

REGIONAL FREIGHT COMMODITY PROFILE

Chemicals

COMMODITY BUNDLE OVERVIEW

This bundle consists of chemicals other than pharmaceutical drugs. The types of commodities included in this bundle are: basic chemicals, such as organic and inorganic compounds, gases, wood or gum chemicals; plastic matter or rubber; fertilizers; and chemical products, such as paints, lacquers, adhesives, and inks.

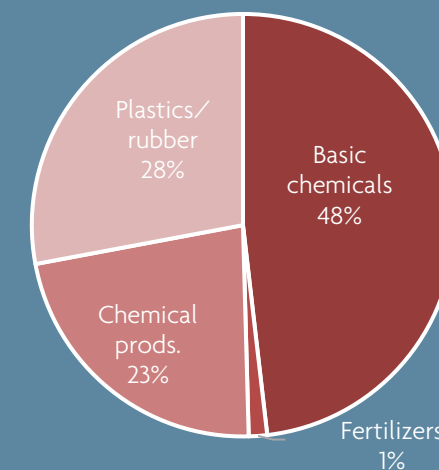
The primary data source for commodity flows reported in this profile is NJTPA's Freight Forecasting Tool, which generates commodity freight data and forecasts for a 2020 base year and 2050 forecast year. This profile describes freight flows between domestic origins and destinations.

- 25.7 million tons in 2020, increasing 14 percent to 29.2 million tons in 2050.
- Represents 7 percent of the goods moved in the region by weight and 14 percent by value.
- More than 21 million square feet of warehousing/distribution center space dedicated to this bundle.
- 85 percent moves by truck, 10 percent moves by rail, and 5 percent moves by other modes.

Highlights

Composition

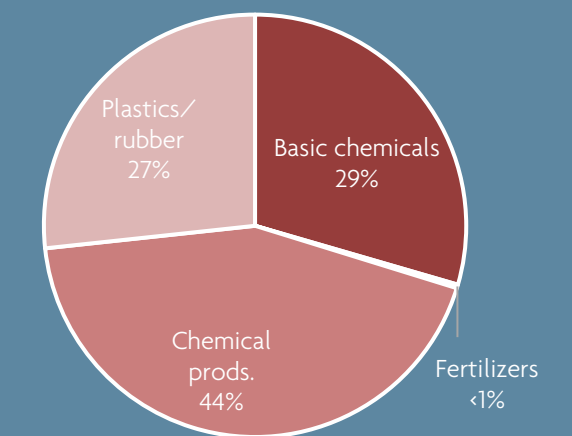
Domestic Tons in 2020



Total Tons: 25.7 million

Source: NJTPA Freight Forecasting Tool, 2020

Domestic Value in 2020



Total Value: \$98 billion

Source: NJTPA Freight Forecasting Tool, 2020

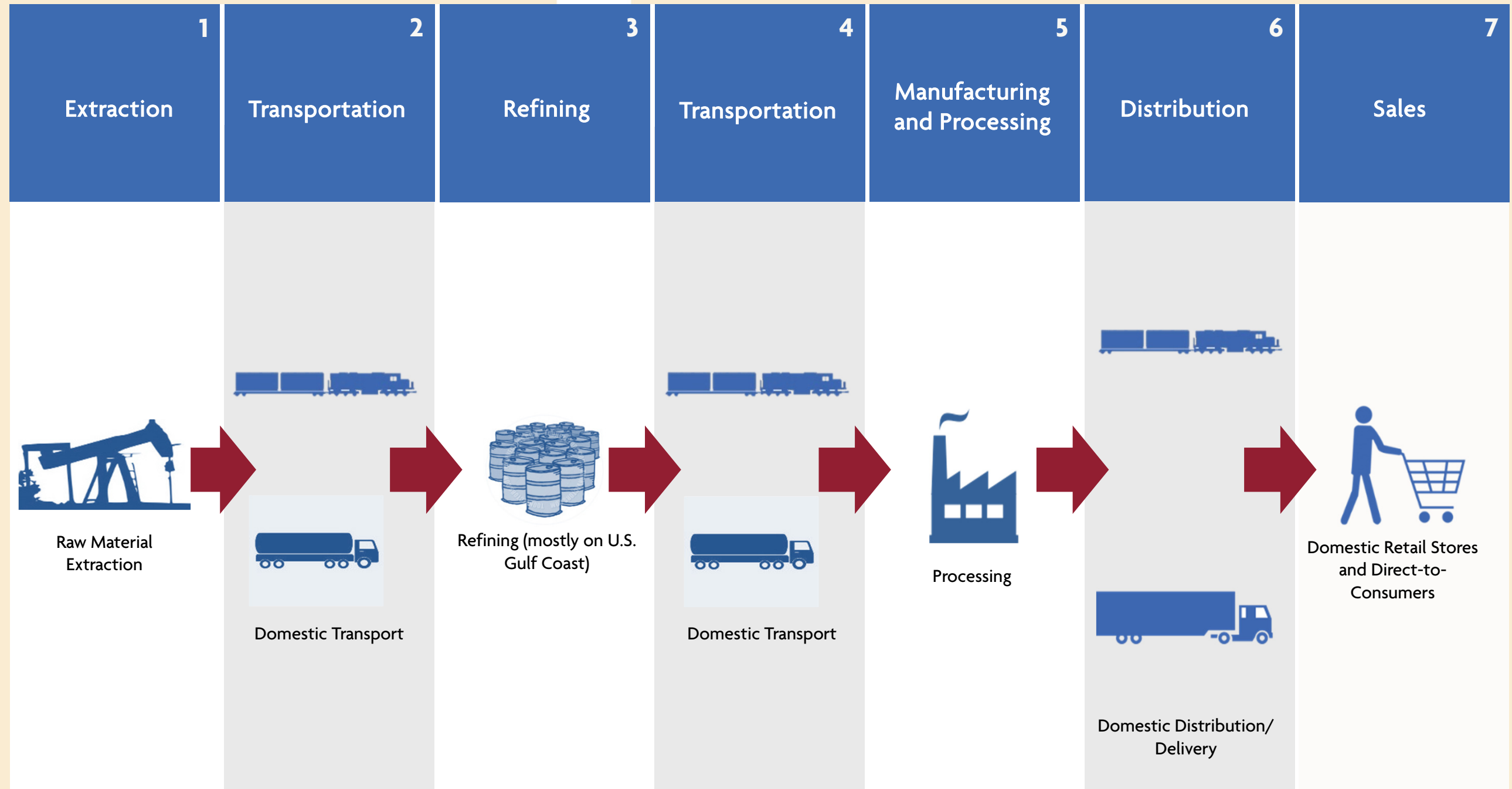
Basic chemicals represent almost half of the tonnage in this bundle, but less than 30 percent of the value of goods in this bundle. Chemical products are less than one quarter of the tonnage but 44 percent of the value of goods. Plastics and rubber are more than one quarter of the tonnage and value.

