

## 4. Economic Context of Freight Transportation in Connecticut

### Highlights

Connecticut's \$251 Billion economy includes \$26.8 Billion attributed to freight-dependent manufacturing sectors. This is 10.7% of the state economy.

Across all business sectors, outbound freight transportation dependency represents \$58.7 Billion of the state economy while inbound freight transportation dependency represents \$57.5 Billion of Connecticut's economy.

The total value forecast for Connecticut freight increases from \$256 billion in 2013 to \$379 Billion by 2030.

The Aircraft Engine and Parts and the Aircraft manufacturing sectors are the top industry drivers of the 3.2% average annual compound growth in the Primary Manufacturing Sector forecasted from 2015 to 2042.

The Pharmaceutical Preparation Manufacturing industry leads the Secondary Manufacturing Sector in Connecticut, forecasted to more than triple in value of output to over \$27 Billion annually by 2042.

Refined Petroleum Products is the top commodity category shipped into the state, accounting for 14 percent of the total of all inbound shipments to the state.

Warehouse and Distribution Center freight traffic represents six percent of total inbound shipments into the state.

## Forecast Sources and Forecast Period

The data used to describe the economic context for freight transportation includes the IHS Transearch modal commodity flow database for the state of Connecticut. In addition, the TREDIS model was used to match commodity shipment activity from Transearch with industry sector-level production and consumption of goods. The combination of Transearch data used with TREDIS is called *TREDIS fueled by Transearch*<sup>1</sup>. This version of the TREDIS system is an industry economics-driven freight model that generates a time-series of future freight flows derived from the forecasted production and consumption patterns of industries as they change over time. The model can be used to analyze alternative forecast scenarios, or to analyze the impact of planned system improvements on future freight shipping needs. The model considers the production and consumption by industries within a region and estimates the level and pattern of future freight flows based on the projected growth in industry activity, such that the transportation system accommodates the level of expected growth. The default macroeconomic forecasts used as inputs to TREDIS are provided by commercial forecasters Moody's Analytics and include a 30 year forecast horizon.

## Industry Structure of the Connecticut Economy

The economy of Connecticut, like the United States as a whole, is dominated by the services sector, rather than goods producing sectors such as Manufacturing, Agriculture or Mining. At the end of 2015, the Connecticut Department of Labor reported that just 9.5% of state employment was engaged in manufacturing, while 90.4% of non-farm employment was in the service sector. Freight transportation serves all industries in the state, but Manufacturing remains the most directly dependent on freight transportation besides the Transportation Services sector itself. According to the U.S. Bureau of Economic Analysis, Connecticut's \$251 Billion in Gross State Product (2014) included \$26.8 Billion (10.7%) attributed to the freight-dependent manufacturing sectors. Within the past decade, the Great Recession of 2008-2009 resulted in a large downturn in the state's Manufacturing, Wholesale and Retail Trade and Warehousing and Distribution sectors. In Connecticut, the Wholesale and Retail Trade and Warehousing and Distribution sectors have recovered and now exceed pre-recession levels of output. The value of output in the Manufacturing sectors has struggled to recover, and is still below pre-Recession peaks. The state's Agriculture and Utility sectors experienced smaller impacts from the Great Recession, although they have since grown slowly.

The long-term forecasts are for continued recovery in Connecticut Manufacturing, with both Primary<sup>2</sup> Manufacturing and Secondary Manufacturing sectors growing the most of any sectors in the state. Wholesale and Retail Trade are also expected to see gains. Compared with Manufacturing, the size and growth of the Warehousing and Distribution, Agriculture and Extraction and Utilities sectors are forecasted to be much smaller for Connecticut. These slower growing sectors are in a more mature phase of development with limited in-state potential to grow as rapidly as new technically-oriented

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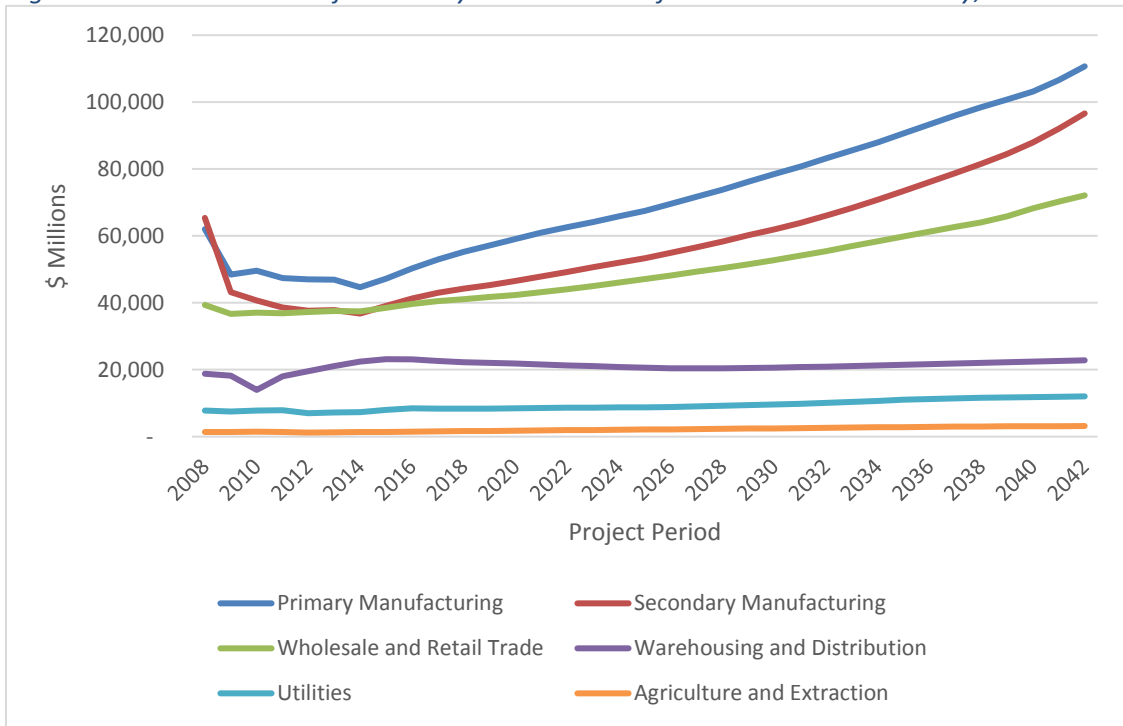
<sup>1</sup> TREDIS Fueled by Transearch is the formal product name of the combined TREDIS model system bundled with IHS Markit Transearch modal commodity freight flow data.

<sup>2</sup> Primary Manufacturing transforms raw materials into industrial materials. Secondary Manufacturing produces goods for final consumption from industrial materials and components.

manufacturing due to the competitive situation, the impact of regulations and availability of land compared with alternative suppliers out-of-state.

Comparisons in the relative value of industry sector output forecasted to 2042 in Figure 4.1 below show the long-term importance of Manufacturing and Wholesale and Retail Trade to Connecticut.

*Figure 4.1 Trends in the Major Industry Sector Shares of the Connecticut Economy, 2008 - 2042*

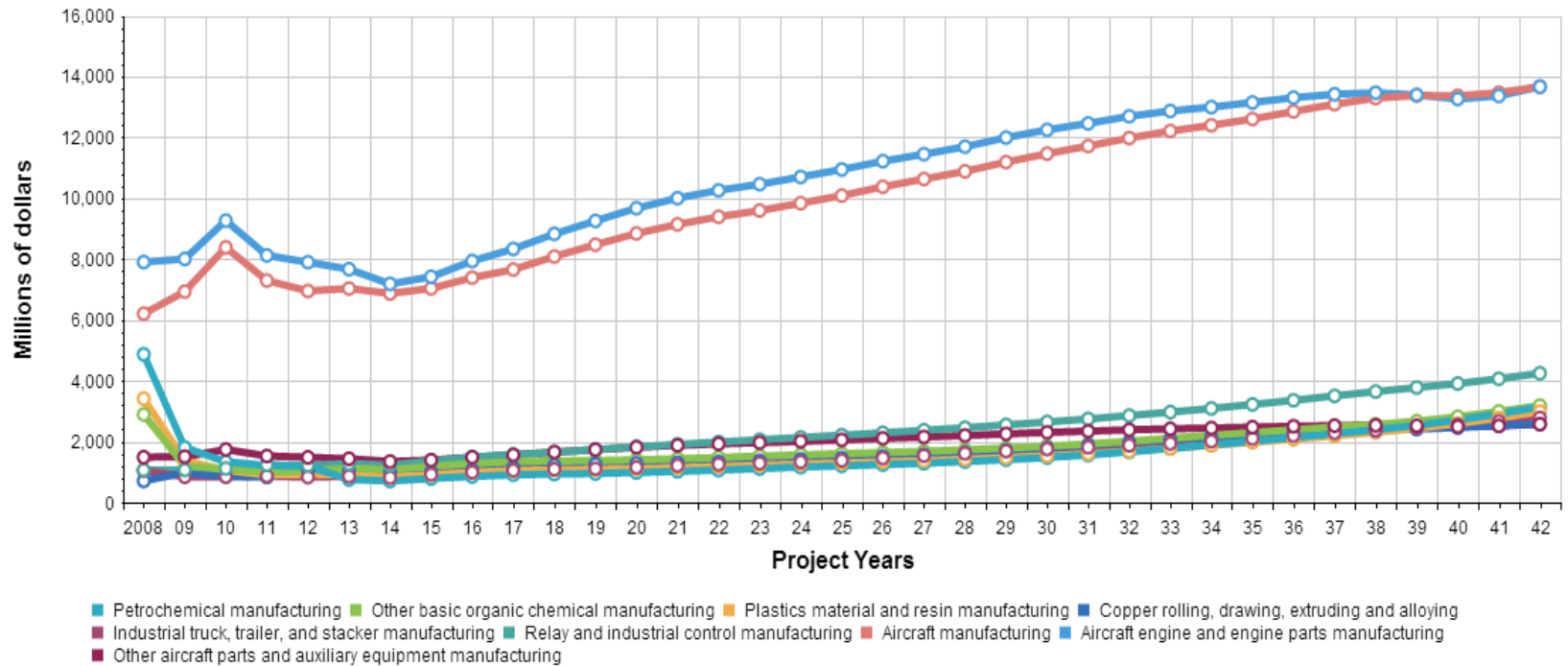


Source: EDR Group from TREDIS and Moody’s Analytics

### Industries Driving Sectoral Growth in the Connecticut Economy

The Primary Manufacturing industry sector within the Connecticut economy is being driven by the growth in the Aircraft Engine and Parts and the Aircraft manufacturing sectors. These two sectors are the top industry drivers of the 3.2% average annual compound growth in the Primary Manufacturing Sector forecasted from 2015 to 2042. In Figure 4.2 the composition of output of the top industries driving the Connecticut Primary Manufacturing sector shows the relative importance of the aircraft engine and aircraft manufacturing sectors to other sectors in the Connecticut economy.

