is,” as part of “regular” trade.
- ▶ A contained trade deficit represents a kind of “stealth” deterioration of the U.S. plastics trade position, which may eventually express itself in the “regular” trade figures.
- ▶ The same countries that are exporting manufactured goods to the U.S. are also exporting contained resins and plastic products.
- ▶ Contained trade analysis allows one to calculate the “true consumption” of resins and plastic products in the U.S. True consumption represents an opportunity, because it is the true size of the domestic market.
- ▶ The true size of the domestic market is growing at a healthy pace.

A. METHODOLOGY

To estimate the value of resins and plastic products contained in goods, an “input-output” methodology is used to quantify the amount of resins or plastic products required to manufacture the product.¹² [Figure 19](#) helps illustrate the steps taken for input-output calculations.

First, the values of U.S. exports and imports of goods were tabulated. The goods breakdown is based on the six-digit North American Industry Classification System (NAICS) codes, which amounted to approximately 450 different categories of exports and imports.¹³ Second, input-output coefficients were developed based on data from the U.S. Bureau of Economic Analysis (BEA). The coefficients estimate the value of resins or plastic products required to make a dollar’s worth of a product in that NAICS category. Finally, the value of the product was

multiplied by the relevant input-output coefficient to derive an estimate of the value of resins or plastic products contained in each import and export category.

For example, during 2014, the U.S. imported \$5.1 billion of household refrigerators and home freezers (NAICS 335222).¹⁴ According to the appropriate input-output coefficient, it takes \$0.033991 worth of plastics film, sheet and packaging material (NAICS 326110) to make a dollar’s worth of refrigerators and freezers. Multiplying those two figures together yields an estimated \$171.9 million of plastics film, sheet and packaging materials contained in refrigerators and freezers imported into the U.S. in 2014. The more precise calculation is:



$$\begin{aligned} &\$5,058.6 \text{ million} \times 0.033991 \\ &= \\ &\$171.9 \text{ million} \\ &\text{in Plastic Film, Sheet and} \\ &\text{Packaging Materials} \end{aligned}$$

Thus, the input-output methodology provides an estimated measure of the value of resins and plastic products that are contained in goods imported into and exported from the U.S. However, note the following limitations of the input-output calculations presented here:

- ▶ First, input-output figures are estimates. As such, they do not precisely quantify the value of goods. Official U.S. trade data are more accurate (but measure something

¹¹ “Mass balance” is a concept familiar to engineers and scientists. It accounts for the physical quantities flowing in and out of a system.
¹² For more on input-output techniques, see: Ronald E. Miller and Peter D. Blair, *Input-Output Analysis: Foundations and Extensions, 2nd Edition*. Cambridge, UK: Cambridge University Press, 2009.

¹³ NAICS-based trade data are calculated by assigning HTS-based data to NAICS categories. The two statistical groupings do not exactly match, so some of the NAICS-based trade numbers presented in this section differ from the HTS-based numbers presented elsewhere in the report.

¹⁴ Probe’s model uses import data on a Landed, Duty Paid basis, rather than on a Customs Value basis used elsewhere in this study.

different).

- ▶ Second, the model coefficients are based on U.S. technology in 2007. This is because the coefficients are based on BEA analysis of data from the 2007 Economic Census, which is prepared by the government every five years. More recent data are not available. The 2012 Economic Census data have not yet been released and, once they are, it will take years for the BEA to update the input-output model coefficients to reflect the 2012 Census data.
- ▶ Third, the coefficients are based on U.S. technology. That is, the analysis assumes that toy factories in China, for instance, use the same dollar value of resins per dollar's worth of toys (valued at U.S. import prices), as do U.S. toy manufacturers.¹⁵
- ▶ Finally, input-output models are better at tracking expendable inputs, like fuel and plastics, than they are at tracking capital inputs, like machine time and the use of factory buildings. For this reason,

the analysis is valid for resins and plastic products, but it is not valid for molds and machinery.

Despite these limitations, a contained trade analysis based on input-output coefficients is helpful in observing trends and otherwise viewing captive movements of resins and plastic products in international trade.

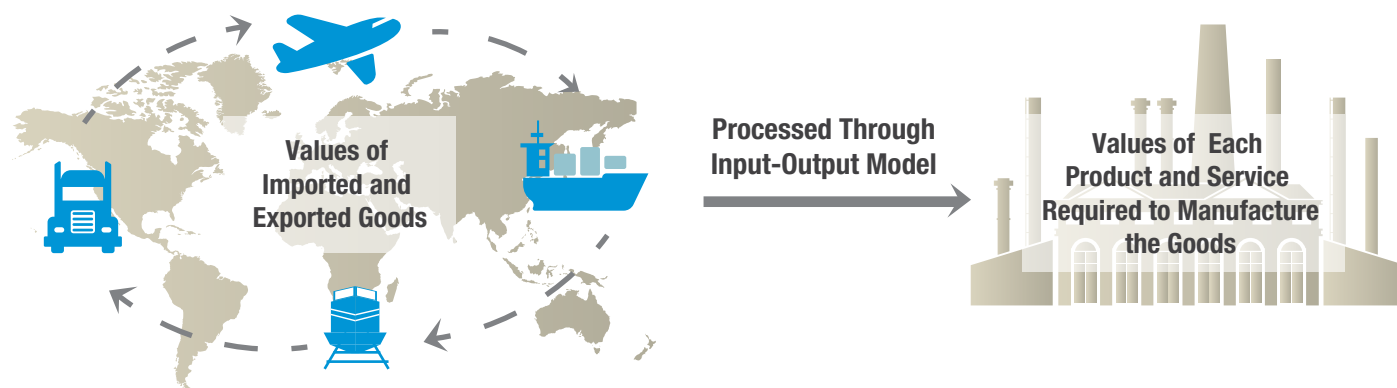
[Figure 20](#) illustrates the effect of contained trade on U.S. resin movements.¹⁶ The top portion of the chart shows movements in “regular” resin trade, i.e., values captured under the HTS system. The bottom portion of the chart provides an analysis of resins contained in intermediate and finished goods flowing between the U.S. and the rest of the world.

In 2014, the U.S. resin industry produced \$96 billion worth of resins, which were either shipped to U.S. processors or exported.¹⁷ “Regular” exports and imports, i.e., values captured under the HTS system, led to the \$19.5 billion resin trade surplus discussed in [Section I-B](#). To the \$35.2 billion of resins that the U.S. exported, the rest of the world added an estimated \$300 billion of its own resin production. The combined resin was shipped to processors and downstream users worldwide. These produced an estimated \$11 to \$15 trillion in final and intermediate goods. A lot of those goods were shipped to the U.S. along with their resin content. Because of its large merchandise trade deficit, the U.S. imported a far greater quantity of these goods than it exported.

\$21.2 billion in resins is estimated to have been contained in U.S. exports of goods (other than resins) during 2014, and \$42.8 billion in resins is estimated to have been contained in U.S. imports of goods (other than resins) during 2014 ([see Figure 20](#)). On a “regular” basis, the U.S. had the aforementioned \$19.5 billion surplus in resins. On a “contained” basis, the U.S. had a \$21.6 billion deficit. On the “total” basis, which nets out the regular and contained balances, the U.S. had a \$2.2 billion trade deficit.

FIGURE 19

INPUT-OUTPUT METHODOLOGY



¹⁵ It is more plausible to assume that the two countries use the same amount of plastics in a toy than it is to assume that they use the same amount of labor.

¹⁶ It should be noted that the contained trade analysis does not permit identification of the country of origin of the resin imported into the U.S. on a contained basis. It could be U.S.-produced resin making a round trip, or it could be resin produced in other countries such as China or Saudi Arabia.

¹⁷ The \$96 billion in resin production equals the resin shipments number presented in Section II above. “Regular” exports and imports are the same as the export and import figures presented in [Section I](#). The figures for U.S. production of products, rest-of-world production of products, and rest-of-world production of resins are rough estimates provided for illustration purposes only.

B. U.S. TRADE IN RESINS AND PLASTIC PRODUCTS, ALL COUNTRIES

COMBINED

The 2014 surplus of “regular” resin trade of \$19.5 billion was more than offset by a contained deficit of \$21.6 billion, resulting in the U.S. resin industry’s total deficit of \$2.2 billion in 2014 — as is also shown in Figure 20. [Table 31](#) shows U.S. “regular,” contained and total trade in resins in more detail than in Figure 20, with data for 2012 through 2014.

The “regular” trade balance in resins improved throughout most of the period between 1998 to 2014. The balance of contained resins deteriorated, from slightly less than a \$7 billion deficit in 1998 to a \$21.6 billion deficit in 2014 ([see Figure 21](#)).¹⁸

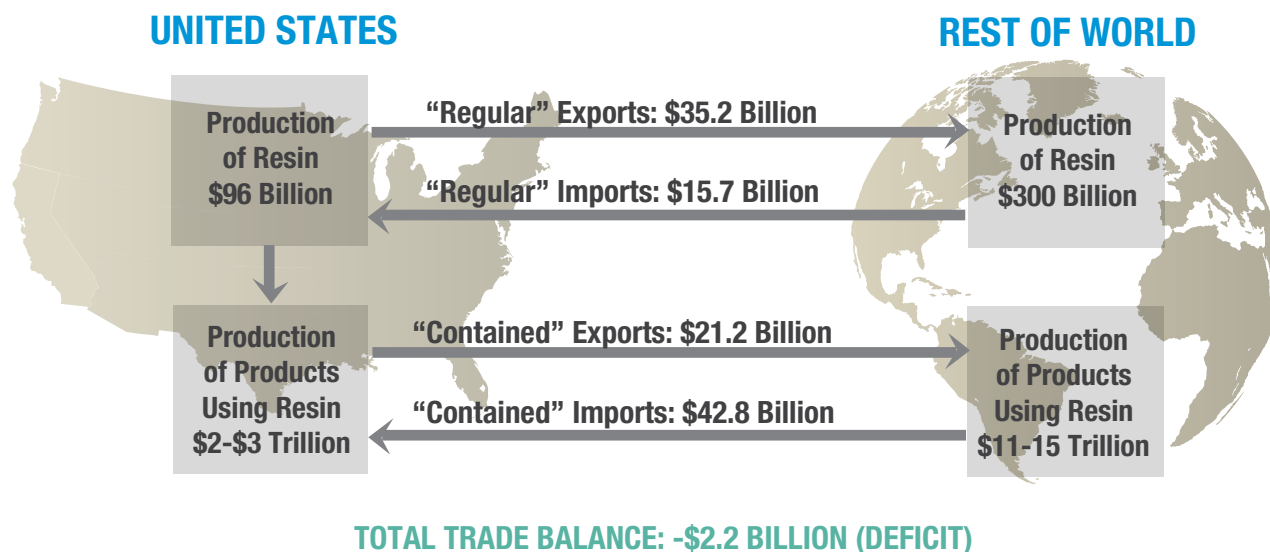
[Table 32](#) provides an analysis of contained trade in plastic products. For example, using the input-output methodology, the estimated 2014 value of plastics packaging materials, film and sheet “contained” in other products that were exported from the U.S. was \$8.4 billion. The table shows the export and import value of “regular” plastic products (HTS 3916 – 3926), the estimated value of plastic products “contained” in other goods, and the overall trade balance (net exports) in plastic product trade.

The total deficit rose 11.1 percent from \$26.6 billion in 2013 to a net deficit of \$29.6 billion in 2014. This deficit level amounted to 14.3 percent of plastic products shipments in 2014 ([see Table 32](#)).¹⁹

Although trade in “regular” plastic products has had only a modest deficit of around \$7 billion annually, there is a large total trade deficit — because of the large deficit in contained plastic products ([see Figure 22](#)). Although there is limited evidence so far, there is hope that the total trade deficit for plastic products is stabilizing. We will know better when Europe recovers and starts importing more merchandise.



FIGURE 20
U.S. RESIN FLOWS, 2014



¹⁸ The recession added some volatility to the contained graph. The graph bumped up when U.S. imports were reduced by the recession. Imports increased after the recession and sent the graph back downward again.

¹⁹ This percentage is based upon estimated plastic products shipments of \$206.1 billion in 2014. See footnote 5 for a discussion of the method that Probe Economics LLC used to develop the estimate.

C. THE “TRUE” CONSUMPTION OF RESINS AND PLASTIC PRODUCTS

Apparent consumption, a concept introduced in [Section II](#), provides a convenient measure of market size. However, it measures consumption only at the first channel of distribution, i.e., resins sold to plastic processors and converters. This can be valuable information for resin sellers who want to know how much resin they and their competitors are selling domestically. Apparent consumption does not measure ultimate consumption — how much resin is going to final domestic consumers, whether or not that resin originated and/or was processed domestically.

Industry strategists often seek to understand how fast this end-use market is growing — not just what is exiting their plant gates. This knowledge helps them identify whether slowing sales are due to a maturing market or due to either domestic or import competition — perhaps indirect competition in the form of imported items that contain their products. Some resin producers, for example, have noticed that apparent consumption is not growing as fast as it once did. Some have speculated that this slow growth is attributable to the maturation or saturation of the plastics market. Others have realized that there is a final or “true” market that could be growing faster than the apparent consumption they were observing. This recognition has called for another measure of resin consumption.

This contained trade analysis makes it possible to calculate another measure of consumption, i.e., an estimate of the flow of resins and plastic products into end-markets or to the final consumer. This measure is called “true consumption.”

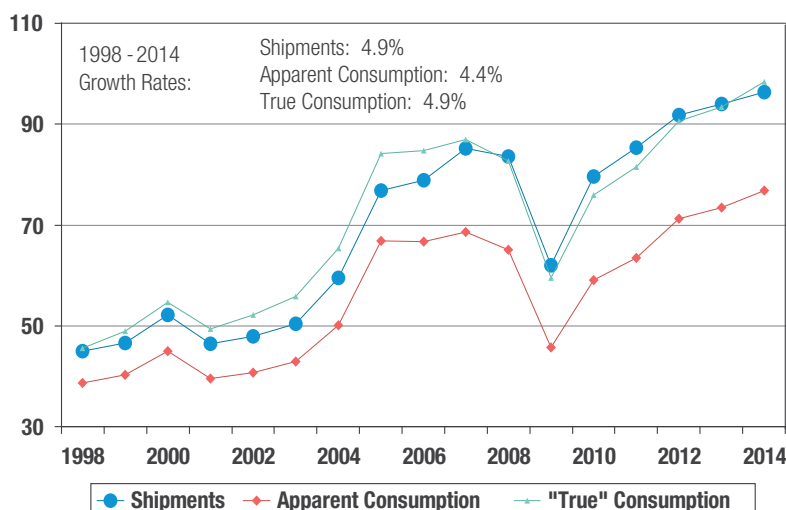
[Figure 23](#) shows how true consumption was derived in the case of resins. In 2014, the domestic resin industry’s shipments were estimated at \$96.3 billion. To calculate apparent consumption, the \$15.7 billion in “regular” imports was added and the \$35.2 billion in “regular” exports was subtracted, resulting in apparent consumption of \$76.8 billion (discussed in [Section II-C](#)). Apparent consumption (the amount of resin going to the first stage of processing) was less than shipments in 2014, because the U.S. sent a net \$19.5 billion of its resin to other countries, where it was processed.

To account for resins (produced in the U.S. or elsewhere) that were converted outside the U.S. and subsequently entered the U.S. market as part of other products, it was necessary to estimate the value of resins contained in these exports and imports. The estimated value of resins contained in imports (\$42.8 billion) was added to the apparent consumption figure. The estimat-

ed value of resins contained in exports (\$21.2 billion) was subtracted, resulting in a “true” consumption figure of \$98.5 billion for resins in 2014. This is quite a bit higher than apparent consumption and shows that domestic producers have quite a bit of their own domestic market that they could potentially serve.