LOGISTICS SUMMARY

The graphic to the right represents the supply chain for the chemicals commodity bundle from initial extraction of raw material to the refining process and through final delivery of finished goods to costumers.

This supply chain consists of seven steps:

1. Raw material is extracted from domestic locations in the U.S. and Canada.
2. Product is transported by tanker truck, rail tank cars, and pipeline.
3. Product is refined and processed, mainly in facilities along the U.S. Gulf Coast.
4. Product is transported by pipeline, rail tank car, and barge.
5. Manufacturing facilities produce finished goods.
6. Shipments are distributed to customers via rail intermodal and truck.
7. Finished goods are delivered to retail stores and directly to customers to fulfil orders.



Business Locations by Industry Type

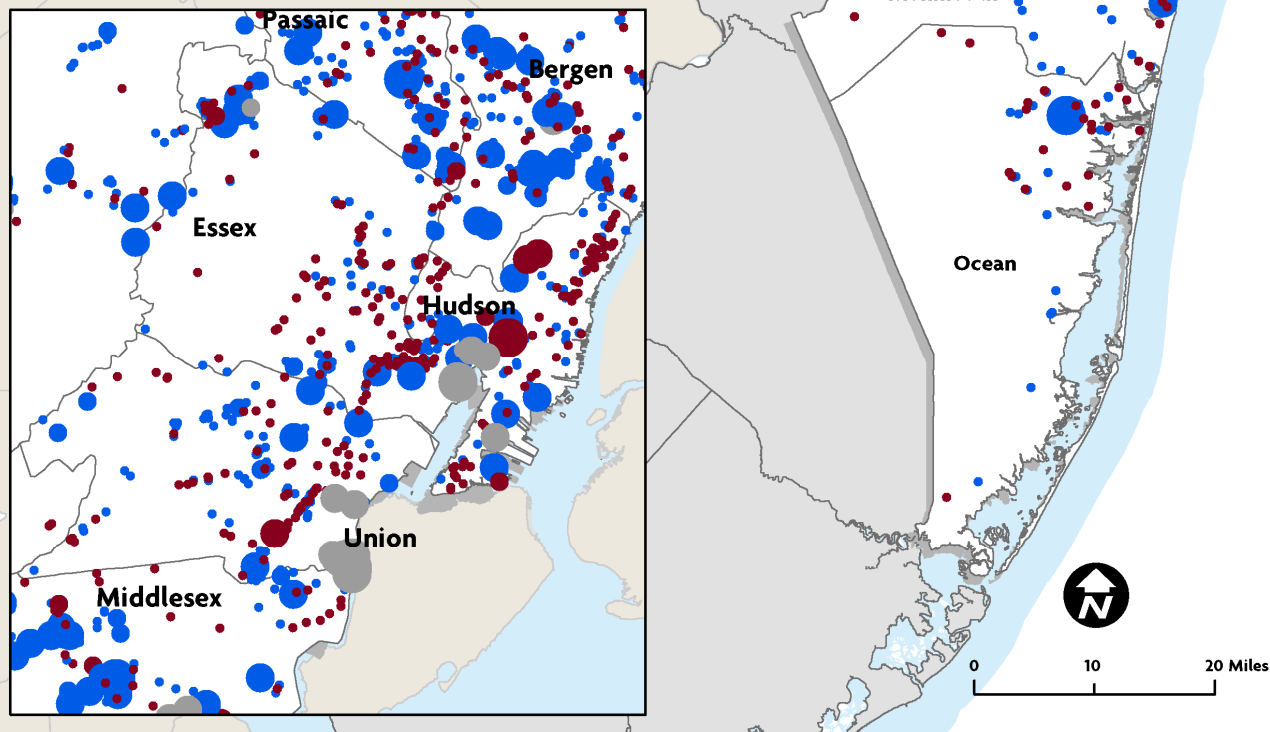
Business Square Footage by Industry Type

