Moving Texas Exports
Examining the role of transportation in the plastic resin export supply chain
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The freight transportation system of a state has a direct and indirect impact on international trade. The mode of transportation has a direct impact on the cost, efficiency, and reliability of moving export products to overseas markets. So too does the capacity of the transportation infrastructure. Freight infrastructure investments that increase system capacity could reduce travel times and costs, which can translate into increased economic productivity, as well as enhanced labor and market access. Better labor and market access, in turn, could contribute to increased economic competitiveness (3), which can result in increased exports. The Organization for Economic Cooperation and Development (4) reported that most countries with high-quality infrastructure rank high in the world index for overall competitiveness. Specifically, quality infrastructure is a key indicator of international economic competitiveness because it determines the scale, volume, and efficiency of international trade.

The objective of this series of papers is to describe the supply chains for six of Texas’ major export commodities and identify the role of transportation in the supply chain. The study examined the transportation concerns of exporters, transportation policies and regulations affecting the costs of exports, and infrastructure concerns. This is the third paper in the series and documents the role of transportation in the plastic resin export supply chain and key transportation issues and concerns that were shared with the study team.

Introduction

In 2014, U.S. exports of goods and services amounted to $2.34 trillion, with Texas accounting for $289 billion of that amount (1). Furthermore, in 2013, Texas’ exports supported approximately 1.1 million jobs (2). There is no doubt that Texas’ transportation system—its roads, rail, ports, pipelines, airports, and border crossings—facilitates export trade. The freight transportation system of a state has a direct and indirect impact on international trade. The mode of transportation has a direct impact on the cost, efficiency, and reliability of moving export products to overseas markets. So too does the capacity of the transportation infrastructure. Freight infrastructure investments that increase system capacity could reduce travel times and costs, which can translate into increased economic productivity, as well as enhanced labor and market access. Better labor and market access, in turn, could contribute to increased economic competitiveness (3), which can result in increased exports. The Organization for Economic Cooperation and Development (4) reported that most countries with high-quality infrastructure rank high in the world index for overall competitiveness. Specifically, quality infrastructure is a key indicator of international economic competitiveness because it determines the scale, volume, and efficiency of international trade.
Background

In Texas, the raw materials (i.e., hydrocarbons) for plastic resin are found in natural gas. Therefore, plastic resin manufacturers are very sensitive to the supply and price of natural gas. The increased mining of shale formations in the United States and Texas has resulted in an increase in natural gas production and lower natural gas prices. This has allowed the petrochemical industry, specifically the plastic resins subsector, to increase its competitiveness in global markets (5). For example, between 2005 and 2012, the United States went from being the most costly producer of ethylene, a primary component of plastic, to being one of the least costly producers in the world (5).

Most plastic resin manufacturing in Texas occurs along the Gulf Coast (i.e., Houston, Freeport, and Beaumont/Port Arthur region) (see Figure 1). Moderate resin manufacturing concentrations can also be found in North Texas (i.e., around the Dallas/Fort Worth region). These areas are not the only areas with resin manufacturers but rather represent areas of high concentrations of resin manufacturing employment relative to the size of the local labor force (6).

Texas is the leading producer of natural gas in the United States, accounting for almost 30 percent of the United States’ marketed natural gas production in 2013 (6).
Most plastic resin manufacturing in Texas occurs along the Gulf Coast. Moderate resin manufacturing concentrations can also be found in North Texas.

The demand for resin is mainly concentrated in the Northeast and Midwest United States and globally, so the industry is very reliant on an efficient transportation system to remain competitive. In 2012, 130 million tons of plastic resins were transported on the U.S. transportation system, with 37 percent of total shipments moved mainly in rail hopper cars (5).

In 2012, the United States exported approximately $30.5 billion of plastic resins to Mexico, Canada, Latin America, Europe, China, and other countries. Exports accounted for 35 percent of total plastic resin production in 2012 (5). In 2014, Texas itself exported $14.7 billion of plastic resin to other countries (6). The top export markets for Texas’ resin manufacturing are Mexico, Canada, China, Belgium, Brazil and Columbia (6). In 2014, the resin manufacturing industry employed approximately 9,872 Texans, and the average annual wage in the industry was $101,140. In 2014, Texas’ resin manufacturing industry ranked first in the nation in total production workers, value of shipments, and total capital investments (6).

Figure 1. Regional Concentrations of Resin Manufacturing in Texas.

