

## REGIONAL FREIGHT COMMODITY PROFILE

# *Machinery, Electronics, and Transportation Equipment*

### COMMODITY BUNDLE OVERVIEW

This commodity bundle consists of four specific commodity groups: machinery, such as engines or engine parts, farm machinery, and industrial machinery; electronics, such as household appliances, lighting and fixtures, and power supply; transportation equipment, including automobiles, aircraft, and rail equipment; and instruments, including laboratory equipment, photographic equipment, watches, and clocks.

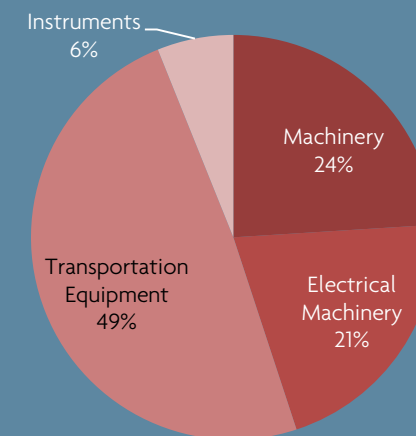
The primary data source for commodity flows reported in this profile is NJTPA's Freight Forecasting Tool, which generates commodity freight data and forecasts for a 2010 base year and 2040 forecast year. This profile describes freight flows between domestic origins and destinations.

- 22 million tons in 2010, increasing 39% to 31 million tons in 2040.
- Represents 3.3% of the goods moved in the region by weight and 16.7% by value.
- 1,649 business establishments employing 31,252 send or receive goods in this commodity bundle.
- Nearly 30 million square feet of warehousing/distribution center space dedicated to this commodity bundle.
- 92% moves by truck, 8% by rail, and less than 1% moves by other modes

Highlights

## Composition

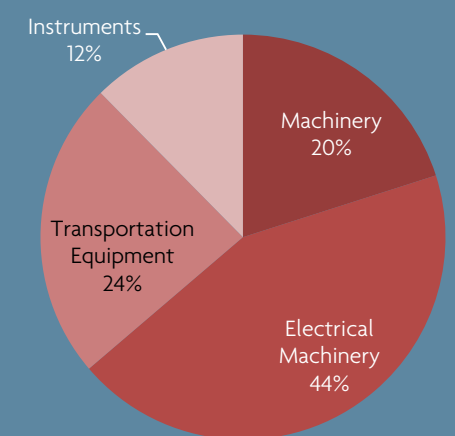
### Domestic Tons in 2010



Total Tons: 22 million

Source: NJTPA Freight Forecasting Tool, 2012

### Domestic Value in 2010



Total Value: \$306 billion

Source: NJTPA Freight Forecasting Tool, 2012

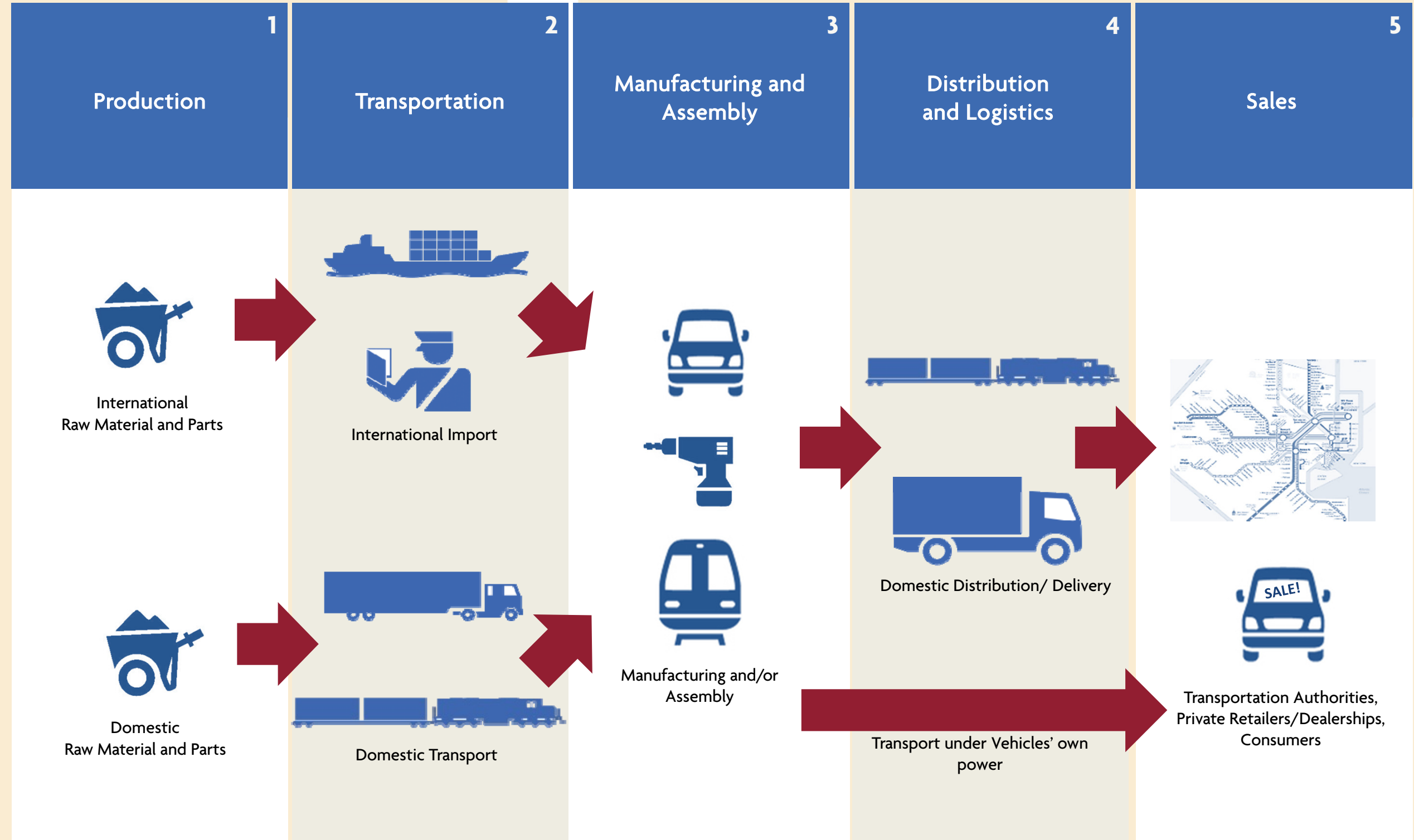
Transportation equipment represents nearly one-half of the goods in this bundle by weight, but less than one-quarter by value. Electrical machinery and instruments represent greater shares of this bundle by value (44 percent and 12 percent, respectively) than by weight (21 percent and 6 percent, respectively)