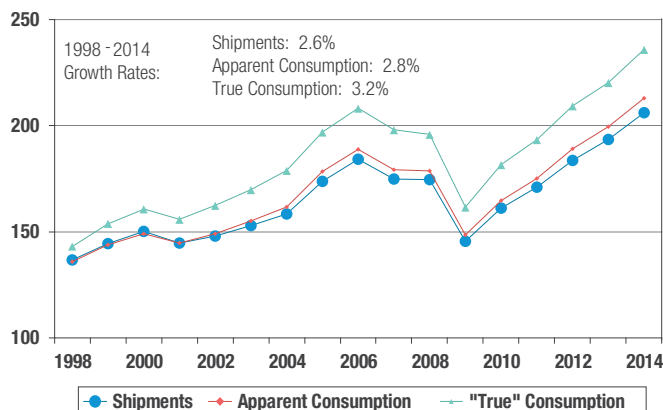
[Figure 24](#) compares the growth rate of apparent consumption and “true” consumption for resins between 1998 and 2014. Apparent consumption grew 4.4 percent per annum during this period. “True” consumption grew at a faster, 4.9 percent annual rate.

FIGURE 24
THE “TRUE” CONSUMPTION OF RESIN IN THE U.S.
BILLIONS OF DOLLARS



A similar calculation was performed for plastic products. [Figure 25](#) compares the growth rate for apparent consumption and “true” consumption for plastic products between 1998 and 2014. Apparent consumption for plastic products grew by 2.8 percent per year. “True” consumption grew by 3.2 percent per year.

FIGURE 25
THE “TRUE” CONSUMPTION OF PLASTIC PRODUCTS IN THE U.S.
BILLIONS OF DOLLARS



[Figures 24](#) and [25](#) illustrate two important trends: (1) U.S. consumption of goods that contain resins and plastic products has been greater than apparent consumption and has been growing faster; and (2) U.S. producers have been losing share of this “true consumption” market to foreign suppliers — mostly foreign suppliers of manufactured goods that contain resins or plastic products. This market share impact is observed in the spread between “true” consumption, which is what the U.S. populace is actually consuming, and apparent consumption, which is what U.S. resin and plastic products producers realize. To benefit from the growth in “true” consumption, the U.S. plastics industry must realize increased use of their

products in U.S.-produced manufactured goods.

Unfortunately, the industry has little or no control over where manufactured goods are produced. As long as manufacturing operations are being outsourced, domestic plastics sales will be lost. On the positive side, there is hope that U.S. manufacturing is starting to return home. For instance, the non-durables segment of the U.S. manufacturing trade balance has been improving since 2008.

D. THE KINDS OF GOODS THAT CONTAIN RESINS AND PLASTIC PRODUCTS

[Table 32](#) identifies seven categories of plastic products contained in other goods. This section analyzes trade in those “other goods.”

[Table 33](#) identifies the top 20 export products ranked by resin content.²⁰ By resin content, “All Other Plastics Products (NAICS 326199)” was the largest category in 2014, with \$3.3 billion of contained resin.

The second largest was “Not Reinforced Plastic Plates, Sheet, etc. (Except Packaging) (NAICS 326113),” at \$1.9 billion.

The next largest categories were “All Other Basic Organic Chemicals (NAICS 325199),” at \$1.8 billion, and “Automobiles and Light Duty Vehicles, Including Chassis (NAICS 336111),” at \$1.1 billion.

The organic chemicals might seem counterintuitive. The U.S. exported \$1.8 billion of resin contained in, or used to manufacture or package, these chemicals. The plastics usage per dollar is modest (\$0.050923 per dollar’s worth of chemicals according to the model coefficients), but a high dollar value (\$34.8 billion) of “All Other Organic Chemicals” was exported in 2014. So, it adds up.

In 2014, the largest import category of resin containing goods was “All Other Plastics Products (NAICS 326199),” at \$5.0 billion. The category, “Automobiles and Light Duty Vehicles, Including Chassis (NAICS 336111)” was second at \$3.2 billion. “All Other Basic Organic Chemicals (NAICS 325199)” was third, at \$1.7 billion. [Table 34](#) identifies the top 20 import products ranked by resin content. As explained on the previous page, the high ranking of organic chemicals may not be self-evident, but it can be justified.

[Tables 35](#) and [36](#) (which are based on Appendix E) show exported and imported goods ranked by plastic products content in 2014. “Automobiles and Light Duty Motor Vehicles, Including Chassis (NAICS 336111)” represented the most plastics products being exported as part of another product – \$2.5 billion. There are a lot of plastic parts in automobiles, and, yes, the U.S. does export automobiles. The same automotive category also accounted for the most plastic products being imported as part of another product – \$7.1 billion. The U.S. may export automobiles, but it imports more of them ([see Table 36](#)).

E. KEY COUNTRIES FOR CONTAINED RESINS AND PLASTIC PRODUCTS TRADE

The input-output methodology also permits examination of the countries that account for the largest contained resins and plastic products surpluses and deficits. [Tables 37](#) through [40](#) summarize the results of this country-specific analysis.

[Table 37](#) lists the 10 countries accounting for the largest contained resin surpluses in 2014. Canada ranked first, giving the U.S. a contained surplus of \$957 million. Belgium, Australia and Hong Kong were ranked second through fourth in terms of a contained surplus. At the mouth of the Rhine River, Belgium (Antwerp) is a major transit point for ship-borne industrial goods entering Europe, which might explain that country’s high rankings.

Of the 10 countries accounting for the largest contained resin deficits in 2014, China ranked first, with a deficit of \$11.8 billion – 62 percent of the total deficit. Japan, Germany and Mexico are the next three largest in terms of generating contained resin deficits for the U.S. ([see Table 38](#)). The countries that are sending the U.S. a lot of contained resins are also using a lot of resins. Some could be overlooked customers for U.S. resin companies.

[Table 39](#) shows the 10 countries with which the U.S. had the largest surpluses in contained plastic products in 2014. Australia, the United Arab Emirates, Hong Kong and Belgium are highest on the list. As discussed above, Belgium is a major gateway into Europe. The U.S.

²⁰ Plastic resins themselves use a lot of plastic resin, in the manufacturing and packaging processes. This is an obvious and not very interesting fact. Resins would be at the top of [Tables 33](#) and [34](#), had the authors not removed them from the list to focus on more interesting trends.





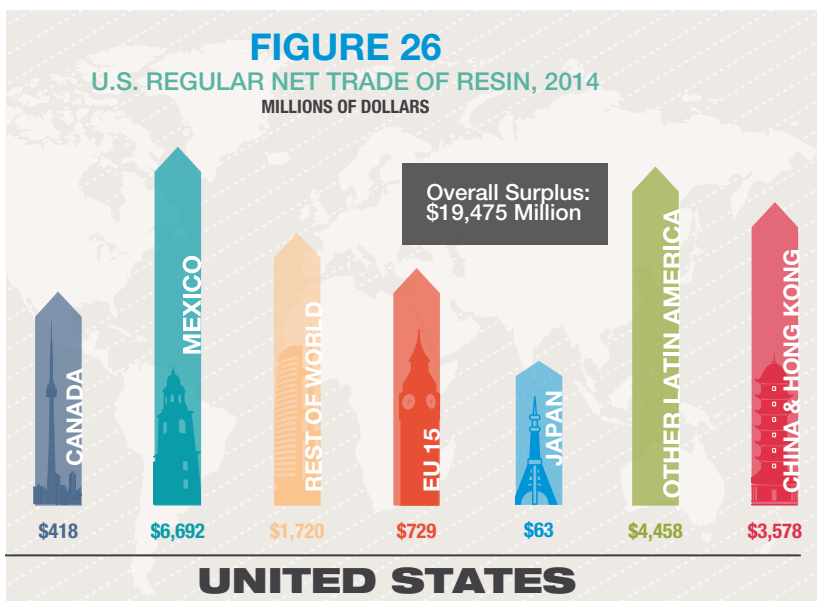
may import a lot of hydrocarbon products from those Middle Eastern countries, but it also exports goods there – aircraft, etc.

Of the top 10 countries accounting for the largest deficits in contained plastic products, China, a large exporter of manufactured goods, accounted for \$10.5 billion, or 46 percent of the total contained plastic products deficit. Mexico, Japan and Germany were next on the list (see Table 40).

F. U.S. RESIN TRADE FLOWS

The contained trade model depicts the movement of resins into and out of the U.S. on both a regular and contained basis. Figures 26, 27 and 28 depict those trade flows according to geographic regions from the U.S.I.T.C. Country Group List^{21 22} Figure 26 shows how the 2014 U.S. surplus in resins of \$19,475 million was distributed among eight world regions. The largest surpluses were with Mexico, Other Latin America, China & Hong Kong and Other Asia. Those resins were processed into goods that were subsequently consumed locally or exported. In 2014, the U.S. had a \$21,634 million contained deficit in resins that had been processed into goods (see Figure 27). The U.S. contained deficit was distributed among all regions. China & Hong Kong was by far the dominant net exporter of plastics-containing goods to the U.S. — \$12,383 million on a net contained resins basis. China & Hong Kong were followed distantly by Other Asia, EU15 and Japan.

The U.S. had its largest surpluses with Other Latin America and Mexico, and the largest deficit with China & Hong Kong. On a net basis, the U.S. imported \$8,805 million more resins contained in goods from China & Hong Kong than the value of the resins that it sent to China & Hong Kong as raw resins. The Total Balance is the sum of the Regular and Contained Balances. Figure 28 shows how the U.S. Total Balance deficit of \$2,161 million in 2014 was distributed among the regions.



G. PLASTICS TRADE FROM A BROADER PERSPECTIVE

The resin and plastic products trade that we just discussed fits within the broader framework of all U.S. merchandise trade. The U.S. merchandise trade balance worsened substantially between 1998 and 2006, with the annual deficit rising by \$643 billion (see Figure 29). There has been improvement since then, especially during the 2008-9 recession, when the country consumed less of everything, including imports. The negative situation does appear to have turned around, although part of the recent improvement was in energy products.²³

Manufacturing trade – especially trade in the durable manufactured products that contain so

²¹The list can be seen at <http://dataweb.usitc.gov> includes the original 15 members of the European Union, all of which are industrialized. "Other Asia" includes all of Asia except Japan, China and Hong Kong. "Other Latin America" includes all of Latin American except Mexico.

²² As is discussed in footnote 14, Probe's contained trade model uses imports on a Landed Duty Paid basis, while the rest of the study, including Figures 26-28, uses imports on a Customs Value basis. For that reason, Figures 27 and 28 do not correspond exactly with Appendix D.

²³ The country imported less crude oil and started exporting more refined petroleum products as a result of the "shale revolution."

much resin and plastic products – has improved, but not quite so much. That is mainly why the contained balances, shown in [Figure 21 and 22](#), have continued to deteriorate.

The trade balance shown in [Figure 29](#) would look even better, were it not for a few countries. Trade with Europe and China/Hong Kong has been problematic ([see Figure 30](#)).²⁴ Those countries accounted for 53 percent of the U.S. merchandise trade deficit in 2014, and their trade surpluses with the U.S. continue to grow. The U.S. trade balance with the rest of the world has been improving since 2006.

The trade problem for Europe and China/Hong Kong is rooted in those countries' economies. The European economy has been doing poorly, so the European Central Bank has launched a "quantitative easing" program. It is lowering interest rates, lowering the value of the euro versus the dollar, and making European exporters more competitive in the U.S. market. China is experiencing a slowdown in growth and has not been very successful, thus far, in re-balancing its economy away from exports and infrastructure investments and towards domestic consumption. So, it is pushing out exports as much as ever, even though its cost competitiveness is not what it once was – wages in China have risen rapidly.

Those higher wages in China are starting to produce some new winners – new destinations for the off-shoring of U.S. manufacturing. In 2004, India was the 15th-ranked country for exporting contained resin to the U.S. By 2014, India has risen to 10th. Vietnam wasn't in the top 15 in 2004. It appeared in the ranking in 2009 and rose to 11th in 2014. Given their cost advantages relative to China, these countries are processing more resin, doing more manufacturing, and sending more of those plastic-containing manufactured products to the U.S. The resin content of products exported to the U.S. in 2014 by India and Vietnam was \$793 million and \$701 million respectively. Less of that is U.S. resin than would otherwise be the case because India at least protects its domestic resin industry from imports ([see Table 41](#)).



TOP-15 EXPORTERS OF CONTAINED RESIN TO THE U.S. IN 2014

CHINA

MEXICO

CANADA

JAPAN

GERMANY

KOREA

TAIWAN

UNITED KINGDOM

ITALY

INDIA

VIETNAM

FRANCE

IRELAND

THAILAND

MALAYSIA

Source: Probe Economics LLC

²⁴ To be consistent with the previous section of this report, the graph shows numbers for EU 15, the original 15 members of the European Union (EU), and for China and Hong Kong combined.

IV. IMPLICATIONS FOR THE U.S. PLASTICS INDUSTRY



The trade data analyzed in this study show the recovery from a serious recession. The industry held onto its overall trade surplus, albeit entirely because of the industry's resin sector. U.S. resin exports have been very competitive, as feedstock costs have fallen in response to growing shale gas supplies. However, some of that advantage was lost towards the end of 2014, as world oil prices fell and lowered the costs of foreign resin producers – which use mostly oil-based raw materials.

All plastics industry sectors other than machinery saw a deteriorating trade balance in 2014. This deterioration was in response to a U.S. economy that was recovering, at a time when many other economies were weak or were growing slower than before. When an economy grows, it demands more imports. The U.S. was demanding more imports in 2014, while many of these other countries were not.

On a contained basis (i.e., the quantities of resins and plastic products that enter and leave the country as part of other goods), the trade deficit increased (worsened) in 2014. As with the “regular” trade deficit discussed in the previous paragraph, such an increase is expected during a recovery period, as the U.S. demand for foreign goods increases. The two contained deficits stabilized in recent years, although 2014 delivered a setback. Hopefully 2014 was an anomaly and the stabilization will continue, offering some hope for a more competitive U.S. manufacturing sector in the future.

U.S. plastics industry exports, having fallen off because of the recession, resumed growth in 2014, by recording a 3.1 percent increase. An increase was realized in all industry sectors other than molds, the exports of which fell 10.1 percent in 2014.

The growing U.S. economy meant that more production was needed to meet domestic demand. Industry shipments rose an estimated 5.1 percent in 2014, while apparent consumption rose 6.0 percent. As a result, the ratio of industry exports to domestic shipments fell from 20.5 percent in 2013 to 20.1 percent in 2014. Over the same period, the ratio of industry exports to apparent consumption also fell, from 21.4 percent to 20.8 percent. The ratio of industry imports to apparent consumption rose, from 17.1 percent in 2013 to 17.3 percent in 2014.

The condition of the U.S. plastics industry does not look as good when the amounts of resins and plastic products contained in the import and export of other goods are considered. In 2014, the amount of resin contained in other goods showed an increased deficit – up 2.7 percent in 2014. The surplus in resins traded as resins (the “regular” trade balance) decreased 5.4 percent. The “total” trade balance, considering both “regular” trade and “contained” trade, was a negative \$2.2 billion in 2014, after a \$0.7 billion surplus in 2013. We are hopeful that the recent deterioration of this balance is related to the U.S. recovery and economic problems abroad and will prove to be only temporary.

The pattern is similar in contained plastic products, where the U.S. has a deficit in regular trade (\$6.8 billion in 2014) and an even bigger deficit in contained trade (\$22.8 billion in 2014). Both deficits have been worsening.

Contained trade analysis reveals a pattern in which resins and plastic products are exported from the U.S. and return to the country as part of other goods. It makes for bad logistics to produce plastic products and resins in the U.S. and then ship them to manufacturing operations elsewhere, only to then ship them back to the U.S. Ultimately, producers will have to decide whether to move their plastics-using operations back to the U.S. or to move resin

and plastic products production overseas. Over the last decade, the latter choice has won out, at least for plastic products. Plastic processing operations have moved to overseas locations to be near their manufacturing customers. In this sense, the contained trade analysis has revealed an unseen, or “stealth,” deterioration of the industry's international trade position. It remains to be seen whether this deterioration will continue. The recent slowdown in deterioration suggests that it could be reversible.

The net import of goods that contain resins and plastic products masks a healthier level of “true” consumption in the U.S. market. True consumption includes the consumption of resin and plastic products as is, as well as the consumption of these plastics industry items as part of other products. Not only has true consumption grown steadily, but it has outpaced apparent consumption since 1997. The deteriorating U.S. merchandise trade balance contributes to this trend by reducing the growth of apparent consumption. As the merchandise trade deficit stabilizes, as it appears to be doing, U.S. plastics companies could realize more gains from consumption increases, and U.S. apparent consumption may start growing as fast as true consumption — it already has in some recent years. This could add about a percentage point to the annual growth rate of resins and plastic products apparent consumption. An actual decrease in the U.S. merchandise trade deficit, as appears to be happening, would boost plastics industry growth even further.

