



# MISSOURI State Freight & Rail Plan

## COMMODITY FLOW PROFILE



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# 1.0 Introduction

It is critical to understand what future freight demand might look like in Missouri in order to determine the future needs of the freight system. This technical memorandum presents existing and potential future demand for freight in the state for the plan year of 2045. It also provides insight into modal dependence, route choice and equipment and service needs of the state's businesses. This forecast provides a "baseline" against which future demand for goods movement can be considered, and thus is not only a reflection of current macro-economic trends, but also the current trends in logistics, distribution and sourcing within the freight generating economic sectors. The baseline forecast will be used to develop alternate freight flow scenarios under varying economic, political and policy alternatives in a future task.

## 1.1 Data and Methodology

Several data sources were used in the commodity flow, detailed as follows:

- **2018-2045 IHS Transearch<sup>1</sup>.** An annual database of U.S. county-level freight movement data including market-to-market flow data, 4-digit level Standard Transportation Commodity Code commodity types and transportation mode. Volume is the primary measurement of the commodity flows and is presented in terms of annual short tons, units (such as truck counts) and dollar value. For Missouri, traffic coverage includes flows that are intra-market (internal), inbound (external-to-internal), outbound (internal-to-external) and overhead or through (external-to-external). The Transearch capability combines primary shipment data obtained from many of the nation's largest rail and truck freight carriers with information from public, commercial and proprietary sources to generate a base year estimate of freight flows at the county level. Once the base year is completed, a separate model is used to produce a 30-year forecast of freight flows. These projections are driven primarily by IHS Economics' long-term U.S. Macroeconomic and Business Markets Insights forecasts.
- **2018 Carload Waybill Sample for Missouri.** The Association of American Railroads collects a stratified sample of carload waybills annually for the Surface Transportation Board from railroads that terminated at least 4,500 carloads each year for each of the previous three years, or which move five percent or more of any state's total rail traffic. MoDOT obtained and provided to the consultant the confidential version of the Waybill Sample, which includes detailed shipment data including origin county, destination county, 7-digit level STCC commodity type, equipment type and tonnage. This data formed the basis for the base year freight rail traffic. IHS processed the base year data and developed a 2045 forecast which was incorporated into the IHS Transearch data.

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<sup>1</sup> Although Transearch is a comprehensive database that provides a greater level of commodity flow detail along individual trade lanes and corridors than publicly available sources, data limitations exist for certain types of shipments. There is limited information about agricultural movements within a state or region. Detailed commodity flows are not available below the county level, and these data do not show how products move from farms to elevators, intermodal connections with railroads or waterways or processing locations. As a result, agricultural movements are underreported and likely understated in this analysis. More information and analysis on this activity is discussed in the Missouri Freight & Rail Profile (Volume 2) and the Economic Futures and Needs Assessment Report using additional data and research.

## 1.2 Report Organization

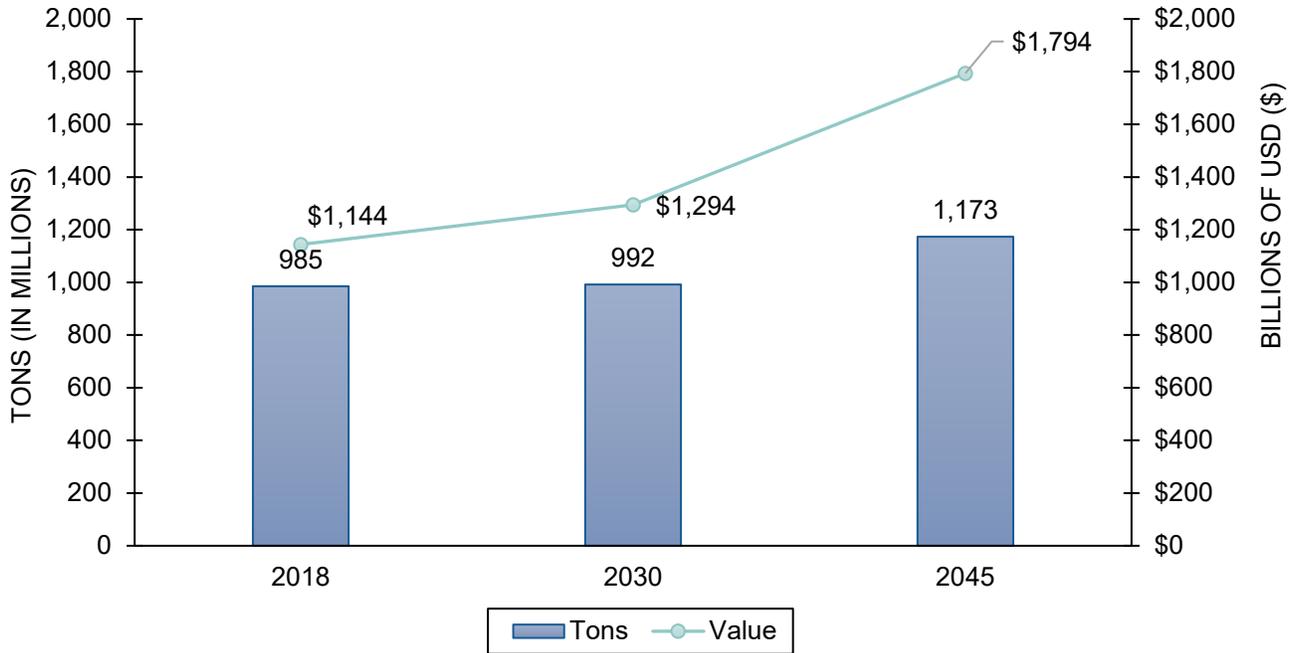
Following the introduction, the remainder of the report is organized by geography as follows:

- **Section 2** provides a summary of commodity flow at the statewide level including modal split, directional split, trading partners and top commodities. This includes examining the volume and value of freight for the base year of 2018 and forecast years of 2030 and 2045.
- **Section 3** provides an overview of commodity flows at the district level including modal and directional split and top commodities. This includes examining the volume and value of freight for the base year of 2018 and forecast years of 2030 and 2045.
- **Section 4** provides a summary of commodity flow at the county level including total volume and value for the base year of 2018 and forecast year of 2045.
- **Section 5** provides a summary of commodity flow on National Highway System corridors in Missouri including total volume and value for the base year of 2018 and forecast year of 2045.

## 2.0 Statewide Freight Demand

In 2018, more than 985 million tons of freight valued at \$1.1 trillion moved on Missouri’s transportation system (see Figure 2.1). By 2045, the state’s transportation system is projected to carry more than 1.1 billion tons of freight, valued at \$1.8 trillion annually, an increase of 19% by tonnage and 57% by value.

**FIGURE 2.1 PROJECTED FREIGHT TONNAGE AND VALUE, 2018-2045**

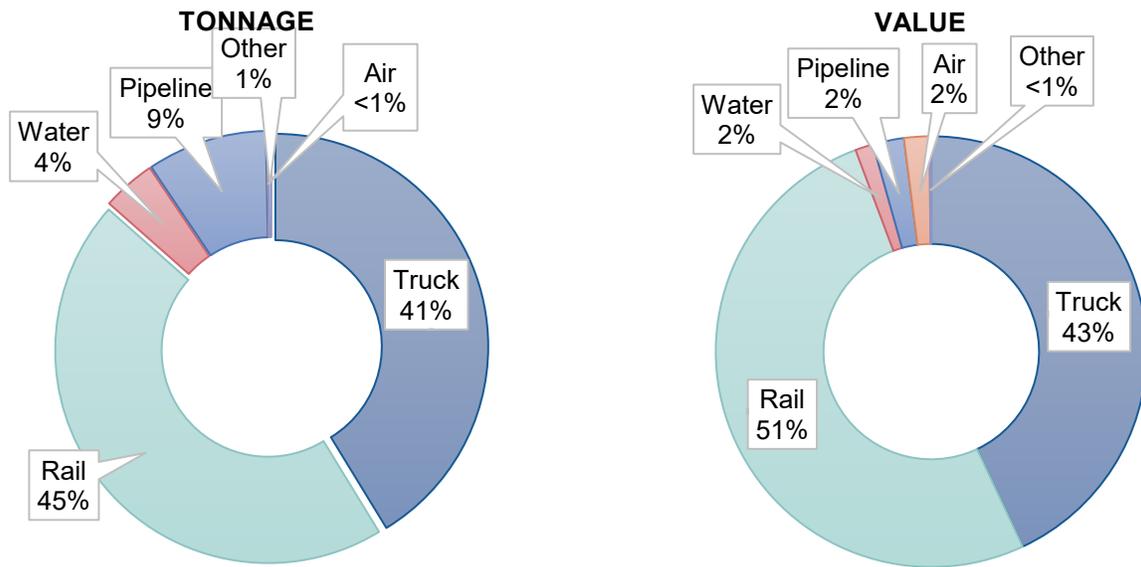


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### 2.1 Modal Split

Missouri is unique among U.S. states for the high volume and value of freight moving on the state’s rail system. Rail carried 45% of the total weight and 51% of the total value of goods moving on the state’s transportation system. Trucking accounts for the second highest modal share, accounting for 41% of goods moved by weight and 43% of goods moved by value. By weight, pipelines (9%) and waterways (4%) account for the bulk of the remainder of freight carried by the state’s transportation system, with air and other modes only accounting for a tiny fraction. When measured by value, rail and truck transport account for more than 94% of the state’s freight movements, with air, pipeline and water accounting for around two percent each. Figure 2.2 shows Missouri’s freight tonnage by tonnage, value and mode.

FIGURE 2.2 MISSOURI FREIGHT TONNAGE AND VALUE BY MODE, 2018

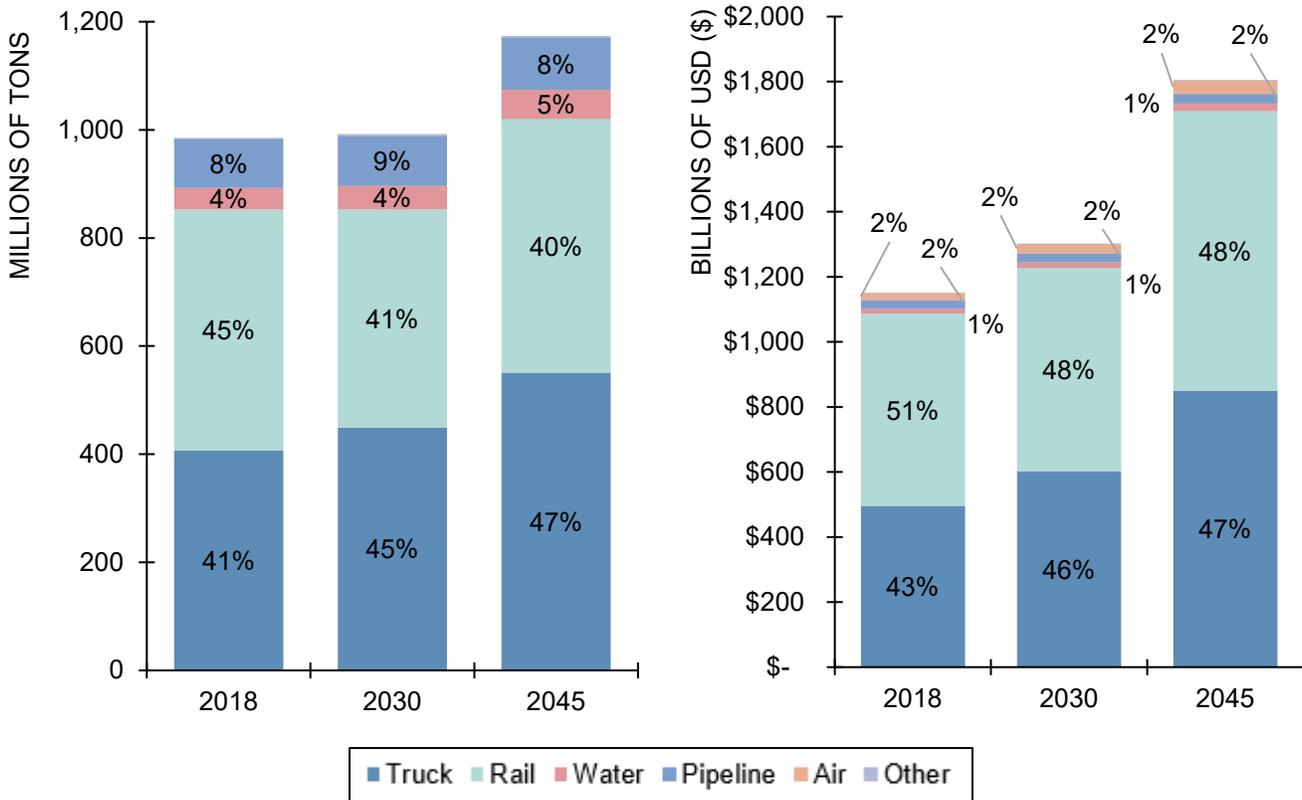


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

Looking into the future, overall freight tonnage moved on Missouri’s transportation system is projected to grow by 20% between 2018 and 2045, with almost all of the growth projected to occur between 2030 and 2045. The growth in freight volume is projected to be mostly driven by trucking, growing by a projected 35% and surpassing rail (which is only projected to grow by 5%) as the largest freight mode by volume. Water-based freight transportation also is projected to see significant growth between 2018 and 2045 (35%), as is air transportation (71%), although its overall share of volume would remain a small fraction of total freight.

A different story emerges when examining projected goods movement measured by value. All modes will see an overall increase in the value of transported goods in 2045, with the total value of goods projected to reach almost \$1.8 trillion, representing a 57% increase between 2018 and 2045. While rail will continue to represent the highest value, by 2045, the value of freight moved by truck will be nearly even with rail. Freight moved by air will almost double in value between 2018 and 2045, seeing the highest growth of all modes, although still remaining only 2.3% of the total freight value move by the state. Figure 2.3 shows the modal split for tonnage and value for current and future years.

FIGURE 2.3 MISSOURI FREIGHT BY MODE FOR TONNAGE AND VALUE, 2018-2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

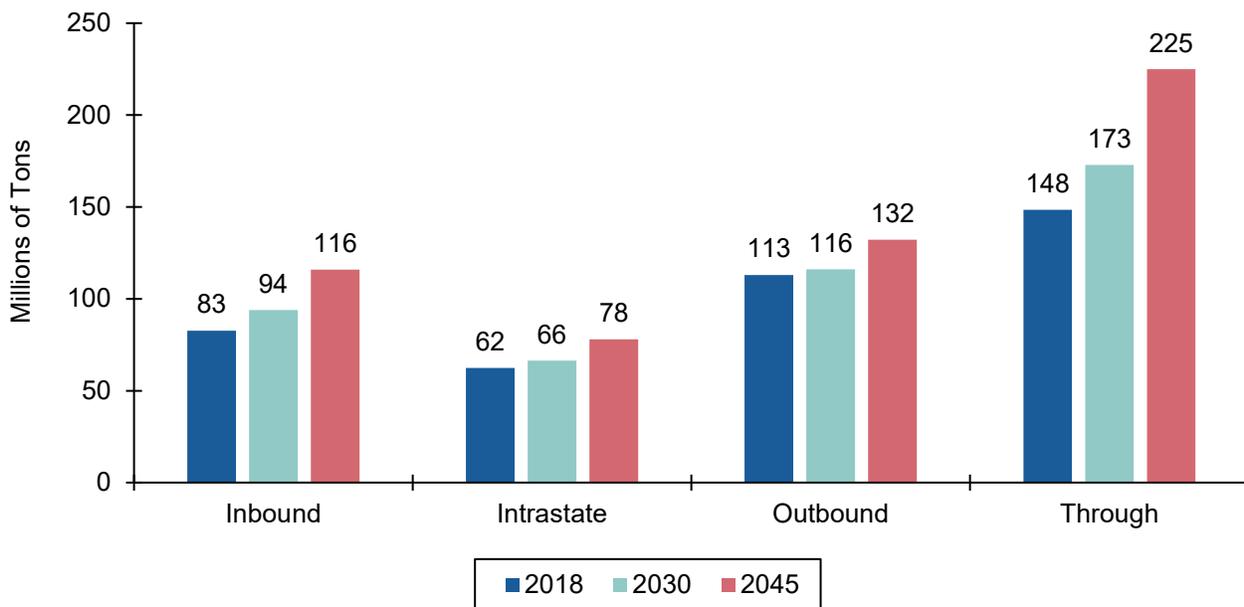
## Truck Freight Demand

### Truck Directional Split

In 2018, 32.5 million trucks transported more than 400 million tons of freight worth more than \$495 billion on Missouri’s highways. Figure 2.4 and Figure 2.5 summarize the overall directional movements of this freight. In terms of tonnage and value, by far the largest percent comes from commodities that are traveling through Missouri, which account for 37% of tons and 58% of value of all commodities. In terms of the number of trucks on the highways, freight was evenly split among trucks that were traveling into, out of, through and within Missouri. Each of those directions account for between 21-27% of the trucks traveling on the highways.

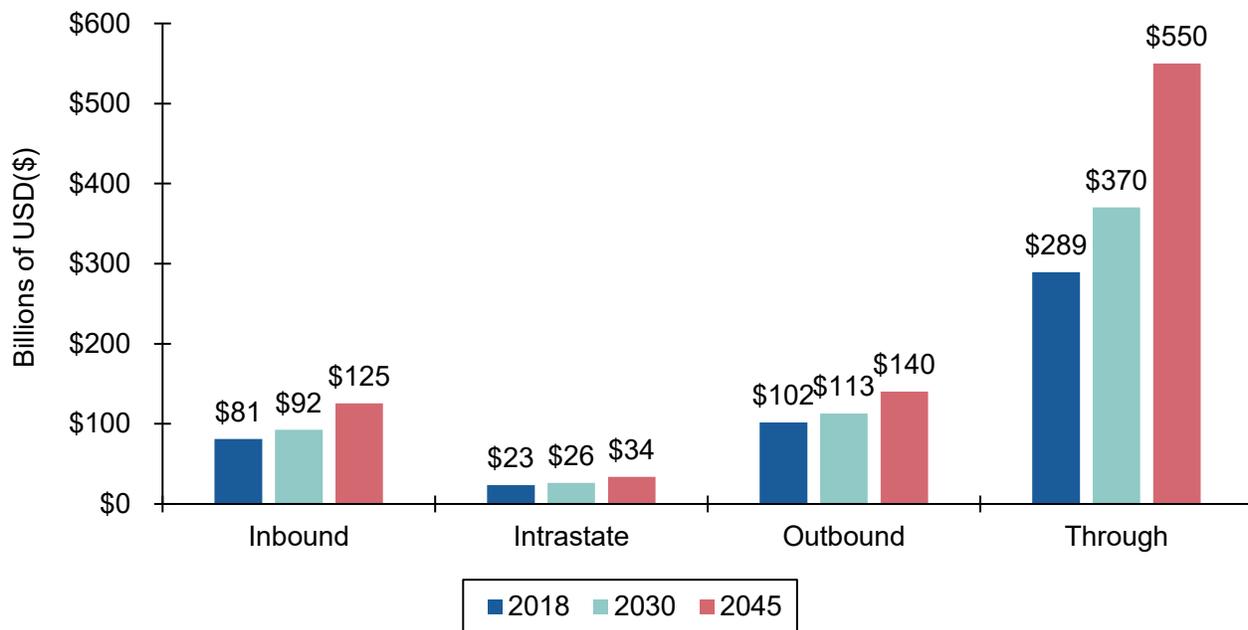
By 2045, through movements are projected to make up a larger proportion of freight movements via truck in Missouri, accounting for 41% of tons and 65% of the value of all commodities moved by trucks, as shown in Figure 2.5. However, the tonnage and value is projected to increase for all other directions as well, with inbound truck activity projected to increase at the second highest rate, both by tonnage and value.

FIGURE 2.4 TRUCK FREIGHT TONNAGE BY DIRECTION, 2018-2045



Source: IHS Transearch.

FIGURE 2.5 TRUCK FREIGHT VALUE BY DIRECTION, 2018-2045

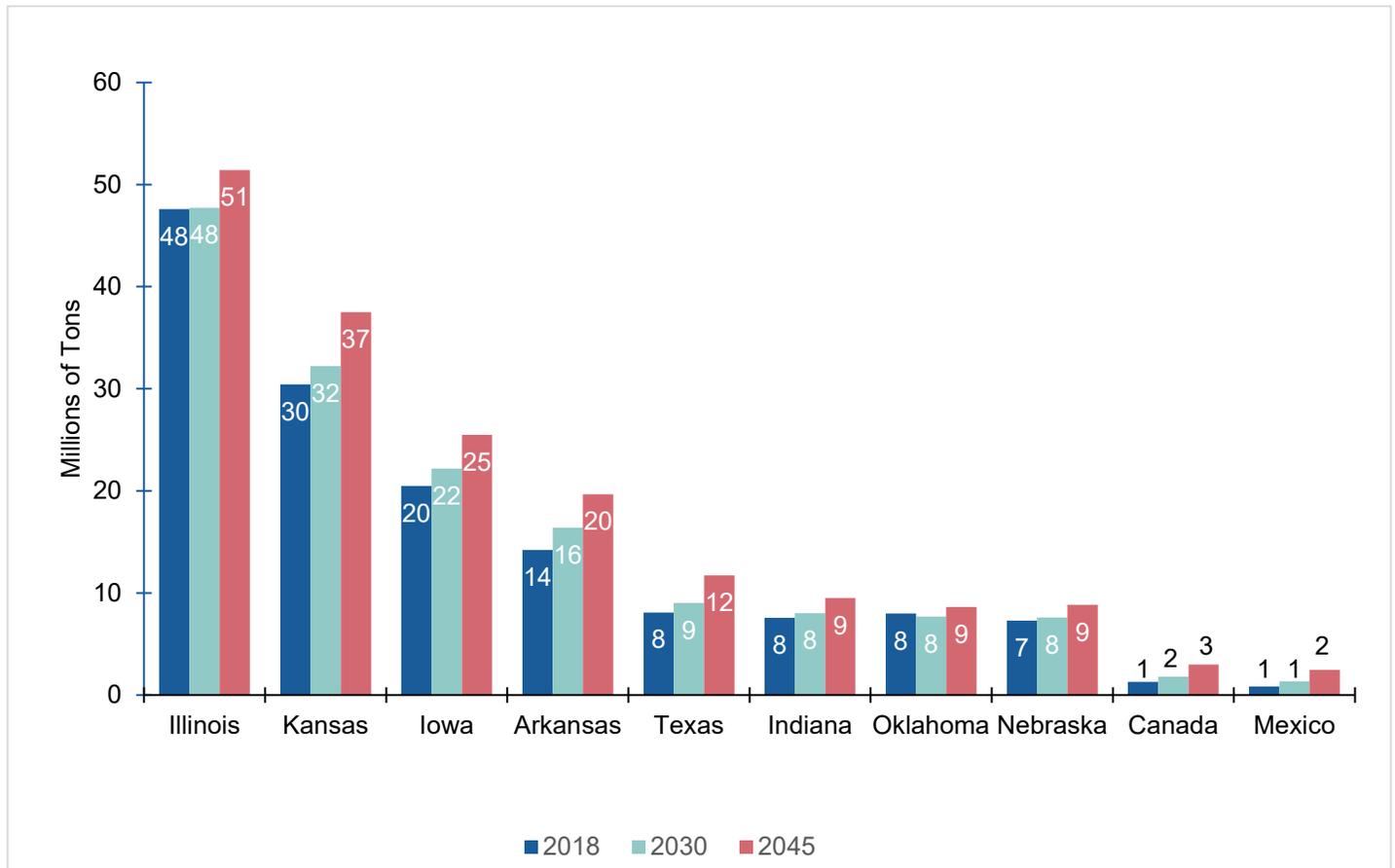


Source: IHS Transearch.

### Top Truck Trading Partners

Figure 2.6 shows Missouri’s top trading partners for truck freight by tonnage in 2018, 2030 and 2045. Illinois is Missouri’s most significant trading partner for truck freight, accounting for nearly 25% of the combined exported and imported goods. Other neighboring states, such as Kansas, Iowa and Arkansas, also account for significant proportions of truck trade with Missouri, with Texas having the largest share of any non-neighboring state. Between 2018 and 2045, truck trade is expected to increase across the board, with Texas seeing the highest growth rate of Missouri’s top trading partners, at nearly 45%. While overall levels of truck trade between Missouri and Canada and Mexico are far lower, trade with both countries is expected increase by 130% and 197% respectively.

**FIGURE 2.6 TRUCK FREIGHT TOP TRADING PARTNERS, 2018-2045**



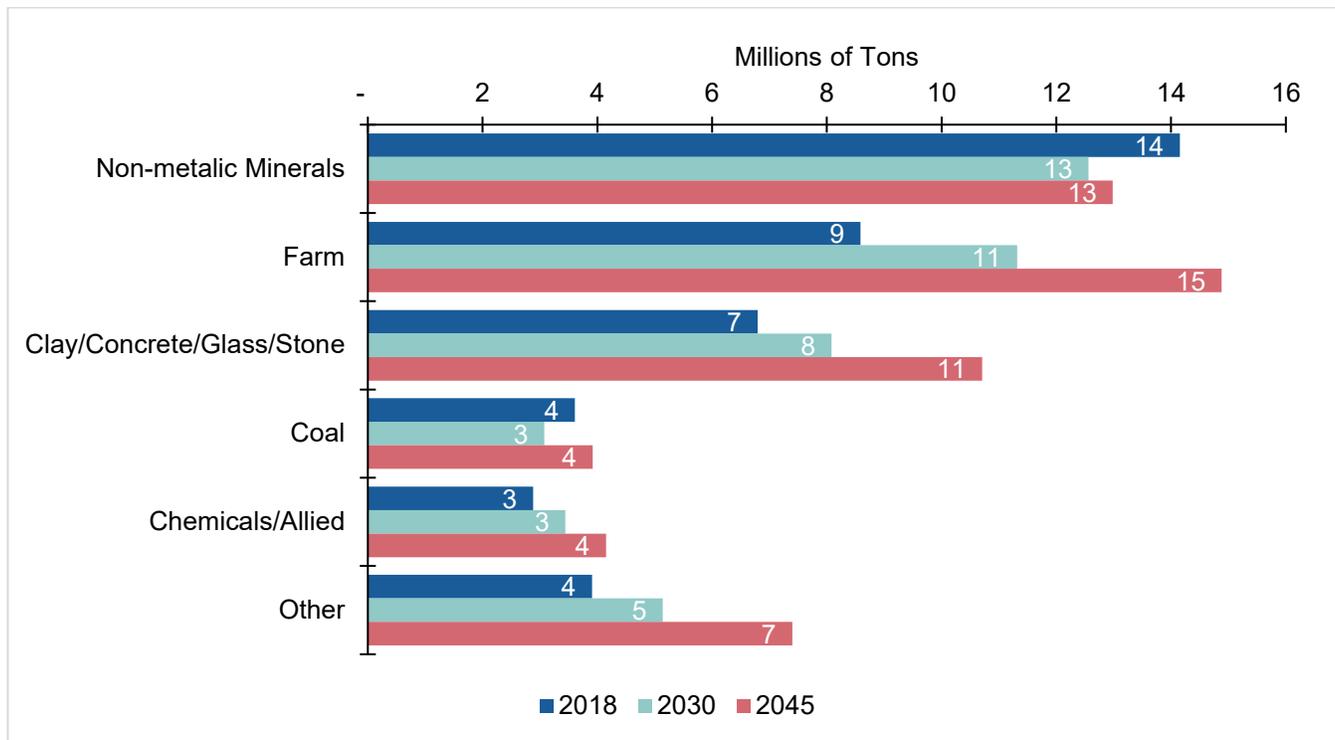
Source: IHS Transearch.

### Top Truck Commodities

Figure 2.7 shows the top commodities by weight moved by truck in Missouri in 2018 and their 2030 and 2045 projections, excluding through movements. Non-metallic materials led the way with 87 million tons of goods moved into or from Missouri in 2018, representing almost 31% of all goods (excluding through), with farm goods following behind with 60 million tons, or 23% of all goods moved by truck. However, both of these goods categories are expected to see under 10% growth between 2018 and 2045, while tonnage of food/kindred goods, petroleum/coal

and secondary moves<sup>2</sup> are all expected to grow by nearly 50% or more. In terms of value of goods moved, Figure 2.8 shows secondary moves and food/kindred goods representing the highest value goods moved by truck, with \$37 billion and \$27 billion of goods moved respectively, with transportation equipment and farm goods following close behind.

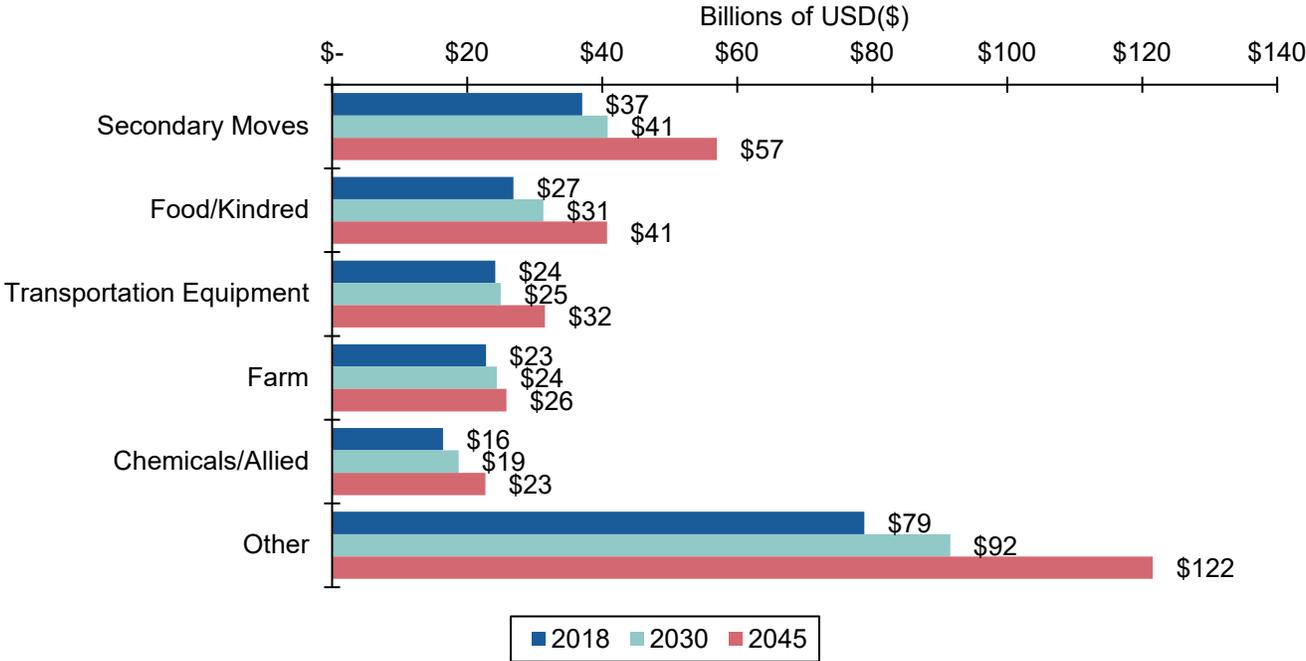
**FIGURE 2.7 TOP TRUCK COMMODITIES BY VOLUME, 2018-2045**



Source: IHS Transearch.

<sup>2</sup> Secondary traffic refers to drayage movements transporting cargo between origin or destination points and a transshipment facility, such as an intermodal rail yard, an airport or a port..

FIGURE 2.8 TOP TRUCK COMMODITIES BY VALUE, 2018-2045



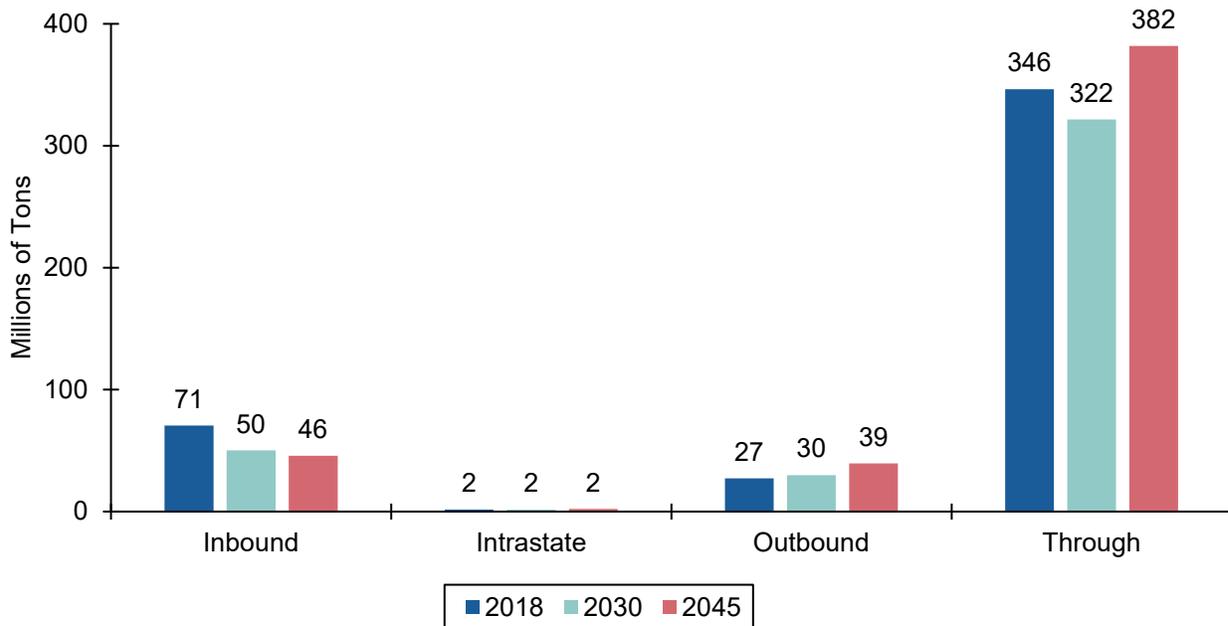
Source: IHS Transearch.

