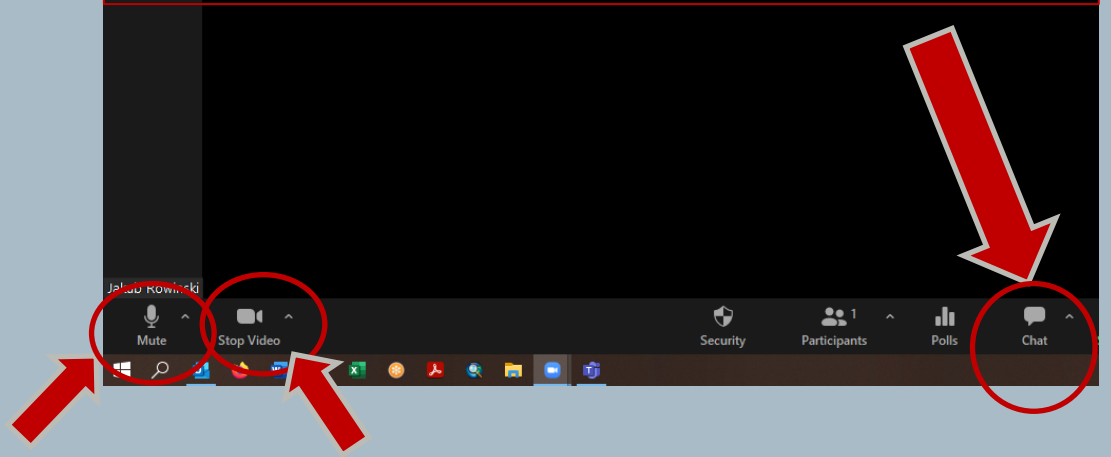
February 21 Freight Initiatives Committee Agenda

- Roll Call of Members
- Approval of Minutes
- Update on NJTPA Freight Division Activities
- Annual Trucking Industry Update
  - Darrin Roth, Vice President, Highway Policy, American Trucking Associations
  - Jeffrey Short, Vice President, American Transportation Research Institute
- Two-Minute Reports on Freight Activities from Committee Members
- Next Meeting: **Monday, April 17, 2023** – Annual Port Industry Update
- Adjournment

Please use the Chat box to ask questions during the presentations and if requesting credits, please post your name and email, followed by either AICP or PE with your PE license number



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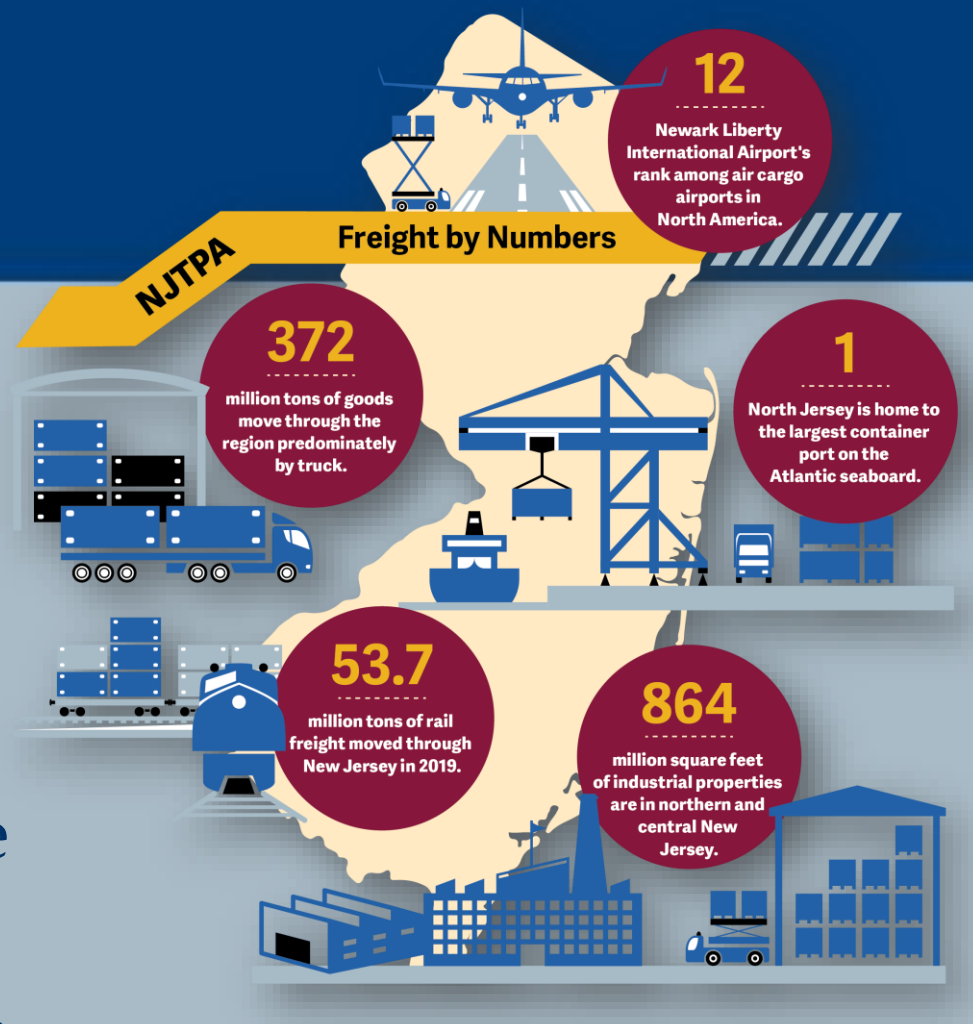
NJTPA

2022 Industrial Market

- Over 864 million SF in the region
- More than 12 million SF under construction
- 33 buildings delivered in 2022
  - 152 new buildings since the start of 2017
- Leases/renewals: 40% retail/wholesale and 39% 3PL
- Home Depot, 1.3 million SF in Monroe, NJ
- Spec buildings coming to market



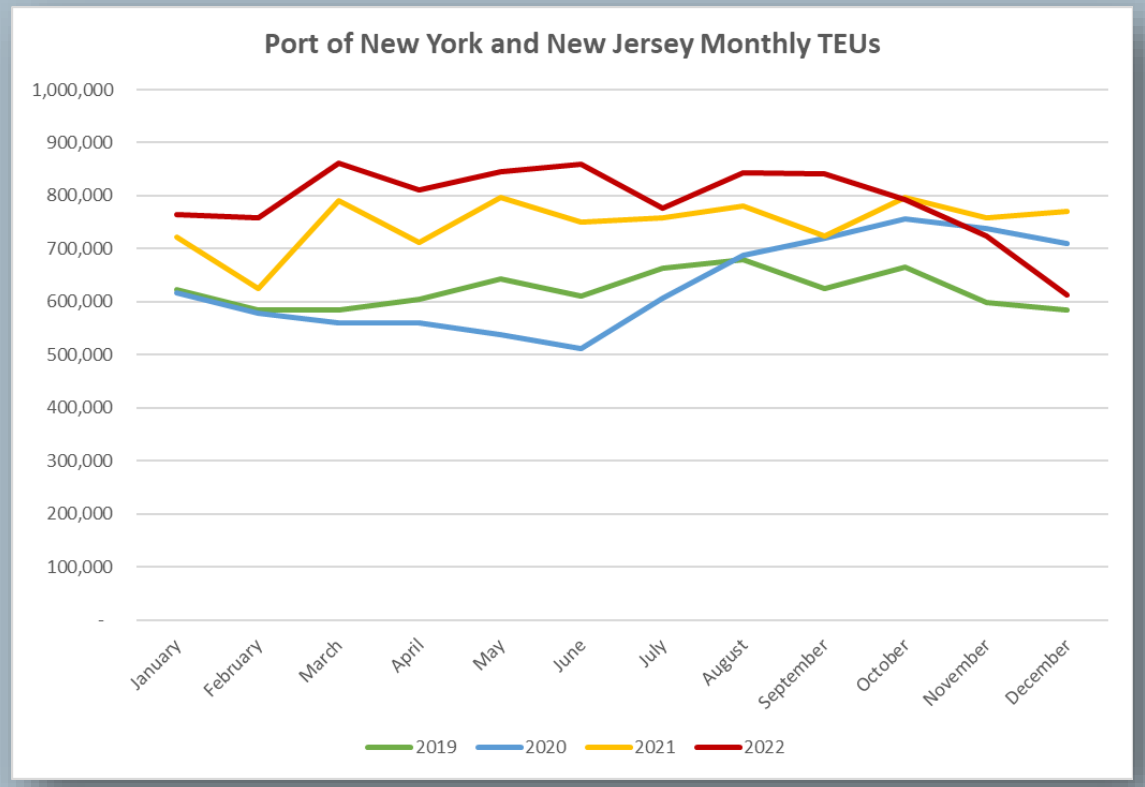
NJTPA

NJTPA Freight Division Update

- Upcoming MAP Forum Multi-State Freight Working Group Workshop on Off-Shore Wind Developments on March 23

  Agenda and Zoom Connection Information at: https://njtpa.org/Get-Involved/Info-Resources/Calendar/2023/March/Planning-and-Transportation-Workshop-Off-Shore-Win.aspx

- Continuing work to enhance and update our Goods Movement Strategies for Communities webtool.



Source: Port Authority of New York and New Jersey

NJTPA

NJTPA Freight Division Studies

Freight Rail Grade Crossing Assessment Update

- Completed Scoring and Prioritizing of Grade Crossings
- Held Second Meeting of the Study Technical Advisory Committee (TAC)
- Developing Grade Crossing Profiles for Top 10 Crossings

FY2021 Freight Concept Development Program Studies

- Completed Second Round of Local Officials Briefings for Bound Brook and Roxbury Projects
- Second Round of Public Meetings for Both Studies in Mid-March
- Developing Final Documentation for Both Studies

NJTPA

February FIC Presentations

- Darrin Roth, Vice President, Highway Policy, American Trucking Associations
- Jeffrey Short, Vice President, American Transportation Research Institute

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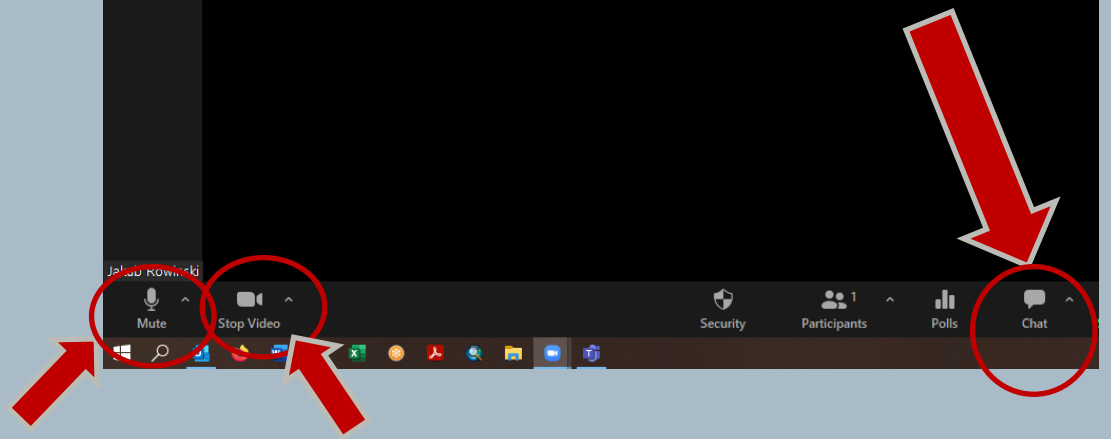

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NJTPA

North Jersey Transportation Planning Authority, Inc.
FREIGHT INITIATIVES COMMITTEE

February 21, 2023

Darrin Roth
Vice President, Highway Policy
American Trucking Associations
droth@trucking.org

ATA TRUCKING Moves America Forward

Trucking Big Picture

- The freight market is worse than the macro-economy for a host of reasons, including:
  - Consumers move back to buying services (e.g., travel)
    - Related, port volumes have plummeted
  - Housing is currently in a recession (construction and sales)
  - And factory output slowing
- But the freight economy is uneven with some sectors doing better than others.
- Overall: truck market is moving back to historical averages/trend from 2.5 years of well above average demand growth.