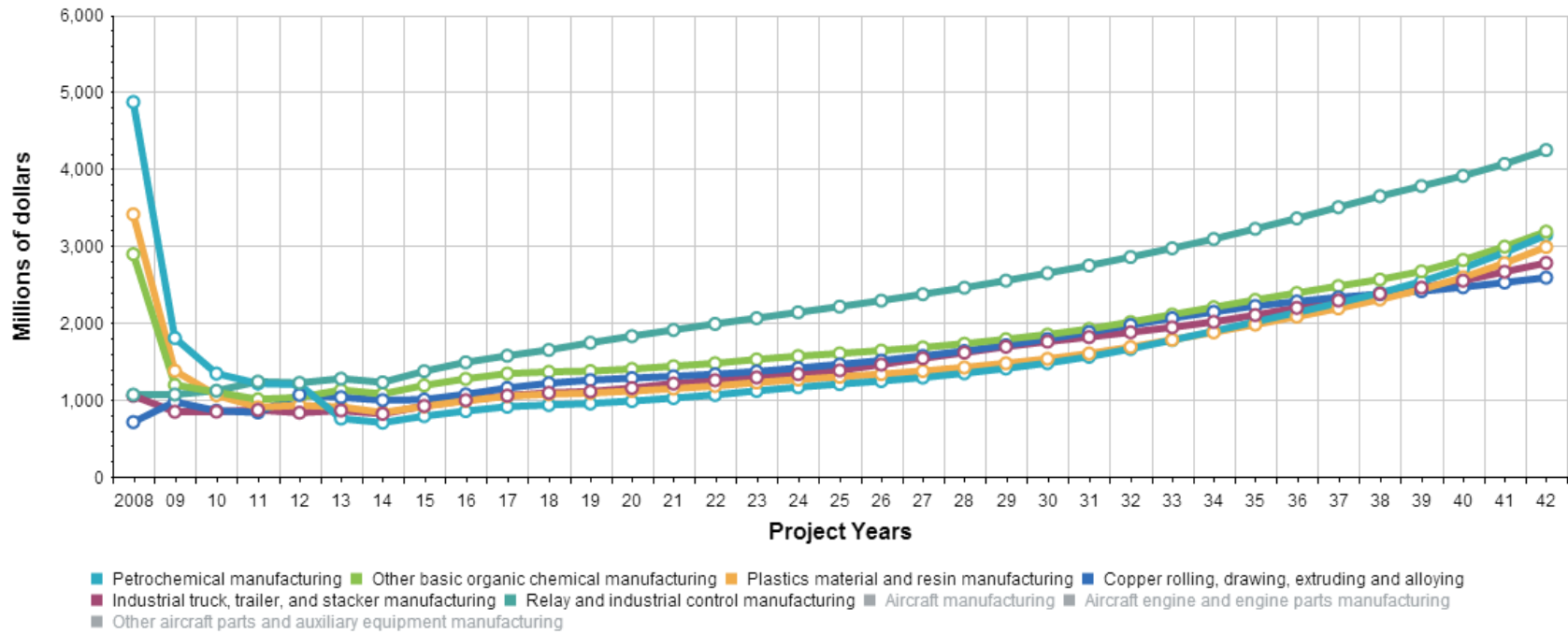
Figure 4.2 Composition of Output of Top Industries Driving the Connecticut Primary Manufacturing Sector, to 2042



Source: EDR Group

Apart from aircraft, aircraft engine and parts manufacturing, other top drivers of the Primary Manufacturing sector growth are Relays and Industrial Controls manufacturing and Other Basic Organic Chemical manufacturing. After the declines in these industry sectors observed in 2009 – 2010, the forecast for continued average annual compound growth from 2015 to 2042 of 4.3% and 3.7%, respectively, in these subsectors shows the key drivers of the forecast growth in Primary Manufacturing.

Figure 4.3 Top Industries, Other than Aircraft & Aircraft Engines Driving Connecticut’s Primary Manufacturing Sector, Value of Output to 2042



Source: EDR Group

The consumption and production forecasts for the Aircraft or Parts commodity category from 2013 to 2042 are shown in Figure 4.4. The average of the forecasts, as shown in Table 4.1, over the long-term for the consumption and production from 2013 to 2042 are 2.1% and 2.2% respectively. The average forecast growth rates are calculated over the period. The growth over the 2013 to 2042 period is separately shown for *domestic* and *international* shipment geographies. The Aircraft or Parts category is the top commodity produced/consumed by the major Primary Manufacturing industry sector. Domestic markets are the largest as both a source of the goods consumed and the destination for products produced in this sector through the forecast period. Growth in both the sourcing of goods consumed and products produced in this category is slightly higher for international business partners than domestic suppliers and customers, although off of a much smaller base. This is evidence of the growing importance for the state freight network in providing connectivity to U.S. international trade gateways, such as the Port of New York and New Jersey and JFK airport, and others, most of which are external to Connecticut.

Figure 4.4 Production and Consumption of Aircraft or Parts, \$ Million, 2013-2042

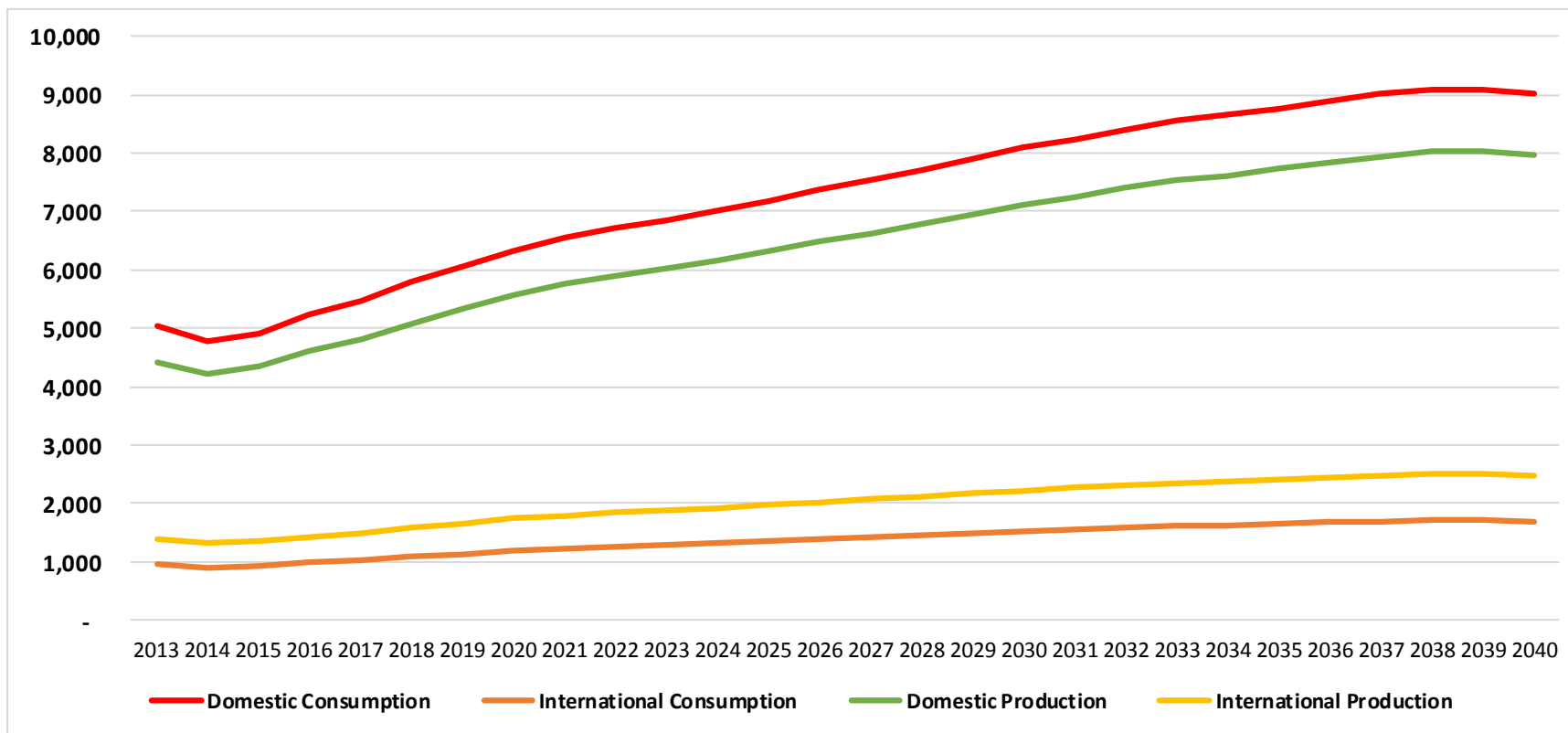


Table 4.1 Growth in Commodity Consumption & Production in Connecticut, Aircraft or Parts, 2013 to 2042

Growth in Commodity Production and Consumption: Aircraft or Parts (%)				
	Commodity Consumption		Commodity Production	
	Domestic	Foreign	Domestic	Foreign
Avg. Growth 2013-2042	2.1%	2.1%	2.2%	2.2%