Source: (6).

1The resin manufacturing industry includes establishments that produce plastic resins, synthetic rubber, and synthetic fibers.
Plastic Resin Export Supply Chain

In the United States, plastics are manufactured from hydrocarbon gas liquids (a byproduct of petroleum refining) and natural gas processing. The plastic resin (plastic pellet) export supply chain starts with the extraction of oil or natural gas from oil or gas wells. At the shale formations in Texas, natural gas is mined and transported via pipeline to a gas processing plant. At the gas processing plant, natural gas is refined into ethane and propane, among other petrochemical products.

Plastics are typically made in large batches to capitalize on economies of scale (making the manufacturing of the product cost effective). The plastic pellets are typically loaded into a rail hopper car (as part of the manufacturing process) and transported to a storage-in-transit (SIT) yard, a yard that typically stores covered hoppers filled with plastic pellets. According to one stakeholder, it costs $7 to $8 per day for a loaded hopper rail car to be stored in the rail yard. This storage relieves the plastic resin manufacturer or bagging facility from the costs of maintaining inventory on site until the marketplace is such that the manufacturer is ready to sell and ship the product.

2 In some countries, plastics are made from crude oil.
From the SIT yard, a hopper car transports the plastic pellets to a bagger facility in Texas, where the plastic pellets are bagged using a 4-foot by 4-foot bag and put into ocean-going containers. The containerized plastic can then follow one of two routes:

- The containerized plastic is put onto a railcar and delivered to the Port of Los Angeles or the Port of Long Beach, directly to the dock (9). It is currently faster to travel from Houston by rail to the West Coast ports (called the land bridge) and then by sea to Asia than to take the all-water route (i.e., by sea) between Houston and Asia.
- The containerized plastic is drayed to a Texas port, such as the Port of Houston or the Port of Freeport, for export. From the Port of Houston, for example, ocean containers filled with plastic pellets are mainly transported by sea to Asia or Europe (9).

After reaching their markets, the plastic pellets are used to manufacture a range of plastic products by using processes such as extrusion, injection molding, and blow molding.

In some cases, a hopper rail car transports the plastic pellets from the SIT yard to a bagger facility in Los Angeles, California. The round-trip travel time from Houston to Los Angeles by rail hopper car is 10 days (10). In Los Angeles, the plastic pellets are bagged and put into ocean-going containers for shipment to Asia (10).

After reaching their markets, the plastic pellets are used to manufacture a range of plastic products by using processes such as extrusion, injection molding, and blow molding. Figure 2 shows the plastic resin export supply chain.
Figure 2. Supply Chain for Texas Plastic Resin.
Captive Rail

The plastic resin industry relies upon rail for a significant portion of its supply chain, so if rail rates increase, the cost of exporting plastic resin also increases. Some industry stakeholders mentioned that plastic resins are dependent on rail transportation because of the bulk nature of the commodity and because rail is an integral part of the manufacturing process. However, most plastic resin producers are served by only one railroad. Some believe that this lack of competition results in higher rail charges for plastic shippers (11). On the other hand, the railroad industry maintains that rail hauls less than half of the market for plastic resin transportation and faces significant transportation competition (e.g. from trucking) in the resin market (12).

Also, railroads are offering competitive rates to move Gulf Coast plastics destined for Asia to West Coast ports (13). This is largely because of the imbalance in trade, resulting in more imports into West Coast ports destined for Texas than exports from Texas destined for West Coast ports. To prevent empty backhauls, railroads offer competitive rail rates to West Coast ports from Texas.

Union Pacific Railroad (UP) furthermore pointed out that on average and adjusted for inflation, rail customers currently pay less to move freight on UP than they did 30 years ago. In addition, customers receive better service. For example, UP is the only rail company that employs a chemicals transportation safety advisor (14). It is, however, unclear whether plastic resin exporters currently pay less than what they did 30 years ago and whether this specific industry receives better service.

Transportation Issues

Texas’ transportation system (pipelines, rail, trucks, and marine ports) is an important component of the plastic resin export supply chain. For the United States and Texas to remain competitive in the global plastic resin market, it is important that plastic resin shipments be delivered in a timely and cost-effective manner. This section of the document highlights a number of transportation concerns that the industry believes add costs to the plastic resin export supply chain.