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Freight Buckets

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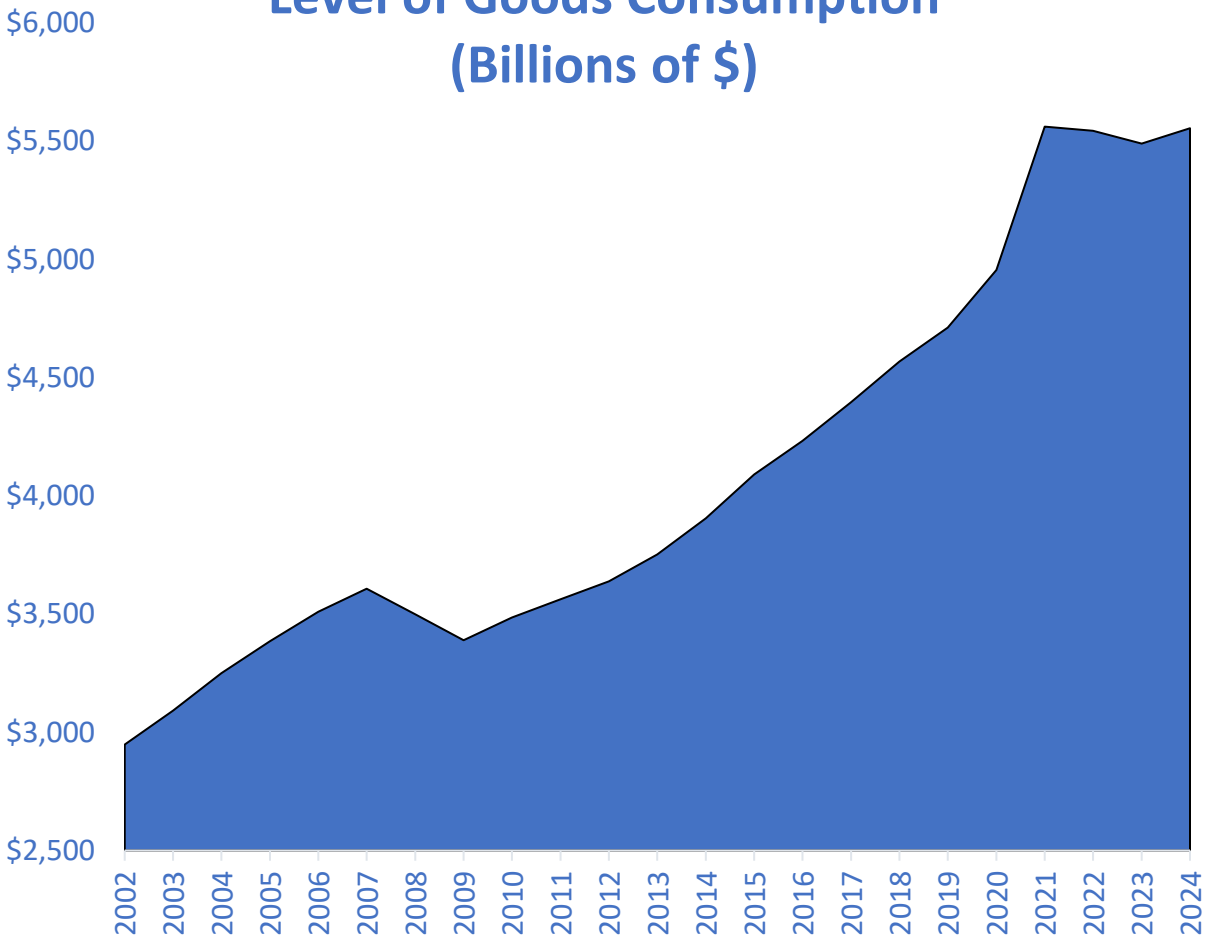
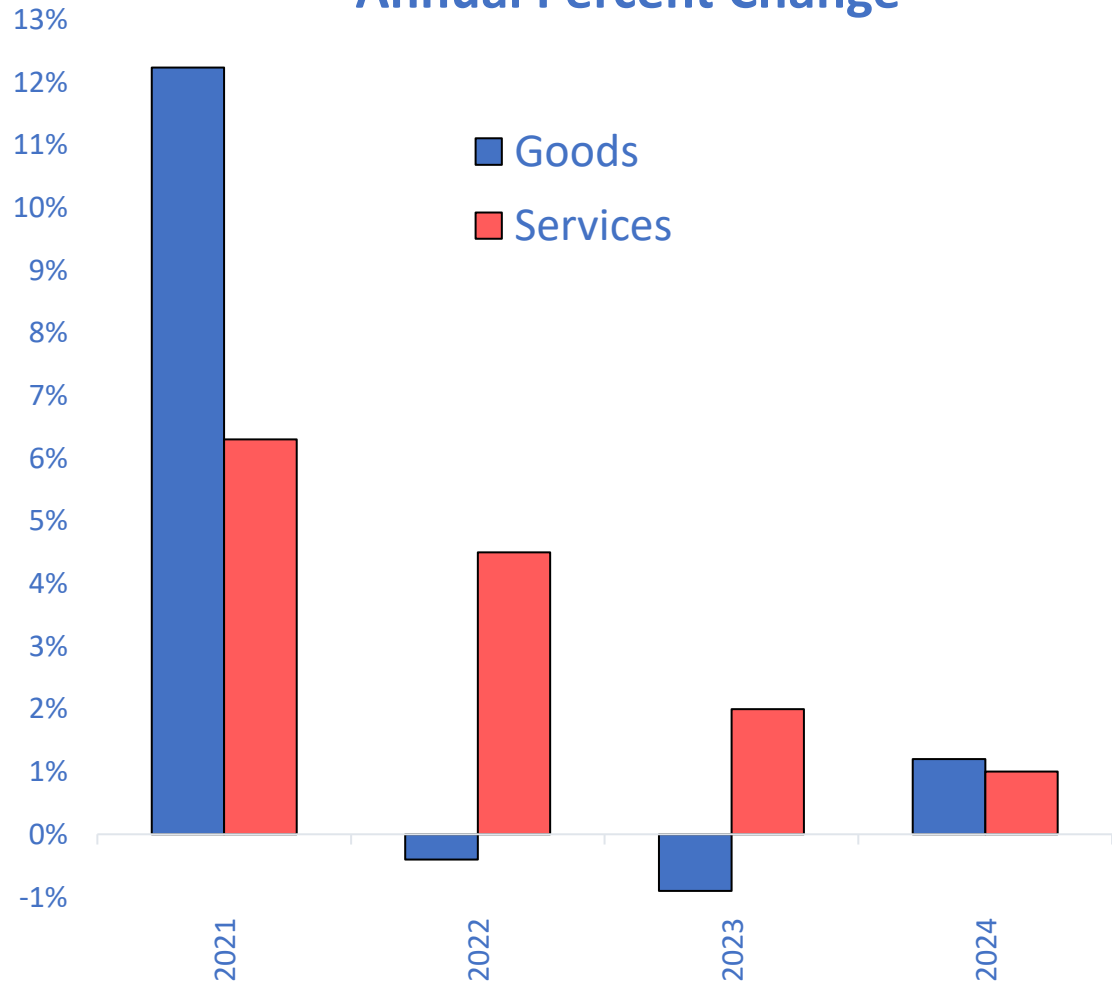
Personal Consumption Expenditures of Goods (Inflation Adjusted)

Level of Goods Consumption (Billions of $)



