NJTPA NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY
Defining the Vision. Shaping the Future.

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: industrial chemicals, such as organic and inorganic compounds, gases, or dyes used in manufacturing; plastic matter or synthetic fibers; soap or detergents; paints, lacquers, or wood or gum chemicals; miscellaneous chemicals, including adhesives, explosives, and inks; and hazardous materials.

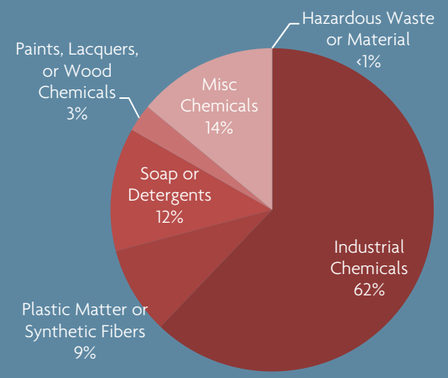
The primary data source for commodity flows reported in this profile is NJTPA's Freight Forecasting Tool, which generates commodity freight data and forecasts for a 2010 base year and 2040 forecast year. This profile describes freight flows between domestic origins and destinations.

Highlights

- 57 million tons in 2010, increasing 40% to 80 million tons in 2040.
- Represents 8.6% of the goods moved in the region by weight and 8.6% by value.
- 1,657 business establishments employing 33,840 send or receive goods in this bundle.
- More than 21 million square feet of warehousing/ distribution center space dedicated to this bundle.
- 73% moves by truck, 16% moves by rail, 11% moves by domestic water, and less than 1% moves by air or other modes.