Chemicals

Legend Square Feet Occupied

- Production**
- 0 - 24,999
 - 25,000 - 49,999
 - 50,000 - 249,999
 - 250,000 +
- Logistics**
- 0 - 24,999
 - 25,000 - 49,999
 - 50,000 - 249,999
 - 250,000 +
- Sales**
- 0 - 24,999
 - 25,000 - 49,999
 - 50,000 - 249,999
 - 250,000 +

Source: Source: CoStar, 2015; InfoGroup, 2019; Cambridge Systematics, 2020; NJOIT, 2008; Esri, 2014
 Note:
 "Production" includes Manufacturing, Utilities, Mining, & Agriculture
 "Logistics" includes Transportation and Distribution
 "Sales" includes all other categories



BUSINESS LOCATIONS SUMMARY

The map on the previous page illustrates the locations of facilities that ship, handle, or receive commodities in this bundle, including:

- Production facilities such as manufacturing businesses where goods are produced, and correspond to Step 1 in the logistics summary chart on pages 2 and 3.
- Logistics facilities, including warehousing and transportation facilities through which goods are distributed, and correspond to steps 2 through 6 on the logistics summary chart.
- Sales, represented in Step 7 on the logistics summary chart, including retail, services, and institutional establishments where goods are sold.

Clusters of business establishments that handle chemicals are located primarily in the northeastern and central counties, including southern Bergen and Passaic, Hudson, eastern Essex and Union, Middlesex, and central Somerset counties.

KEY INDUSTRY TRENDS

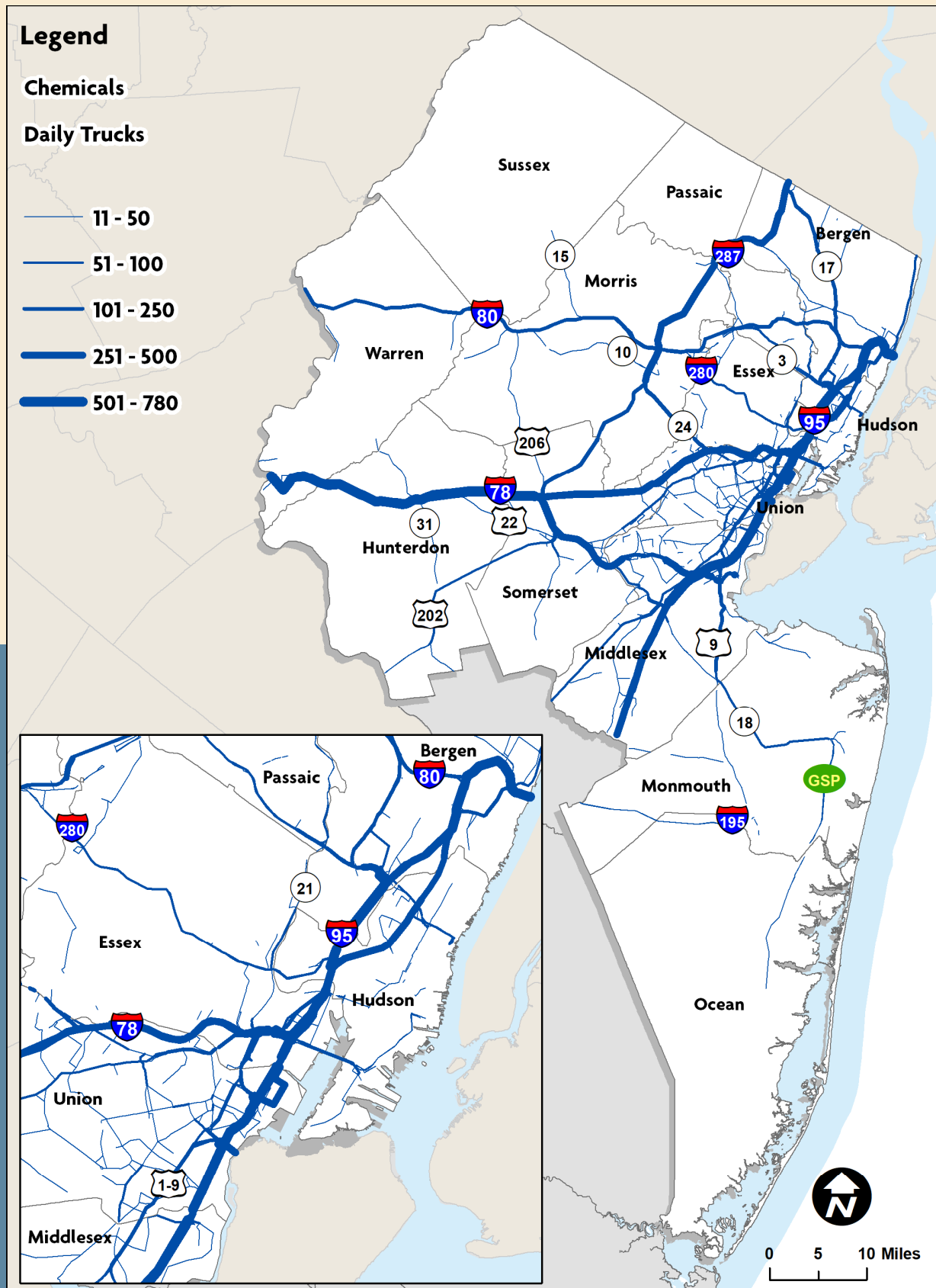
The following trends are shaping demand for chemicals commodities today, and projected demand in the future:

- Sustainability trends may negatively impact chemical industry business with calls for decarbonization and materials substitution with the reduction of plastic materials.
- Geopolitical and trade tensions will continue to pose uncertainty to this industry and affect demand. US tariffs are impacting the industry where businesses require Chinese import chemicals, and vice versa, Chinese tariffs are impacting cost and demand for US chemical exports. There could be increased demand for certain production facilities to be located in the US for strategic purposes in the future.
- New Jersey chemical manufacturers are playing an important role in fighting the COVID-19 crisis as a producer of disinfectants. Some companies which produce isopropyl alcohol have retooled to produce hand sanitizer and disinfectants.

Chemical Manufacturing Facility



Highway Network Utilization, 2020



Source: NJTPA Freight Forecasting Tool, 2020; NJRTM-E, 2019; NJOIT, 2008; Esri, 2014.

HIGHWAY NETWORK FLOWS OF CHEMICALS

The map on the previous page shows the volume of truckloads of goods in this bundle traveling on highway segments in the NJTPA region every day.

Portions of the New Jersey Turnpike between Exit 9 in Middlesex County and the George Washington Bridge, and Interstate 78 between Interstate 287 and the Pennsylvania border carry more than 500 truckloads of chemicals every day in each direction.

Portions of Interstate 287 in Bergen, Passaic, Morris, and Somerset counties and Interstate 78 east of Interstate 287 carry 250 to 500 truckloads of chemicals daily in each direction.

COMMODITY FLOW SUMMARY

Collectively, about 25.7 million tons of goods in this bundle, worth \$98 billion, moved in the NJTPA region in 2020. By 2050, more than 29 million tons worth nearly \$112 billion are expected to move in the region. These projections represent 14 percent growth by tons and by value.

This bundle represented 7 percent of the goods moved in the region by weight and 14 percent by value in 2020. By 2050, these shares are expected to remain the same.

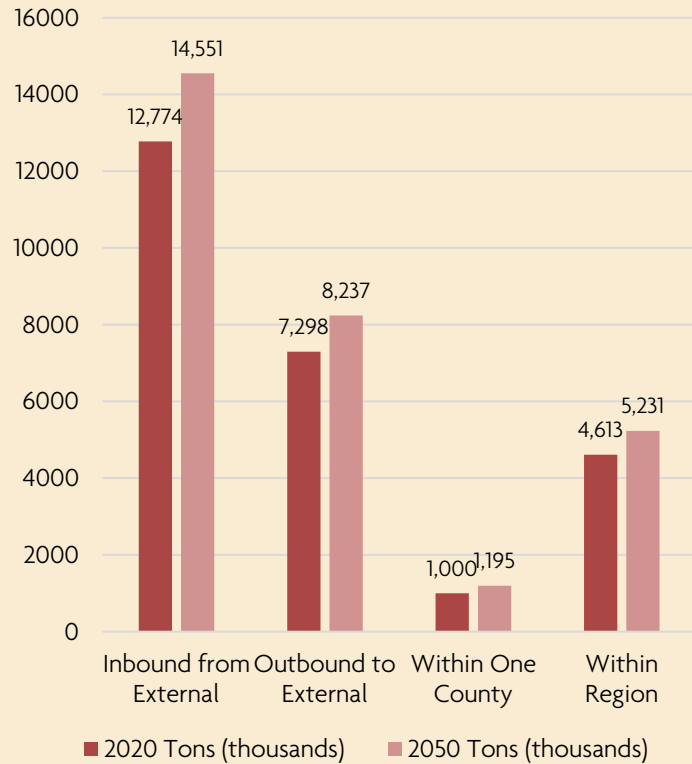
As the table below shows, basic chemicals are the top commodity by weight, and chemical products are the top commodity by value. Growth in the tonnage and value of fertilizers is expected to lag the rest of the goods in this bundle.