A discussion about the U.S. merchandise trade deficit and its relationship with the plastics industry trade position would be remiss without noting China's impact. China is, and will likely remain, a key plastics trading partner. In 2014, China remained the industry's third largest export market, after Mexico and Canada, with plastics industry exports to China valued at \$5.2 billion, or 8.3 percent of total exports. However, China also accounted for the largest industry-wide

bilateral trade deficit, and accounted for the largest increase in plastics industry imports from 2012 to 2014. The deficit was most acute in plastic products trade, where the U.S. had a \$11.5 billion deficit with China. Not surprisingly, China generated large deficits in both contained resins and contained plastic products trade. China held 8.3 percent of the U.S. mold market in 2014, and was second only to Canada as the top gaining country from 2012 to 2014 in exports of molds to the U.S. So far, China is not such a big factor in the U.S. plastics machinery market, with a 5.5 percent share in 2014.

Several factors contribute to a bilateral trade deficit like the one the U.S. has with China, including low wages, government subsidies, tariffs, non-tariff trade barriers and currency manipulation. Higher wages in China are cutting into the country's competitive advantage, but that hasn't changed the game so far. There is an argument that China's currency, the renminbi (RMB), is no longer undervalued and is not as manipulated as it once was, but the recent RMB devaluation of around 2.4 percent, however it came about, will further exacerbate the U.S. trade deficit with China, which is way too big.

###



FIGURES 1-30



FIGURE 1
U.S. PLASTICS INDUSTRY TRADE BALANCE
(BILLIONS OF U.S. DOLLARS)

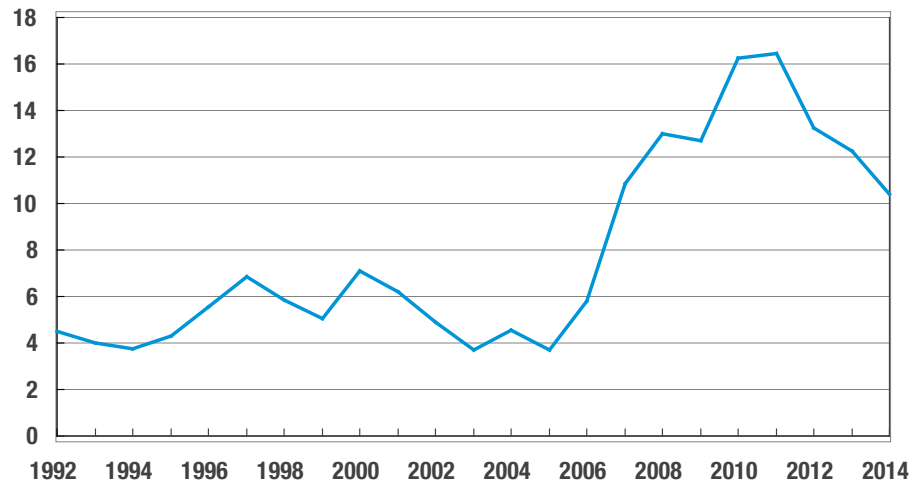


FIGURE 2
U.S. RESIN TRADE BALANCE
(BILLIONS OF U.S. DOLLARS)

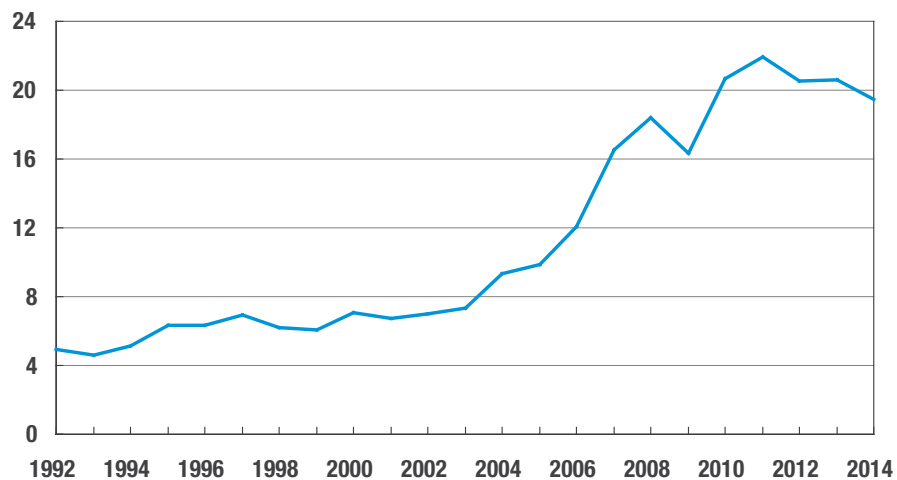


FIGURE 3
U.S. PLASTIC PRODUCTS TRADE BALANCE
(BILLIONS OF U.S. DOLLARS)

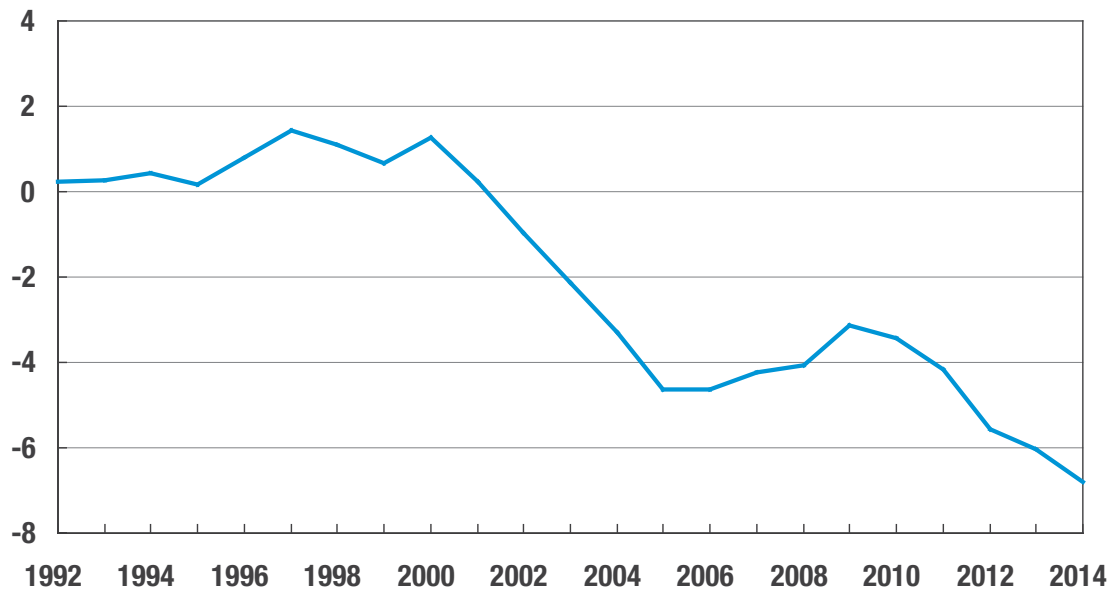


FIGURE 4
U.S. MOLDS TRADE BALANCE
(BILLIONS OF U.S. DOLLARS)

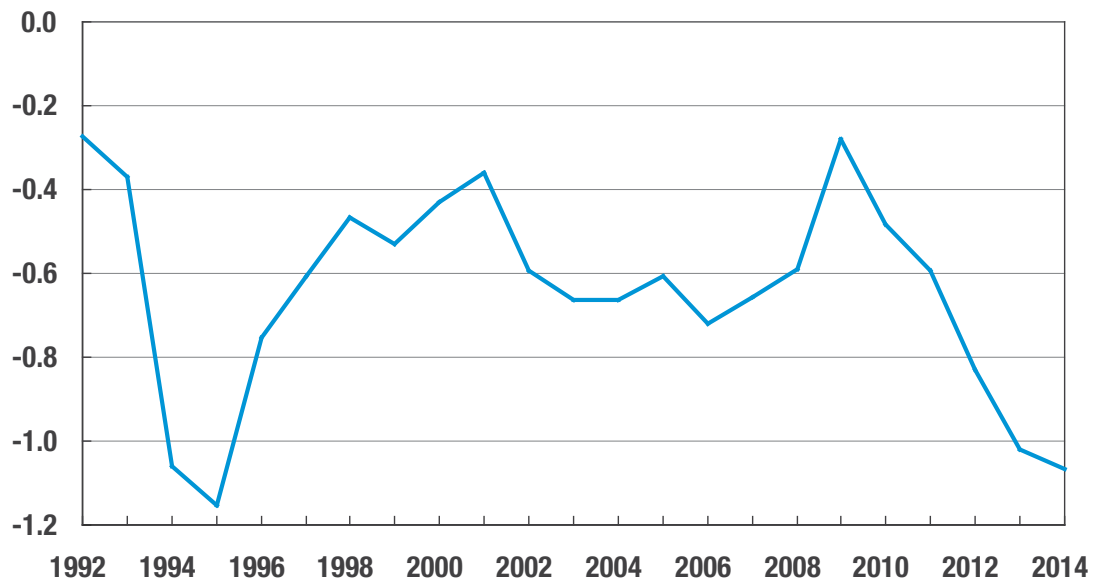


FIGURE 5
U.S. PLASTICS MACHINERY TRADE BALANCE
 (BILLIONS OF U.S. DOLLARS)

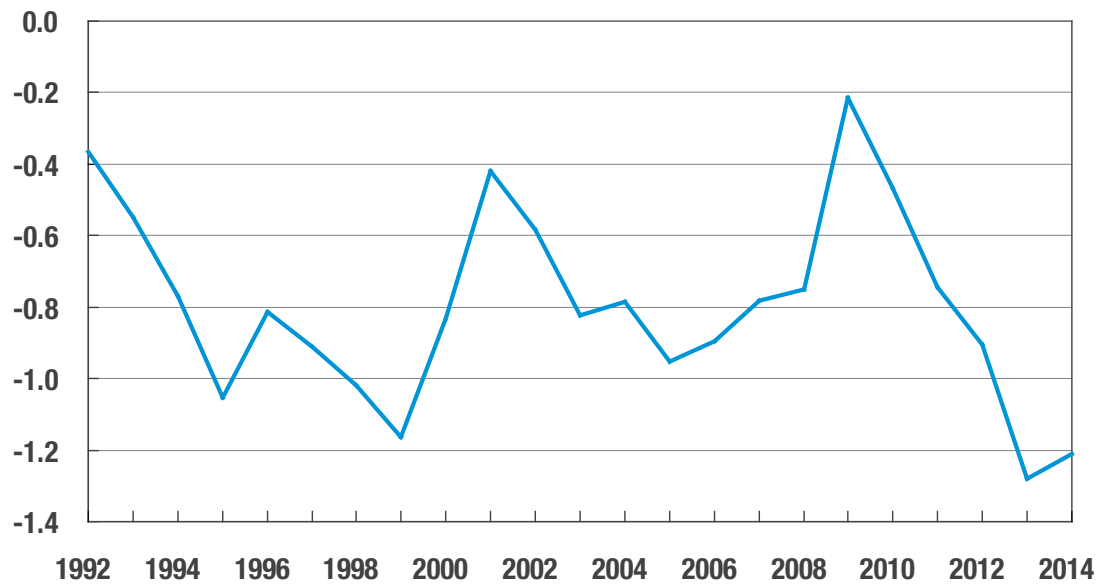


FIGURE 6
U.S. PLASTICS TRADE BALANCES BY INDUSTRY SEGMENT
 (BILLIONS OF DOLLARS)

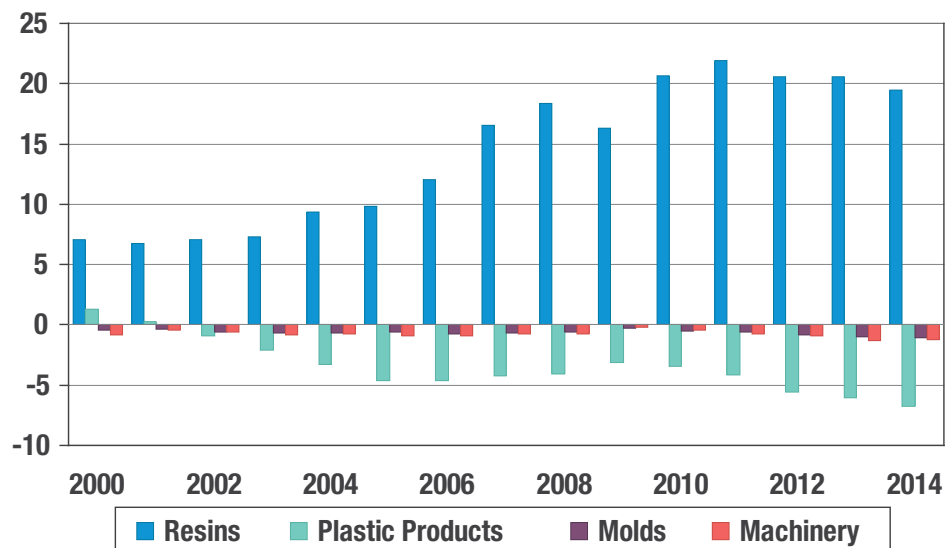


FIGURE 7

U.S. PLASTICS TRADE BALANCES WITH FTA 20 COUNTRIES

(BY PLASTICS INDUSTRY SEGMENT, BILLIONS OF DOLLARS)

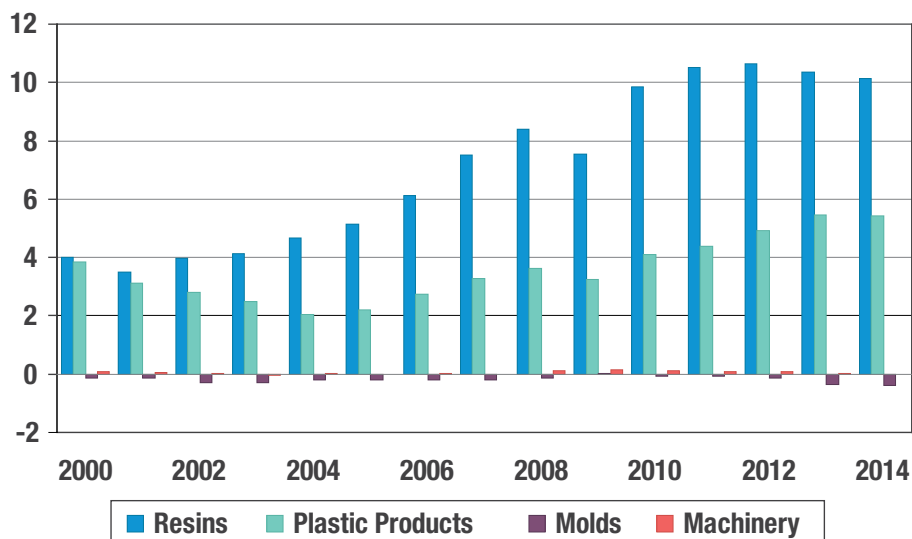


FIGURE 8

TOTAL PLASTICS INDUSTRY

(BILLIONS OF DOLLARS)

