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

REGIONAL FREIGHT COMMODITY PROFILE

Energy

COMMODITY BUNDLE OVERVIEW

The energy commodity bundle consists of three specific commodity groups of unrefined and refined fuel and energy commodities. These include: coal; crude (unrefined) petroleum, natural gas, or gasoline; and refined petroleum or coal products. Refined petroleum or coal products include refined petroleum, fuels, heating oil, liquefied gases, and asphalt.

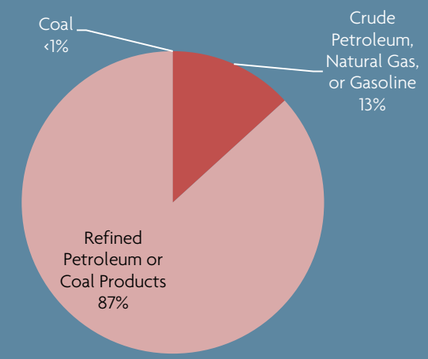
The primary data source for commodity flows reported in this profile is NJTPA's Freight Forecasting Tool, which generates commodity freight data and forecasts for a 2010 base year and 2040 forecast year. This profile describes freight flows between domestic origins and destinations.

Highlights

- 112 million tons in 2010, increasing 36% to 153 million tons in 2040.
- Represents 16.9% of the goods moved in the region by weight and 2.5% by value.
- 125 business establishments employing 1,190 people send or receive goods in this bundle.
- Nearly 3 million square feet of warehousing/distribution center space dedicated to this commodity bundle.
- 56% moves by water, 38% by truck, 4% by rail, and 2% by pipeline and other modes.