## LOGISTICS SUMMARY

The graphic to the right represents the supply chain for the machinery and transportation equipment commodity bundle from initial sourcing of raw material and parts through final delivery to customers.

This supply chain consists of five steps:

1. International and domestic parts and raw material are produced.
2. International goods are transported by ocean vessel to U.S. Ports-of-Entry where they are inspected by U.S. Customs and transloaded to trucks. Domestically produced material and parts are transported by truck and rail intermodal.
3. Factories manufacture or assemble finished products.
4. Finished goods are distributed to customers by truck or rail, or are moved under the vehicles' own power to their final destination.
5. Shipments are delivered to customers, including consumers and transportation authorities, according to customers' specification.



## Business Square Footage by Industry Type

### Machinery, Electronics, and Transportation Equipment

#### Legend

##### Square Feet Occupied

##### Production

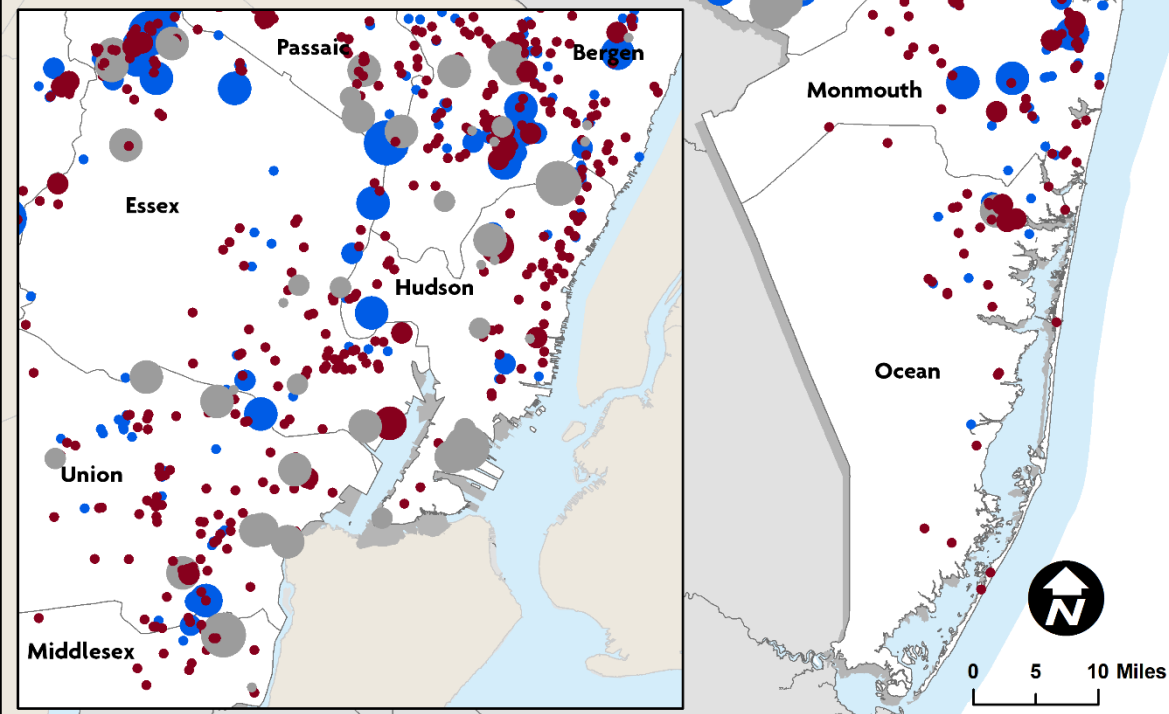
- 0 - 24,999
- 25,000 - 49,999
- 50,000 - 249,999
- 250,000 +

