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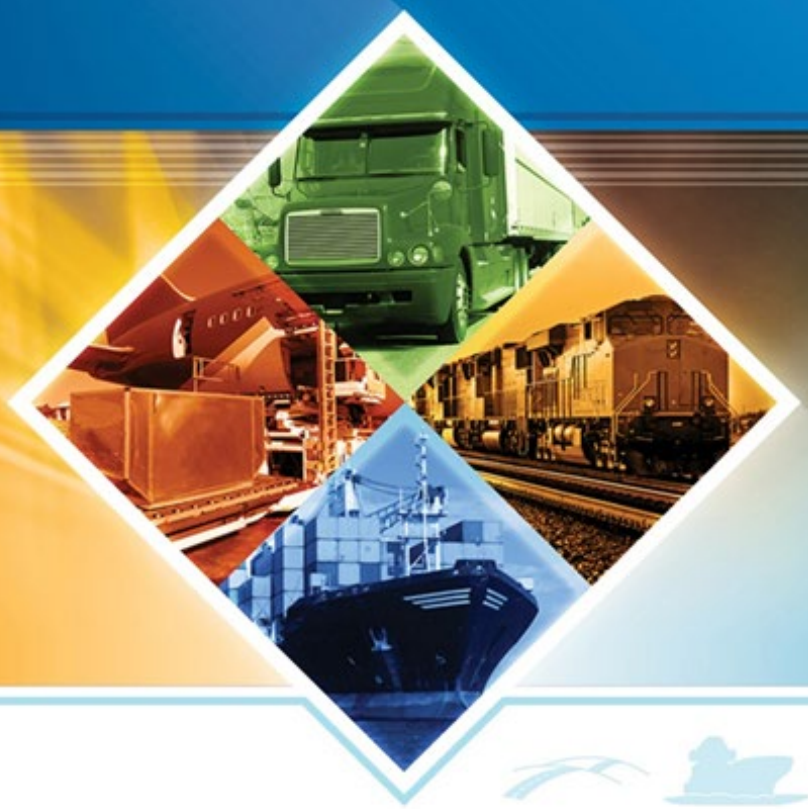
FREIGHT QUICK FACTS REPORT



U.S. Department of Transportation
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16. Abstract

Our Nation's freight transportation system consists of a vast network of roads, railways, navigable channels, and pipelines that connect hundreds of seaports, airports, and intermodal facilities in the movement of raw materials and finished products throughout the country. This report provides practitioners and the public at large with a user-friendly source of information about this vital system, focusing on answering a wide-range of freight-related questions, particularly about how the sector has changed over the past several years. Chapter 1 provides an overview of the extent and usage of freight infrastructure in the United States. Chapter 2 discusses the impacts of this freight transportation system on the economy, environment, and society. Chapter 3 concludes by summarizing key freight trends and providing an overview of policy and funding issues in the sector.

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INTRODUCTION

Our Nation's freight transportation system consists of a vast network of roads, railways, navigable channels, and pipelines that connect hundreds of seaports, airports, and intermodal facilities in the movement of raw materials and finished products throughout the country. The economic prosperity and competitiveness of America is inherently dependent on the efficiency and performance of this complex conveyor system.

This report provides practitioners and the public at large with a user-friendly source of information about this vital system. The report draws from a variety of sources and publications, including the *draft National Freight Strategic Plan* (NFSP) (https://www.transportation.gov/freight/NFSP), the *Freight Facts and Figures 2015 Report (*http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/data_and_statistics/by_subject/freight/freight_facts_2015/*)*, the *National Transportation Statistics* publication *(*http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/index.html*)* and Federal Highway Administration (FHWA) Office of Policy website (http://www.fhwa.dot.gov/policy/).

The objective of this report is to provide basic information that answers a wide range of freight-related questions, particularly about how the sector is rapidly evolving. For example, the economic recession of 2008 precipitated declines in freight modes used to move consumer goods, although several markets rebounded strongly. The changing energy landscape of the country—from increasing domestic production and declining coal consumption—will continue driving changes in freight demand into the future, particularly for railroads and pipelines. The evolving nature of globalization and trade is reshaping the geography of shipments, placing increased importance on border crossings and gateway infrastructure. These and many other changes to the structure of the economy are happening at the same time that the technology and best practices for moving freight are improving, leading to more efficient, responsive, and sustainable supply chains.

To describe these and other freight realities, the document is organized into the following three chapters. Chapter 1 provides an overview of the extent and usage of freight infrastructure in the United States. Chapter 2 discusses the impacts of this freight transportation system on the economy, environment, and society. Chapter 3 concludes by summarizing key freight trends and providing an overview of the policy and funding environment in the sector, which is currently evolving in response to the landmark Fixing America's Surface Transportation Act (FAST Act) introduced last year. Having reliable and timely information about our freight transportation system is fundamental to navigating this changing environment.

To remain concise, this document does not discuss at length the caveats of the data sources used. Please see the original referenced sources for additional details and analysis.

1. EXISTING INFRASTRUCTURE AND HOW IT IS USED

Multimodal Perspective – Mode Share

The freight transportation system relies on a variety of modes to support domestic and international supply-chains. As shown in Table 1, trucks carry the majority of freight in the continental United States, both by tonnage and value. Pipelines carry the second largest tonnage, although this mode involves only specific liquid and gaseous commodities. The commodities moved by truck and air tend to have a higher value per ton, giving these modes a higher share in terms of value. In interpreting this table, it is important to keep in mind that most goods rely on multiple freight modes throughout the supply chain.

Table 1. Mode share by tonnage and value, 2015.

	Millions of Tons				Billions of 2015 USD			
Domestic Mode	Domestic Only	Export	Import	Total	Domestic Only	Export	Import	Total
Air (include truck-air)	0%	0%	0%	0%	1%	17%	14%	4%
Multiple modes & mail	2%	5%	3%	2%	12%	6%	6%	11%
Other and unknown	0%	0%	0%	0%	0%	1%	2%	0%
Pipeline	19%	13%	16%	18%	9%	4%	4%	8%
Rail	9%	15%	9%	9%	3%	5%	5%	3%
Truck	66%	52%	35%	64%	73%	57%	53%	69%
Water	4%	15%	11%	5%	2%	10%	9%	4%
No domestic mode	0%	0%	25%	2%	0%	0%	7%	1%
Total	**16,045**	**912**	**1,099**	**18,056**	**15,558**	**1,745**	**2,567**	**19,871**

USD= U.S. dollars
Source: BTS and FHWA Freight Analysis Framework 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).

Table 1 also provides a breakdown of freight flows by whether they are part of an international supply chain (exports or imports) or have domestic origins and destinations. Overall, exports represent 8.8 percent of value shipped and imports represent 12.9 percent. In terms of tonnage, these proportions are 5.0 percent and 6.1 percent, respectively.

Measuring commodity flows in terms of tonnage is useful for assessing infrastructure requirements (how much needs to be moved), while measuring the economic value of the flows is more useful in highlighting economic impacts and interdependencies. However, measuring the value of flows has the drawback that many factors can lead to year-over-year changes, including changes in the prices of the underlying commodities. Therefore, where possible, this document reports both tonnage and value.

Multimodal Perspective – Commodity Mode Shares

The patterns of production and consumption in an economy are the primary drivers of freight mode share. Table 2 shows the mode shares of the top 15 commodities in terms of tonnage, which account for 80.5 percent of all tons shipped in 2015. The commodity groups reported in this document follow the two-digit Standard Classification of Transported Goods (SCTG) definitions. Pipelines are the primary shipping medium for natural gas, gasoline, fuel oils, and crude petroleum. Rail is used primarily for coal, cereal grains, basic chemicals, and other bulk products. Trucks are involved in the supply chains of almost all commodities, particularly for consumer goods that need to be delivered to retail locations.

Table 2. Commodity share of tons by mode, 2015.

Rank	Top Commodities by Tonnage	Mode (percent)						Millions of Tons
		Air	Pipeline	Rail	Truck	Water	Other	
1	Coal-n.e.c.	0	80	2	15	2	0	2,647.0
2	Gravel	0	0	4	90	3	2	1,820.3
3	Gasoline	0	31	2	59	7	1	1,227.2
4	Cereal grains	0	0	18	77	4	2	1,099.0
5	Nonmetal mineral products	0	0	4	94	1	2	1,072.6
6	Fuel oils	0	29	2	51	17	1	1,054.4
7	Coal	0	0	61	23	8	8	1,001.1
8	Crude petroleum	0	50	4	3	13	30	903.4
9	Other foodstuffs	0	0	7	89	1	3	704.1
10	Waste/scrap	0	0	5	92	2	2	652.9
11	Natural sands	0	0	4	94	1	1	562.0
12	Other agricultural products	0	0	5	86	4	5	554.4
13	Wood products	0	0	6	90	0	3	433.2
14	Basic chemicals	0	8	27	50	13	1	408.6
15	Mixed freight	0	0	0	97	0	2	386.1
	Other	0	0	10	82	3	4	3,529.6
	Total	**0**	**18**	**9**	**64**	**5**	**4**	**18,055.9**

n.e.c.=not elsewhere classified
Source: BTS and FHWA Freight Analysis Framework 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4); however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value was adjusted for inflation.
Other includes: multiple modes & mail, no domestic mode, and other, and unknown.

Table 3 shows the top 15 commodities moved by value and the freight modes used. These top 15 commodities account for 73 percent of all value shipped. Trucks overwhelmingly transport high-value commodities such as electronics, mixed freight shipments, vehicles, and machinery. Air shows up prominently in this table, especially for higher-value, time-sensitive commodities such as electronics, machinery, pharmaceuticals, and precision instruments.

Table 3. Commodity share of value by mode, 2015.

Rank	Top Commodities by Value	Mode (percent)						Billions of Dollars (2015)
		Air	Pipeline	Rail	Truck	Water	Other	
1	Electronics	15	0	0	62	2	21	1726.9
2	Motorized vehicles	1	0	7	77	2	13	1513.9
3	Mixed freight	1	0	0	90	2	7	1505.4
4	Machinery	7	0	1	77	3	12	1185.4
5	Gasoline	0	31	2	59	7	1	1165.3
6	Coal-n.e.c.	0	57	3	35	4	1	967.8
7	Pharmaceuticals	8	0	0	53	1	38	932.2
8	Fuel oils	0	27	1	56	15	1	880.1
9	Misc. mfg. prods.	7	0	0	65	1	26	816.3
10	Other foodstuffs	0	0	5	91	1	3	733.2
11	Plastics/rubber	1	0	12	76	2	9	732.8
12	Textiles/leather	2	0	0	73	3	22	673.4
13	Crude petroleum	0	49	4	3	14	31	610.5
14	Base metals	1	0	8	85	2	5	560.8
15	Precision instruments	20	0	0	44	2	35	492.7
	Other commodities	3	1	6	79	3	8	5373.9
	Total	**4**	**8**	**3**	**69**	**4**	**12**	**19870.7**

n.e.c.=not elsewhere classified
Source: BTS and FHWA Freight Analysis Framework 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: Other includes: multiple modes & mail, no domestic mode, and other and unknown.