Composition

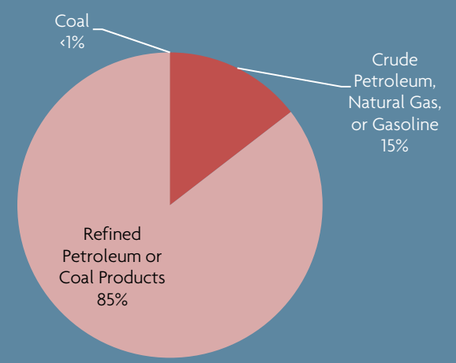
Domestic Tons in 2010



Total Tons: 112 million

Source: NJTPA Freight Forecasting Tool, 2012

Domestic Value in 2010



Total Value: $46 billion

Source: NJTPA Freight Forecasting Tool, 2012

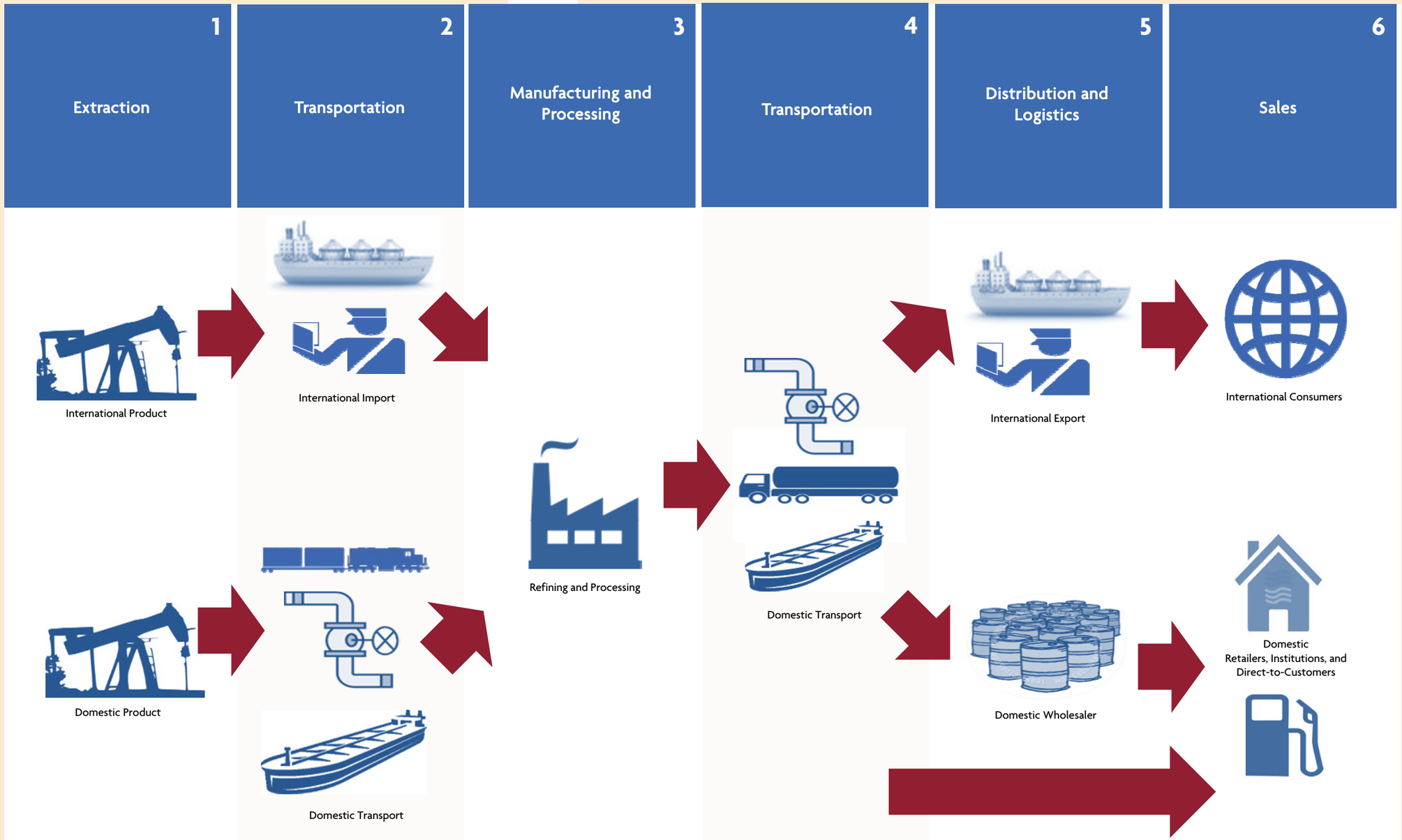
Refined petroleum or coal products represents 87 percent of goods in the energy commodity bundle by weight and 85 percent by value. Most of the remaining tonnage and value consist of crude petroleum, natural gas, or gasoline. Coal represents less than 1 percent of this bundle by weight and by value.

LOGISTICS SUMMARY

The graphic to the right represents the supply chain for the energy commodity bundle from initial extraction of raw product through the refining and processing phase to the delivery of finished goods to consumers and wholesalers.