### Rail Freight Demand

#### Rail Directional Split

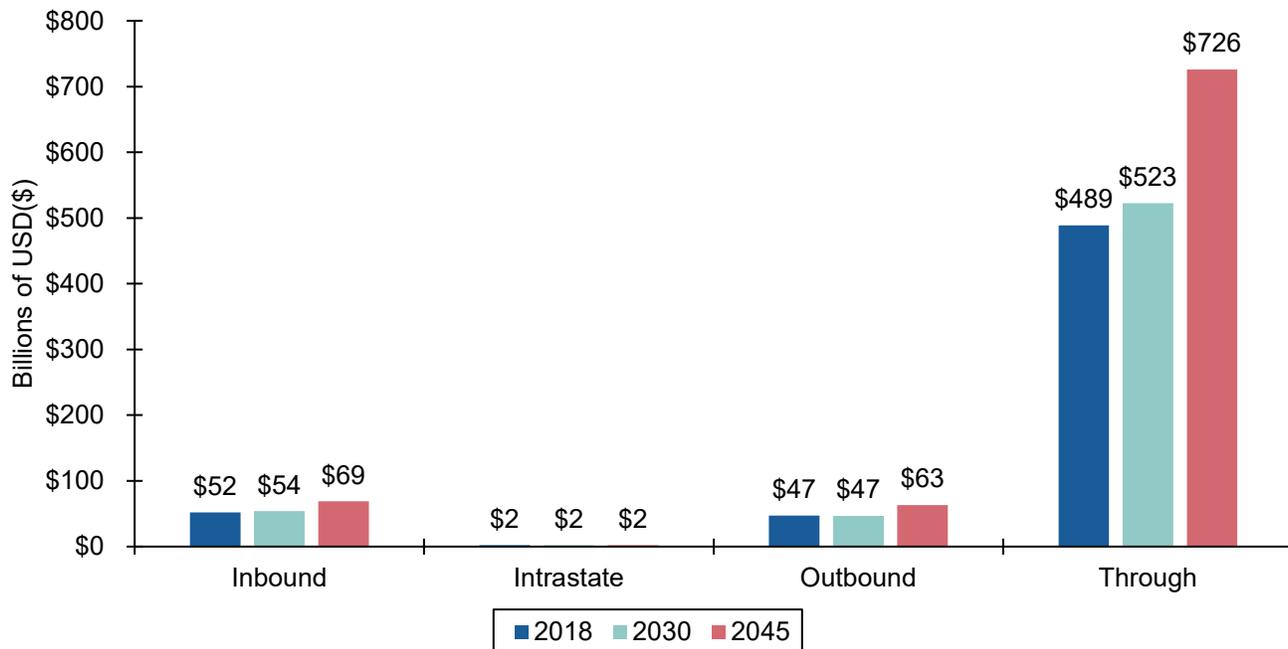
More than 414 million tons of rail freight moved to, from, within or through the Missouri in 2018. Through freight dominates the state’s freight flow, accounting for more than 75% of freight tonnage, as shown in Figure 2.9. The dominance of through movements is expected to continue into the future, representing 81% of tonnage and 84% of value in 2045. Rail freight shipments originating and terminating within Missouri (i.e., intrastate) are minor compared to inbound, outbound and through shipments. Despite the drastic difference in tonnage between outbound and inbound freight in the state, the values are similar, as shown in Figure 2.10, with inbound freight values just slightly larger than outbound values.

FIGURE 2.9 RAIL FREIGHT VOLUME BY DIRECTION, 2018-2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 2.10 RAIL FREIGHT VALUE BY DIRECTION, 2018-2045

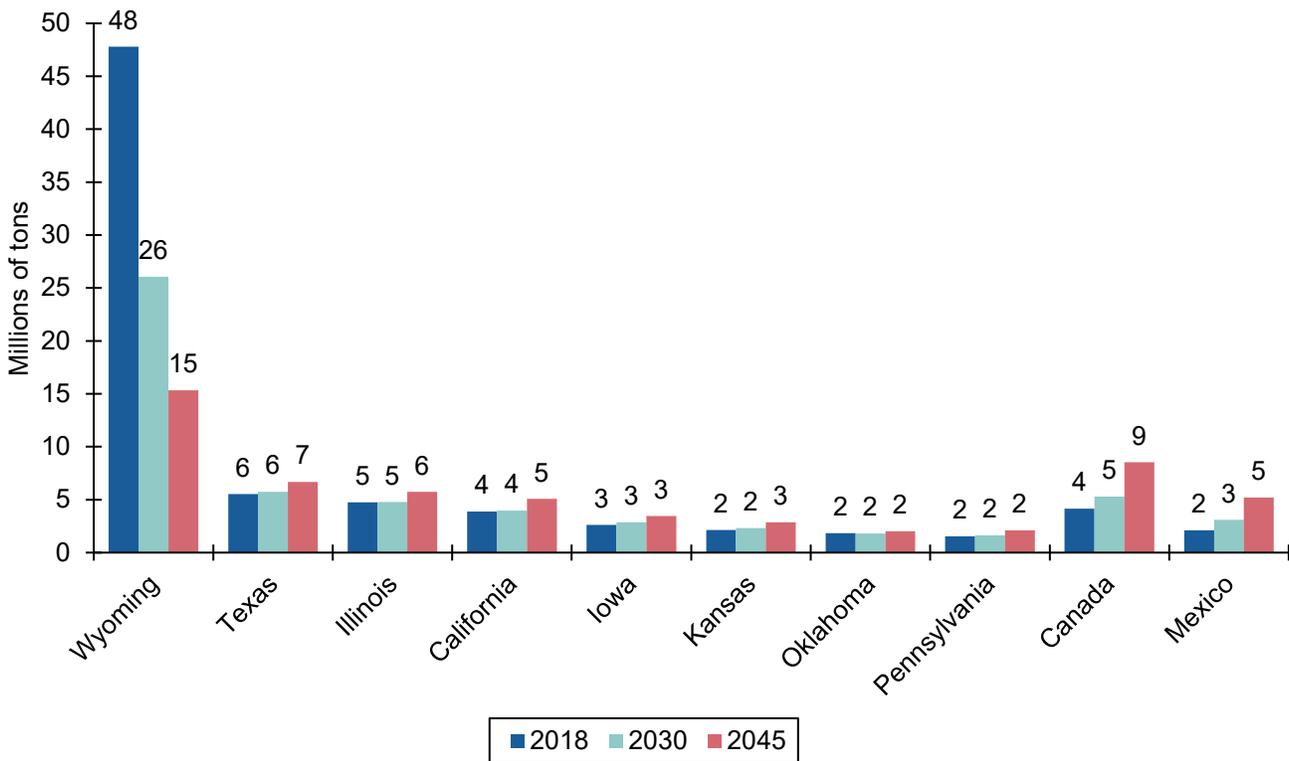


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### Top Rail Trading Partners

Figure 2.11 shows Missouri’s top trading partners for freight rail for 2018 plus projections for 2030 and 2045. Wyoming is by far the state’s foremost trading partner, representing nearly half of all freight rail trade in 2018. Texas and Illinois are Missouri’s next top trading partners for freight rail, with California projected to nearly catch up to Illinois by 2045. While Wyoming is still projected to remain the state’s top trading partner in 2045, the volume of freight rail trade between the two states is expected to decline by 68%, most likely due to the precipitous projected drop-off in coal movements. In the same interval, rail freight trade is expected to grow by 105% with Canada and 145% with Mexico.

**FIGURE 2.11 TOP RAIL FREIGHT TRADING PARTNERS, 2018-2045**

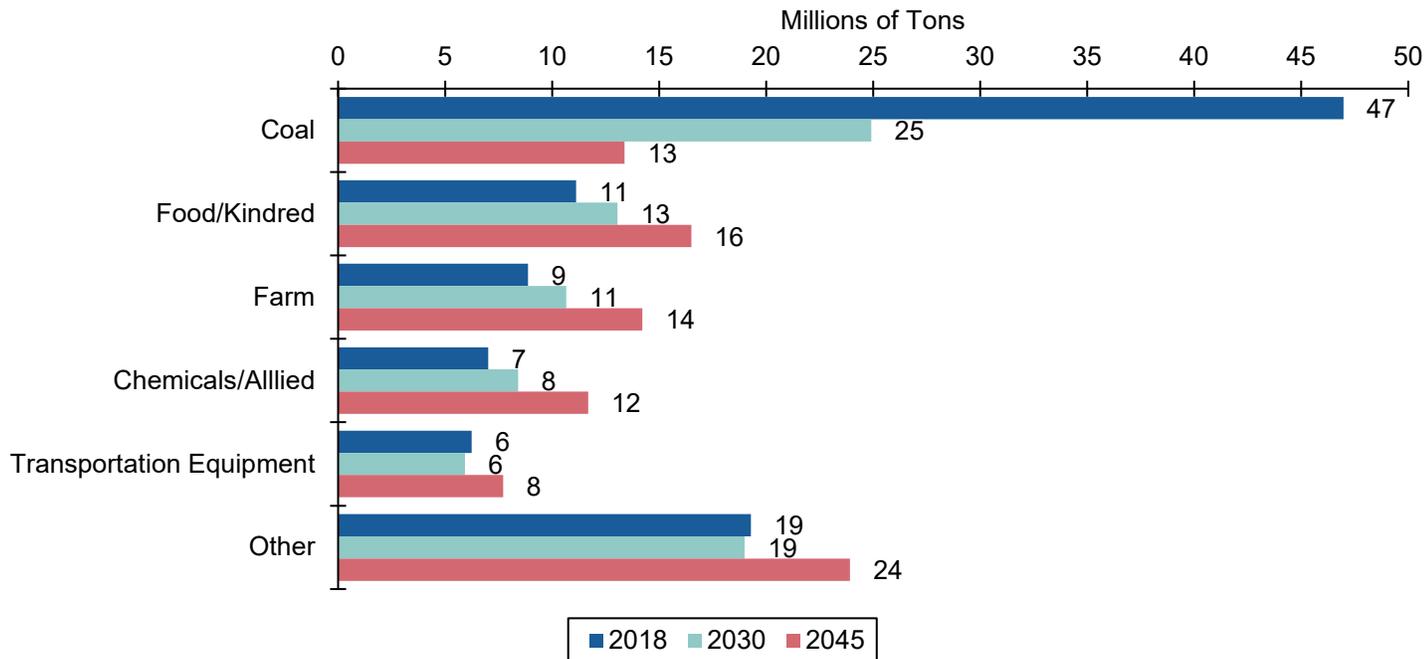


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### Top Rail Commodities

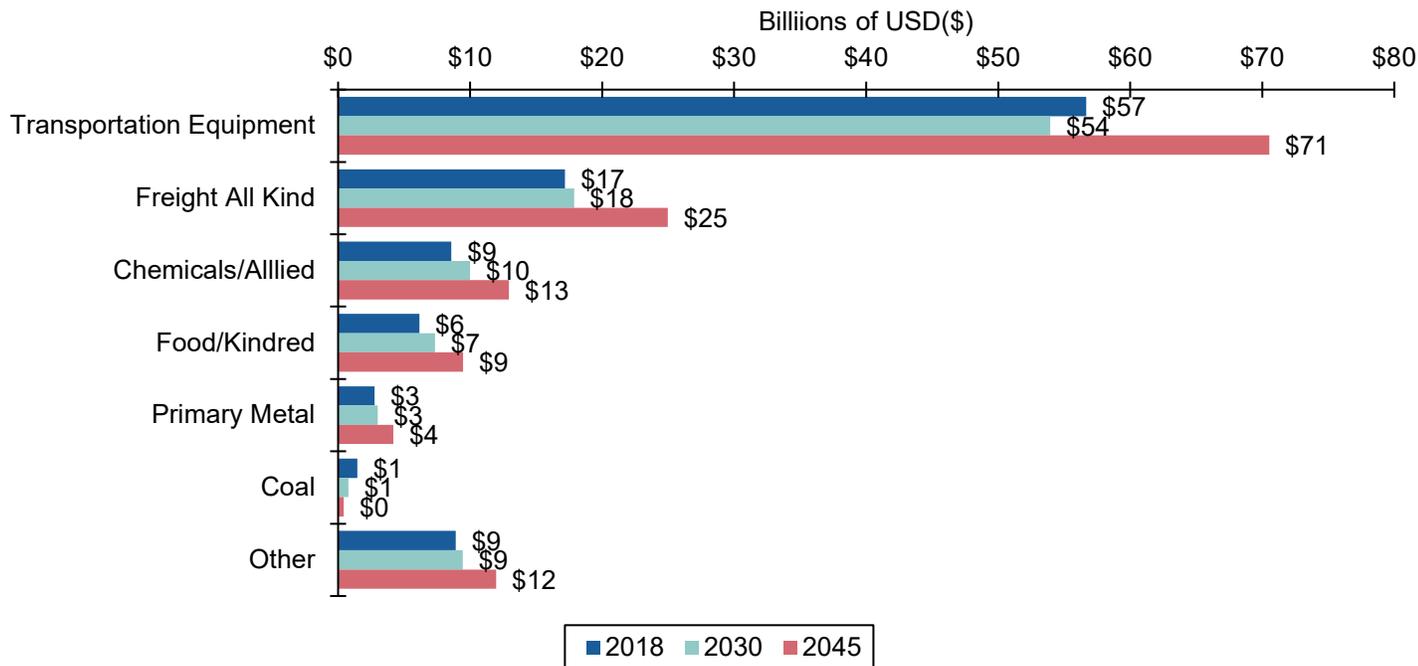
Coal was by far the state’s top commodity for freight rail trade by tonnage in 2018, as shown in Figure 2.12. However, coal movements are expected to drop by 72% between 2018 and 2045. Food/kindred goods are expected to overtake coal by 2045, with farm products and chemicals following behind. Transportation equipment only accounted for 6% of freight rail tonnage in 2018, despite accounting for by far the highest value of freight rail movements. As shown in Figure 2.13, transportation equipment accounted for 27% of all value in 2018 and is projected to account for 24% of value in 2045. Despite its dominance of freight rail volumes, the value of coal only accounted for less than one percent of all freight value in 2018.

FIGURE 2.12 TOP RAIL FREIGHT COMMODITIES BY VOLUME, 2018-2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 2.13 TOP RAIL FREIGHT COMMODITIES BY VALUE, 2018-2045



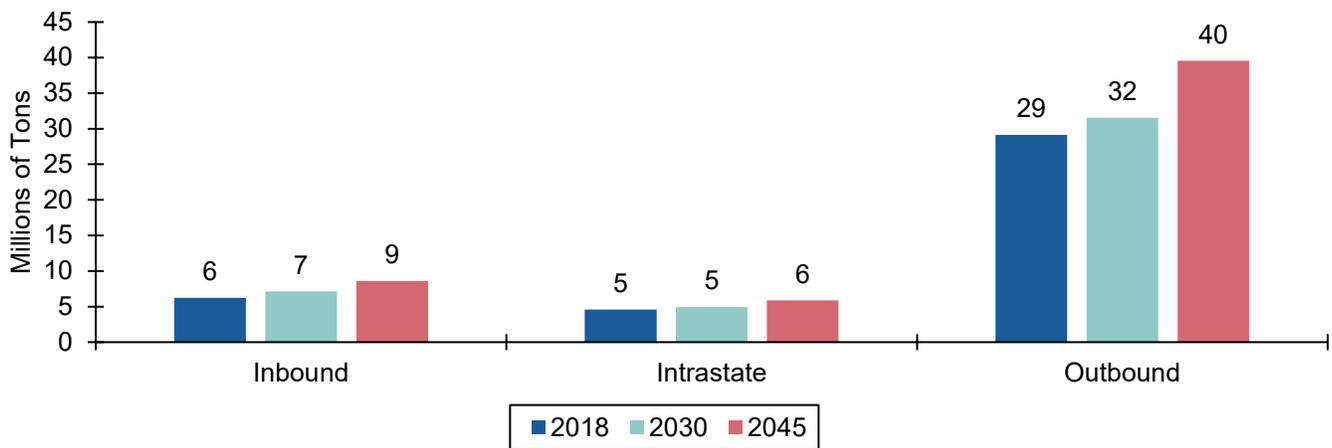
Source: IHS Transearch and STB Confidential Carload Waybill Sample.

## Water Freight Demand

### Water Directional Split

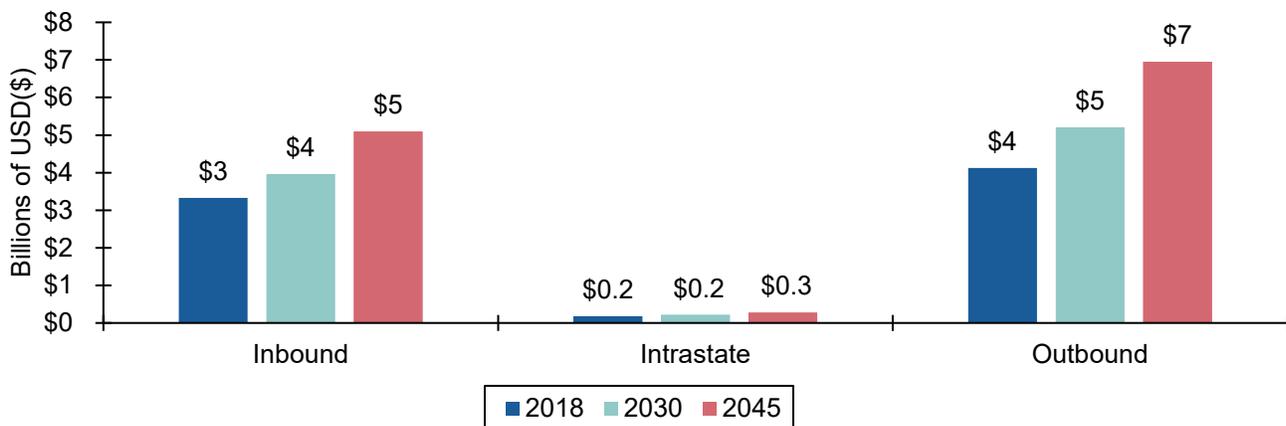
In 2018, according to IHS Markit's Transearch data, there was just under 40 million tons of commodities worth \$7.6 billion transported into, out of and within Missouri's ports and waterways. Figure 2.14 summarizes this trade by direction for freight volumes, while Figure 2.15 shows the value for each direction. Outbound trade made up the majority of trade both in terms of tonnage (73%) and value (54%). Behind that is inbound trade, which makes up 16% of tonnage yet 44% of value of all trade on Missouri's waterways. Intrastate trade made up the smallest component of trade, at 11% of tonnage and 2% of value. Water-based freight shipments are expected to increase in all directions between 2018 and 2045 by relatively similar rates for both volume and value, with inbound volumes (38%) and outbound values (68%) expected to see the largest increase.

**FIGURE 2.14 WATER FREIGHT VOLUME BY DIRECTION, 2018-2045**



Source: IHS Transearch.

**FIGURE 2.15 WATER FREIGHT VOLUME BY VALUE, 2018-2045**

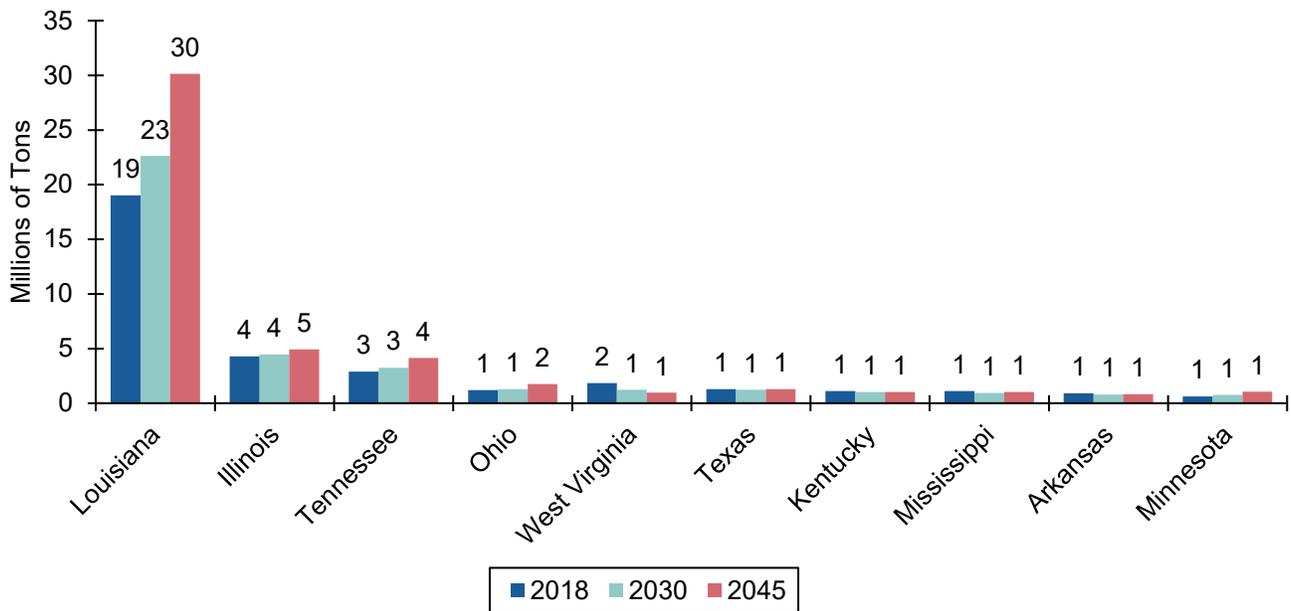


Source: IHS Transearch.

### Top Water Trading Partners

Missouri’s principal trading partners for water freight are shown in Figure 2.16. Louisiana is Missouri’s predominant trading partner for goods transported into and out of the state’s ports, comprising 54% of all goods in 2018. This share is expected to increase to 62% by 2045. Waterborne freight flows between Missouri and Louisiana are primarily comprised of shipments that are transferred to/from container ships to/from international markets. Illinois represents the state’s second largest trading partner for goods transported via water, with Tennessee following closely behind.

FIGURE 2.16 TOP TRADING PARTNERS FOR WATER, 2018-2045

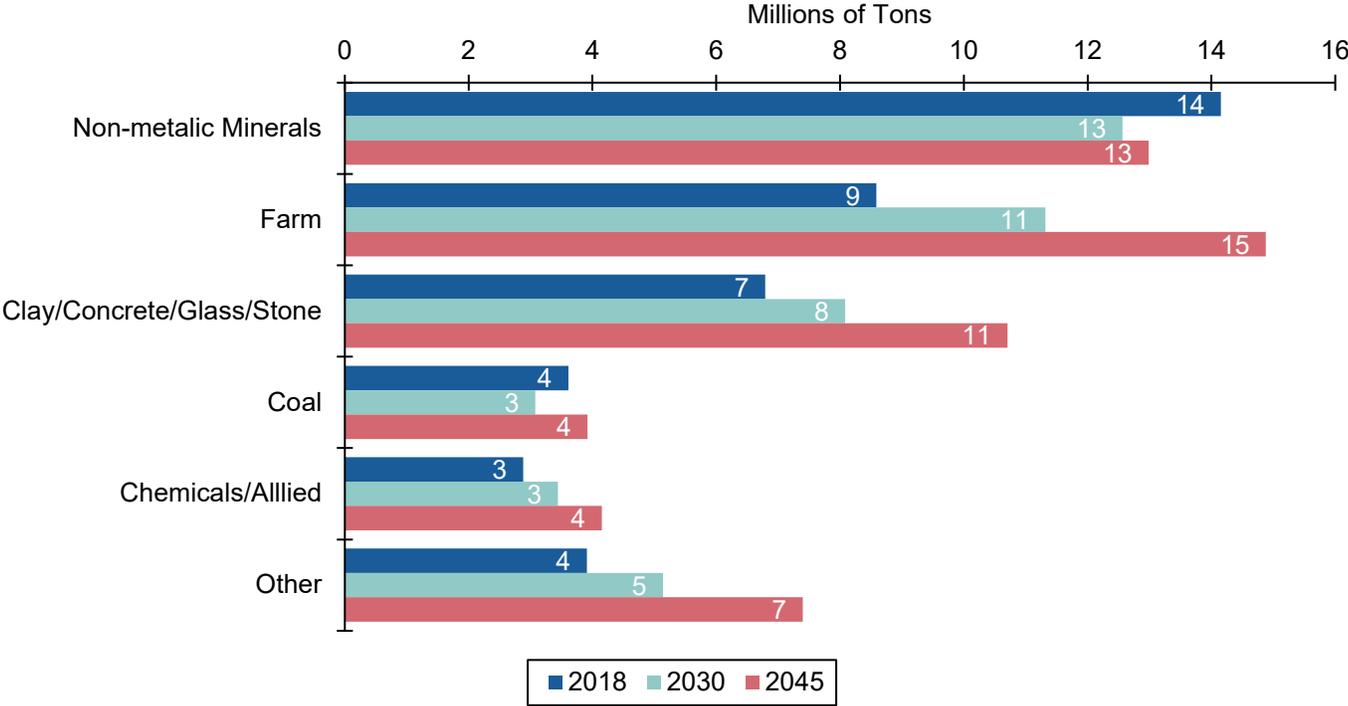


Source: IHS Transearch.

### Top Water Commodities

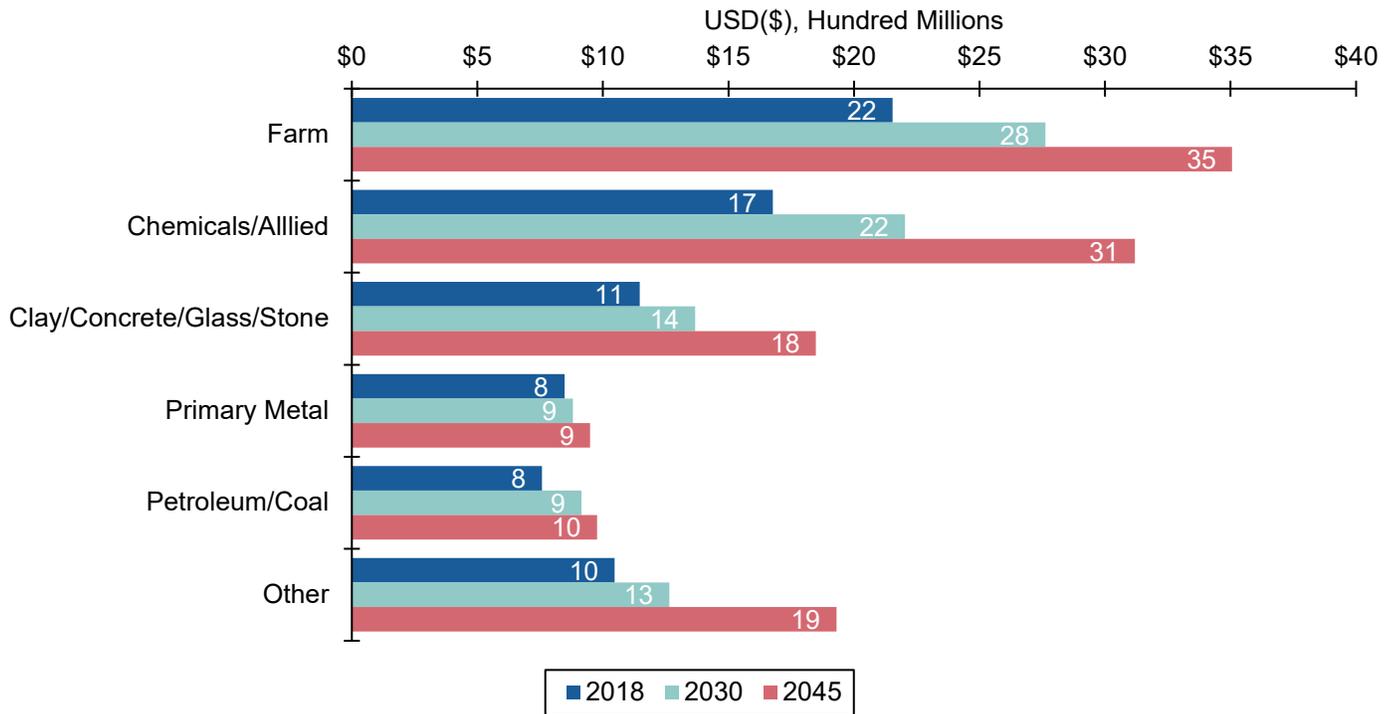
Figure 2.17 and Figure 2.18 show the top commodities transported into, out of and within Missouri’s ports and waterways in terms of tonnage and value respectively. Non-metallic materials comprised the highest share of tonnage in 2018 with more than 35%. However, farm products are expected to overtake non-metallic minerals by 2030, and are projected to comprise more than 27% of water trade by volume in 2045. Clay, concrete, glass and stone also represent a significant and growing proportion of commodities transported by water. In terms of value, farm goods represent the highest share (28%), followed by chemicals/allied products (22%). Despite the high tonnage of non-metallic minerals transported in 2018, non-metallic minerals only represented 2% of value in the same year.

FIGURE 2.17 TOP COMMODITIES FOR WATER FREIGHT BY VOLUME, 2018-2045



Source: IHS Transearch.

FIGURE 2.18 TOP COMMODITIES FOR WATER FREIGHT BY VALUE, 2018-2045



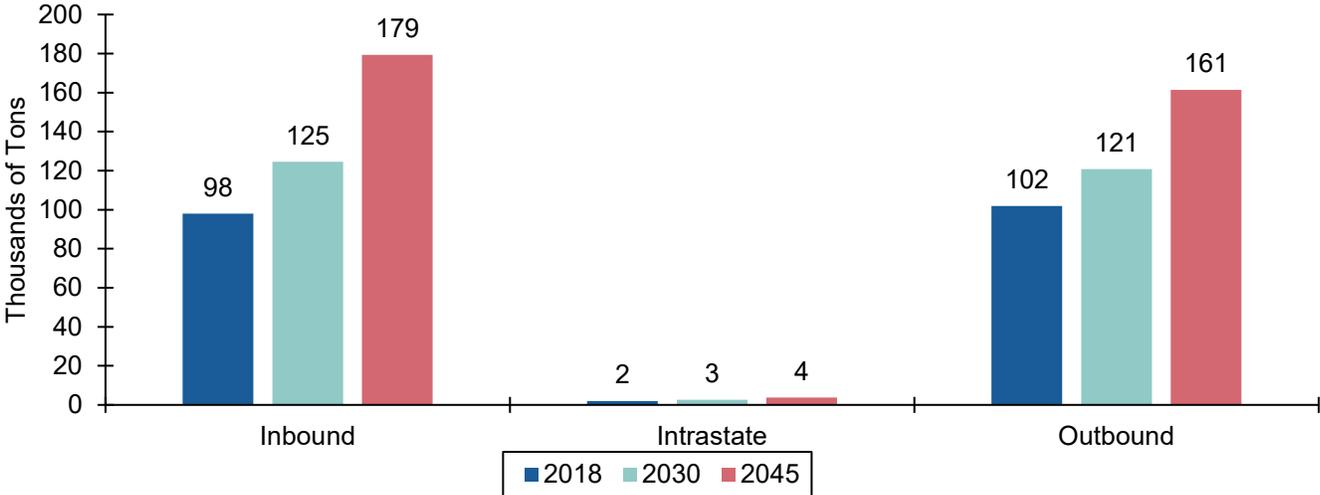
Source: IHS Transearch.

## Air Freight Demand

### Air Directional Split

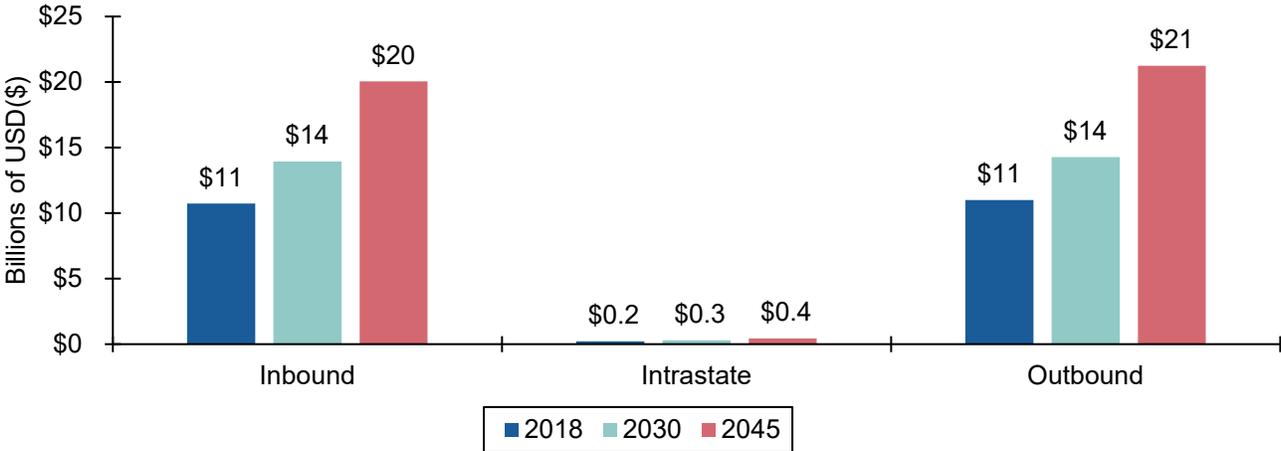
Missouri’s air cargo movements in 2018 totaled more than 201,000 tons and were valued at \$22 billion, which equates to a value of nearly \$109,000 per ton. Air cargo trade in Missouri is fairly balanced, as shown in Figure 2.19, with a 50% tonnage export and 48% tonnage import split. Similarly, as shown in Figure 2.20, 50% of Missouri’s air cargo value is exported, and 49% is imported. About 1% of air cargo by value remains within the state. While the directional distribution of air freight is not projected to change much by 2045, overall activity is expected to increase 71% by tonnage and 90% by value.

FIGURE 2.19 AIR FREIGHT VOLUME BY DIRECTION, 2018-2045



Source: IHS Transearch.