Multimodal Perspective – Modal Trends

Freight volumes increased rapidly throughout most of the 1990s and 2000s as shown in Table 4. Even though the economic recession of 2008 temporarily decreased freight ton-miles, after 2010 growth has rebounded strongly to pre-recession averages. Looking into the future, the U.S. Department of Transportation (USDOT) forecasts total ton-miles to grow at 1 percent per year through 2040. Projections of steady economic growth (the economy doubling in size by 2045) and population growth (an additional 68 million people by 2045) will drive this increase in freight transportation demand.

The USDOT expects different freight modes to grow at different rates. Trucks have been rapidly gaining mode share since 1990 and will continue to do so out to 2040. Rail has also been steadily gaining mode share over the last two decades, although the USDOT expects these advances to slow down in the medium term and reverse in the long term, as several key bulk commodities play a smaller role in the economy (refer to page 6).

Table 4. Historical and forecasted mode share of ton-miles, 1990 to 2040.

Domestic Mode	Ton-Miles Mode Share					Average Annual Growth Rate (percent)			
						Historical		Forecast	
	1990	2000	2010	2015	2040	1990 to 2000	2000 to 2010	2010 to 2015	2015 to 2040
Truck	36.4%	42.3%	44.0%	46.5%	54.4%	3.2	1.0	3.0	1.6
Railroad	22.9%	28.1%	29.4%	28.7%	25.9%	3.8	1.1	1.4	0.6
Pipeline	22.0%	17.3%	17.0%	16.7%	12.1%	-0.8	0.5	1.5	-0.3
Domestic Water Transportation	17.9%	11.5%	8.8%	7.4%	6.8%	-2.8	-2.0	-1.8	0.6
Air	0.8%	0.7%	0.8%	0.7%	0.7%	1.1	1.0	0.9	0.8
Total Ton-Miles (trillions)	**4.77**	**5.62**	**5.98**	**6.56**	**8.39**	**1.6**	**0.6**	**1.9**	**1.0**

Source: *Draft National Freight Strategic Plan* (https://www.transportation.gov/sites/dot.gov/files/docs/draft_NFSP_for_Public_Comment_508_102015201520v1.pdf), BTS Special Tabulation, Figure 4.

Table 5 shows that, from 2007 to 2015, substantial decreases in tons shipped for almost all modes occurred because of the economic recession. Pipelines, which saw almost double-digit growth from the boom in natural gas and petroleum production, are one exception; however, as shown in Table 4, The Freight Analysis Framework (FAF) forecasts pipelines to grow at a slower pace in the coming decades, mainly in response to volatility in the energy markets. Air cargo tons and value have also grown quickly over the past several years—a trend that is expected to continue out to 2045.

Table 5. Historical and forecasted tons and value, 2007 to 2045.

Domestic Mode	Historical Average Annual Growth Rate 2007 to 2015 (percent)		Forecasted Average Annual Growth Rate 2015 to 2045 (percent)	
	Tons	Value	Tons	Value
Air (include truck-air)	4.4	9.1	4.1	4.8
Multiple modes & mail	-4.7	0.0	1.6	2.4
No domestic mode	-1.2	2.7	0.3	0.3
Other and unknown	-24.5	-20.6	-0.3	4.7
Pipeline	9.0	6.5	1.1	0.7
Rail	-2.2	0.4	0.7	2.0
Truck	-1.8	-0.2	1.2	2.1
Water	3.1	14.5	1.1	2.6
Total	**-0.6**	**0.5**	**1.1**	**2.2**

Source: USDOT, Draft National Freight Strategic Plan, BTS Special Tabulation, Figure 4. (https://www.transportation.gov/sites/dot.gov/files/docs/Draft_NFSP_for_Public_Comment_508_10%2015%2015%20v1.pdf).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 to 2015; however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value was adjusted for inflation.

Multimodal Perspective – Commodity Forecast

The FAF developed forecasts by projecting the level of economic activity in each commodity-producing industry and deriving freight transportation requirements. Table 6 provides a summary of these commodity-level projections. From 2007 to 2015, the economic recession depressed the flows of most commodities. The commodities that decreased the most in tonnage were waste/scrap, cereal grains, coal, gravel, and nonmetal mineral products. At the same time, measured by value, several commodities grew consistently over this period, such as mixed freight, gasoline, coal-n.e.c. (not elsewhere classified—mostly natural gas and petroleum products), fuel oils, and crude petroleum. Note that some of the growth in coal-n.e.c. can be attributed to a change in how activity was measured in the FAF; however, there has clearly been a rapid increase in natural gas production over the past five years.

Looking into the future, FAF forecasts tonnage growth in coal-n.e.c., nonmetal mineral products, other foodstuffs, waste/scrap, and basic chemicals. In terms of value, significant growth is expected from electronics, machinery, pharmaceuticals, and miscellaneous manufacturing products. Growth in these high value commodities will drive mode share increases for air (Table 5), while declines in bulk commodities will have a negative impact on rail mode share.

Table 6. Historical and forecasted commodity flows, 2007 to 2045.

Rank	Top Commodities by Tons	Tons		Rank	Top Commodities by Value	Value	
		Historical Average Annual Growth Rate 2007 to 2015 (percent)	Forecasted Average Annual Growth Rate 2015 to 2045 (percent)			Historical Average Annual Growth Rate 2007 to 2015 (percent)	Forecasted Average Annual Growth Rate 2015 to 2045 (percent)
1	Coal-n.e.c.	9.3	1.5	1	Electronics	0.7	3.8
2	Gravel	-2.7	1.0	2	Motorized vehicles	0.6	1.3
3	Gasoline	2.5	-0.5	3	Mixed freight	2.7	1.7
4	Cereal grains	-3.6	0.9	4	Machinery	-6.4	3.3
5	Nonmetal min. prods.	-3.2	1.6	5	Gasoline	5.0	-0.6
6	Fuel oils	4.4	-0.3	6	Coal-n.e.c.	6.5	1.5
7	Coal	-4.5	-1.0	7	Pharmaceuticals	-1.0	3.4
8	Crude petroleum	1.0	-0.1	8	Fuel oils	8.0	-0.4
9	Other foodstuffs	3.4	1.8	9	Misc. mfg. products	0.4	3.0
10	Waste/scrap	-8.5	1.7	10	Other foodstuffs	1.9	2.0
11	Natural sands	-0.2	1.4	11	Plastics/rubber	1.3	2.5
12	Other ag prods.	3.0	1.6	12	Textiles/leather	-2.1	1.1
13	Wood prods.	0.5	0.8	13	Crude petroleum	4.8	-0.1
14	Basic chemicals	-1.6	2.0	14	Base metals	-1.6	1.4
15	Mixed freight	1.5	1.5	15	Precision instruments	1.4	4.5
	Other commodities	-2.5	1.8		Other commodities	-0.3	2.1
Total		**-0.6**	**1.1**	**Total**		**0.5**	**2.2**

n.e.c.=not elsewhere classified, ag=agricultural, mfg.=manufacturing, min=mineral, prods=products
Data Source: BTS and FHWA, Freight Analysis Framework, version 3.5 and 4.2, 2016 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4); however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value was adjusted for inflation.

Multimodal Perspective – International Trade

Trade with other countries has increased rapidly in recent decades, bringing the value of exports and imports to a total of $3.9 trillion in 2013. The freight transportation sector plays a critical role in connecting the U.S. economy to the rest of the world and ensuring the competitiveness of American businesses.

With the implementation of North American Free Trade Agreement (NAFTA) and increasing regional economic integration, U.S. border crossings have become an ever more important part of the freight transportation system. Trade by land between the United States and Mexico quadrupled in value from 1995 to 2014. Table 7 shows that each year around 11.2 million trucks and 2.0 million rail containers cross the Mexican or Canadian borders. Since 2010, truck crossings have increased at the fast pace of 2.4 percent per year and rail container crossings have grown at the impressive rate of 7.6 percent per year. Freight activity at the borders has rebounded strongly since the economic recession of 2008, with most of the gains coming from trade with Mexico.

Table 7. Thousands of border crossings and average annual percentage change, 2000 to 2014.

Type of Border	Shipment Type	2000	2010	2014	Annual Average Growth Rate (percent)	
					2000 to 2010	2010 to 2014
Canadian Border	Trucks	7,048	5,444	5,802	-2.5	1.6
	Loaded truck containers	5,335	4,171	4,145	-2.4	-0.2
	Trains	33	26	29	-2.4	2.8
	Loaded rail containers	1,215	1,209	1,575	0.0	6.8
Mexican Border	Trucks	4,526	4,743	5,415	0.5	3.4
	Loaded truck containers	2,350	3,174	3,779	3.1	4.5
	Trains	7	8	10	1.3	5.7
	Loaded rail containers	266	318	474	1.8	10.5
Both Borders	Trucks	11,574	10,187	11,217	-1.3	2.4
	Loaded truck containers	7,685	7,345	7,924	-0.5	1.9
	Trains	40	34	39	-1.6	3.5
	Loaded rail containers	1,481	1,527	2,049	0.3	7.6

Source: BTS Freight Facts and Figures 2015 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm), Table 2-11.
Note: "Number of trains" includes both passenger and freight trains.

Truck – Commodities Moved

Trucks carry 64 percent of the tons and 69 percent of the value moved in the United States. As shown in Table 8, the top commodities moved by truck are gravel, nonmetallic mineral products, and cereal grains, which together represent more than 30 percent of all truck tons; however, from 2007 to 2015 all three of these commodities saw significant declines, leading overall truck tons to decline at an average rate of 1.8 percent during this period, despite commodities such as gasoline, other foodstuffs, and fuel oils increasing. The FAF predicts a rebound in truck tons over the coming decades, with an average growth rate of 1.2 percent per year.

On the other hand, as seen in Table 9, the top commodities in terms of value are mixed freight, motorized vehicles, and electronics. These three commodities saw moderate growth from 2007 to 2015; however, the fourth top commodity, machinery, saw a precipitous decline during this time. The FAF forecast predicts strong growth in electronics, pharmaceuticals, miscellaneous manufactured products, and a sharp rebound in machinery freight during the 2015-2045 period.

Table 8. Top commodities moved by truck, 2007 to 2045.