Composition

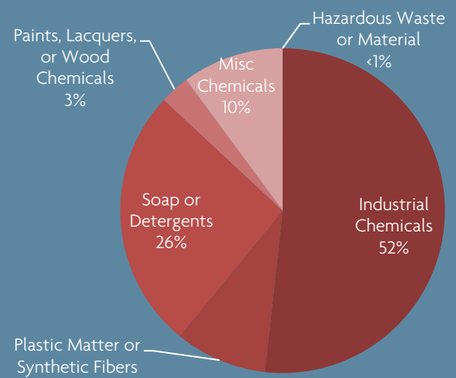
Domestic Tons in 2010



Total Tons: 57 million

Source: NJTPA Freight Forecasting Tool, 2012

Domestic Value in 2010



Total Value: $158 billion

Source: NJTPA Freight Forecasting Tool, 2012

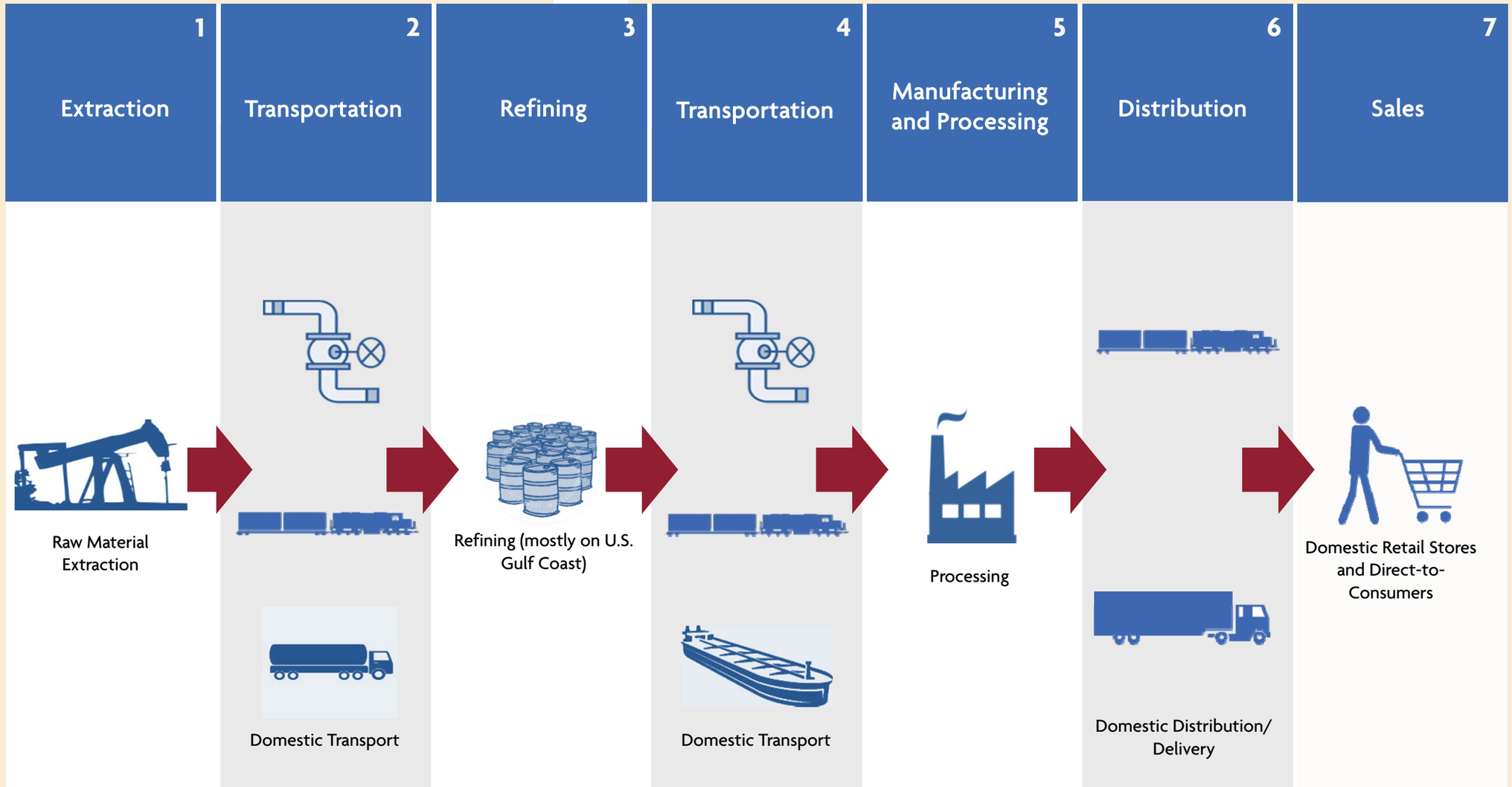
Industrial chemicals represent more than three-fifths of this commodity bundle by weight, and more than half by value. Miscellaneous chemicals and soap or detergents each represent more than 10 percent of this bundle by weight and by value.

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.