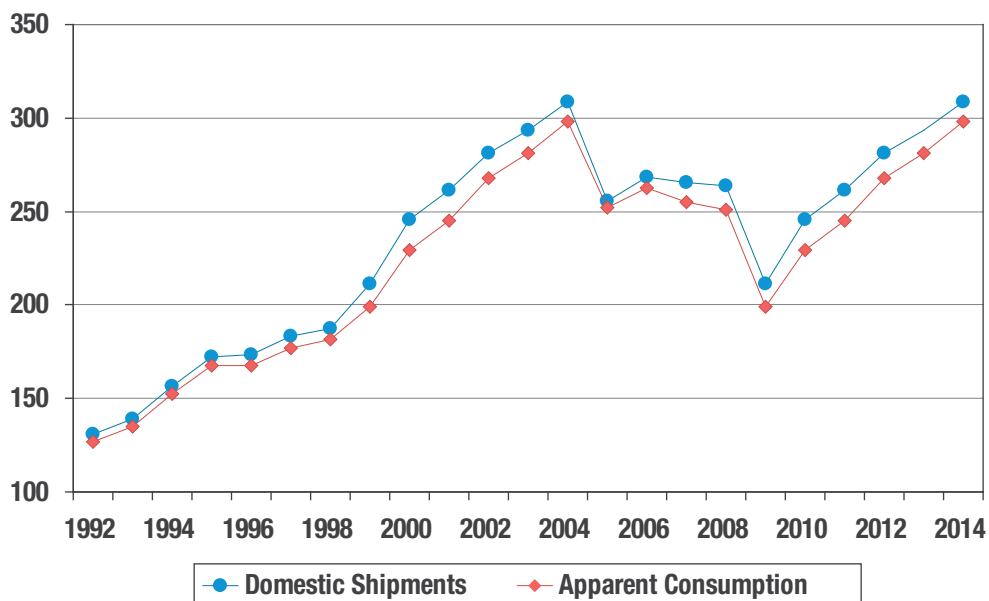


FIGURE 9

RESINS

(BILLIONS OF DOLLARS)

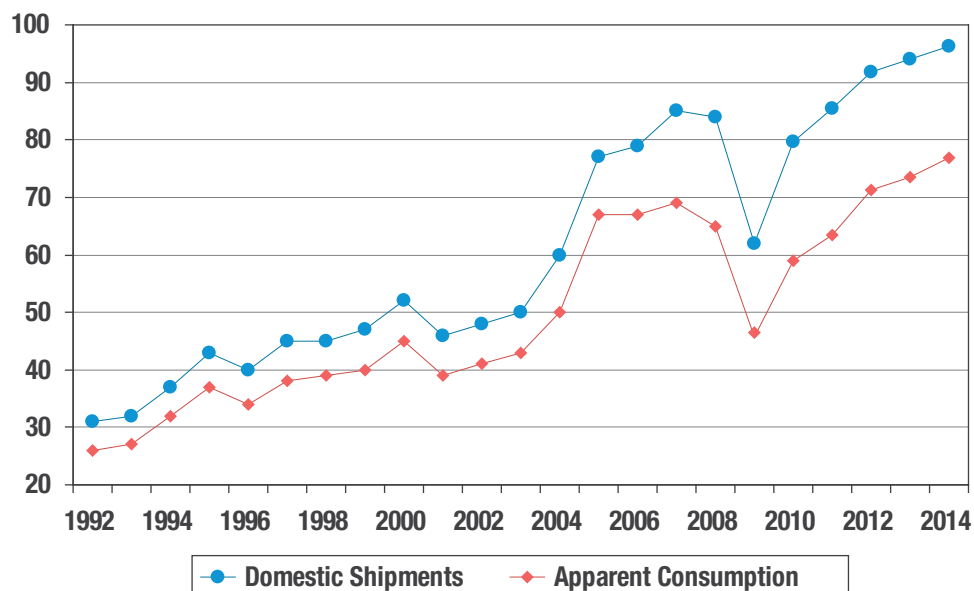


FIGURE 10

PLASTIC PRODUCTS

(BILLIONS OF DOLLARS)

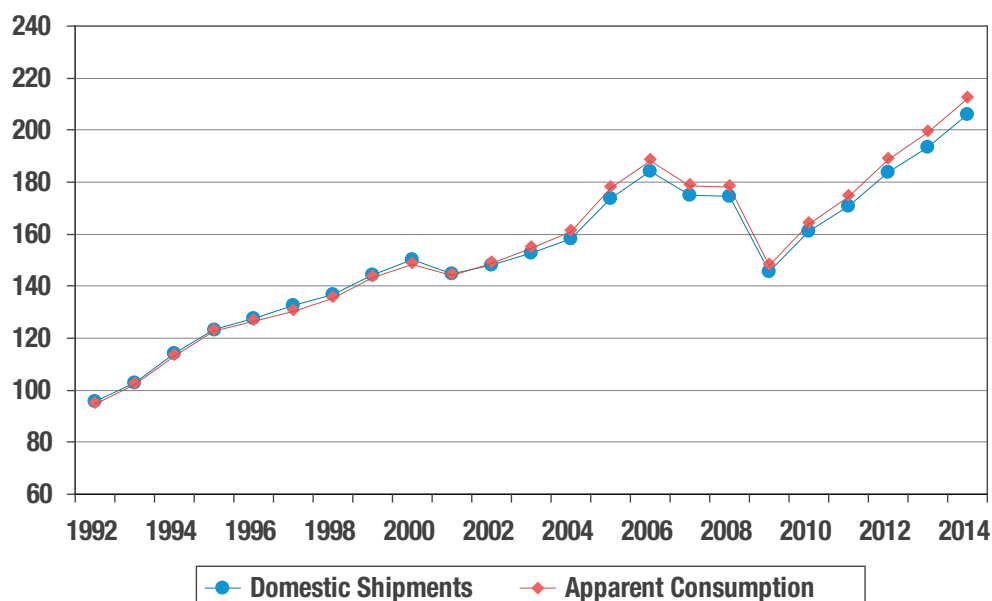


FIGURE 11
MOLDS FOR PLASTICS
 (BILLIONS OF DOLLARS)

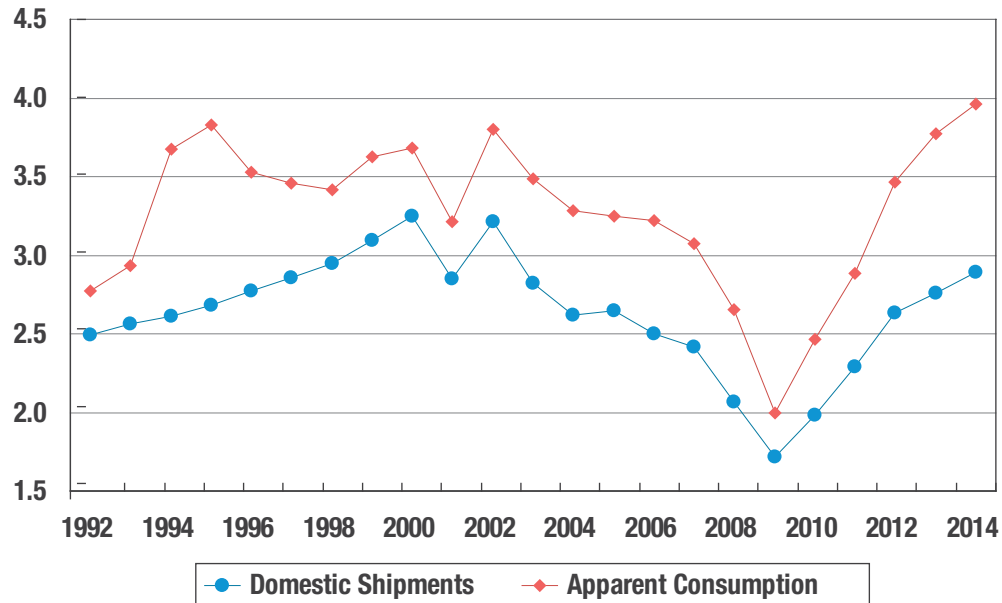


FIGURE 12
PLASTICS MACHINERY
 (BILLIONS OF DOLLARS)

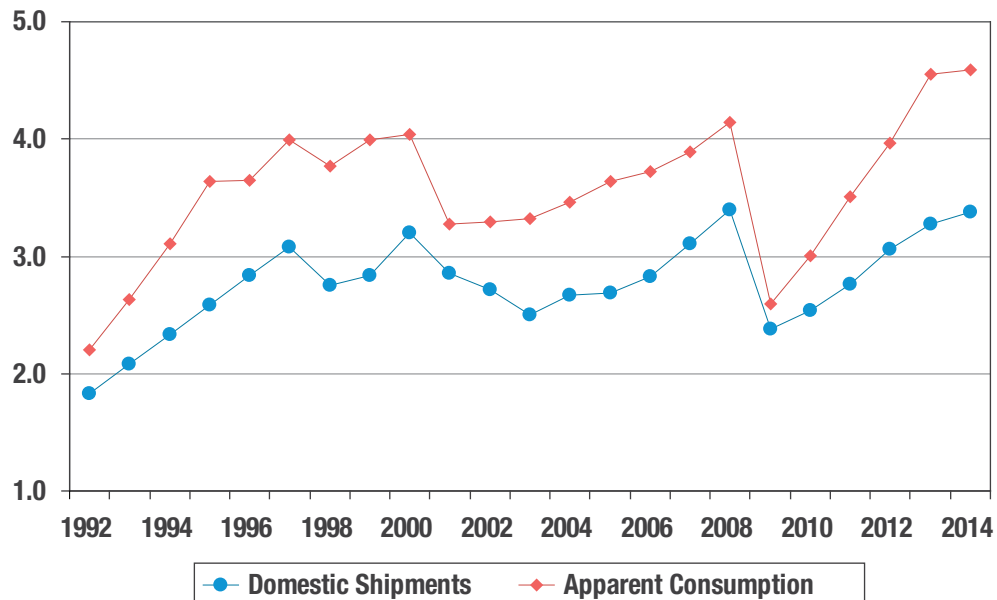


FIGURE 13
PLASTICS INDUSTRY APPARENT CONSUMPTION
 (BILLIONS OF DOLLARS)