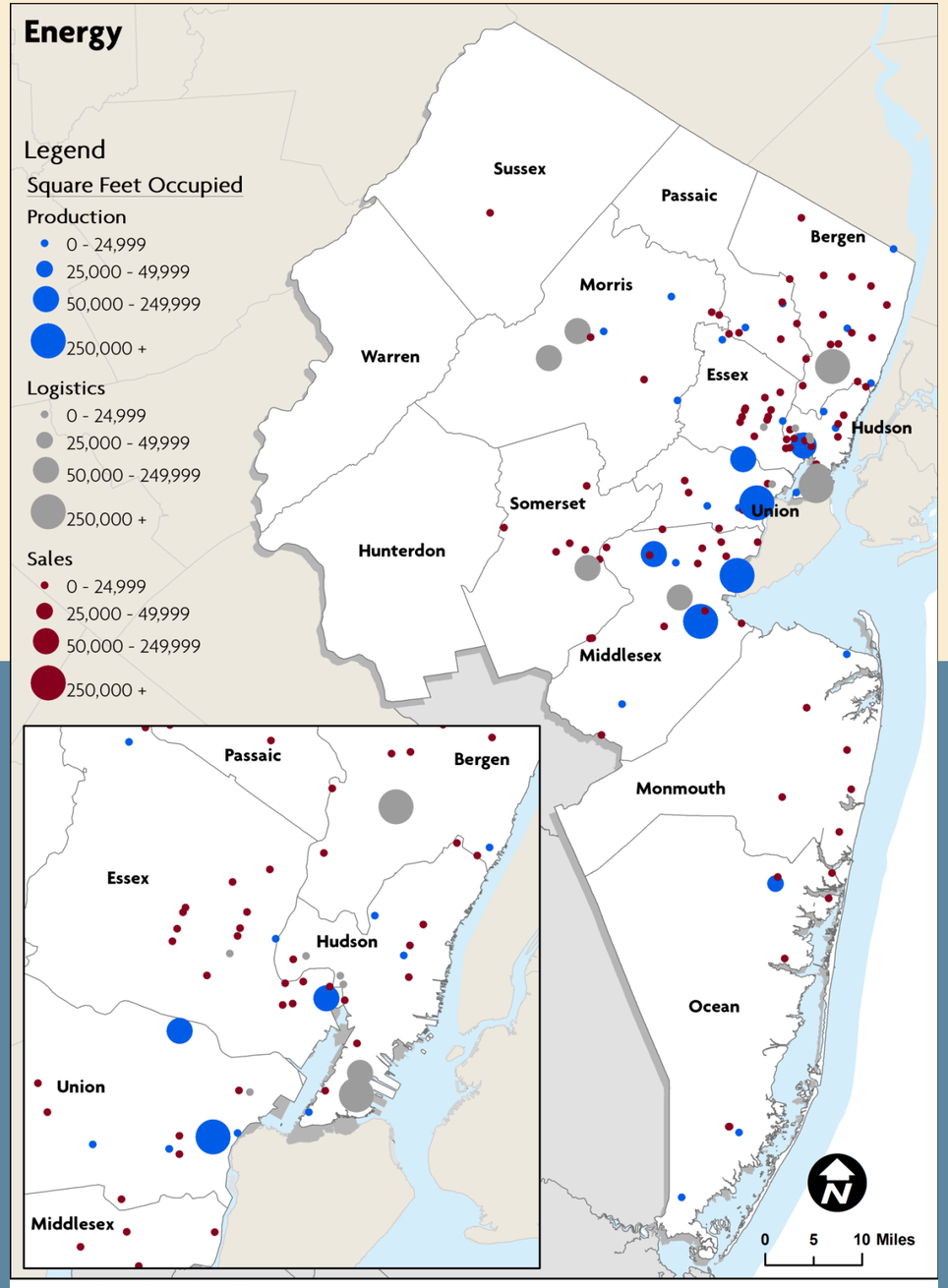
This supply chain consists of six steps:

1. Raw material is extracted from international and domestic sources.
2. International goods are transported by ocean oil tankers to U.S. Ports-of-Entry where they are inspected by U.S. Customs and transloaded to pipelines, rail tank cars, or barges. Domestically produced goods are transported by pipeline, rail tank car, and barge.
3. Raw material is refined into finished product in manufacturing and processing facilities.
4. Finished products are shipped by truck oil tanker, water, or pipeline.
5. Shipments are then distributed via one of the following three routes:
    A. Through a marine terminal for international export.
    B. To a domestic wholesaler
    C. By truck directly from the refining facility to domestic retailers, institutions, or direct-to-consumer.
6. Shipments are delivered to international and domestic customers, according to the customers' specifications.



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 2-5 in the Logistics Summary on Pages 2-3.
"Sales" includes Retail, Health Care, and Professional Services, corresponding to Step 6 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 5 on the logistics summary chart.
- Sales, represented in Step 6 on the logistics summary chart, including retail, services, and institutional establishments where goods are sold. Gasoline stations throughout the region are not shown.