FIGURE 2.20 AIR FREIGHT VALUE BY DIRECTION, 2018-2045

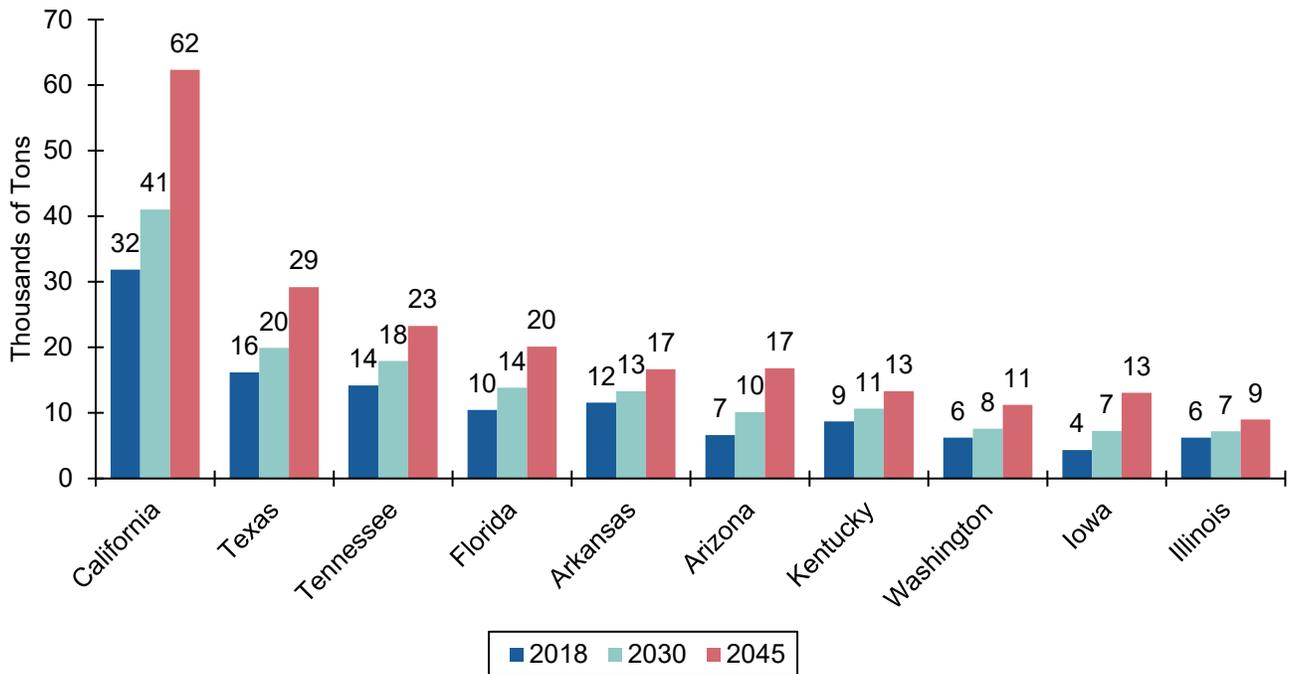


Source: IHS Transearch.

### Top Air Trading Partners

As shown in Figure 2.21, California is Missouri’s top trading partner for air freight, comprising 16% of all air trade in 2018, and is projected to remain so into the future, comprising more than 18% of air trade with Missouri in 2045. Other significant trading partners for air freight include Texas and Tennessee. While Arizona is only the state’s sixth largest trading partner for air freight, air trade between Arizona and Missouri is expected to grow by 154% between 2018 and 2045, while air trade with Iowa is expected to grow by more than 200% in the same time frame.

FIGURE 2.21 TOP TRADING PARTNERS FOR AIR FREIGHT, 2018-2045

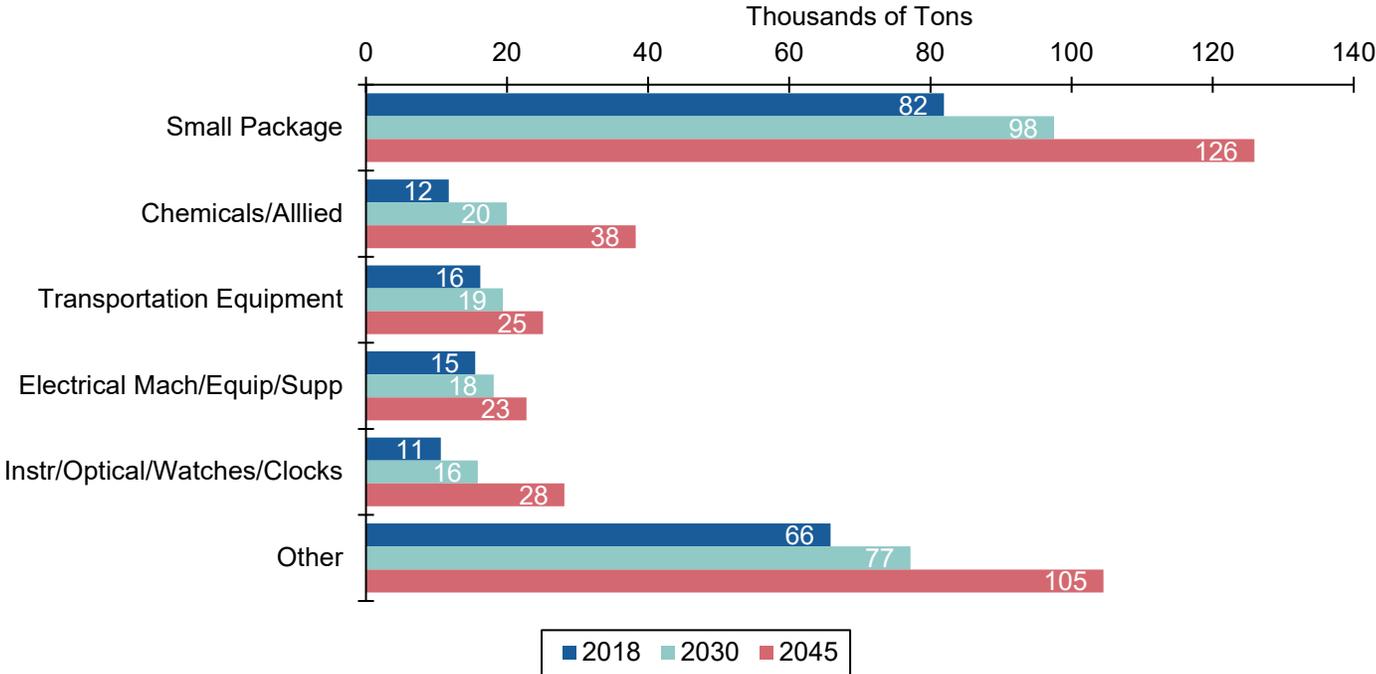


Source: IHS Transearch.

### Top Air Commodities

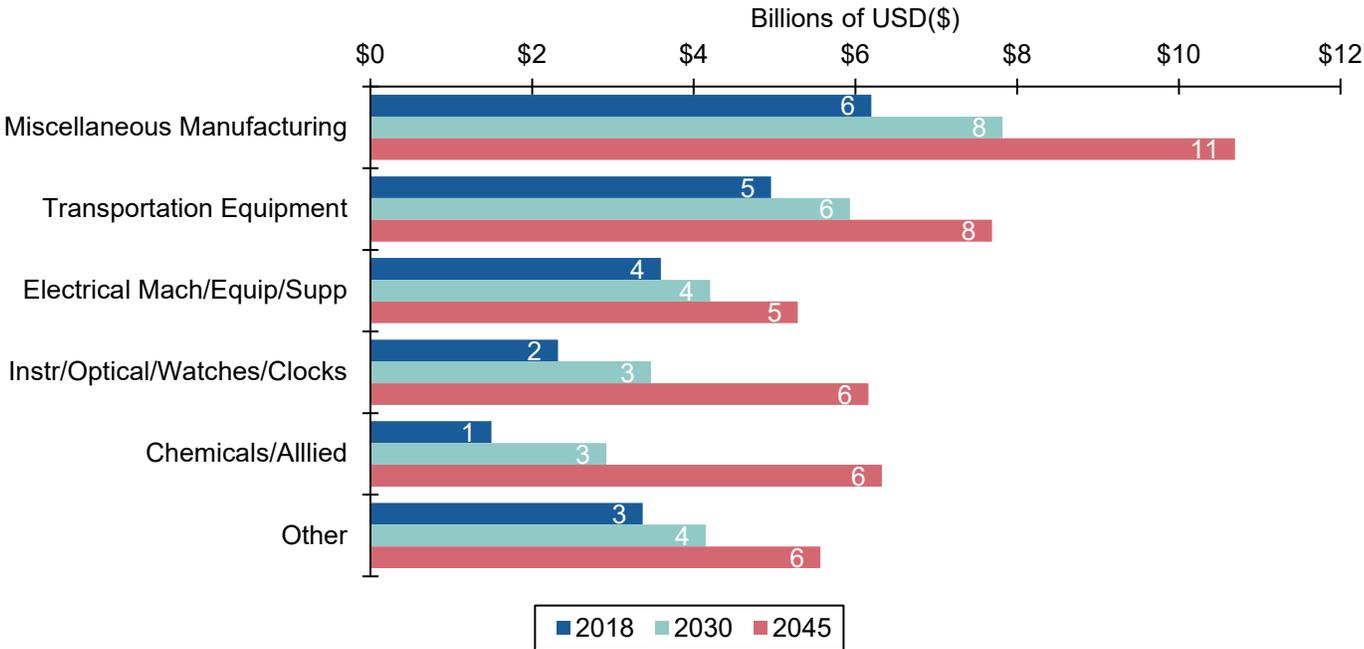
Figure 2.22 and Figure 2.23 provide a breakdown of the top commodities being imported and exported in Missouri in 2018. Small packaged freight shipments was the number one commodity being shipped by air in terms of tonnage for both imported (38%) and exported (43%) air cargo. FedEx and UPS are major air cargo carriers of packages at MCI, STL and SGF, and the United States Postal Service partners with both express carriers and several major airlines to transport its letters and parcels at all three Missouri cargo-handling airports. It is important to note that although these packaged shipments account for the most tonnage, they are not quantified in terms of value within the Transearch data product used for this study, and therefore no value for packaged shipments is available.

FIGURE 2.22 TOP COMMODITIES FOR AIR FREIGHT BY VOLUME, 2018-2045



Source: IHS Transearch.

FIGURE 2.23 TOP COMMODITIES FOR AIR FREIGHT BY VALUE, 2018-2045

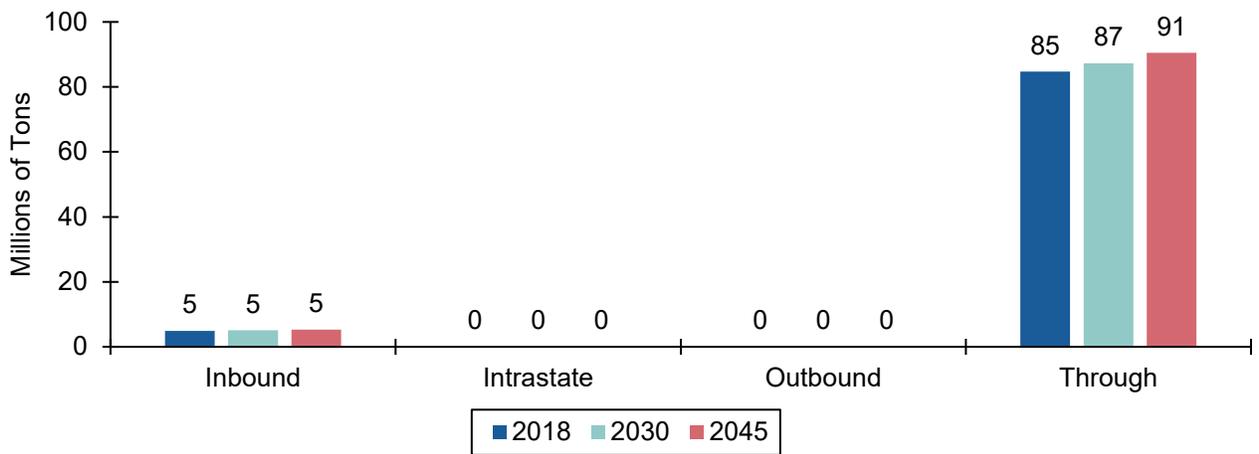


Source: IHS Transearch.

## Pipeline Freight Demand

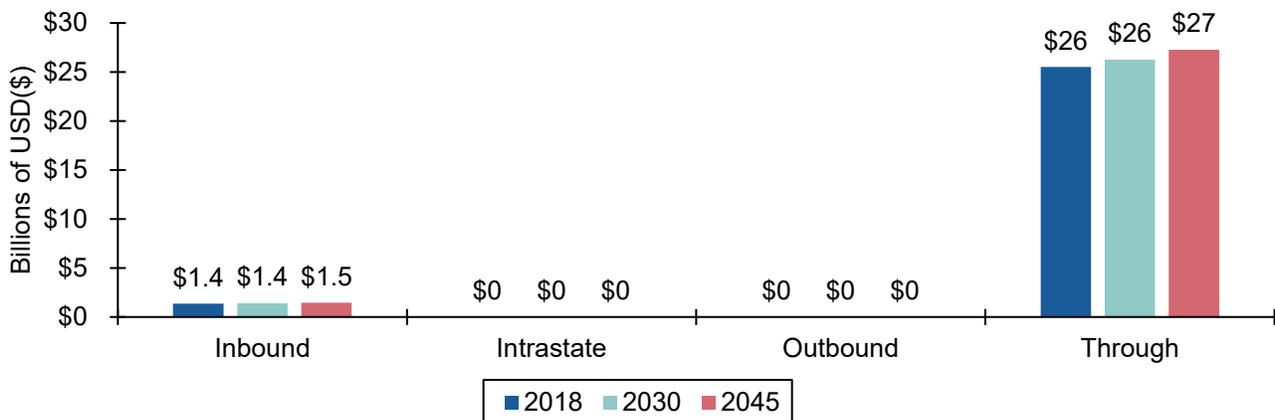
In 2018, more than 89 million tons of commodities worth \$26.9 billion were carried into or through Missouri by pipeline. There were no outbound commodities transported by Missouri’s pipelines. The commodities carried were comprised almost entirely of crude petroleum, which made up 99.9% of the total commodities based on both tonnage and value. Liquefied gases, coal or petroleum and petroleum refining products were the other two commodities transported through Missouri’s pipelines, at least among those that are tracked by Transearch. These two commodities accounted for less than 10,000 tons combined. Approximately 4.9 million tons of crude petroleum worth \$1.3 billion was brought into the state of Missouri in 2018. The remaining flows were considered through flows, though some did originate in Kansas City, KS. All of Missouri’s inbound pipeline flows in 2018, which consist solely of crude petroleum, originated from Alberta, and Alberta is projected to remain Missouri’s only pipeline trading partner through 2045.

**FIGURE 2.24 PIPELINE VOLUME BY DIRECTION, 2018-2045**



Source: IHS Transearch.

**FIGURE 2.25 PIPELINE VOLUME BY DIRECTION, 2018-2045**

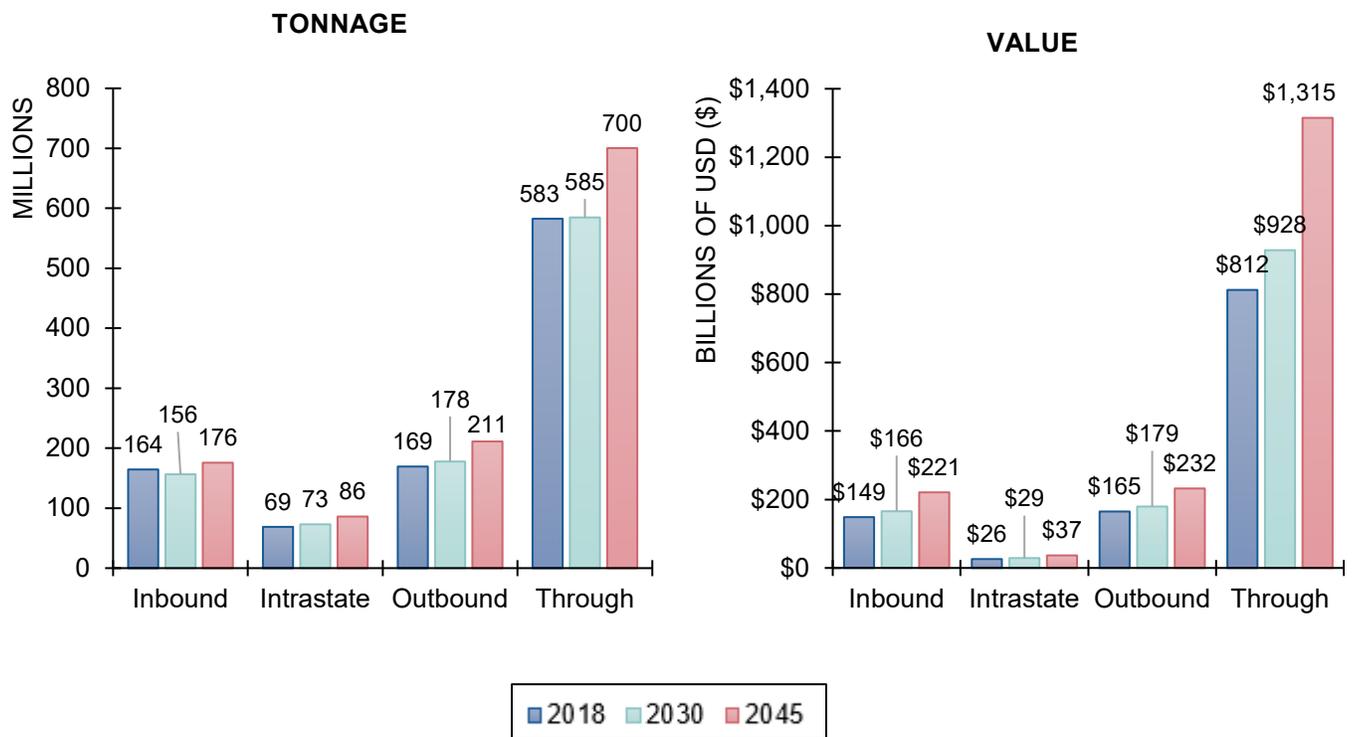


Source: IHS Transearch.

## 2.2 Directional Split

A large volume of freight moves to, from, within and through Missouri on a daily basis. When measured by weight, shipments that pass through the state without stopping (known as “through” movements) accounted for 59% of the more than 1 billion tons moved in 2018, by far the largest type of movement. Outbound and inbound shipments each comprised 17% of the total tons, followed by intrastate shipments (7%). Through shipments also represented the highest total value of goods moved through the state (70%), followed by outbound shipments (14%), inbound shipments (13%) and intrastate shipments (2%). Figure 2.26 summarizes the directional split by weight and value for goods moving in Missouri in 2018, 2030 and 2045. The directional split is expected to remain fairly consistent in the future.

**FIGURE 2.26 MISSOURI FREIGHT DIRECTIONS BY TONNAGE AND VALUE, 2018-2045**



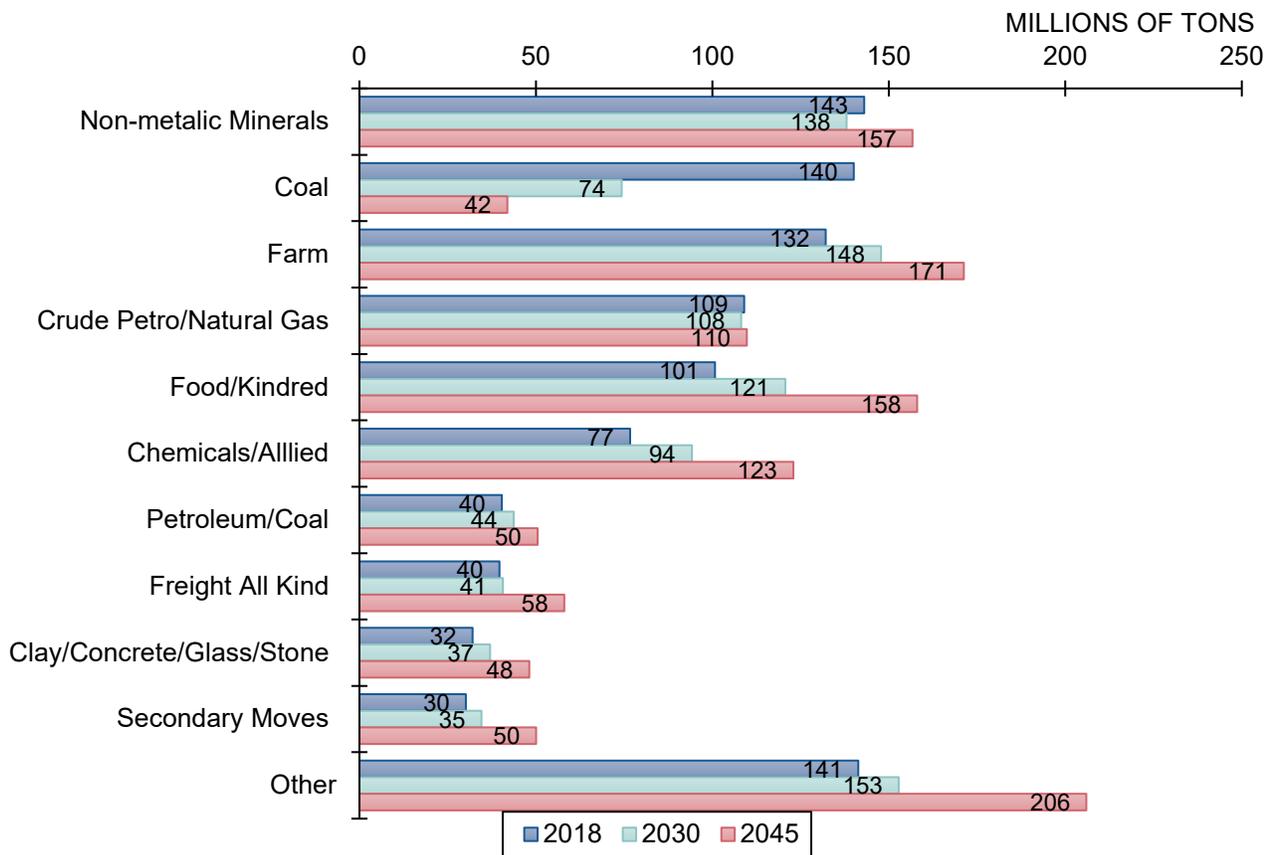
Source: IHS Transearch and STB Confidential Carload Waybill Sample.

Freight traffic by both value and weight is projected to grow in all directions between 2018 and 2045. By tonnage, increases between 20% and 25% are expected in all directions except for inbound traffic, which is only projected to grow by 7%. By value, through traffic is projected to grow by more than 60%, while the value of freight moved in other directions is projected to grow between 40% and 50%. Due to Missouri’s extensive transportation network and central location in the national transportation system, through traffic will continue to account for largest share of freight movement in the state.

## 2.3 Top Commodities

In 2018, the top commodity moved by weight in Missouri was non-metallic minerals (15%), followed closely by coal (14%) and farm products (13%). Crude petroleum/natural gas (11%) and food & kindred products (10%) also represent significant commodity flows in Missouri. Projections for 2045 show that farm products will become Missouri’s top commodity by tonnage, growing by 30%. Non-metallic minerals is expected to drop to the third largest commodity category by tonnage. In 2012, coal was the top commodity by weight (237 million tons), but coal movements have since decreased by nearly one hundred million tons. The tonnage of coal is projected to continue to decline by more than 70% between 2018 and 2045, while petroleum and natural gas movement is only expected to grow by 1%. Food products and chemicals are projected to leapfrog the aforementioned energy products by 2045, with food products becoming the second largest commodity. Figure 2.27 shows the top commodities by tonnage for 2018 and their 2045 projections. A complete list of commodity codes, definitions and descriptions are available in Appendix A.

**FIGURE 2.27 MISSOURI TOP COMMODITIES BY TONNAGE, 2018-2045**

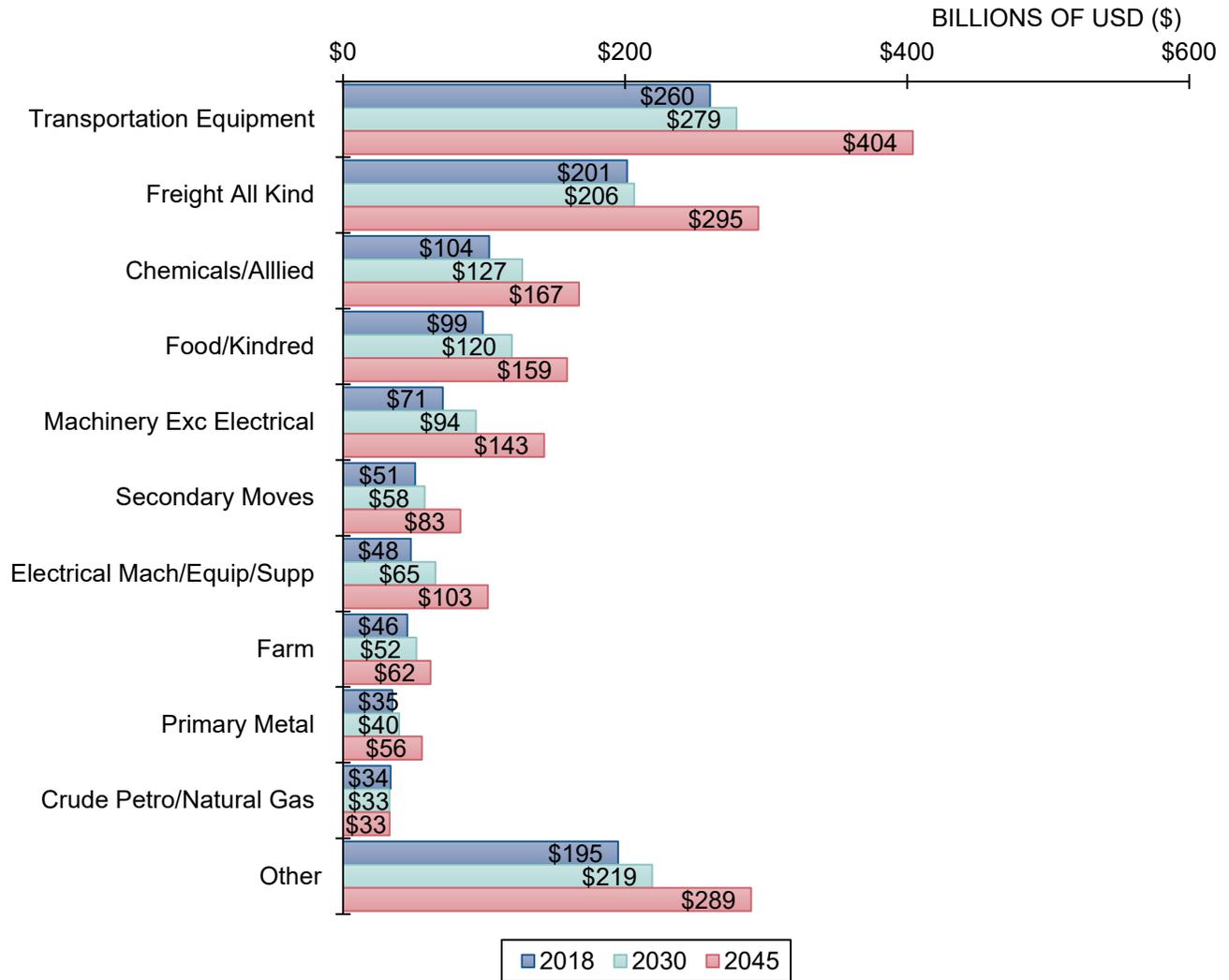


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

Transportation equipment, which only represents 3% of all tonnage, represents by far the highest value, representing 23% of the value of Missouri freight commodities, followed by mixed freight (18%), chemicals (9%)

and food products (9%). The overall distribution of the value of commodities is projected to remain somewhat consistent in 2045, with transportation equipment and mixed freight continuing to lead the way. The value of machinery, both electrical and non-electrical, is expected to more than double between 2018 and 2045. Figure 2.28 shows the top commodities by value for 2018 through 2045.

**FIGURE 2.28 MISSOURI TOP COMMODITIES BY VALUE, 2018-2045**



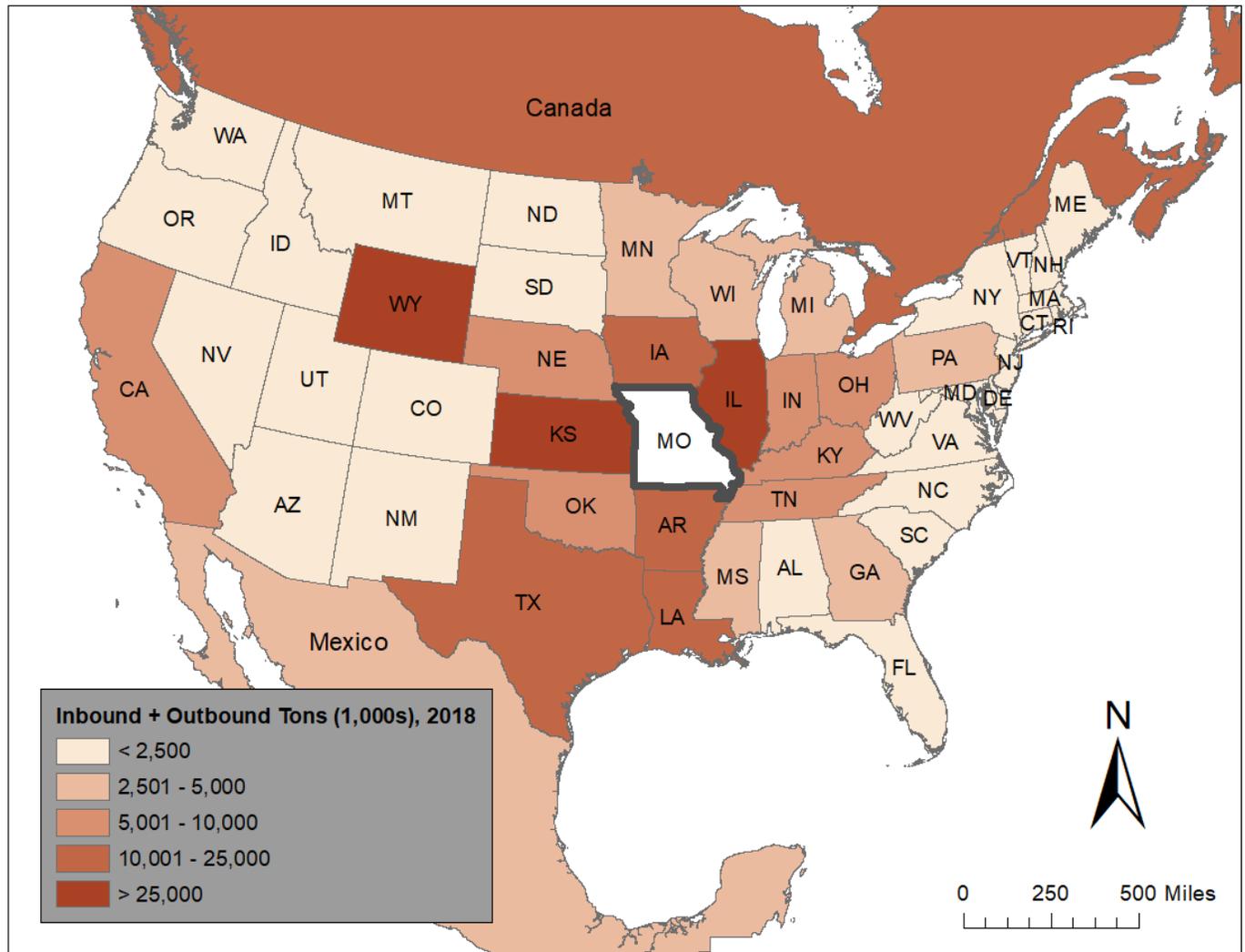
Source: IHS Transearch and STB Confidential Carload Waybill Sample.

## 2.4 Missouri's Trading Partners

Figure 2.29 shows Missouri's trading partners based on highest combined inbound and outbound tonnage in 2018. Illinois was Missouri's top trading partner, accounting for 56.6 million tons of combined inbound and outbound freight, almost 17 percent of the total. Wyoming and Kansas were the next top trading partners, respectively accounting for 48 million and 32.6 million tons.

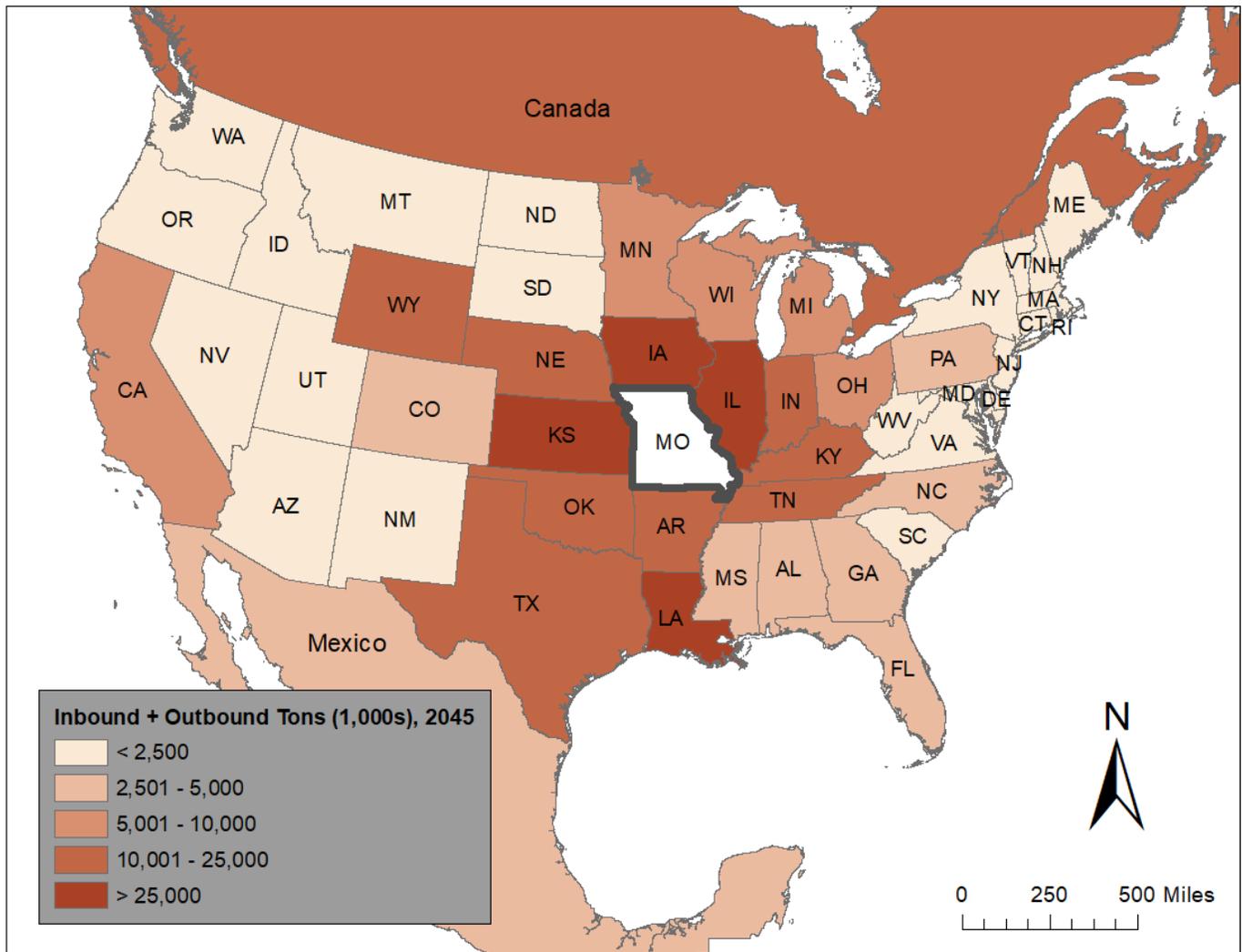
Figure 2.30 shows Missouri's projected trading partners by volume in 2045. Illinois is projected to remain the state's top trading partner, with a modest 10% projected growth in overall trade activity between the states. Wyoming is projected to drop from the second largest trading partner to the seventh largest, with trade between the two states dropping by a projected 67%. Kansas and Louisiana are projected to be Missouri's second and third most significant trading partners in 2045, with trade with Kansas growing by nearly 25% and trade with Louisiana growing by more than 56% between 2018 and 2045.