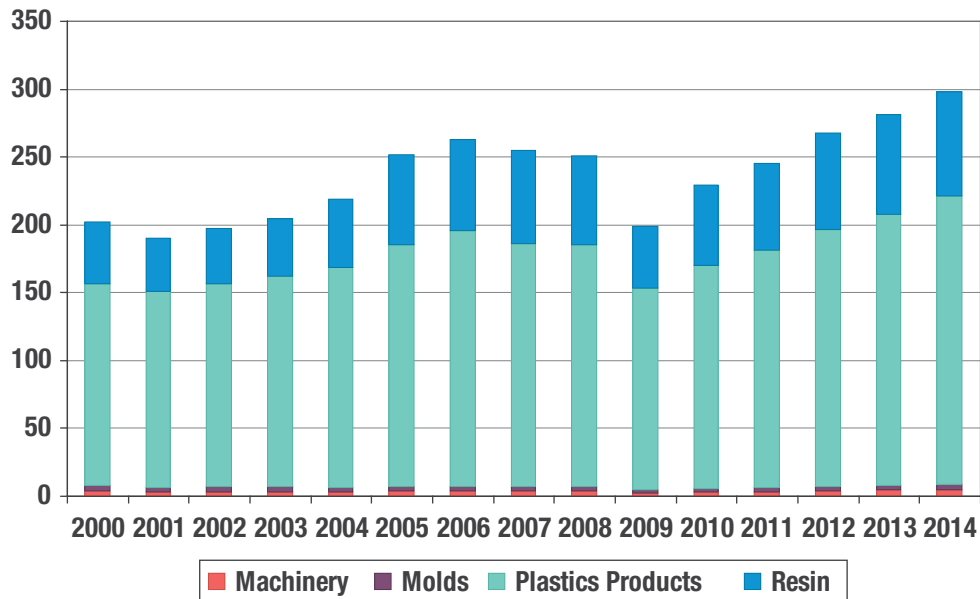


FIGURE 14
DOMESTIC AND IMPORT SHARES OF
U.S. TOTAL PLASTICS INDUSTRY

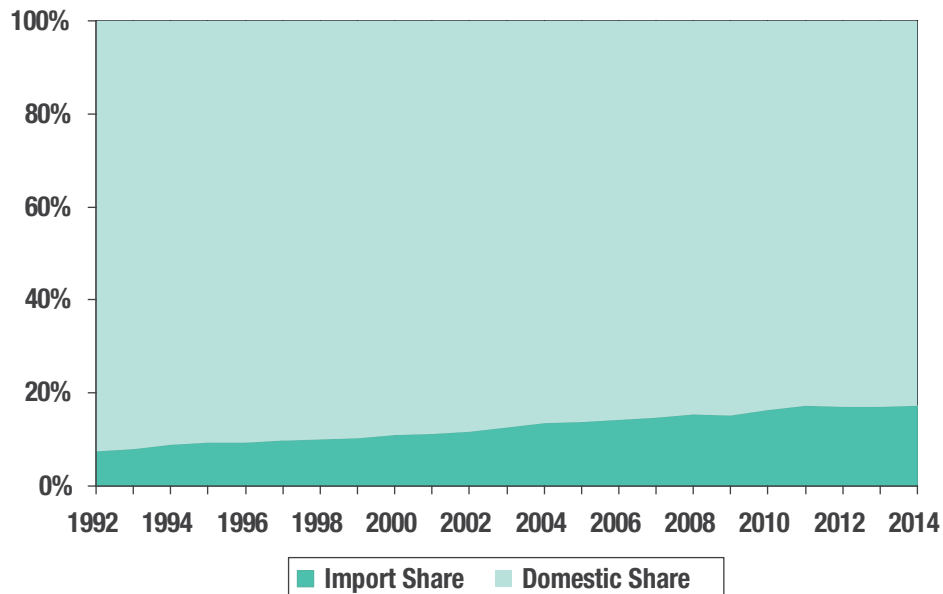


FIGURE 15
DOMESTIC AND IMPORT SHARES OF
U.S. RESIN MARKET

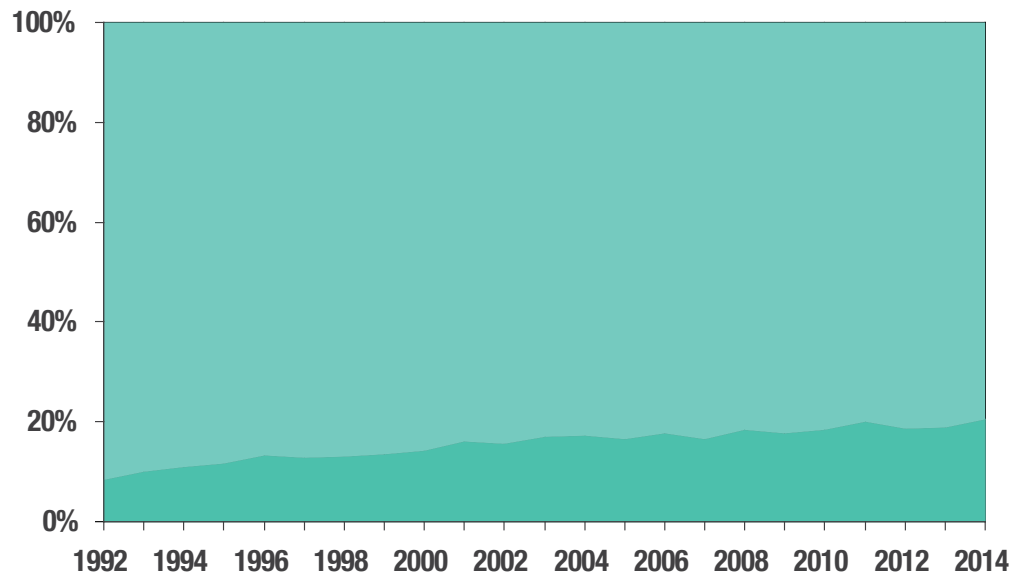


FIGURE 16
DOMESTIC AND IMPORT SHARES OF
U.S. PLASTIC PRODUCTS MARKET

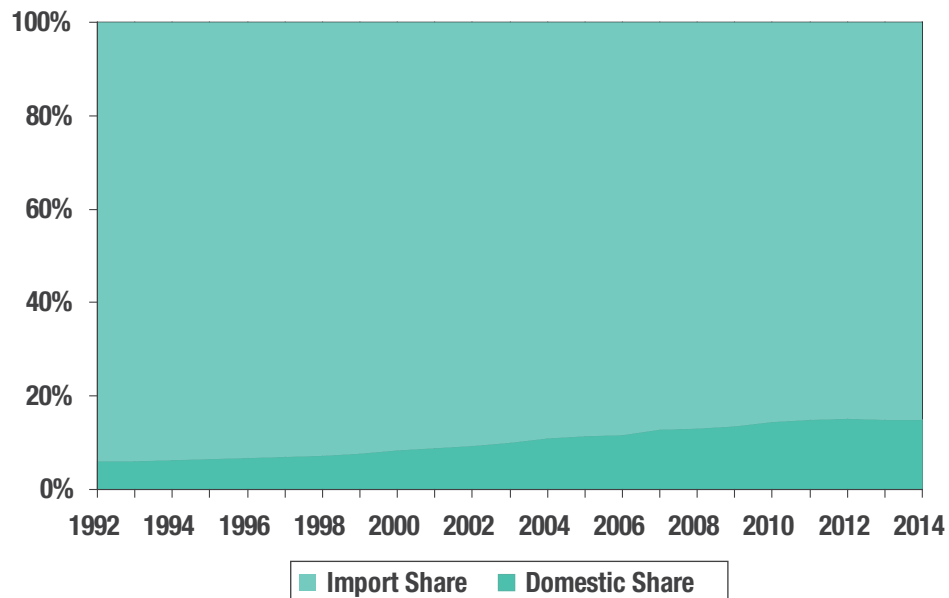


FIGURE 17
DOMESTIC AND IMPORT SHARES OF
U.S. MOLDS FOR PLASTICS MARKET

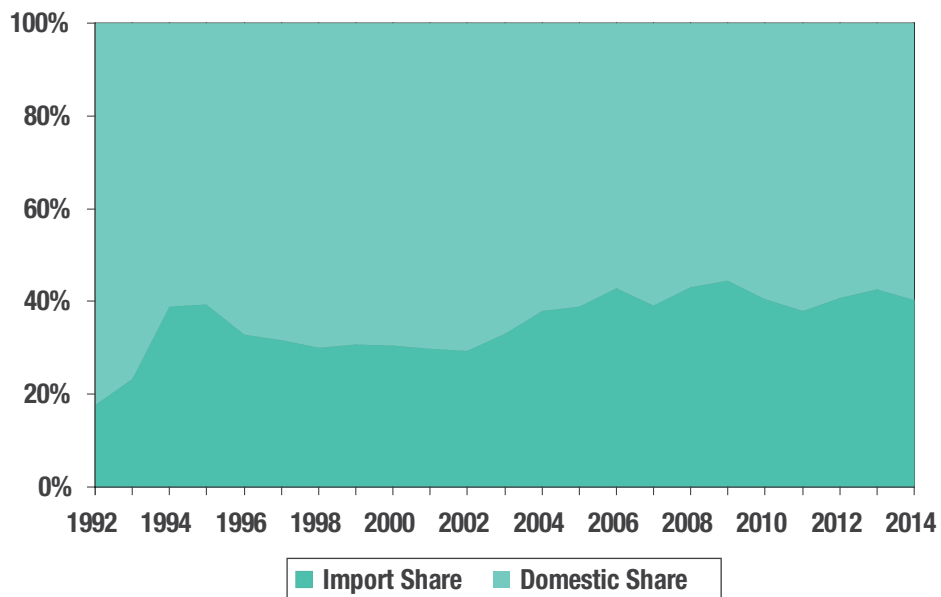


FIGURE 18
DOMESTIC AND IMPORT SHARES OF
U.S. PLASTICS MACHINERY MARKET

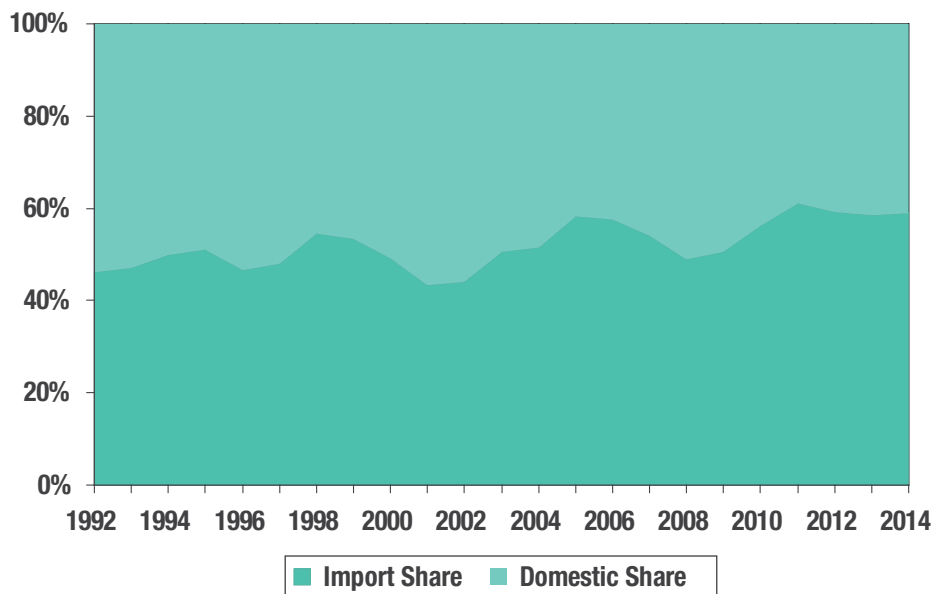


FIGURE 19
INPUT-OUTPUT METHODOLOGY

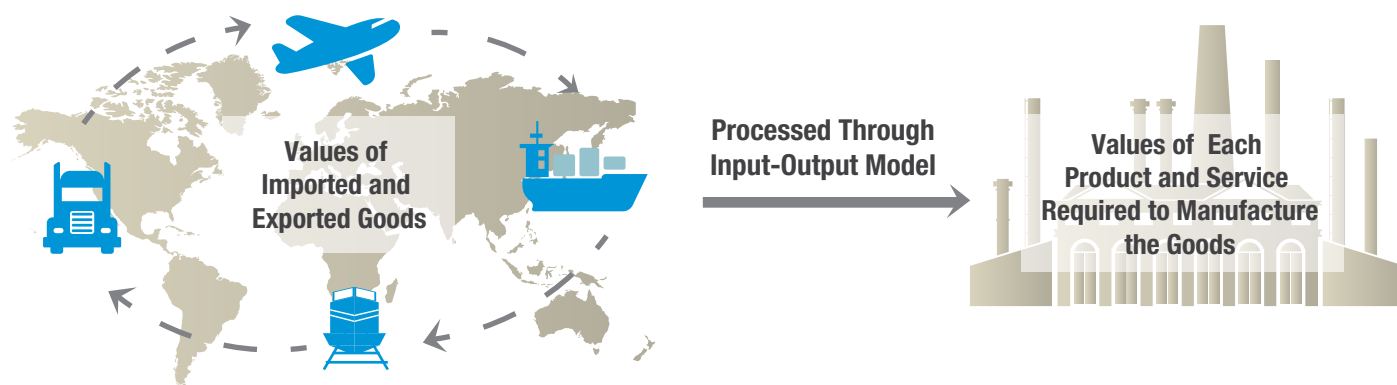


FIGURE 20
U.S. RESIN FLOWS, 2014

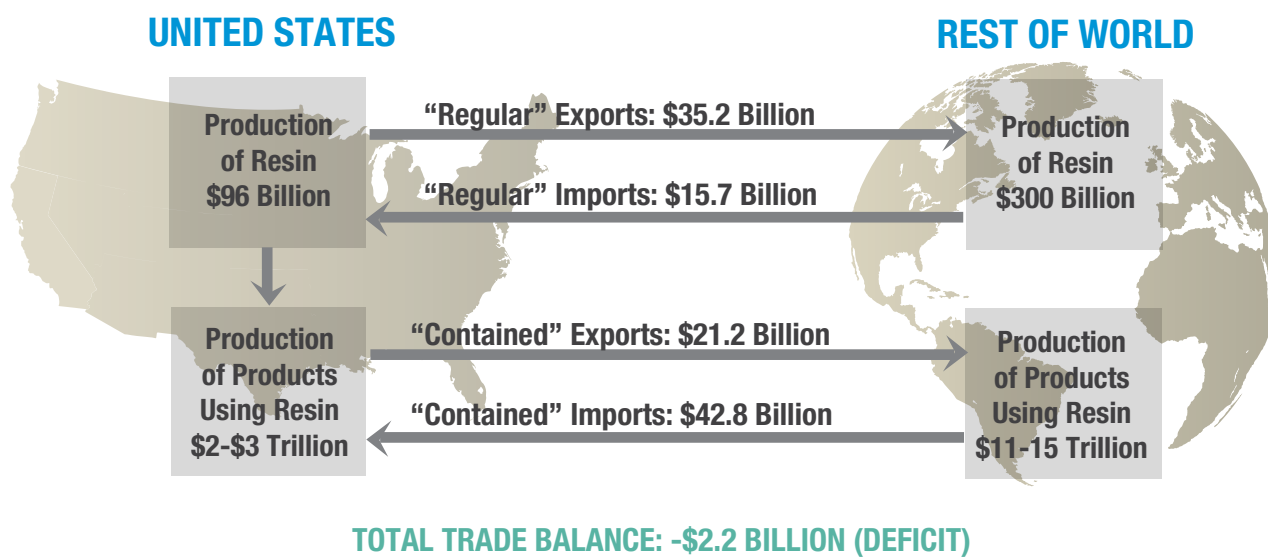


FIGURE 21
TRADE BALANCES IN RESIN
 BILLIONS OF DOLLARS

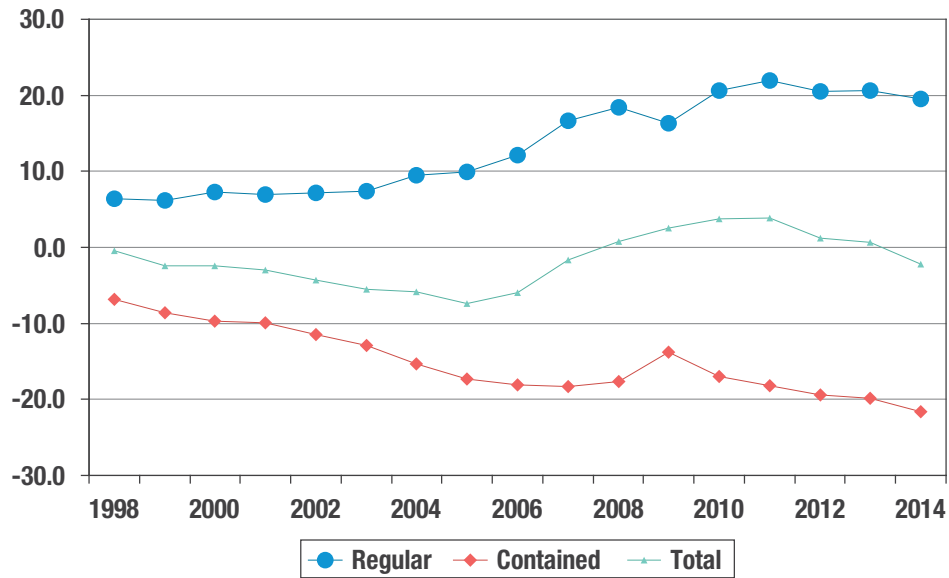


FIGURE 22
TRADE BALANCES IN PLASTIC PRODUCTS
 BILLIONS OF DOLLARS

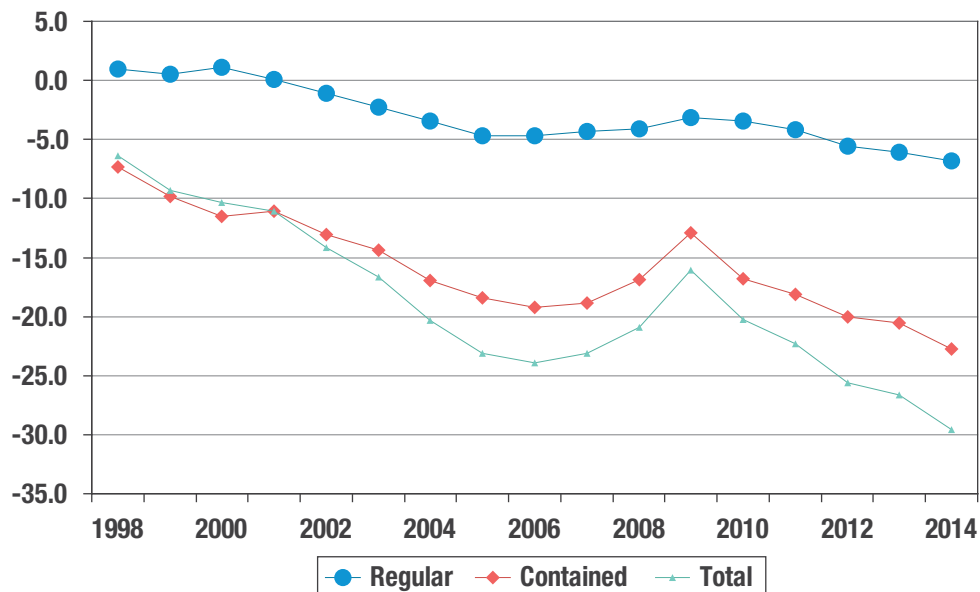


FIGURE 23
DERIVATION OF THE “TRUE” CONSUMPTION OF RESIN
BILLIONS OF DOLLARS, 2014

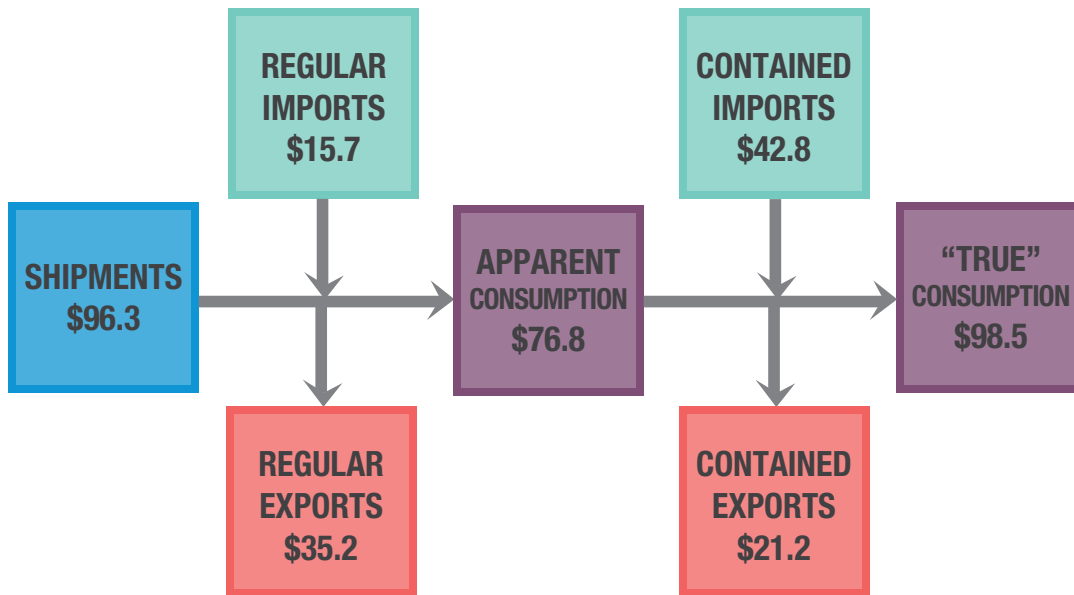


FIGURE 24
THE “TRUE” CONSUMPTION OF RESIN IN THE U.S.
BILLIONS OF DOLLARS

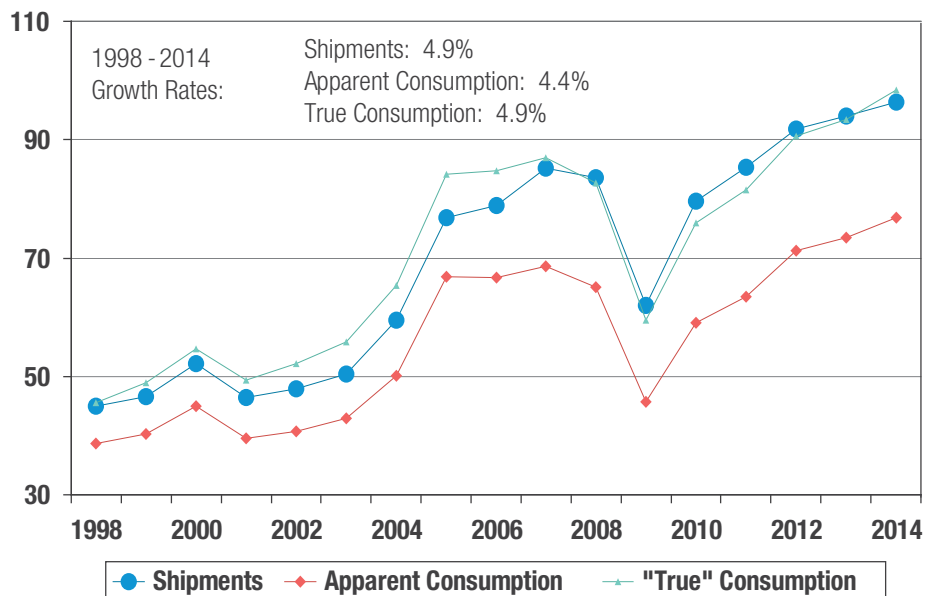


FIGURE 25
THE “TRUE” CONSUMPTION OF PLASTIC PRODUCTS IN THE U.S.
BILLIONS OF DOLLARS

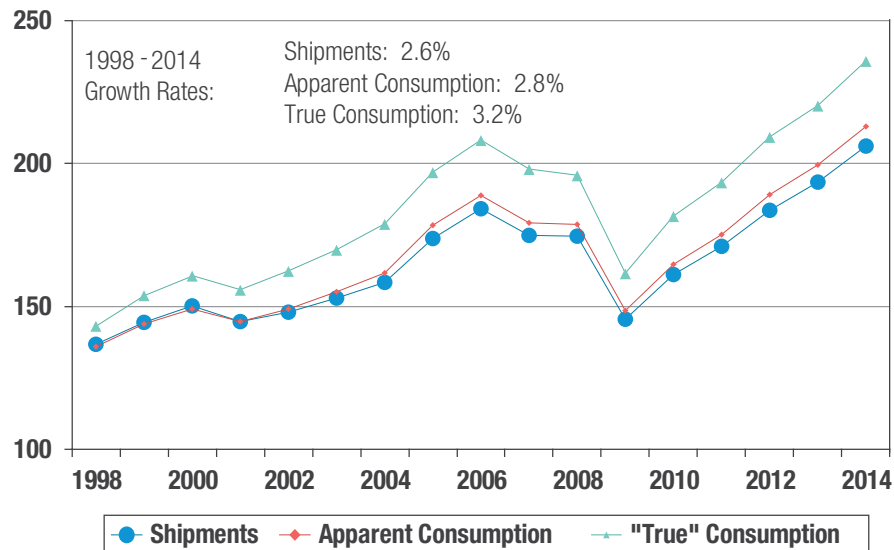


FIGURE 26
U.S. REGULAR NET TRADE OF RESIN, 2014
MILLIONS OF DOLLARS

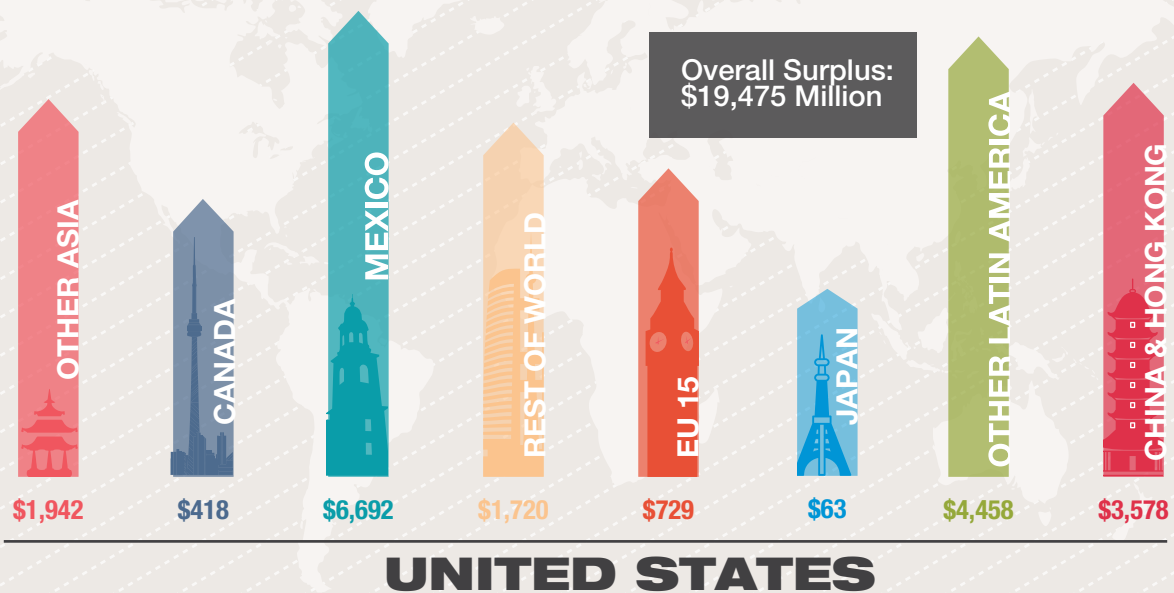


FIGURE 27

U.S. CONTAINED NET TRADE OF RESIN, 2014
MILLIONS OF DOLLARS

UNITED STATES