Annual Percent Change



Sources: BEA & ATA

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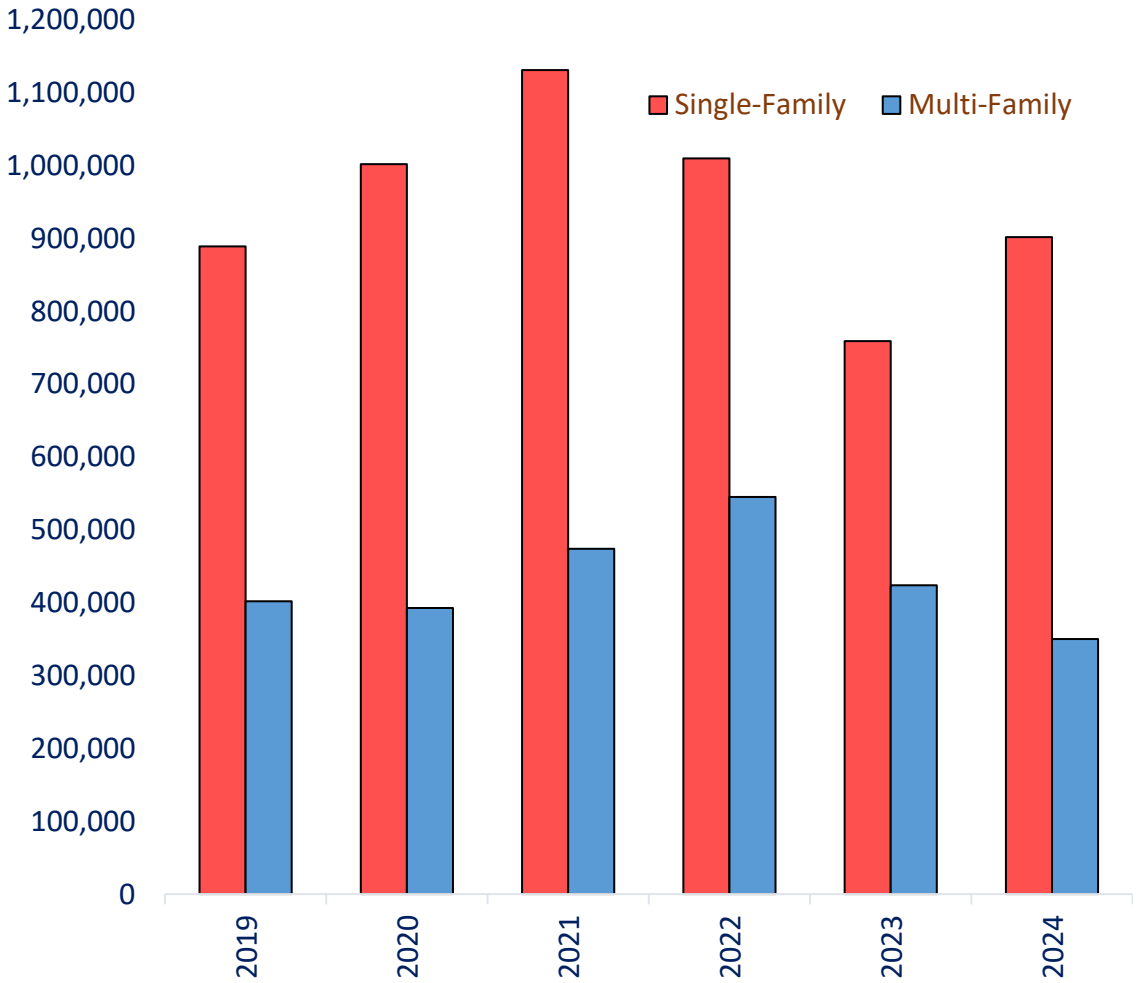
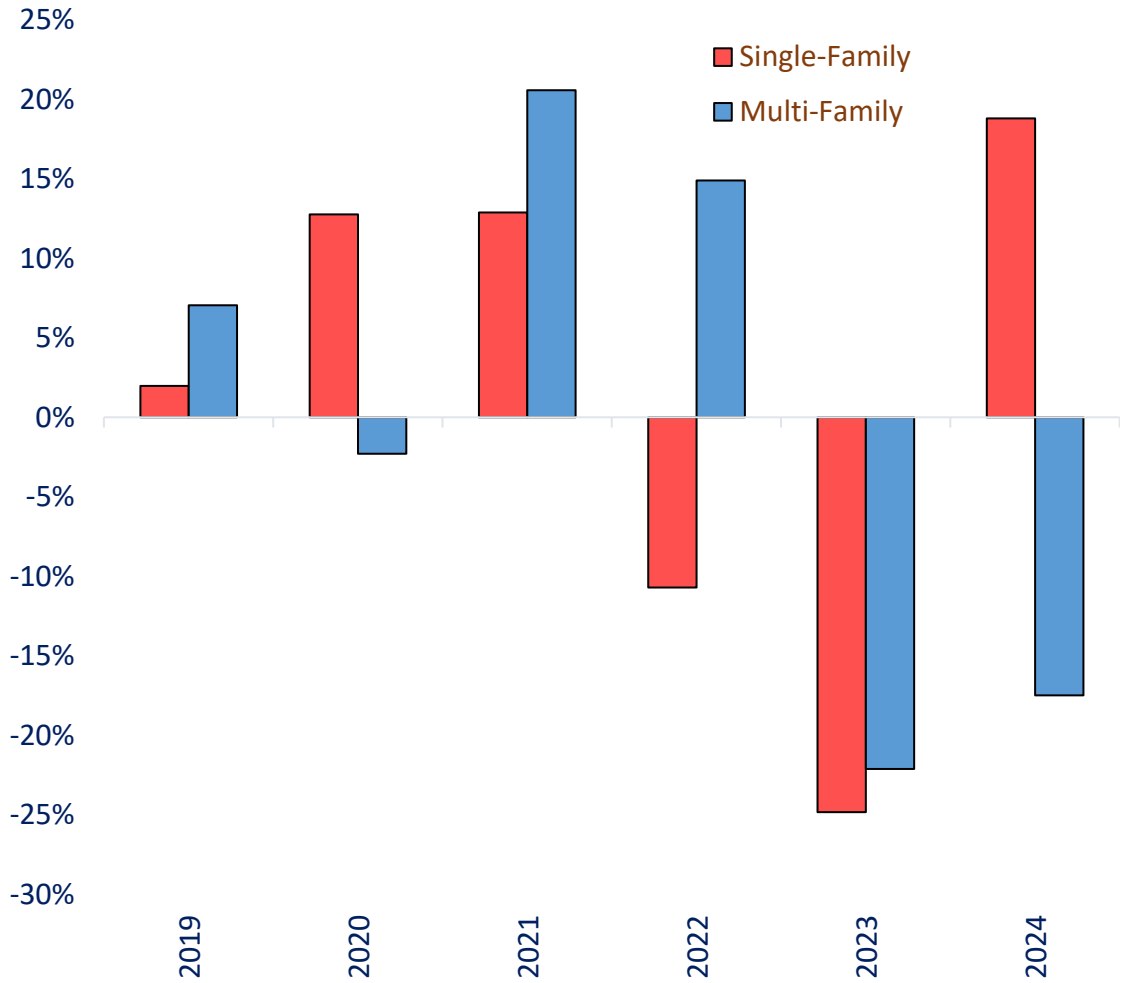
Housing Market: Construction

Annual Level of Housing Starts



Annual Percent Change of Starts



Sources: Census Bureau & ATA

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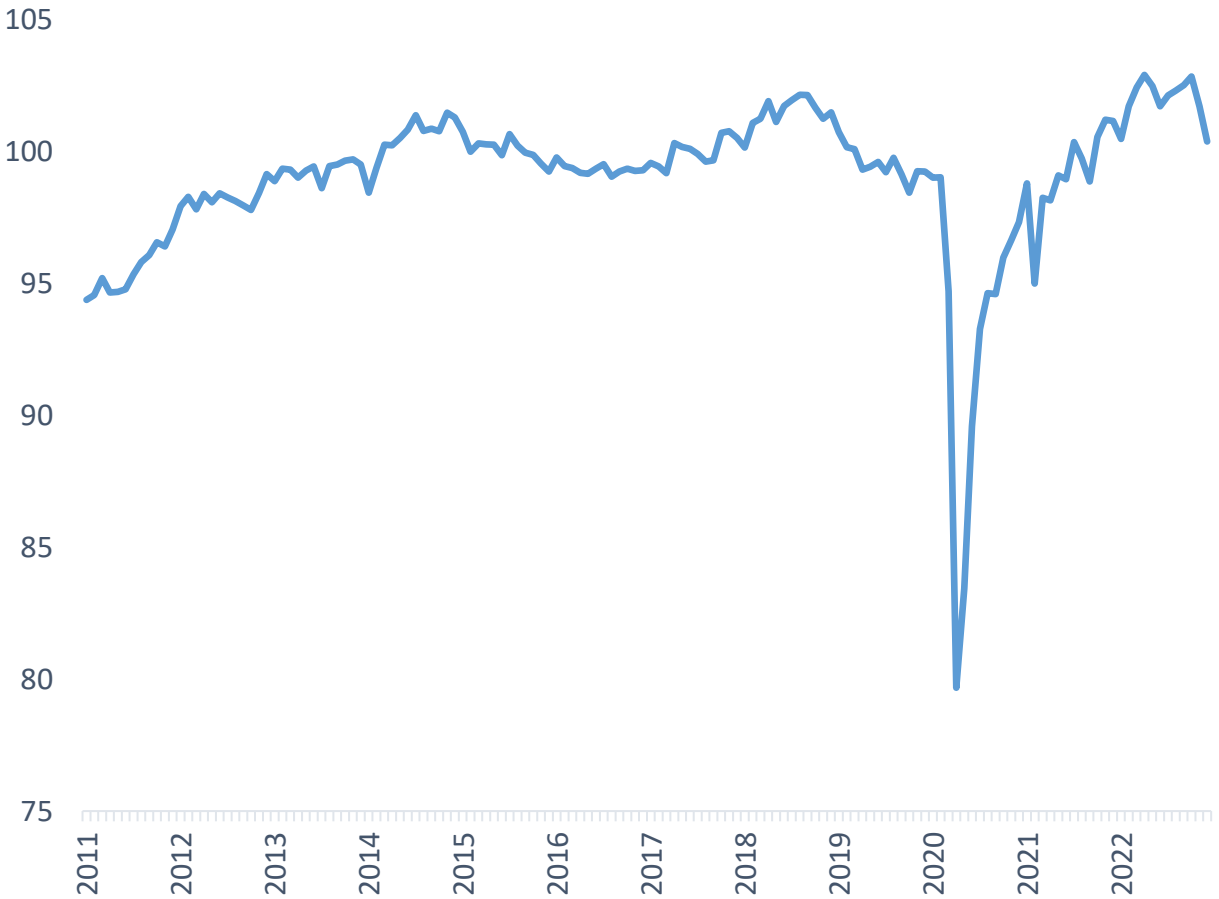
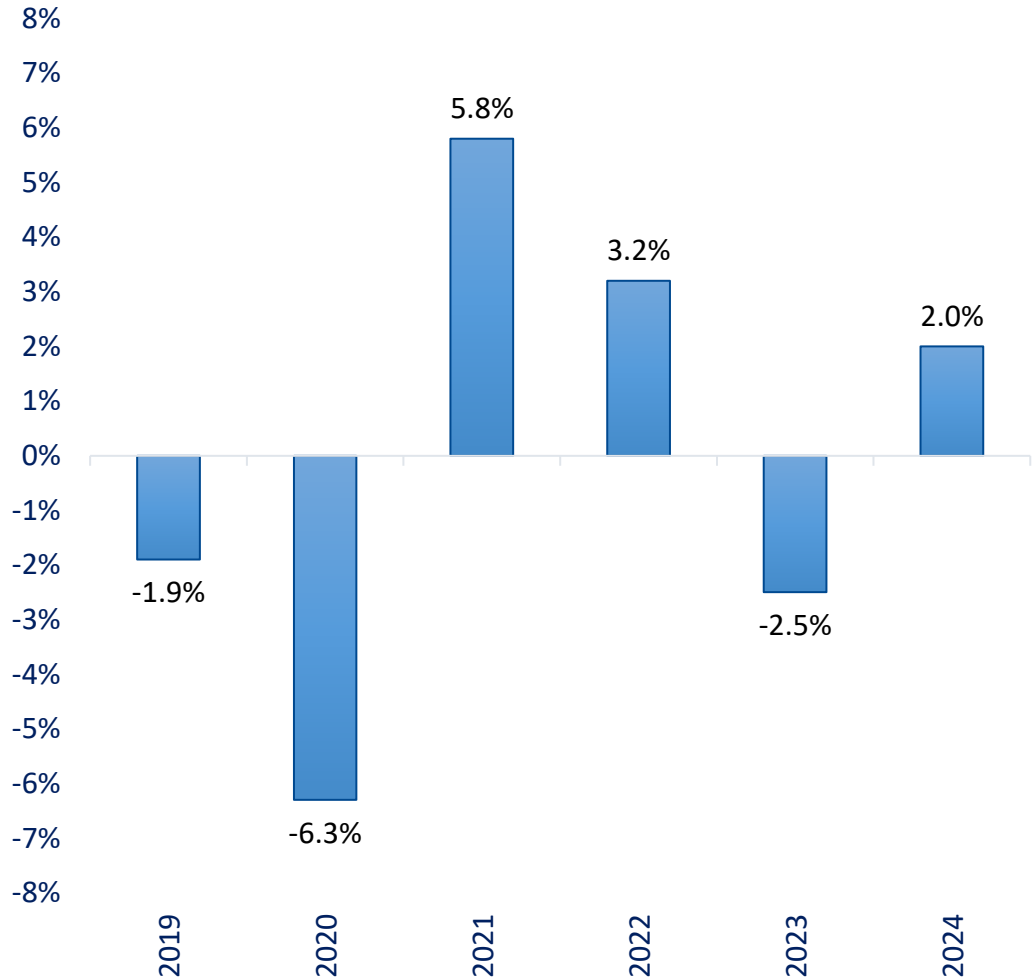
Factory Output