1 Since the Staggers Rail Act in 1980, the number of Class I railroads and the extent of the Texas rail network have declined. This has resulted in less competition within the industry.
In 2014, the Port of Houston exported 244,812 twenty-foot equivalent units of plastic resin. The Port of Houston conservatively estimated that, starting in 2017, it will handle an additional 250,000 twenty-foot equivalent units of plastic resin per year (21).

**Rail Capacity**
As mentioned previously, rail is an integral component of the plastic resin manufacturing process. In the past, the railroads could accommodate modest incremental increases in plastic resin production (13). Some stakeholders reported that additional rail capacity (i.e., SIT yard capacity) is needed to handle the demand for plastic resin shipments. As evidence, they noted an occasion when plastic resin from Freeport destined for baggers in Houston was embargoed. In other words, the railroads could not offer the capacity needed by the plastic manufacturers. Union Pacific, however, responded that embargoes are a last resort for railroad companies and are often imposed because of bottlenecks elsewhere in the supply chain. The railroad explains that the company maintains surge capacity to accommodate temporary excess demand and has contracted in the past with independent third parties to provide SIT yard capacity for immediate customer needs. The company has been investing in capacity to accommodate increases in plastic resin shipments and is committed to continue to invest as demand requires and as resin manufacturers commit to their needed rail capacity requirements through contracts between the railroad and the producer (12).

**Truck Driver Shortages**
The plastics industry is also concerned about inadequate trucking capacity; and both truck and truck driver shortages (15). The trucking industry is challenged by high driver turnover and low driver retention. Investments in resin production in the Gulf Coast by ExxonMobil alone are anticipated to increase the number of trucks from 50 to 360 per day (15). The Port of Freeport noted that last-mile deliveries are anticipated to grow 15 percent per year—not accounting for the opening of the Panama Canal (8). The situation is expected to worsen in the future.

**Overweight Regulations**
The federal government mandates the maximum size and weight of trucks in an effort to preserve (i.e., prevent damage to) the highway and road infrastructure. While industry clearly benefits from more productive (i.e., heavier) trucks, these benefits have to be balanced against the costs to rehabilitate and maintain a state’s highway and road infrastructure. Currently, federal regulations limit trucks to a maximum gross vehicle weight of 80,000 lb. Table 1 provides the legal axle weight limits for trucks operating on Texas’ highways.

The trucking industry is challenged by high driver turnover and low driver retention. Inadequate trucking capacity is a daunting challenge for industry.
The annual base fee for the over-axle/over-gross weight tolerance permit fee is $90, and the administrative fee is $5. These fees are added to the county fee, which is a function of the number of counties the trucking company intends to operate in (see Table 2) (16). Prior to permit issuance, the trucking company must file an over-axle/over-gross weight tolerance permit bond of $15,000 or an irrevocable letter of credit with the Texas Department of Motor Vehicles (16).

Table 1. Legal Axle Limits on Highways in Texas.

<table>
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<tr>
<th>AXLES</th>
<th>NON-INTERSTATE (POUNDS)</th>
<th>INTERSTATE (POUNDS)</th>
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<tbody>
<tr>
<td>Single Axles</td>
<td>20,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Tandem Axles*</td>
<td>34,000</td>
<td>34,000</td>
</tr>
<tr>
<td>Tridem Axles**</td>
<td>42,000</td>
<td>42,000</td>
</tr>
<tr>
<td>Quadrum Axles***</td>
<td>50,000</td>
<td>50,000</td>
</tr>
</tbody>
</table>

* Two consecutive axles extending across the full width of the vehicle at a spacing of 48 inches.
** Three consecutive axles extending across the full width of the vehicle at a spacing of 48 inches.
*** Four consecutive axles extending across the full width of the vehicle at a spacing of 48 inches.

States may, however, grant special use permits to commercial oversize/overweight vehicles traveling on the state-maintained system (e.g., not the interstate system). Plastic pellets are a commodity that “weighs out before it cubes out.” In other words, the weight limit of the truck is reached before the truck is fully loaded. In Texas, trucking companies can apply for an annual over-axle/over-gross weight tolerance permit to move divisible loads on vehicles that exceed the gross vehicle weight by up to 5 percent and the axle weight by up to 10 percent. The permit allows a gross vehicle weight of 84,000 lb and a weight of up to 37,400 lb on a tandem axle. The permit does not allow trucks to exceed the Texas legal size limits or operate on the interstate system.

Table 2. Over-Axle/Over-Gross Weight Tolerance Permit Fee.