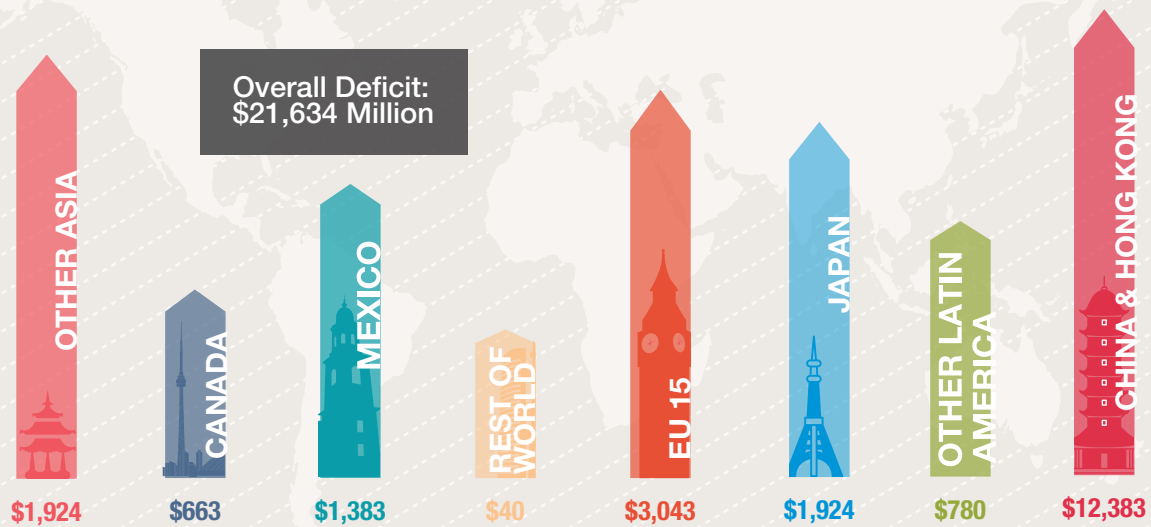


FIGURE 28

U.S. TOTAL NET TRADE OF RESIN, 2014
MILLIONS OF DOLLARS

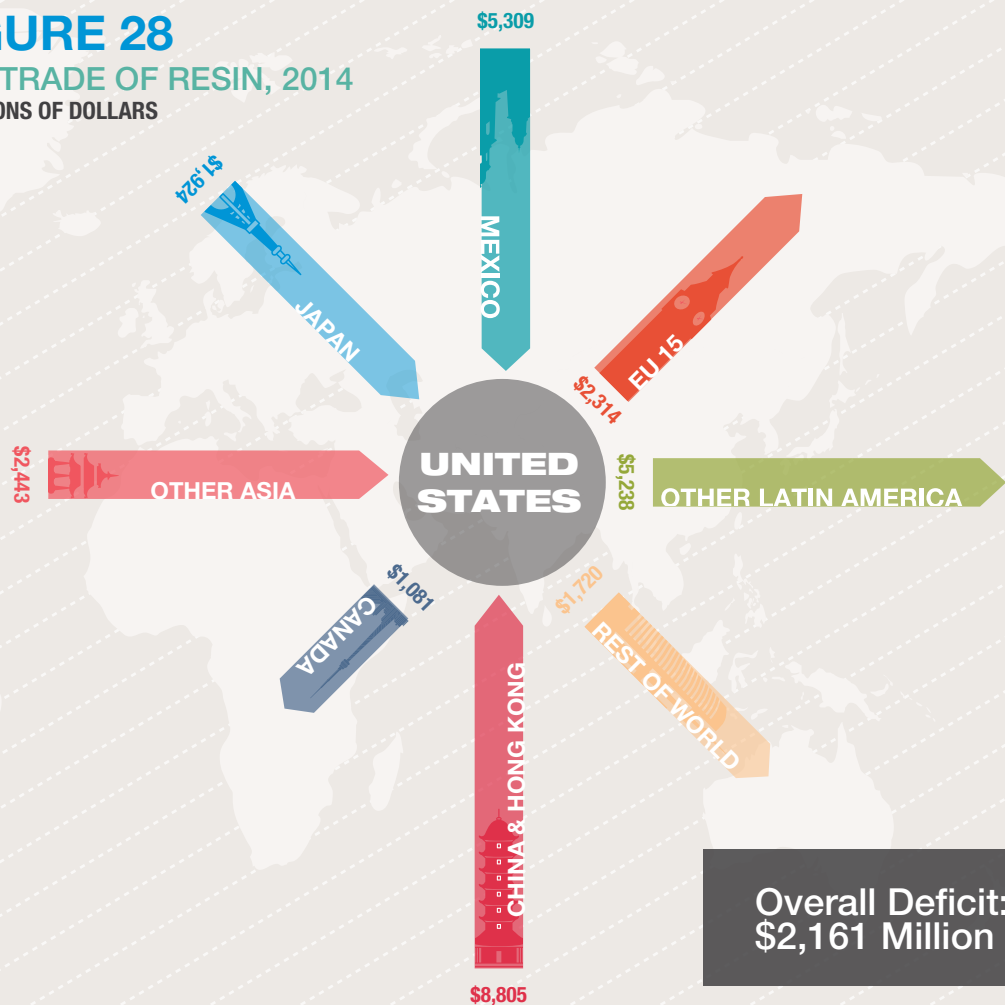


FIGURE 29
U.S. MERCHANDISE TRADE BALANCE
 BILLIONS OF DOLLARS

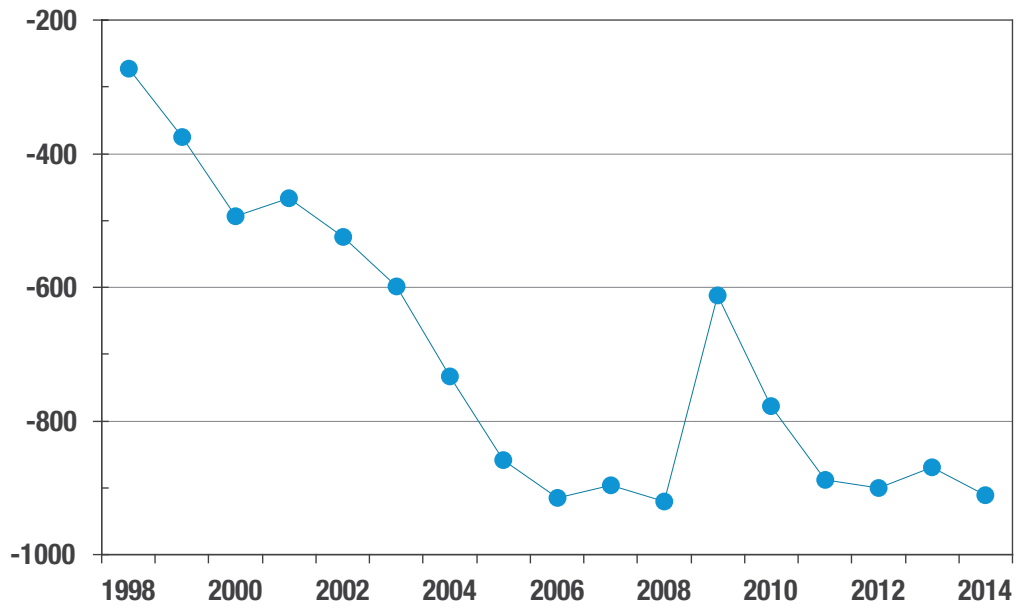
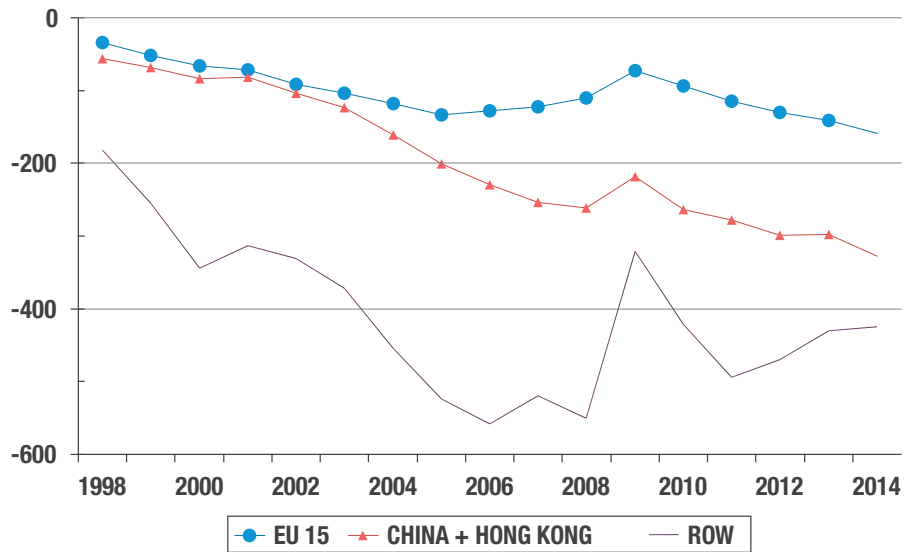


FIGURE 30
U.S. MERCHANDISE TRADE BALANCE
 BY COUNTRY/REGION
 BILLIONS OF DOLLARS



TABLES 1-41



TABLE 1
U.S. PLASTICS INDUSTRY EXPORTS

	2012	2013	2014	% CHANGE 2013/2014
Exports, FAS \$Millions	58,673	60,259	62,149	3.1%
Share of Total Merchandise Exports	4.3%	4.4%	4.4%	#N/A

TABLE 2
TOP 10 PLASTICS INDUSTRY EXPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
392690	ARTICLES OF PLASTICS, NESOI	5,170
390120	POLYETHYLENE HAVING A SPECIFIC GRAVITY OF 0.94 OR MORE, IN PRIMARY FORMS	2,700
390410	POLYVINYL CHLORIDE, NOT MIXED WITH ANY OTHER SUBSTANCES, IN PRIMARY FORMS	2,650
390110	POLYETHYLENE HAVING A SPECIFIC GRAVITY OF LESS THAN 0.94, IN PRIMARY FORMS	2,457
390190	POLYMERS OF ETHYLENE NESOI, IN PRIMARY FORMS	2,278
390810	POLYAMIDE-6,-11,-12,-6,6,-6,9,-6,10 OR -6,12 (NYLON TYPE), IN PRIMARY FORMS	2,134
390690	ACRYLIC POLYMERS NESOI, IN PRIMARY FORMS	1,885
390720	POLYETHERS NESOI, IN PRIMARY FORMS	1,854
390210	POLYPROPYLENE, IN PRIMARY FORMS	1,768
391990	PLATES, SHEETS, FILM, FOIL, TAPE AND OTHER FLAT SHAPES OF PLASTICS, SELF-ADHESIVE, NESOI	1,691

TABLE 3
U.S. PLASTICS INDUSTRY IMPORTS

	2012	2013	2014	% CHANGE 2013/2014
Imports, Customs Value \$Millions	45,429	48,029	51,742	7.7%
Share of Total Merchandise Imports	2.0%	2.1%	2.2%	#N/A