##### 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: 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 2-4 in the Logistics Summary on Pages 2-3.

"Sales" includes Retail, Health Care, and Professional Services, corresponding to Step 5 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 4 on the logistics summary chart.
- Sales, represented in Step 5 on the logistics summary chart, including retail, services, and institutional establishments where goods are sold.

Clusters of large production and logistics facilities and smaller sales facilities are located in southern Bergen and Passaic counties, Hudson, eastern Essex and Union counties, northern Middlesex County, and in the vicinity of NJ Turnpike Exit 8A in southern Middlesex County.

## KEY INDUSTRY TRENDS

The following trends are shaping demand for machinery, electronics, and transportation equipment today, and projected demand in the future:

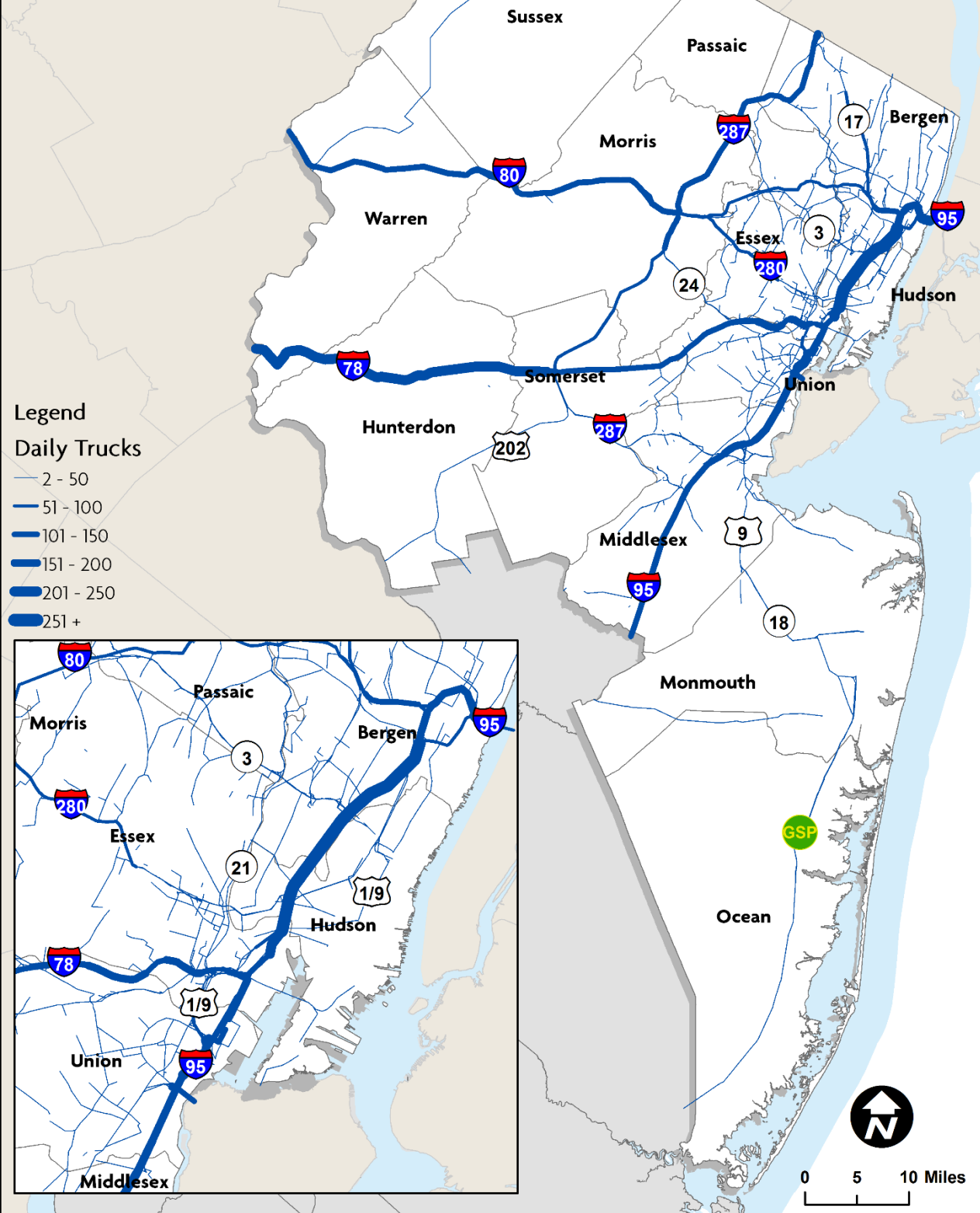
- Rising costs of doing business and ensuring quality control in Asia are leading to "reshoring" of some electronics and machinery manufacturing.
- Growing middle class population worldwide is driving projected growth in global demand for automobiles manufactured overseas and in the U.S.
- Rail tank car production associated with expected U.S. DOT regulations should increase. Stricter standards will require companies to retrofit existing tank cars or order new tank cars.
- Anticipated growth in urban transit ridership and air travel will require the production of other transportation equipment.