<table>
<thead>
<tr>
<th>NUMBER OF COUNTIES</th>
<th>COUNTY FEE ($)</th>
<th>TOTAL OVERWEIGHT PERMIT FEE ($)</th>
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<tr>
<td>1–5</td>
<td>175</td>
<td>270</td>
</tr>
<tr>
<td>6–20</td>
<td>250</td>
<td>345</td>
</tr>
<tr>
<td>21–40</td>
<td>450</td>
<td>545</td>
</tr>
<tr>
<td>41–60</td>
<td>625</td>
<td>720</td>
</tr>
<tr>
<td>61–80</td>
<td>800</td>
<td>895</td>
</tr>
<tr>
<td>81–100</td>
<td>900</td>
<td>995</td>
</tr>
<tr>
<td>101–254</td>
<td>1,000</td>
<td>1,095</td>
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Since oceangoing containers have a maximum weight capacity of 59,040 lb (for a 40-foot standard container), the current overweight regulations do not allow plastic manufacturers to fully use the capacity of the oceangoing containers. Even with an over-axle/over-gross weight tolerance permit, the oceangoing container would not be full. To comply with current weight regulations, plastic pellet containers destined for overseas markets are underloaded and transported to a transloading facility typically on port property. Additional product is added at the transloading facility to take full advantage of the capacity of the oceangoing containers, but transloaders charge relatively high prices for this service (17). This transloading adds costs to the supply chain. The plastic manufacturers want the state to allow higher weights for oceangoing containers to maximize the capacity of the container, reducing transportation costs (18).
Heavy-Weight Corridors

One option to address the issue of underloading ocean-going containers (and eliminating the transloading cost) is to increase the allowable weight of ocean-going containers moving on the highway network. The second is to develop a heavy-weight corridor that serves the port. For example, House Bill 1321 from the 84th Texas Legislature (2015) allowed for a heavy-weight corridor to serve the Port of Freeport. This corridor serves all plastic manufacturers near the port. The fee to use the corridor is $30. Of the $30, $26 goes directly toward maintaining the corridor, $3 goes to the software company that facilitates the issuing of electronic permits, and $1 covers the administrative costs.

The corridor allows each ocean-going container to be loaded with 20 percent more plastic pellets. This means that the same amount of plastic pellets that used to be moved in five containers can now be moved in four containers. In other words, one local dray movement is eliminated, resulting in a cost savings of approximately $700 to $800 (8).

Heavy-Weight Corridors

In 1997, the 75th Texas Legislature (Texas State Senate Bill 1276) allowed the Texas Department of Transportation to grant the Brownsville Navigation District (BND) the authority to issue permits for the movement of oversize/overweight vehicles transporting freight between the Gateway International Bridge and the Port of Brownsville. On February 17, 1998, the Texas Transportation Commission approved BND’s permit-issuing authority. In 10 months (by December 15, 1998), BND had issued 23,713 permits. The success of this corridor has since resulted in the designation of a number of heavy-weight corridors in the Lower Rio Grande Valley and serving marine ports (e.g., the Port of Freeport).

One benefit of a heavy-weight corridor to the private sector is increased vehicle/container capacity use (specifically for cargo that weighs out before it cubes out). The heavy-weight corridor also removes the need for transloading cargo to capitalize on higher ocean container weight limits. This implies significant savings to industry. The Texas Department of Transportation uses the revenues raised from the issued permits to maintain the designated heavy-weight corridors. For ports that are currently not served by a heavy-weight corridor, this can be a contentious issue.

Last-Mile Congestion

Some containerized pellet products have been slowed in transit to the Port of Houston because of the number of at-grade rail crossings. At-grade rail crossings require trucks to wait for trains to clear the crossings. This is a major concern to the Port of Houston because it impacts the efficiency with which rail containers can be transported to or from the port terminal. Furthermore, it is anticipated that increased traffic from the expanded Panama Canal will aggravate these landside access issues to the Port of Houston. The Port of Houston noted that an Alameda-type solution is needed to improve the efficiency of rail shipments to and from the Port of Houston (18).

The Alameda Corridor in California is an example of a multimodal transportation solution to address landside access concerns for a U.S. port. The Alameda Corridor consists of a 20-mile depressed trench for rail traffic—separated from road traffic—that links the Ports of Los Angeles and Long Beach to the transcontinental rail yards east of downtown Los Angeles. The Alameda Corridor eliminated 200 at-grade rail crossings, increased average train speeds from 12 mph to 30 mph, reduced congestion, enhanced safety, and increased mobility (19).