The largest production and logistics facilities are located in eastern Union and northeastern Middlesex counties, along the shores of Arthur Kill.

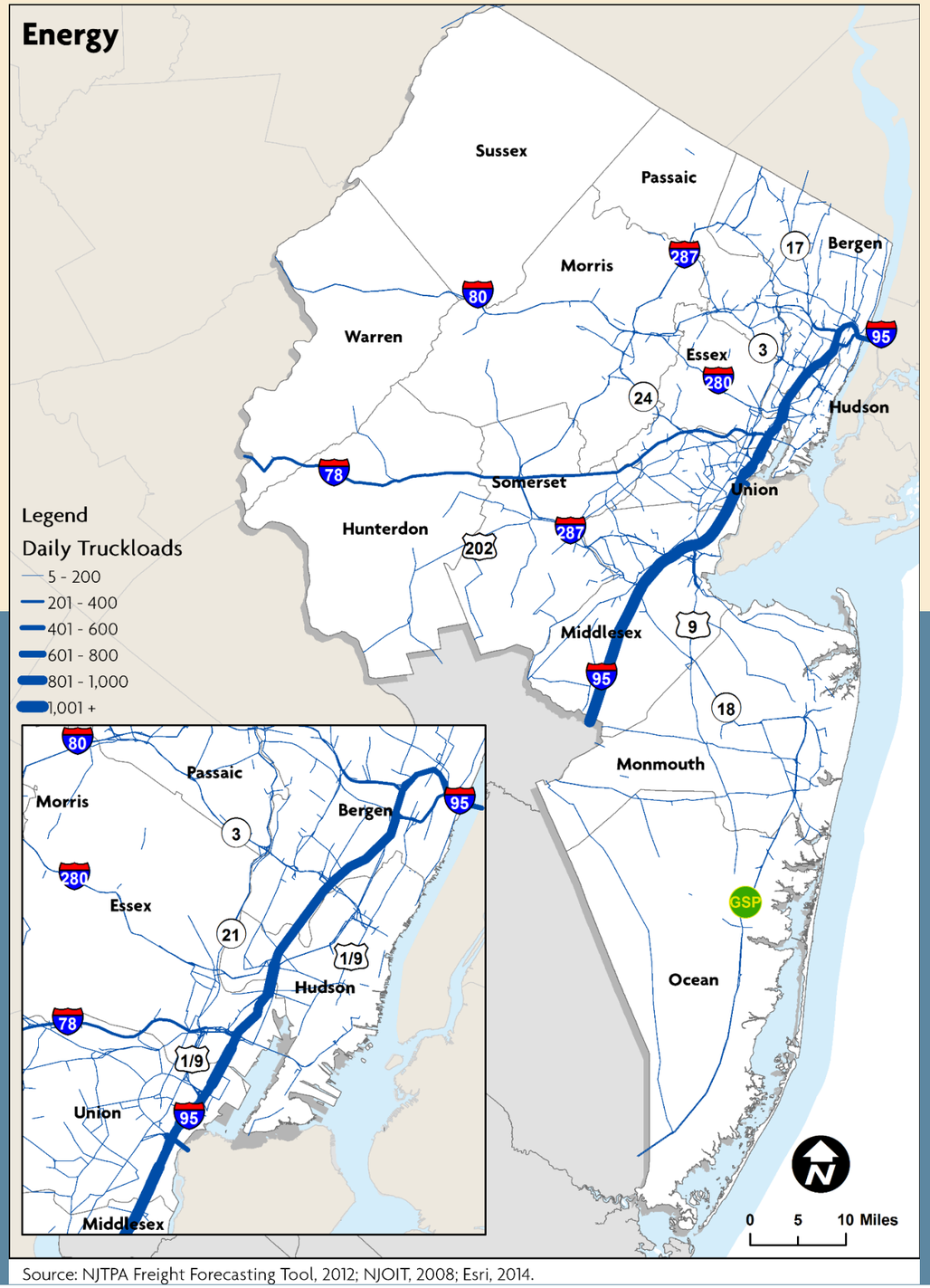
KEY INDUSTRY TRENDS

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

- Petroleum supply is growing with vastly increased domestic production and steady-to-growing international production.
- Growth in demand is slowing worldwide.
- Alternative energy sources such as wind and solar power will continue to expand, reducing the U.S. reliance on fossil fuels for energy, however, natural gas production is rapidly expanding.
- Shipments of crude oil by rail are increasing in the NJTPA region.