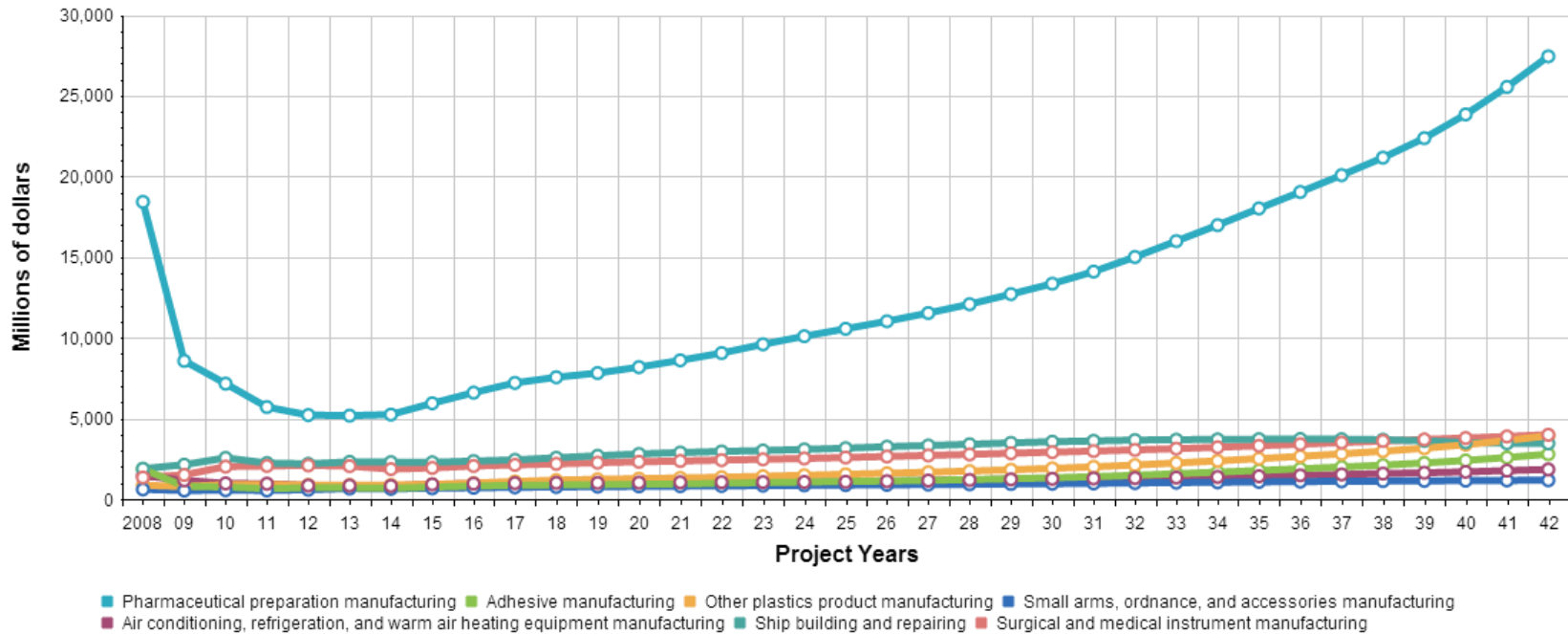
Source: EDR Group

*Secondary Manufacturing Sector of the Connecticut Economy*

The Secondary Manufacturing industry sector within the Connecticut economy is being driven by the growth observed and forecasted to continue in the Pharmaceutical Preparation Manufacturing industry. The Secondary Manufacturing in this case is production of finished pharmaceutical preparation products for consumption from industrial materials and components. As seen in Figure 4.5, though this industry saw a great decline in output following the Great Recession, and recovery has been subsequently modest, the longer-term projections are for steady modest growth that leads to record high output, as the value of production, by 2036 and further growth beyond. The other industry sectors driving growth in Secondary Manufacturing are projected to see growth off of a lower base.



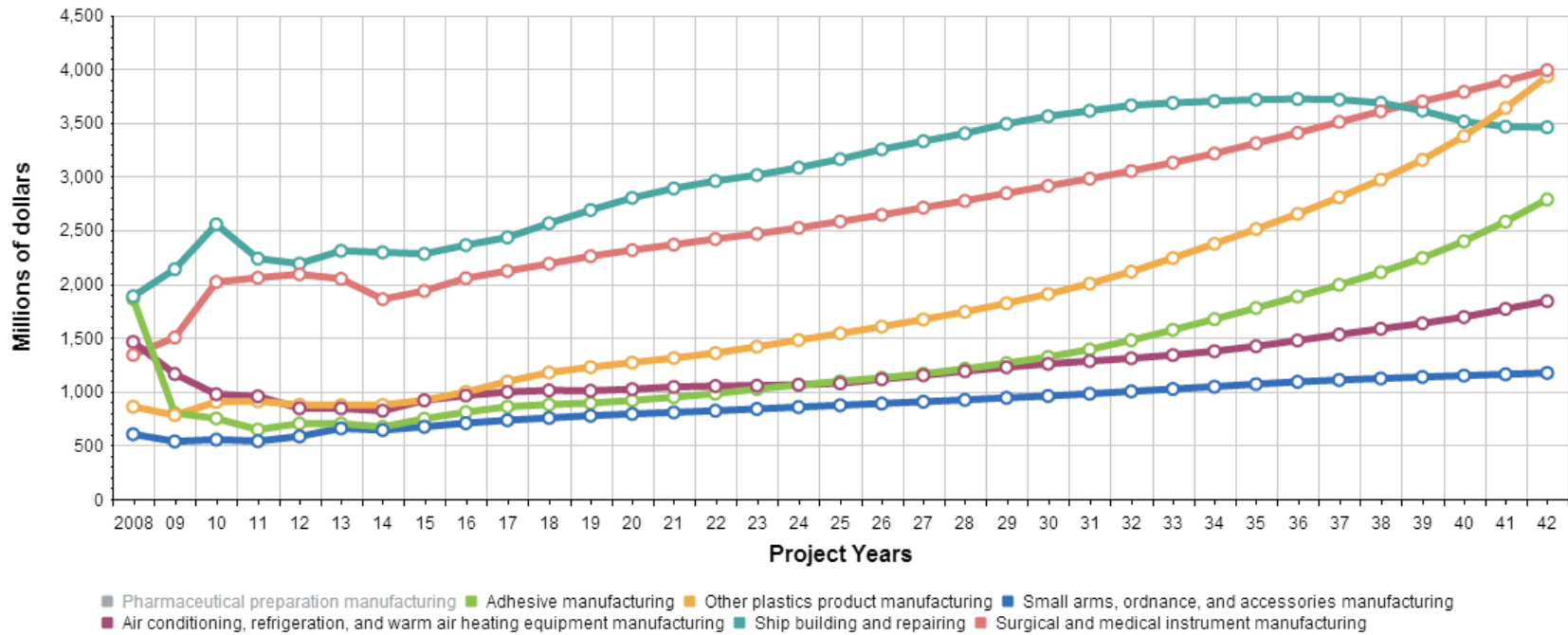
Figure 4.5 Composition of Output of Top Industries Driving the Connecticut Secondary Manufacturing Sector, to 2042



Source: EDR Group

In addition to the Pharmaceuticals Preparations Manufacturing industry, other industry sectors contribute to growth in Connecticut's Secondary Manufacturing Sector. These include such sectors as Shipbuilding and Repair, Air Conditioning, Refrigeration and Warm Air Heating Equipment Manufacturing, Other Plastics Manufacturing, and Adhesive Manufacturing, within the Secondary Manufacturing sector. As shown in Figure 4.6, there was a divergence in performance across these industries during and immediately following the Great Recession reflecting how closely each industry was tied to building construction which had crashed in 2009 and 2010. Since 2011 these sectors have struggled to sustain growth. Each sector is projected to see long-term growth with Other Plastics Manufacturing expected to have the strongest growth by 2042.

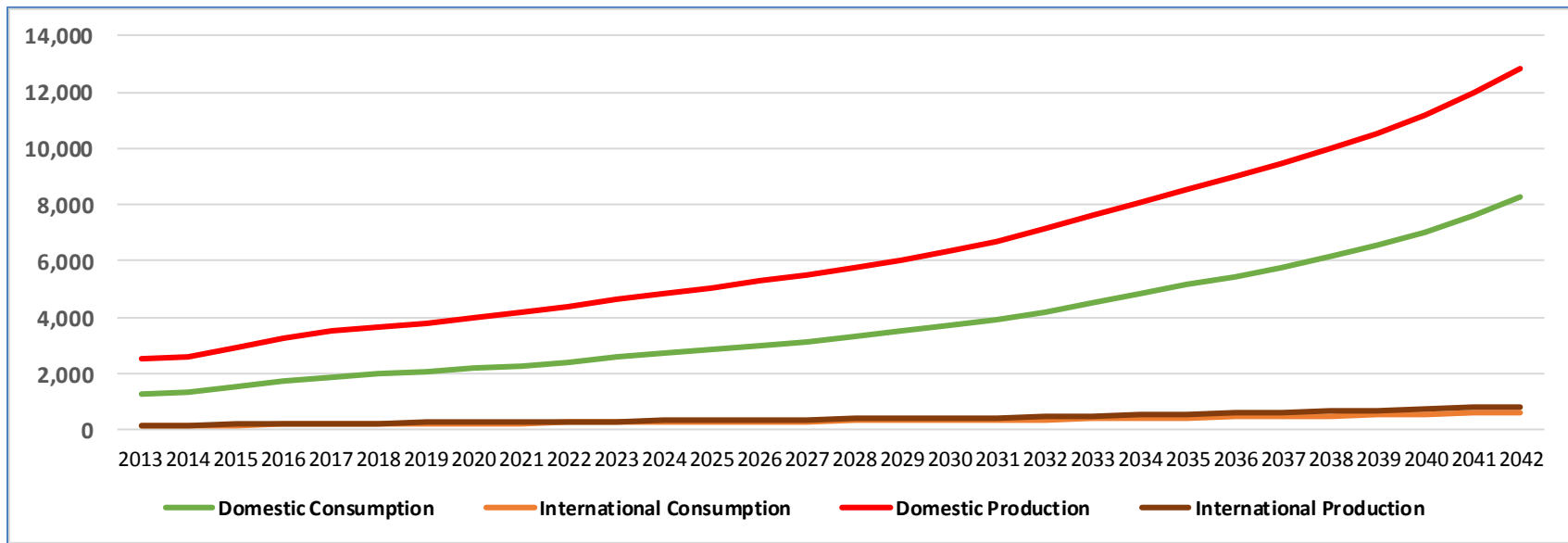
Figure 4.6 Top Industry Drivers, Excepting Pharmaceutical Preparation Manufacturing, of Connecticut Secondary Manufacturing, Value of Output to 2042



Source: EDR Group

Figure 4.7 details the long-term consumption and production of the Pharmaceutical Preparations sector, forecasted from 2013 out to 2042. The growth over the 2013 to 2042 period is detailed by domestic and international shipment geography. The Pharmaceutical Preparations are the top commodity category produced/consumed by the major Secondary Manufacturing industry sector. Within this sector domestic markets for drug products are the largest as both a source of the goods consumed and the destination for products produced in this sector through the forecast period. Connecticut drug producers compete mostly in the domestic market due to regulatory and competitiveness barriers that act to limit exporting drugs overseas, resulting in more than 10 times the size of the dependency on international markets. Growth in both the sourcing of goods consumed in this category and products produced in this category is higher for domestic business partners than international suppliers and customers for Drugs. For this sector the links of the state freight network, such as the highway links to the rest of New England and the highway links to the rest of the country are critical to this business for Connecticut.

Figure 4.7 Production and Consumption of Pharmaceuticals Drugs, \$ Million, 2013-2042



Source: EDR Group

Sorted by the value of domestic production, in Table 4.2 the Secondary Manufacturing Sector commodity categories with the highest output are Soap or Other Detergents, Drugs and Medical or Dental Instruments. The Drugs commodity category also ranks high among the value of domestic consumption. For most commodities, neither consumption nor production is greater for international trade than for domestic sourcing or sale. An exception for consumption is Communications Equipment where the \$355 million internationally-sourced inputs consumed is more than double the \$138 million value of domestically-sourced products in that category.