**FIGURE 2.29 MISSOURI'S TRADING PARTNERS BY TONNAGE, 2018**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 2.30 MISSOURI'S TRADING PARTNERS BY TONNAGE, 2018

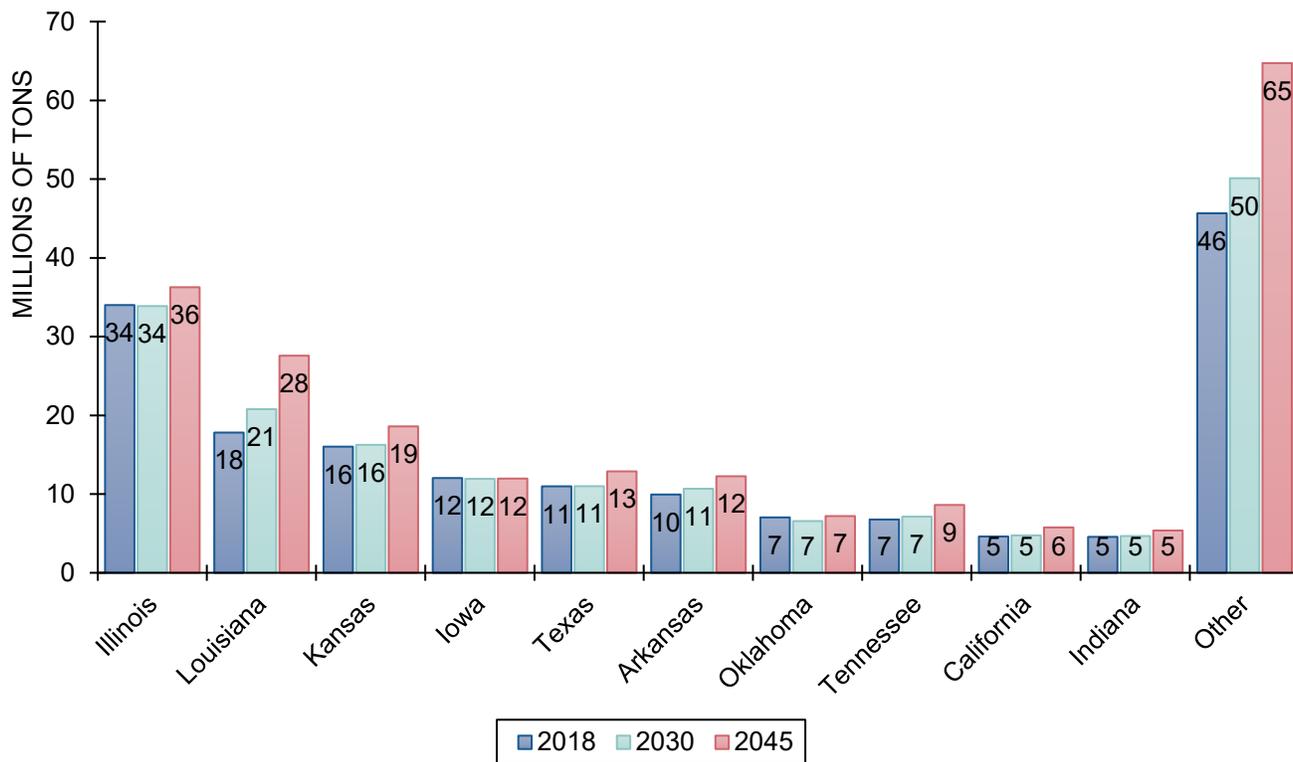


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### Outbound Goods

Missouri's exports travel to a wide range of domestic and international destinations. Seven of the state's top ten trading partners for exports consist of states that border Missouri. However, nearly half (49%) of the state's exports are shipped to states that do not border Missouri. Figure 2.31 shows the state's top trading partners for outbound goods. Illinois represented the state's top trading partner, receiving 34 million tons in 2018. Notably, Louisiana (11%) represented the state's second largest partner for outbound goods while Texas (6%) was the fifth largest in 2018, demonstrating the reach of Missouri's export economy. Canada and Mexico accounted for just under 3% of exports.

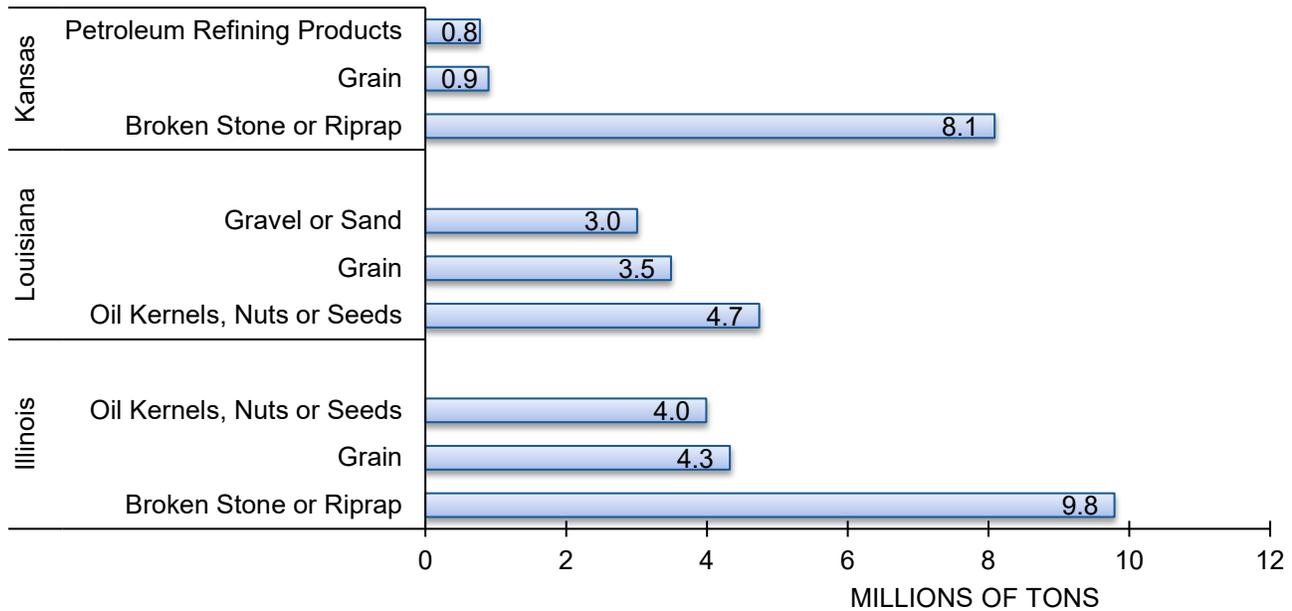
FIGURE 2.31 MISSOURI'S TOP OUTBOUND TRADING PARTNERS BY TONNAGE, 2018 - 2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

In terms of the top commodities exported to Missouri’s top trading partners, Figure 2.32 shows that there is some degree of consistency among the types of goods that have the highest tonnage of outbound traffic. Broken stone/riprap is the highest volume good transported to both Illinois and Kansas, while oil kernels, nuts and seeds is another top commodity category exported to Louisiana and Illinois. Grain is also a top export to all three of Missouri’s top trading partners.

FIGURE 2.32 TOP COMMODITIES BY TONNAGE FOR MISSOURI'S TOP OUTBOUND PARTNERS, 2018

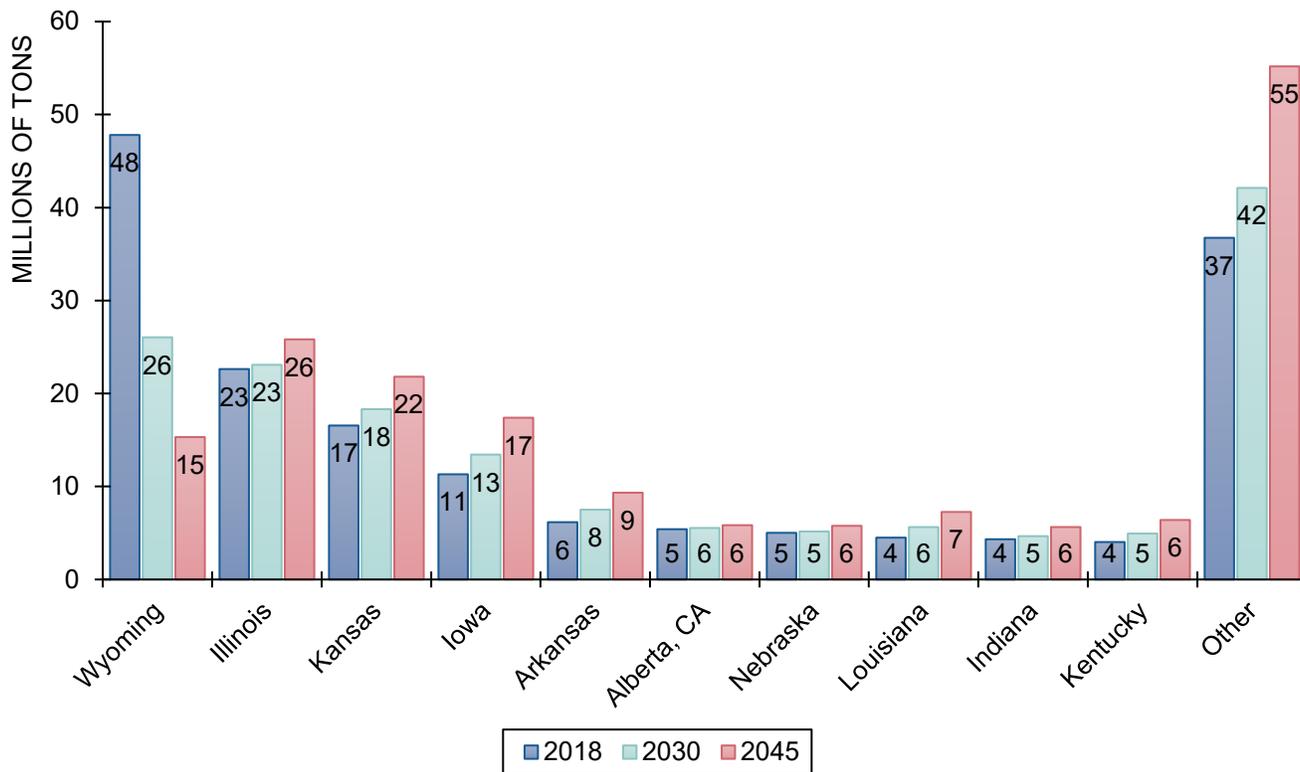


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

## Inbound Goods

Goods arriving in Missouri also have a diverse set of origins, with the state receiving 201 million tons of goods in 2018. Neighboring states only account for 38% of the origins for imported goods. Currently, Wyoming is by far the state's largest trading partner for imported goods, with 29% of the state's imports originating there. The neighboring states of Illinois and Kansas made up 14% and 13% of imports respectively in 2018. Projections show that this distribution will change dramatically by 2045, with imports originating from Wyoming dropping by more than 30 million tons, decreasing its share to only 9% due to the projected decline in coal traffic. All other jurisdictions in the top ten trading partners for imports are projected to see a percentage increase in trade between 2018 and 2045. States projected to see the most substantial growth in trade to Missouri include Texas, Louisiana and Kentucky, with Texas moving from Missouri's 11<sup>th</sup> largest trading partner to its seventh largest for imports. North American trade with Canada and Mexico is a larger factor for imports than exports, representing nearly 6% of overall imports. The Canadian province of Alberta represented Missouri's sixth largest trading partner in 2018 with more than 3 percent of imports. North American trade is expected to increase from 5.6% of imports to 8% of imports by 2045. Figure 2.33 shows the top inbound trading partners by weight for 2018 and their 2045 projections.

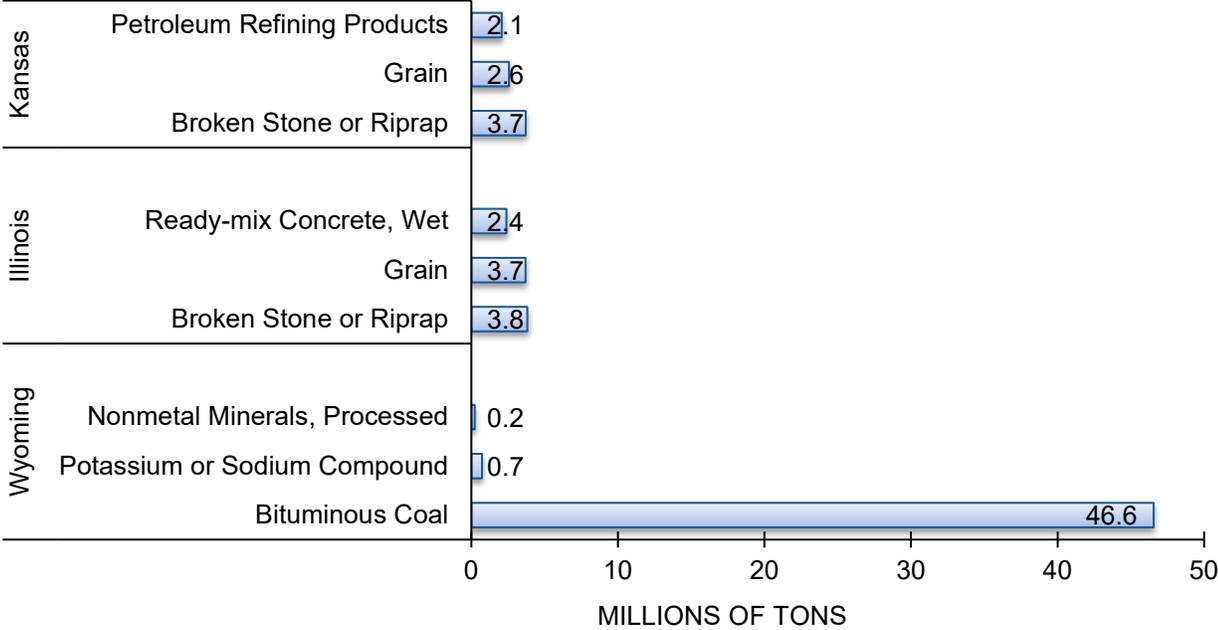
FIGURE 2.33 MISSOURI'S TOP INBOUND TRADING PARTNERS BY TONNAGE, 2018-2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

Figure 2.34 shows the top commodities by tonnage for Missouri’s top inbound trading partners in 2018. As discussed previously, bituminous coal from Wyoming was by far Missouri’s largest import by volume in 2018, though it is projected to decrease from 46.5 million tons in 2018 to 13.3 million tons in 2045. Top imports by volume from Missouri’s other top inbound trading partners, Illinois and Kansas, include broken stone/riprap and grain. Additionally, significant volumes of petroleum refining products are imported from Kansas, as well as ready-mix concrete from Illinois.

FIGURE 2.34 TOP COMMODITIES BY TONNAGE FOR MISSOURI'S TOP INBOUND PARTNERS, 2018



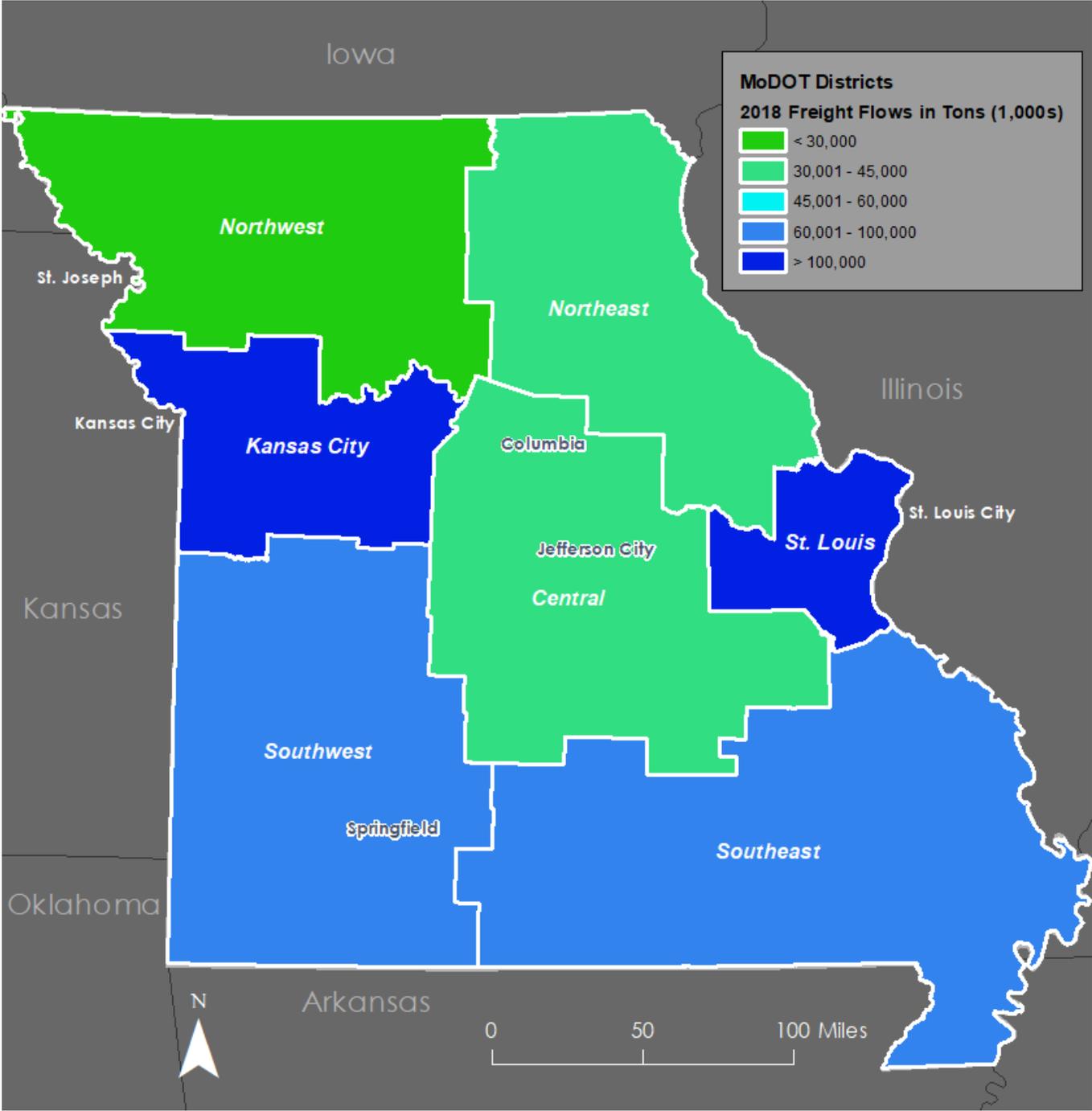
Source: IHS Transearch and STB Confidential Carload Waybill Sample.

## 3.0 District Level Freight Demand

This section examines the freight activity originating and terminating in MoDOT's seven districts. Figure 3.1 shows the tonnage of combined imports and exports for each MoDOT district in 2018. The St. Louis region leads all districts in freight flows, with more than 130 million tons of goods moved in 2018, followed by the Kansas City district where just more than 100 million tons were imported or exported in 2018. Outside of the two major metropolitan districts, the Southeast district generated the most freight activity, with nearly 70 million tons of imports and exports in 2018. The Northwest district saw the least amount of freight activity in 2018, with just under 30 million tons.

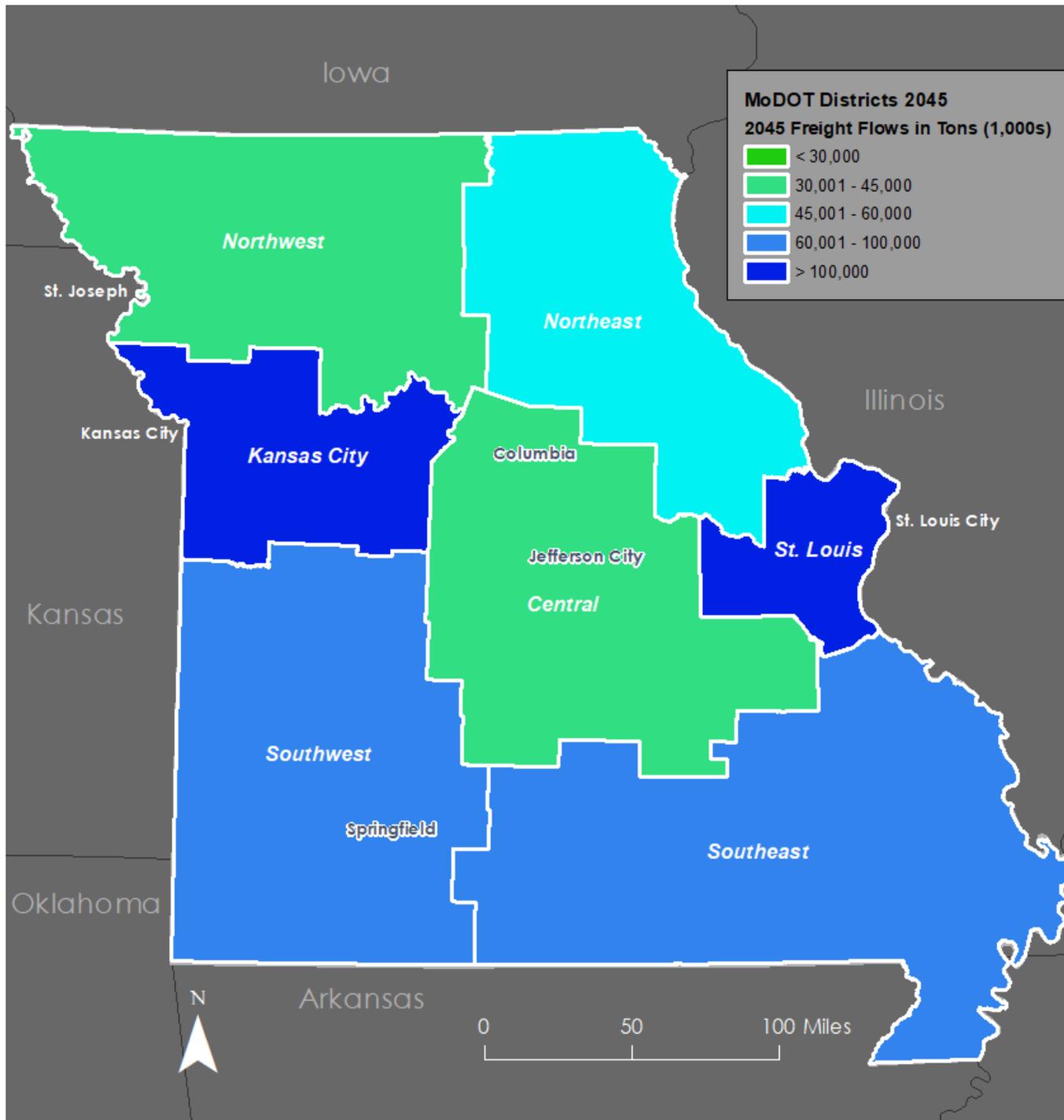
Figure 3.2 shows the projected MoDOT district freight tonnage in 2045. The overall distribution of freight activity is not expected to change significantly, with the St. Louis and Kansas City regions continuing to dominate. Freight flows are projected to grow in each MoDOT district between 2018 and 2045, with the highest growth rates projected for the Central (32%) and Southeast (29%) districts, and the lowest growth projected for the Northeast district (5.6%).

FIGURE 3.1 FREIGHT TONNAGE BY MODOT DISTRICT FOR INBOUND, OUTBOUND AND INTRA-DISTRICT FLOWS, 2018



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

**FIGURE 3.2 FREIGHT TONNAGE BY MODOT DISTRICT FOR INBOUND, OUTBOUND AND INTRA-DISTRICT FLOWS, 2045**



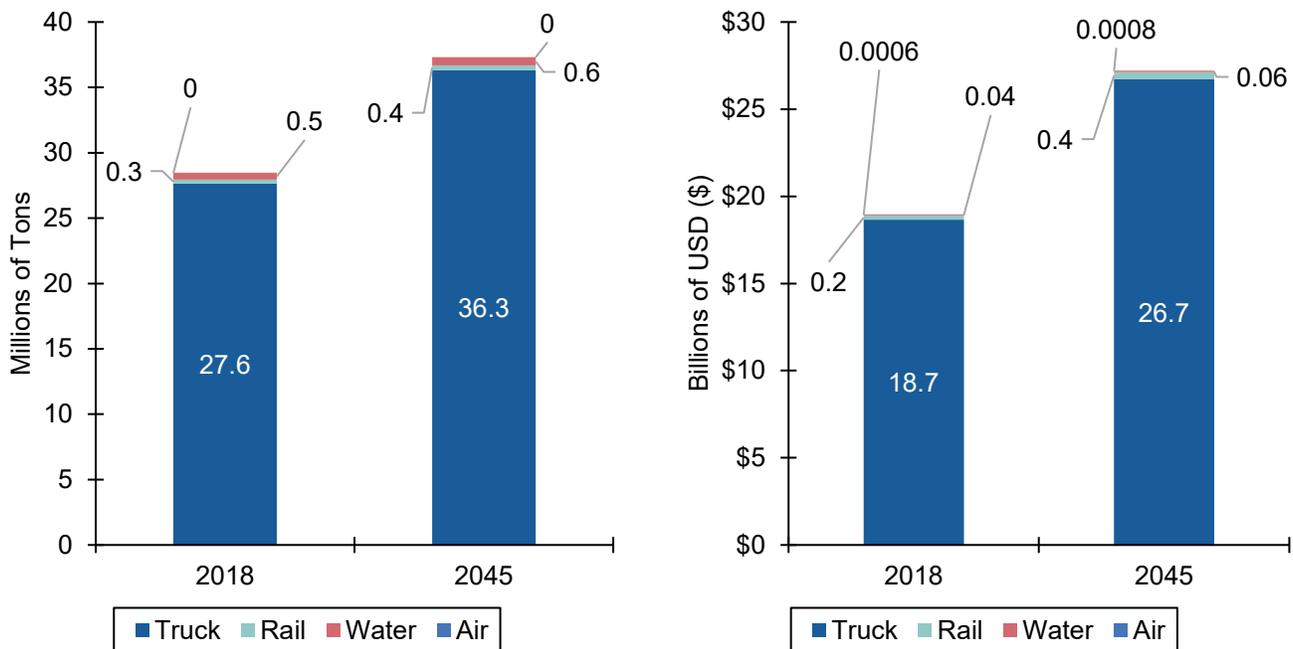
Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### 3.1 Central District

Missouri’s Central District, located between Kansas City and St. Louis, is mostly rural but includes the cities of Columbia and Jefferson City. The Central District also includes a sizable portion of the Ozark Mountains, including the tourism and recreation areas of Lake Ozark and Osage Beach, and smaller cities such as Boonville and Rolla.

The modal breakdown of freight tonnage and value for the Central District is shown in Figure 3.3. Trucks carried the majority (97%) of goods, both in terms of weight and value in 2018. This trend is expected to remain firmly in place through 2045, with remaining modes carrying minimal freight volumes. Overall, the Central District moved 28 million tons of goods worth \$19 billion in 2018. Through 2045, these figures are expected to rise to 37 million tons of goods worth \$27 billion.

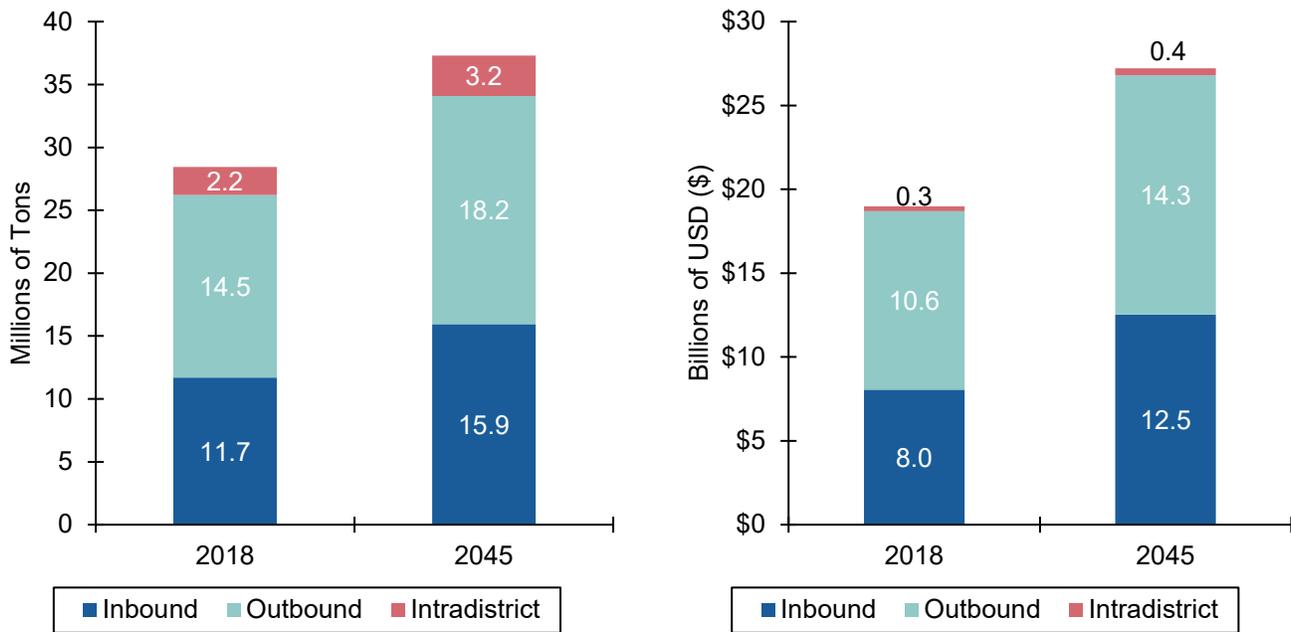
**FIGURE 3.3 CENTRAL DISTRICT FREIGHT TONNAGE AND VALUE BY MODE, 2018 - 2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The directional breakdown of freight tonnage and value is shown in Figure 3.4. Outbound shipments comprised just over half (51%) of all shipments by tonnage in 2018, with slightly higher figures (56%) for value. On the basis of tonnage, inbound shipments represented 41% of all shipments in 2018, a figure expected to rise only slightly to 43% in 2045. Intra-district tonnage on the other hand, appears to be primarily comprised of heavy-weight, low-value shipments. This is indicated by such shipments comprising up to 9% of tonnage but just 2% of total value through 2045.

FIGURE 3.4 CENTRAL DISTRICT FREIGHT FLOWS BY TONNAGE AND VALUE, 2018 - 2045

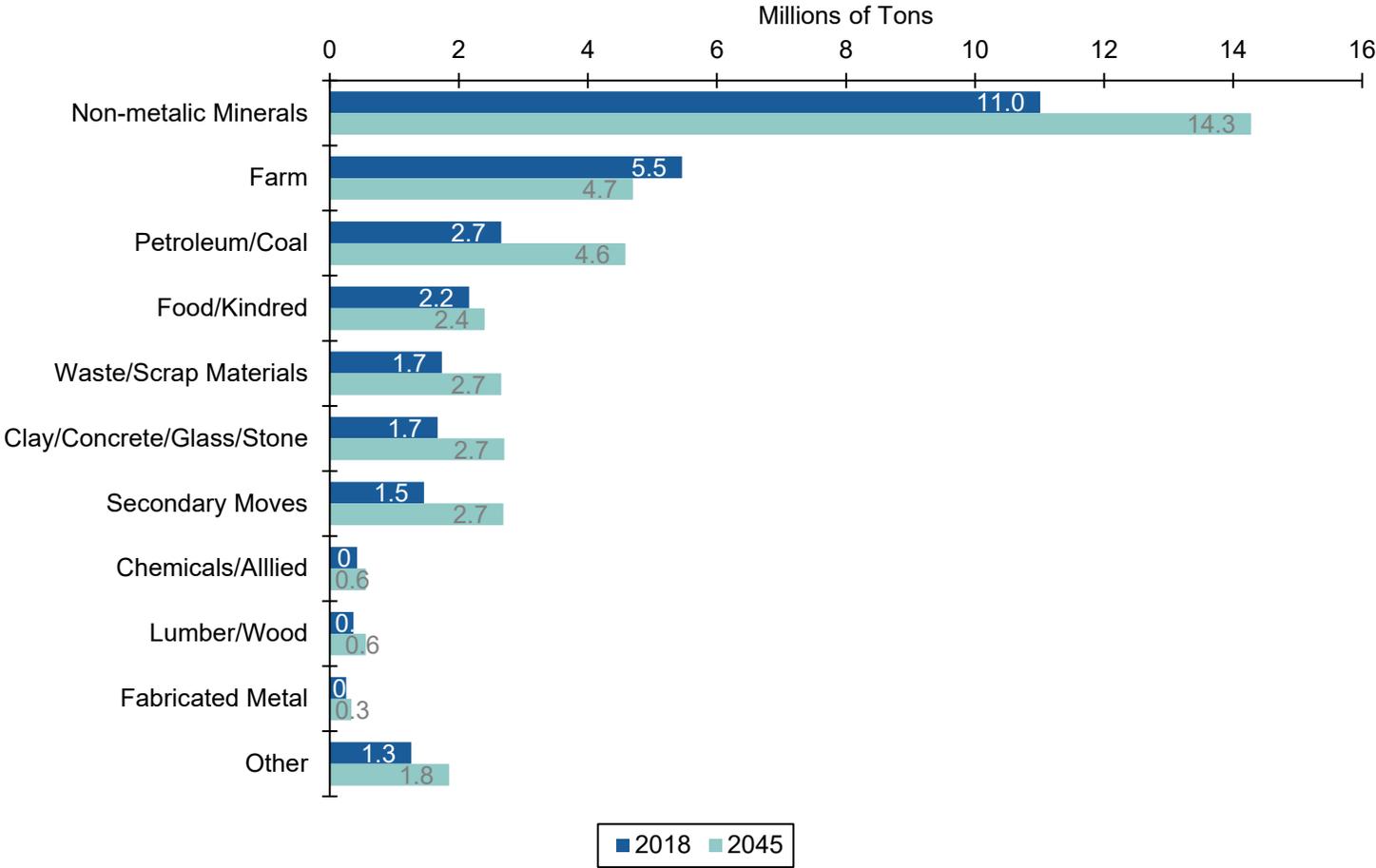


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The top commodities by tonnage and value are shown in Figure 3.5 and Figure 3.6. By tonnage, nonmetallic minerals were the top commodity in 2018 (39%), followed by farm products (19%) and petroleum/coal (9%). Through 2045, increases in tonnage are expected for most commodities with the exception of farm products, which is expected to drop from a 19% share to 13%, while non-metallic minerals are expected to increase to more than 14 million tons, or approximately 38% of all tonnage.