Rank	Top Commodities by Tonnage	Million Tons 2015	Percent of Tons	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Gravel	1,643	14.3	-2.7	1.0
2	Nonmetal mineral products	1,004	8.7	-3.4	1.6
3	Cereal grains	844	7.3	-4.1	0.8
4	Gasoline	719	6.2	2.6	-1.0
5	Other foodstuffs	630	5.5	3.3	1.8
6	Waste/scrap	599	5.2	-8.8	1.6
7	Fuel oils	541	4.7	4.6	-0.9
8	Natural sands	527	4.6	0.3	1.5
9	Other agricultural products	479	4.2	3.5	1.5
10	Coal-n.e.c.	407	3.5	-1.1	1.5
11	Wood products	390	3.4	0.8	0.7
12	Mixed freight	375	3.3	1.5	1.4
13	Logs	317	2.8	-5.8	0.9
14	Animal feed	299	2.6	3.8	1.4
15	Base metals	297	2.6	-1.4	1.4
	Other commodities	2,442	21.2	-2.6	1.7
Total		**11,513**	**100.0**	**-1.8**	**1.2**

n.e.c.=not elsewhere classified, USD=U.S. dollars

Source: BTS and FHWA Freight Analysis Framework, version 3.5 and 4.2, 2016 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).

Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4); however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value was adjusted for inflation..

Table 9. Top commodities moved by truck, by value, 2007 to 2045.

Rank	Top Commodities by Value	Billion USD 2015	Percent of USD	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Mixed freight	1,315	9.9	3.8	1.5
2	Motorized vehicles	1,131	8.5	2.5	1.2
3	Electronics	1,029	7.8	1.9	3.7
4	Machinery	882	6.6	-6.5	3.1
5	Gasoline	671	5.1	6.1	-1.0
6	Other foodstuffs	646	4.9	2.9	1.9
7	Plastics/rubber	537	4.0	2.5	2.3
8	Misc. manufactured products	516	3.9	1.6	3.1
9	Pharmaceuticals	477	3.6	-3.0	3.2
10	Fuel oils	475	3.6	9.6	-1.0
11	Textiles/leather	474	3.6	-0.9	1.0
12	Base metals	461	3.5	0.3	1.4
13	Articles-base metal	380	2.9	-3.0	2.0
14	Furniture	361	2.7	7.2	2.5
15	Chemical products.	358	2.7	0.7	2.6
	Other	3,553	26.8	1.1	1.9
Total		**13,267**	**100.0**	**1.1**	**2.1**

USD=United States Dollar
Source: BTS and FHWA Freight Analysis Framework 3.5 and 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4); however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value was adjusted for inflation.

Source: Thinkstock

Truck – Sector Characteristics

The truck fleet in service is highly diverse and provides a variety of functions throughout the country. As shown in Table 10, single-unit trucks travel more frequently on urban roads than combination trucks, as they are used more frequently for urban deliveries. On the other hand, combination trucks travel more frequently on intercity routes, accruing more mileage on interstate highways.

Table 10. Truck vehicle miles traveled by roadway type, 2014.

Roadway Type	Single-Unit Trucks		Combination Trucks		All Vehicles	
	Billion VMT	Percent	Billion VMT	Percent	Billion VMT	Percent
Rural - Total	42.7	39	89.5	53	234.3	30
Rural - Interstate	9.3	8	46.8	28	355.1	8
Rural - Arterial	16.3	15	29.3	17	334.4	12
Rural - Other	17.1	16	13.4	8	920.9	11
Urban - Total	66.6	61	80.4	47	519.8	70
Urban - Interstate	16.5	15	40.9	24	1,584.9	17
Urban - Other	50.1	46	39.5	23	2,104.7	52
Total Urban and Rural	**109.3**	**100**	**169.8**	**100**	**3,025.7**	**100**

VMT = vehicle miles traveled
Source: FHWA Highway Statistics 2014, Table VM-1 (https://www.fhwa.dot.gov/policyinformation/statistics/2014/vm1.cfm).
Note: Single-units trucks have two axles and at least six tires or a gross vehicle weight rating exceeding 10,000 lbs.

As shown in Table 11, combination trucks and single-unit trucks account for 9.2 percent of total miles driven in the United States in 2014. In that year, 8.3 million single-unit trucks and 2.5 million combination trucks were registered. On average, combination trucks drove around six times more miles per year than single-unit trucks.

Table 11. Truck vehicle miles traveled and registrations, 2014.

Vehicle Type	Urban and Rural Miles		Registered Vehicles		Average VMT per year
	Billion VMT	Percent	Billion VMT	Percent	
Single-unit trucks	109.3	3.6	8.33	3.2	13,123
Combination trucks	169.8	5.6	2.58	1.0	65,897
All Vehicles	**3,025.7**	**100.0**	**260.4**	**100.0**	**11,621**

VMT = vehicle miles traveled
Source: FHWA Highway Statistics 2014, Table VM-1, (https://www.fhwa.dot.gov/policyinformation/statistics/2014/vm1.cfm).

As can be seen in Table 12, total truck miles decreased from 2007 to 2010 primarily due to the effects of the economic recession. Single-unit truck vehicle miles traveled (VMT) decreased more quickly than VMT for combination trucks. The mileage traveled by all vehicles in the United States decreased as well, albeit not as quickly. Since 2010, most of the increase in truck travel has been on urban interstate highways, where truck traffic is growing at a pace much faster than general traffic, while declines in truck travel have occurred on rural interstates and non-interstate roads.

Table 12. Trends in truck vehicle miles traveled and registrations, 2007 to 2013 (percent).

Variables		Urban		Rural		All Roads
		Interstate	Non-Interstate	Interstate	Non-Interstate	
Average Annual Growth Rate 2007 to 2010	System lane-miles	1.12	1.69	0.02	0.02	0.49
	Single-unit truck VMT	-4.51	-3.08	0.45	-2.16	-2.64
	Combination truck VMT	-2.70	-0.36	-2.62	-0.55	-1.55
	All vehicle VMT	-0.38	-0.21	-1.42	-1.66	-0.71
Average Annual Growth Rate 2010 to 2013	System lane-miles	2.34	2.35	-0.74	-0.56	0.29
	Single-unit truck VMT	2.27	-0.07	-6.21	-2.88	-1.27
	Combination truck VMT	3.29	-2.68	-0.74	-4.73	-1.41
	All vehicle VMT	1.88	0.79	-1.57	-1.41	0.24

VMT = vehicle miles traveled
Source: FHWA Highway Statistics 2007 - 2014, Table VM-1 (https://www.fhwa.dot.gov/policyinformation/statistics/2014/vm1.cfm).

Currently in the United States, more than 4 million centerline miles of public roads exist, of which 230,000 are interstates or high-volume highways. Roadway lane miles increased at 0.5 percent per year from 2007 to 2010 and 0.3 percent per year from 2010 through 2013. The roadway network also includes more than 600,000 bridges.

Rail – Commodities Moved

Rail moves 9.0 percent of tons and 3.0 percent of freight value in the United States. The single most important commodity for rail is coal. As can be seen in Table 13, in 2015 coal accounted for 36.3 percent of all tons moved. However, from 2007 to 2015, shipments of coal have been declining rapidly, averaging 6.1 percent per year. The FAF predicts that these declines will continue as the energy mix within the United States changes in response to more stringent environmental regulations and the emergence of alternative energy sources.

Declines in coal shipments from 2007 to 2015 were partially offset by increases in shipments of other energy products, such as crude petroleum and gasoline, because pipeline capacity could not accommodate the boom in domestic production. However, this is unlikely to continue as pipeline capacity catches up to demand and uncertainty in world oil markets makes U.S. crude less competitive. Shipments of other commodities such as cereal grains, fertilizers, plastic/rubber, and other foodstuffs have increased since 2007 and are expected to continue increasing out to 2045.

Table 13. Top commodities moved by rail, by tonnage, 2007 to 2045.

Rank	Top Commodities by Tonnage	Million Tons 2015	Percent of Tons	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Coal	615.0	36.3	-6.1	-1.3
2	Cereal grains	197.7	11.7	2.3	0.8
3	Basic chemicals	111.7	6.6	-0.8	2.1
4	Gravel	79.0	4.7	0.2	0.7
5	Fertilizers	69.7	4.1	5.4	1.5
6	Plastics/rubber	58.4	3.4	2.8	2.9
7	Metallic ores	56.5	3.3	-0.2	0.5
8	Other foodstuffs	48.8	2.9	5.9	2.1
9	Coal-n.e.c.	47.9	2.8	-6.9	1.6
10	Base metals	45.1	2.7	-2.9	1.3
11	Nonmetal mineral products	38.0	2.2	6.6	1.7
12	Crude petroleum	35.8	2.1	65.3	-0.9
13	Waste/scrap	30.7	1.8	-4.0	1.6
14	Wood products	28.1	1.7	-2.3	2.0
15	Other agricultural products	26.1	1.5	5.3	1.7
	Other	205.2	12.1	-0.1	1.8
Total		**1,693.5**	**100.0**	**-2.2**	**0.7**

n.e.c.=not elsewhere classified, USD=U.S. dollars

Source: BTS and FHWA Freight Analysis Framework, version 3.5 and 4.2, 2016 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4); however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table.Value was adjusted for inflation.

Table 14. Top commodities moved by rail, by value, 2007 to 2045.

Rank	Top Commodities by Value	Billion USD 2015	Percent of USD	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Motorized vehicles	103.3	15.2	-3.6	2.1
2	Plastics/rubber	86.5	12.8	3.5	3.1
3	Basic chemicals	80.7	11.9	0.1	2.3
4	Cereal grains	53.6	7.9	6.4	0.9
5	Base metals	44.3	6.5	-4.9	1.4
6	Other foodstuffs	33.6	4.9	8.7	2.4
7	Coal-n.e.c.	30.1	4.4	-4.5	1.6
8	Crude petroleum	24.7	3.6	71.4	-0.9
9	Coal	23.7	3.5	-2.8	-1.0
10	Fertilizers	23.1	3.4	8.3	1.7
11	Gasoline	18.7	2.8	14.9	1.9
12	Newsprint/paper	17.6	2.6	-2.0	1.5
13	Other agricultural products	15.2	2.2	8.4	2.0
14	Chemical products	12.6	1.9	1.4	3.0
15	Machinery	11.2	1.6	-3.0	4.1
	Other	99.4	14.7	-1.1	2.2
Total		**678.3**	**100.0**	**0.4**	**2.0**

n.e.c.=not elsewhere classified, USD=U.S. dollars
Source: BTS and FHWA, Freight Analysis Framework, version 3.5 and 4.1, 2016 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 to 2015; however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table.

Faced with declines and slow growth in coal and other bulk commodities transported by carload service, railroads have generally adopted the strategy of improving the competitiveness of their intermodal service to gain market share from trucks. Railroads have accomplished this by reducing travel times, improving reliability, and serving a wider variety of markets. As can be seen in Table 15, the majority of freight still used carload service, representing 90 percent of tons and 84 percent of ton-miles. However, since 2000 there has been a steady increase in the proportion of intermodal freight in terms of both tons and ton-miles. At the same time, rail shipments appear to be growing in length as railroads connect markets farther away from each other.

Table 15. Rail intermodal vs carload, 2000 to 2014.