An Oil Refining Facility in Middlesex County

Highway Network Utilization, 2010



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

HIGHWAY NETWORK FLOWS OF ENERGY COMMODITIES

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.

The NJ Turnpike/Interstate 95 between the border of Middlesex and Mercer counties and Exit 14 in Essex County carries the greatest volume of energy products in the region. More than 1,000 truckloads of energy products move on this highway daily. Portions of the NJ Turnpike north of Exit 14 carry between 800 and 1,000 truckloads per day. Portions of Interstate 78 between the NJ Turnpike and the Pennsylvania border, Interstate 80 in Bergen County, and Route 9 in Middlesex County carry 200-400 truckloads of energy products every day.

COMMODITY FLOW SUMMARY

Collectively, 112 million tons of goods in this bundle, worth $46 billion, moved into, out of, through, or within the NJTPA region in 2010. By 2040, nearly 153 million tons worth more than $65 billion will move in the region. These projections represent 36 percent growth by tons and 40 percent growth by value.

This bundle represented 16.9 percent of the goods moved in the region by weight and 2.5 percent by value in 2010. By 2040, these shares are expected to change slightly, as the bundle will represent 16.5 percent of all goods by weight and 2.4 percent by value.

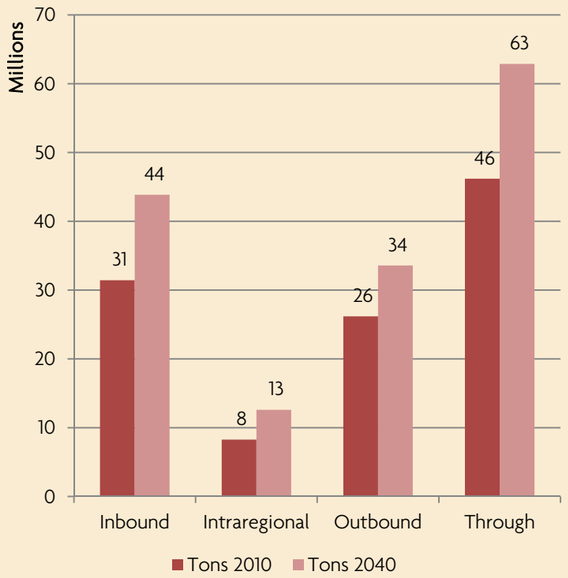
As the table below shows, the top five commodities in this bundle are: petroleum refining products, crude petroleum, asphalt paving blocks or mix, liquefied gases, and miscellaneous coal or petroleum products. Together they represent 96 percent of all of the energy commodities moved into, out of, or within the NJTPA region by weight.

Commodities in the Energy Commodity Bundle

STCC4	Commodity	Tons (thousands)	Value (millions)	STCC4	Commodity	Tons (thousands)	Value (millions)
2911	Petroleum Refining Products	41,558	N/A	1321	Natural Gasoline	188	N/A
1311	Crude Petroleum	8,101	N/A	2990	Misc Coal or Petroleum Products	3	$17,580
2951	Asphalt Paving Blocks or Mix	7,139	<$1	1320	Natural Gasoline	<1	$324
2912	Liquefied Gases, Coal or Petroleum	4,449	$151	2950	Paving or Roofing Materials	<1	<$1
2991	Misc Coal or Petroleum Products	2,321	$3,235	1120	Bituminous Coal or Lignite	<1	$512
2952	Asphalt Coatings or Felt	1,330	$85	1110	Anthracite	<1	$1
1310	Crude Petrol. or Natural Gas	433	$3,666	1111	Anthracite	<1	$1,143
2910	Prod Of Petroleum Refining	355	$153				

Source: NJTPA Freight Forecasting Tool, 2012
Note: "STCC4" represents the four-digit Standard Transportation Commodity Code (STCC)
Note: "N/A" indicates missing or unknown value.