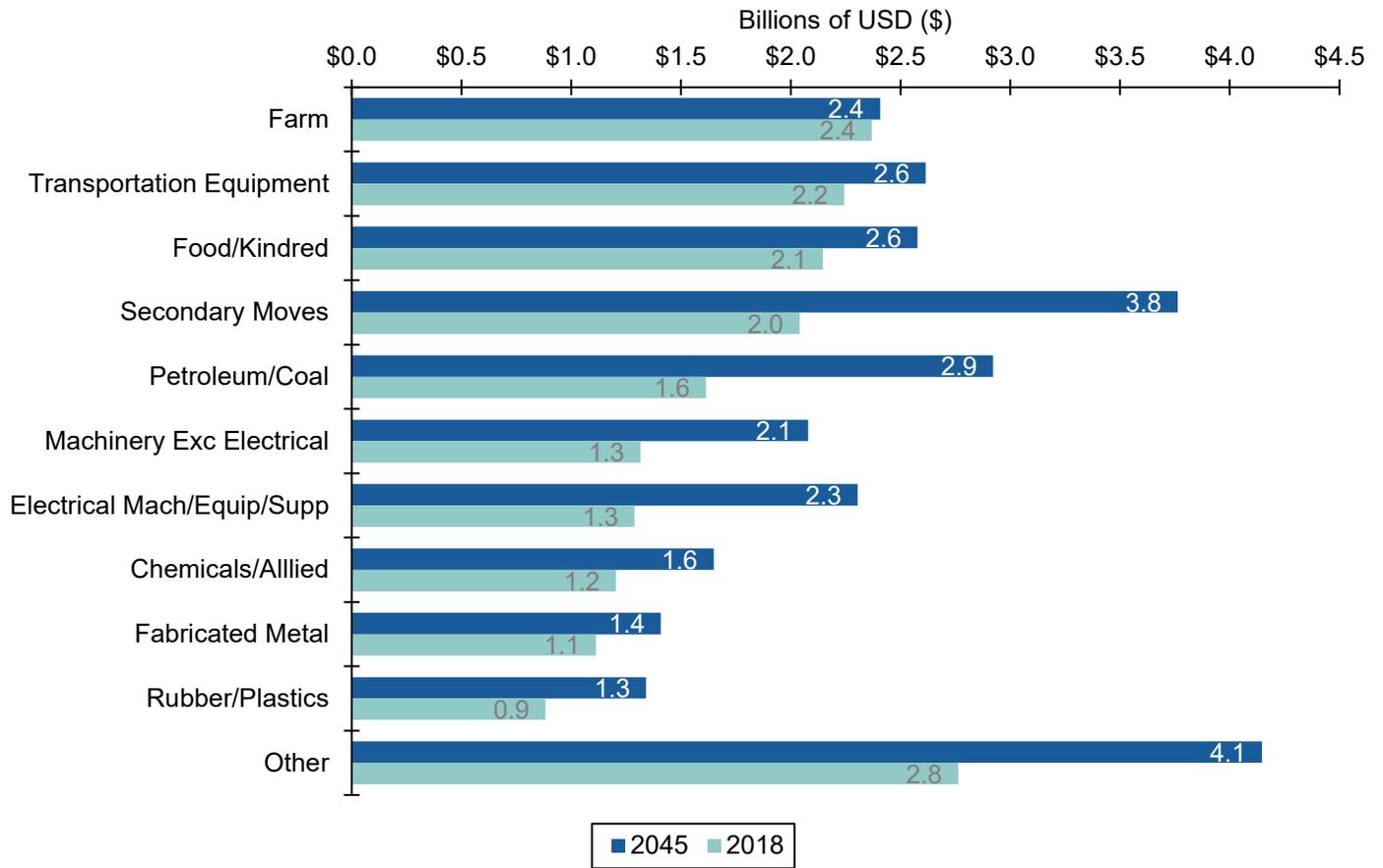
On the basis of value, there was somewhat less disparity amongst the top commodities. In 2018, farm products, transportation equipment, food/kindred products, and secondary movements each accounted for more than \$2 billion. Through 2045, secondary movements are expected to be the top commodity at almost \$4 billion, or 14% of all value, followed by petroleum/coal (under \$3 billion at 11%), and transportation equipment (more than \$2.5 billion at 10%). Increases in value are expected for all commodities, although the amount for farm commodities appears to be notably smaller.

FIGURE 3.5 CENTRAL DISTRICT TOP COMMODITIES BY TONNAGE, 2018-2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 3.6 CENTRAL DISTRICT TOP COMMODITIES BY VALUE, 2018-2045

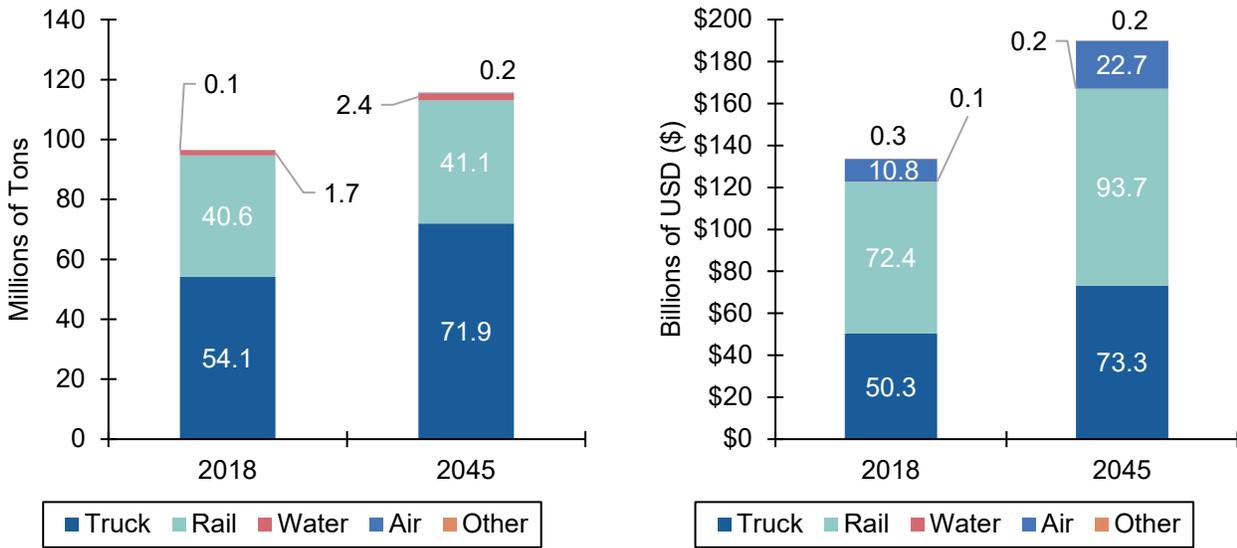


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### 3.2 Kansas City District

Missouri’s Kansas City District includes Kansas City and surrounding suburbs and communities. Overall, the Kansas City District moved 96 million tons of goods worth \$134 billion in 2018. By 2045, these figures are expected to rise to 116 million tons of goods worth \$190 billion. The modal breakdown of freight tonnage and value for the Kansas City District is shown in Figure 3.7. For the Kansas City District, the majority of goods were transported by truck and rail in 2018. On the basis of tonnage, trucks carried 56% of goods in 2018, while rail carried 42%. By 2045, the market share of trucks is expected to increase to 62%, while the market share of rail is expected to decline to 36%. This indicates that most of the expected growth in tonnage through 2045 will be carried by trucks. On the basis of value, rail had the largest market share at 54% in 2018, although this figure is expected to drop to 49% in 2045. The market share for trucks is expected to remain fairly constant (38% in 2018 compared to 39% in 2045). Air cargo is expected to comprise a higher total of value in 2045 (12% in 2045, compared to 8% in 2018).

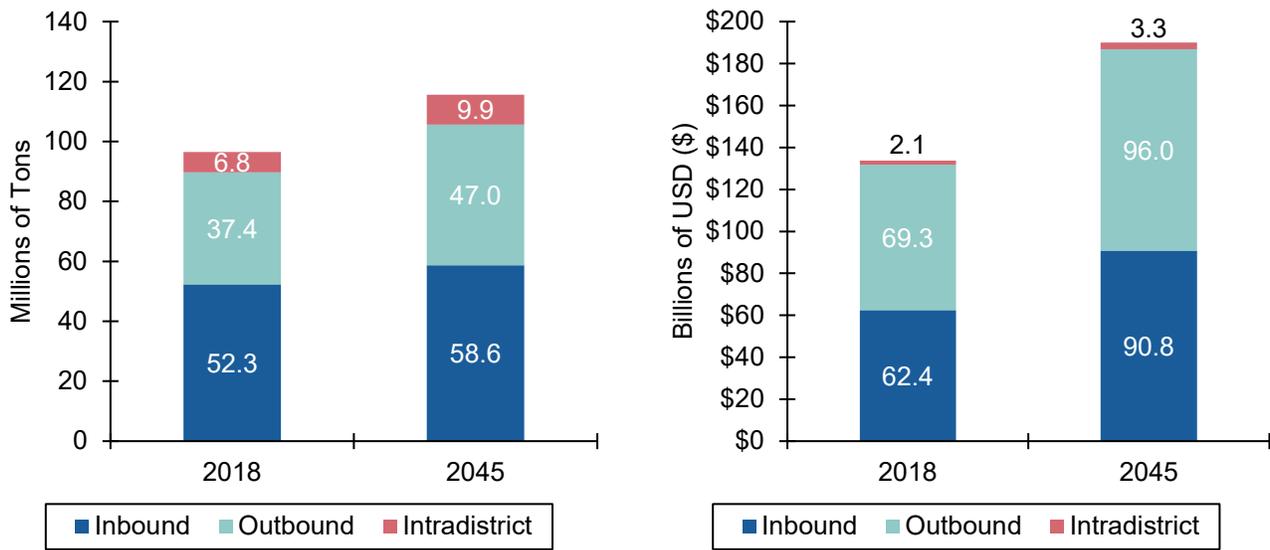
**FIGURE 3.7 KANSAS CITY DISTRICT FREIGHT TONNAGE AND VALUE BY MODE, 2018 - 2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The directional breakdown of freight tonnage and value is shown in Figure 3.8. Inbound shipments comprised approximately 54% of all shipments by tonnage in 2018, a proportion expected to decline slightly to 51% in 2045, based on increases in other directional tonnage proportions. Outbound shipments comprised 39% of all tonnage in 2018 and expected to increase to 41% by 2045. The remaining tonnage is intra-district shipments, which comprised 7% in 2018, with an additional 2% increase to 9% expected through 2045. In terms of value, the split between inbound and outbound shipments was closer to equal. Inbound shipments comprised 47% in 2018, with an expected increase to 48% in 2045, while outbound shipments comprised 52% in 2018, with an expected decrease to 50% in 2045. The lower proportions of outbound shipments for the Kansas City District, in comparison to most other districts, is likely due to the higher population and urbanized, consumer-driven geography of the district.

**FIGURE 3.8 KANSAS CITY DISTRICT FREIGHT FLOWS BY TONNAGE AND VALUE, 2018 - 2045**

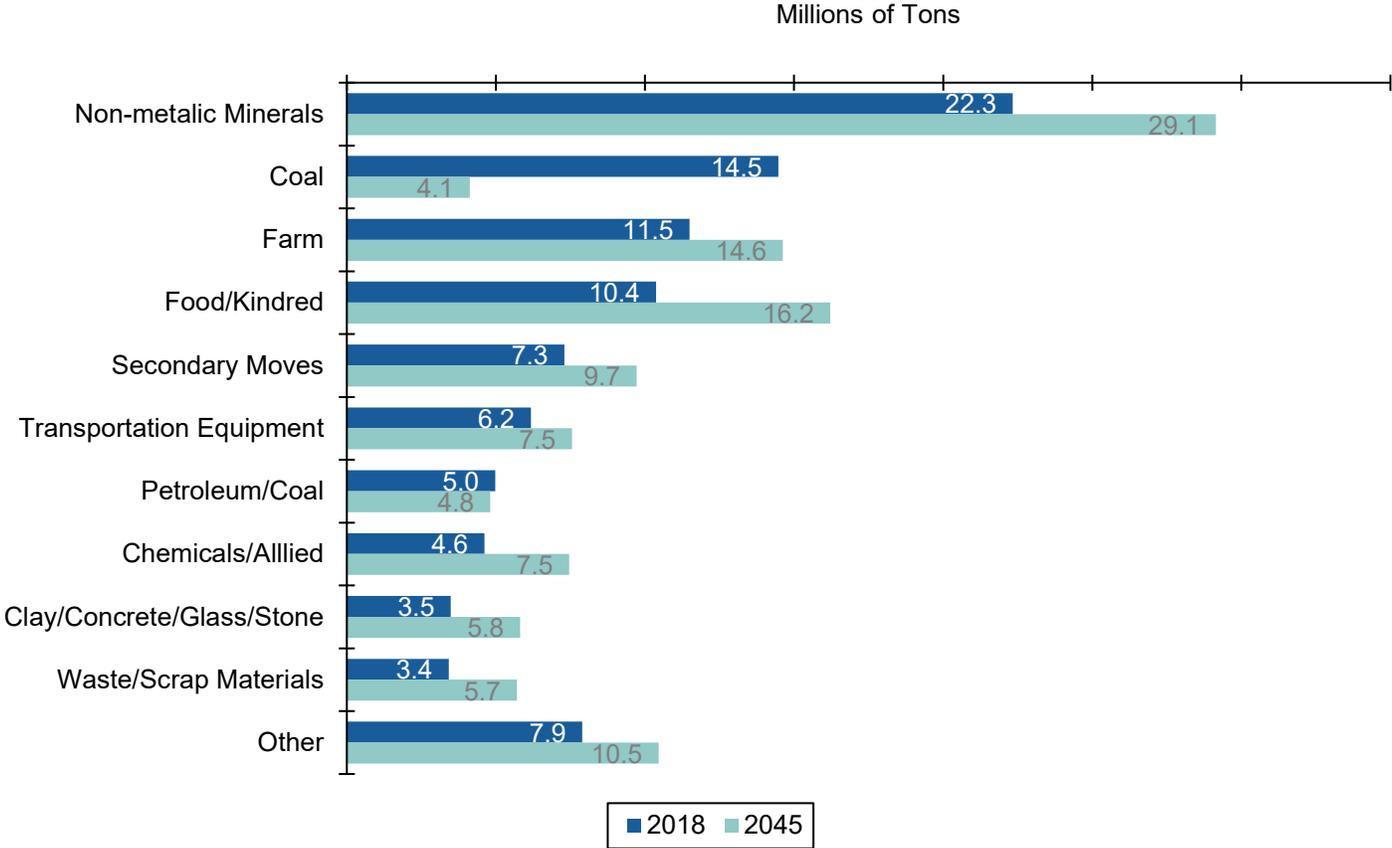


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The top commodities by tonnage and value are shown in Figure 3.9 and Figure 3.10 respectively. By tonnage, nonmetallic minerals, coal, farm products and food/kindred goods rounded out the top four with more than 58 million tons in 2018. By 2045, nonmetallic minerals are expected to remain the top commodity with an increase to 29 million. The biggest predicted drop is for coal, which is expected to decline from 14 million tons in 2018 to 4 million tons in 2045, including a decrease in the total share of commodities moved from 15% to just 4%. The biggest increase in market share is expected for food/kindred goods from 11% to 14%.

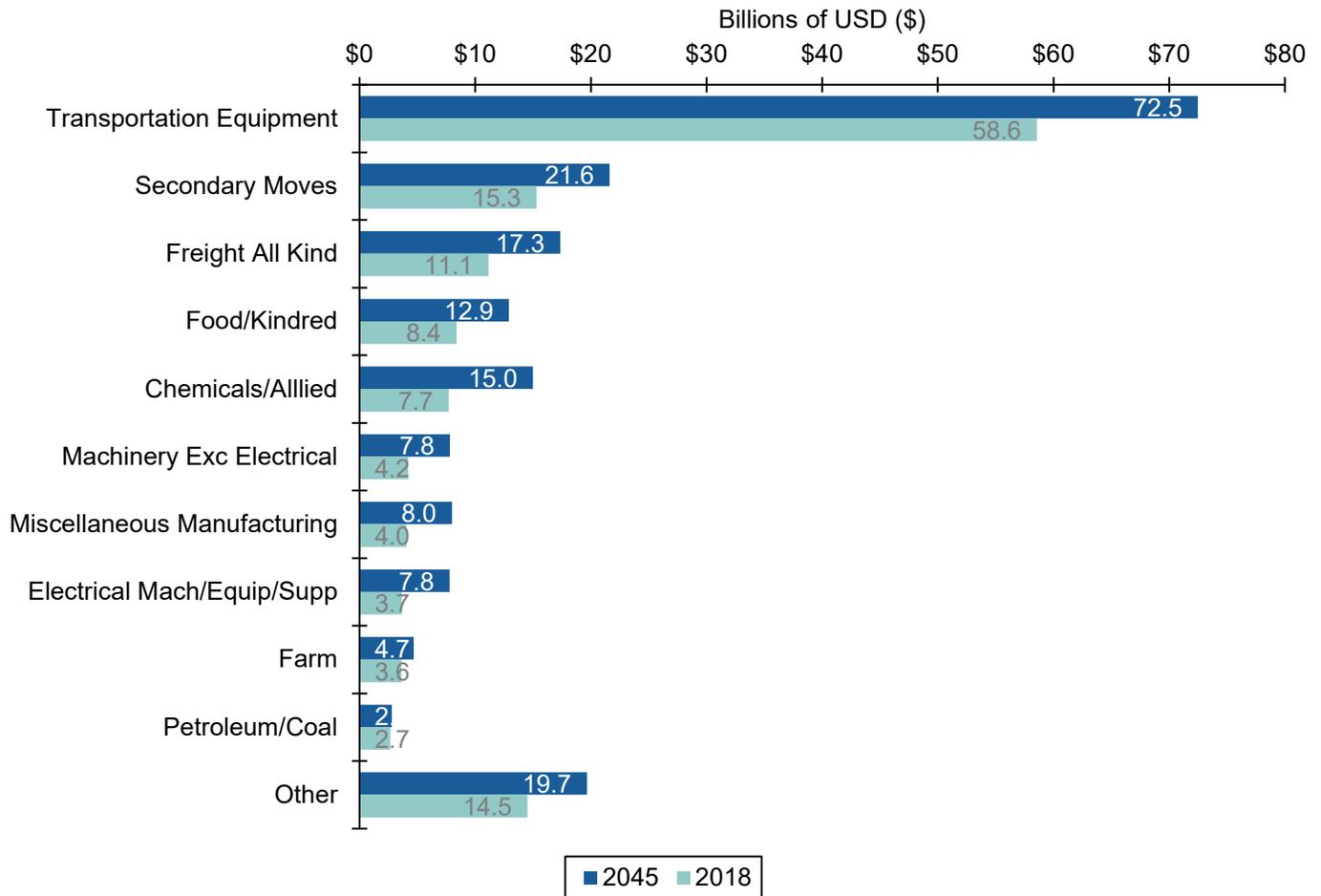
By value, transportation equipment had by far the largest share of all goods moved at 44% in 2018. This equated to almost \$59 billion. This was followed by secondary moves (drayage and warehouse and distribution moves) and freight all kinds (general freight moved in containers) at 11% and 8% respectively. By 2045, transportation equipment shipments are expected to be valued at \$72 billion, despite a decrease in market share to 38%. Increases in market share are however expected for most of the other top commodities, including chemicals/allied products and machinery.

FIGURE 3.9 KANSAS CITY DISTRICT TOP COMMODITIES BY TONNAGE, 2018-2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 3.10 KANSAS CITY DISTRICT TOP COMMODITIES BY VALUE, 2018-2045

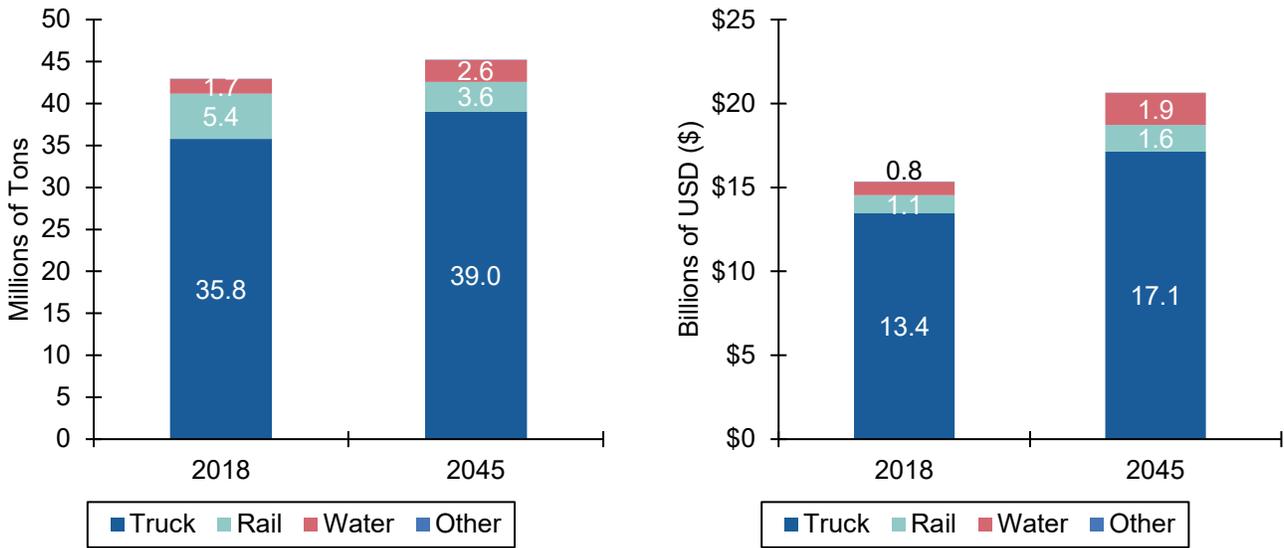


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### 3.3 Northeast District

Missouri’s Northeast District is predominantly rural in terms of geography, but also includes a number of small cities including Bowling Green, Kirksville, and Hannibal. Overall, the Northeast District moved 43 million tons of goods worth \$15 billion in 2018. By 2045, these figures are expected to rise to 45 million tons of goods worth \$21 billion. The modal breakdown of freight tonnage and value for the Northeast District is shown in Figure 3.11. For both tonnage (83%) and value (88%), trucks carried the majority of goods in 2018. This trend is expected to remain largely in place through 2045. As for the remaining modes, the share of value of goods carried by water is expected to increase notably from 5% to 9% of goods. On the other hand, the rail tonnage share is expected to decrease from 13% to 8%, despite a slight increase in value from 7% to 8%.

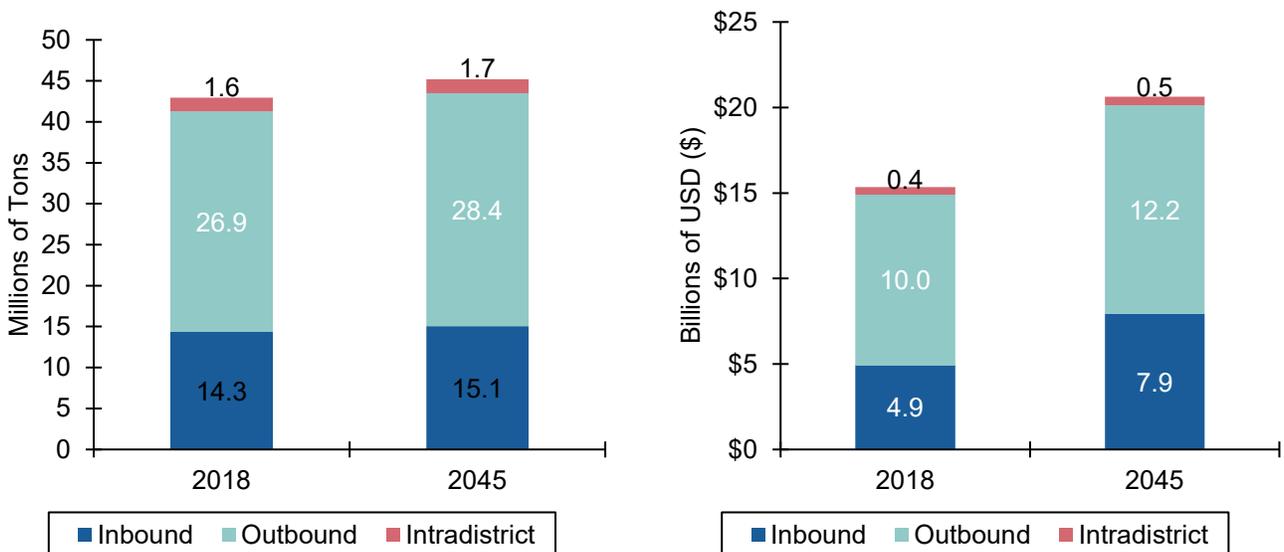
**FIGURE 3.11** NORTHEAST DISTRICT FREIGHT TONNAGE AND VALUE BY MODE, 2018 - 2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The directional breakdown of freight tonnage and value is shown in Figure 3.12. Outbound shipments comprise the largest proportions of directional movements for both tonnage and value. By tonnage in 2018, outbound shipments comprised 63%, while inbound comprised 33%. The remaining intra-district shipments were 4%. Through 2045, these proportions are expected to remain steady. By value, the proportion of outbound shipments is expected drop slightly from 65% to 59% between 2018 and 2045, while inbound shipments are expected to increase from 32% to 39%. Remaining intradistrict shipments are expected to drop from 3% to 2%.

**FIGURE 3.12** NORTHEAST DISTRICT FREIGHT FLOWS BY TONNAGE AND VALUE, 2018 - 2045

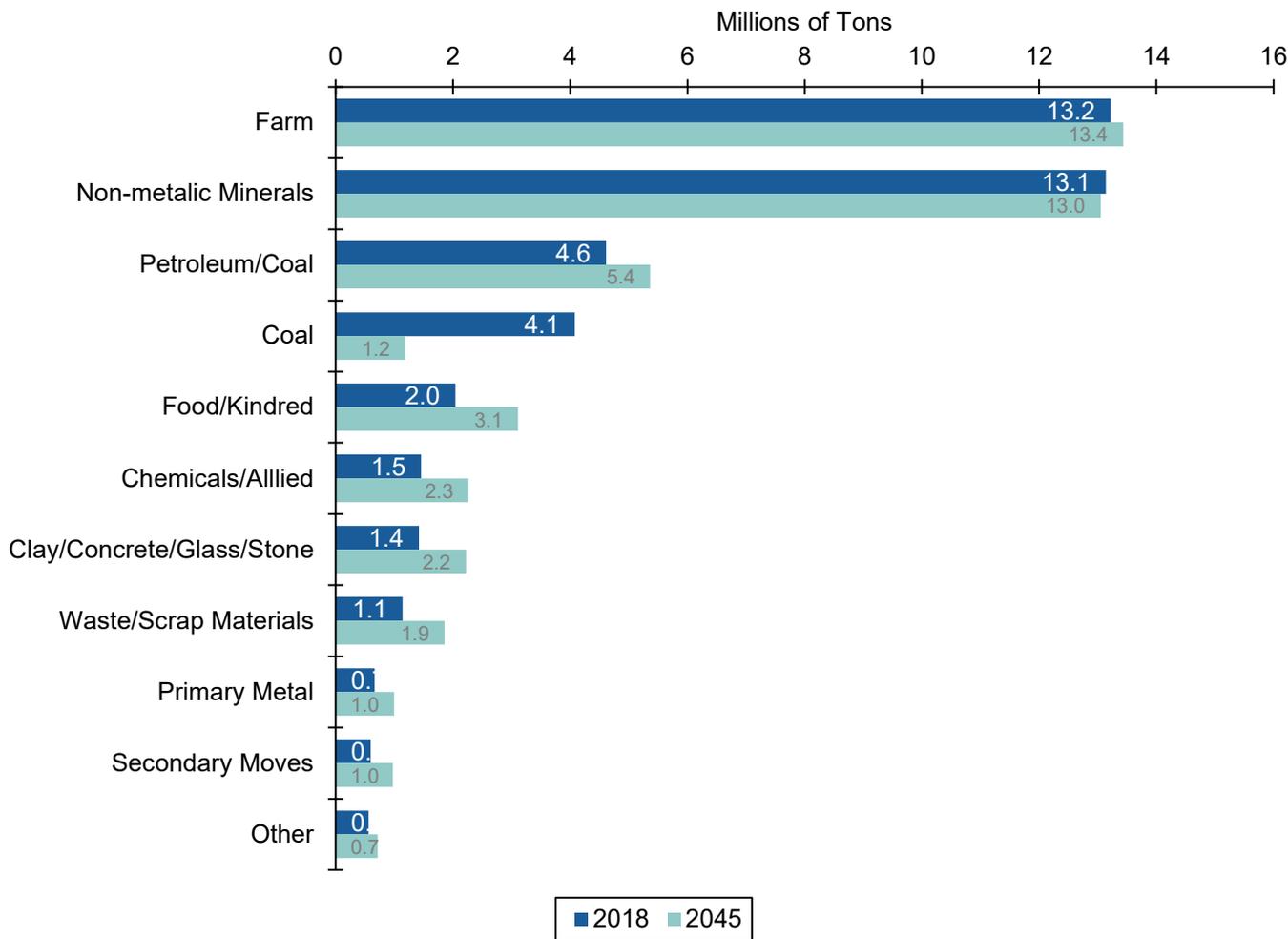


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The top commodities by tonnage and value are shown in Figure 3.13. By tonnage, farm products and nonmetallic minerals were the top shipments, each with approximately 13 million tons and a market share of 31%. None of the remaining commodities had more than 5 million tons transported. Through 2045, these trends are expected to remain constant, although notable increases in tonnage are expected for petroleum and food/kindred products. On the other hand, coal tonnage is expected to decline from 4 million tons to just over 1 million.

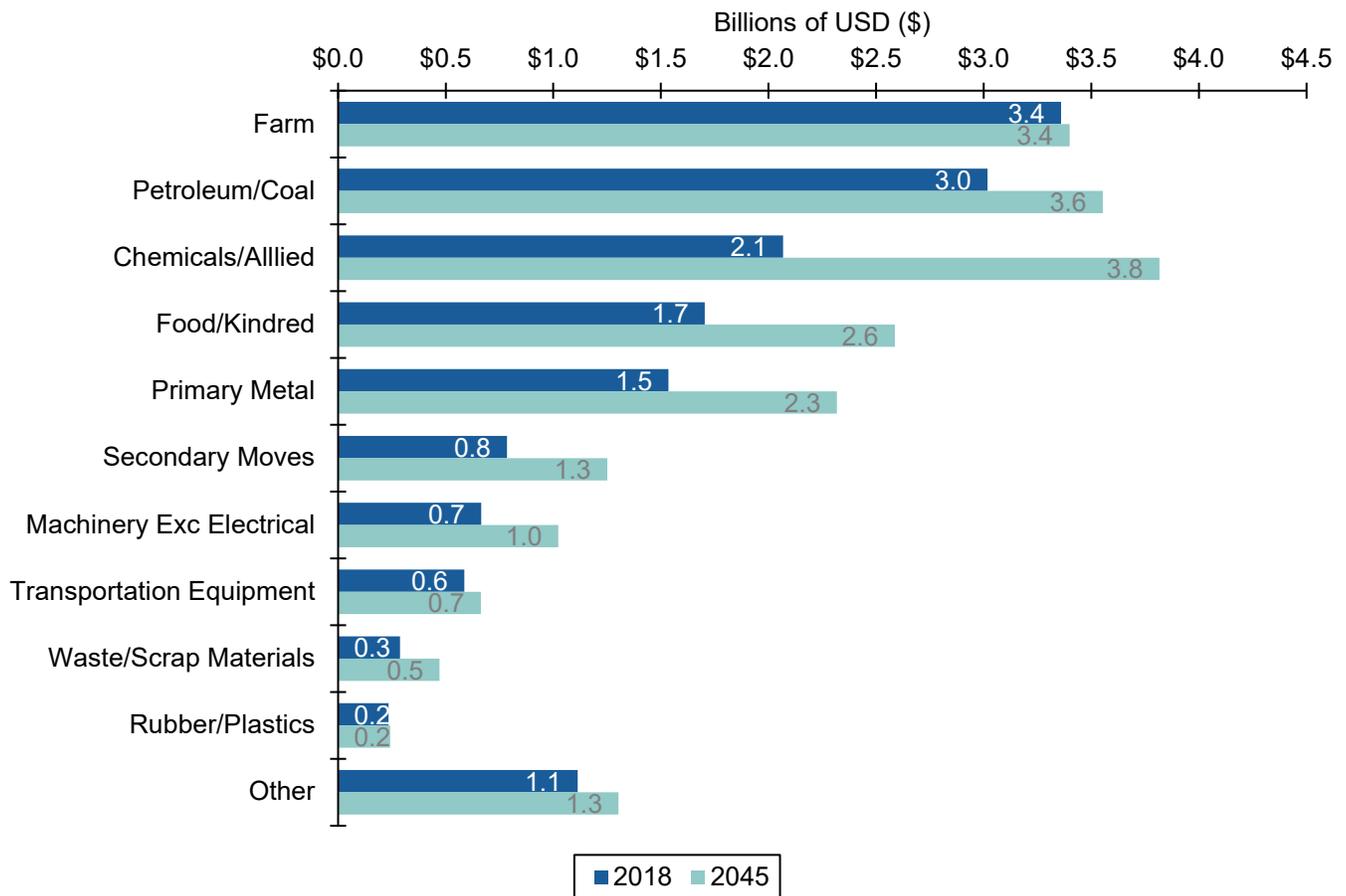
By value, farm products and petroleum products were the two highest in 2018, each worth more than \$3 billion, and with a market share of at least 20%. By 2045, chemicals/allied products are expected to be the top commodity by value, at \$3.8 billion, followed by petroleum at \$3.5 billion. Notable increases in value for food/kindred products and primary metals are expected as well.