Variables	2000	2010	2014	Average Annual Growth Rate (percent)	
				2000 to 2010	2010 to 2014
Total Rail Tons (billion)	**2.02**	**1.85**	**1.88**	**-0.9**	**0.5**
Share Carload Tons	91.9	91.3	89.8	-	-
Share Intermodal Tons	8.1	8.7	10.2	-	-
Total Rail Ton-mile (trillion)	**1.51**	**1.69**	**1.81**	**1.1**	**1.7**
Share Carload Ton-miles	84.4	84.8	83.5	-	-
Share Intermodal Ton-miles	15.6	15.2	16.5	-	-
Rail Length of Haul (miles)	**748**	**916**	**963**	**2.0**	**1.3**
Carload Length of Haul (miles)	688	851	896	2.2	1.3
Intermodal Length of Haul (miles)	1,443	1,598	1,562	1.0	-0.6

Source: STB Public Waybill Samples 2000 - 2014 (https://www.stb.dot.gov/stb/industry/econ_waybill.html).

Table 16 highlights the commodity trends that are driving changes in intermodal and carload freight activity. Of the top six carload commodities, half have declined rapidly since 2010. Coal declined at 2.2 percent per year over this period, which affected rail greatly as it contributed to 40 percent of carload ton-miles in 2014. On the other hand, freight flows of crude petroleum have almost doubled each year since 2010, and shipments of nonmetallic minerals have grown substantially at 16 percent per year. Since 2010, intermodal ton-miles have grown three times faster than carload ton-miles. Most of this growth came from shipments of chemical products, apparel, food, and paper.

Table 16. Top carload commodities by rail service type, by ton miles, 2000 to 2014.

Rank	Top Carload Commodities by Ton-miles	Billions of Ton-miles 2014	Percent of Ton-miles	Average Annual Growth Rate (percent)	
				2000 to 2010	2010 to 2014
1	Coal	614.2	40.6	2.3	-2.2
2	Chemical products	192.0	12.7	1.8	1.9
3	Agriculture	148.7	9.8	2.2	-2.5
4	Food	108.7	7.2	2.8	-1.5
5	Crude petroleum	88.7	5.9	28.6	95.2
6	Nonmetallic minerals	81.0	5.4	1.0	15.5
7	Lumber	48.6	3.2	-5.2	4.7
8	Refined petroleum products	42.7	2.8	0.8	3.5
9	Metal	42.2	2.8	-2.6	2.8
10	Paper	37.3	2.5	-2.9	-2.0
11	Transportation equipment	37.2	2.5	-4.1	7.3
12	Clay, concrete, glass	31.7	2.1	-3.1	3.1
13	Waste	17.7	1.2	-0.8	-2.3
14	Metallic ores	17.2	1.1	0.8	0.7
15	Hazardous materials	1.8	0.1	0.5	6.0
	Other	3.1	0.2	-9.6	-5.1
Total		**1,512.7**	**100.0**	**1.2**	**1.3**

Source: STB Public Waybill Samples 2000 - 2014 (https://www.stb.dot.gov/stb/industry/econ_waybill.html).

Source: Thinkstock

Table 17. Top intermodal commodities by rail service type, by ton miles, 2000 to 2014.

Rank	Top Intermodal Commodities by Ton-miles	Billions of Ton-miles 2014	Percent of Ton-miles	Average Annual Growth Rate (percent)	
				2000 to 2010	2010 to 2014
1	Misc. mixed shipments	186.0	62.4	0.0	3.3
2	Food	21.2	7.1	3.9	5.6
3	Agriculture	13.8	4.6	19.1	0.7
4	Chemical products	11.1	3.7	3.9	17.1
5	Shipping containers	9.7	3.2	-0.2	-0.9
6	Paper	8.3	2.8	5.0	6.7
7	Apparel	7.2	2.4	9.2	12.9
8	Transportation equipment	7.2	2.4	0.9	9.7
9	Waste	4.4	1.5	7.5	0.3
10	Freight forwarder traffic	3.8	1.3	-2.9	-8.7
11	Rubber/plastics	3.7	1.2	8.3	0.6
12	Electrical equipment	2.6	0.9	5.2	7.9
13	Small packaged freight	2.6	0.9	-5.5	4.4
14	Furniture	2.4	0.8	3.0	12.1
15	Metal products	1.9	0.6	9.5	2.7
	Other	12.2	4.1	-4.1	2.1
Total		**298.2**	**100.0**	**0.9**	**3.9**

Source: STB Public Waybill Samples 2000 - 2014 (https://www.stb.dot.gov/stb/industry/econ_waybill.html).

Rail – Sector Characteristics

The railroad sector has undergone significant changes over the last 20 years. As Table 18 shows, track mileage has decreased rapidly since 1990 as the sector shed less profitable routes and focused on key corridors. Declines in total system mileage have occurred primarily in parts of the network owned by Class 1 and regional railroads, while the system miles owned by local railroads have grown over this period. Overall railroad productivity has soared, allowing railroads to move more freight with less. In 2012, Class 1 railroads owned 69 percent of system miles, with the remainder split between regional and local railroads.

Table 18. Rail industry characteristics, 1990 to 2013.

Key Variables	1990	2000	2010	2011	2012	2013	Average Annual Growth Rate (percent)	
							1990 to 2000	2000 to 2011
System Miles - All Rail	175,909	170,512	138,576	138,518	138,477	-	-0.31	-2.05
System Miles - Class 1	133,189	120,597	95,573	95,387	95,264	-	-0.99	-2.30
System Miles - Regional	18,375	20,978	10,407	10,355	10,355	-	1.33	-6.77
System Miles - Local	24,337	28,937	32,596	32,776	32,858	-	1.75	1.20
Railroad Companies	530	560	565	567	-	-	0.55	0.09
Class 1 Railroads	14	8	7	7	-	-	-5.44	-1.33
Other Railroads	516	552	558	560	-	-	0.68	0.11
Class 1 Locomotives	18,835	20,028	23,893	24,250	24,707	25,033	0.62	1.78
Class 1 Freight Cars	658,902	560,154	397,730	380,699	380,641	373,838	-1.61	-3.37
Other Freight Cars	103,527	132,448	101,755	95,972	92,742	88,122	2.49	-2.60
Carloads (million)	21.4	27.8	29.2	30.0	28.4	28.8	2.64	0.51
Revenue Ton-miles (trillion)	1.03	1.47	1.69	1.73	1.71	1.74	3.55	1.44
Tons (billions)	1.42	1.74	1.85	1.85	1.76	1.76	2.01	0.63

Source: AAR Railroad Facts 2014 Edition; *BTS National Transportation Statistics* (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_01_11.html).

Waterborne – Commodities Moved

The rapid increase of international trade over the past decades, especially across the Pacific Ocean, has given added importance to ports and other waterborne infrastructure in the U.S. economy. Unlike the commodity tables for other modes that have focused on freight movements within the country, Table 19 includes both domestic and international shipments. It is necessary to include international shipments because waterborne transportation plays a more important role in connecting America to the rest of the world than moving goods internally—around 72 percent of international trade tons leave or enter the United States by water.

Energy commodities such as crude petroleum, gasoline, coal, and fuel oils represent the top four commodities by tonnage, accounting for 48 percent of all tons in 2015. From 2007 to 2015, crude, petroleum, and cereal grains decreased substantially, although increases in fuel oils, coal, gasoline, and other agriculture products partially offset these declines.

Crude petroleum is also a top commodity handled in terms of value, although consumer goods on international shipments play a larger role by this metric. Motorized vehicles, machinery, electronics, and textiles are the top commodities moved in terms of value and are likely to continue growing through 2045 as international trade continues to expand. Indeed, FAF projects waterborne tons to grow at 2.6 percent per year and value to grow at 3.9 percent per year, which is significantly faster than looking just at domestic waterborne cargo (Table 19 and 20).

Table 19. Top commodities moved by domestic and international waterborne, by tonnage, 2007 to 2045.

Rank	Top Commodities by Tonnage	Million Tons 2015	Percent of Tons	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Crude petroleum	265.8	19.1	-6.3	0.3
2	Fuel oils	192.7	13.8	8.5	1.4
3	Coal	127.8	9.2	7.0	1.3
4	Cereal grains	82.9	5.9	-1.9	2.5
5	Gasoline	82.7	5.9	6.0	-0.2
6	Other agricultural products	70.6	5.1	4.5	4.3
7	Basic chemicals	57.1	4.1	0.5	4.1
8	Nonmetallic minerals	41.8	3.0	-5.1	1.6
9	Waste/scrap	40.4	2.9	0.3	4.9
10	Base metals	38.6	2.8	1.1	1.9
11	Metallic ores	37.7	2.7	0.1	1.6
12	Other foodstuffs	33.5	2.4	4.8	4.1
13	Plastics/rubber	29.0	2.1	1.6	4.6
14	Machinery	24.6	1.8	5.1	4.7
15	Fertilizers	24.0	1.7	2.4	1.3
	Other commodities	245.6	17.6	-3.8	4.3
	Total	**1,394.8**	**100.0**	**-0.7**	**2.6**

Source: BTS and FHWA Freight Analysis Framework 3.5 and 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4); however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value adjusted for inflation.

Source: Thinkstock

Table 20. Top commodities moved by domestic and international waterborne, by value, 2007 to 2045.

Rank	Top Commodities by Value	Billion USD 2015	Percent of USD	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Motorized vehicles	197.6	9.8	1.2	2.8
2	Machinery	173.2	8.6	0.9	4.8
3	Crude petroleum	172.9	8.6	-3.1	0.2
4	Electronics	171.9	8.5	4.4	5.2
5	Textiles/leather	144.8	7.2	1.8	4.0
6	Fuel oils	135.6	6.7	14.0	1.5
7	Plastics/rubber	94.3	4.7	3.9	4.5
8	Basic chemicals	83.6	4.1	2.8	4.2
9	Gasoline	75.1	3.7	9.1	-0.2
10	Other agricultural products	68.0	3.4	8.6	4.4
11	Articles-base metal	60.4	3.0	2.7	3.2
12	Base metals	59.3	2.9	2.7	2.1
13	Misc. manufacturing products	54.4	2.7	0.3	4.7
14	Other foodstuffs	48.5	2.4	7.3	4.1
15	Chemical products	46.5	2.3	3.9	5.5
	Other commodities	429.3	21.3	4.3	4.6
Total		**2,015.4**	**100.0**	**3.0**	**3.9**

USD=U.S. dollars
Source: BTS and FHWA Freight Analysis Framework 3.5 and 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4); however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value was adjusted for inflation.

Waterborne – Main Ports

As Table 21 shows, on average, half of the tonnage handled at U.S. ports is domestic and the rest comprises either imports or exports. The Port of South Louisiana, Port of New Orleans, and Port of Baton Rouge handle a high proportion of domestic cargo, while ports on the West Coast, such as the Port of Los Angeles and the Port of Long Beach, primarily receive imports from Asia. Just 10 deep-water ports (that can accept large ships due to having water depth of 30 feet or more) are responsible for 65 percent of the value of containerized international trade.