Domestic Tons by Direction, 2010 and 2040



About 46 million tons of energy commodities (41 percent of all tons in this bundle) passed through the NJTPA region . About 31 million tons (28 percent) are moving inbound, 26 million tons (23 percent) are moving outbound, and 8 million tons (8 percent) are moving intraregionally.

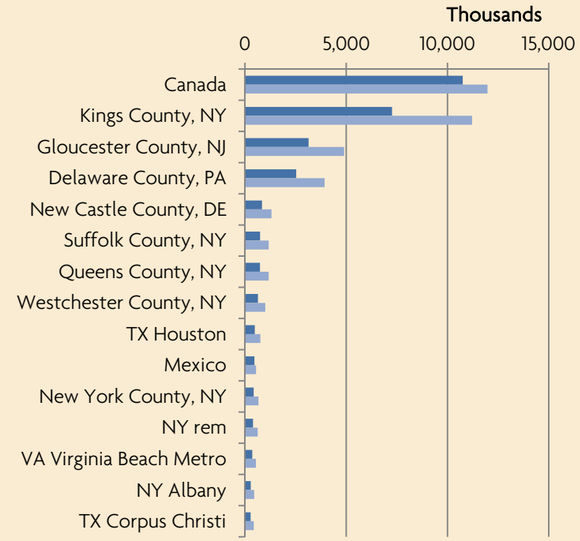
About 94 percent of the goods in this bundle imported to the NJTPA region originate in one of the locations shown in the graph to the right. Nearly 11 million tons originated in Canada. Among the top origins, flows from the remainder of New York State are expected to grow fastest (58 percent) and flows from Canada are expected to grow slowest (11 percent) by 2040.

The locations shown in the far-right graph are the destinations of 73 percent of the goods in this commodity bundle that leave the NJTPA region. The Albany region of NY is the top destination for outbound energy products. Flows to the remainder of New York State are expected to grow fastest (46 percent) and flows to the Maryland suburbs of Washington are expected to grow slowest (7 percent).

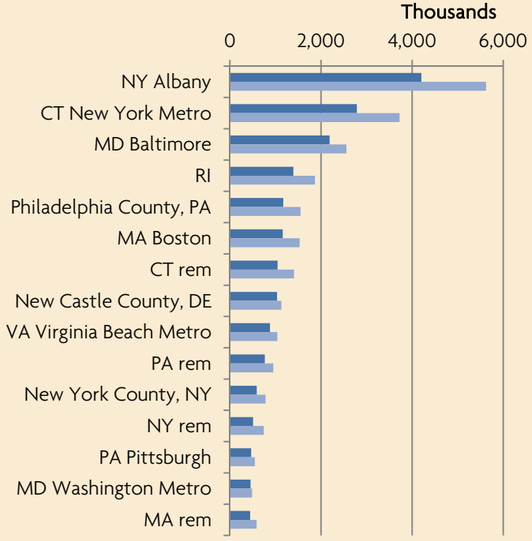
Source: NJTPA Freight Forecasting Tool, 2012

More than Half of the Energy Commodities Move by Water (Left). Most of the Rest Moves by Truck (Right)

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



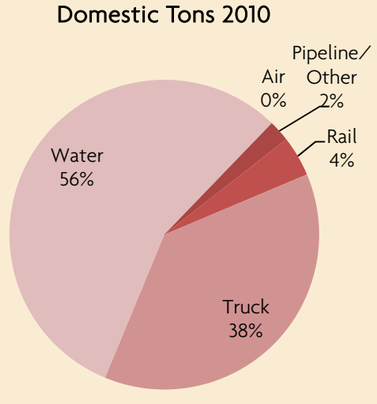
Source: NJTPA Freight Forecasting Tool, 2012
Note: "rem" stands for "remainder," which refers to the portions of a state outside major metropolitan regions.