Level of Output (Index)



Annual Percent Change in Output



Source: Federal Reserve & ATA

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Trucking Demand

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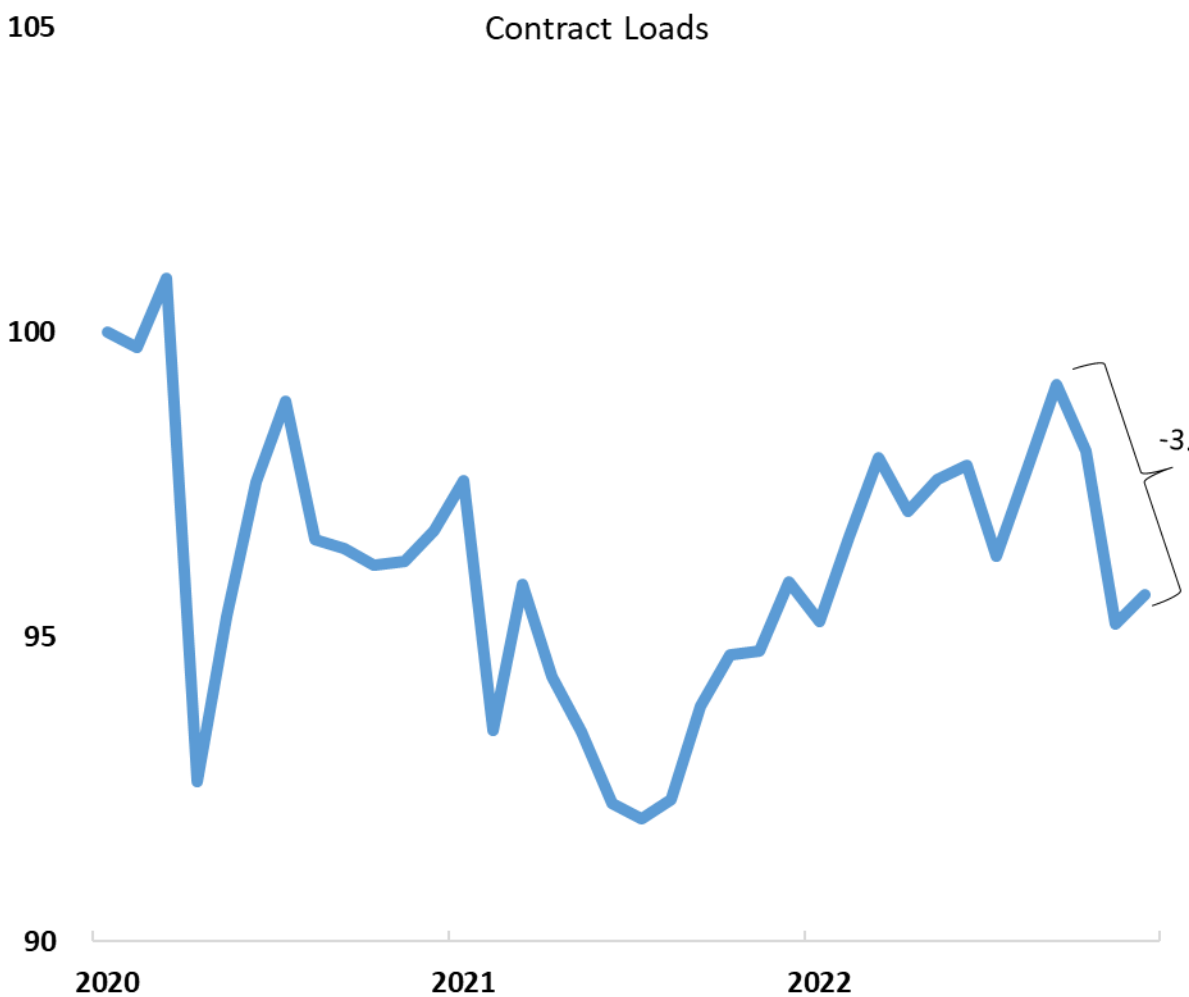
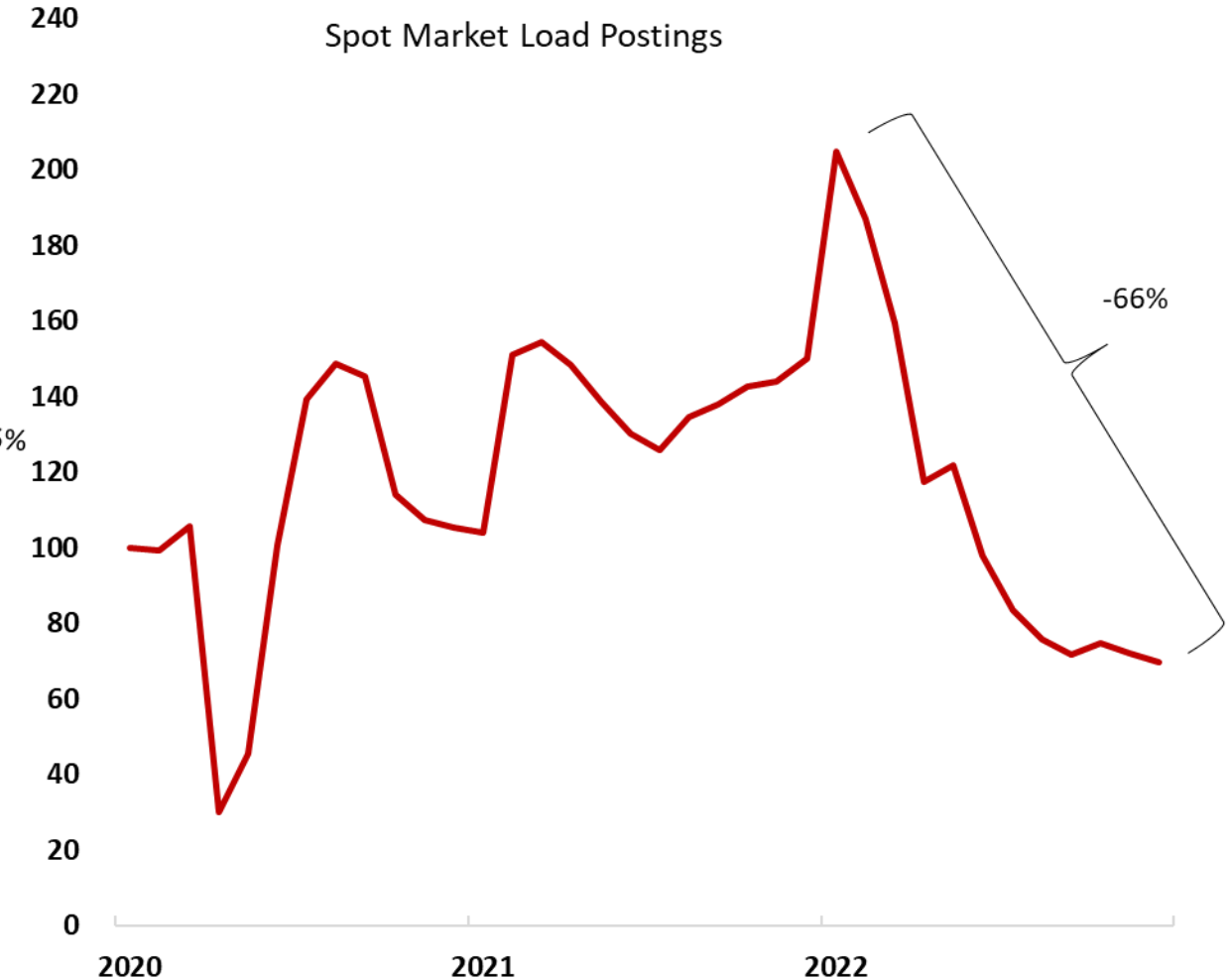
Truckload Loads

(Index; January 2020 = 100)