Since 2010, the ports that have seen the fastest growth in tonnage have been the Port of South Louisiana, Port of Beaumont, Port of Corpus Christi, Port of New Orleans, and Port of Baton Rouge. It is uncertain how exactly the Panama Canal expansion will affect international shipping; however, the potential exists for this project to have a substantial impact on the geography of maritime transport. To take advantage of these changes many ports have invested significantly in dredging and deepening projects to accommodate larger ships, affecting their competitive position moving forward.

Table 21. Top ports by total tons, 2014.

Rank	Top Ports by Tons	2014				Average Annual Growth Rate of Total Tons (percent)	
		Total Million Tons	Percent Domestic	Percent Imports	Percent Exports	2000 to 2010	2010 to 2014
1	South Louisiana, Louisiana, Port	267.4	53	15	32	0.9	3.1
2	Houston, Texas	234.3	31	33	36	2.0	0.8
3	New York, New York and New Jersey	126.2	37	48	15	0.1	-2.4
4	Beaumont, Texas	87.3	39	45	16	0.0	3.2
5	Long Beach, California	85.0	13	56	31	0.8	3.0
6	Corpus Christi, Texas	84.9	47	31	22	-1.0	3.6
7	New Orleans, Louisiana	84.5	56	21	23	-2.2	3.9
8	Baton Rouge, Louisiana	69.2	62	19	20	-1.6	5.6
9	Mobile, Alabama	64.3	43	28	29	0.4	3.6
10	Los Angeles, California	61.0	9	56	34	2.6	-0.6
11	Lake Charles, Louisiana	56.8	49	35	15	0.3	1.0
12	Plaquemines, Louisiana, Port of	55.5	64	4	32	-0.7	-0.2
13	Cincinnati-Northern Kentucky, Ports	49.9	100	0	0	-	-
14	Norfolk Harbor, Virginia	48.0	13	22	66	-0.2	3.7
15	Texas City, Texas	47.9	39	32	28	-0.3	-4.1
16	Huntington - Tristate	46.4	100	0	0	-2.2	-6.8
17	St. Louis, Missouri and Illinois	38.9	100	0	0	-0.8	6.0
18	Duluth-Superior, Minnesota and Wisconsin	37.4	76	2	22	-1.3	0.5
19	Baltimore, Maryland	37.2	18	35	47	-0.3	-1.6
20	Port Arthur, Texas	36.7	30	20	50	3.9	4.9
	Other ports	986.8	55	25	20	-	-
	Total Top 150 Ports	**2,605.5**	**49**	**26**	**24**	**-**	**-**

Source: USACE US Waterway Data, Principal Ports of the United States (http://www.navigationdatacenter.us/data/datappor.htm).

There are approximately 360 commercial sea, river, and lake ports with 3,200 cargo and passenger terminals. Inland navigation is possible through an extensive network of 12,000 miles of waterways and 240 locks and dams. More than 38,000 domestic maritime vessels, including tugs, barges, and oceangoing ships, use these waterways.

Some ports specialize in the handling of containers on international shipments. Table 22 shows the number of containers passing through the top 20 ports in the U.S. The Ports of Los Angeles and Long Beach handled 32 percent of all containerized cargo. Along with the Ports of Oakland and Seattle, these serve as the main gateways for trade with Asia. On the East Coast, the Ports of New York/New Jersey, Savannah, and Hampton Roads are the largest handlers of containerized cargo. Inland access from the ports is provided by trucks and intermodal railroads.

Table 22. Top ports by twenty-foot equivalent units, 2015.

Rank	Top Port by TEUs	Millions of TEUs 2015	Percent Change 2014 to 2015
1	Los Angeles, California	8.16	-2.20
2	Long Beach, California	7.19	5.40
3	New York/New Jersey	6.37	10.40
4	Savannah, Georgia	3.74	11.70
5	Seattle/Tacoma Alliance, Washington	3.53	4.00
6	Hampton Roads, Virginia	2.55	6.50
7	Oakland, California	2.28	-4.90
8	Houston, Texas	2.13	9.20
9	Charleston, South Carolina	1.97	10.10
10	Honolulu, Hawaii (FY)	1.21	7.60
11	San Juan, Puerto Rico (FY)	1.21	-8.30
12	Port Everglades, Florida (FY)	1.06	4.70
13	Miami, Florida (FY)	1.01	15.00
14	Jacksonville, Florida (FY)	0.92	-2.30
15	Baltimore, Maryland	0.84	9.10
16	New Orleans, Louisiana	0.52	7.00
17	Anchorage, Alaska	0.49	-16.90
18	Philadelphia, Pennsylvania	0.43	-4.80
19	Wilmington, Delaware	0.34	0.90
20	Wilmington, North Carolina	0.29	4.60
	Other	1.87	-4.50
	Total US Ports	**48.11**	**3.80**

TEU=twenty-foot equivalent units, FY=fiscal year
Source: American Association of Port Authorities, NAFTA Container Port Ranking 2015 (http://www.aapa-ports.org/unifying/content.aspx?ItemNumber=21048).

Air – Commodities Moved

Air freight specializes in high value commodities that are time-sensitive. Table 23 shows that electronics and machinery represent the top commodities for air, combining to make up more than 30 percent of all tons shipped and more than 40 percent of all value shipped. From 2007 to 2015, many of the top commodities in terms of tonnage decreased, primarily because of the economic recession. This led the air sector as a whole to decline by 2.3 percent per year over that time. However, some commodities saw substantial growth, including meat/seafood, animal feed, and motorized vehicles. Looking into the future, the FAF projects air cargo to be the fastest growing freight mode in the United States, with tonnages growing at 4.3 percent per year and value growing at 5.0 percent per year. FAF predicts that almost all air cargo commodities will see substantial growth, with electronics, machinery, precision instruments, and pharmaceuticals growing the fastest. Tables 23 and 24 include freight shipments of more than 100 pounds moved by commercial or private aircraft providing freighter or express service.

Table 23. Top commodities moved by domestic or international air, by tonnage, 2007 to 2045.

Rank	Top Commodities by Tonnage	Million Tons 2015	Percent of Tons	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Electronics	2.11	19.9	0.3	5.0
2	Machinery	1.26	11.9	-6.6	4.7
3	Textiles/leather	0.81	7.7	-3.0	3.8
4	Other agricultural products	0.71	6.7	-1.2	4.6
5	Precision instruments	0.66	6.2	-0.7	5.7
6	Motorized vehicles	0.57	5.4	3.2	1.7
7	Articles-base metal	0.48	4.6	-1.9	3.7
8	Plastics/rubber	0.45	4.2	-1.7	4.3
9	Meat/seafood	0.43	4.0	17.3	3.1
10	Chemical products	0.38	3.6	-4.9	5.1
11	Animal feed	0.37	3.5	38.0	3.1
12	Misc. manufacturing products	0.36	3.4	-4.5	4.0
13	Basic chemicals	0.26	2.4	2.7	3.6
14	Pharmaceuticals	0.25	2.4	-0.1	5.0
15	Transport equipment	0.23	2.2	4.0	4.0
	Other commodities	1.25	11.8	-8.8	3.5
	Total	**10.58**	**100.0**	**-2.3**	**4.3**

Source: BTS and FHWA Freight Analysis Framework 3.5 and 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4), however these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value adjusted for inflation.

Table 24. Top commodities moved by domestic or international air, by value, 2007 to 2045.

Rank	Top Commodities by Value	Billion USD 2015	Percent of USD	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Electronics	392.1	31.8	2.6	5.2
2	Misc. mfg. products	162.5	13.2	0.5	5.0
3	Precision instruments	132.1	10.7	-0.5	6.1
4	Machinery	128.6	10.4	-8.2	4.8
5	Pharmaceuticals	99.6	8.1	1.9	5.1
6	Transportation equipment	79.8	6.5	0.1	4.1
7	Basic chemicals	78.2	6.3	10.0	4.1
8	Textiles/leather	27.9	2.3	-2.8	3.7
9	Motorized vehicles	23.2	1.9	8.1	2.0
10	Chemical products	22.1	1.8	1.0	5.2
11	Articles-base metal	16.4	1.3	2.5	3.6
12	Plastics/rubber	14.3	1.2	3.1	4.4
13	Mixed freight	11.7	1.0	-12.9	4.4
14	Nonmetal mineral products	5.9	0.5	0.5	4.4
15	Waste/scrap	5.3	0.4		5.6
	Other commodities	32.8	2.7	1.9	3.8
	Total	**1,232.4**	**100.0**	**0.0**	**5.0**

USD=U.S. dollars
Source: BTS and FHWA Freight Analysis Framework 3.5 and 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4), however these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value was adjusted for inflation.

Source: Thinkstock

Air – Main Airports

As Table 25 demonstrates, the airport that lands the most tons in the United States is Memphis International Airport, which is the air hub of FedEx. The airport with the second highest tonnage is Ted Stevens Anchorage International Airport, although the majority of tons landed never leave the airport because freighter airlines use it primarily as a refueling stop on international flights between Asia and the United States. The airport with the third highest tonnage is Louisville International Airport, which is the air hub of United Parcel Service. Currently more than 500 commercial airports and thousands of general aviation airports handle air cargo throughout the country.

Table 25. Top airports by air cargo, 2000 to 2013.

Rank	Airport Code	Top Airports by Landed Tons	Millions of Tons 2013	Percent of Tons	Average Annual Growth Rate (percent)	
					2000 to 2010	2010 to 2013
1	MEM	Memphis Intl.	4.58	13.6	33.2	2.0
2	ANC	Ted Stevens Anchorage Intl.	4.06	12.1	4.9	-7.1
3	SDF	Louisville International Airport	2.45	7.3	49.5	0.8
4	LAX	Los Angeles Intl.	2.03	6.0	2.2	0.5
5	MIA	Miami Intl.	2.11	6.3	3.1	1.3
6	ORD	Chicago O'Hare Intl.	1.57	4.7	3.2	-3.0
7	JFK	John F Kennedy Intl.	1.45	4.3	-0.7	-4.1
8	IND	Indianapolis Intl.	1.10	3.3	32.4	1.9
9	ATL	Hartsfield Jackson Atlanta Intl.	0.79	2.3	0.2	-1.7
10	DFW	Dallas Fort Worth Intl.	0.75	2.2	5.8	-3.4
11	EWR	Newark Liberty Intl.	0.74	2.2	6.0	-7.4
12	CVG	Cincinnati Northern Kentucky Intl.	0.66	2.0	7.5	15.4
13	OAK	Metropolitan Oakland Intl.	0.57	1.7	29.8	0.5
14	HNL	Honolulu Intl.	0.63	1.9	4.0	0.8
15	SFO	San Francisco Intl.	0.50	1.5	-5.7	-1.7
16	IAH	George Bush Intercontinental	0.50	1.5	6.1	-1.0
17	ONT	Ontario Intl.	0.47	1.4	34.0	0.4
18	PHL	Philadelphia Intl.	0.48	1.4	9.3	-2.7
19	SEA	Seattle Tacoma Intl.	0.41	1.2	2.8	-0.9
20	PHX	Phoenix Sky Harbor Intl.	0.29	0.9	5.9	0.9
		Other airports	7.46	22.2	7.2	-1.8
		Total	**33.61**	**100.0**	**6.9**	**-1.4**

Intl=International
Source: BTS, T-100 Segment Data, 2000 – 2013 (http://www.transtats.bts.gov/Fields.asp?Table_ID=293).
Note: Considers airports with landed weight in excess of 100 million pounds.