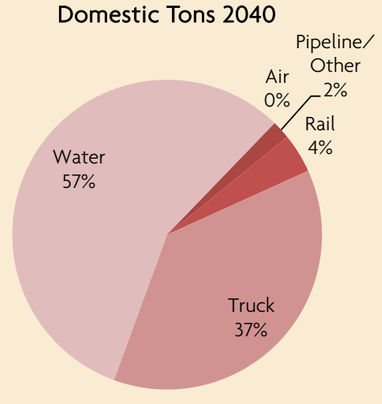


Source: NJTPA Freight Forecasting Tool, 2012
Note: "rem" stands for "remainder," which refers to the portions of a state outside major metropolitan regions.

Mode Splits, 2010 and 2040

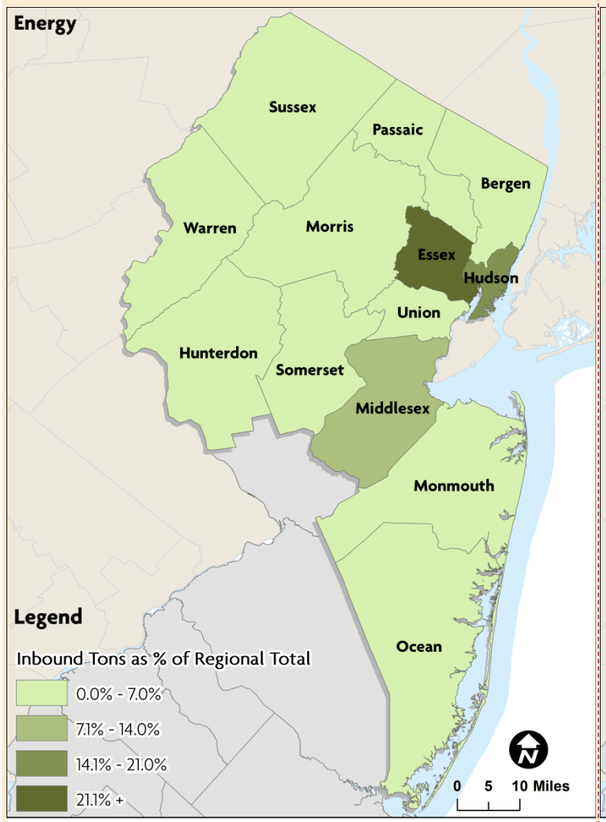
In 2010, about 56 percent of the energy commodities moving in the NJTPA region traveled by domestic water. Trucks moved about 38 percent of goods. About 4 percent traveled by rail, and 2 percent by pipeline or other modes. Close to zero percent of energy commodities were transported by domestic air. By 2040, the mode split is expected to remain similar.





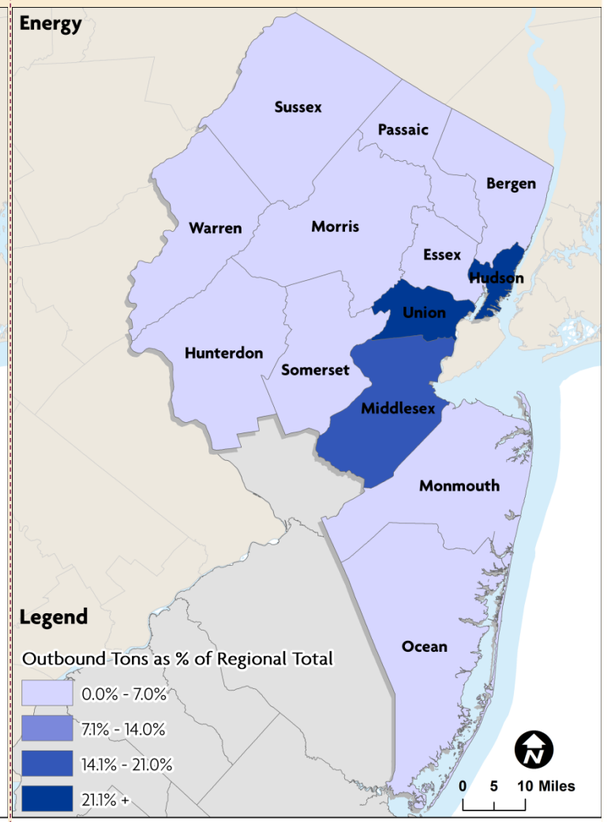
Source: NJTPA Freight Forecasting Tool, 2012