Forecasted Change in Commodity Flows in the Chemicals Bundle by Weight and Value, 2020 and 2050

| Commodity | 2020 Tons (thousands) | 2050 Tons (thousands) | 2020 Value (millions \$) | 2050 Value (millions \$) | Change in | |
|--------------------|-----------------------|-----------------------|--------------------------|--------------------------|----------------------------------|------------|
| | | | | | Change in Tons, Value, 2020-2050 | 2050 |
| Basic chemicals | 12,372 | 14,116 | 29,016 | 33,136 | 14% | 14% |
| Fertilizers | 359 | 385 | 271 | 291 | 7% | 7% |
| Chemical prods. | 5,778 | 6,538 | 42,820 | 48,557 | 13% | 13% |
| Plastics/rubber | 7,175 | 8,176 | 26,273 | 29,860 | 14% | 14% |
| Grand Total | 25,684 | 29,214 | 98,379 | 111,844 | 14% | 14% |

Source: NJTPA Freight Forecasting Tool, 2020

Domestic Tons by Direction, 2020 and 2050



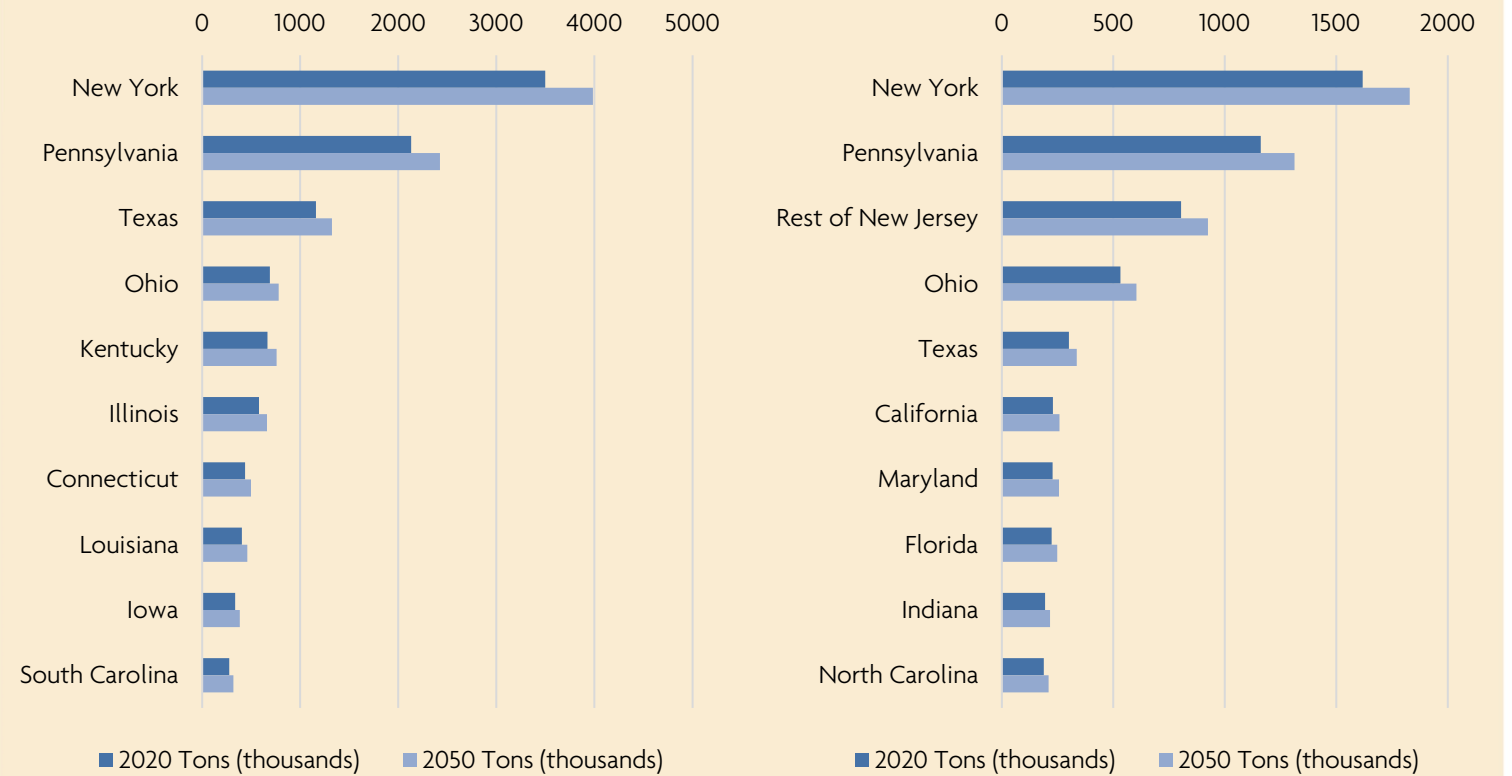
About 12.8 million tons of chemicals (50 percent of all tons in this bundle) move into the NJTPA region from origins outside the region. About 28 percent originate in the region and travel outside the region, 18 percent travel between NJTPA counties, and 4 percent travel within one NJTPA county alone.

About 80 percent of the goods in this bundle imported to the NJTPA region originate in one of the locations shown in the graph on the next page. About 27 percent originate in New York alone. Among the top origins, flows from South Carolina are expected to grow fastest (15 percent) through 2050.