Pipeline – Commodities Moved

Pipelines are an important part of the freight transportation system, delivering energy commodities to consumers around the United States or acting as gateways for energy exports to foreign markets. Pipelines move the second highest volume in terms of tonnage and third highest value in terms of dollars. As Table 26 shows, 64.5 percent of the tonnage carried by pipeline is coal-n.e.c., which mostly consists of natural gas and petroleum products. The introduction of new technologies in the extraction of natural gas has increased U.S. production considerably, leading to substantial growth from 2007 to 2015. Looking out to 2045, FAF expects the growth for this commodity to slow but still remain positive.

Table 26. Top commodities moved by pipeline, by tonnage, 2007 to 2045.

Rank	Top Commodities by Tonnage	Million Tons 2015	Percent of Tons	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Coal-n.e.c.	2,127.3	64.5	16.2	1.5
2	Crude petroleum	448.1	13.6	1.0	-0.2
3	Gasoline	385.5	11.7	1.5	0.0
4	Fuel oils	302.8	9.2	4.3	0.0
5	Basic chemicals	34.1	1.0	-4.6	2.3
	Other	2.7	0.1	24.7	1.4
	Total	**3,300.4**	**100.0**	**9.0**	**1.1**

n.e.c.= not elsewhere classified, USD=U.S. dollars
Source: BTS and FHWA Freight Analysis Framework 3.5 and 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007 (version 3) to 2015 (version 4); however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value adjusted for inflation. Changes in the methodology used to account for natural gas from 2007 to 2015 could lead this table to overestimate the growth observed during this time period.

Table 27. Top commodities moved by pipeline, by value, 2007 to 2045.

Rank	Top Commodities by Value	Billion USD 2015	Percent of USD	Average Annual Growth Rate (percent)	
				Historical (2007 to 2015)	Forecasted (2015 to 2045)
1	Coal-n.e.c.	554.8	37.2	9.1	1.7
2	Gasoline	364.4	24.4	4.8	-0.1
3	Crude petroleum	299.9	20.1	4.8	-0.3
4	Fuel oils	241.6	16.2	7.7	0.0
5	Basic chemicals	29.4	2.0	-1.4	2.4
	Other	1.7	0.1	9.4	2.6
	Total	**1,491.9**	**100.0**	**6.5**	**0.7**

n.e.c.= not elsewhere classified, USD=U.S. dollars
Source: BTS and FHWA Freight Analysis Framework 3.5 and 4.2 (http://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm).
Note: FAF made specific revisions to its modal and commodity definitions from 2007(version 3) to 2015 (version 4); however, these changes are unlikely to alter significantly the tendency of the historical results shown in this table. Value adjusted for inflation. Changes in the methodology used to account for natural gas from 2007 to 2015 could lead this table to overestimate the growth observed during this time period.

As Table 28 demonstrates, there are more than 2.4 million miles of pipeline in the United States serving a variety of functions. The majority, around 93 percent, are used for natural gas (including distribution). Mileage in natural gas pipelines has grown on average 1.2 percent per year from 2004 to 2010, slowing to 0.6 percent per year from 2010 to 2014.

Table 28. Extent of pipeline network, 2004 to 2014.

Pipeline Use	Thousand Miles 2014	Percent of Miles	Average Annual Growth (percent)	
			2004 to 2010	2010 to 2014
Natural gas pipeline	**2,253.7**	**93.1**	**1.2**	**0.6**
Distribution main lines	1,142.3	47.2	1.2	0.7
Distribution service lines	783.5	32.4	1.8	0.9
Transmission	303.0	12.5	0.1	-0.2
Gathering	25.0	1.0	-3.9	-2.7
Oil	**111.7**	**4.6**	**1.1**	**1.8**
Crude oil	49.3	2.0	1.7	5.1
Refined petroleum	62.4	2.6	0.6	-1.2
Highly volatile liquids	**51.8**	**2.1**	**1.9**	**3.2**
Other	**3.2**	**0.1**	**6.0**	**4.0**
Total	**2,420.4**	**100.0**	**1.3**	**0.8**

Source: USDOT Pipeline and Hazardous Materials Safety Administration, Annual Report Mileage Summary Statistics (http://www.phmsa.dot.gov/portal/site/PHMSA/).

Around 4.6 percent of pipeline mileage involves the transportation of crude oil or refined petroleum products. Oil pipeline mileage increased after 2010, especially for crude oil, which grew at 5.1 percent per year. This growth has come from the resurgence of domestic crude oil production, especially in the Bakken fields in North Dakota and Montana and the Eagle Ford and Permian Basins in Texas.

According to the NFSP (https://www.transportation.gov/freight/NFSP), even though the pipeline network is extensive, it is better positioned to move crude oil imports than the new domestic production. However, recent volatility in international oil markets has slowed to a halt investments in new pipeline capacity.

2. IMPACTS AND PERFORMANCE

Economic Impacts

The freight transportation sector plays a fundamental role in the U.S. economy, enabling commerce, trade, and other economic activities. Table 29 provides an overview of its contribution to gross domestic product (GDP). Total U.S. GDP (in chained 2009 dollars) reached $15.6 trillion in 2013, after growing at an average pace of 1.6 percent per year from 2000 to 2010 (in spite of the economic recession), and 1.8 percent from 2010 to 2013 in real terms. Population increases and productivity improvements fueled this growth.

In 2013, 8.9 percent of U.S. GDP came from the transportation sector, including both passenger and freight modes. From 2000 to 2010, transportation expenditures decreased but then rebounded, growing at an average rate of 3.4 percent per year until 2013. The proportion of GDP spent on the transportation sector has been decreasing over the past decades.

Freight can either be transported by shippers themselves with their own equipment (in-house) or by contracted, specialized firms (for-hire). Certain specialized logistics providers (such as third party logistics providers, or 3PLs, and the specialized providers referenced generally by the new term "4PLs") also provide a wide range of supply-chain services, including warehousing, inventory management, and transportation. The for-hire freight transportation sector accounted for $440.5 billion in 2013 (chained 2009 dollars), representing 2.8 percent of the U.S. economy. As a proportion of the transportation sector, for-hire freight transportation accounts for almost 32 percent of income. It is likely that Table 29 underestimates the size of the freight sector because it only considers for-hire services; companies with in-house transportation capabilities are not considered. The proportion of the whole economy dedicated to for-hire freight transportation has remained fairly constant since 2000, which has important implications as the U.S. economy is expected to double in size over the next 30 years.

The Moving Ahead for Progress in the 21st Century Act (MAP-21) and Fixing America's Surface Transportation Act (FAST Act) legislation integrates performance into many federal transportation programs and contains several performance elements. The Federal Highway Administration (FHWA) is in the process of promulgating a rulemaking in consultation with States, metropolitan planning organizations, and other stakeholders in accordance with 23 U.S.C. 150. The requirements for freight performance measurement in the new National Highway Freight Program will measure freight movement and reliability on the Interstate System.

Table 29. Gross domestic product and employment in transportation, 2000 to 2013.

Economic Variables	2000	2010	2013	Average Annual Growth Rate (percent)	
				2000 to 2010	2010 to 2013
U.S. population	282.2	308.1	315.2	0.88	0.76
U.S. GDP (billions of chained 2009 $)	12,559.7	14,783.8	15,583.3	1.64	1.77
Total transportation-related GDP (billions of chained 2009 $)	1,347.9	1,251.2	1,381.8	-0.74	3.36
Percent of GDP in transportation	*10.7*	*8.5*	*8.9*	-	-
Total for-hire transportation services GDP (billions of chained 2009 $)	379.9	421.4	440.5	1.04	1.49
Percent of GDP in for-hire transportation services	*3.0*	*2.9*	*2.8*	-	-
Total U.S. labor force (thousand)	132,019	130,275	136,368	-0.13	1.54
Employment in transportation and warehousing (thousands)	4,410	4,191	4,495	-0.51	2.36
Percent of labor force in transportation and warehousing	*3.3*	*3.2*	*3.3*	-	-

GDP=gross domestic product
Source: US Census Bureau (http://www.census.gov/); BTS National Transportation Statistics, Tables 3-4, 3-4 and 3-23 (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/index.html#chapter_3).

Of the 136.3 million people employed in the United States in 2013, 3.3 percent worked in the transportation and warehousing sector. Since 2010, employment in this sector has increased much faster than employment in the rest of the economy, at 2.4 percent per year. Currently around 1.4 million people are employed in for-hire trucking.

Source: Thinkstock

Energy Consumption

Moving more than 18 billion tons each year, often across the country, requires a significant amount of energy. Table 30 contains estimates of the energy consumption of four key freight modes. Trucking is the mode that consumes the most energy today, even though total energy consumption has decreased over 1.3 percent per year since 2007. Initially the economic recession caused these declines, but since then, the positive trend has continued as truck fuel efficiency continues to inch upward, as shown in Table 31. The introduction of a wide range of fuel saving technologies in long-haul trucking, such as improvements in aerodynamics and low-rolling-resistance tires, has improved the fuel efficiency of modern trucks and will continue achieving energy savings as a greater proportion of the fleet is retrofitted.

Table 30. Energy consumption by mode in trillion British thermal units, 2007 to 2013.

Freight Mode	2000	2010	2013	Average Annual Growth Rate (percent)	
				2007 to 2010	2010 to 2013
Truck	6,549	6,245	6,005	-1.6	-1.3
Class I rail	567	488	515	-4.9	1.8
Water	1,367	1,194	1,003	-4.4	-5.6
Pipeline	642	695	888	2.7	8.5

BTU=British thermal unit
Source: BTS Freight Facts and Figures 2015, Table 6-7 (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/data_and_statistics/by_subject/freight/freight_facts_2015/chapter6/table6_7).

Total energy consumption by Class 1 railroads decreased from 2007 to 2010, but increased after 2010 due to increases in rail tonnage, which offset noteworthy improvements in rail fuel efficiency. In general, trains are getting longer, taller and heavier, carrying more freight with each unit of energy consumed.

Table 31. Freight fuel efficiency, 1990 to 2013.

Freight Mode	1990	2000	2010	2013	Average Annual Growth Rate (percent)		
					1990 to 2000	2000 to 2010	2010 to 2013
Single-unit trucks (miles/diesel gallon)	6.2	7.4	7.3	7.3	1.79	-0.14	0.00
Combination trucks (miles/diesel gallon)	5.8	5.3	5.9	5.8	-0.90	1.08	-0.57
Class 1 freight rail (ton-miles/diesel gallon)	329.9	394.1	480.5	468.9	1.79	2.00	-0.47
Domestic aircraft operations (miles/gallon)	0.32	0.41	0.54	0.59	2.51	2.79	3.00

Source: BTS National Transportation Statistics, Tables 4-8, 4-13 and 4-14 (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/index.html); AAR Railroad Facts 2014 Edition, pp. 63.