Commodities in this bundle include household appliances, machinery, and transportation equipment such as automobiles and railroad equipment.



## Highway Network Utilization, 2010

### Machinery, Electronics, and Transportation Equipment



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

## HIGHWAY NETWORK FLOWS OF MACHINERY, ELECTRONICS, AND TRANSPORTATION EQUIPMENT

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 14 in Essex County and Exit 18 in Bergen County and Interstate 78 west of Interstate 287 carry more than 250 daily truckloads of goods in this bundle. The George Washington Bridge, the NJ Turnpike between Exit 13 in Union County and Exit 14, and Interstate 78 in Essex County carry 200-250 truckloads daily. Portions of the NJ Turnpike south of Exit 13, Interstate 78 between Route 24 in Union County and Interstate 287 in Somerset County, and Interstate 80 west of Interstate 287, accommodate 150-200 truckloads of machinery, electronics, and transportation equipment daily.

## COMMODITY FLOW SUMMARY

Collectively, 22 million tons of goods in this bundle, worth \$306 billion, moved into, out of, through, or within the NJTPA region in 2010. By 2040, 31 million tons worth more than \$430 billion will move in the region. These projections represent 39 percent growth by tons and 41 percent growth by value.

This bundle represented 3.3 percent of the goods moved in the region by weight and 16.7 percent by value in 2010. By 2040, this bundle is expected to maintain the same share by weight, but represent a slightly smaller share (15.9 percent) by value.

As the table below shows, the top five commodities in this bundle are motor vehicles or parts, construction machinery or equipment, electrical industrial equipment, industrial pumps, and surgical or medical instruments. Together they represent 63 percent of all of the goods in this bundle by weight.

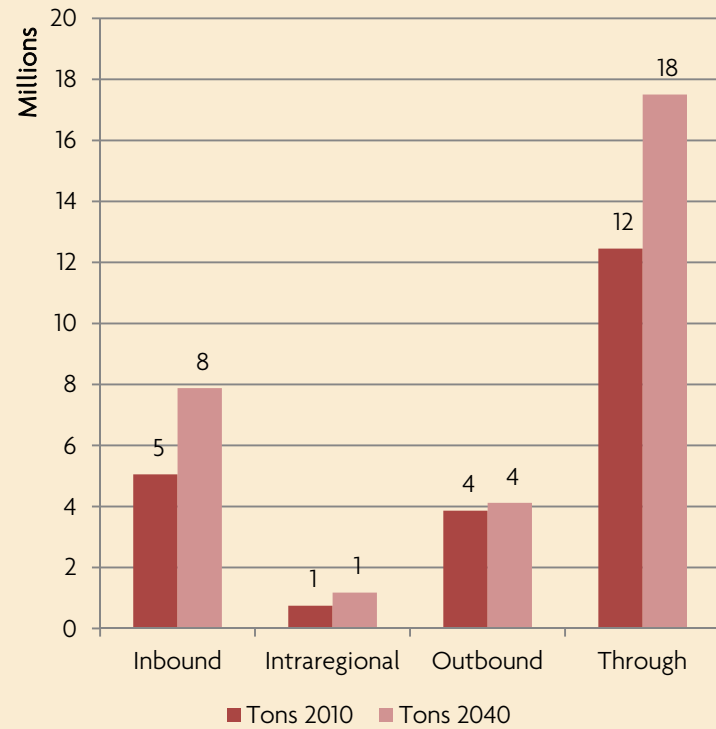
## Commodities in the Machinery, Electronics, and Transportation Equipment Commodity Bundle