The graph on the next page also shows the destinations of 75 percent of the goods in this commodity bundle that leave the NJTPA region. New York, and Pennsylvania are the top destinations of chemicals exported from the NJTPA region, each receiving more than 1 million tons in 2020. Among the destinations shown in the graph, flows to the portions of New Jersey outside the NJTPA region are expected to grow fastest (15 percent) between 2020 and 2050.

Source: NJTPA Freight Forecasting Tool, 2020

Top Origins of Inbound Domestic Commodities (Left) and Top Destinations of Outbound Domestic Commodities (Right), 2020 and 2050



Source: NJTPA Freight Forecasting Tool, 2020

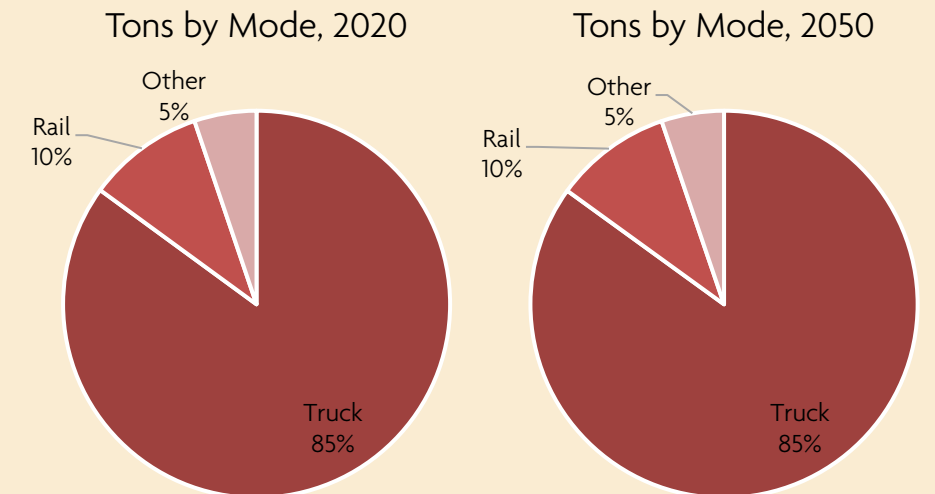
Source: NJTPA Freight Forecasting Tool, 2020

Nearly All Chemicals in the NJTPA Region are Transported by Truck or Rail



Mode Splits, 2020 and 2050

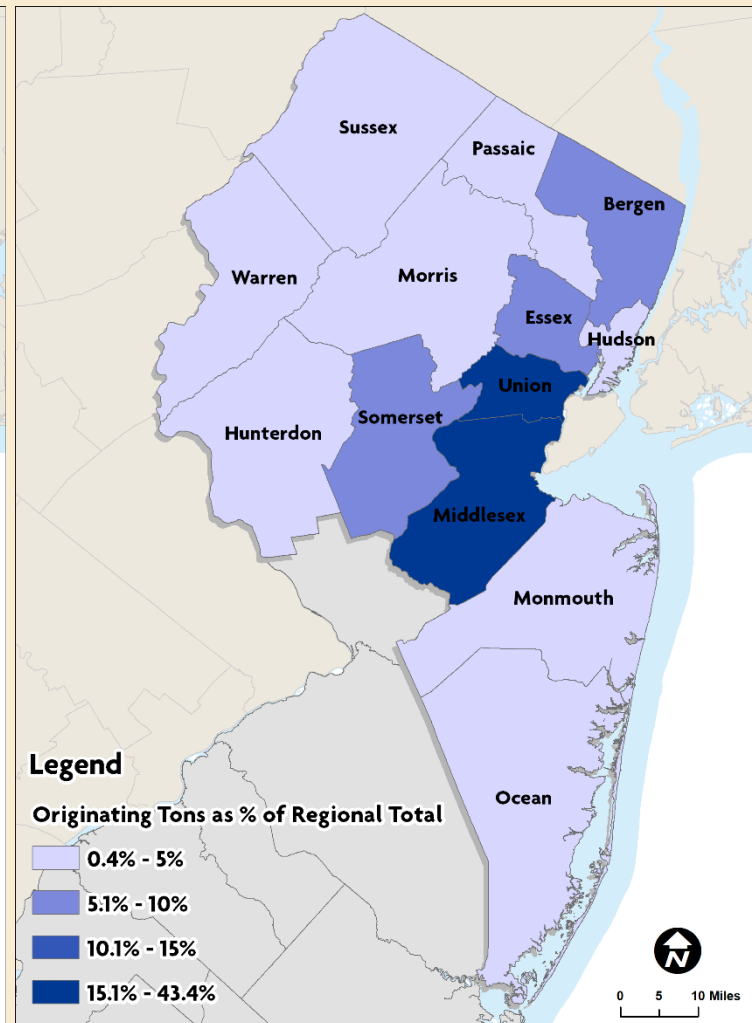
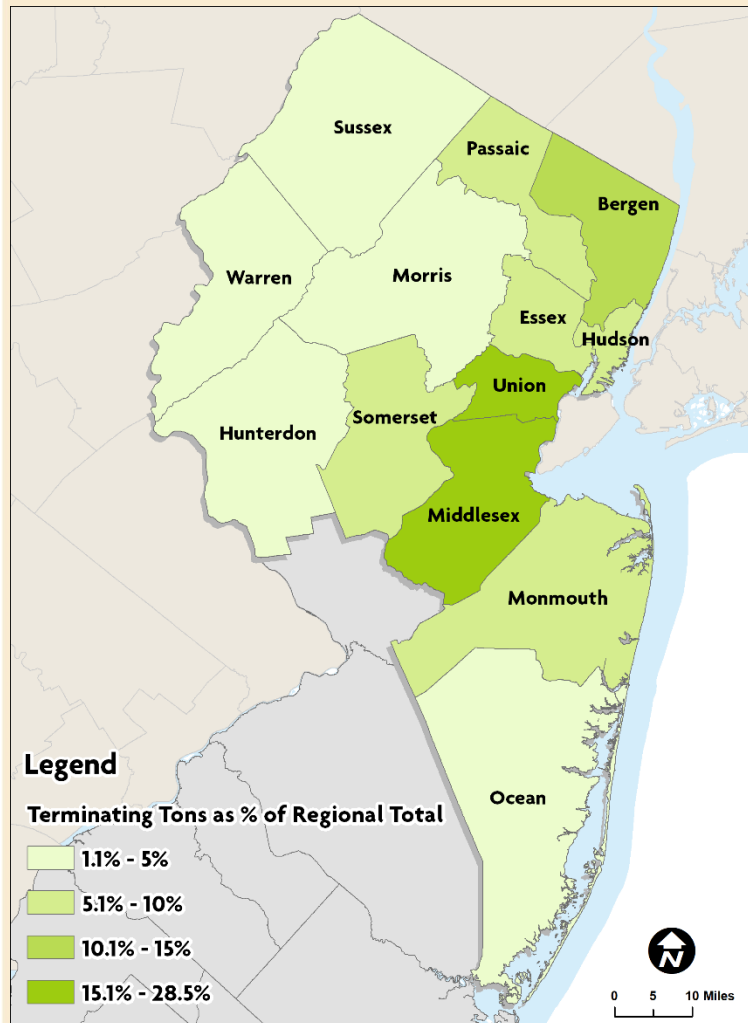
In 2020, about 85 percent of the chemicals commodities moving in the NJTPA region traveled by truck. About 10 percent moved by rail, and 5 percent moved on other transportation modes. By 2050, the mode split is expected to remain similar.