The Port Terminal Railroad Administration (PTRA) reported that the company invested $81.9 million in capital projects over the past 6 years (2011 to 2016) to ensure adequate capacity to handle the increase in container movements at the Port of Houston. The PTRA therefore maintains it has adequate capacity to handle current and anticipated container traffic.

* Of the $30, $26 goes directly toward maintaining the corridor, $3 goes to the software company that facilitates the issuing of electronic permits, and $1 covers the administrative costs.
In 2014, the Port of Houston handled 872,728 export containers and 753,070 import containers (21).

**Port Gate Congestion and Port Gate Hours**
Concern has been expressed about congestion at the Port of Houston gates. However, the Port of Houston Authority said that since it resumed responsibility from APM Terminals for the terminal gates, congestion issues have largely been resolved (18).

Industry has pointed out that current port gate hours are an impediment (15) and add cost to the plastic resin supply chain. The Port of Houston is open five days a week from 7:00 a.m. to 5:00 p.m. However, the railroad intermodal ramps are open 24 hours a day and seven days a week (15).

**Container Availability**
In 2014, the Port of Houston handled 872,728 export containers (measured in twenty-foot equivalent units [TEUs]) and 753,070 import containers (measured in TEUs) (21). This imbalance between the number of export and import containers results in a shortage of empty oceangoing containers in Houston, requiring high drayage costs to reposition empty containers to the Port of Houston (e.g., from Dallas/Fort Worth or in some cases from ports such as Los Angeles/Long Beach). The cost to reposition a container varies widely and could range between $200 and $600 on routes between Central/South America and the Gulf Coast (22). These drayage movements tend to be empty movements on one leg of the haul, which adds cost to the supply chain.

However, the Port of Houston indicated that resin producers are unnecessarily concerned about empty container availability. The Port of Houston stated that shipping lines will import the required empty containers to serve surging resin exports (23).

**Panama Canal Expansion**
The Panama Canal can only transit container ships with a total capacity of 4,800 TEUs. The $5.25 billion canal expansion project will allow the canal to handle container ships with a capacity of 12,600 TEUs (24). Using the expanded Panama Canal will decrease the distance from the Gulf Coast ports to Asia for these larger containerships by approximately 9,000 miles, with associated decreases in ocean liner costs that would potentially be passed on to exporters in the form of lower ocean freight rates (24).

It is generally believed that the opening of the expanded Panama Canal will result in an increase in cargo handled at Gulf Coast ports, although the magnitude is unclear (25) and will largely depend on the tolls levied by the Panama Canal Authority. In other words, how the total supply chain costs and reliability through the expanded Panama Canal compare with the cost of the land bridge to Los Angeles or Long Beach is still unknown.

Some industry experts, however, believe that post-Panamax vessels – container ships that exceed the 32.2 m width length of the Panama Canal and that can transport up to 18,000 TEUs – will not traverse the Gulf but would rather transload in the Caribbean or Cuba to smaller ships that will provide feeder services to Gulf Coast ports. The capacity of these transshipment vessels typically ranges between 3,200 and 4,500 TEUs (8). Since it is unclear how this arrangement would affect freight rates, the impact of the Panama Canal on plastic resin exports through Gulf Coast ports is uncertain at this time.
Shipping Line Frequency
Texas ports are not serviced by scheduled shipping lines to China—a large market for plastic pellets—to the same extent as the West Coast ports. This puts Texas ports at a disadvantage compared to the Ports of Los Angeles and Long Beach, which have frequent scheduled liner services to China. Concern was also expressed about the capacity at Texas ports to handle increased resin exports (9). However, the Port of Houston stated that scheduled liner shipping service is not an issue for Texas exporters of plastic pellets. ExxonMobil also said that all major shipping lines are currently serving the Port of Houston (15).

Pipeline Capacity
While Texas’ pipeline network is extensive, pipeline capacity to Texas ports is considered insufficient. Expanding the pipeline network involves both the public and private sectors. Pipelines in Texas are owned by private companies. Users pay a fee to transport natural gas via pipeline. Although there are no permit requirements for building intrastate pipelines—pipelines that originate and end—in Texas (26), the construction of additional pipeline infrastructure is a costly and can be a lengthy procedure. Industry has therefore expressed concern about the capacity of Texas’ pipelines in serving increased demand for natural gas transportation and the potential impacts on the plastic resin industry (8).