STCC4 Commodity	Tons (thousands)	Value (millions)	STCC4 Commodity	Tons (thousands)	Value (millions)
3710 Motor Vehicles or Parts	4,2271	\$27,037	3650 Radio or TV Equipment	120	\$2,050
3530 Construction Machinery or Equipment	517	\$3,871	3610 Electrical Transformers or Switchgear	112	\$3,499
3620 Electrical Industrial Equipment	455	\$11,039	3520 Farm Machinery or Equipment	111	\$827
3560 Industrial Pumps	454	\$6,117	3660 Telephone or Transmitting Equipment	102	\$5,593
3840 Surgical or Medical Instruments	432	\$7,735	3590 Misc Machinery or Parts	85	\$496
3550 Manufacturing Machinery	392	\$5,038	3860 Photographic Equipment or Supplies	80	\$2,863
3640 Lighting and Fixtures	341	\$10,337	3720 Aircraft or Aircraft Parts	79	\$2,872
3630 Household Appliances	336	\$3,242	3730 Ships or Boats or Parts	45	\$750
3670 Electronic Components	308	\$19,766	3820 Mechanical Measuring or Control Equipment	35	\$3,859
3580 Service Industry Machinery	281	\$1,993	3810 Engineering, Lab, or Scientific Equipment	18	\$323
3690 Misc Electrical Equipment	249	\$4,097	3750 Motorcycles, Bicycles, or Parts	10	\$202
3790 Misc Transportation Equipment	218	\$776	3870 Watches, Clocks, Etc.	10	\$1,159
3510 Internal Combustion Engines	171	\$1,938	3760 Missile or Space Vehicles or Parts	9	\$377
3570 Office Machinery	168	\$4,250	3850 Ophthalmic or Opticians Goods	8	\$407
3740 Railroad Locomotives, Cars, or Parts	143	\$548	3830 Optical Instruments or Lenses	5	\$580
3540 Metal-working Machinery	140	\$2,874			

Source: NJTPA Freight Forecasting Tool, 2012

Note: "STCC4" represents the four-digit Standard Transportation Commodity Code (STCC)

## Domestic Tons by Direction, 2010 and 2040



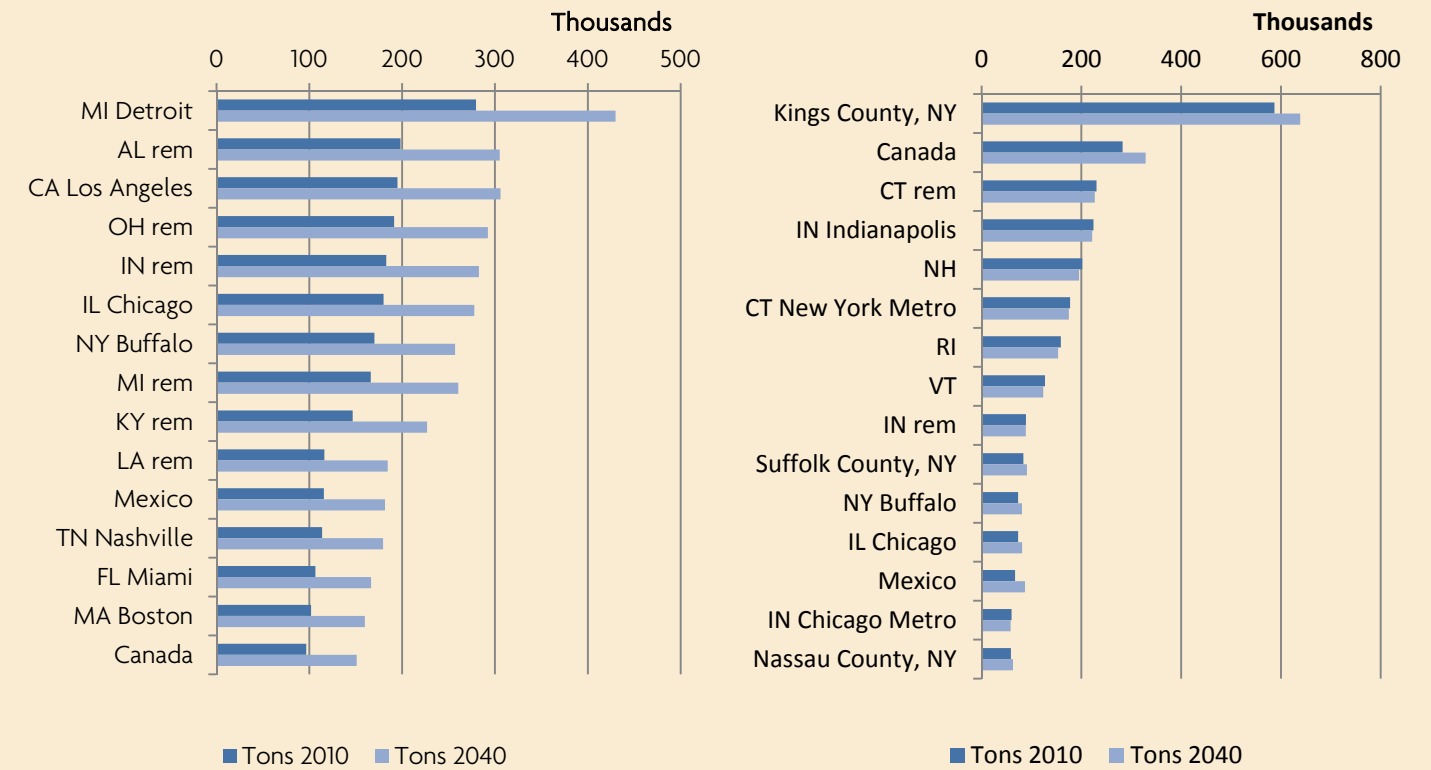
About 12 million tons (56 percent of all tons in this bundle) passed through the NJTPA region. About 5 million tons (23 percent) are moving inbound, 1 million tons (18 percent) are moving outbound, and 1 million tons (3 percent) are moving intraregionally.