Sources: ATA's Trucking Activity Report & DAT.com

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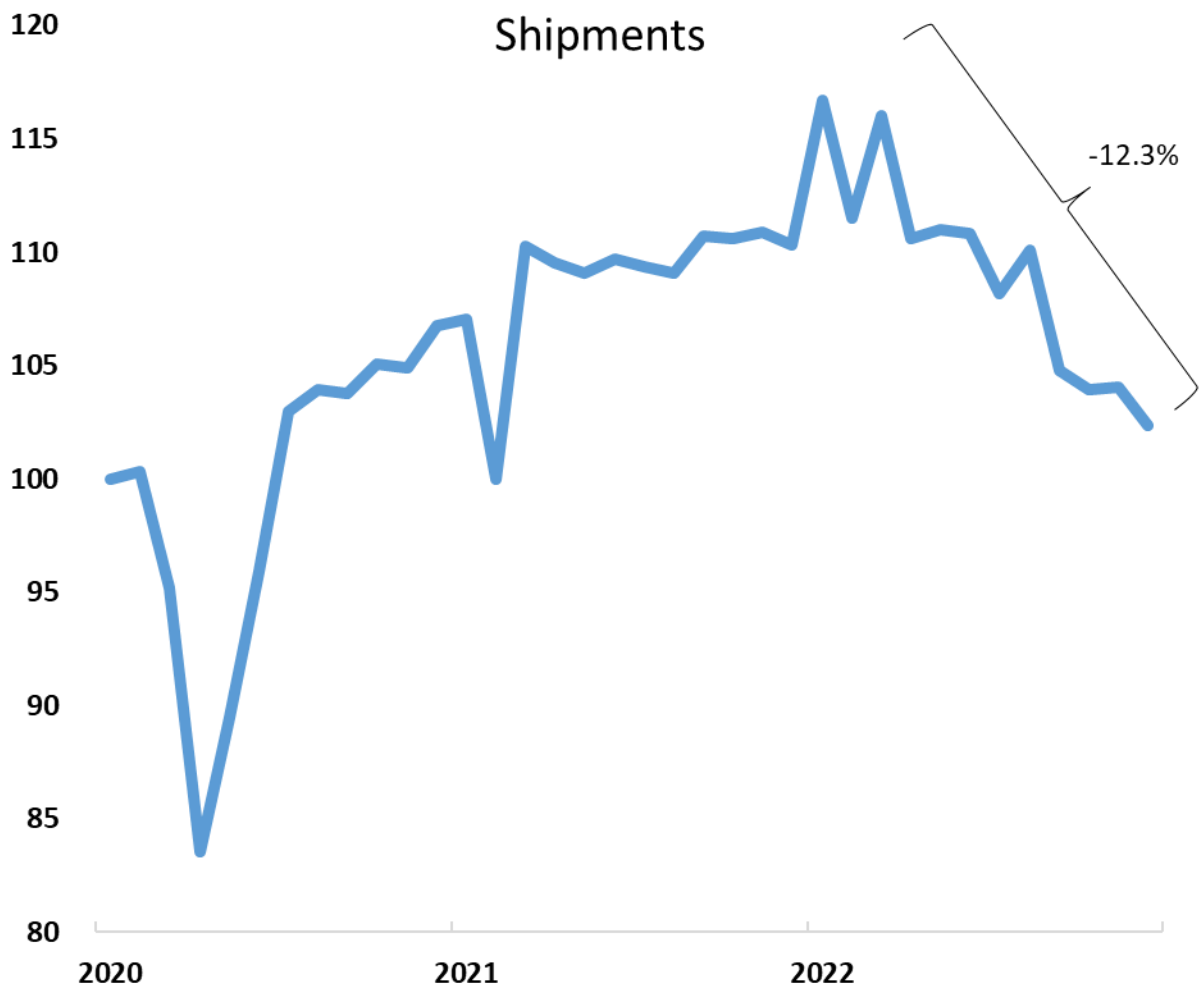
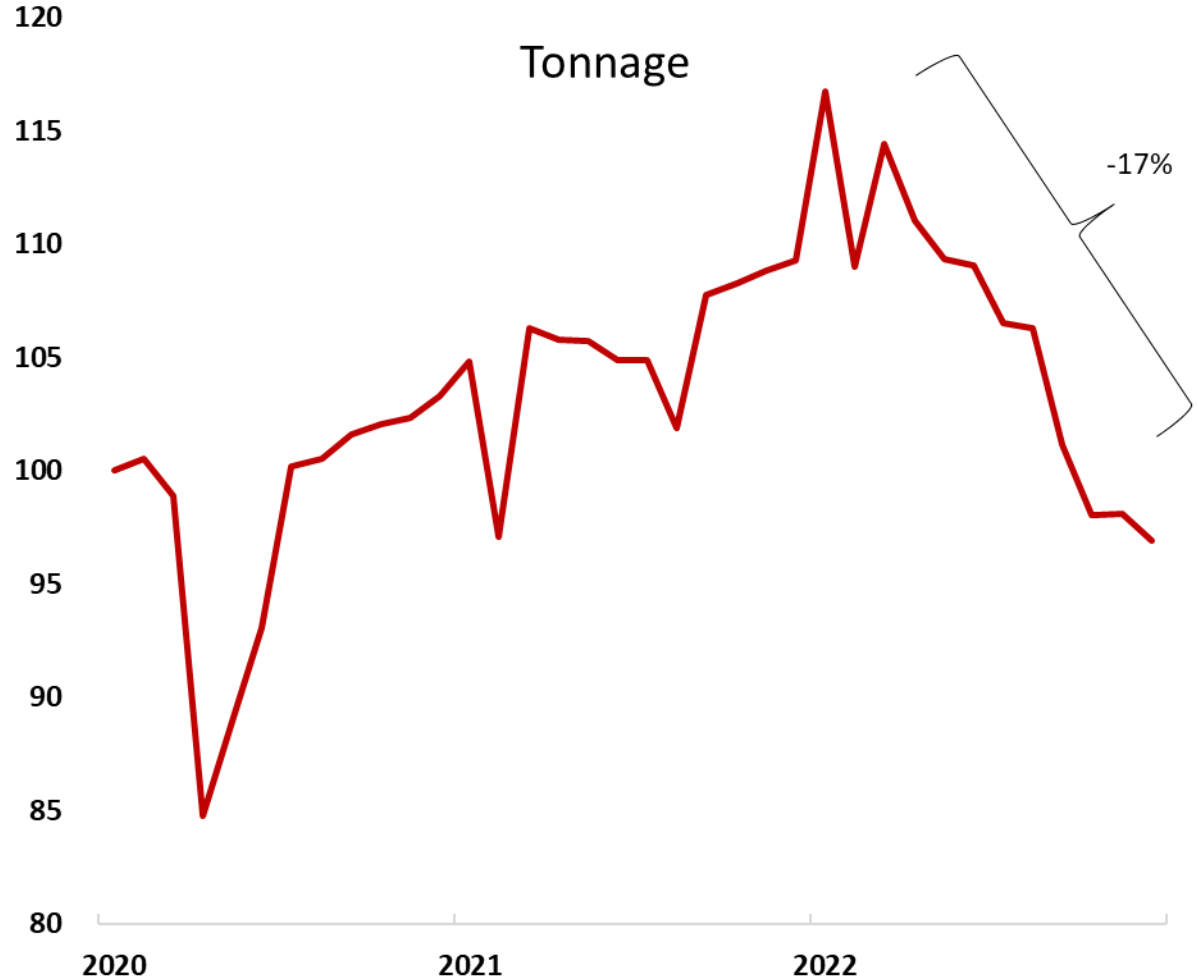
LTL Shipments and Tonnage

(Index; January 2020 = 100)





Sources: ATA's Trucking Activity Report

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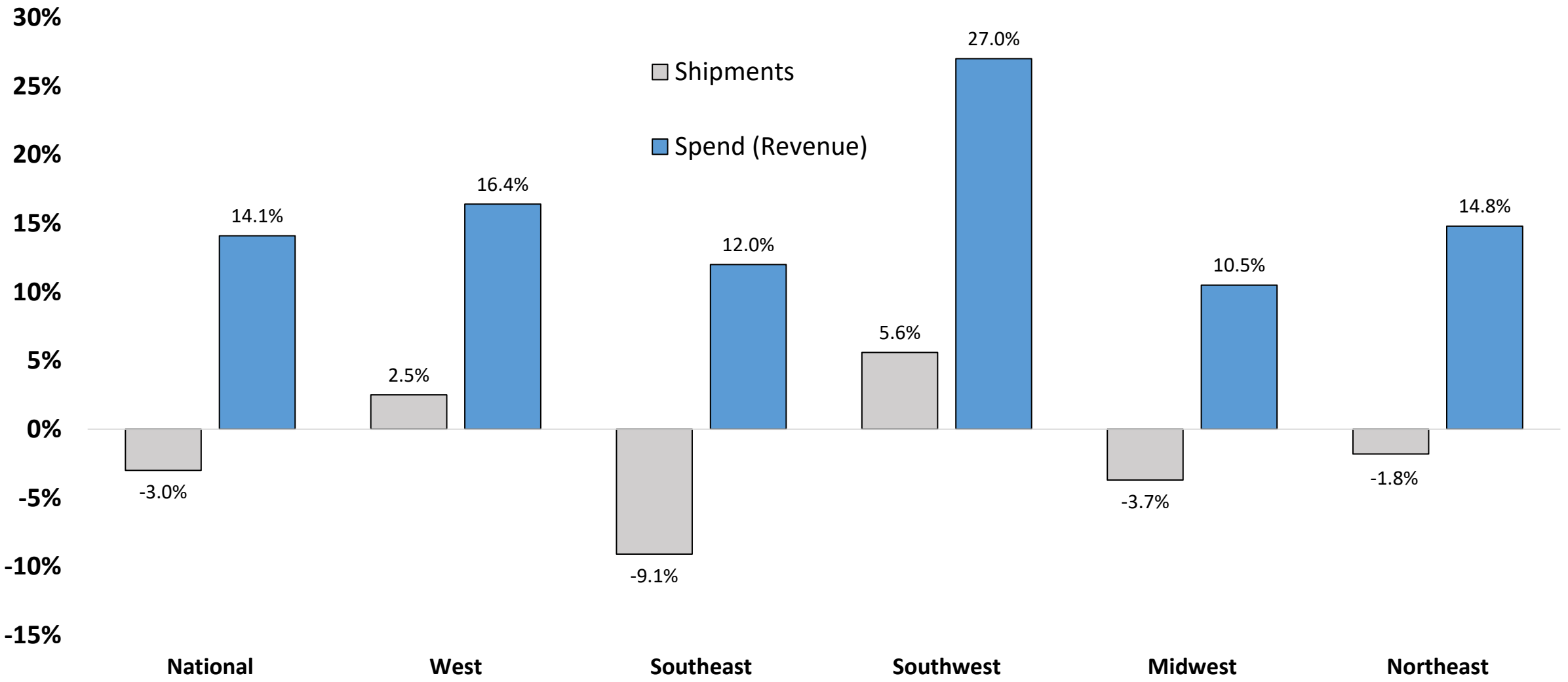
2022 U.S. Bank Freight Metrics

Year-over-Year Percent Change; Includes all types of TL and LTL freight



Source: U.S. Bank

www.freight.usbank.com

Note: For motor carriers, spending is the same as revenue.
Data includes FSC revenue.