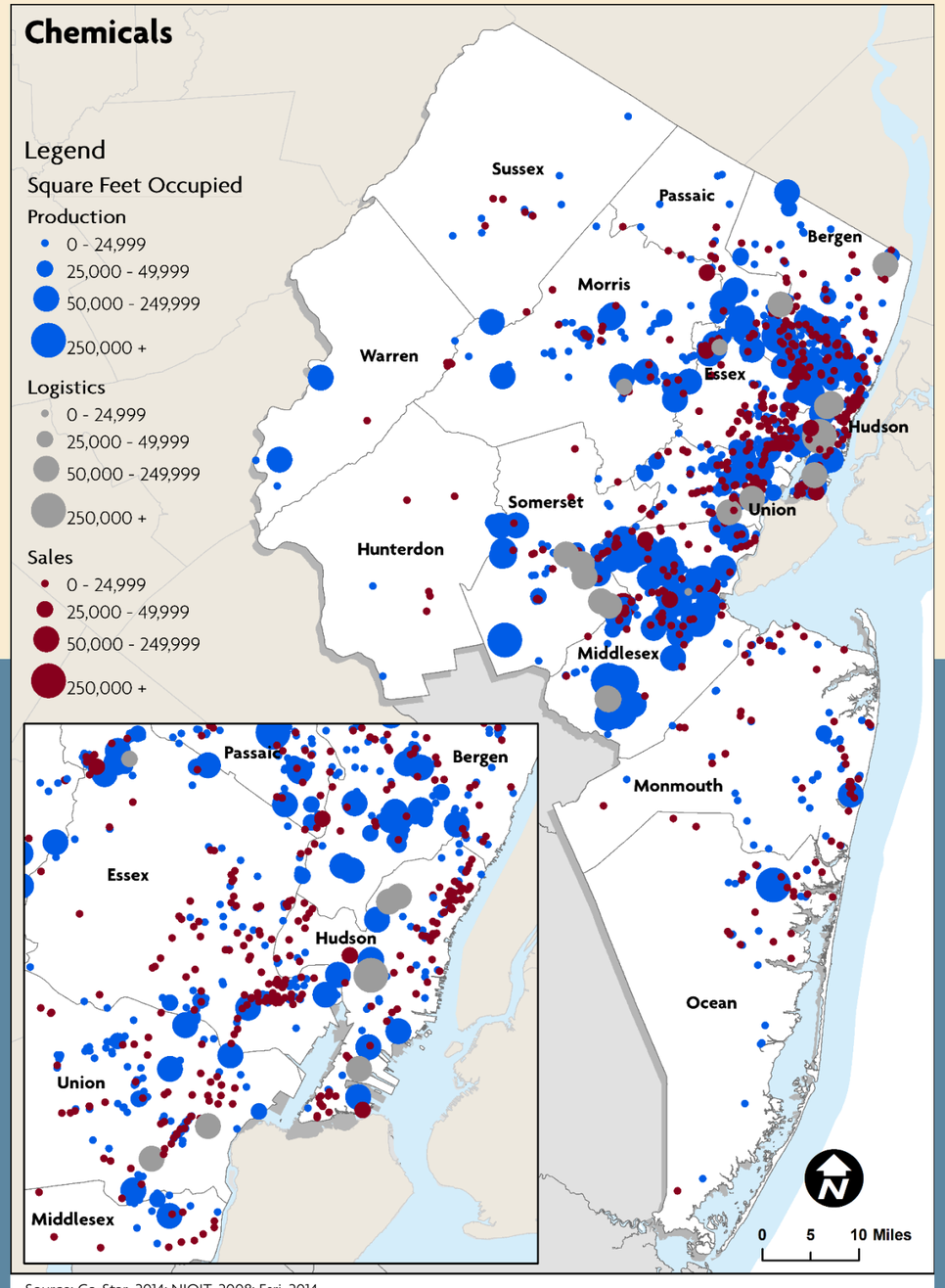
This supply chain consists of seven steps:

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



Source: Co-Star, 2014; NJOIT, 2008; Esri, 2014.
Note: "Production" includes Manufacturing, Utilities, Mining & Agriculture, corresponding to Step 1 in the Logistics Summary on Pages 2-3.
"Logistics" includes Wholesale Trade and Warehousing, corresponding to Steps 2-6 in the Logistics Summary on Pages 2-3.
"Sales" includes Retail, Health Care, and Professional Services, corresponding to Step 7 in the Logistics Summary on Pages 2-3.

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 clustered primarily in the northeastern and central counties, including southern Bergen and Passaic, Hudson, eastern Essex and Union, Middlesex, and central Somerset counties.