Inbound Domestic Tons by County, 2010



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

Outbound Domestic Tons by County, 2010



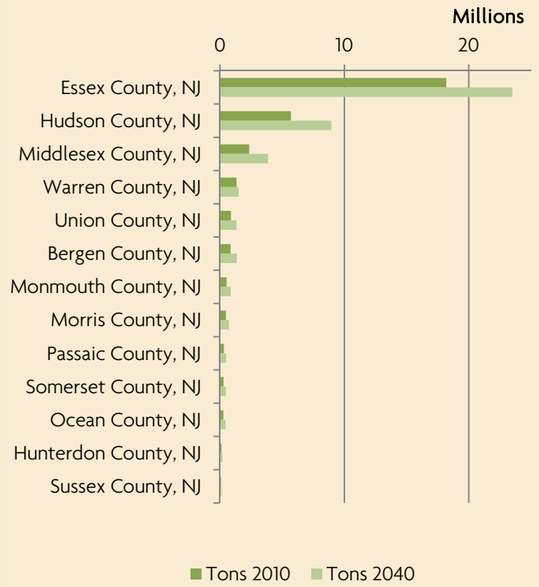
Source: NJTPA Freight Forecasting Tool, 2012; NJOIT, 2008; Esri, 2014.

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 58 percent of inbound goods in the energy commodity bundle are destined for Essex County alone. Hudson, Middlesex and Warren counties are also among the top destinations in the region. Projected growth rates in inbound energy commodities tonnage between 2010 and 2040 range from 29 percent (Essex County) to 65 percent (Middlesex County).

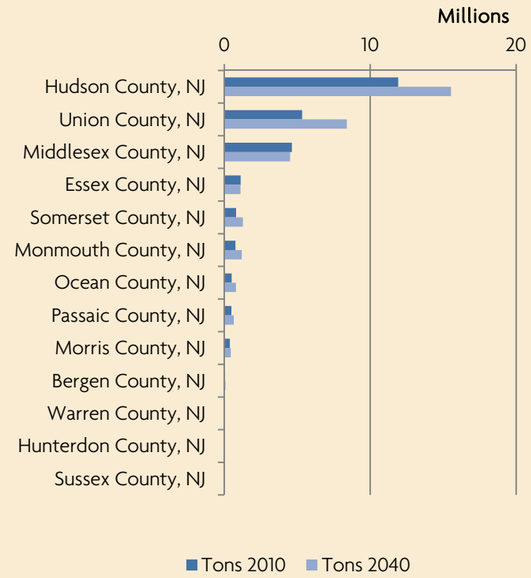
About 46 percent of all goods in the energy commodity bundle traveling outbound from the NJTPA region originate in Hudson County. Hudson, Union and Middlesex together produce 84 percent of all outbound tonnage. Projected growth rates in outbound tonnage between 2010 and 2040 range from -5 percent (Hunterdon, and Sussex counties) to 62 percent (Ocean County).

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 energy commodity flows and logistics in the North Jersey region and elsewhere, consult the following sources:

- United States Energy Association, www.usea.org
- United States Energy Information Administration, www.eia.gov
- American Petroleum Institute, www.api.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 6.6 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 energy commodities 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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