Capacity of the Gulf Intracoastal Waterway
Plastic pellets are a bulk commodity and, in principle, well suited to being moved by barge (as opposed to rail or truck). Barges moving plastic pellets operate between the Port of Freeport and the Port of Houston. However, these barges are underloaded because the Gulf Intracoastal Waterway (GIWW) is not deep enough. Industry pointed out that the GIWW can provide substantial additional capacity to Texas’ transportation system if the canal is dredged (17).

Chassis Pools
In the past, steamship lines owned chassis that drivers used to transport the steamship line’s containers. This required large pools of chassis for each steamship line. In recent years, the steamship lines have removed themselves from the chassis business as they entered into alliances with each other. Chassis pools managed by leasing companies emerged.

The concern is that with the emergence of chassis pools, there is a shortage of chassis at Texas ports, and the available chassis are not well maintained. Responsibility for chassis tires, for example, is contentious (18). Chassis availability and maintenance (e.g., regular breakdowns and lights not working) impact the drayage operations (last-mile delivery) at Texas ports. Poorly maintained chassis also delay drivers when pulled over by law enforcement and ticketed for infractions. Although some trucking companies have started to invest in chassis, this is not the norm yet because the steamship lines will only reimburse pool chassis leases (18).

West Coast Port Labor Issues
Since a substantial number of the plastic pellets manufactured in Texas are exported through the Ports of Los Angeles and Long Beach, labor disputes at these West Coast ports impact the plastic resin export supply chain negatively. On the other hand, the West Coast ports also compete with Texas ports in terms of transit time, access to scheduled liner services, and the size of the container vessels that can be accommodated. These factors benefit the plastic resin export supply chain (28).
Key Findings
The following are the key findings from this research:

- Rail is a key component of the plastic resin export supply chain, and any increases in rail rates increase the cost of exporting plastic resin.
- Rail companies are committed to meeting any demand for capacity in accordance with their contracts with resin manufacturers.
- Truck and truck driver shortages due to high driver turnover and low driver retention is a concern to industry.
- To comply with current weight regulations, plastic pellet export containers are underloaded and transported to a transloading facility (typically on port property). Additional product is then added to take full advantage of the capacity of the oceangoing containers, adding cost to the plastic resin export supply chain.
- Heavy-weight corridors benefit the private sector by improving vehicle/container capacity use and removing the need for transloading cargo to capitalize on higher oceangoing container weight limits.
- Last-mile congestion at the Port of Houston impacts the efficiency with which plastic pellet containers can be transported to or from the port terminal.
- Current port gate hours at the Port of Houston are an impediment and add cost to the plastic resin supply chain.
- An imbalance between the number of export and import containers results in a shortage of empty ocean containers in Houston, requiring high repositioning costs to transport empty containers to the Port of Houston.
- Using the expanded Panama Canal will decrease the all ocean distance from the Gulf Coast ports to Asia for post-Panamax vessels by approximately 9,000 miles, with associated decreases in ocean liner costs. However, it is unclear how the expanded Panama Canal will ultimately impact Texas’ plastic resin exports through Gulf Coast ports.
- Texas ports are at a disadvantage compared to the Ports of Los Angeles and Long Beach, which have more frequently scheduled liner services to China, a major export destination for plastic resin.
- While Texas’ pipeline network is extensive, pipeline capacity to Texas ports is regarded insufficient and expanding the pipeline network is a costly and can be a lengthy procedure.
- The GIWW is not deep enough to move full barges of plastic pellet containers between the Port of Freeport and the Port of Houston.
- Chassis availability and maintenance affect the drayage operations at Texas ports, impacting the last-mile delivery of containerized cargo to the port.
- Since a substantial number of the plastic pellets manufactured in Texas are exported through the Ports of Los Angeles and Long Beach, labor disputes at these West Coast ports impact the plastic resin export supply chain.
References


8. Personal communication with Port of Freeport, June 25, 2015.

9. Personal communication with Alliance Texas, November 2014.


12. Personal communication with Union Pacific, November 18, 2016.


14. Email communication with Union Pacific Railroad, October 7, 2015.


17. Personal communication with Port of Beaumont, June 24, 2015.

18. Personal communication with Port of Houston Authority, June 24, 2015.


20. Personal communication with Port Terminal Rail-
road Administration, January 2017.


27. Personal communication with R&T Truck, Inc., May 19, 2015.