*Table 4.2 Consumption and Production by Commodity Category for Connecticut in Secondary Manufacturing Sector, 2013 – 2042 (\$million)*

Commodity	Commodity Consumption		Commodity Production	
	Domestic	International	Domestic	International
Soap or Other Detergents	1,258.6	94.6	7,707.4	295.4
Drugs	3,754.9	328.6	6,363.9	409.0
Medical or Dental Instruments	933.0	27.5	5,614.6	140.9
Misc. Plastic Products	2,274.6	272.1	5,016.4	509.6
Ships or Boats	635.7	56.3	4,192.5	464.4
Misc. Chemical Products	711.7	202.3	4,159.4	457.4
Bakery Products	486.2	3.5	3,362.6	1.2
Measuring or Controlling Equipment	202.9	175.2	2,542.4	457.7
Communication Equipment	138.0	355.2	2,344.8	224.8
Agricultural Chemicals	21.9	11.2	2,182.8	107.9
Misc. Food Preparations	1,137.6	121.3	1,699.3	162.5
Metal Stampings	37.5	6.8	1,551.3	92.0
Special Industry Machinery	230.4	27.1	1,291.8	200.9
Electronic Components	1,628.8	67.8	1,243.2	56.4
Fabricated Structural Metal Products	1,041.2	18.3	1,072.3	84.7
Misc. Electrical Machinery	437.3	70.9	1,070.1	198.1
Dairy Products	543.6	14.8	998.2	20.9
Toys, Amusement, Athletic Equipment	114.1	29.4	976.0	120.2
Beverages or Flavor Extracts	1,017.5	105.0	950.6	7.0
Cutlery, Hand Tools or Hardware	125.7	81.8	861.6	179.7
Newspapers	271.9	0.2	813.7	0.0
Engineering, Lab or Scientific Equipment	130.3	25.2	701.1	167.8
Containers or Boxes, paper	595.5	15.6	627.1	16.1
Photographic Equip or Supplies	82.2	8.9	619.9	122.4
Reclaimed Rubber	81.3	0.6	608.6	0.6
Industrial Electrical Equipment	3,309.9	97.3	526.5	19.3
Concrete, Gypsum, or Plaster	9.3	1.0	525.0	2.2
Small Arms,30mm or Less	134.0	43.2	449.5	78.1
Household or Office Furniture	454.3	263.8	444.5	14.7
Meat or Poultry, Fresh or Chilled	961.9	28.0	427.3	8.3

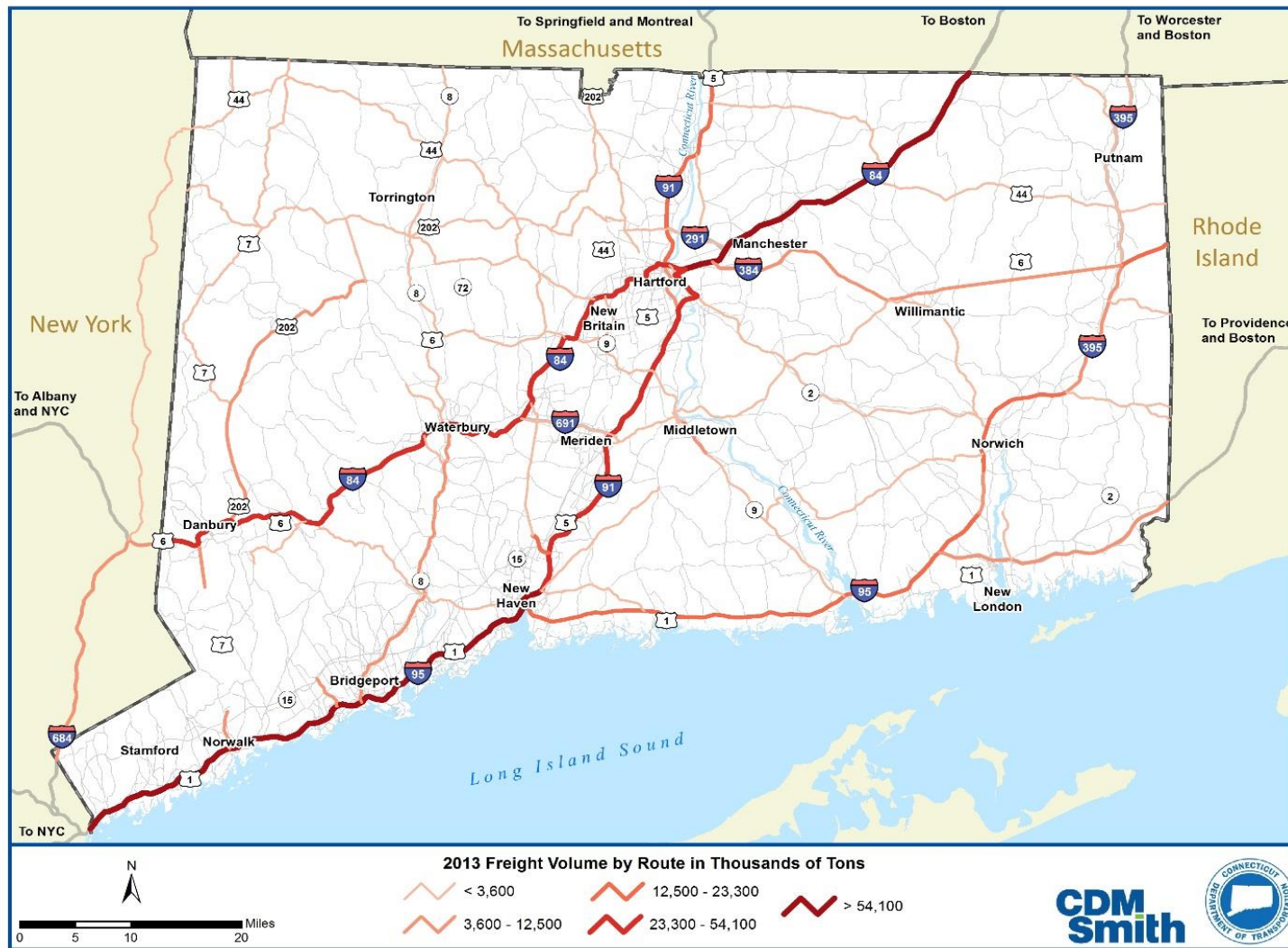
Source: EDR Group

## Freight Transportation Network Implications from the Economic Context

### Connecticut Freight Flow Activity Summary

Freight transportation in Connecticut can be classified in several ways, one of which is the way in which freight movements use the state's transportation network. Individual freight trips can be categorized as internal to the state's border, inbound from elsewhere to a delivery point in the state, outbound to a point outside Connecticut, and through trips that both originate and are destined for points external to the state. Connecticut's location is such that there is considerable through freight, especially for freight moving along the I-95 and I-84 corridors between the other New England states and the rest of the country. (See Connecticut State Freight Route Map in Figure 4.8 for tonnage by route in 2013 and State Freight Route Map in Figure 4.9 for value by route in 2013.) In value terms this through freight has the highest value of all freight moving on the state network. Generally, the through freight corresponds to relatively fewer economic transactions in the state and therefore has the least direct benefit. This is due to the fact that the employment, output and value-added associated with the production and sale of goods moving through Connecticut accrue to other states (or countries) instead of to Connecticut businesses and workers. Close behind through freight in value is the 33.4% of state freight moving inbound to Connecticut from elsewhere. The outbound freight ranks next in value at about 20 percent of total freight value in the state. The internal shipments of freight within the state rank lowest in value at 11.6% of the total.

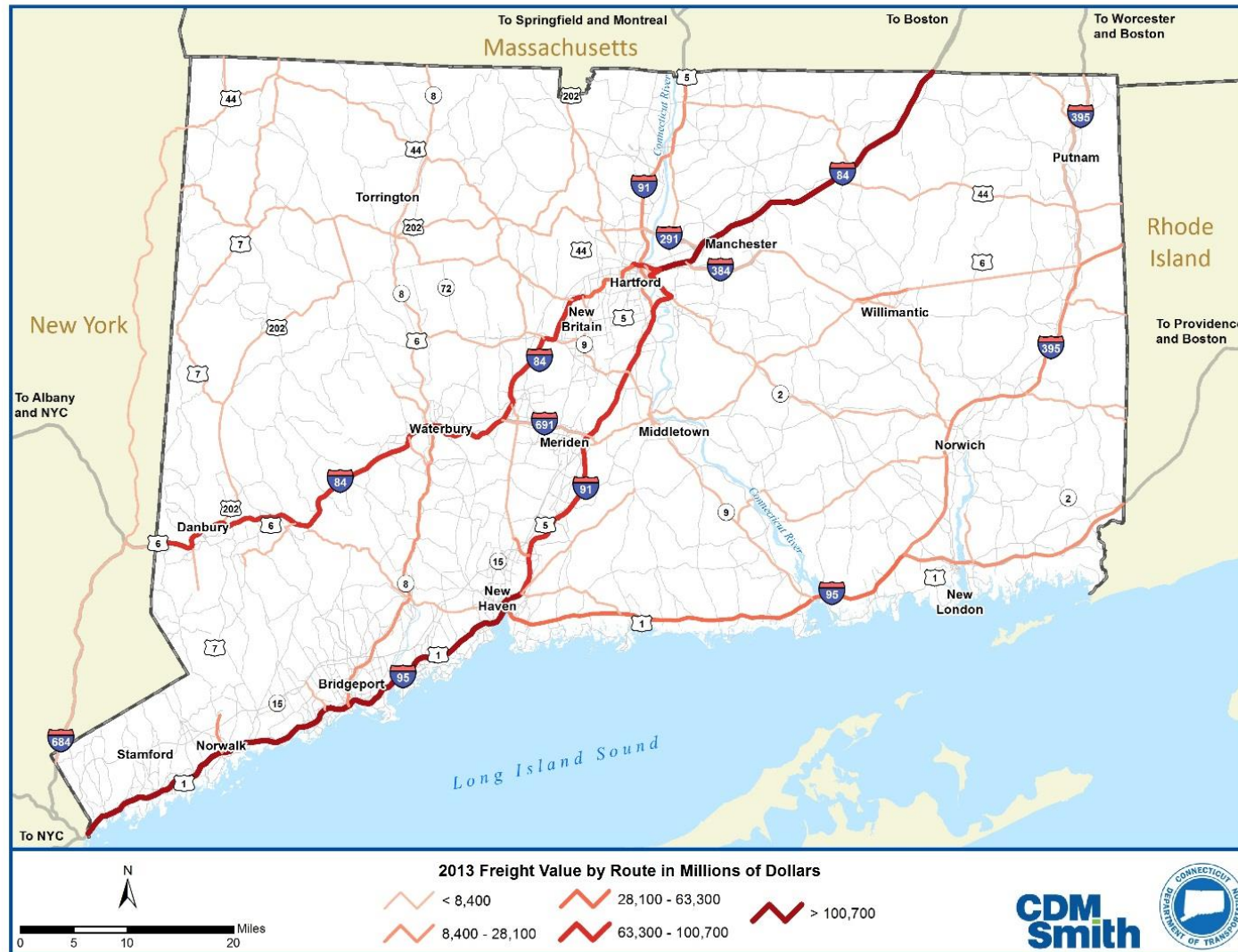
Figure 4.8 Connecticut State Freight Route Map, Thousands of Tons by Route, 2013