**FIGURE 3.13 NORTHEAST DISTRICT TOP COMMODITIES BY TONNAGE, 2018-2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 3.14 NORTHEAST DISTRICT TOP COMMODITIES BY VALUE, 2018-2045



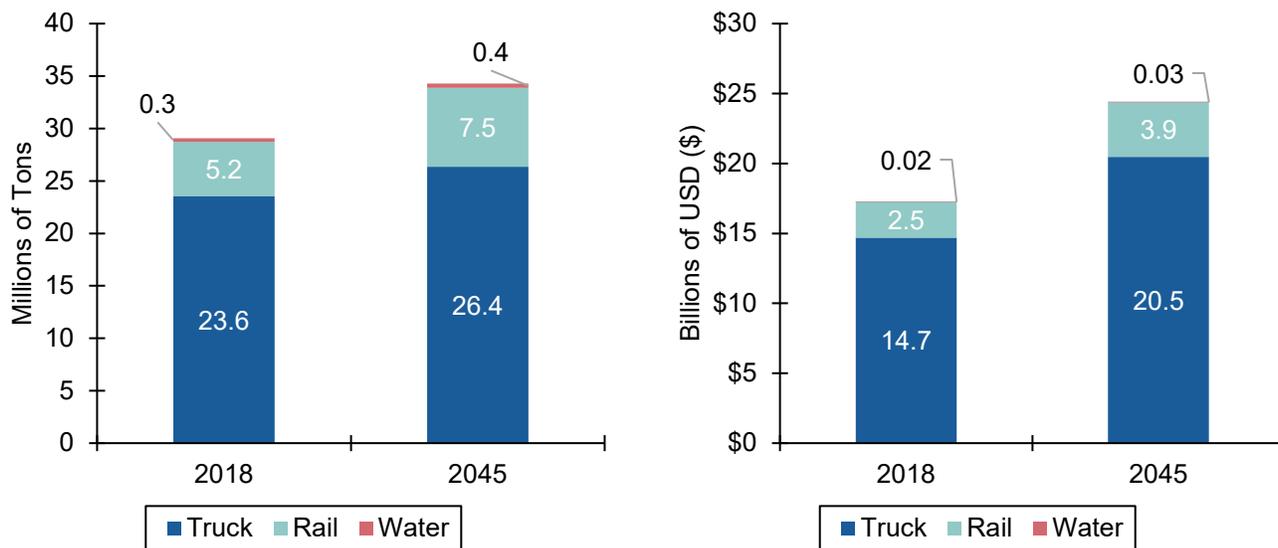
Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### 3.4 Northwest District

Missouri’s Northwest District is predominantly rural in terms of geography, but also includes St. Joseph, and a number of smaller cities including Cameron, Maryville and Savannah. Overall, the Northwest District moved 29 million tons of goods worth \$17 billion in 2018. Through 2045, these figures are expected to rise to 34 million tons of goods worth \$24 billion.

The modal breakdown of freight tonnage and value for the Northwest District is shown in Figure 3.15. For both tonnage and value, trucks carry the highest proportion of goods. In terms of tonnage, the market share of trucks is expected to decrease slightly from 81% to 77% through 2045. Rail tonnage proportions are expected to increase from 18% to 22%. On the basis of value, the market share of trucks was even higher at 85%, and is expected to remain steady at 84% through 2045. Rail market share is expected to be 16%, compared to 15% in 2018.

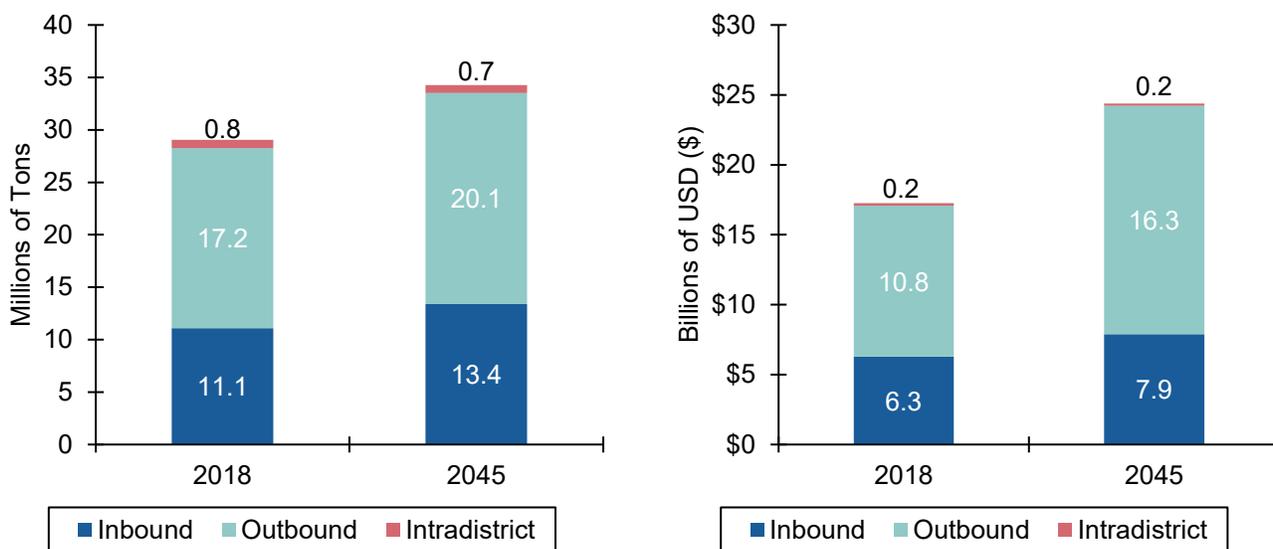
**FIGURE 3.15 NORTHWEST DISTRICT FREIGHT TONNAGE AND VALUE BY MODE, 2018 - 2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The directional breakdown of freight tonnage and value is shown in Figure 3.16. Outbound shipments comprise the largest proportions of directional shipments for both tonnage and value. In terms of tonnage, outbound shipments comprised 59%, followed by 38% and 3% respectively for inbound and intra-district in 2018. Through 2045, these percentages are expected to remain constant. In terms of value, outbound shipments comprised 63% and inbound comprised 36%. Through 2045, the proportion of outbound shipments is expected to increase by 4%, while the proportion of inbound shipments are expected to decrease by the same amount.

**FIGURE 3.16 NORTHWEST DISTRICT FREIGHT FLOWS BY TONNAGE AND VALUE, 2018 - 2045**

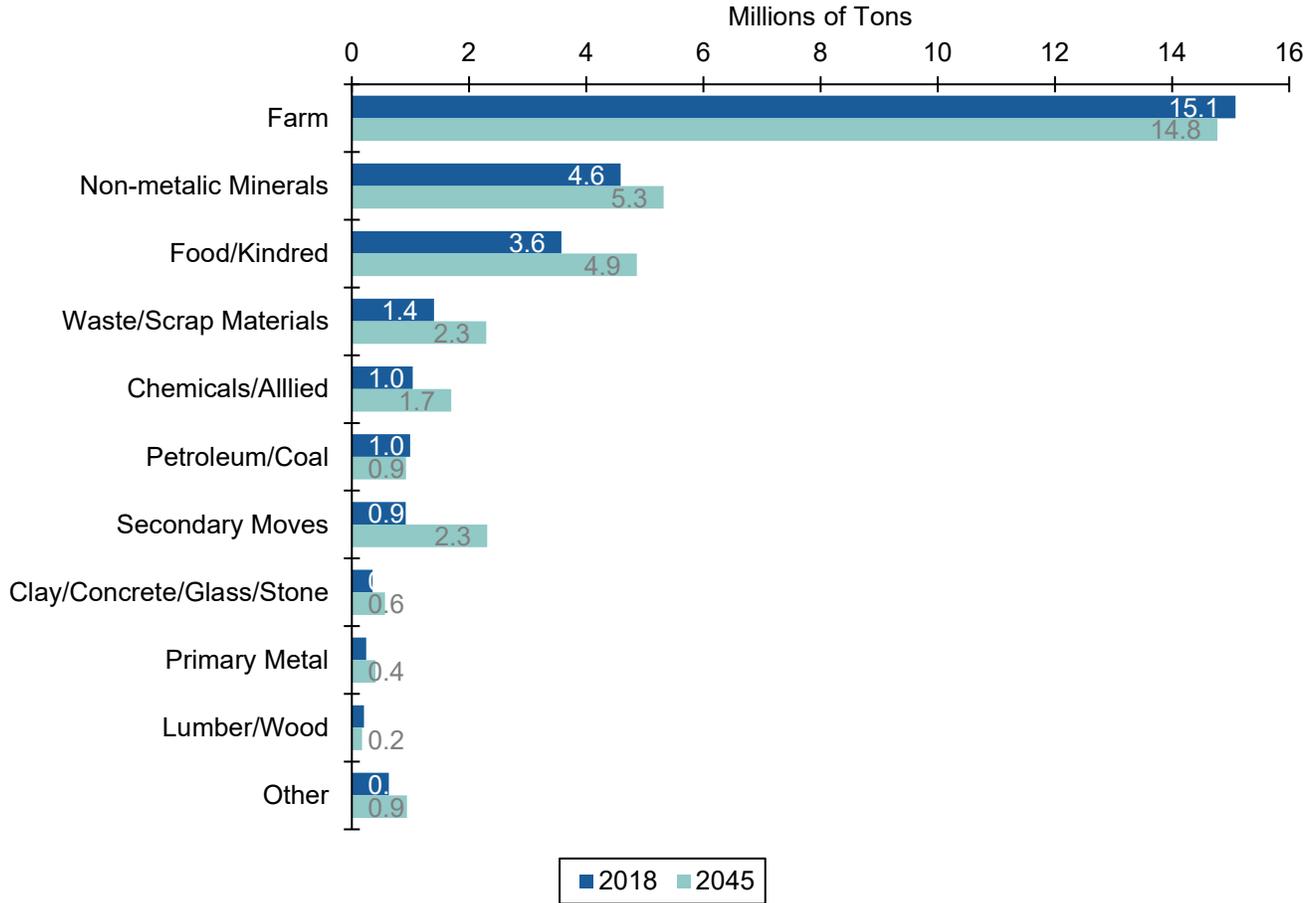


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The top commodities by tonnage and value are shown in Figure 3.17 and Figure 3.18 respectively. Farm products had the highest total tonnage at more than 15 million, accounting for 52% on total tons originating or terminating in the district in 2018. The next two highest were non-metalic minerals and food/kindred products at 4.5 million and 3.5 million respectively. By 2045 farm products are expected to continue to be the top commodity however the tons are expected to decrease slightly by 2%.

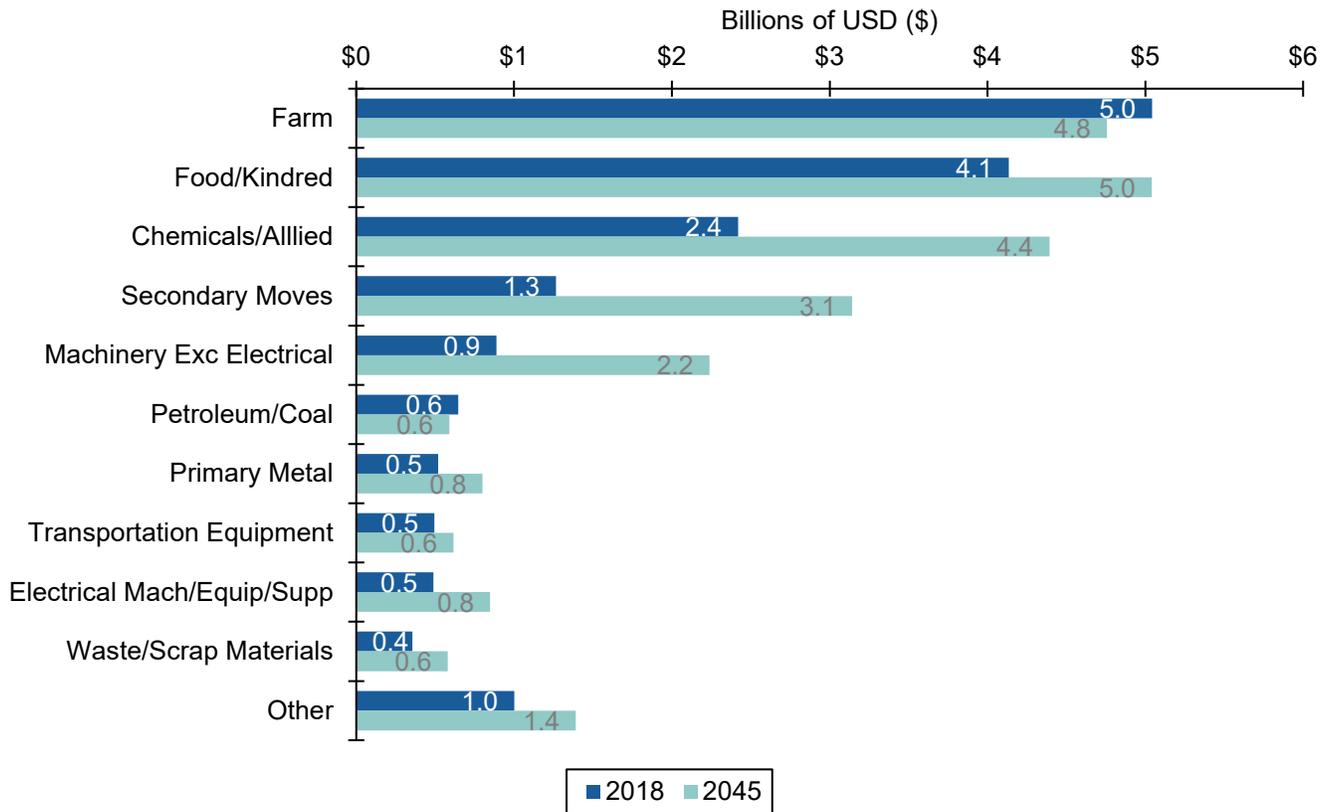
By value, in 2018 farm products and food/kindred products were the top commodities, worth more than \$5 billion and \$4 billion respectively. Combined, these two commodities accounted for more than 50% of the value of all goods originating or terminating in the district. By 2045, food/kindred products is expected to be the most valuable commodity at more than \$5 billion. Despite a small decrease in total value of farm products, the commodity is still expected to be the second-highest at \$4.75 billion. Notable increases in value for chemical/allied products, secondary moves and machinery are expected as well.

FIGURE 3.17 NORTHWEST DISTRICT TOP COMMODITIES BY TONNAGE, 2018-2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 3.18 NORTHWEST DISTRICT TOP COMMODITIES BY VALUE, 2018-2045



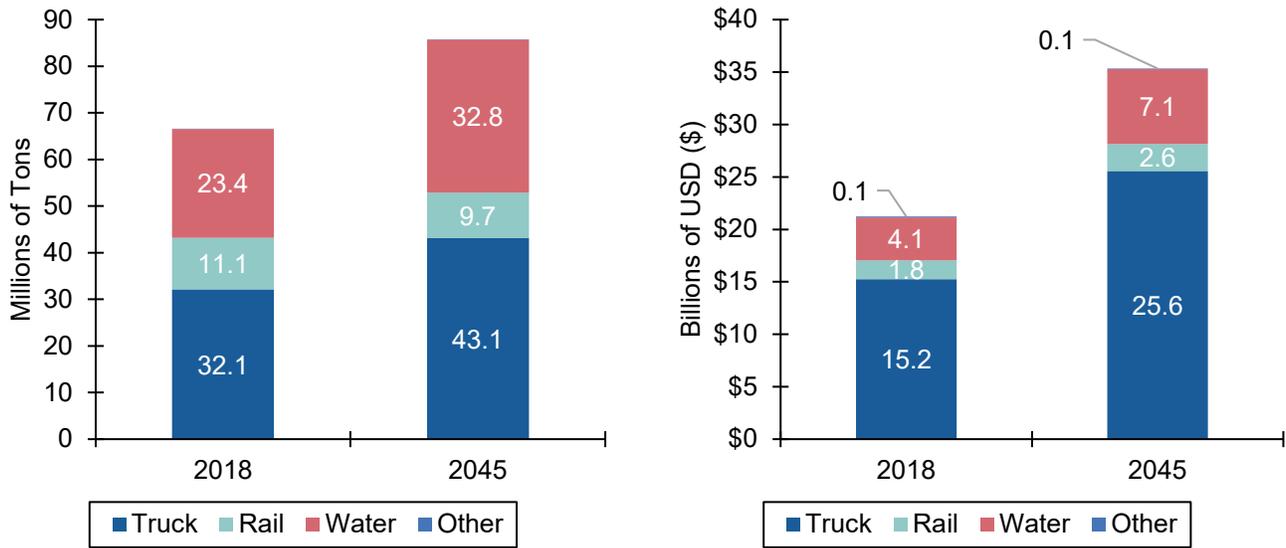
Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### 3.5 Southeast District

Missouri’s Southeast District is predominantly rural in terms of geography, but also includes Cape Girardeau and a number of smaller cities including Poplar Bluff, Sikeston and West Plains. Overall, the Southeast District moved 67 million tons of goods worth \$21 billion in 2018. Through 2045, these figures are expected to rise to 86 million tons of goods worth \$35 billion.

The modal breakdown of freight tonnage and value for the Southeast District is shown in Figure 3.19. Given the proximity to the Mississippi River, water (barge) is used to transport a sizable portion of goods, especially in terms of tonnage. In 2018, water comprised 35% of all tonnage, the most of any districts, with an increase to 38% expected through 2045. This indicates that barge modes tend to carry heavy bulk goods, as opposed to high-value goods. Still, trucks comprised the largest proportion of tonnage moved at 48% in 2018, with an increase to 50% expected by 2045. These increases in modal share appear to come at the expense of rail tonnage which is expected to decrease from 17% to just 11% in 2045. In terms of value, truck comprised a much larger proportion of goods at 72% in 2018, compared to water (19%) and rail (8%). Despite a sizable increase in total value across all modes, these modal proportions are expected to remain largely in place through 2045.

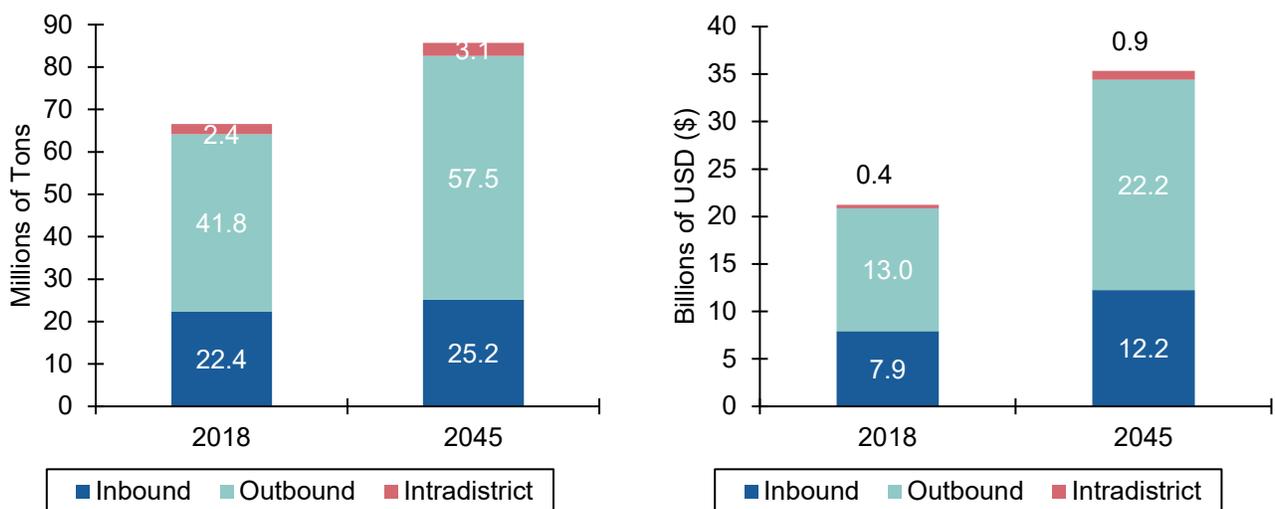
**FIGURE 3.19 SOUTHEAST DISTRICT FREIGHT TONNAGE AND VALUE BY MODE, 2018 - 2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The directional breakdown of freight tonnage and value is shown in Figure 3.20. Outbound shipments comprise the largest proportions of directional shipments for both tonnage and value. In terms of tonnage, outbound shipments comprised 63% in 2018, with an expected slight increase to 67% expected through 2045. This is compared to figures of 34% and 29% respectively for inbound shipments between 2018 and 2045. In terms of value, outbound shipments are expected to increase from 61% to 63% through 2045, while inbound shipments are expected to decrease from 37% to 35%. For both tonnage and value, intra-district shipments are not expected to exceed 4% of all shipments.

**FIGURE 3.20 SOUTHEAST DISTRICT FREIGHT FLOWS BY TONNAGE AND VALUE, 2018 - 2045**

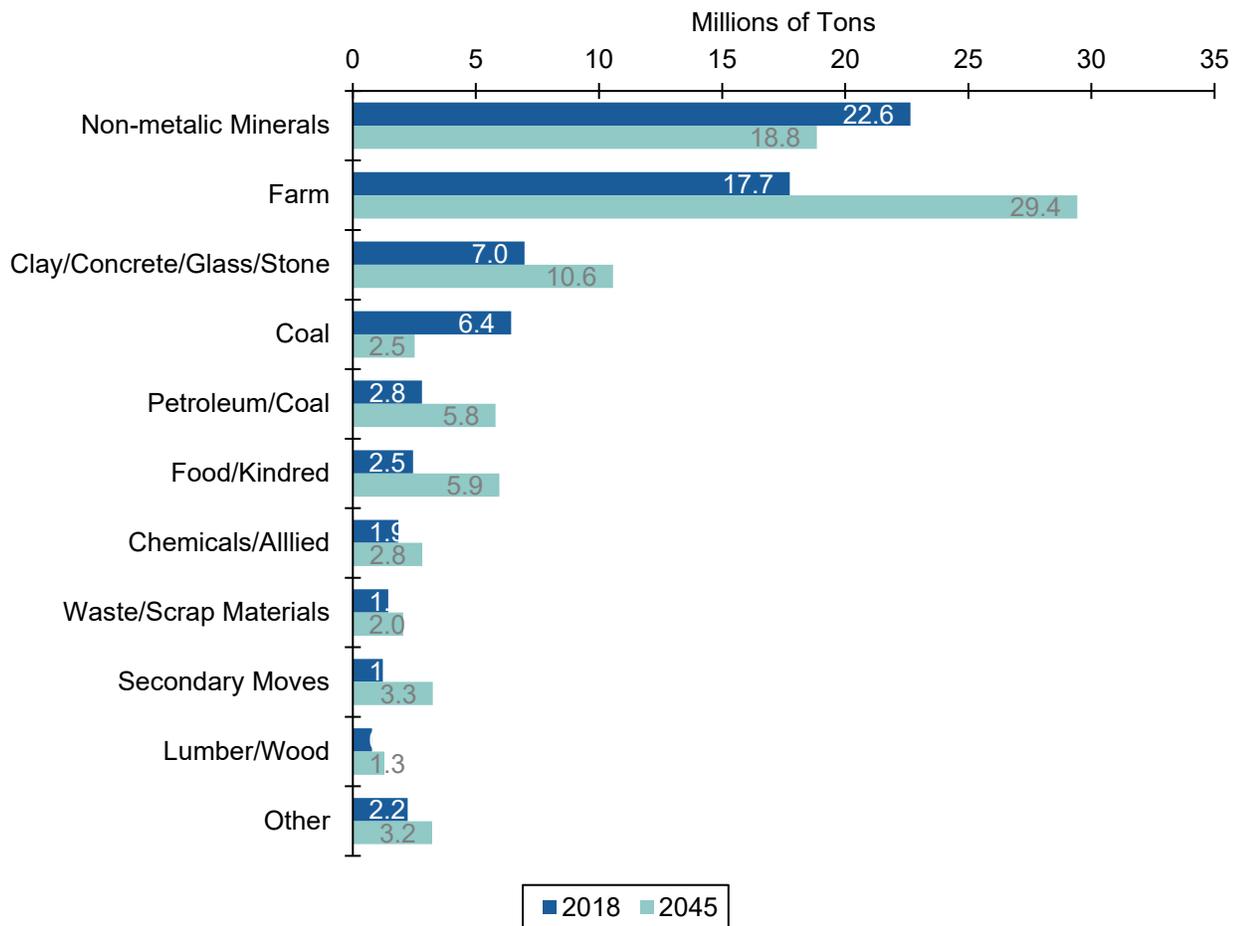


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The top commodities by tonnage and value are shown in Figure 3.21 and Figure 3.22. Non-metallic minerals and farm products had the highest tonnage totaling more than 40 million tons in 2018, accounting for more than half of all tonnage. Through 2045, these two commodity groups are expected to comprise the majority of tonnage, although farm products are expected to have the highest total tonnage at nearly 30 million, a significant increase from 2018. On the other hand, non-metallic minerals are expected to decline in tonnage by 4 million, along with coal. Notable increases in tonnage are also expected for clay, concrete, glass and stone, petroleum products and food/kindred products.

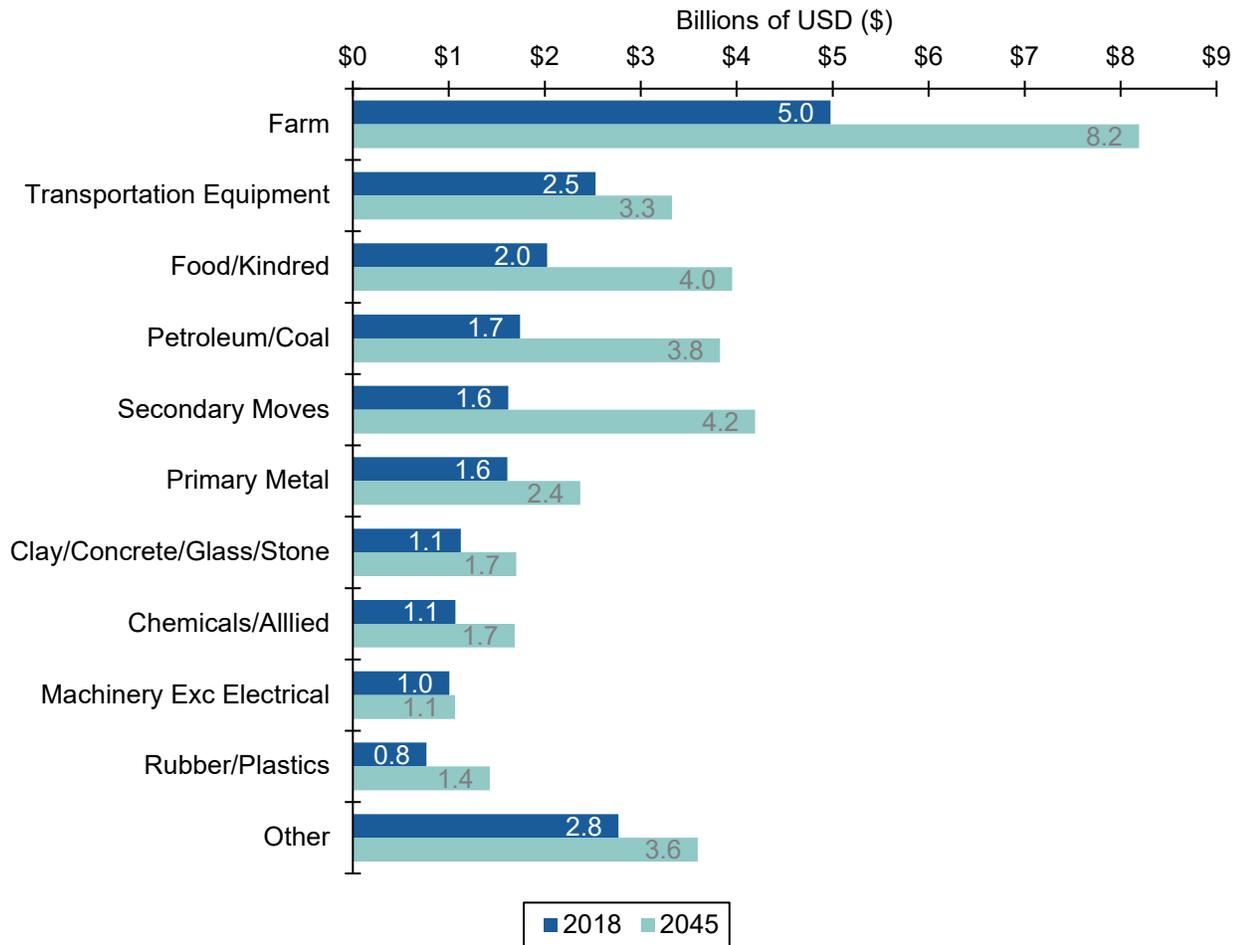
Farm products were the most valuable in 2018 with a total of just under \$5 billion and a market share of 23%. This was followed by transportation equipment and food/kindred products which had totaled more than \$2 billion. Through 2045, a large increase in the total value of farm products to \$8.2 billion is expected, although total market share is expected to remain constant at 23%. Overall, notable increases in total value are expected for most of the top commodities.

**FIGURE 3.21 SOUTHEAST DISTRICT TOP COMMODITIES BY TONNAGE, 2018-2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 3.22 SOUTHEAST DISTRICT TOP COMMODITIES BY VALUE, 2018-2045



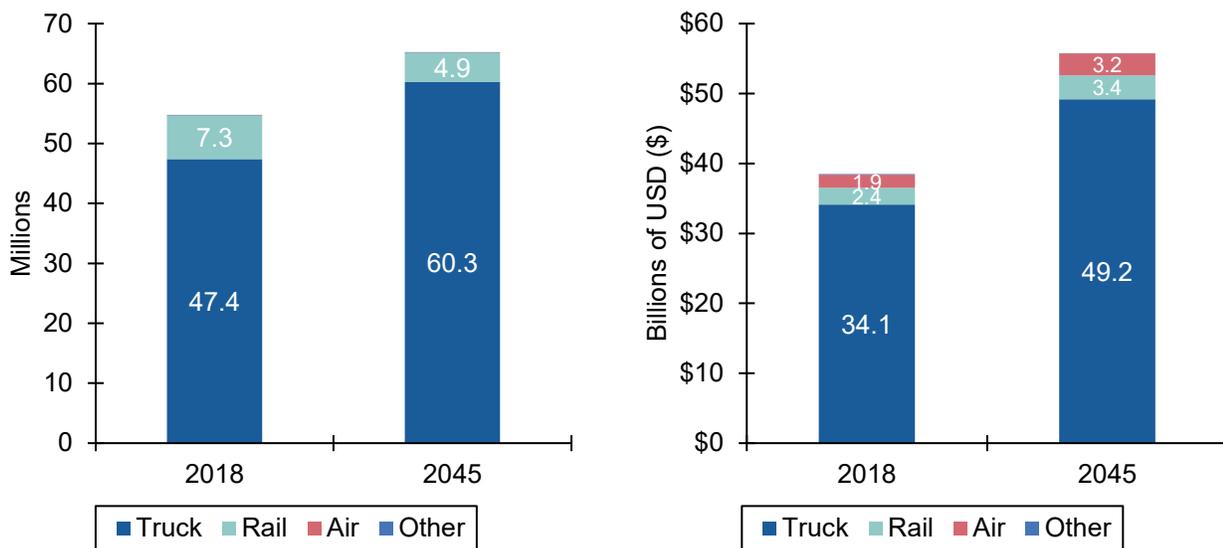
Source: IHS Transearch and STB Confidential Carload Waybill Sample.

## 3.6 Southwest District

Missouri's Southwest District is mostly rural, but includes the city of Springfield. The Southwest District also includes a sizable portion of the Ozark Mountains, and smaller cities such as Branson, Joplin and Neosho. Overall, the Southwest District moved 55 million tons of goods worth \$38 billion in 2018. Through 2045, these figures are expected to rise to 65 million tons of goods worth \$56 billion.

The modal breakdown of freight tonnage and value for the Southwest District is shown in Figure 3.23. By tonnage, trucks accounted for 87% of all goods, with rail accounting for nearly all of the remaining share. Through 2045, the share of goods transported by truck is expected to increase further to 92%, considering increases truck transport and decreases in rail transport. By value, trucks transported 88% of all goods in 2018, with the remaining share split relatively evenly between rail and air modes. These trends are expected to remain in place through 2045.