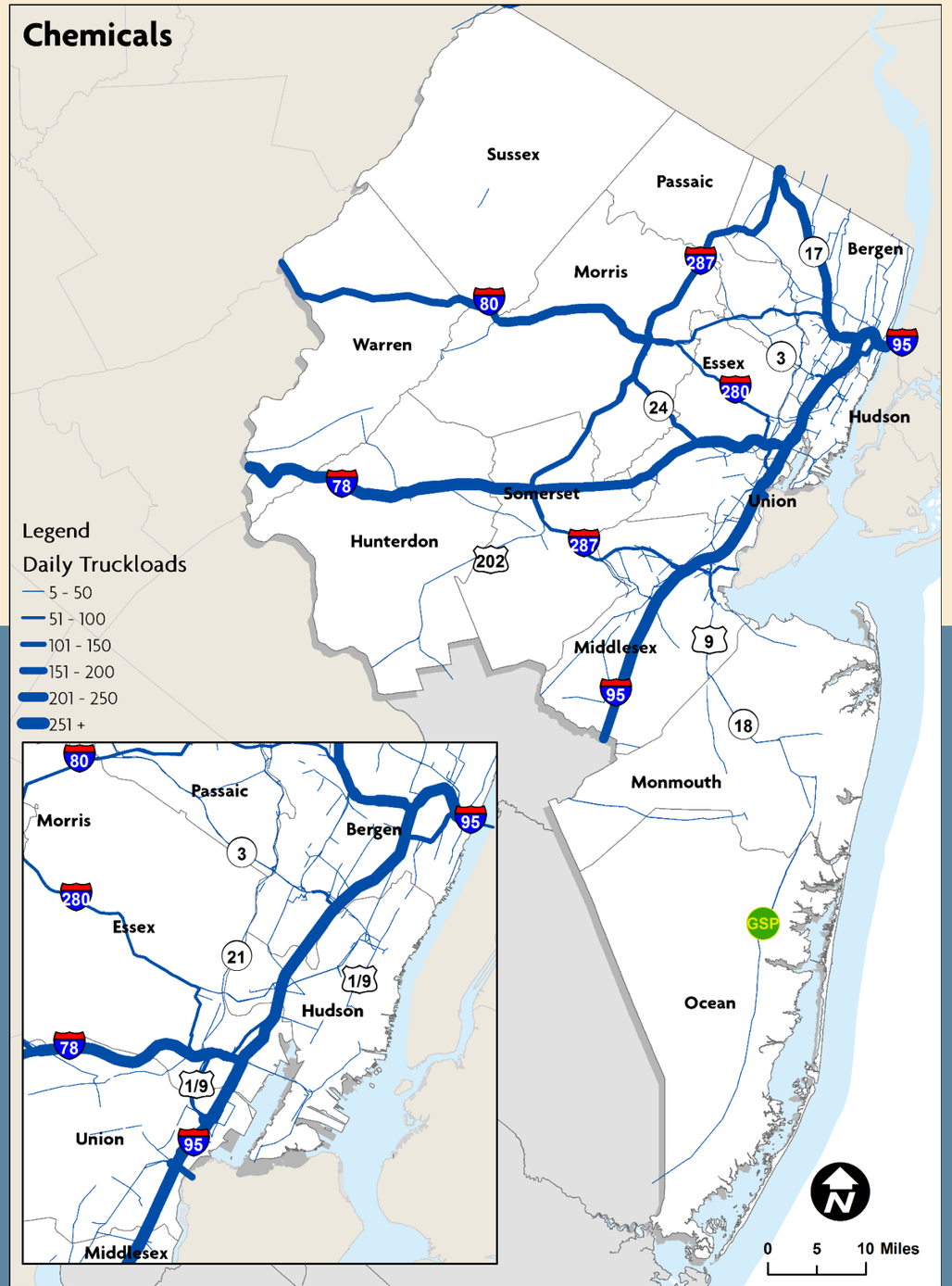
KEY INDUSTRY TRENDS

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

- Increasing consumer demand for bio-based chemicals with less environmental impact combined with price volatility for oil and gas may place a limit on growth in the industry.
- Paint and coating products used in commercial and retail construction will see increased use as the U.S. economy expands and the demand for new buildings grows.
- Material sourced from shale deposits will provide a higher percent of industry inputs.
- Plastics remains a growth market throughout the world. Matured U.S. and European markets will see a growing demand for new high performance plastics, while the automobile and construction industries in South America and the retail market in Asia will continue to spur demand for more conventional uses.

Chemical Manufacturing Facility

Highway Network Utilization, 2010



Source: NJTPA Freight Forecasting Tool, 2012; NJOIT, 2008; Esri, 2014.

HIGHWAY NETWORK FLOWS OF CHEMICALS

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

Portions of the NJ Turnpike between Exit 8A in Middlesex County and the George Washington Bridge, Interstate 78 between the NJ Turnpike and Route 24 and between Interstate 287 and the Pennsylvania border carry more than 250 truckloads of chemicals every day. Portions of Interstate 80 in Morris County, Route 17 in Bergen County, and Interstate 78 in western Union and eastern Somerset counties carry 200 to 250 truckloads of chemicals daily. The NJ Turnpike south of Exit 8A, Interstate 80 in Warren County, and Interstate 287 in Bergen, Passaic, and Morris counties carry 150 to 200 daily truckloads of chemicals.

COMMODITY FLOW SUMMARY

Collectively, about 57 million tons of goods in this bundle, worth $158 billion, moved into, out of, through, or within the NJTPA region in 2010. By 2040, nearly 80 million tons worth $221 billion will move in the region. These projections represent 40 percent growth by tons and 40 percent growth by value.

This bundle represented 8.6 percent of the goods moved in the region by weight and by value in 2010. By 2040, these shares are expected to change slightly, as the bundle will represent 8.5 percent of all goods by weight and 8.2 percent by value.