Climate Change

The energy sources used in freight transportation tend to have a large carbon footprint. As can be seen in Table 32, in 2013 freight transportation contributed to 7.7 percent of greenhouse gas emissions in the United States, representing 29 percent of all transportation-related emissions. Since 2000, emissions from the freight sector have been steadily increasing due to rising freight volumes, while emissions from the other transportation sectors and the rest of the economy have been decreasing. As can be seen in Table 33, most of the growth in greenhouse gas emissions has come from the trucking sector, although this growth slowed down after 2010. On the flipside, emissions from rail and pipelines appear to have accelerated since 2010. If the Freight Analysis Framework (FAF) forecast is realized, trucking will generate an even larger proportion of future freight-generated greenhouse gas emissions.

Table 32. Greenhouse gas emissions in the United States, 2000 to 2014.

	2000	2010	2013	2014	Average Annual Growth Rate (percent)	
					2000 to 2010	2010 to 2013
U.S. total ($MMTCO_2eq$)	7,259.0	6,985.0	6,800.0	6,870.0	-0.38	-0.41
Transportation sector ($MMTCO_2eq$)	1,926.70	1,832.00	1,794.00	1,814.50	-0.50	-0.24
Percent transportation of total	*26.5*	*26.2*	*26.4*	*26.4*	-	-
Freight transportation sector ($MMTCO_2eq$)	496.1	509.6	513	518.3	0.27	0.42
Percent freight of total	*6.8*	*7.3*	*7.0*	*7.5*	-	-

$MMTC0_2eq$= million metric tons carbon dioxide equivalent
Source: US EPA Draft U.S. Greenhouse Gas Inventory Report: 1990 – 2014, Figure 2-1 and ANNEX 3 Table A-118 (https://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Annex-3-Additional-Source-or-Sink-Categories.pdf).

Table 33. Freight greenhouse gas emissions, 2000 to 2014 (in million metric tons carbon dioxide equivalent).

Freight Mode	2000	2010	2013	2014	Average Annual Growth Rate (percent)	
					2000 to 2010	2010 to 2014
Trucking	347.5	389.7	395.7	407.4	1.2	1.1
Freight rail	40.9	38	39.7	41.8	-0.7	2.4
Ships and other boats	48.1	28.5	15.7	6.3	-5.1	-31.4
Pipelines	35.2	37.1	45.9	46.5	0.5	5.8
Commercial aircraft	20.1	16.3	15.9	16.2	-2.1	-0.2
Total	**496.1**	**509.6**	**513**	**518.3**	**0.3**	**0.4**

Source: US EPA Draft U.S. Greenhouse Gas Inventory Report: 1990 – 2014, ANNEX 3 Table A-118 (https://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Annex-3-Additional-Source-or-Sink-Categories.pdf).

Air Quality

The combustion of fossil fuels not only generates significant quantities of greenhouse gas emissions, it also leads to the emission of several additional air pollutants that are detrimental to the environment and human health. The amount of air pollution that each freight mode emits depends on the type of control technology installed, operational characteristics, and atmospheric conditions, among other variables. In addition, air pollution near urban areas will have a greater adverse impact than in sparsely populated areas. Table 34 provides an estimate of the average emission rates of three key air quality pollutants and greenhouse gas emissions.

Looking into the future, the implementation of stricter environmental regulations (e.g., curbing criteria pollutants and mitigating climate change) and continued improvements in vehicle technology will reduce emission rates in the coming years. Emissions of particulate matter are expected to improve the fastest for both trucks and rail, as already strict environmental standards are expected to be further tightened. Emissions of nitrous oxides and volatile organic compounds are also expected to improve substantially.

Table 34. Emission rates for trucks and rail, 2015 to 2040.

Type of Emissions		2015	2030	2040	Percentage of Forecasted Average Annual Improvement (2015 to 2040)
Combination Trucks	NOx grams/mile	9.02	2.48	2.04	-5.8
	PM10 grams/mile	0.367	0.050	0.029	-9.7
	VOC grams/mile	0.862	0.354	0.317	-3.9
	CO_2 grams/mile	1,879.4	1,704.5	1,683.5	-0.4
Single-Unit Trucks	NOx grams/mile	4.09	0.94	0.81	-6.3
	PM10 grams/mile	0.211	0.027	0.023	-8.5
	VOC grams/mile	0.880	0.236	0.210	-5.6
	CO_2 grams/mile	1,133.3	1,039.3	1,031.7	-0.4
Freight Rail	NOx grams/ton-mile	0.2671	0.0878	0.0400	-7.3
	PM10 grams/ton-mile	0.0070	0.0017	0.0006	-9.6
	VOC grams/ton-mile	0.0124	0.0033	0.0015	-8.1
	CO_2 grams/ton-mile	21.036	16.826	14.498	-1.5

NOx=nitrous oxide, PM10=particulate matter 10 microns, VOC=volatile organic compound, CO_2= carbon dioxide
Source: Truck rates are from nationwide simulation of EPA MOVES 2014a (https://www3.epa.gov/otaq/models/moves/). Rail rates are from EPA Emission Factors for Locomotives (https://www3.epa.gov/nonroad/locomotv/420f09025.pdf), EPA-420-F-09-025 April 2009 using fuel efficiency from AAR Railroad Facts 2014 Edition, pp. 63.

Safety Impacts

The freight transportation sector comes into contact with millions of people each day, from employees in the various freight modes to passengers on non-freight modes. Ensuring the safety of all these people is a top priority. Table 35 provides an overview of the injuries and fatalities related to four key freight modes and uses estimates of freight activity to estimate accident rates. In 2013 freight movement contributed to 4,507 fatalities and 99,122 injuries in the United States, representing 13 percent of all transportation-related fatalities.

Trucking is responsible for the majority of these accidents, accounting for 87.9 percent of fatalities and 95.8 percent of injuries. However, from 2000 to 2013, the total number of trucking-related fatalities decreased by 2.2 percent per year, and injuries decreased by 2.9 percent per year. According to the Federal Motor Carrier Safety Administration (FMCSA), 1.8 percent of the drivers of large trucks involved in fatal crashes in 2014 had a blood alcohol content of 0.08 or higher, which is significantly lower than the 22.1 percent found in passenger vehicle drivers involved in fatal crashes. Rail-related fatalities and injuries also decreased sharply over this time period, in part because of investments to improve highway-rail crossings.

The rate of fatalities and injuries per ton-mile in truck transportation is many times greater than that for other freight modes, even though it has decreased significantly since 2000.

Table 35. Freight-related injuries and fatalities, 2000 to 2013.

Fatalities	2013	Annual Growth Rate 2000 to 2013 (percent)	Injuries	2013	Annual Growth Rate 2000 to 2013 (percent)
Truck fatalities	3,964	-2.2	Truck injuries	95,000	-2.9
Railroad fatalities	509	-2.6	Railroad injuries	3,977	-5.1
Waterborne fatalities	25	-3.9	Waterborne injuries	100	4.7
Pipeline fatalities	9	-10.5	Pipeline injuries	45	-4.4
Total freight fatalities	***4,507***	***-2.3***	***Total freight injuries***	***99,122***	***-3.0***
Truck fatalities/ billion ton-miles	1.375	-3.6	Truck injuries/ billion ton-miles	32.953	-4.4
Railroad fatalities/ billion ton-miles	0.278	-3.7	Railroad injuries/ billion ton-miles	2.172	-6.2
Waterborne fatalities/ billion ton-miles	0.050	-2.0	Waterborne injuries/ billion ton-miles	0.199	6.8
Pipeline fatalities/ billion ton-miles	0.008	-11.1	Pipeline injuries/ billion ton-miles	0.042	-5.1
Total fatalities/ billion ton-miles	***0.717***	***-3.2***	***Total injuries/ billion ton-miles***	***15.779***	***-3.9***

Note: Trucks include vehicles with gross vehicle weight ratings at or over 10,000 pounds.
Source: BTS Freight Facts and Figures 2015, Table 6-1 (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/data_and_statistics/by_subject/freight/freight_facts_2015/chapter6/table6_1) and Table 6-2 (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/data_and_statistics/by_subject/freight/freight_facts_2015/chapter6/table6_2). Also, draft National Freight Strategic Plan, BTS Special Tabulation, Figure 4 (https://www.transportation.gov/sites/dot.gov/files/docs/Draft_NFSP_for_Public_Comment_508_10%2015%2015%20v1.pdf).

Congestion Impacts

Congestion is costly for the freight transportation system, especially for the trucking industry. Sitting in traffic leads to higher fuel consumption, longer travel times, and unreliable delivery times. The *draft National Freight Strategic Plan* (NFSP) (https://www.transportation.gov/freight/NFSP) estimated these congestions costs total more than $27 billion each year.

The growth and increasing urbanization of the U.S. population will exacerbate congestion unless drastic actions are taken. The U.S. population is expected to grow by 68 million by 2045 and the majority will live in already congested urban and suburban areas. The proportion of the population living in these areas will reach 90 percent by 2040, from 84 percent in 2010 and 77 percent in 1980. Not only are more people likely to live in urban areas, but the freight transportation system is going to increase its reliance on trucks, as can be seen in Table 4. This will increase roadway congestion, making it more difficult and costly to move goods to and from intermodal infrastructure that is often located in cities, such as ports, rail yards and airports.

Table 36 provides an overview of how congestion has evolved in U.S. cities since 2000. As expected, most congestion costs, congestion costs per capita, and wasted fuel combustion, occur in the largest cities. However, a clear trend is evident in which medium-size cities show the fastest growth in congestion.

Table 36. Highway congestion in urban areas, 2000 to 2014.

Population Level	Average Annual Highway Congestion Cost Per Urban Area		Average Annual Highway Congestion Cost per Commuter		Average Annual Gallons of Fuel Wasted per Urban Area	
	Million USD in 2014	Average Real Growth Rate 2000 to 2014 (percent)	USD in 2014	Average Real Growth Rate 2000 to 2014 (percent)	Million Gallons in 2014	Average Growth Rate 2000 to 2014 (percent)
≥ 3 million	5,259	-0.4	1,433	-0.4	99.5	2.0
1 million to < 3 million	1,281	0.4	1,045	0.4	25.7	2.7
500,000 to < 1 million	474	0.3	867	0.1	9.8	2.5
< 500,000	191	1.3	704	1.2	9.8	10.6
101 urban area average	1,371	0.0	1,189	-0.2	26.7	2.3
471 urban area average	338	4.8	960	0.0	6.6	4.6

USD=U.S. dollars

Source: BTS National Transportation Statistics, Table 1-72 (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_01_72.html) and Table 4-28 (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_04_28.html).