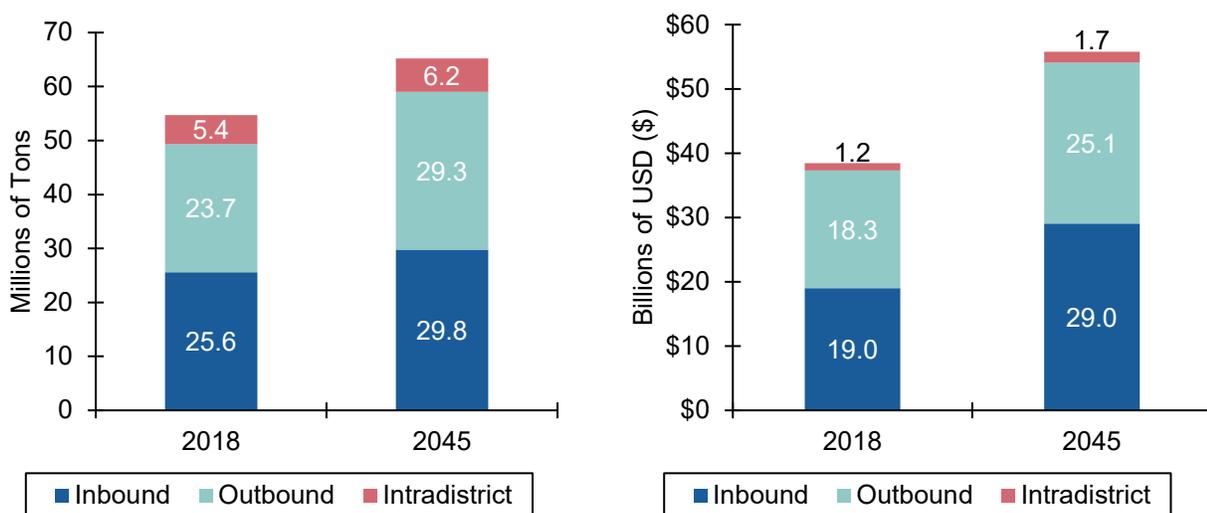
**FIGURE 3.23 SOUTHWEST DISTRICT FREIGHT TONNAGE AND VALUE BY MODE, 2018 - 2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The directional breakdown of freight tonnage and value for the Southwest District is shown in Figure 3.24. In terms of tonnage, there was a relatively even split between inbound tonnage (47%) and outbound tonnage (43%) in 2018. With a slight 1-2% decrease in inbound tonnage and similar decrease in outbound tonnage, these figures are expected to remain in place through 2045, with intra-district tonnage comprising the remaining market share. In terms of value, similar trends appeared to be in place in 2018, despite somewhat less intra-district tonnage. Through 2045 however, inbound shipments are expected to rise to 52%, while outbound shipments are expected to decrease to 45%.

**FIGURE 3.24 SOUTHWEST DISTRICT FREIGHT FLOWS BY TONNAGE AND VALUE, 2018 - 2045**

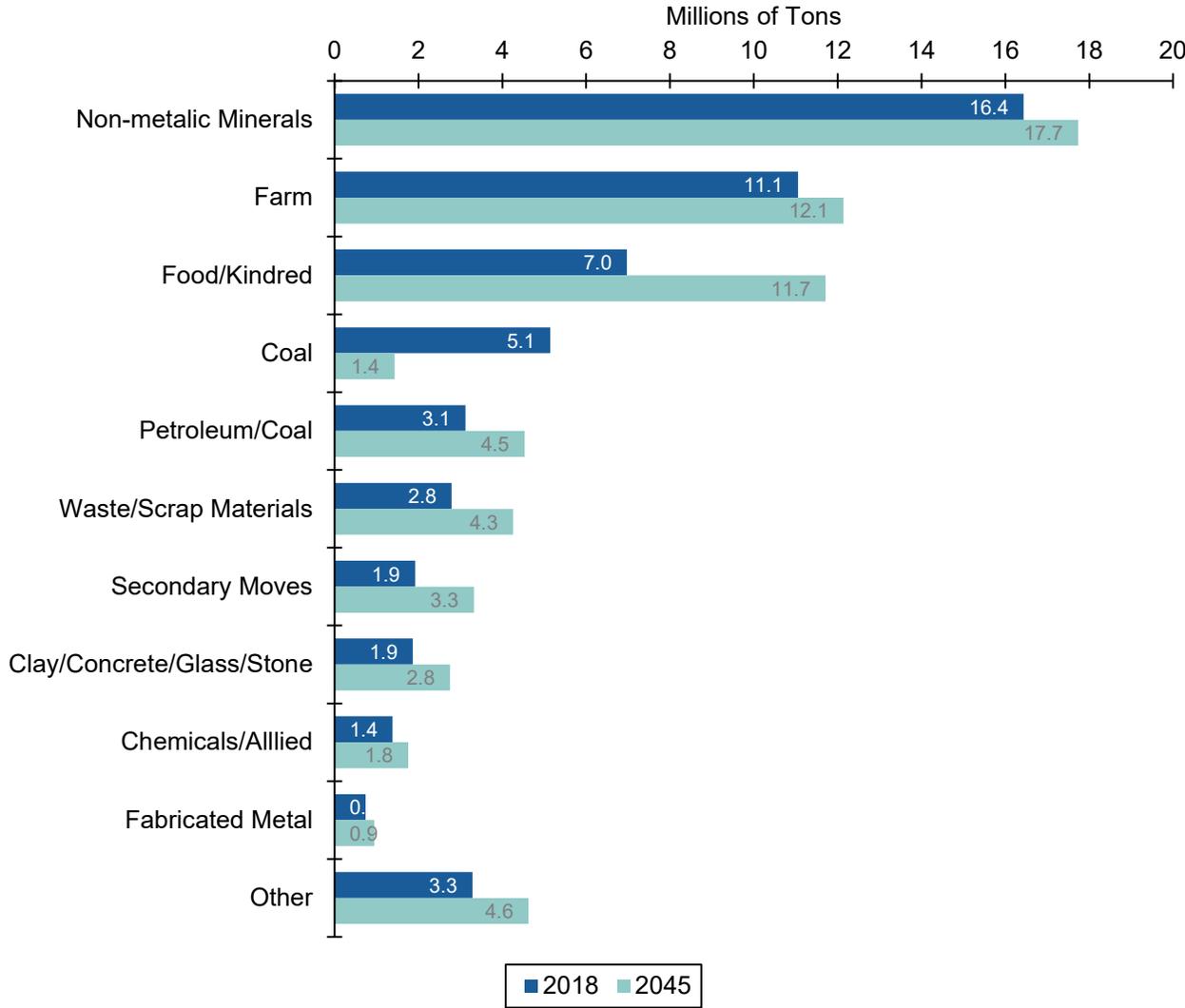


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The top commodities by tonnage and value are shown in Figure 3.25 and Figure 3.26. Non-metallic minerals and farm products had the highest total tonnage, at more than 10 million tons each in 2018. Together, these two goods accounted for half of all tonnage. Through 2045, the tonnage for these two commodities is still expected to be the most, although with a reduced market share. This can be attributed to notable expected rises in tonnage for other commodities including food/kindred products and waste/scrap metals.

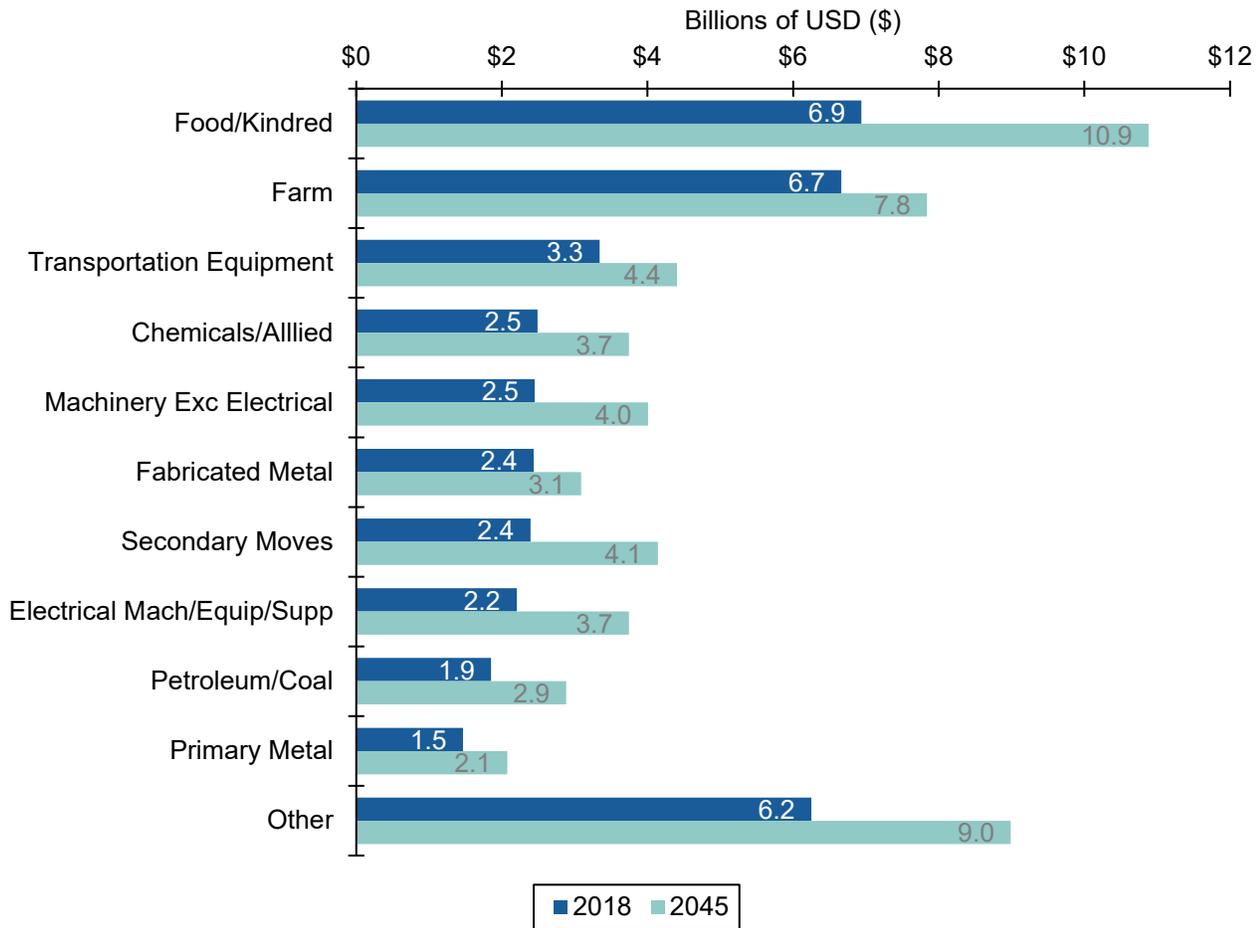
Food/kindred goods were the most valuable in 2018, with a total of just under \$7 billion and a market share of 18%. This was followed by farm goods which had a total value of \$6.6 billion. Through 2045, a large increase in the total value of food/kindred to \$10.9 billion is expected, resulting in an increased market share of 20%. Overall, notable increases in total value are expected for most of the top commodities.

**FIGURE 3.25 SOUTHWEST DISTRICT TOP COMMODITIES BY TONNAGE, 2018-2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 3.26 SOUTHWEST DISTRICT TOP COMMODITIES BY VALUE, 2018-2045



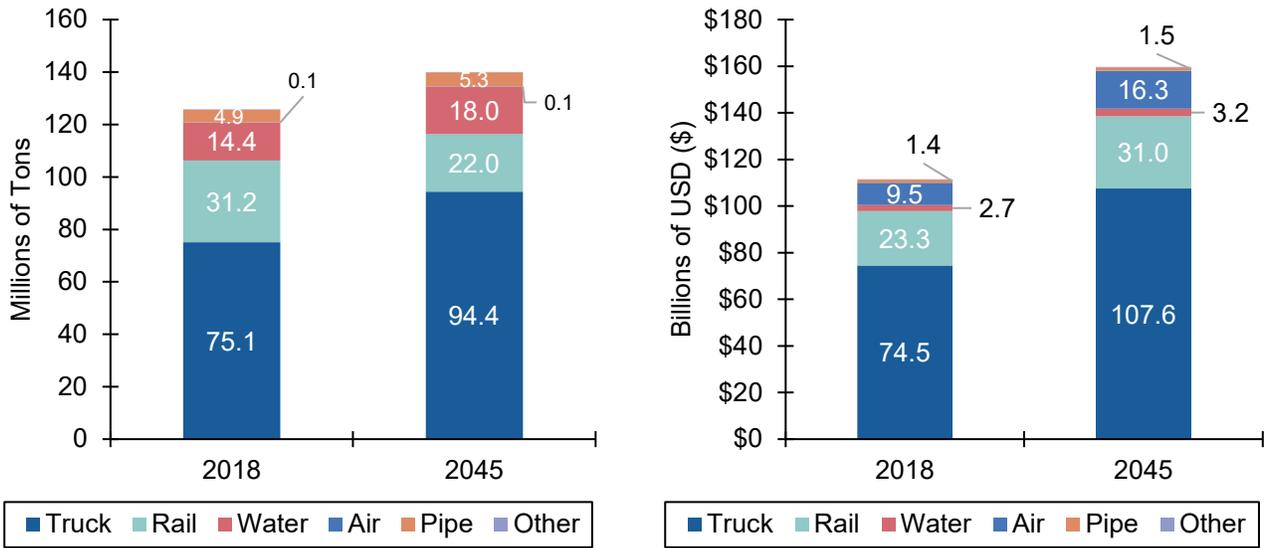
Source: IHS Transearch and STB Confidential Carload Waybill Sample.

### 3.7 St. Louis District

Missouri’s St. Louis District primarily includes St. Louis and surrounding suburbs and communities. Overall, the St. Louis District moved 126 million tons of goods worth \$111 billion in 2018. By 2045, these figures are expected to rise to 140 million tons of goods worth \$160 billion.

The modal breakdown of freight tonnage and value for the St. Louis District is shown in Figure 3.27. Trucks carried 60% of goods by tonnage in 2018, with an additional 25% of goods carried by rail. The remaining market share was comprised of water (11%), and unique to the St. Louis District, pipelines (4%). Through 2045, truck tonnage market share is expected to increase to 67%, while rail tonnage market share is expected to decline notably to 16%. Water is expected to see a slight increase to 13% while pipeline tonnage is expected to remain steady. By value, truck and rail accounted for 67% and 21% market share respectively. Most of the remaining goods, by value, were transported by air, which had a market share of 9%. Through 2045, these trends are expected to remain steady.

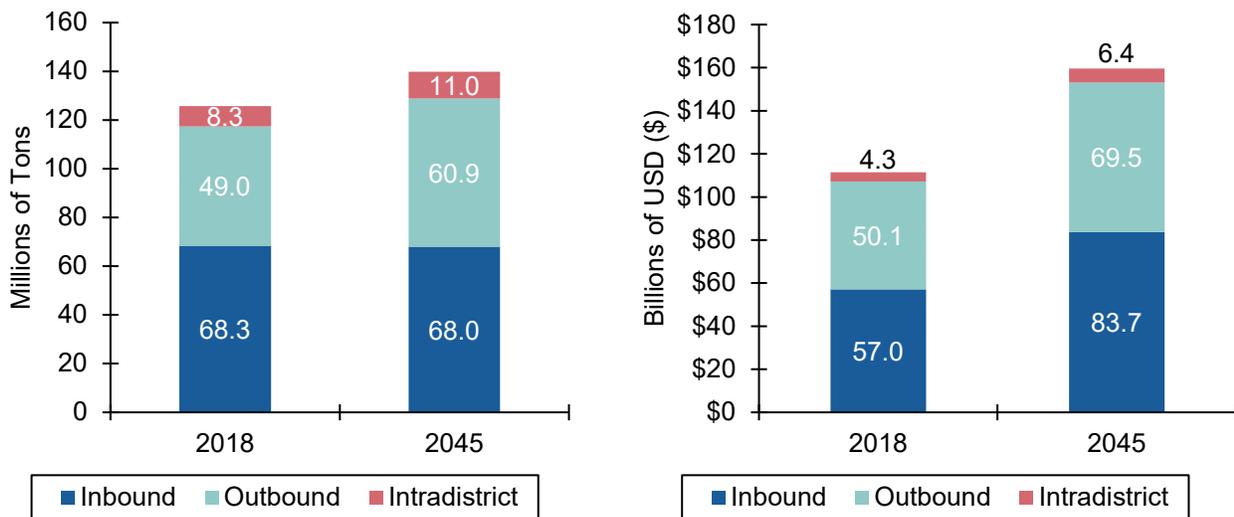
**FIGURE 3.27 ST. LOUIS DISTRICT FREIGHT TONNAGE AND VALUE BY MODE, 2018 - 2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The directional breakdown of freight tonnage and value for the St. Louis District is shown in Figure 3.28. In terms of tonnage, inbound shipments comprised a slight majority at 54%, compared to 39% for outbound shipments in 2018. The disparity between these two directions is expected to decrease somewhat through 2045, with inbound shipments decreasing to 49% and inbound shipments increasing to 44%. In terms of value, inbound shipments comprised 51%, compared to 45% for outbound shipments. Through 2045, these market shares are expected to largely remain in place, based on fluctuations of no more than 1%. Intra-district shipments are expected to remain steady at 4% of all value through 2045.

**FIGURE 3.28 ST. LOUIS DISTRICT FREIGHT FLOWS BY TONNAGE AND VALUE, 2018 - 2045**

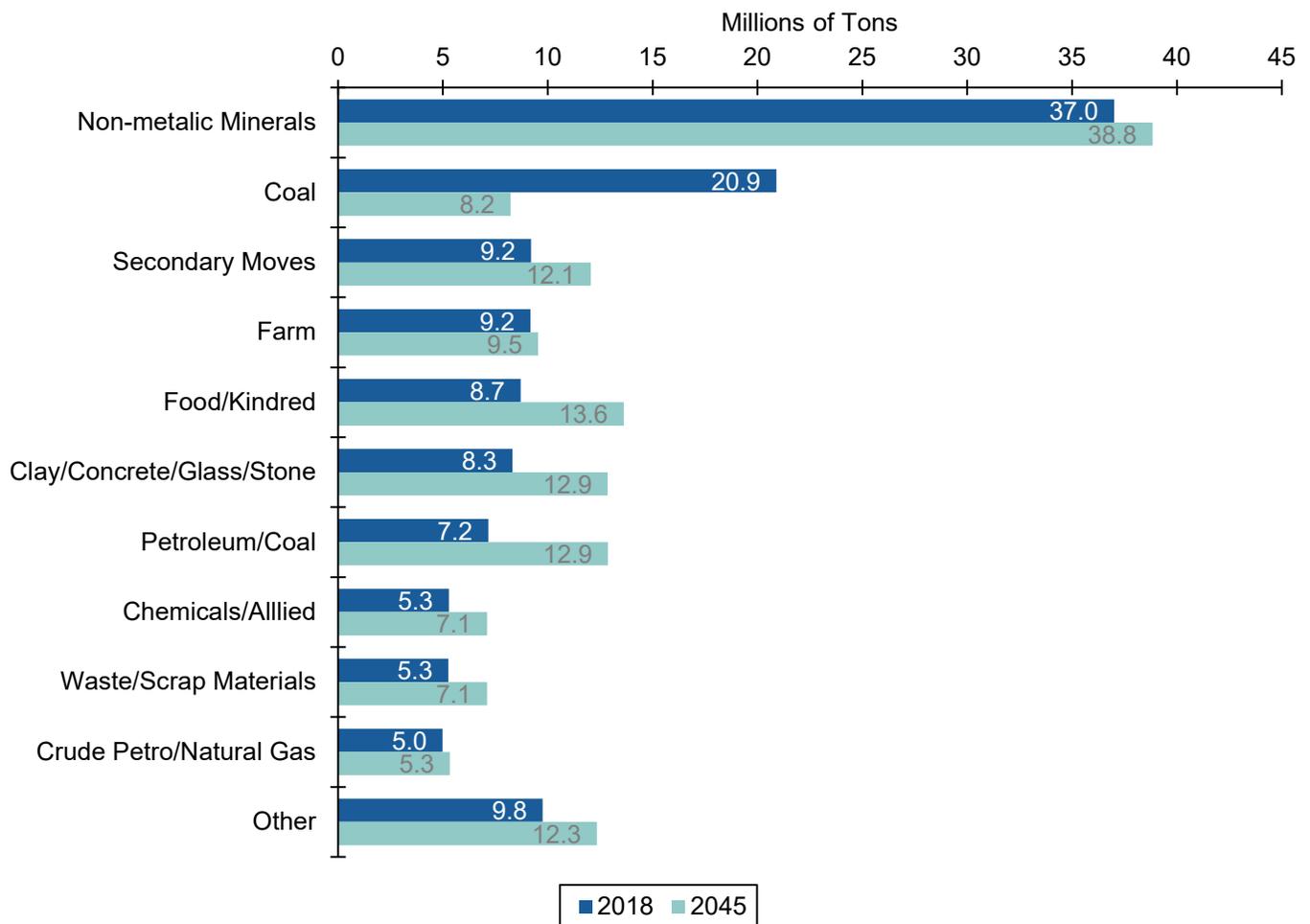


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

The top commodities by tonnage and value are shown in Figure 3.29 and Figure 3.30. Non-metallic minerals and coal had the highest total tonnage, at more than 20 million tons each in 2018. Together, these two goods accounted for just under half of all tonnage. Through 2045, non-metallic mineral tonnage is expected to rise slightly to just under 39 million tons. However, a notable decline in coal tonnage is expected to just over 8 million (a change in market share from 17% to just 6%). Notable increases in tonnage are expected for a number of other top commodities including food/kindred products, clay/concrete/glass/stone and petroleum products.

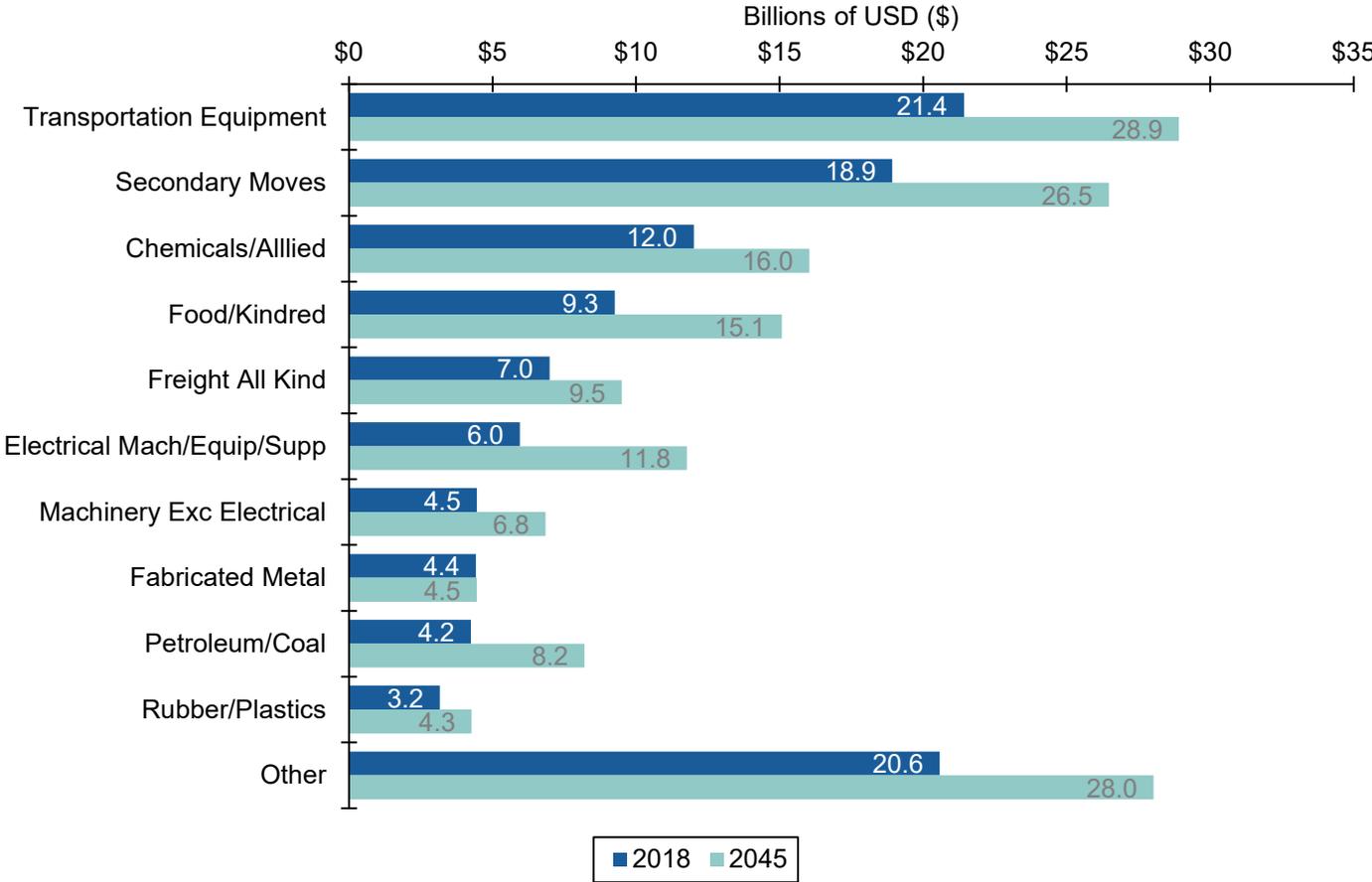
Transportation equipment was the most valuable in 2018, with a total of \$21.4 billion and a market share of 19%. This was followed by secondary moves which had a total value of just under \$9 billion and a market share of 17%. Through 2045, the market shares of these, and most of the top commodities, are expected to remain relatively constant. Overall, a large increase in total value is expected for most of the top commodities including chemicals/allied products, food/kindred products and electrical machinery.

**FIGURE 3.29 ST. LOUIS DISTRICT TOP COMMODITIES BY TONNAGE, 2018-2045**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

FIGURE 3.30 ST. LOUIS DISTRICT TOP COMMODITIES BY VALUE, 2018-2045

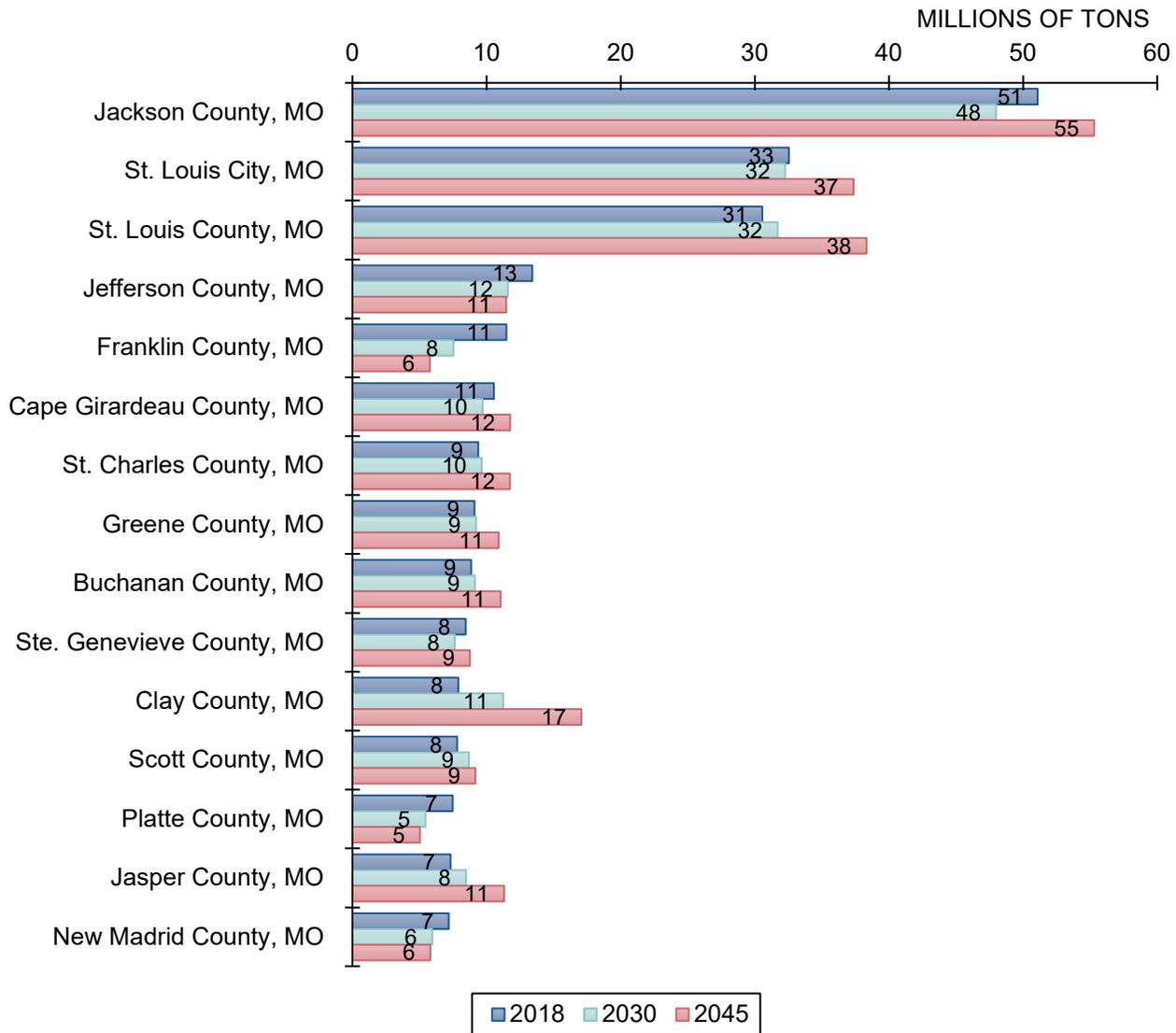


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

## 4.0 County Level Freight Demand

This section examines the volume of freight activity originating and terminating in Missouri at the county level. Goods movement activity is heavily concentrated in the state's most populous areas, particularly in the Kansas City and St. Louis metropolitan areas. These two metropolitan areas represent almost 50% of freight activity that either originates and/or terminates in Missouri (inbound, outbound and intra-county flows). Twenty-seven percent of freight movement in 2018 occurred in counties within the St. Louis metropolitan area, and 23% occurred within the Kansas City metropolitan area. Jackson County, home to Kansas City, saw the highest county-level share of freight movement, with more than 50 million tons of goods moving through the county in 2018, accounting for 15% of the state's total. St. Louis City and St. Louis County follow close behind, representing 10% and 9% of the state's total goods movement respectively. Five of the top ten counties for overall goods movement are located in the St. Louis area, including Jefferson, Franklin and St. Charles counties. Counties outside of the major metro areas with high levels of freight movement include Cape Girardeau County, Greene County (Springfield), Buchanan County (St. Joseph) and Sainte Genevieve County. Figure 4.1 shows the top freight-generating counties in Missouri by weight in 2018 and their 2045 projections.

FIGURE 4.1 TOP FREIGHT GENERATING COUNTIES BY WEIGHT, 2018-2045

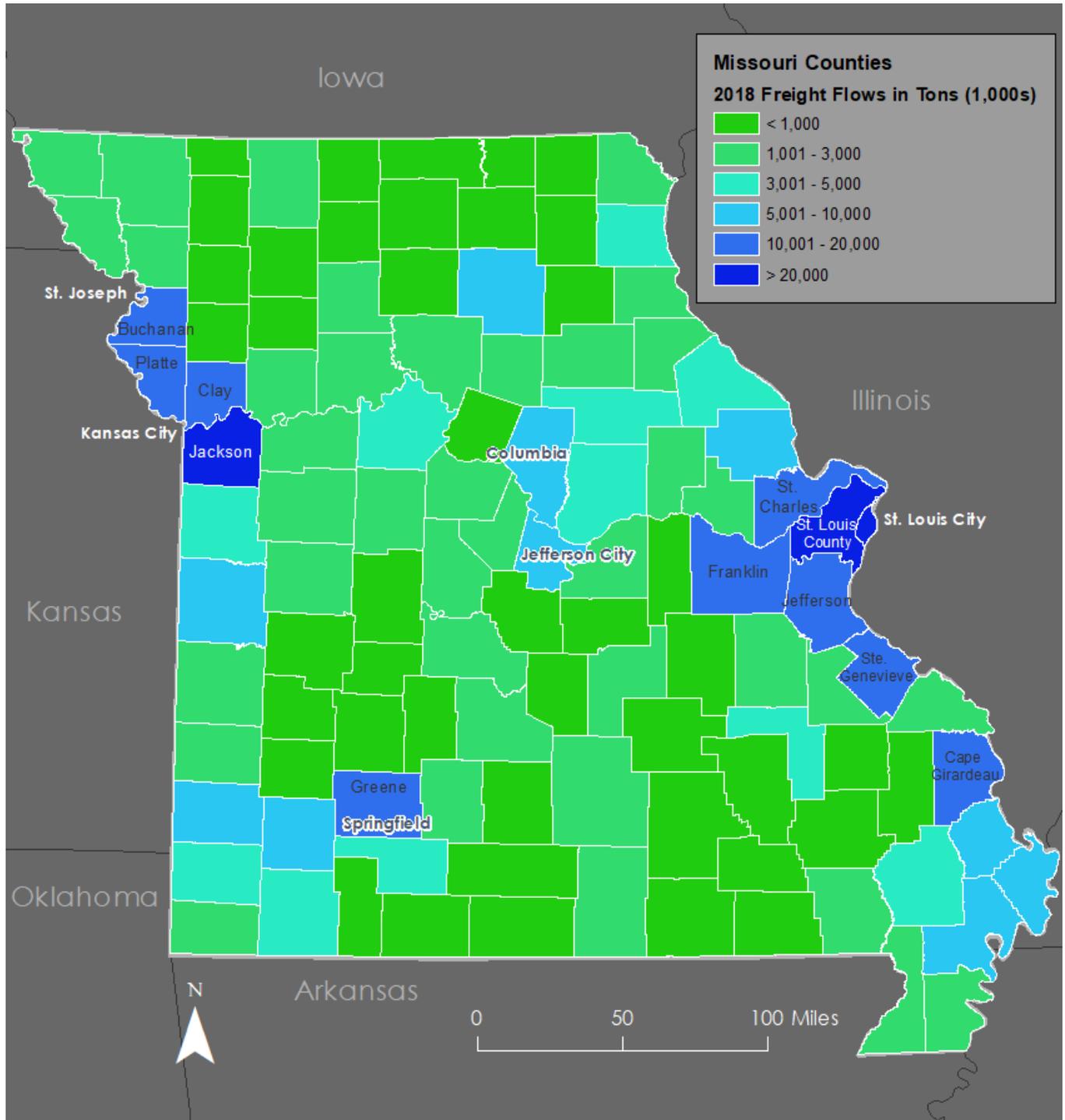


Source: IHS Transearch and STB Confidential Carload Waybill Sample.