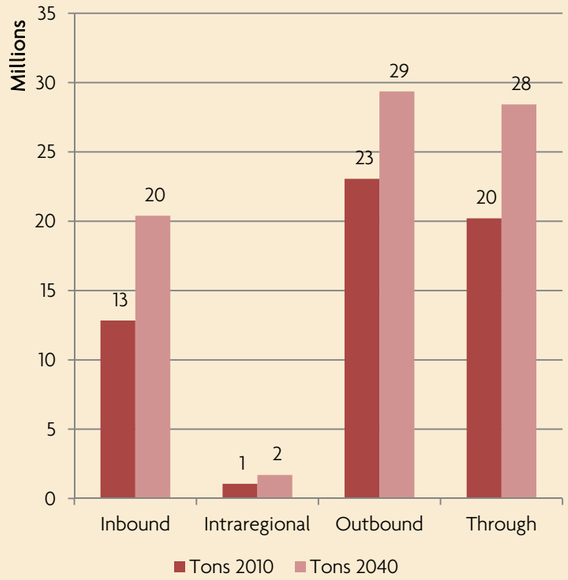
As the table below shows, the top five commodities in this bundle are: miscellaneous industrial organic chemicals, chemical preparations not elsewhere classified, plastic materials or synthetic fibers, miscellaneous industrial inorganic chemicals, and cosmetics and perfumes. Together they represent 96 percent of all of the energy commodities moved into, out of, or within the NJTPA region by weight.

Commodities in the Chemicals Commodity Bundle

STCC4	Commodity	Tons (thousands)	Value (millions)	STCC4	Commodity	Tons (thousands)	Value (millions)
2818	Misc Industrial Organic Chemicals	14,100	$37,770	2841	Soap or Other Detergents	308	$490
2899	Chemical Preparations, Nec	3,570	$4,323	2820	Plastic Mater or Synth Fibres	282	$260
2821	Plastic Materials or Synth Fibres	2,954	$9,786	2842	Specialty Cleaning Preparations	264	$654
2819	Misc Industrial Inorganic Chemicals	2,694	$1,810	2810	Industrial Chemicals	232	$242
2844	Cosmetics,perfumes, Etc.	2,295	$22,915	2861	Gum or Wood Chemicals	193	$281
2812	Potassium or Sodium Compound	2,019	$2,975	2816	Inorganic Pigments	133	$732
2843	Surface Active Agents	1,600	$4,238	2892	Explosives	114	$392
2813	Industrial Gases	1,522	$7,043	2840	Soap or Other Detergents	104	$118
2815	Cyclic Intermediates or Dyes	1,353	$5,571	2890	Misc Chemical Products	26	$60
2893	Printing Ink	1,072	$5,155	2850	Paints, Lacquers, Etc.	12	$30
2814	Crude Prod Of Coal,gas,petroleum	904	$457	2860	Gum or Wood Chemicals	9	$2
2851	Paints, Lacquers, Etc.	804	$3,210	48XX	Waste Hazardous Materials or Substances	3	<$1
2891	Adhesives	389	$1,122	49XX	Hazardous Materials	<1	$2

Source: NJTPA Freight Forecasting Tool, 2012
Note: "STCC4" represents the four-digit Standard Transportation Commodity Code (STCC)

Domestic Tons by Direction, 2010 and 2040



Source: NJTPA Freight Forecasting Tool, 2012

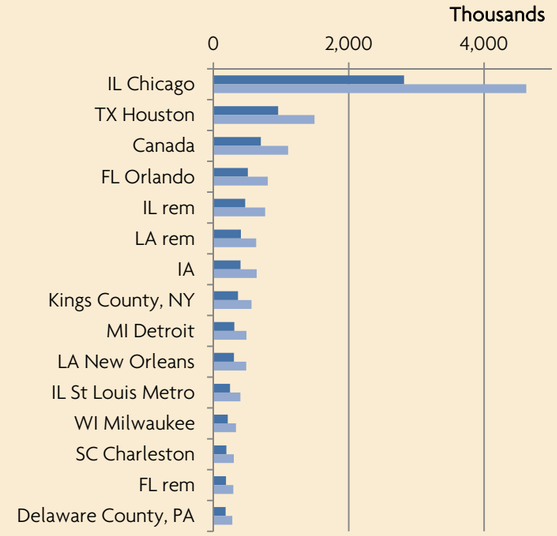
About 23 million tons of chemicals (40 percent of all tons in this bundle) originate in the NJTPA region and travel outbound. About 23 million tons (35 percent) passed through the NJTPA region, 13 million tons (23 percent) moved inbound from outside the region, and 1 million tons (2 percent) moved intraregionally.