Note: Findings from the *2015 Urban Mobility Scorecard* include 101 urban areas. Averages from that report are referenced in this table. The report also includes individual congestion statistics for 370 other urban areas (totaling 471), averages for which are also referenced.

Roadway Condition

Table 37 provides an overview of how road conditions in the United States have changed since 2000. Many metrics can be used to assess roadway condition; however, the International Roughness Index is used in this case because of its popularity. From this, it appears that the condition of urban roads has worsened, especially on interstates and other freeways, while rural road conditions have improved. Trucks are responsible for a disproportionate amount of pavement deterioration because of their heavy axle loads. Currently, the Federal truck weight limit is set at 80,000 lbs. gross vehicle weight, 20,000 lbs. for single axles, and 34,000 lbs. for tandem axles. Some bridges have lower weight limits based on specific restrictions.

Table 37. Percent of roadway miles with an International Roughness Index over 170, 2000 to 2013 (percent).

Types of Roadway	2000	2013	Average Annual Growth Rate 2000 to 2013 (percent)
Rural - Interstates	2.1	2.4	1.0
Rural - Other principal arterials	4.0	4.9	1.6
Rural - Minor arterials	7.0	7.2	0.2
Rural - Major collectors	22.1	19.7	-0.9
Urban - Interstates	6.5	5.1	-1.8
Urban - Other freeways and expressway	10.9	7.2	-3.1
Urban - Other principal arterials	30.0	25.8	-1.2
Urban - Minor arterials	33.7	38.2	1.0
Urban - Collectors	52.3	53.7	0.2

Source: BTS Freight Facts and Figures 2015, Table 3-4 (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/data_and_statistics/by_subject/freight/freight_facts_2015/chapter3/table3_4).

3. TRENDS, POLICY AND FUNDING

Key Trends

The *draft National Freight Strategic Plan* (NFSP) (https://www.transportation.gov/freight/NFSP) identified the following key freight trends.

1. Growth in freight tonnages will be caused by:
   - The U.S. economy doubling in size over the next 30 years.
   - The Nation's population increasing to 389 million (by 2045), compared to 321 million in 2015.
   - Americans increasingly living in congested urban areas.
2. Under investment in the freight system has been caused by:
   - Few public-sector funds being dedicated to freight infrastructure.
   - Freight projects being costly to undertake.
   - Freight projects not competing well with non-freight projects because of the manner in which public investments are evaluated.
   - Freight projects involving multiple transportation modes, jurisdictions, and stakeholders, each having different objectives or operating under different investment timeframes.
3. Difficulties in planning and implementing freight projects have resulted from the decentralized approach of State and local agencies working with each other and a broad array of Federal and private sector partners, leading to challenges such as fragmented decision-making.
4. An ongoing need to address safety, security, and resilience in order to continue reducing accidents and fatalities, and to address special risks to our physical and cyber infrastructure.
5. Increased global economic competition will:
   - Lead to a "significant amount of goods moved by air, truck, and train through land border crossings with Mexico and Canada."
   - Force ports to "address congestion and equipment-shortage challenges generated by bigger, new generation container ships as well as the larger bulk ships that are now able to transit the expanded Panama Canal." This will involve "investing to modernize their facilities by dredging harbors, raising bridges, automating and expanding container yards, purchasing larger ship-to-shore cranes, and improving roads and rail connections to surface infrastructure."
   - Result in "a surge in domestic energy production and increased domestic manufacturing and assembly work."

6. Application and development of new technologies will:
   - Enable faster and more accurate analysis of freight routes, travel times, and infrastructure capacity.
   - Increase productivity in the freight industry and change the skill sets needed to work in freight.
   - Automate and expedite inspection processes, improving safety and lowering costs.
   - Transform freight transportation through autonomous vehicle technologies.
   - Provide many benefits through positive train control and next generation air traffic control.

Policy Context

On December 4, 2015, the President signed the first long-term transportation reauthorization act in a decade, the Fixing America's Surface Transportation Act (FAST Act). This Act provides 5 years of funding certainty for infrastructure planning and investment, including $305 billion over FY 2016-2020 for all modes. The FAST Act establishes a national policy of maintaining and improving the condition and performance of the National Multimodal Freight Network ("the Network"), described below, to ensure that the Network provides a foundation for the U.S. to compete in the global economy. The FAST Act specifies goals associated with this national policy related to the condition, safety, security, efficiency, productivity, resiliency, and reliability of the Network, and also includes goals to reduce the adverse environmental impacts of freight movement on the Network. These goals are to be pursued in a manner that is not burdensome to State and local governments. (49 U.S.C. 70101). With regard to freight, the FAST Act includes the following two programs:

- National Highway Freight Program: Provides $1.2 billion per year on average for States according to a formula, for construction, operational improvements, freight planning, and performance measures. Up to 10 percent of this budget can be spent on rail, port or intermodal projects. The National Highway Freight Program requires State freight plans.
- FASTLANE Grant Program: Provides $900 million per year on average for competitive grants or Transportation Infrastructure Finance and Innovation Act (TIFIA) loans. These funds can be used for projects on the National Highway Freight Network, National Highway System, rail and intermodal infrastructure, and rail-highway grade crossings. States, large metropolitan planning organizations, Tribes, localities, and Federal Land Management Agencies may apply. The first round of awards can be found on the FASTLANE website (https://www.transportation.gov/fastlanegrants).

To implement the two programs above, the FAST Act:

- Requires a national freight strategic plan that presents multi-modal freight policy goals.
- Requires the designation of a National Multimodal Freight Network.
- Requires the designation of a National Highway Freight Network.
- Requires State freight plans.
- Encourages State freight advisory committees.

In addition to this new program introduced by the FAST Act, there are many existing programs that will continue to be used in the freight sector to fund capital expenses. Some of the larger ones include:

- Federal Highway Administration (FHWA) programs such as the National Highway Performance Program (NHPP), the Surface Transportation Program (STP), and the Highway Safety Improvement Program (HSIP).
- Transportation Investment Generating Economic Recovery (TIGER) Grants.
- The Congestion Mitigation and Air Quality Improvement Program (CMAQ).
- The TIFIA credit assistance program.

Funding Overview

Isolating the funding of freight transportation infrastructure is difficult because many freight-related projects benefit passenger transportation as well. Therefore, this section describes funding of the whole transportation sector. Financing freight projects is often complex because they tend to be costly to undertake and regularly involve a variety of modes, jurisdictions, and stakeholders, each operating with separate objectives and timeframes.

As can be seen from Table 38, the government (Federal, State, and local) spent $350 billion on the transportation system in 2012, with the majority going toward highways. Revenues came from each of the modes in roughly the same proportion as expenditures. Over time, expenditures grew at 1.6 percent per year from 2000 to 2010, and accelerated to 3.1 percent per year as a result of the programs introduced to stimulate the economy following the economic recession of 2008. Government spending on railroads increased quickly from 2000 to 2010, at almost double digit pace, although, since 2010, it appears to be decreasing. However, most spending on rail came from private Class 1 railroads. It is estimated that from 1980 to 2013, over half a trillion dollars was spent by Class 1 railroads on rail infrastructure, representing 40 percent of all revenues during this time.

Table 38. Public sector expenditures by different transportation modes, 2000 to 2012.

Expenditures on Modes	Billions of USD 2012	Percent of USD	Percentage Average Annual Growth Rate (chained 2009 USD)	
			2000 to 2010	2010 to 2012
Highway	225.9	64.5	0.7	5.3
Transit	54.9	15.7	2.3	0.2
Railroads	2.3	0.7	9.7	-9.3
Air	50.9	14.5	3.5	-1.3
Water	14.9	4.2	3.8	-1.4
Pipeline	0.2	0.1	2.5	-3.2
General	1.3	0.4	4.4	34.5
Total	**350.4**	**100.0**	**1.6**	**3.1**

USD=U.S. dollars

Source: BTS Government Transportation Financial Statistics 2014, Table 2-A and Table 2-B (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/government_transportation_financial_statistics/2014/table_2a.html).

Table 39. Public sector revenues by different transportation modes, 2000 to 2012.

Revenues from Modes	Billions of USD 2012	Percent of USD	Percentage Average Annual Growth Rate (chained 2009 USD)	
			2000 to 2010	2010 to 2012
Highway	206.3	64.5	2.0	-1.5
Transit	55.2	17.2	0.9	-1.3
Railroads	1.8	0.5	9.3	-20.1
Air	41.8	13.1	3.2	-3.3
Water	13.3	4.1	2.6	-1.8

Revenues from Modes	Billions of USD 2012	Percent of USD	Percentage Average Annual Growth Rate (chained 2009 USD)	
			2000 to 2010	2010 to 2012
Pipeline	0.1	0.0	0.6	-6.9
General	1.5	0.5	-0.7	26.2
Total	**319.8**	**100.0**	**2.0**	**-1.8**

USD=U.S. dollars

Source: BTS Government Transportation Financial Statistics 2014, Table 2-A and Table 2-B (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/government_transportation_financial_statistics/2014/table_2a.html).

Table 40 shows that, on the whole, 43.4 percent of expenditures in 2012 went toward capital projects while 56.6 percent went toward maintenance and operations. This table also shows that State and local governments made the majority of expenditures, which in this table includes grants from the Federal government.

Table 40. Public expenditures by type and level of government, 2012.

Mode	Billions of USD 2012	Type of Expense (percent)		Level of Government (percent)	
		Capital	Maintenance & Operations	Federal	State & Local
Highway	192.2	53.4	46.6	4.2	95.8
Transit	51.4	21.4	78.6	0.2	99.8
Railroads	1.6	54.6	45.4	100.0	0.0
Air	39.0	32.6	67.4	43.6	56.4
Water	12.4	16.5	83.5	61.0	39.0
Pipeline	0.08	0.0	100.0	70.9	29.1
General	1.42	0.0	100.0	98.6	1.4
Total	**298.1**	**43.4**	**56.6**	**12.0**	**88.0**

USD=U.S. dollars

Source: BTS Government Transportation Financial Statistics 2014, Table 15-A (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/government_transportation_financial_statistics/2014/table_15a.html)and Table 21-A (http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/government_transportation_financial_statistics/2014/table_21b.html).

Conclusion

The Freight Quick Facts Report 2016 aims to supply practitioners and the public at large with a user-friendly source of information about the Nation's vital freight system. It mines and supplies a host of data resources to provide a bird's eye view of the extent and usage of freight infrastructure in the United States; the impacts of the freight transportation system on the economy, environment, and society; and the key freight trends driving policy and funding issues. The Report is organized in tabular fashion so that its data can be integrated with other information sources for use by a variety of stakeholders.

The economic prosperity and competitiveness of America depends upon the efficiency and performance of the Nation's complex freight transportation system. The Freight Quick Facts Report 2016 provides data and context to help stakeholders steward the system and adapt to evolving needs.

Source: Thinkstock

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