TABLE 4
TOP 10 PLASTICS INDUSTRY IMPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
392690	ARTICLES OF PLASTICS, NESOI	5,910
392410	TABLEWARE AND KITCHENWARE OF PLASTICS	2,543
390190	POLYMERS OF ETHYLENE NESOI, IN PRIMARY FORMS	2,372
392490	HOUSEHOLD ARTICLES NESOI (OTHER THAN TABLEWARE AND KITCHENWARE) AND TOILET ARTICLES, OF PLASTICS	2,105
392321	SACKS AND BAGS (INCLUDING CONES), OF POLYMERS OF ETHYLENE	2,057
390120	POLYETHYLENE HAVING A SPECIFIC GRAVITY OF 0.94 OR MORE, IN PRIMARY FORMS	1,553
392620	ARTICLES OF APPAREL AND CLOTHING ACCESSORIES NESOI, OF PLASTICS	1,309
392390	ARTICLES FOR THE CONVEYANCE OR PACKING OF GOODS, NESOI, OF PLASTICS	1,296
392010	PLATES, SHEETS, FILM, FOIL AND STRIP OF PLASTICS, NOT SELF-ADHESIVE, NON-CELLULAR, NOT REINFORCED OR LAMINATED ETC., OF POLYMERS OF ETHYLENE	1,270
390760	POLYETHYLENE TEREPHTHALATE, IN PRIMARY FORMS	1,219

TABLE 5
U.S. PLASTICS INDUSTRY TRADE BALANCE: KEY COUNTRIES
 (SURPLUSES AND DEFICITS IN MILLIONS OF DOLLARS)

	2012	2013	2014
<u>Top 5 Surplus Countries in 2014:</u>			
Mexico	9,858	10,802	11,148
Belgium	1,707	1,931	1,887
Brazil	1,777	2,008	1,826
Hong Kong	1,046	986	1,076
Canada	1,429	870	864
<u>Top 5 Deficit Countries in 2014:</u>			
China	-7,756	-8,519	-9,151
Germany	-1,751	-2,015	-2,249
Taiwan	-793	-911	-959
Japan	-729	-831	-835
Italy	-410	-454	-541
<u>Balance with All Other Countries:</u>	8,865	8,362	7,342
<u>Overall Trade Surplus:</u>	13,243	12,229	10,407

TABLE 6
TOP 5 RESIN EXPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
390120	POLYETHYLENE HAVING A SPECIFIC GRAVITY OF 0.94 OR MORE, IN PRIMARY FORMS	2,700
390410	POLYVINYL CHLORIDE, NOT MIXED WITH ANY OTHER SUBSTANCES, IN PRIMARY FORMS	2,650
390110	POLYETHYLENE HAVING A SPECIFIC GRAVITY OF LESS THAN 0.94, IN PRIMARY FORMS	2,457
390190	POLYMERS OF ETHYLENE NESOI, IN PRIMARY FORMS	2,278
390810	POLYAMIDE-6,-11,-12,-6,6,-6,9,-6,10 OR -6,12 (NYLON TYPE), IN PRIMARY FORMS	2,134

TABLE 7
TOP 5 RESIN IMPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
390190	POLYMERS OF ETHYLENE NESOI, IN PRIMARY FORMS	2,372
390120	POLYETHYLENE HAVING A SPECIFIC GRAVITY OF 0.94 OR MORE, IN PRIMARY FORMS	1,553
390760	POLYETHYLENE TEREPHTHALATE, IN PRIMARY FORMS	1,219
390690	ACRYLIC POLYMERS NESOI, IN PRIMARY FORMS	849
390110	POLYETHYLENE HAVING A SPECIFIC GRAVITY OF LESS THAN 0.94, IN PRIMARY FORMS	665

TABLE 8
U.S. RESIN TRADE BALANCE: KEY COUNTRIES
(SURPLUSES AND DEFICITS IN MILLIONS OF DOLLARS)

	2012	2013	2014
<u>Top 5 Surplus Countries in 2014:</u>			
Mexico	5,928	6,450	6,692
China	2,795	2,747	2,793
Belgium	1,444	1,668	1,663
Brazil	1,353	1,558	1,386
Hong Kong	745	683	786
<u>Top 5 Deficit Countries in 2014:</u>			
Germany	-785	-791	-1,016
Bahamas	-133	-145	-157
Sweden	-97	-118	-150
Italy	-72	-82	-128
Spain	-68	-108	-118
<u>Balance with All Other Countries:</u>	9,440	8,726	7,724
<u>Overall Trade Surplus:</u>	20,549	20,586	19,475

TABLE 9
TOP 5 PLASTIC PRODUCTS EXPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
392690	ARTICLES OF PLASTICS, NESOI	5,170
391990	PLATES, SHEETS, FILM, FOIL, TAPE AND OTHER FLAT SHAPES OF PLASTICS, SELF-ADHESIVE, NESOI	1,691
392310	BOXES, CASES, CRATES AND SIMILAR ARTICLES, OF PLASTICS	1,525
392010	PLATES, SHEETS, FILM, FOIL AND STRIP OF PLASTICS, NOT SELF-ADHESIVE, NON-CELLULAR, NOT REINFORCED OR LAMINATED ETC., OF POLYMERS OF ETHYLENE	1,348
392190	PLATES, SHEETS, FILM, FOIL AND STRIP OF PLASTICS, NESOI, NON-CELLULAR PLASTICS NESOI	1,053

TABLE 10
TOP 5 PLASTIC PRODUCTS IMPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
390190	POLYMERS OF ETHYLENE NESOI, IN PRIMARY FORMS	2,372
390120	POLYETHYLENE HAVING A SPECIFIC GRAVITY OF 0.94 OR MORE, IN PRIMARY FORMS	1,553
390760	POLYETHYLENE TEREPHTHALATE, IN PRIMARY FORMS	1,219
390690	ACRYLIC POLYMERS NESOI, IN PRIMARY FORMS	849
390110	POLYETHYLENE HAVING A SPECIFIC GRAVITY OF LESS THAN 0.94, IN PRIMARY FORMS	665

TABLE 11
U.S. PLASTIC PRODUCTS TRADE BALANCE: KEY COUNTRIES
(SURPLUSES AND DEFICITS IN MILLIONS OF DOLLARS)

	2012	2013	2014
<u>Top 5 Surplus Countries in 2014:</u>			
Mexico	3,400	3,792	3,958
Canada	1,061	1,251	1,229
Singapore	455	438	435
Brazil	370	388	374
Australia	384	377	363
<u>Top 5 Deficit Countries in 2014:</u>			
China	-10,249	-10,881	-11,527
Taiwan	-921	-1,042	-1,092
Germany	-404	-517	-590
Korea	-501	-537	-564
Israel	-253	-272	-326
<u>Balance with All Other Countries:</u>	1,085	946	951
<u>Overall Trade Surplus:</u>	-5,573	-6,057	-6,790

TABLE 12
TOP 5 MOLDS FOR PLASTICS EXPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
8480718045	INJECTION TYPE MOLDS FOR RUBBER OR PLASTICS, NESOI	294
8480790000	MOLDS FOR RUBBER OR PLASTICS, OTHER THAN INJECTION OR COMPRES- SION TYPES	99
8480718060	COMPRESSION TYPE MOLDS FOR RUBBER OR PLASTICS, NESOI	70
8480711000	INJECTION OR COMPRESSION TYPE MOLDS FOR RUBBER OR PLASTICS, FOR SHOE MACHINERY	54
8480714000	INJECTION OR COMPRESSION TYPE MOLDS, FOR RUBBER OR PLASTICS, FOR THE MANUFACTURE OF SEMICONDUCTOR DEVICES	12

TABLE 13

TOP 5 MOLDS FOR PLASTICS IMPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
8480718045	INJECTION TYPE MOLDS, OTHER	1,282
8480718060	COMPRESSION TYPE MOLDS, OTHER	117
8480799090	MOLDS, NESOI, FOR RUBBER OR PLASTICS	114
8480799010	BLOW MOLDS FOR RUBBER OR PLASTICS	44
8480799020	BLADDER OPERATED MOLDS FOR RUBBER OR PLASTICS	16

Table 14

U.S. MOLDS FOR PLASTICS TRADE BALANCE: KEY COUNTRIES (SURPLUSES AND DEFICITS IN MILLIONS OF DOLLARS)

	2012	2013	2014
Top 5 Surplus Countries in 2014:			
Mexico	340	361	283
Ireland	11	6	9
Brazil	8	5	5
Costa Rica	3	4	5
Venezuela	9	3	3
Top 5 Deficit Countries in 2014:			
Canada	-414	-645	-576
China	-289	-306	-319
Japan	-200	-133	-123
Germany	-75	-105	-102
Korea	-84	-62	-92
Balance with All Other Countries:	-137	-146	-160
Overall Trade Surplus:	-829	-1,020	-1,066

TABLE 15

TOP 5 PLASTICS MACHINERY EXPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
8477800000	MACHINERY, NESOI, FOR WORKING RUBBER OR PLASTICS OR FOR THE MANUFACTURE OF PRODUCTS FROM THESE MATERIALS	268
8477900095	PARTS, NESOI, OF MACH F WORKING RUBBER OR PLASTICS	253
8477900010	PARTS OF INJECTION-MOLDING MACHINES FOR RUBBER OR PLASTICS	210
8477590100	MACH, NESOI, FOR MOLDING OR FORMING RUBBER OR PLASTICS	178
8477900020	PARTS OF EXTRUDERS FOR RUBBER OR PLASTICS	128

TABLE 16
TOP 5 PLASTICS MACHINERY IMPORT CATEGORIES, 2014

Six-Digit HTS Code	Description	FAS Value \$ Millions
8477908501	PARTS OF INJECTION-MOLDING MACHINES	395
8477800000	MACHINERY, NESOI, FOR WORKING RUBBER OR PLASTICS OR FOR THE MANUFACTURE OF PRODUCTS FORM THESE MATERIALS	313
8477109040	OTHER INJECTION MOLDING MACHINES OF A TYPE USED FOR PROCESSING THERMOPLASTICS WITH A CLAMP FORCE EQUAL TO OR GREATER THAN 50 TONS & LESS THAN 300 TONS	257
8477908595	MACH PARTS OTH, F/WORK RUBBER	231
8477109050	OTHER INJECTION MOLDING MACHINES OF A TYPE USED FOR PROCESSING THERMOPLASTICS WITH A CLAMP FORCE EQUAL TO OR GREATER THAN 300 TONS & LESS THAN 750TONS	183

Table 17
U.S. PLASTICS MACHINERY TRADE BALANCE: KEY COUNTRIES
(SURPLUSES AND DEFICITS IN MILLIONS OF DOLLARS)

	2012	2013	2014
<u>Top 5 Surplus Countries in 2014:</u>			
Mexico	191	199	215
Brazil	46	58	61
Hong Kong	12	43	55
Saudi Arabia	13	19	30
United Kingdom	20	16	26
<u>Top 5 Deficit Countries in 2014:</u>			
Germany	-487	-602	-540
Japan	-325	-352	-355
Canada	-254	-251	-207
Austria	-157	-163	-141
Italy	-93	-124	-116
<u>Balance with All Other Countries:</u>	129	-122	-239
<u>Overall Trade Surplus:</u>	-904	-1,279	-1,212

Table 18
TRADE FLOWS AS A PERCENTAGE OF DOMESTIC SHIPMENTS

	2012	2013	2014
Exports			
Resins	36.8%	36.7%	36.5%
Plastic Products	12.5%	12.3%	12.1%
Molds for Plastics	22.1%	21.3%	18.3%
Plastics Machinery	47.1%	42.4%	44.3%
Total	20.9%	20.5%	20.1%
Imports			
Resins	14.4%	14.8%	16.3%
Plastic Products	15.5%	15.4%	15.4%
Molds for Plastics	53.5%	58.3%	55.1%
Plastics Machinery	76.6%	81.4%	80.2%
Total	16.2%	16.4%	16.8%
Net Exports			
Resins	22.4%	21.9%	20.2%
Plastic Products	-3.0%	-3.1%	-3.3%
Molds for Plastics	-31.4%	-37.0%	-36.9%
Plastics Machinery	-29.5%	-39.0%	-35.9%
Total	4.7%	4.2%	3.4%

Table 19
SUMMARY DATA ON U.S. FOREIGN TRADE IN PLASTICS, 1992-2014
(MILLIONS OF DOLLARS)

Category	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Exports												
Resins	7,178	7,372	8,675	10,677	10,849	11,997	11,410	11,626	13,643	13,211	13,582	14,786
Plastic Products	5,924	6,450	7,481	8,220	9,173	10,533	10,865	11,679	13,699	12,757	12,718	13,138
Molds	220	315	373	354	409	491	560	581	691	598	524	491
Machinery	648	688	776	802	885	1,006	1,043	969	1,156	1,006	868	858
Total	13,970	14,825	17,305	20,053	21,316	24,028	23,879	24,855	29,190	27,571	27,691	29,274
Imports												
Resins	2,241	2,719	3,502	4,321	4,450	4,931	5,057	5,414	6,413	6,307	6,403	7,344
Plastic Products	5,740	6,203	7,087	8,089	8,470	9,223	9,904	11,163	12,564	12,703	13,819	15,377
Molds	493	684	1,434	1,507	1,163	1,096	1,027	1,112	1,122	957	1,118	1,154
Machinery	1,013	1,236	1,545	1,856	1,698	1,918	2,062	2,133	1,988	1,424	1,451	1,681
Total	9,488	10,842	13,569	15,773	15,782	17,169	18,050	19,822	22,087	21,391	22,791	25,555
Net Exports												
Resins	4,936	4,653	5,174	6,356	6,399	7,066	6,353	6,213	7,230	6,904	7,179	7,442
Plastic Products	184	247	394	131	703	1,310	962	515	1,135	54	(1,101)	(2,239)
Molds	(273)	(369)	(1,061)	(1,153)	(754)	(605)	(467)	(531)	(431)	(359)	(594)	(663)
Machinery	(365)	(548)	(770)	(1,055)	(814)	(912)	(1,019)	(1,164)	(832)	(418)	(583)	(823)
Total	4,482	3,982	3,737	4,280	5,534	6,859	5,829	5,032	7,103	6,181	4,900	3,718

SUMMARY DATA ON U.S. FOREIGN TRADE IN PLASTICS, 1992-2014
(MILLIONS OF DOLLARS)

Category	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Change
Exports												
Resins	18,059	21,001	24,053	28,011	30,446	24,502	31,550	34,723	33,775	34,530	35,150	1.8%
Plastic Products	14,385	15,813	17,449	18,493	19,346	16,859	20,307	22,072	22,873	23,751	24,974	5.1%
Molds	584	659	659	548	558	609	513	500	582	587	528	-10.1%
Machinery	999	1,170	1,243	1,321	1,279	1,096	1,221	1,397	1,442	1,389	1,497	7.7%
Total	34,028	38,642	43,404	48,374	51,628	43,066	53,590	58,693	58,673	60,259	62,149	3.1%
Imports												
Resins	8,616	11,033	11,903	11,392	12,022	8,128	10,876	12,752	13,226	13,945	15,674	12.4%
Plastic Products	17,804	20,536	22,161	22,800	23,446	20,036	23,770	26,270	28,447	29,809	31,764	6.6%
Molds	1,248	1,266	1,379	1,206	1,147	888	997	1,093	1,411	1,607	1,595	-0.8%
Machinery	1,784	2,121	2,140	2,102	2,028	1,311	1,687	2,142	2,346	2,668	2,709	1.5%
Total	29,452	34,955	37,583	37,501	38,644	30,363	37,331	42,257	45,429	48,029	51,742	7.7%
Net Exports												
Resins	9,443	9,968	12,150	16,619	18,424	16,374	20,674	21,971	20,549	20,586	19,475	-5.4%
Plastic Products	(3,419)	(4,722)	(4,712)	(4,308)	(4,101)	(3,177)	(3,463)	(4,198)	(5,573)	(6,057)	(6,790)	12.1%
Molds	(663)	(607)	(721)	(657)	(590)	(279)	(485)	(592)	(829)	(1,020)	(1,066)	4.5%
Machinery	(785)	(952)	(896)	(781)	(749)	(216)	(466)	(745)	(904)	(1,279)	(1,212)	-5.2%
Total	4,575	3,687	5,821	10,873	12,985	12,703	16,260	16,436	13,243	12,229	10,407	-14.9%

Table 20
U.S. TOTAL PLASTICS INDUSTRY APPARENT CONSUMPTION
(MILLIONS OF DOLLARS)