About 64 percent of the goods in this bundle imported to the NJTPA region originate in one of the locations shown in the graph to the right. About 22 percent originate in the Chicago region of Illinois alone. Among the top origins, flows from the Chicago region are expected to grow fastest (64 percent) and flows from Kings County, NY (Brooklyn) are expected to grow slowest (54 percent) through 2040.

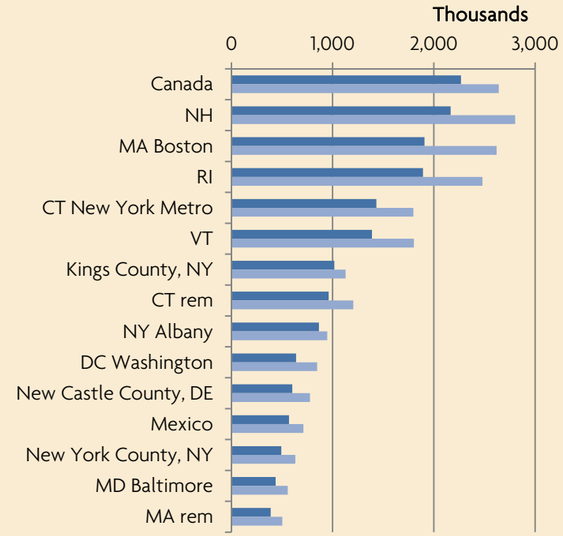
The locations shown in the far-right graph are the destinations of 74 percent of the goods in this commodity bundle that leave the NJTPA region. Canada, and parts of New England are the top destinations of chemicals exported from the NJTPA region. Among the destinations shown in the graph, flows to the Boston region are expected to grow fastest (37 percent) and flows to the Albany, NY region are expected to grow slowest (9 percent).

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

Top Origins of Inbound Domestic Commodities (Left) and Top Destinations of Outbound Domestic Commodities (Right), 2010 and 2040



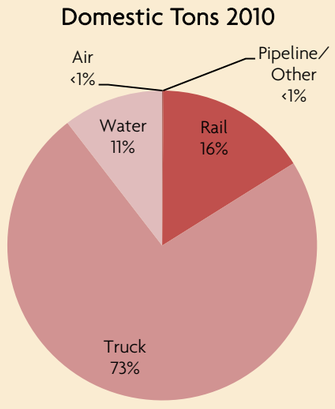
Source: NJTPA Freight Forecasting Tool, 2012
Note: "rem" stands for "remainder," which refers to the portions of a state outside major metropolitan regions.

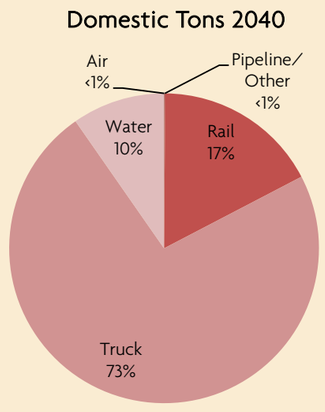


Source: NJTPA Freight Forecasting Tool, 2012
Note: "rem" stands for "remainder," which refers to the portions of a state outside major metropolitan regions.