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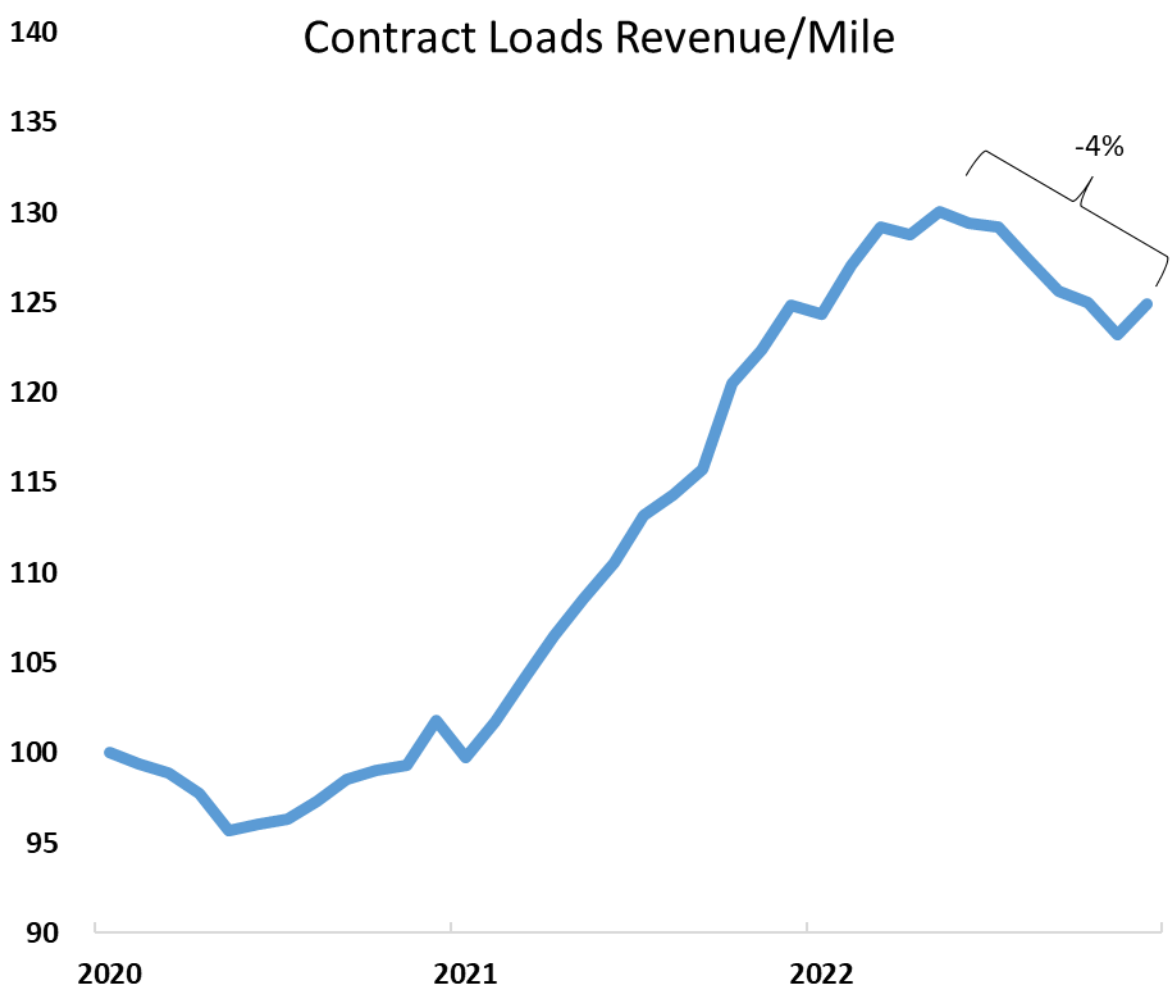
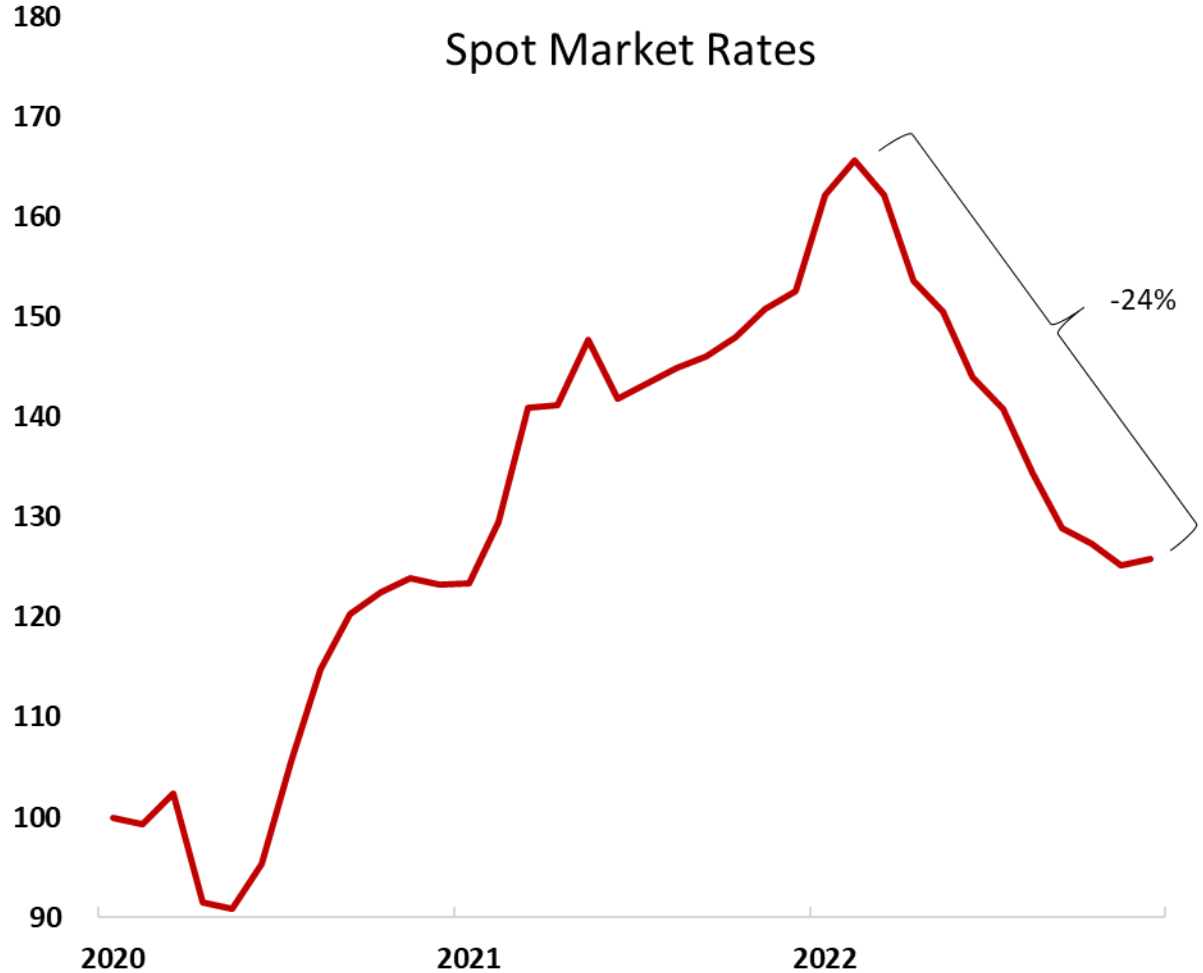
Trucking Supply

Truckload Pricing Proxy Metrics

(Index; January 2020 = 100)





Sources: ATA's Trucking Activity Report & DAT.com
Note: Revenue per mile excludes fuel surcharge revenue

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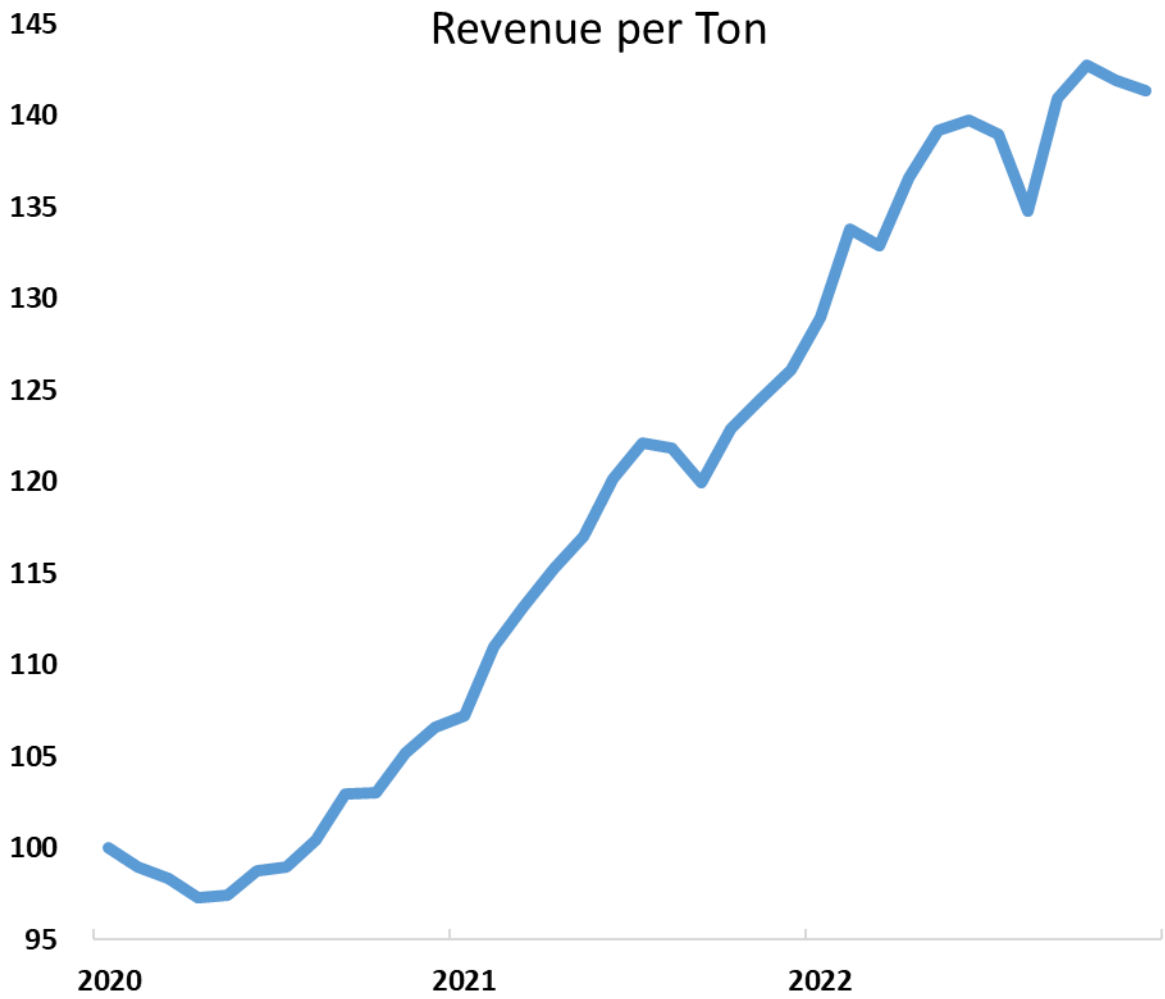
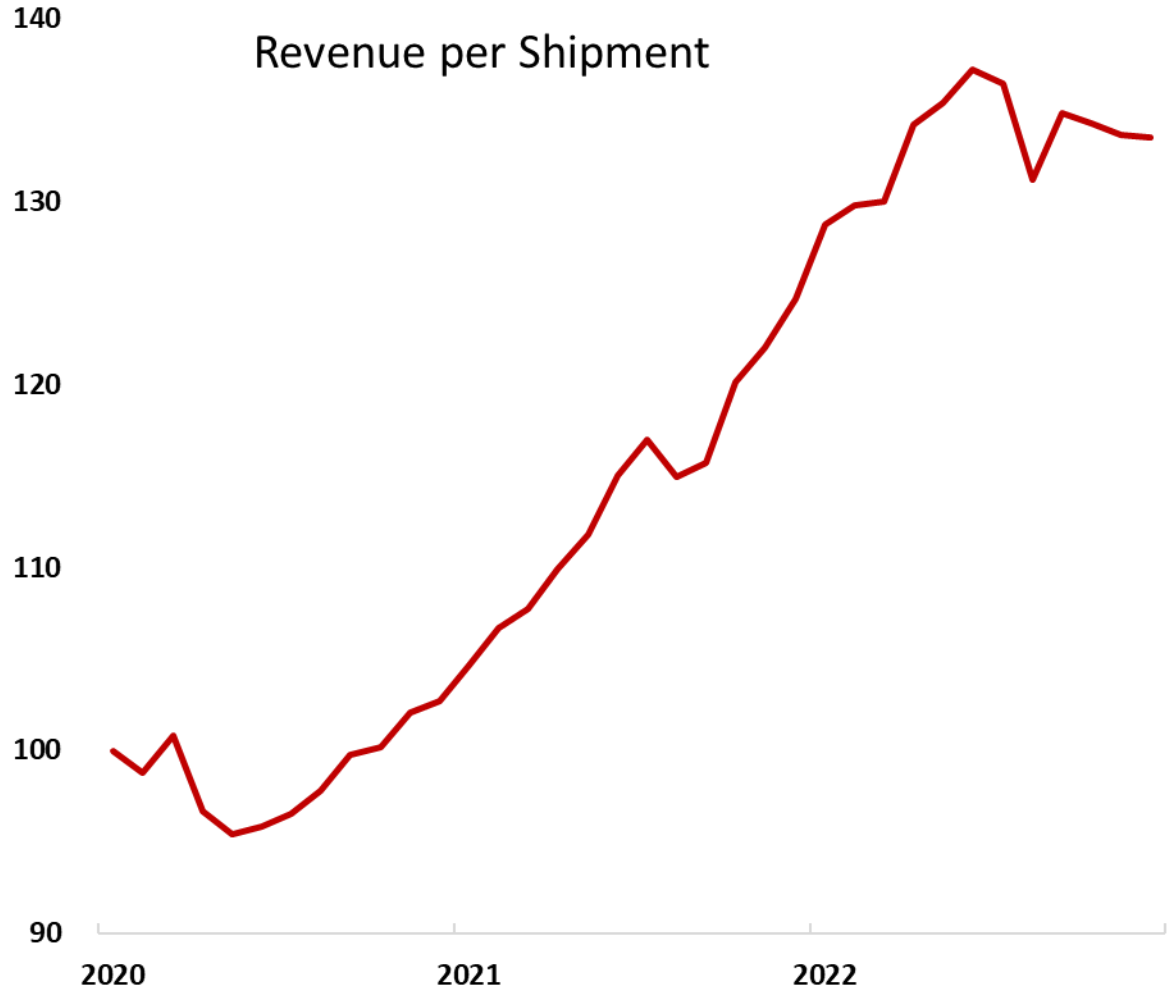
LTL Pricing Metrics