About 47 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. Close to 300,000 tons originated in the Detroit region of Michigan. Among the top origins, flows from Louisiana remainder are expected to grow fastest (59 percent) and flows from the Buffalo, NY region are expected to grow slowest (51 percent) through 2040.

The locations shown in the far-right graph are the destinations of 65 percent of the goods in this commodity bundle that leave the NJTPA region. Kings County, NY (Brooklyn), Canada, portions of Connecticut outside the New York City metropolitan region, and the Indianapolis region of Indiana are among the top destinations. By 2040, flows to Mexico are expected to grow fastest (30 percent), while flows to Rhode Island, northwestern Indiana, and New Hampshire are expected to decline by 3 percent.

Source: NJTPA Freight Forecasting Tool, 2012

## 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.

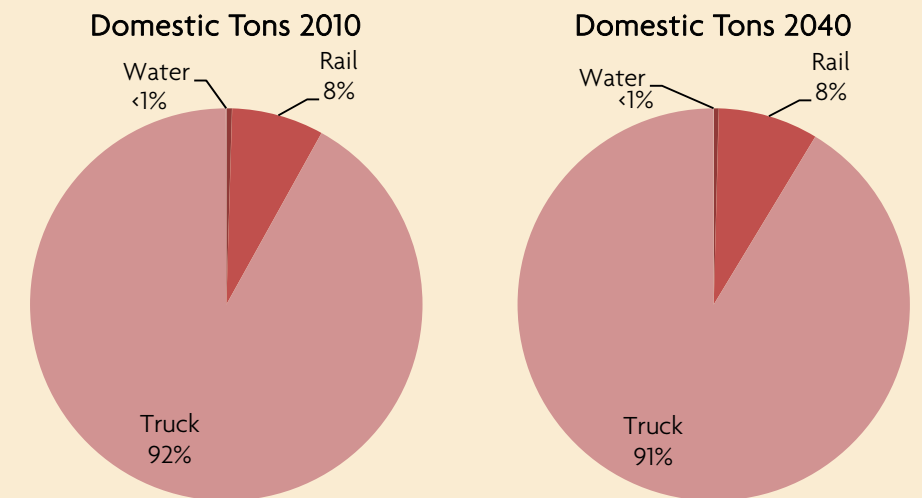
Source: NJTPA Freight Forecasting Tool, 2012  
Note: "rem" stands for "remainder," which refers to the portions of a state outside major metropolitan regions.