Mode Splits, 2010 and 2040

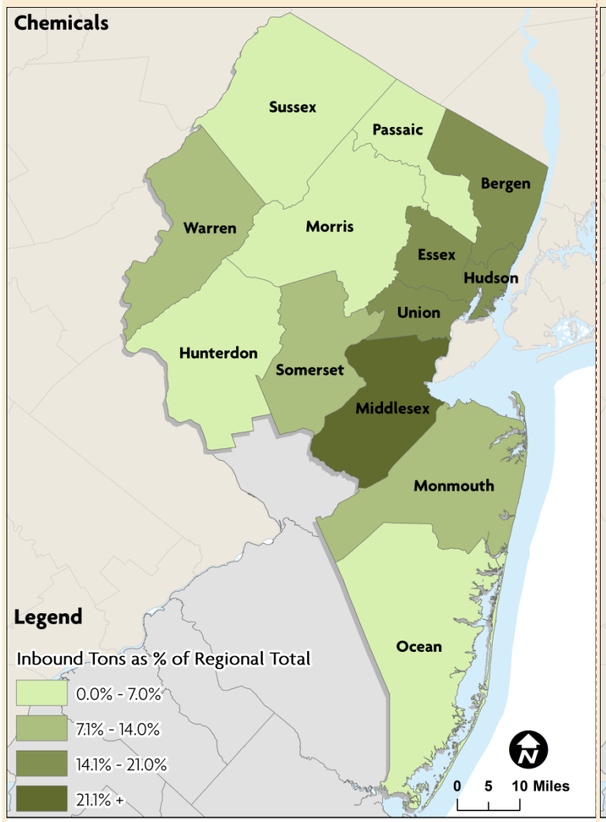
In 2010, about 73 percent of the chemicals commodities moving in the NJTPA region traveled by truck. About 16 percent traveled by rail, 11 percent moved by domestic water, and less than 1 percent moved by each air and other modes. By 2040, the mode split is expected to remain similar.





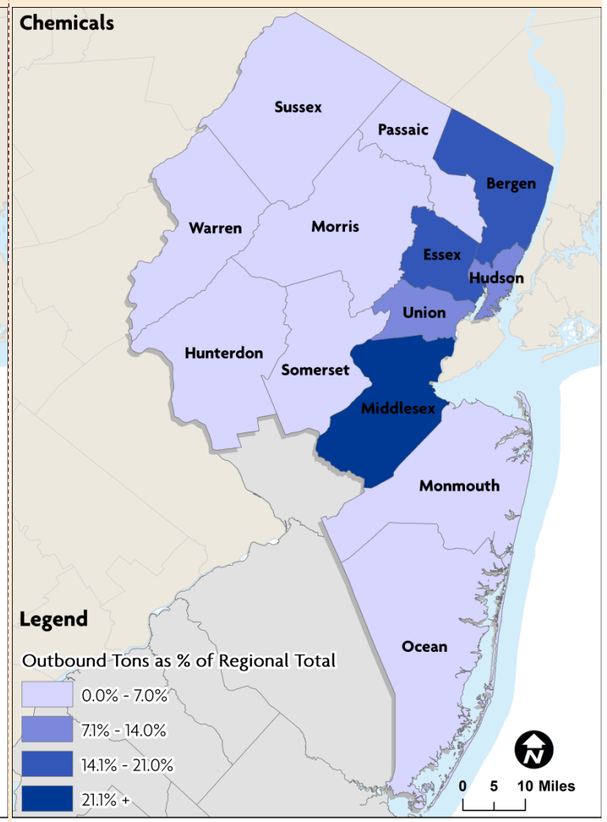
Source: NJTPA Freight Forecasting Tool, 2012

Inbound Domestic Tons by County, 2010



Source: NJTPA Freight Forecasting Tool, 2012; NJOIT, 2008; Esri, 2014.

Outbound Domestic Tons by County, 2010



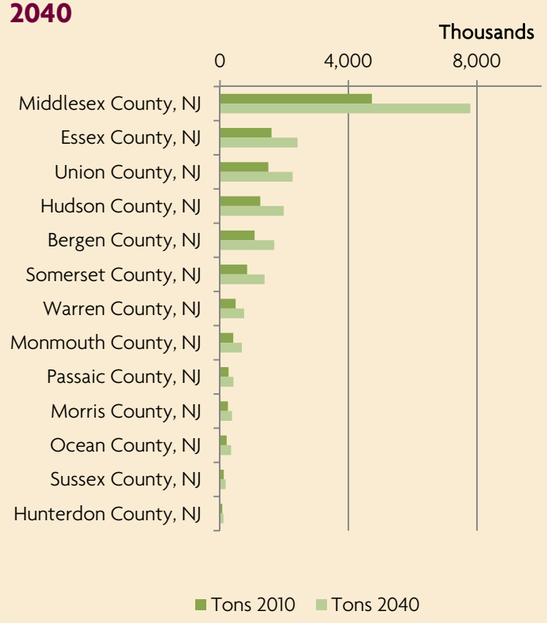
Source: NJTPA Freight Forecasting Tool, 2012; NJOIT, 2008; Esri, 2014.