(Index; January 2020 = 100)





Sources: ATA's Trucking Activity Report
Note: Revenue metrics exclude fuel surcharge revenue

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Industry Workforce

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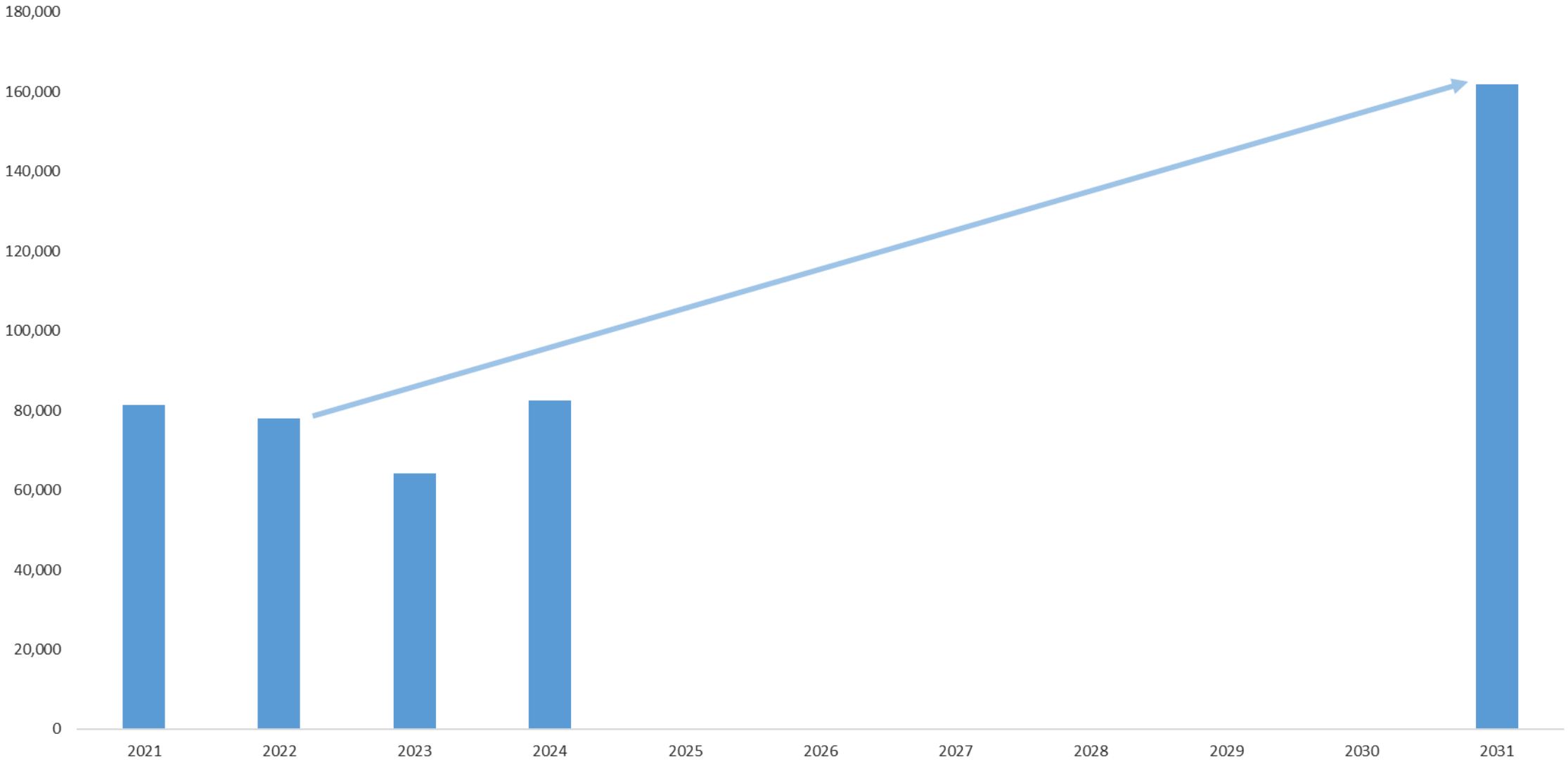
Truck Driver Shortage



Source: ATA

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The Driver Shortage is Not Unique to the United States
Examples from Around the World

- Argentina — 45,000 unfilled truck driver jobs
- China — 1.8 million unfilled truck driver jobs
- Germany — 57,000 – 80,000 unfilled truck driver jobs
- Italy — Up to 20,000 drivers short
- Mexico — 54,000 unfilled truck driver jobs
- Romania — 71,000 unfilled truck driver jobs
- Spain — Up to 20,000 unfilled truck driver jobs
- Turkey — 82,000 unfilled truck driver jobs
- Canada — 26,000 truck driver job openings

Note: unfilled jobs numbers will be higher than an actual shortage number
Source: ATA & IRU

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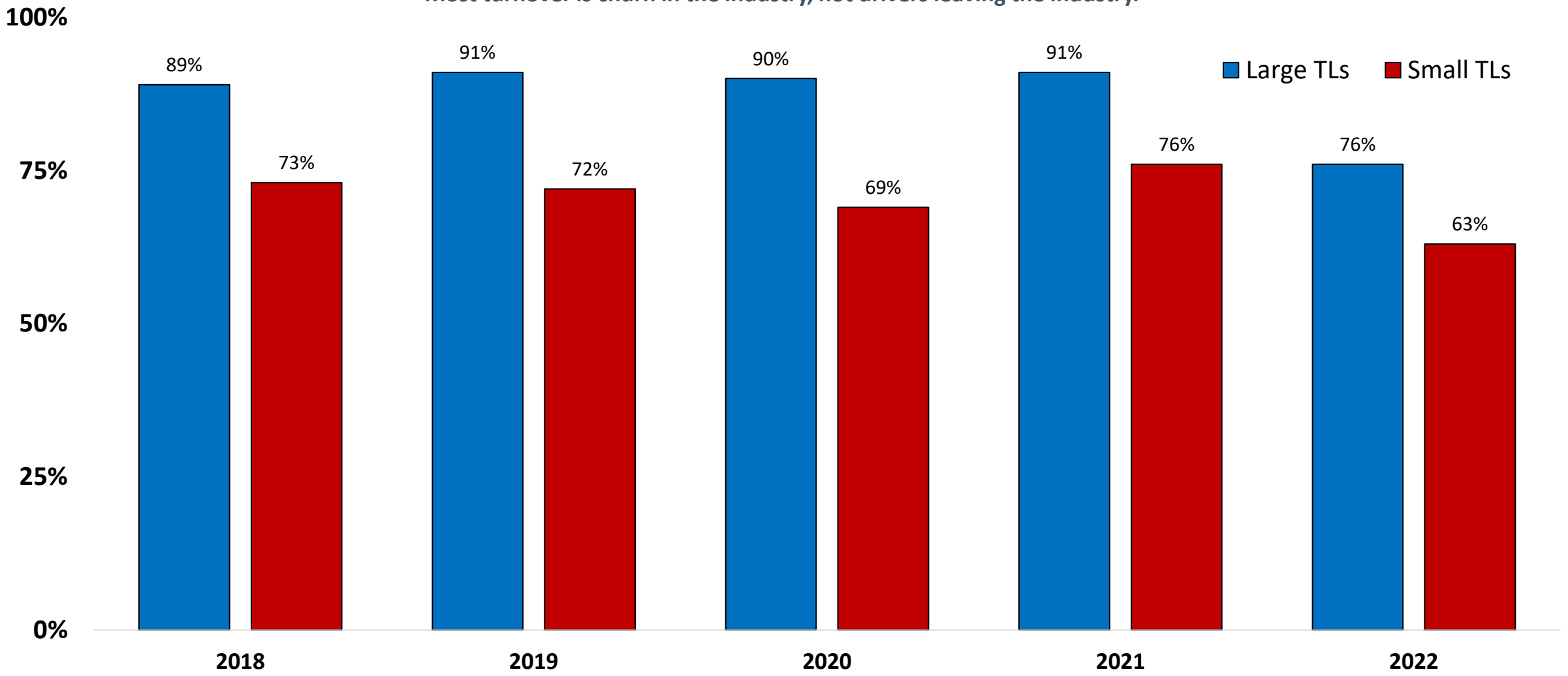
Truckload Driver Turnover

Annual Average Rate

Most turnover is churn in the industry, not drivers leaving the industry.