Source: NJTPA Freight Forecasting Tool, 2020

Inbound Domestic Tons by County, 2020

Outbound Domestic Tons by County, 2020



Source: NJTPA Freight Forecasting Tool, 2020; NJRTM-E, 2019; NJOIT, 2008; Esri, 2014.

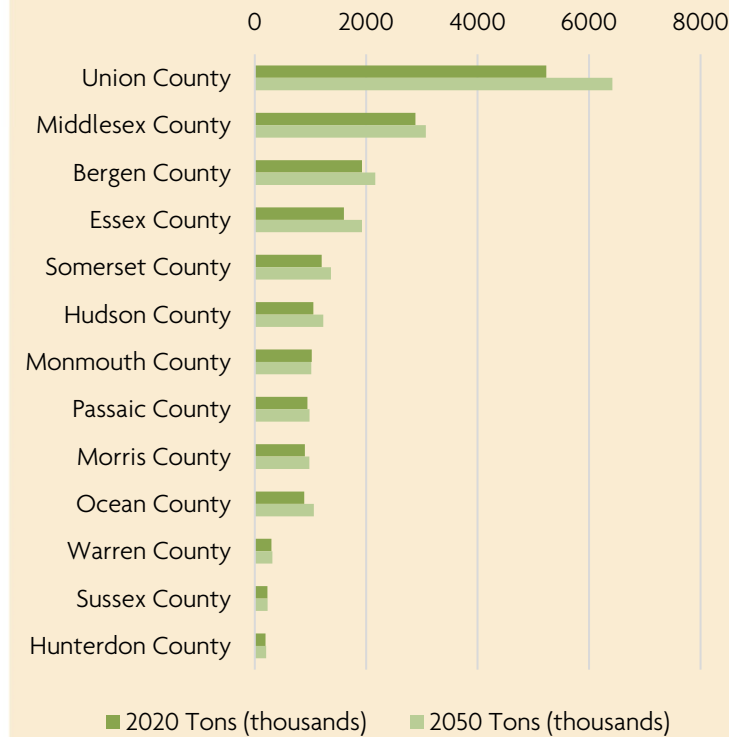
Source: NJTPA Freight Forecasting Tool, 2020; NJRTM-E, 2019; NJOIT, 2008; Esri, 2014.

The maps above and the graphs on the next page show the top counties of origin and top counties of destination for goods in this commodity bundle traveling to or from the NJTPA region.