	2012	2013	2014	% CHANGE 2013/2014
Shipments	281,061	293,705	308,680	5.1%
Exports	58,673	60,259	62,149	3.1%
Imports	45,429	48,029	51,742	7.7%
Apparent Consumption	267,817	281,476	298,272	6.0%

Table 21
U.S. PLASTIC RESIN APPARENT CONSUMPTION
(MILLIONS OF DOLLARS)

	2012	2013	2014	% CHANGE 2013/2014
Shipments	91,741	94,068	96,315	2.4%
Exports	33,775	34,530	35,150	1.8%
Imports	13,226	13,945	15,674	12.4%
Apparent Consumption	71,192	73,483	76,839	4.6%

Table 22
U.S. PLASTIC PRODUCTS APPARENT CONSUMPTION
(MILLIONS OF DOLLARS)

	2012	2013	2014	% CHANGE 2013/2014
Shipments	183,621	193,604	206,097	6.5%
Exports	22,873	23,751	24,974	5.1%
Imports	28,447	29,809	31,764	6.6%
Apparent Consumption	189,194	199,662	212,886	6.6%

Table 23
U.S. MOLDS FOR PLASTICS APPARENT CONSUMPTION
(MILLIONS OF DOLLARS)

	2012	2013	2014	% CHANGE 2013/2014
Shipments	2,636	2,755	2,893	5.0%
Exports	582	587	528	-10.1%
Imports	1,411	1,607	1,595	-0.8%
Apparent Consumption	3,464	3,775	3,959	4.9%

Table 24
U.S. PLASTICS MACHINERY APPARENT CONSUMPTION
(MILLIONS OF DOLLARS)

	2012	2013	2014	% CHANGE 2013/2014
Shipments	3,063	3,277	3,376	3.0%
Exports	1,442	1,389	1,497	7.7%
Imports	2,346	2,668	2,709	1.5%
Apparent Consumption	3,967	4,556	4,588	0.7%

Table 25
SHARES OF IMPORTS IN U.S. PLASTICS MARKET
(PERCENTAGES OF APPARENT CONSUMPTION)

	2012	2013	2014
Total Plastics Industry	17.0%	17.1%	17.3%
Resin	18.6%	19.0%	20.4%
Plastic Products	15.0%	14.9%	14.9%
Molds for Plastics	40.7%	42.6%	40.3%
Plastics Machinery	59.1%	58.6%	59.0%

Table 26**TOP 5 COUNTRIES FOR INCREASING U.S. IMPORTS, 2012 TO 2014
ALL PLASTICS INDUSTRY GOODS**

	2014 Imports as Share of 2014 Apparent Cons.	2012 to 2014 Gain in Imports \$ Millions	Gain as Share of 2014 Apparent Cons.
China	4.8%	1,771	0.6%
Canada	4.1%	1,182	0.4%
Mexico	1.6%	835	0.3%
Germany	1.2%	603	0.2%
Korea	0.7%	385	0.1%

Table 27**TOP 5 COUNTRIES FOR INCREASING U.S. IMPORTS, 2012 TO 2014
RESIN**

	2014 Imports as Share of 2014 Apparent Cons.	2012 to 2014 Gain in Imports \$ Millions	Gain as Share of 2014 Apparent Cons.
Canada	7.5%	955	1.2%
China	1.3%	298	0.4%
Germany	2.0%	259	0.3%
Mexico	1.6%	214	0.3%
Korea	1.0%	191	0.2%

Table 28**TOP 5 COUNTRIES FOR INCREASING U.S. IMPORTS, 2012 TO 2014
PLASTIC PRODUCTS**

	2014 Imports as Share of 2014 Apparent Cons.	2012 to 2014 Gain in Imports \$ Millions	Gain as Share of 2014 Apparent Cons.
China	6.0%	1,366	0.6%
Mexico	1.6%	621	0.3%
Germany	0.6%	201	0.1%
Korea	0.5%	177	0.1%
Taiwan	0.6%	172	0.1%

Table 29

TOP 5 COUNTRIES FOR INCREASING U.S. IMPORTS, 2012 TO 2014 MOLDS FOR PLASTICS

	2014 Imports as Share of 2014 Apparent Cons.	2012 to 2014 Gain in Imports \$ Millions	Gain as Share of 2014 Apparent Cons.
Canada	17.5%	170	4.3%
China	8.3%	29	0.7%
Germany	2.8%	26	0.6%
Portugal	0.6%	10	0.3%
Korea	2.4%	8	0.2%

Table 30

TOP 5 COUNTRIES FOR INCREASING U.S. IMPORTS, 2012 TO 2014 PLASTICS MACHINERY

	2014 Imports as Share of 2014 Apparent Cons.	2012 to 2014 Gain in Imports \$ Millions	Gain as Share of 2014 Apparent Cons.
Germany	15.2%	118	2.6%
Israel	2.3%	91	2.0%
China	5.5%	77	1.7%
France	2.6%	23	0.5%
Japan	8.7%	22	0.5%

Table 31

U.S. TRADE IN CONTAINED AND "REGULAR" PLASTIC RESIN (NAICS 325211, ALL COUNTRIES, MILLIONS OF DOLLARS)

	2012	2013	2014	% CHANGE 2013/2014
Exports				
Regular	33,775	34,530	35,150	1.8%
Contained	20,763	20,957	21,200	0.9%
Total (Contained + Regular)	54,538	55,487	56,349	1.7%
Imports				
Regular	13,226	13,945	15,674	12.4%
Contained	40,127	40,846	42,836	1.8%
Total (Contained + Regular)	53,353	54,790	58,510	2.7%
Net Imports				
Regular	20,549	20,586	19,475	-5.4%
Contained	(19,364)	(19,889)	(21,636)	2.7%
Total (Contained + Regular)	1,185	697	(2,161)	#N/A

Table 32
U.S. TRADE IN CONTAINED AND “REGULAR” PLASTIC PRODUCTS
 (NAICS 3261, ALL COUNTRIES, MILLIONS OF DOLLARS)

	2012	2013	2014	% CHANGE 2013/2014
Exports				
Regular	22,873	23,751	24,974	5.1%
Contained	26,678	27,025	27,602	2.1%
Plastics Packaging Materials, Film and Sheet	8,239	8,287	8,411	1.5%
Plastics Pipe, Pipe Fittings, and Nonlaminated Profile Shapes	2,993	2,989	3,030	1.4%
Laminated Plastics Plate, Sheet and Shapes	908	916	932	1.7%
Polystyrene Foam Products	689	692	709	2.4%
Urethane and Other Foam Products	755	764	787	3.0%
Plastics Bottles	1,387	1,456	1,495	2.6%
Other Plastics Products	11,708	11,919	12,240	2.7%
Total (Contained + Regular)	49,552	50,776	52,577	3.5%
Imports				
Regular	28,447	29,809	31,764	6.6%
Contained	46,683	47,565	50,370	5.9%
Plastics Packaging Materials, Film and Sheet	14,883	15,109	15,964	5.7%
Plastics Pipe, Pipe Fittings, and Nonlaminated Profile Shapes	4,930	4,995	5,175	3.6%
Laminated Plastics Plate, Sheet and Shapes	1,808	1,864	1,982	6.3%
Polystyrene Foam Products	1,208	1,230	1,308	6.3%
Urethane and Other Foam Products	1,916	1,988	2,103	5.8%
Plastics Bottles	1,698	1,743	1,848	6.1%
Other Plastics Products	20,240	20,637	21,990	6.6%
Total (Contained + Regular)	75,130	77,374	82,134	6.2%
Net Imports				
Regular	-5,573	-6,057	-6,790	12.1%
Contained	-20,005	-20,540	-22,767	10.8%
Plastics Packaging Materials, Film and Sheet	-6,644	-6,821	-7,553	10.7%
Plastics Pipe, Pipe Fittings, and Nonlaminated Profile Shapes	-1,937	-2,005	-2,145	7.0%
Laminated Plastics Plate, Sheet and Shapes	-900	-948	-1,051	10.9%
Polystyrene Foam Products	-519	-538	-599	11.5%
Urethane and Other Foam Products	-1,161	-1,224	-1,316	7.5%
Plastics Bottles	-312	-286	-353	23.4%
Other Plastics Products	-8,532	-8,718	-9,750	11.8%
Total (Contained + Regular)	-25,578	-26,598	-29,557	11.1%

Table 33
TOP 20 EXPORT PRODUCTS RANKED BY PLASTIC RESIN CONTENT IN 2014
(MILLIONS OF DOLLARS OF CONTAINED PLASTICS RESIN)

NAICS CODE	Description	Value
326199	All Other Plastics Products	3,261
326113	Not Reinforced Plastic Plates, Sheet, Etc (Except Packaging)	1,893
325199	All Other Basic Organic Chemicals	1,772
336111	Automobiles And Light Duty Motor Vehicles, Including Chassis	1,143
336399	Motor Vehicle Parts, Nesoi	979
325212	Synthetic Rubbers	635
33641X	Civilian Aircraft, Engines, Equipment, And Parts	631
325998	All Other Misc Chemical Products And Preparations (Incl Natural)	631
339112	Surgical And Medical Instruments	466
326122	Plastics Tubes, Hoses, Pipes And Pipe Fittings	410
333999	Other Miscellaneous General Purpose Machinery	374
325510	Paints And Coatings	369
325192	Cyclic Crude And Intermediates	367
336120	Heavy Duty Trucks And Chassis	285
322222	Coated And Laminated Paper	277
335929	Communication And Energy Wire, Nesoi	251
326160	Plastics Bottles	241
325520	Adhesives	224
325992	Photographic Films, Papers, Plates, And Chemicals	215
324110	Petroleum Refinery Products	208
	All Other	10,102
	Total Contained Exports	24,736

Table 34
TOP 20 IMPORT PRODUCTS RANKED BY PLASTIC RESIN CONTENT IN 2014
(MILLIONS OF DOLLARS OF CONTAINED PLASTICS RESIN)

NAICS CODE	Description	Value
326199	All Other Plastics Products	4,998
336111	Automobiles And Light Duty Motor Vehicles, Including Chassis	3,245
325199	All Other Basic Organic Chemicals	1,727
326113	Not Reinforced Plastic Plates, Sheet, Etc (Except Packaging)	1,665
339932	Games, Toys, And Children'S Vehicles	1,389
336399	Motor Vehicle Parts, Nesoi	1,160
335211	Electric Housewares And Household Fans	879
334119	Other Computer Equipment	668
334310	Audio And Video Equipment	601
336322	Motor Vehicle Electrical And Electronic Equipment, Nesoi	599
337127	Institutional Furniture	572
326211	Tires And Tire Parts (Except Retreadings)	566
336120	Heavy Duty Trucks And Chassis	521
314129	Other Household Textile Products	450
339999	Miscellaneous Manufactured Commdoities, Nesoi	441
325411	Medicinal And Botanical Drugs And Vitamins	436
334210	Telephone Apparatus	429
337124	Metal Household Furniture	416
336360	Motor Vehicle Seating And Interior Trim	413
339112	Surgical And Medical Instruments	401
	All Other	22,108
	Total Contained Imports	43,686

Table 35

TOP 20 EXPORT PRODUCTS RANKED BY PLASTIC PRODUCTS CONTENT IN 2014

(MILLIONS OF DOLLARS OF CONTAINED PLASTICS PRODUCTS)

NAICS CODE	Description	Value
336111	Automobiles And Light Duty Motor Vehicles, Including Chassis	2,506
33641X	Civilian Aircraft, Engines, Equipment, And Parts	1,423
336399	Motor Vehicle Parts, Nesoi	1,284
325211	Plastics Materials And Resins	900
325199	All Other Basic Organic Chemicals	731
333999	Other Miscellaneous General Purpose Machinery	712
339112	Surgical And Medical Instruments	678
336120	Heavy Duty Trucks And Chassis	552
325620	Perfumes, Makeups And Other Toiletries	545
334119	Other Computer Equipment	506
910000	Waste And Scrap	478
334413	Semiconductors And Related Devices	382
333618	Other Engine Equipment	361
325412	Pharmaceutical Preparations	335
322222	Coated And Laminated Paper	319
333120	Construction Machinery	312
339113	Surgical Appliances And Supplies	265
333111	Farm Machinery And Equipment	262
324110	Petroleum Refinery Products	241
33631X	Motor Vehicle Gasoline Engines And Engine Parts	240
	All Other	9,988
	Total Contained Exports	23,020

Table 36

TOP 20 IMPORT PRODUCTS RANKED BY PLASTIC PRODUCTS CONTENT IN 2014

(MILLIONS OF DOLLARS OF CONTAINED PLASTICS PRODUCTS)

NAICS CODE	Description	Value
336111	Automobiles And Light Duty Motor Vehicles, Including Chassis	7,118
334119	Other Computer Equipment	1,656
336399	Motor Vehicle Parts, Nesoi	1,521
334310	Audio And Video Equipment	1,380
337127	Institutional Furniture	1,109
336120	Heavy Duty Trucks And Chassis	1,010
333511	Industrial Molds	887
334210	Telephone Apparatus	860
334111	Electronic Computers	800
336322	Motor Vehicle Electrical And Electronic Equipment, Nesoi	785
325199	All Other Basic Organic Chemicals	713
325412	Pharmaceutical Preparations	705
337124	Metal Household Furniture	695
333999	Other Miscellaneous General Purpose Machinery	665
336360	Motor Vehicle Seating And Interior Trim	600
334220	Radio And Television Broadcasting And Wireless Communications Equipment	594
339112	Surgical And Medical Instruments	583
339932	Games, Toys, And Children'S Vehicles	566
334413	Semiconductors And Related Devices	556
325620	Perfumes, Makeups And Other Toiletries	551
	All Other	22,757
	Total Contained Imports	46,110

Table 37
TOP 10 COUNTRIES GENERATING U.S. CONTAINED RESIN SURPLUSES
(MILLIONS OF DOLLARS, 2014)

	Contained
Canada	957
Belgium	388
Australia	362
Hong Kong	263
Brazil	249
United Arab Em	241
Netherlands	229
Singapore	123
Colombia	114
Chile	100
All Other Countries	(21,965)
Total	(18,938)

Table 38
TOP 10 COUNTRIES GENERATING U.S. CONTAINED RESIN DEFICITS
(MILLIONS OF DOLLARS, 2014)

	Contained
China	(11,823)
Japan	(1,716)
Germany	(1,489)
Mexico	(1,158)
Korea	(830)
Vietnam	(636)
Taiwan	(633)
Italy	(611)
India	(538)
Ireland	(452)
All Other Countries	948
Total	(18,938)

Table 39**TOP 10 COUNTRIES GENERATING U.S. CONTAINED PLASTIC PRODUCTS SURPLUSES**
(MILLIONS OF DOLLARS, 2014)

	Contained
Australia	422
United Arab Em	386
Hong Kong	369
Belgium	319
Saudi Arabia	302
Canada	295
Brazil	211
Chile	132
Colombia	130
Singapore	123
All Other Countries	(25,439)
Total	(22,750)

Table 40**TOP 10 COUNTRIES GENERATING U.S. CONTAINED PLASTIC PRODUCTS DEFICITS**
(MILLIONS OF DOLLARS, 2014)

	Contained
China	(10,477)
Mexico	(3,609)
Japan	(3,031)
Germany	(2,235)
Korea	(1,078)
Italy	(828)
Vietnam	(716)
Taiwan	(531)
Malaysia	(464)
Thailand	(447)
All Other Countries	666
Total	(22,750)

Table 41
TOP-15 EXPORTERS OF CONTAINED RESIN TO THE U.S.

2004	2009	2014
China	China	China
Canada	Canada	Mexico
Mexico	Mexico	Canada
Japan	Japan	Japan
Germany	Germany	Germany
Korea	Korea	Korea
Taiwan	United Kingdom	Taiwan
United Kingdom	Taiwan	United Kingdom
Italy	Ireland	Italy
Ireland	Italy	India
France	France	Vietnam
Malaysia	India	France
Brazil	Malaysia	Ireland
Thailand	Thailand	Thailand
India	Vietnam	Malaysia

This page was left blank intentionally.



the plastics industry
trade association

1425 K Street, NW
Suite 500
Washington, DC 20005-3686

plasticsindustry.org