## Automobiles prepared for export



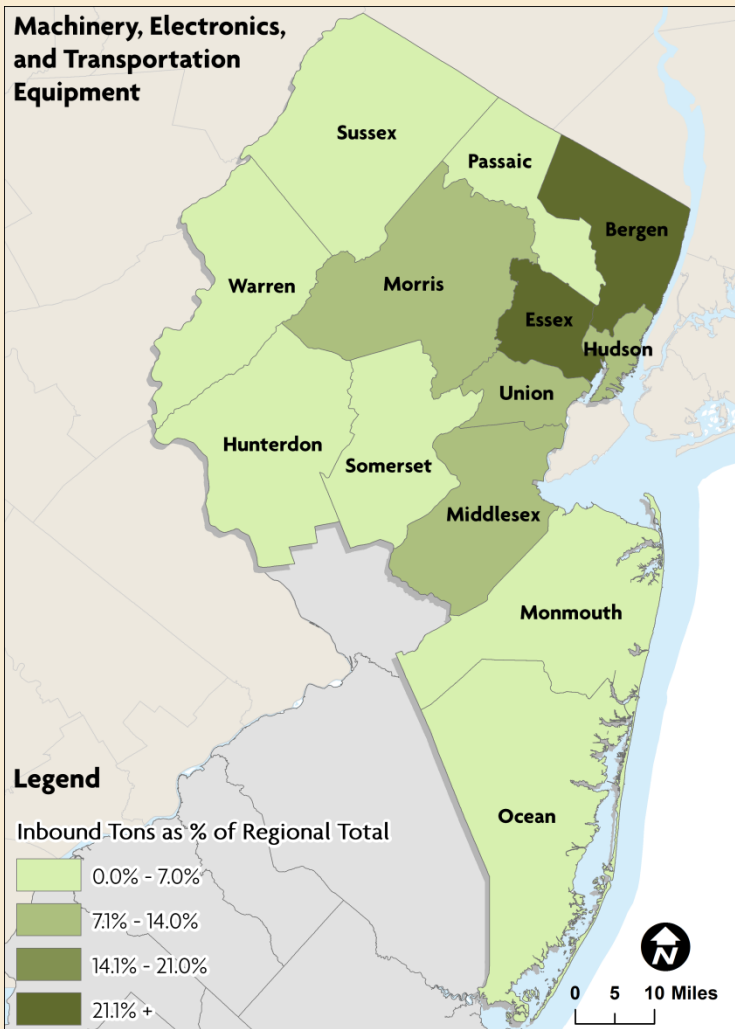
## Mode Splits, 2010 and 2040

In 2010, about 92 percent of the machinery, electronics, and transportation equipment commodities moving in the NJTPA region traveled by truck. Rail carried about 8 percent, and less than 1 percent moved by water. By 2040, the share of tons moving by each mode is expected to remain similar.



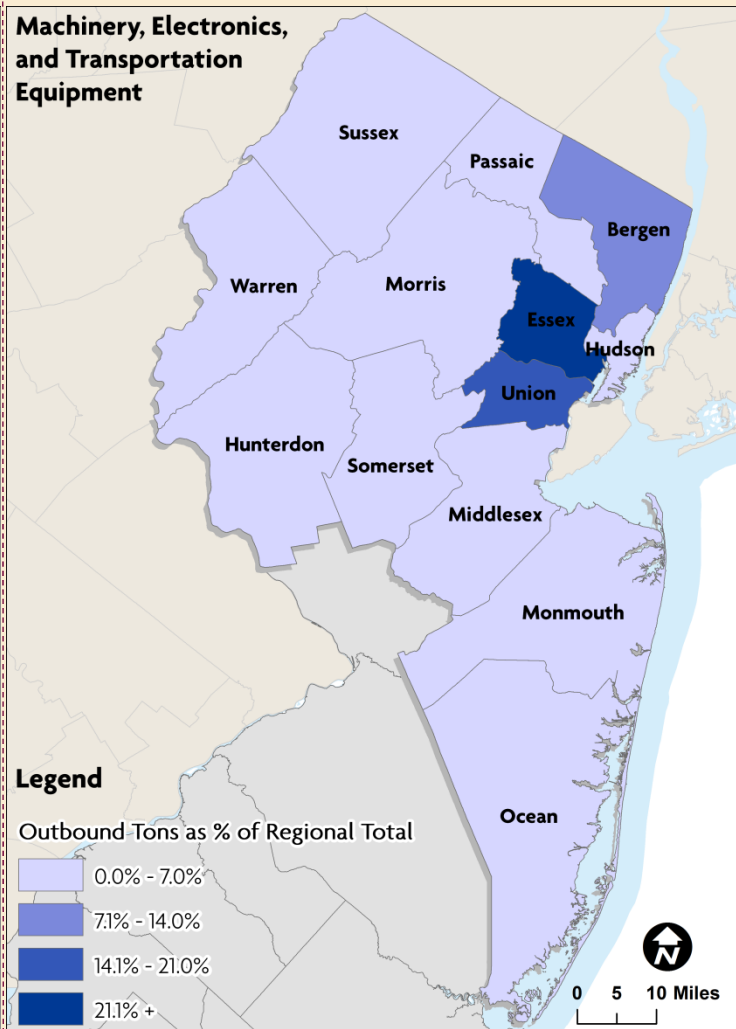
Source: NJTPA Freight Forecasting Tool, 2012