Source: CDM Smith



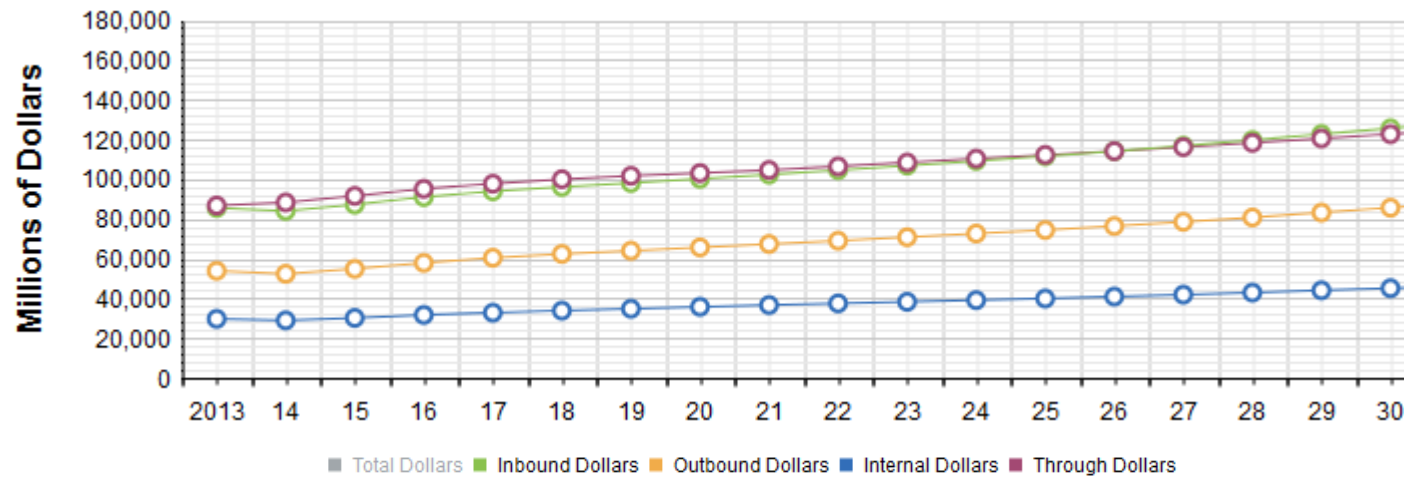
Figure 4.9 Connecticut State Freight Route Map, Millions of Dollars by Route, 2013



Source: CDM Smith

The value of inbound freight movements is projected to overtake the value of through movements in Connecticut after 2026, both valued at just over \$114 billion that year, while the value of outbound freight, having grown to \$76.3 billion in 2026 is forecasted to grow at a fastest pace. These growth trends are depicted in Figure 4.10 with the accompanying data table showing the total value forecast for Connecticut freight increasing from \$256 billion in 2013 to \$379 Billion by 2030. The value of internal-to-Connecticut freight remains the smallest category growing from a base of \$29.7 billion in 2013 to \$45 billion by 2030. The figure also illustrates that freight originating within Connecticut, whether for outbound shipment to other states or for shipment within the state are both lower in value than those shipments originating elsewhere for delivery in the state or to be carried through the state.

Figure 4.10 Directional Composition of Connecticut Freight Flows by year to 2030, in millions of dollars

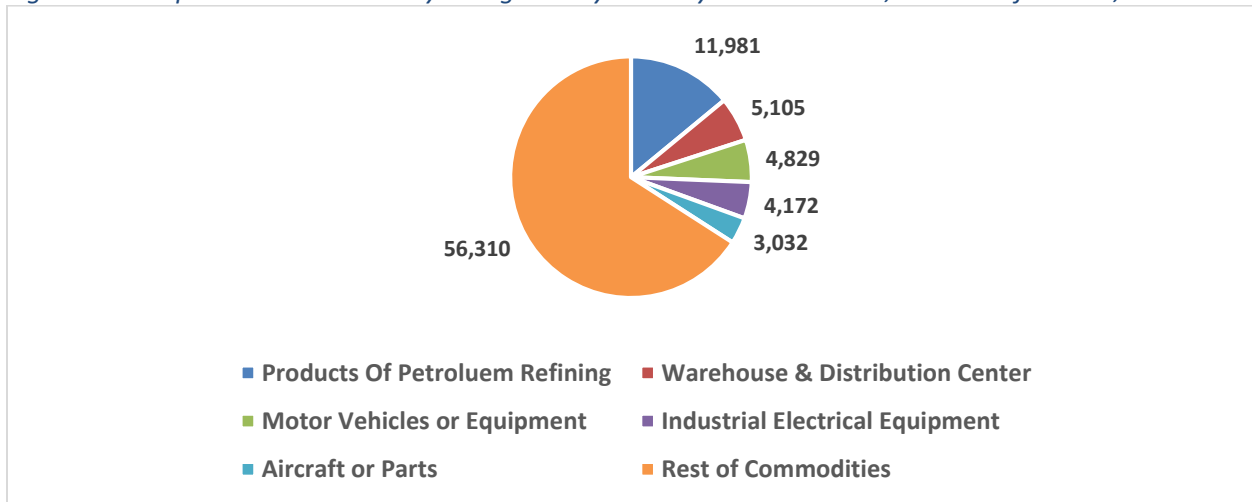


	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total	255,608	253,467	263,646	275,487	284,654	292,082	298,380	304,524	310,750	317,299	324,131	331,084	337,857	345,298	353,118	361,372	370,199	378,766
Inbound	85,429	83,992	87,156	90,932	93,842	96,034	98,033	100,141	102,267	104,489	106,785	109,130	111,439	114,029	116,739	119,598	122,631	125,516
Outbound	53,830	52,332	54,841	57,822	60,401	62,333	63,945	65,619	67,310	68,982	70,764	72,585	74,355	76,350	78,457	80,676	83,144	85,581
Internal	29,663	28,903	30,145	31,641	32,747	33,798	34,759	35,725	36,616	37,448	38,238	39,072	39,903	40,872	41,849	42,873	44,010	45,077
Through	86,687	88,240	91,505	95,092	97,665	99,918	101,643	103,039	104,557	106,379	108,344	110,296	112,160	114,047	116,073	118,225	120,414	122,591

Source: EDR Group

In Figure 4.11, the top commodities ranked in the inbound direction, in dollar terms, are Refined Petroleum Products, Warehousing & Distribution Center goods, Motor Vehicles or Equipment, Industrial Electrical Equipment and Aircraft or Parts. These top commodities, together, represent over a third of all goods shipped inbound to Connecticut, representing 34.1% of the \$85.4 billion of commodities transported into the state in 2013. The top category of Refined Petroleum Products alone represented 14 percent of the total inbound shipments to the state, more than double the six percent share of the next largest category, that of Warehouse and Distribution Center freight traffic.

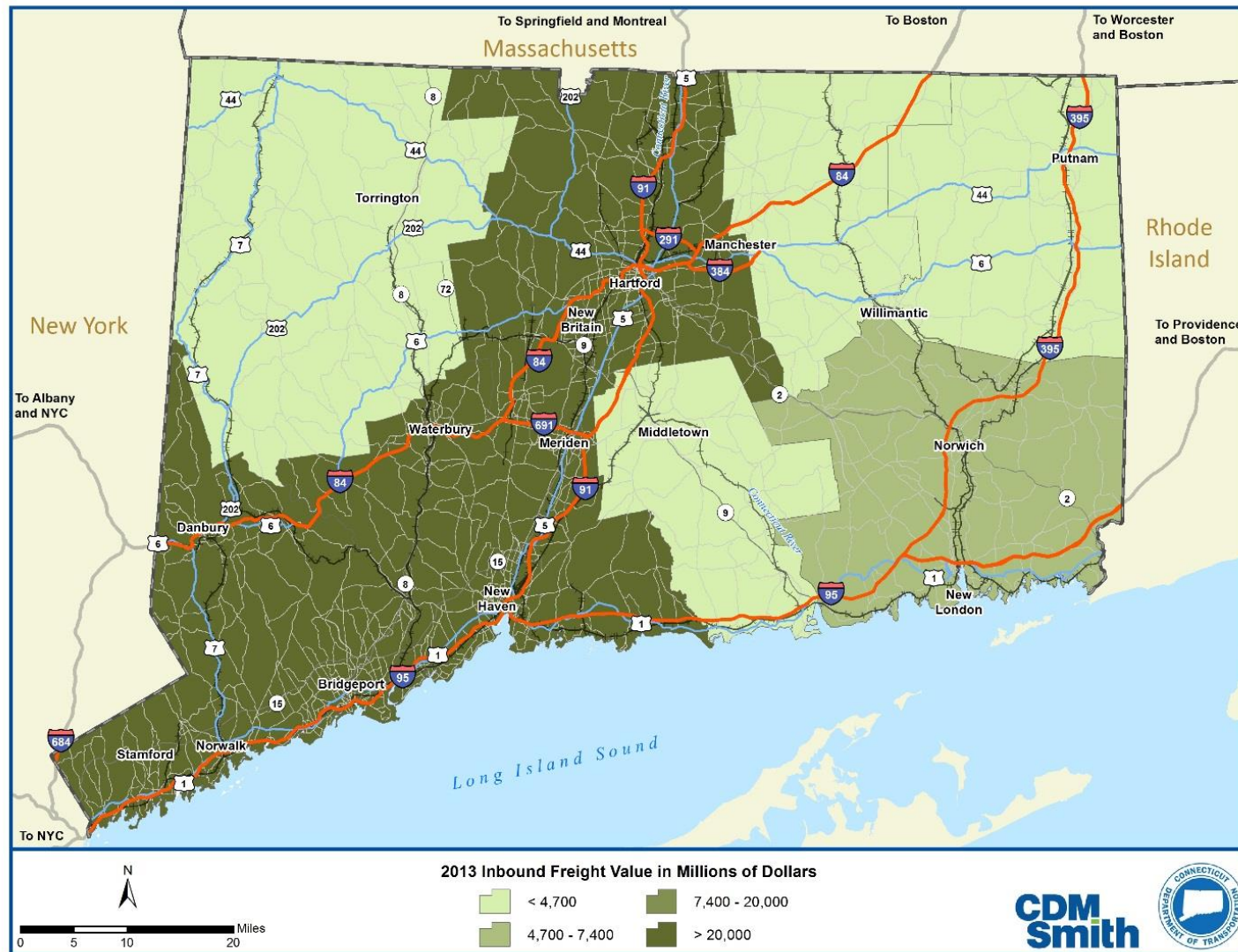
*Figure 4.11 Top Inbound Commodity Categories by Industry in Connecticut, Millions of Dollars, 2013*



Source: EDR Group

The geography of freight shipments in the inbound direction to Connecticut, in total across modes of transportation for 2013 in millions of dollars, is depicted in the state inbound freight map in Figure 4.12.