Note: Overhead or through (external-to-external) freight flows are excluded.

Freight movement in both the St. Louis and Kansas City metropolitan areas is expected to grow moderately between 2018 and 2045, at 15% and 12% respectively. Although Jackson County is expected to see slower growth than St. Louis, Clay County (north of Kansas City) is expected to see freight traffic more than double in that time period, explaining the growth in the Kansas City metropolitan area. Figure 4.2 and Figure 4.3 show the freight activity in tons for each county of the state for 2018 and 2045 respectively. While the overall distribution of inbound, outbound and intra-county flows is projected to remain steady, the maps show upticks in Mississippi County in southeastern Missouri, Jasper County (centered around Joplin) in southwestern Missouri and in Buchanan County (St. Joseph).

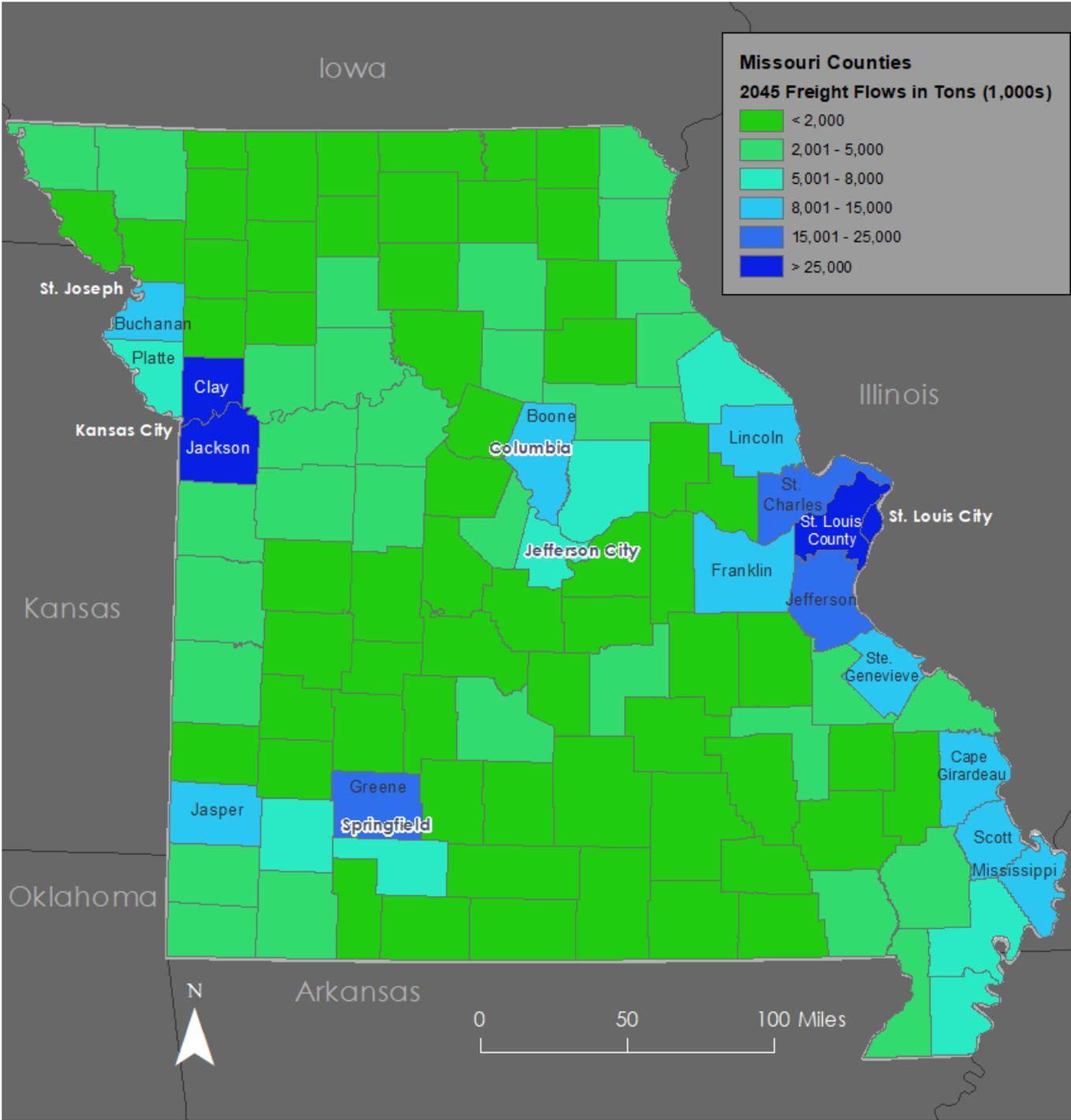
**FIGURE 4.2 FREIGHT TONNAGE BY COUNTY FOR INBOUND, OUTBOUND, INTRA-COUNTY FLOWS, 2018**



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

Note: Overhead or through (external-to-external) freight flows are excluded.

FIGURE 4.3 FREIGHT TONNAGE BY COUNTY FOR INBOUND, OUTBOUND, INTRA-COUNTY FLOWS, 2045



Source: IHS Transearch and STB Confidential Carload Waybill Sample.

Note: Overhead or through (external-to-external) freight flows are excluded.

# 5.0 Highway Corridor Level Freight Demand

This section examines current and future freight activity along Missouri’s highway corridors. Figure 5.1 and Figure 5.2 show the total tonnage of freight carried by roadway corridor in 2018, including interstates, U.S. Highways and State Highways. I-44 is the state’s top corridor by freight tonnage, carrying 1.3 billion tons in 2018. Other major corridors include I-29 (149 million tons), U.S. 54 (125 million tons), U.S. 71 (119 million tons), and I-70 (117 million tons).

**FIGURE 5.1 FREIGHT TONNAGE BY ROADWAY CORRIDOR, 2018**

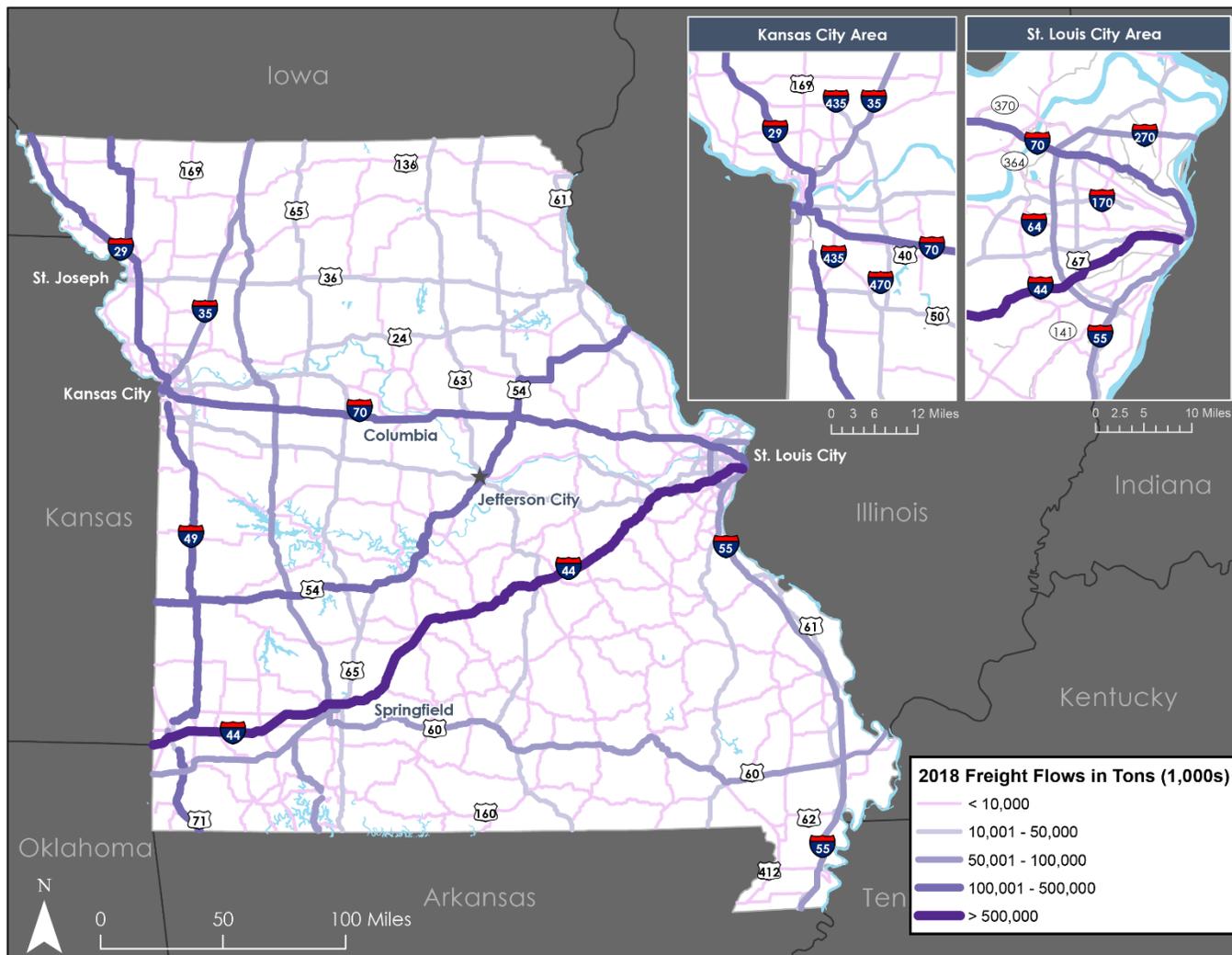
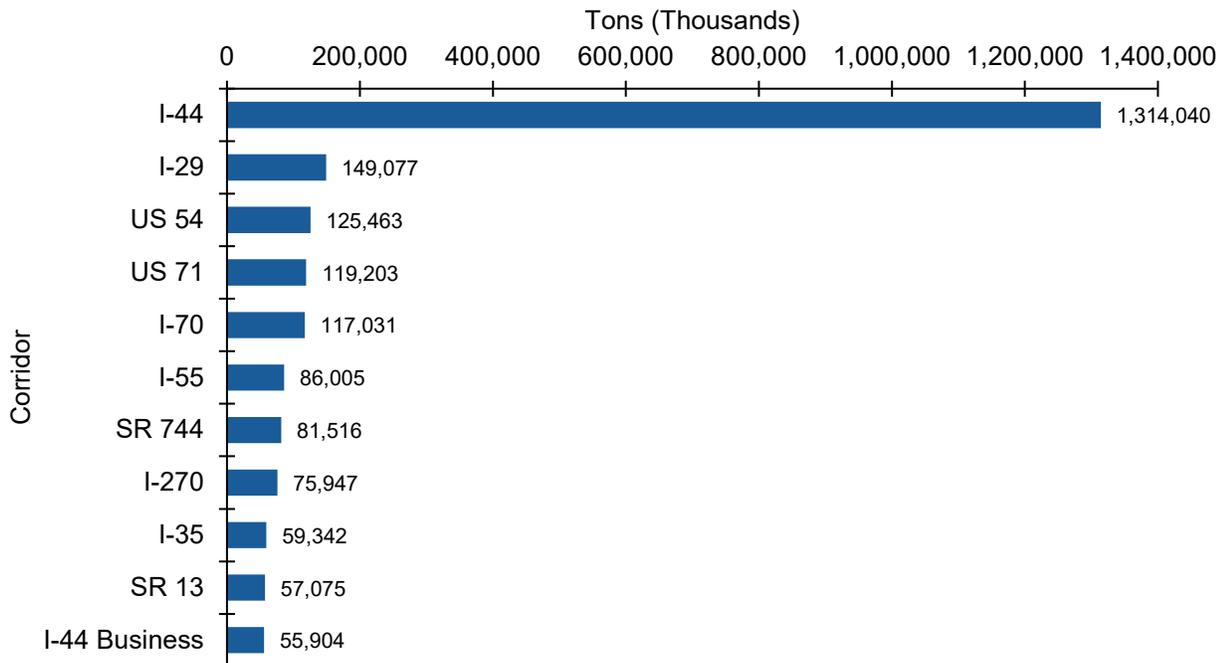


FIGURE 5.2 TOP 10 HIGHWAY CORRIDORS BY FREIGHT TONNAGE, 2018



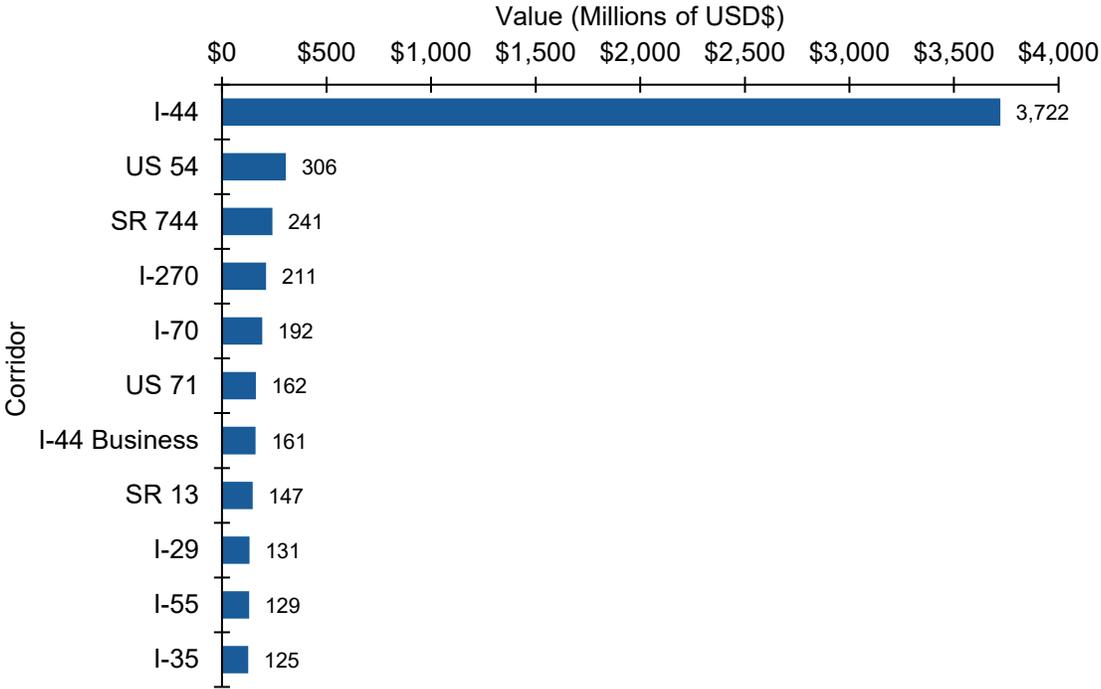
Source: IHS Transearch assigned to the National Highway System using link and highway information provided by IHS. Cambridge Systematics.

Note: 2018 tonnage estimates for U.S. 60 were likely overestimated in the NHS assignment and were adjusted based on truck count observations and knowledge of the region. U.S. 60 is not included in this chart but is estimated to handle between 50 million -100 million tons in 2018.

Figure 5.3 and Figure 5.4 show each roadway corridor by the total freight value carried in 2018. Again, I-44 is by far Missouri's most important freight corridor by value, carrying \$3.7 billion worth of freight in 2018. Other key corridors include U.S. 54 (\$306 million), State Route 744 in Springfield (\$241 million), and I-270 (\$211 million).



FIGURE 5.4 TOP 10 HIGHWAY CORRIDORS BY FREIGHT VALUE, 2018



Source: IHS Transearch assigned to the National Highway System using link and highway information provided by IHS. Cambridge Systematics.

Note: 2018 value estimates for U.S. 60 were likely overestimated in the NHS assignment and were adjusted based on truck count observations and knowledge of the region. U.S. 60 is not included in this chart but is estimated to handle between \$100 million - \$250 million in 2018.

Figure 5.5 and Figure 5.6 show the projected freight flow tonnage on Missouri roadway corridors in 2045. I-44 is expected to continue to be the state’s top freight corridor, carrying a projected 3.8 billion tons. I-270 and I-170 in the St. Louis area are projected to become the second- and third-most important corridors in terms of tonnage, each carrying about 575 million tons.

FIGURE 5.5 FREIGHT TONNAGE BY ROADWAY CORRIDOR, 2045

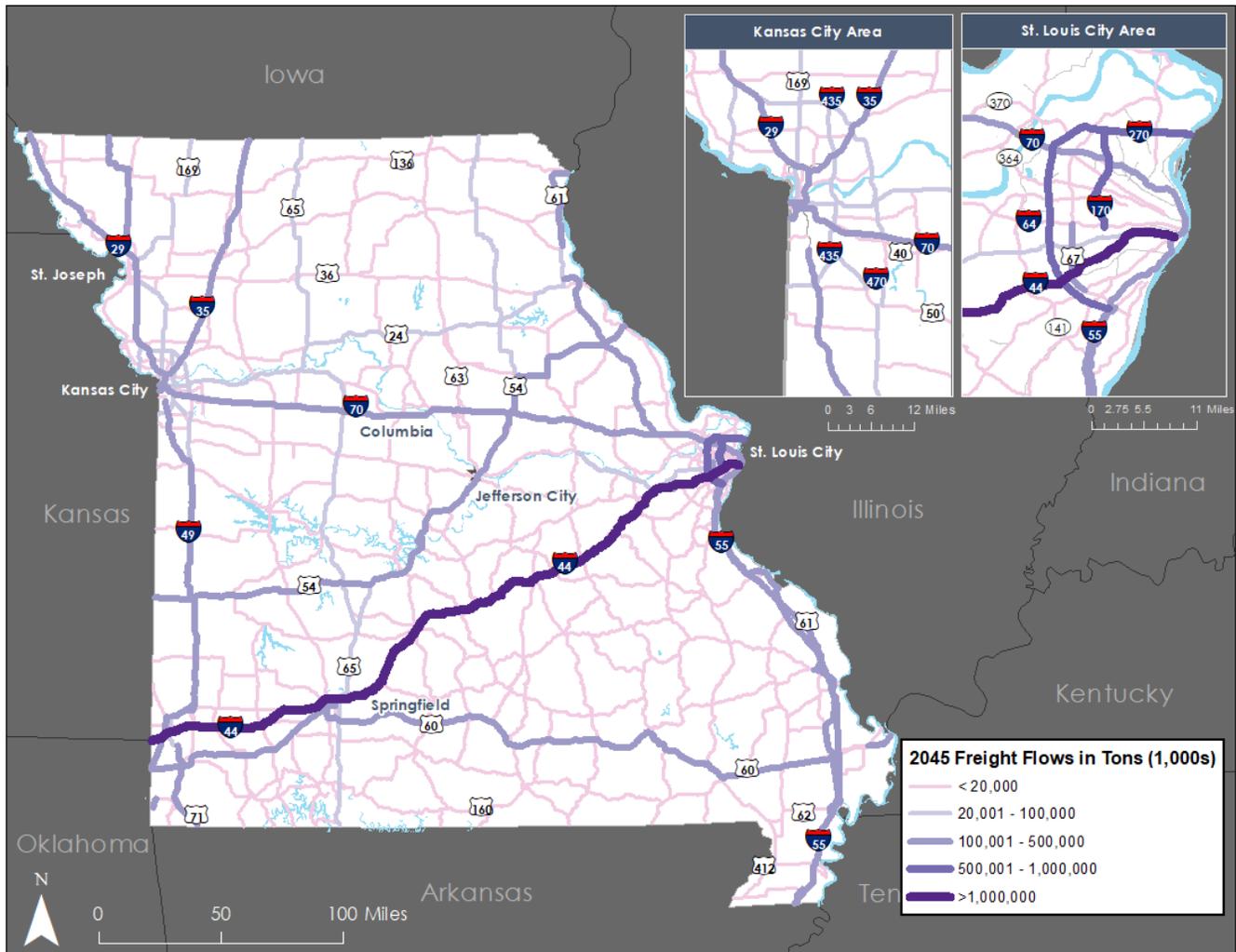
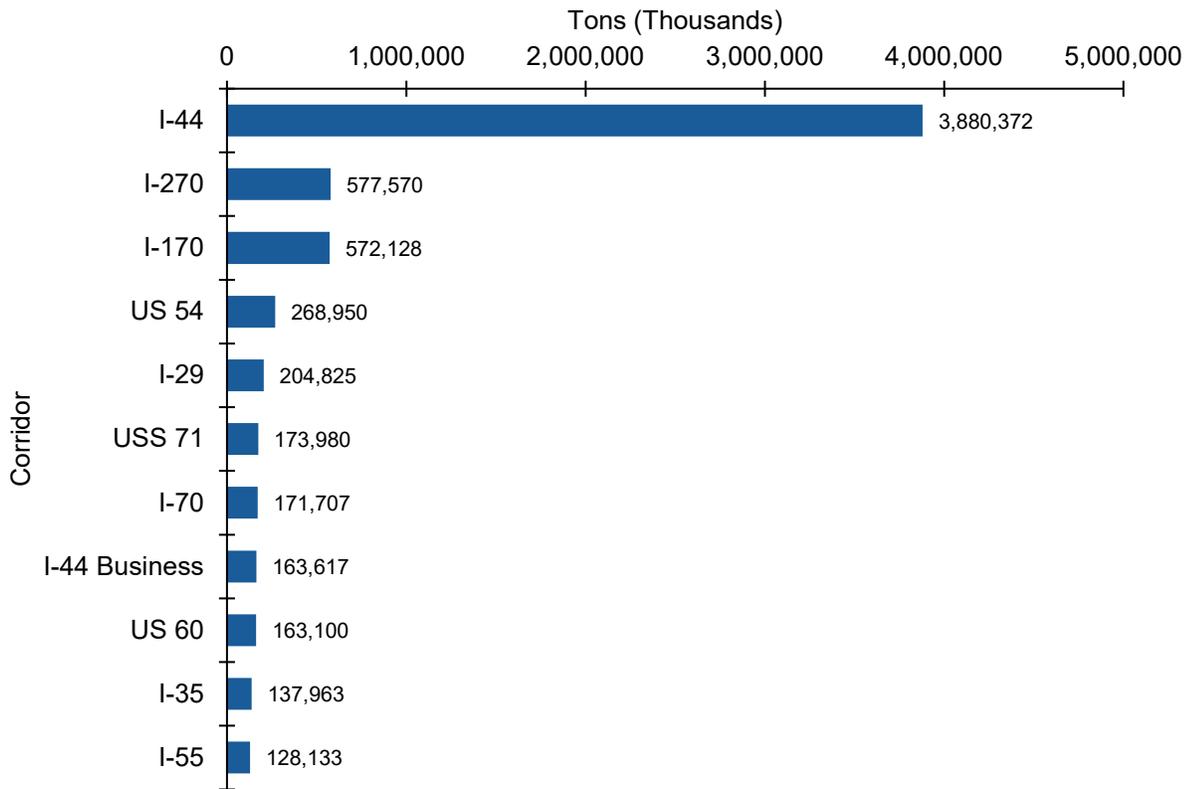


FIGURE 5.6 TOP HIGHWAY CORRIDORS BY FREIGHT TONNAGE, 2045



Source: IHS Transearch assigned to the National Highway System using link and highway information provided by IHS. Cambridge Systematics.

Figure 5.7 and Figure 5.8 show roadway corridors by projected freight values in 2045. I-44 is projected to carry by far the largest value of freight, approximately \$14 billion. I-170 and I-270 are projected to carry \$2.2 billion and \$2.1 billion respectively. Other key corridors include U.S. 54 (\$823 million) and State Route 43 (\$429 million).

FIGURE 5.7 FREIGHT VALUE BY ROADWAY CORRIDOR, 2045

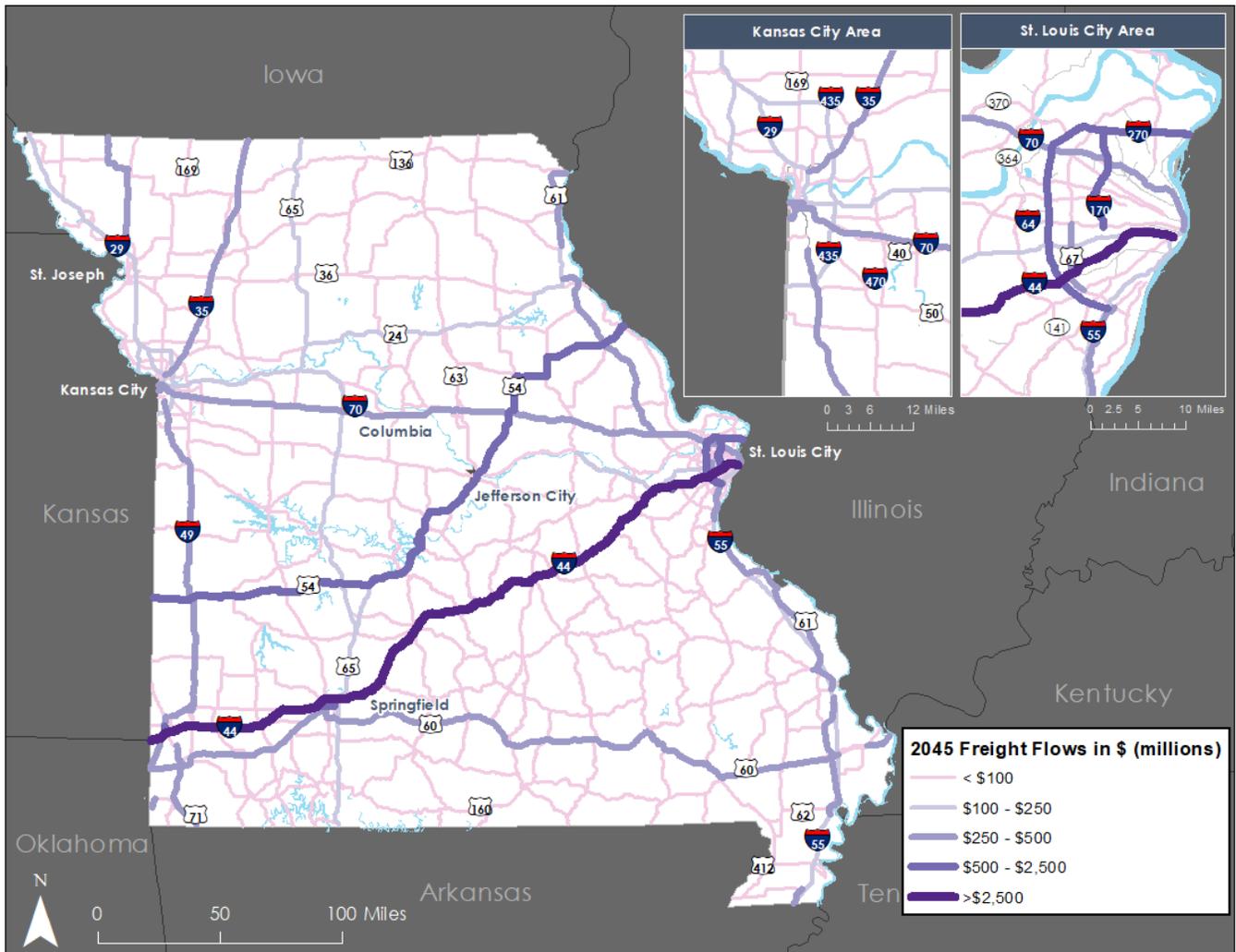
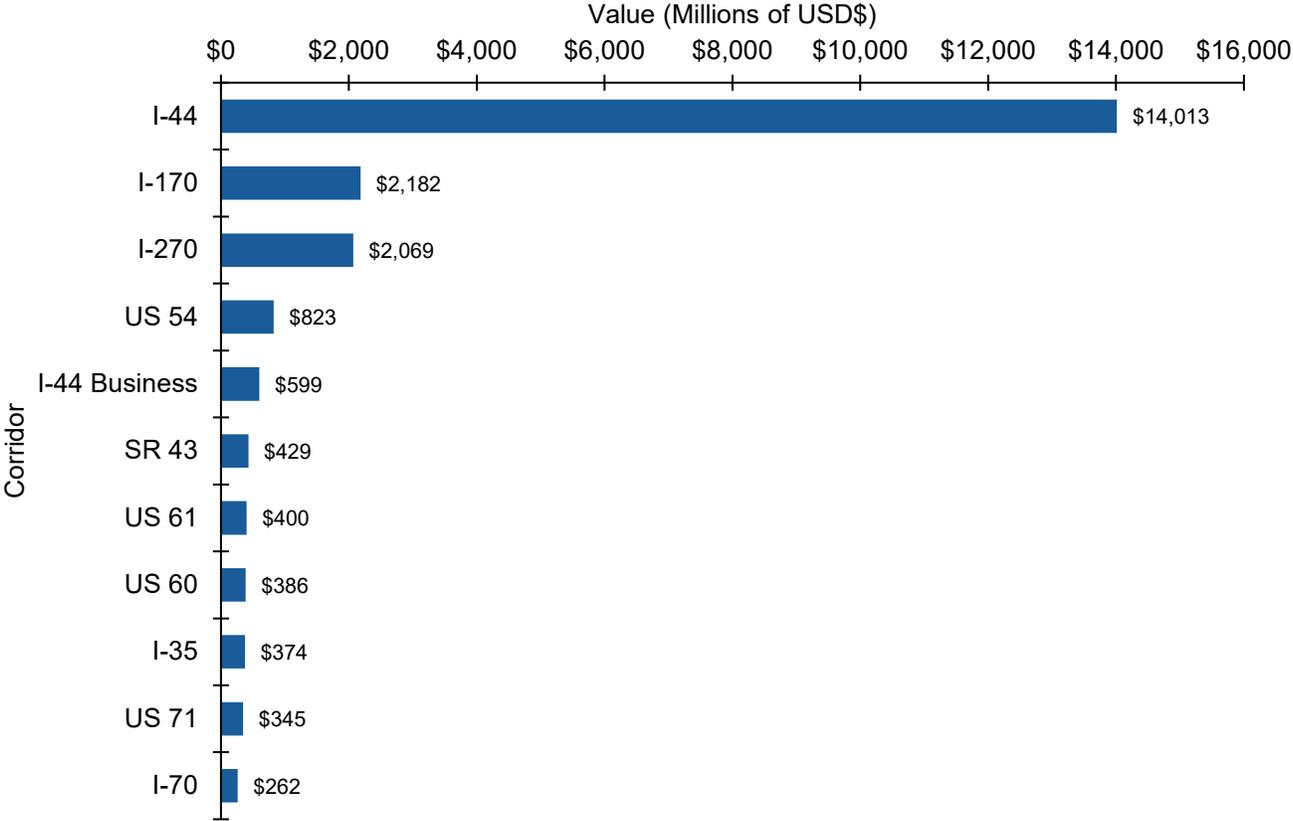


FIGURE 5.8 TOP HIGHWAY CORRIDORS BY FREIGHT VALUE



Source: IHS Transearch assigned to the National Highway System using link and highway information provided by IHS. Cambridge Systematics.

# Appendix A. STCC Commodity Classifications

**TABLE A.1 STANDARD TRANSPORTATION COMMODITY CODE CLASSIFICATIONS AND DESCRIPTIONS**

2-Digit Code	Commodity	Description
01	Farm Product	All types of fruits, vegetables, livestock, animal products, cotton, grain and other farm products.
08	Forest Products	Includes barks, gum and other forest products.
09	Fresh Fish or Marine Products	Fresh fish and marine products.
10	Metallic Ores	Includes iron, copper, nickel, aluminum, lead, zinc and other ores.
11	Coal	Includes all coal products.
13	Crude Petroleum or Natural Gas	Crude petroleum, natural gas and natural gasoline products.
14	Nonmetallic Minerals	This category includes a variety of construction and building products, such as stone blocks or crushed rock materials.
19	Ordnance or Accessories	Guns, ammunition, military equipment and other ordnance or accessories.
20	Food or Kindred Products	This category includes animal products, produce and other processed foods and beverages.
21	Tobacco Products	Cigarettes, cigars, chewing tobacco and other processed tobacco.
22	Textile Mill Products	Woven fabrics, knit fabrics, yarn, silk, carpets and other textile goods.
23	Apparel or Related Products	All types of apparel and accessories.
24	Lumber or Wood Products	Lumber, forest materials and other manufactured wood products.
25	Furniture or Fixtures	All types of furniture and fixtures.
26	Pulp, Paper or Allied Products	Paper, pulp, wallpaper, envelopes, boxes and other paper products.
27	Printed Matter	Newspaper, periodicals, greeting cards and other printed matter.
28	Chemicals or Allied Products	Industrial chemicals, pharmaceutical drugs, cosmetics, soap and detergents, paint and other chemical products.
29	Petroleum or Coal Products	Petroleum, refined products, asphalt and miscellaneous coal and petroleum products.
30	Rubber or Misc. Plastics	Includes tires, inner tubes, rubber or plastic footwear and other products.
31	Leather or Leather Products	Finished and industrial leather, leather footwear, luggage and other leather goods.
32	Clay, Concrete, Glass or Stone	All types of clay, glass and glassware, concrete/cement and stone.
33	Primary Metal Products	Includes steel, iron, lead, copper and other primary metal products.
34	Fabricated Metal Products	Includes cans, cutlery, tools, hardware, bolts/nuts and other fabricated metal products.
35	Machinery	Engines, farm machinery/equipment, elevators, special tools, construction machinery and other types of machinery.
36	Electrical Equipment	Electrical equipment, switchboards, household appliances, electric lamps and other electrical equipment.
37	Transportation Equipment	Includes motor vehicles, truck trailers, aircraft, ships, boards and others.

2-Digit Code	Commodity	Description
38	Instrum. Photo Equip, Optical Eq	Scientific equipment, medical devices and equipment, watches/clocks and others.
39	Misc. Manufacturing Products	Jewelry, toys, games, sporting goods, office supplies and other miscellaneous manufactured goods.
40	Waste or Scrap Materials	Ashes, scrap, chemical waste and other miscellaneous waste.
41	Misc. Freight Shipments	Miscellaneous freight shipments and special commodities.
42	Shipping Containers	Shipping containers, semi-trailers returned empty and other empty equipment.
43	Mail or Contract Traffic	Mail, express and contract traffic.
46	Misc. Mixed Shipments	Mixed shipments, freight all kinds and miscellaneous shipments (mostly intermodal).
47	Small Packaged Freight Shipments	Small packaged freight shipments, including less-than-carload shipments.
50	Secondary Moves	Generally includes shipments of consumer goods that move from multimodal terminals and warehouses and distribution centers.

Source: Transearch; Cambridge Systematics.