### Inbound Domestic Tons by County, 2010



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

### Outbound Domestic Tons by County, 2010



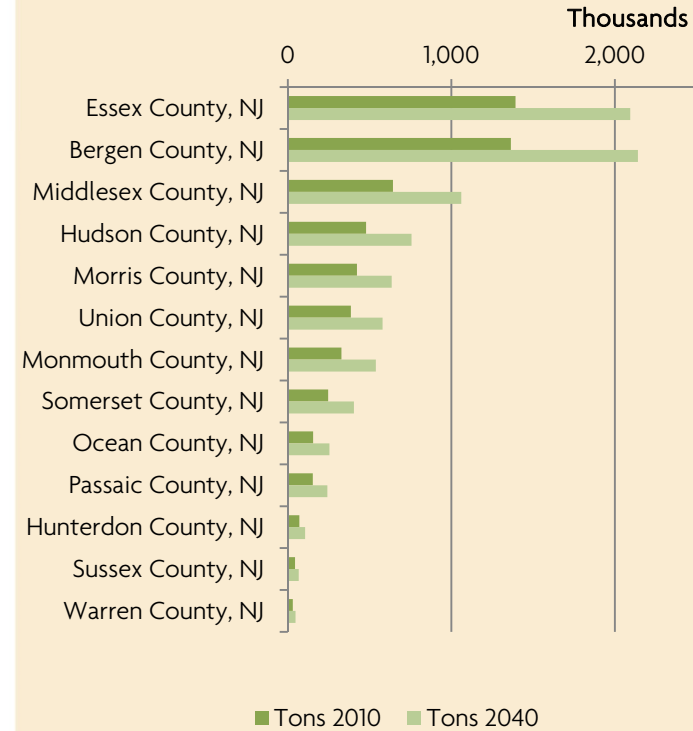
Source: NJTPA Freight Forecasting Tool, 2012; NJOIT, 2008; Esri, 2014.

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 48 percent of all machinery, electronics, and transportation equipment commodities traveling into the NJTPA region terminate in Essex or Bergen counties. Projected growth rates in inbound machinery, electronics, and transportation equipment tonnage between 2010 and 2040 range from 50 percent (Essex, Morris, Union, Hunterdon, and Sussex counties) to 65 percent (Middlesex County). Bergen County is expected to surpass Essex as the top destination county by 2040.

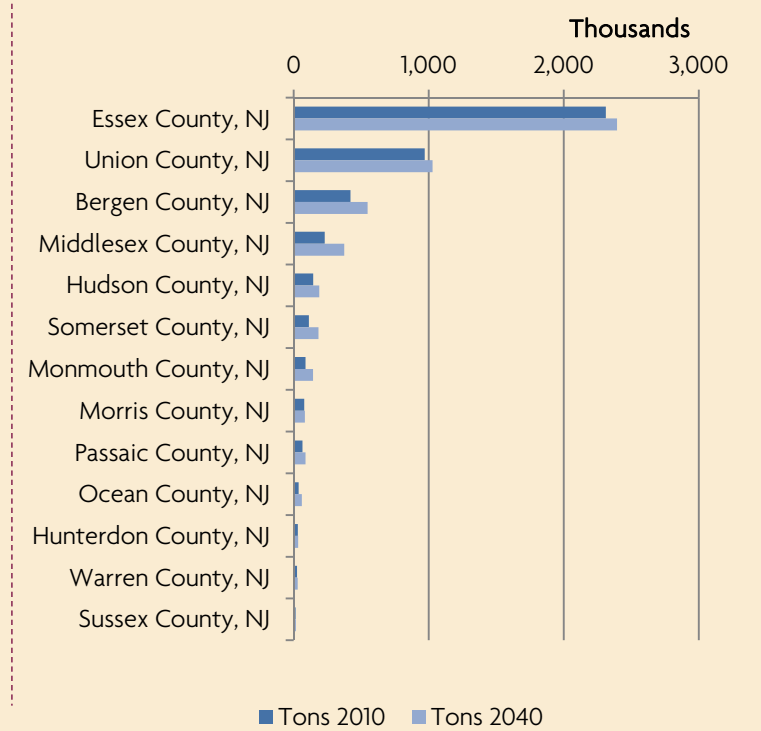
About 51 percent of all goods in this bundle that are shipped outbound originate in Essex County. An additional 36 percent of outbound shipments originate in Union, Bergen, or Middlesex counties. Projected growth rates in outbound tonnage between 2010 and 2040 range from -5 percent (Essex, Union, Morris, Hunterdon, and Sussex counties) to 64 percent (Middlesex, Somerset, Monmouth, and Ocean 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 machinery, electronics, and transportation equipment commodity flows and logistics in the North Jersey region and elsewhere, consult the following sources:

- New Jersey Motor Truck Association, [www.njmta.wildapricot.org](http://www.njmta.wildapricot.org)
- Association of Equipment Manufacturers, [www.aem.org](http://www.aem.org)
- Alliance of Automobile Manufacturers, [www.autoalliance.org](http://www.autoalliance.org)
- Bureau of Labor Statistics, U.S. Department of Labor, [www.bls.gov](http://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 machinery, electronics, and transportation equipment 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](mailto: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.