Figure 4.12 Connecticut State Inbound Freight Map, Total All Commodities, All Modes of Transport, 2013, Source: CDM Smith



Source: CDM Smith

The top commodities ranked in the outbound direction, in tonnage terms, are Broken Stone or Riprap; Waste or Scrap; Products of Petroleum Refining; Gravel or Sand; and Concrete, Gypsum and Plaster. In Table 4.3, the tonnage of these commodities along with the percentage share represented by these levels in 2013 are shown for the top five outbound commodity categories plus the remainder of all other commodities. By weight the top five are 54.3 % of tons shipped outbound from Connecticut.

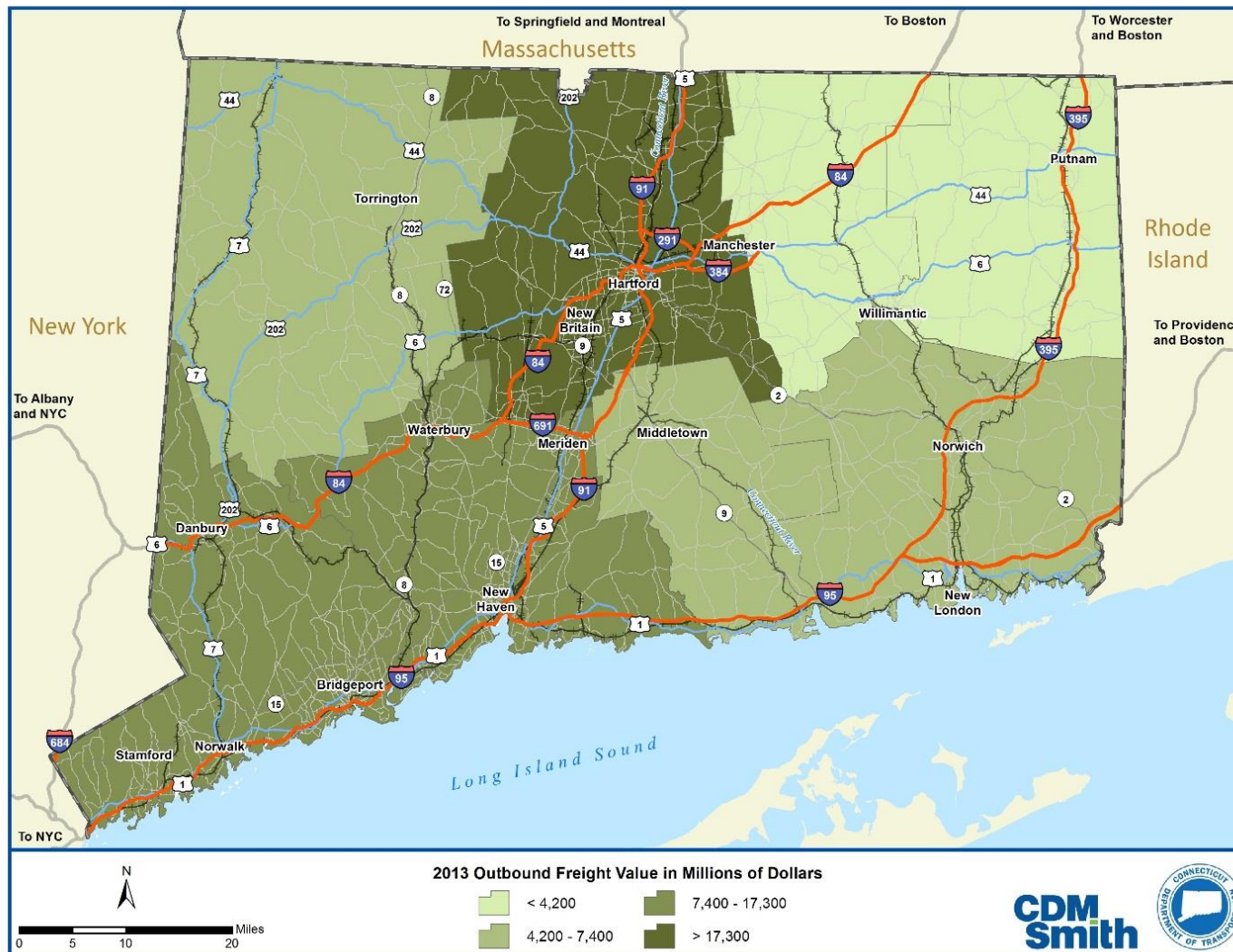
*Table 4.3 Top Outbound Commodity Categories in thousand tons and percent share of total, 2013*

Commodity Category	1000 Tons	Share (%)
Broken Stone or Riprap	9,601	13.5
Waste or Scrap	8,858	12.4
Products of Petroleum Refining	8,016	11.2
Gravel or Sand	6,842	9.6
Concrete, Gypsum, or Plaster	5,403	7.6
All other TOTAL	32,546	45.7

Source: EDR Group from TRANSEARCH data

The geography of shipments in the outbound direction from Connecticut, in total, across modes of transportation for 2013 is depicted in the connecticut state outbound freight map in Figure 4.13.

Figure 4.13 Connecticut State Outbound Freight Map, Total All Commodities, All Modes of Transport, 2013



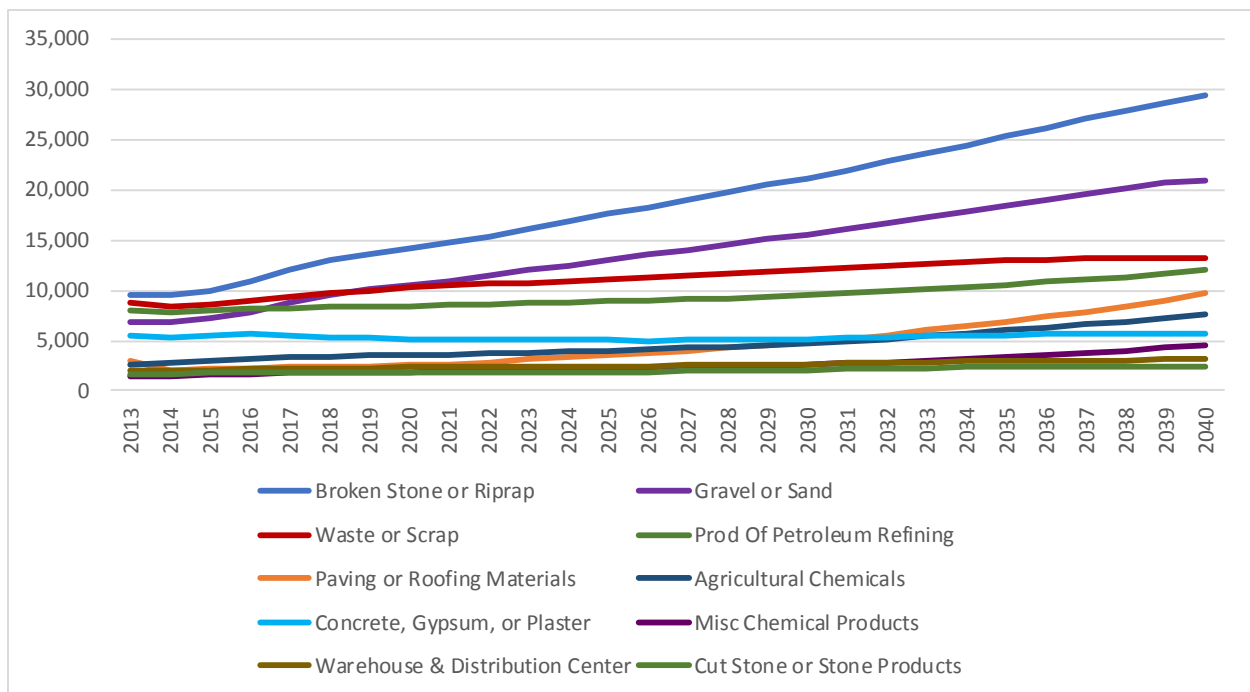
Source: CDM Smith

## Connecticut Freight Commodity Shipments Driven by Top Industries

### Top Commodities Forecasted

The top 10 highest tonnage commodity categories shipped from Connecticut across all modes of transportation are dominated by heavy bulk goods like stone, sand and gravel. Though these goods are often shipped relatively short distances, their use in construction of buildings and infrastructure around the state makes their transport important to the state economy. The long-term forecast of shipments of these commodities, ranked by weight and forecasted out to 2040, is depicted in Figure 4.14. The category of waste and scrap commodities, usually produced as a byproduct of manufacturing or just from the end-of-life of commodities, is ranked second in 2013. There is slower growth forecast for Waste or Scrap than for other categories due to more efficient manufacturing processes and efficiencies, falling to third place by 2040. Petroleum refining products are important in the state as the transportation equipment and residential heating users of these products sustain inbound demand, although with slower growth rates forecast than for most other top 10 commodities.

Figure 4.14 Top 10 Commodity Categories Forecast, all Modes of Transport, in 1000 Tons to 2040



Source: EDR Group from TRANSEARCH data

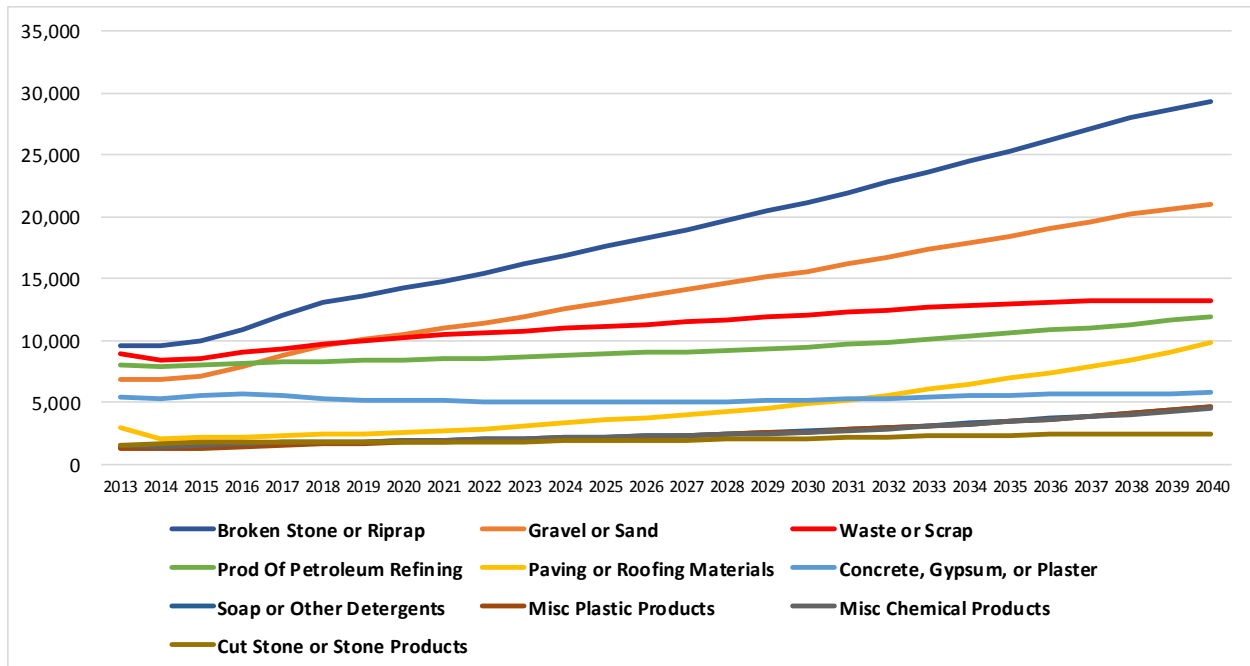
### Top Commodities Forecasted for the Primary Manufacturing Sector

Construction use of Broken Stone or Riprap as well as Gravel and Sand lead the ranks of the forecasts for the top 10 volume commodities produced in the Primary Manufacturing sector in Connecticut long-



term. As shown in Figure 4.15, these categories are expected to see almost triple the volumes transported by 2040 than in the 2013 base year. Slower growth is projected for Waste or Scrap and other lower-volume commodities shipped in 2013 from the Primary Manufacturing industries in Connecticut to their customers.