The maps above and the graphs on the opposite 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 37 percent of inbound goods in the chemicals commodity bundle are destined for Middlesex County alone. Projected growth rates in inbound chemicals tonnage between 2010 and 2040 range from 50 percent (Essex, Union, Morris, Sussex, and Hunterdon counties) to 65 percent (Middlesex County).

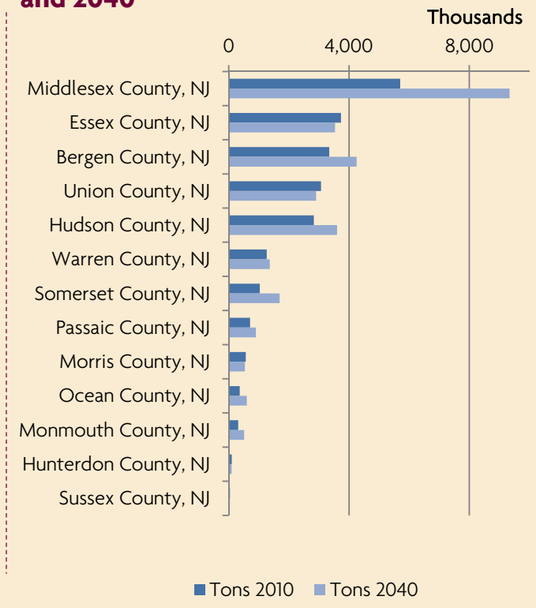
More than two-thirds (69 percent) of all goods in the chemicals commodity bundle traveling outbound from the NJTPA region originate in the counties of Middlesex, Essex, Bergen, or Union. Projected growth rates in outbound tonnage between 2010 and 2040 range from -4 percent (Sussex County) to 62 percent (Middlesex, Somerset, Ocean, and Monmouth counties).

Inbound Domestic Tons by County, 2010 and 2040



Source: NJTPA Freight Forecasting Tool, 2012

Outbound Domestic Tons by County, 2010 and 2040



Source: NJTPA Freight Forecasting Tool, 2012

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
- 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 6.6 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

The NJTPA regional Freight Commodity Profiles study enhanced the NJTPA's freight modeling tools, analyzed, and identified gaps in existing freight and industry data, collected data and information to fill those gaps, and prepared summary data products, including a set of Regional Commodity Profile documents. In addition to supporting freight planning, these profiles will be used in stakeholder outreach and education. Key work tasks included:

- Enhancement of the NJTPA's Freight Forecasting Tool to produce commodity-specific truck trip tables.
- Identification of "Top 11 Regional Commodity Groups" based upon economic and commodity flow data.
- Collection and analysis of data on each of the commodity groups, including: direction of movement; locations of production, shipping, handling, and receiving centers; modes and routes used to transport the commodities.
- Production of "Regional Commodity Profile" documents for each of the Top 11 Regional Commodity Groups, which summarize the data analysis findings using charts, graphs, maps, and descriptive text.

ABOUT THIS PROFILE

The NJTPA developed a Freight Forecasting Tool (FFT) in 2012, which generates alternative domestic freight forecasts to support transportation, land use, and economic development decisions. The FFT was built by Cambridge Systematics, Inc., using commodity flow data from IHS Global Insight and econometric forecasts from the R/ECON model, produced and managed by the Center for Urban Policy Research at Rutgers University. Cambridge Systematics and Parsons Brinckerhoff enhanced the FFT in 2015 to produce commodity group-specific forecast tables.

The NJTPA conducted research on commodity flows and logistics chains for 11 key "commodity bundles," that move in the North Jersey region, including warehouse and terminal moves, food, apparel, paper and printed materials, waste, construction materials, machinery and transportation equipment, other durable goods, pharmaceuticals, chemicals, and hazardous materials. This profile offers an overview of the components, freight demand, and logistics chain for chemicals moving into, out of, through, and within the North Jersey region.

For further information, please contact Jakub Rowinski, NJTPA Project Manager, at jrowinski@njtpa.org. This document was prepared by the North Jersey Transportation Planning Authority, Inc. with funding from the Federal Transit Administration and the Federal Highway Administration. The NJTPA is solely responsible for its contents.

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