About 28 percent of goods in the chemicals commodity bundle terminated in Union County alone in 2020. About 15 percent terminated in Middlesex County. Projected growth rates in inbound chemicals tonnage between 2020 and 2050 range from -1 percent (Monmouth County) to 65 percent (Middlesex County).

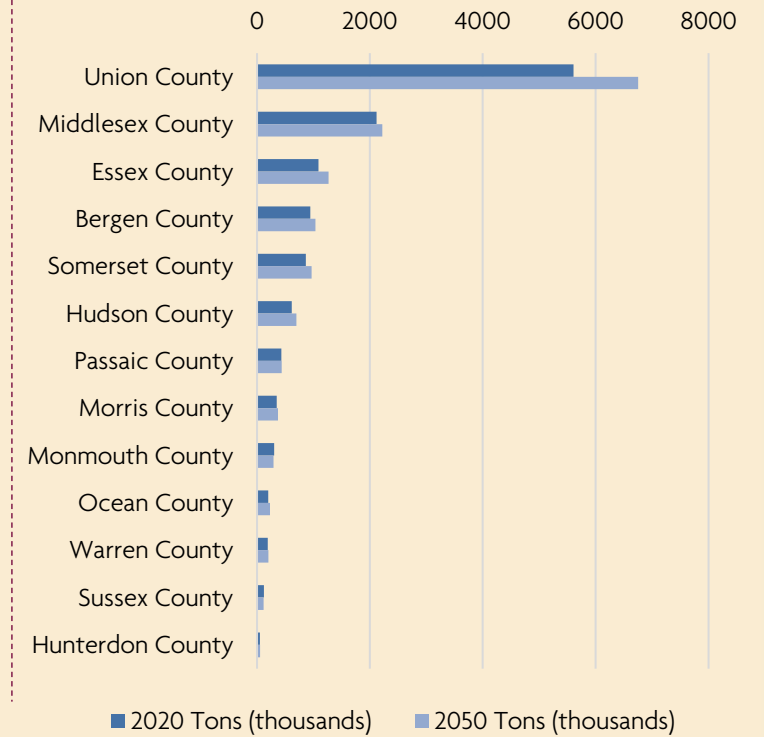
More than 43 percent all goods in the chemicals commodity bundle originating in the NJTPA region originated in Union County in 2020. About 16 percent originated in Middlesex County. Projected growth rates in outbound tonnage between 2020 and 2050 range from -4 percent (Monmouth and Sussex counties) to 20 percent (Union County).

Inbound Domestic Tons by County, 2020 and 2050



Source: NJTPA Freight Forecasting Tool, 2020

Outbound Domestic Tons by County, 2020 and 2050



Source: NJTPA Freight Forecasting Tool, 2020

References

For more information on chemicals commodity flows and logistics in the North Jersey region and elsewhere, consult the following sources:

- American Fuel & Petrochemical Manufacturers, www.afpm.org
- Chemistry Council of New Jersey, www.chemistrycouncilnj.org
- American Petroleum Institute, www.api.org
- Specialty Chemical Manufacturing Association, www.socma.com
- U.S. Pharmacopeia, www.usp.org
- Bureau of Labor Statistics, U.S. Department of Labor, www.bls.gov

ABOUT THE NJTPA

The North Jersey Transportation Planning Authority (NJTPA) is the federally authorized Metropolitan Planning Organization for 6.7 million people in the 13-county northern New Jersey region. Each year, the NJTPA oversees the investment of more than \$1 billion in federal funding for transportation projects and provides a forum for interagency cooperation and public input into funding decisions. It also sponsors and conducts studies, assists county planning agencies and monitors compliance with national air quality goals.

The NJTPA Board of Trustees includes 15 local elected officials, including one representative from each of the 13 northern New Jersey counties – Bergen, Essex, Hudson, Hunterdon, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, and Warren – as well as from the cities of Newark and Jersey City. The Board also includes the Commissioner of the New Jersey Department of Transportation (NJDOT), the Executive Director of NJ TRANSIT, the Chairman of the Port Authority of New York and New Jersey, a Governor's Representative and a Citizens' Representative appointed by the Governor.

ABOUT THE STUDY

Conditions in the goods movement industry have changed over the last several years. The 2050 Freight Industry Level Forecasts Study developed updated information on current and projected freight demand through 2050 for the NJTPA to use in its freight planning activities. This effort built on two previous NJTPA freight planning studies: the 2040 Freight Industry Level Forecasts Study (completed in 2012) and the Regional Freight Commodity Profiles Study (completed in 2015).

This study helps identify locations with concentrations of goods movement activity and where they will occur in the future; the types of commodities that are and will be moving through the region; and where strategic investments should be considered to support economic growth and enhance regional resiliency. The results of this work will serve as background for the NJTPA's next Long Range Transportation Plan as well as freight planning and subregional planning studies.

For further information, please contact Jakub Rowinski, NJTPA Project Manager, at jrowinski@njtpa.org.

This Freight Profile is one of a series of profiles, representing 12 freight commodity bundles in the 13-county NJTPA region.

This document was prepared by the NJTPA with funding from the Federal Transit Administration and the Federal Highway Administration. The NJTPA is solely responsible for its contents.