*Figure 4.15 Top 10 Outbound Commodities from the Primary Manufacturing Sector in Connecticut, in 1000 tons 2013-2040*

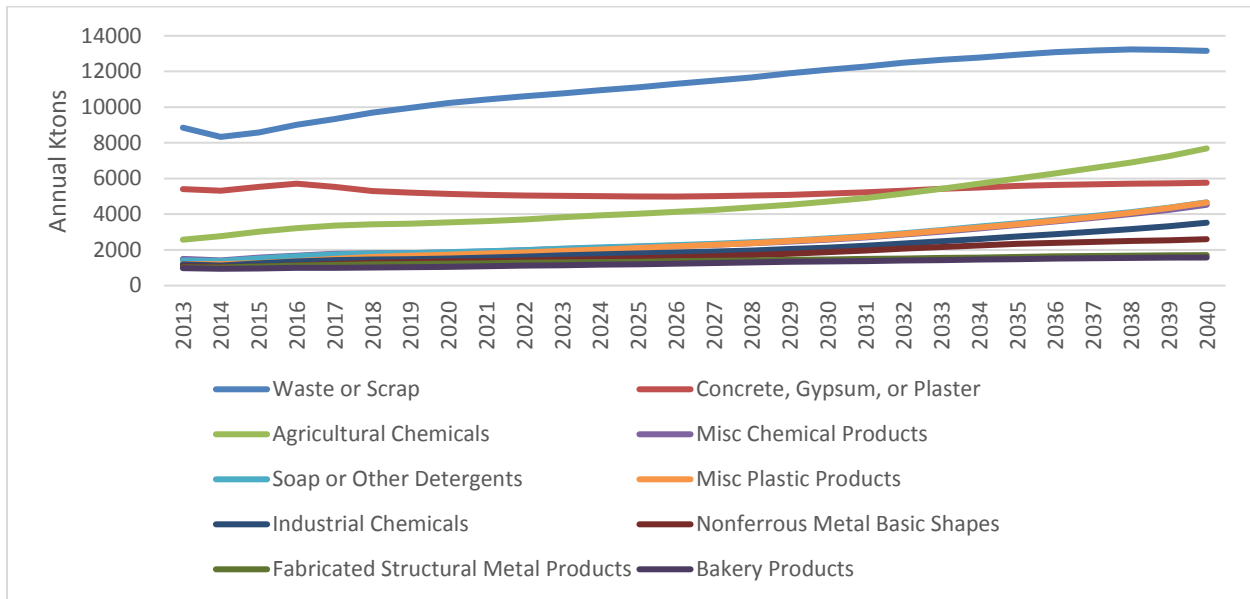


Source: EDR Group from TRANSEARCH data

*Top Commodities Forecasted for the Secondary Manufacturing Sector*

The largest volume commodity category produced by industries in the Secondary Manufacturing sector in Connecticut in 2013 and forecasted to continue to be is waste and scrap, a commodity group comprised of a variety of waste by-products of production processes in the sector. As seen in Figure 4.16, the forecast for the Concrete, Gypsum and Plaster category is for relatively flat growth to 2040 while the most rapid growth forecast among these top 10 commodities is for the Agricultural Chemicals category.

Figure 4.16 Top 10 Commodities, Secondary Manufacturing Sector in Connecticut, in 1000 tons 2013



Source: EDR Group from TRANSEARCH data

### Freight Transportation Modes in Connecticut

The mix of transportation modes serving Connecticut varies directionally, with some directional movements being essentially one way trips, with returns of the equipment empty. For example, the petroleum tank vessels carrying refined fuels to Connecticut return to the refineries empty from the Connecticut ports after unloading, much like many other types of truck deliveries. The reason for the freight equipment to move in the first place is the commodity demand for the goods to be shipped. Thus, what commodities are on board those freight equipment movements matters, especially as those change in the future. The following Table 4.4 provides an example of Connecticut’s freight flows by mode of transport, broken out by direction and mode of transport. The first section of the table shows the relative volume and year-to-year fluctuations observed in total for each of the detailed freight transportation modal detail from the TRANSEARCH freight flow data for the state for the sample years 2013-2015. The bottom section of the table shows just for 2013 the additional dimension of the direction of the modal commodity flows. This provides an example of the variance in use of the network as captured in this underlying freight flow data set.

*Table 4.4 Connecticut Freight Flows by Mode of Transport and Direction, 2013 - 2015*

Data Year	Rail Carload	Rail Intermodal	Rail NEC	Truck Truckload	Truck LTL	Truck PVT	Truck NEC	Air	Water	Pipeline
2013	3,053	-	1,036	46,269	1,300	53,675	1,090	13	9,191	276
2014	2,973	-	999	45,369	1,273	52,685	1,060	13	9,054	276
2015	3,082	-	1,059	46,803	1,323	54,263	1,091	14	9,396	278
Flow Type (2015)	Rail Carload	Rail Intermodal	Rail NEC	Truck Truckload	Truck LTL	Truck PVT	Truck NEC	Air	Water	Pipeline
Inbound Domestic	697	-	-	23,407	615	21,007	-	8	7,709	-
Inbound Foreign	166	-	498	1,322	29	931	659	0	692	36
Internal	306	-	-	7,818	139	14,294	-	-	716	-
Outbound Domestic	1,903	-	-	13,840	511	17,666	-	5	279	-
Outbound Foreign	9	-	561	416	29	366	432	0	0	242

Note: Modes of Freight Transportation include:

Rail - Carload, Intermodal Service, Rail Service Not Elsewhere Classified;

Trucking - Truckload, Less-than-Truckload (LTL), Private Trucking and Trucking Not Elsewhere Classified

Air;

Water; and

Pipeline;

Source: EDR Group from TRANSEARCH data

The state's freight activity can also be classified by the types of commodities shipped, mapped to the modes of transportation used to carry them. An example of this distribution of the state's freight activity is in Table 4.5 below, with the quantity of each of the first ten commodity categories (out of 197 commodity categories in all) carried by each mode of transportation. The recent trends are shown, from 2013 to 2015 in total for all commodities by mode of transport. With the exception of the relatively flat air and pipeline activity during this period, the total for the other freight modes saw drops in 2014 from 2013 levels with a recovery in 2015 to levels higher than in 2013. The largest category, private trucking, also saw the greatest absolute growth of any freight mode between 2013 and 2015.

Table 4.5 Connecticut Freight Flows by Mode and Commodity, Thousands of Tons, 2013 - 2015

Data Year	Rail Carload	Rail Intermodal	Rail NEC	Truck Truckload	Truck LTL	Truck PVT	Truck NEC	Air	Water	Pipeline
2013	3,053	-	1,036	69,665	2,271	67,977	2,449	13	9,191	276
2014	2,973	-	999	69,122	2,271	67,308	2,438	13	9,054	276
2015	3,082	-	1,059	71,421	2,354	69,381	2,523	14	9,396	278
Commodity Category	Rail Carload	Rail Intermodal	Rail NEC	Truck Truckload	Truck LTL	Truck PVT	Truck NEC	Air	Water	Pipeline
Field Crops	83	-	30	914	-	772	18	-	-	-
Fresh Fruits or Tree Nuts	-	-	-	326	-	93	1	-	-	-
Fresh Vegetables	-	-	0	215	-	47	14	-	-	-
Livestock or Livestock Prod	-	-	-	776	-	4	-	-	-	-
Poultry or Poultry Products	-	-	-	52	-	-	-	-	-	-
Misc Farm Products	-	-	-	7	-	0	3	-	-	-
Barks or Gums,crude	-	-	-	11	-	-	0	-	-	-
Misc Forest Products	-	-	-	6	-	-	4	-	-	-
Fresh Fish or Marine Products	-	-	-	33	-	-	3	-	-	-
Fish Hatcheries	-	-	-	-	-	-	-	-	-	-

Note: Modes of Freight Transportation include:

Rail - Carload, Intermodal Service, Rail Service Not Elsewhere Classified;

Trucking - Truckload, Less-than-Truckload (LTL), Private Trucking and Trucking Not Elsewhere Classified Air;

Water; and

Pipeline;

Source: EDR Group from TRANSEARCH data

### Freight Trip Length Characteristics and Total Truck Vehicle Miles Travelled

The distances between shippers and receivers of freight, combined with the characteristics of the network available to connect them, affects demand on the network. In general, the greater the distance shipments travel, the greater the relative demand on the network for the same freight and economic activity.

The average length of freight trips is an indicator of the characteristics of use of Connecticut's freight transportation system, varying by mode of transport. An estimate of truck Vehicle Miles Traveled (VMT) can be calculated from the number of truck trips categorized by the lengths of those trips. Within the major freight transportation modes of truck and rail there are differences in typical freight trip length by type of rail and truck segments. How these patterns change over time drive changes in the composition of demand for freight transportation services in the state as well as changes in supply chains and distribution patterns of shipping businesses.

For the top two types of truck trips in Connecticut, Truckload and Private trucking, the greatest number of trips is in the 101-to-200-mile length category. The largest number of Less-Than-Truckload (LTL) truck trips is in the 500-and-over miles length category, reflecting the less common, but the nature of goods shipped using the smaller shipment size services provided by the LTL motor carriers.

Rail carload freight is found moving short distances within Connecticut. Intermodal rail service for the state is handled by truck to and from intermodal rail terminals located in Massachusetts, New Jersey and New York. Thus the distance shown for Connecticut rail intermodal trips lengths is zero miles.

Summaries of the tonnage truck and rail trip length bands for Connecticut for 2013, with mileage band total tons (thousands) and total vehicle miles travelled (VMT) estimates follow in Table 4.6.

Table 4.6 Connecticut Rail / Truck Rail Tons by Trip Length Bands, 2013, 1000 tons, Truck VMT Detail

Data Year	Rail Carload	Rail Intermodal	Rail NEC	Truck Truckload	Truck LTL	Truck PVT	Truck NEC
2013	3,053	-	1,036	69,665	2,271	67,977	2,449
2014	2,973	-	999	69,122	2,271	67,308	2,438
2015	3,082	-	1,059	71,421	2,354	69,381	2,523
Trip Distance	Rail Carload	Rail Intermodal	Rail NEC	Truck Truckload	Truck LTL	Truck PVT	Truck NEC
0 - 50 Miles	3,053	-	1,036	7,730	137	14,070	-
51 - 100 Miles	-	-	-	3,434	113	4,449	-
101 - 200 Miles	-	-	-	17,502	382	24,383	-
201 - 500 Miles	-	-	-	9,585	235	7,037	656
501 + Miles	-	-	-	8,018	433	3,737	434
TOTAL	3,053	-	1,036	46,269	1,300	53,675	1,090
Average Miles	-	-	-	330	490	201	896
Estimated VMT	-	-	-	15,273,800	636,458	10,803,500	977,151

Note: Modes of Freight Transportation include:

Rail - Carload, Intermodal Service, Rail Service Not Elsewhere Classified;

Trucking - Truckload, Less-than-Truckload (LTL), Private Trucking and Trucking Not Elsewhere Classified

Source: EDR Group from TRANSEARCH data

## Dependence of Connecticut Industry on Freight Transportation

### Businesses in Freight Economy Dependence

Businesses in Connecticut depend on the movement of goods to reach their customers and provide inputs for their continued operations. The degree to which industries depend on freight transportation varies with the nature of the business, with agriculture and some manufacturing firms depending more on outbound freight transportation of production than for inbound transportation of supplies. Consumers in Connecticut as represented by households are primarily freight dependent for deliveries, using inbound transport of freight much more heavily than outbound freight transport of waste, recyclables, product returns or parcel shipments. Calculated as a percent of total output, the dependence on freight transportation for industries in Connecticut in 2013 is summarized in Appendix Table 4.7 and Appendix Table 4.8, for outbound and inbound freight respectively. At one extreme, the (passenger and freight) rail transportation service industry is almost entirely dependent on outbound transportation, with approximately 97 percent of the sector's output, value added, income and jobs dependent on outbound transportation. In contrast, many businesses in service sectors of the economy directly depend very little on freight transportation in either direction, essentially only requiring office supplies as physical inputs provided by inbound transportation. Thus industry sectors such as Finance

and Insurance show zero percent outbound freight transportation service dependence<sup>3</sup> and only about one percent dependence on inbound freight transportation. The two appendix tables contain the dependency on freight transportation in Connecticut of the individual industries that comprise the state economy. These are presented as a percent of total output<sup>4</sup>, value added<sup>5</sup>, income<sup>6</sup> and jobs<sup>7</sup> separately for outbound transportation and then for inbound transportation.

For Connecticut, the overall economic dependence on outbound transportation of all industries averages 23.4% for output, 24.8% for value added, 23.5% for income and 22.8% for jobs. The overall economic dependence on inbound transportation of all industries averages 22.9% for output, 20.8% for value added, 22.8% for income and 23.2% for jobs. That means outbound freight transportation dependency represents \$58.7 Billion of the Connecticut economy while inbound freight transportation dependency represents \$57.5 Billion of the state economy. In the future, as the service sector share of the economy continues to grow, the overall average economic dependence on freight will shrink, although with the economy already heavily dominated by the service sectors, the incremental further reductions in freight dependence will be small.

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<sup>3</sup> Garbage collection and outbound postal mail pickups are not included in the outbound freight dependency data.

<sup>4</sup> U.S. Bureau of Economic Analysis defines industry output as sales or receipts and other operating income, commodity taxes, and inventory change.

<sup>5</sup> U.S. Bureau of Economic Analysis defines industry value added as the difference between an industry's gross output and the cost of its intermediate inputs (including energy, raw materials, semi-finished goods, and services that are purchased from all sources and used in production).

<sup>6</sup> U.S. Bureau of Economic Analysis defines income as the wages and salaries of workers in jobs in the industry

<sup>7</sup> U.S. Bureau of Economic Analysis defines jobs as the number of workers employed in the industry

## Appendix

*Appendix Table 4.7 Connecticut Industry Dependency on Outbound Freight Transport, 2013, Percent of Output*

% of Total Output				
Industry	Output	Value Added	Income	Jobs
Rail Transportation	96.94	96.94	96.94	97
Wood Product Manufacturing	81.26	81.42	78.78	79
Wholesale Trade	71.31	71.31	71.31	71
Petroleum and Coal Products Manufacturing	62.95	72.75	33.89	35
Machinery Manufacturing	62.75	70.77	43.82	47
Crop Production	58.55	61.84	61	64
Leather Product Manufacturing	51.19	51.19	51.19	51
Animal Production	48.08	55.82	52.48	56
Fishing, etc.	45.62	45.63	45.63	46
Couriers, Messengers & Postal Service	44.25	54.53	55.04	36
Miscellaneous Manufacturing	42.35	43.65	41.93	41
Oil and Gas Extraction	42.17	42.17	42.17	42
Forestry & Logging	40.32	40.32	40.32	40
Electrical Equipment & Appliance Manufacturing	35.71	41.23	40.61	34
Chemical Manufacturing	34.7	39.63	39.25	35
Fabricated Metal Manufacturing	33.99	34.94	34.81	34
Apparel Manufacturing	33.26	37.48	38.35	32
Beverage & Tobacco Product Manufacturing	32.88	41.64	39.85	25
Air Transportation	30.66	30.66	30.66	31
Furniture Manufacturing	29.14	31	31.09	31
Plastics & Rubber Products Manufacturing	28.98	29.21	29.09	29
Nonmetal Mineral Product Manufacturing	28.66	29.83	29.54	29
Textile Mills & Products Manufacturing	28.2	31.3	31.87	30
Computer and Electronic Manufacturing	26.26	27.76	27.98	27
Printing	26.25	25.92	25.55	26
Warehousing and Storage	23.36	23.36	23.36	23
Food Manufacturing	22.82	27.96	27.73	29
Mining, Quarrying, & Support	22.71	18.3	25.36	31
Paper Manufacturing	21.23	21.63	21.65	22
Transportation Equipment Manufacturing	16.83	17.82	18.3	19
Primary Metal Manufacturing	14.82	15.84	16.4	16
Media & Information (Publishing, Broadcast, etc.)	2.02	1.87	2.01	3
Business Services (Admin, Support, Waste)	0.11	0.08	0.06	0



Support for Agriculture and Forestry	0	0	0	0
Utilities	0	0	0	0
Construction & Buildings	0	0	0	0
Retail Trade	0	0	0	0
Water Transportation	0	0	0	0
Truck Transportation	0	0	0	0
Transit and Ground Transportation	0	0	0	0
Pipeline Transportation	0	0	0	0
Scenic & Sightseeing Transport Support	0	0	0	0
Finance and Insurance	0	0	0	0
Real Estate and Rental and Leasing	0	0	0	0
Professional, Scientific, and Technical	0	0	0	0
Management Services	0	0	0	0
Education Services	0	0	0	0
Health Care and Social Assistance	0	0	0	0
Arts, Entertainment, and Recreation	0	0	0	0
Lodging	0	0	0	0
Restaurants & Drinking Establishments	0	0	0	0
Other Services	0	0	0	0
Government (Public Administration)	0	0	0	0

Source: EDR Group

Appendix Table 4.8 Connecticut Industry Dependency on Inbound Freight Transport, Percent of Output, 2013

% of Total Output				
Industry	Output	Value Added	Income	Jobs
Crop Production	19.13	18.06	18.74	18.00
Animal Production	40.13	32.78	36.19	32.00
Forestry & Logging	46.36	46.36	46.36	46.00
Fishing, etc.	25.25	25.25	25.25	25.00
Support for Agriculture and Forestry	18.99	18.99	18.99	19.00
Oil and Gas Extraction	19.72	19.72	19.72	20.00
Mining, Quarrying, & Support	12.12	9.72	14.75	16.00
Utilities	6.67	8.40	7.17	7.00
Construction & Buildings	27.92	27.22	27.86	28.00
Food Manufacturing	58.35	51.74	50.56	49.00
Beverage & Tobacco Product Manufacturing	39.00	32.06	36.38	46.00
Textile Mills & Products Manufacturing	50.36	47.32	46.73	48.00
Apparel Manufacturing	37.39	34.21	33.43	37.00
Leather Product Manufacturing	23.29	23.29	23.29	23.00
Wood Product Manufacturing	5.77	5.65	7.40	7.00
Paper Manufacturing	52.44	52.49	52.48	53.00
Printing	25.89	25.73	25.55	26.00
Petroleum and Coal Products Manufacturing	19.37	11.22	43.73	43.00
Chemical Manufacturing	39.28	33.68	34.10	38.00
Plastics & Rubber Products Manufacturing	51.76	51.58	51.45	51.00
Nonmetal Mineral Product Manufacturing	36.37	34.98	34.93	35.00
Primary Metal Manufacturing	65.31	63.36	62.37	62.00
Fabricated Metal Manufacturing	38.79	37.69	37.74	38.00
Machinery Manufacturing	17.38	11.77	30.34	28.00
Computer and Electronic Manufacturing	47.34	45.22	45.16	47.00
Electrical Equipment & Appliance Manufacturing	42.15	35.80	36.10	44.00
Transportation Equipment Manufacturing	37.42	36.77	35.95	36.00
Furniture Manufacturing	44.54	42.71	42.63	42.00
Miscellaneous Manufacturing	30.01	28.97	30.16	30.00
Wholesale Trade	5.67	5.67	5.67	6.00
Retail Trade	5.46	5.40	5.49	6.00
Air Transportation	22.82	22.82	22.82	23.00
Rail Transportation	1.58	1.58	1.58	2.00
Water Transportation	27.05	27.05	27.05	27.00
Truck Transportation	25.25	25.25	25.25	25.00
Transit and Ground Transportation	18.52	-21.58	19.26	17.00
Pipeline Transportation	18.41	18.41	18.41	18.00

Scenic & Sightseeing Transport Support	15.78	15.78	15.78	16.00
Couriers, Messengers & Postal Service	12.72	10.42	10.31	15.00
Warehousing and Storage	4.78	4.78	4.78	5.00
Media & Information (Publ, Broadcast,	5.08	4.67	5.28	6.00
Finance and Insurance	0.94	0.85	1.07	1.00
Real Estate and Rental and Leasing	2.02	1.94	2.38	1.00
Professional, Scientific, and Technical	3.36	3.20	3.27	4.00
Management Services	2.51	2.51	2.51	3.00
Business Services (Admin, Support, Waste)	6.79	6.06	5.45	6.00
Education Services	6.73	6.71	6.67	7.00
Health Care and Social Assistance	9.10	8.82	8.72	9.00
Arts, Entertainment, and Recreation	4.46	4.76	4.82	4.00
Lodging	6.51	6.52	6.52	7.00
Restaurants & Drinking Establishments	20.35	19.82	20.07	20.00
Other Services	7.63	7.57	7.32	6.00
Government (Public Administration)	3.13	1.14	1.30	2.00

Source: EDR Group