Source: ATA's *Trucking Activity Report*

Note: Large fleets have at least $30 million in annual revenue

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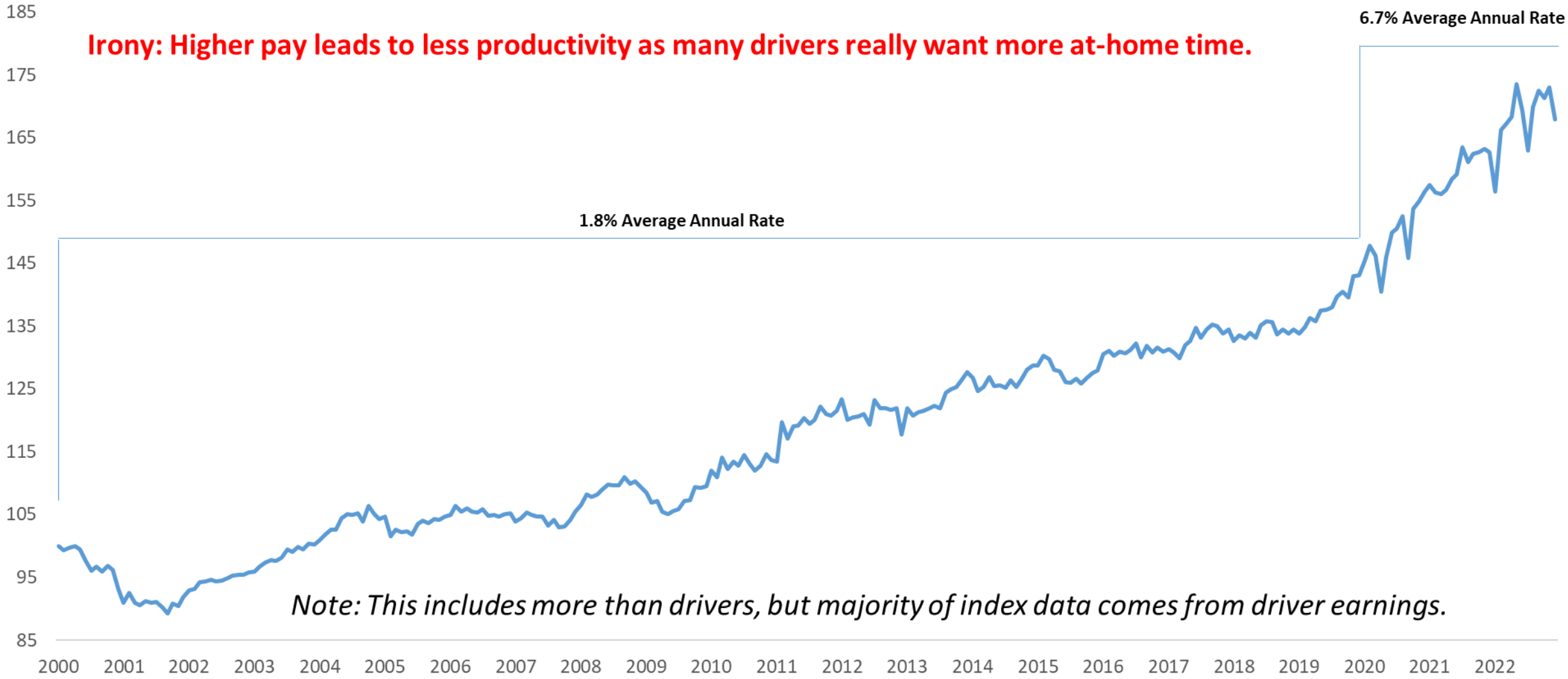
Fleet Costs

Index of Average Weekly Earnings for Production & Nonsupervisory Occupations in Long-Distance General Freight (January 2000 = 100) – Includes TL & LTL



Sources: Department of Labor & ATA

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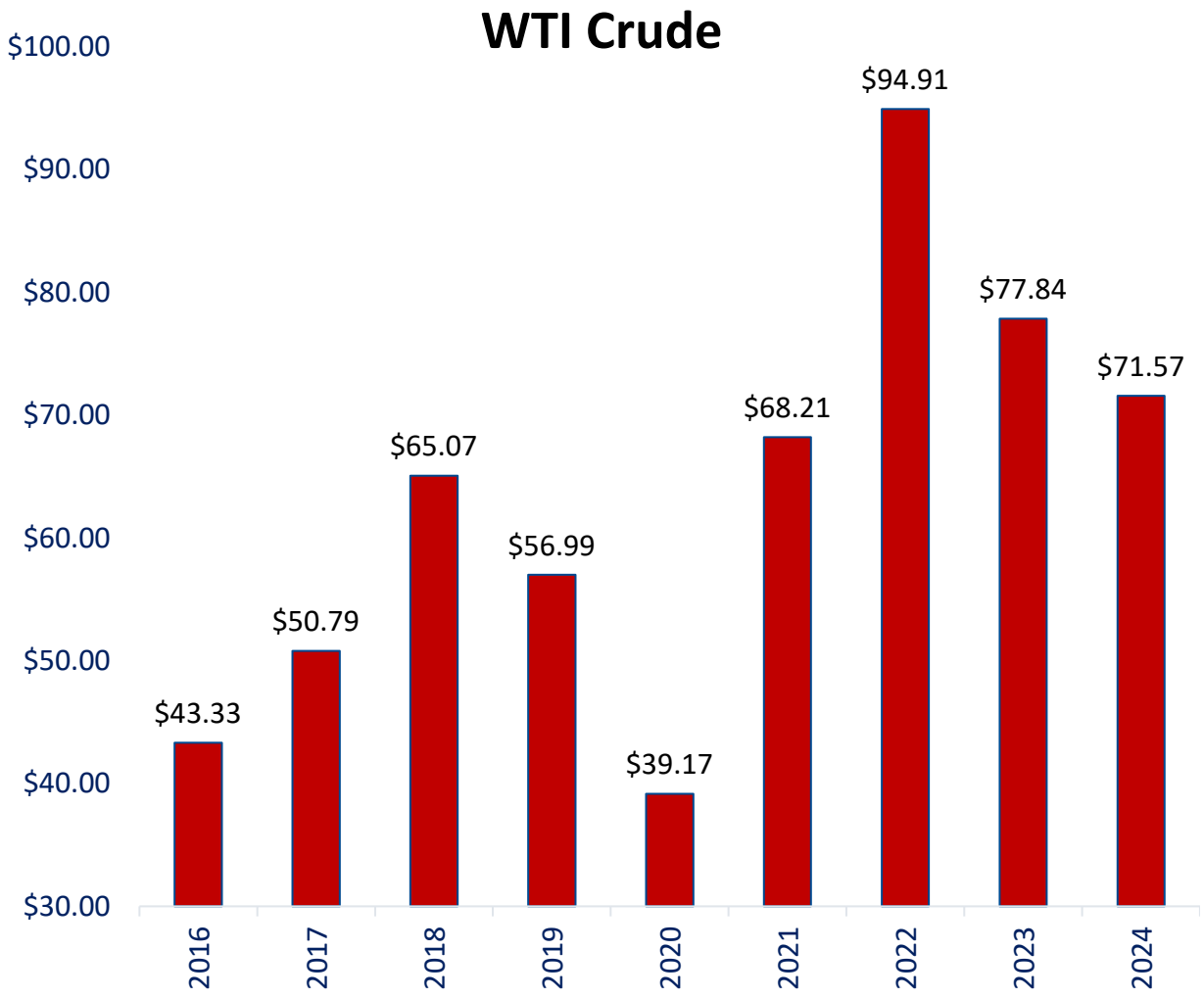
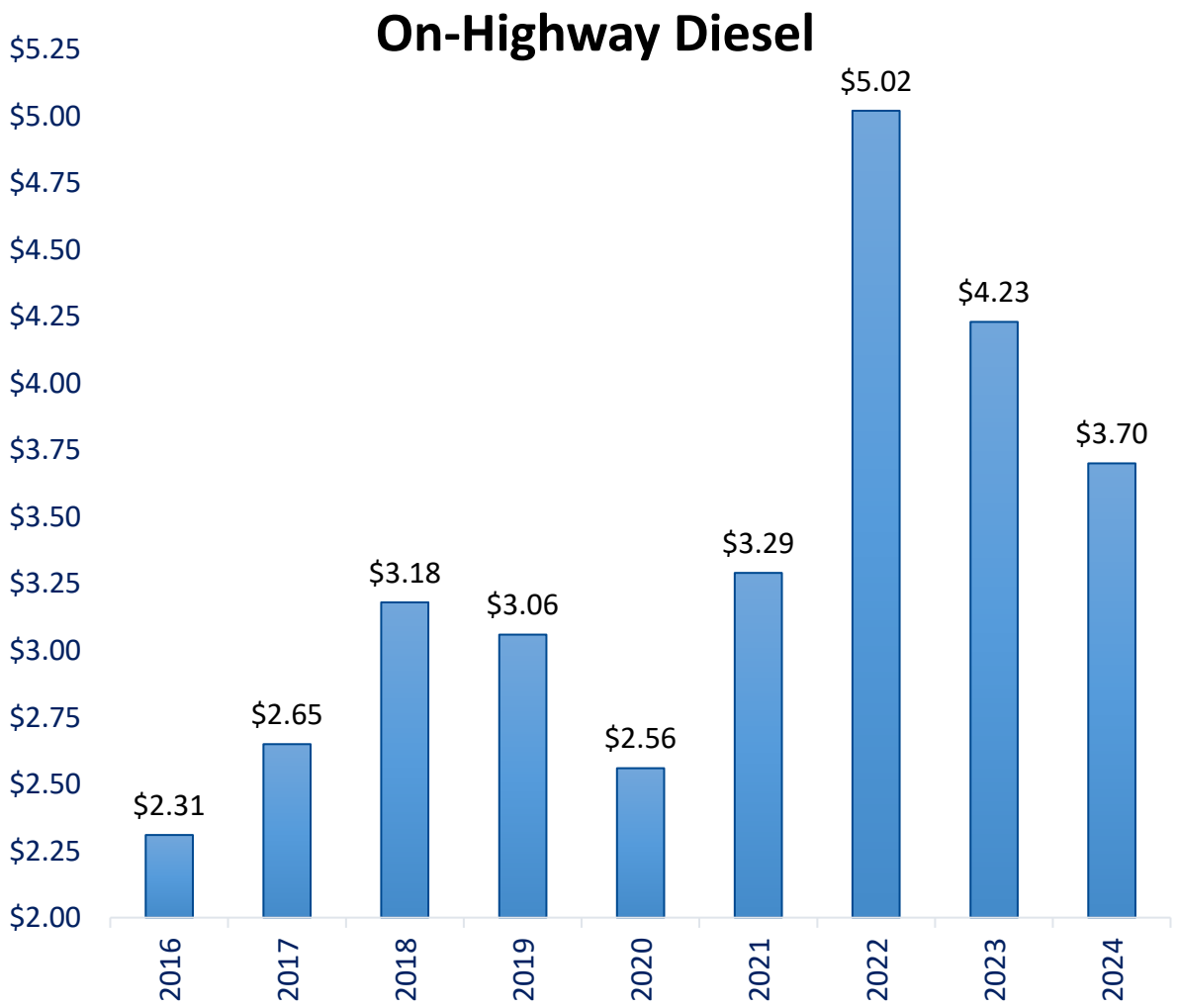
Fuel Prices & Forecasts





Source: Energy Information Administration

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Other Fleet Costs

- Insurance premiums remain very high
- New equipment costs have surged
- Maintenance costs are up
- Other non-driver labor costs are rising fast

Truck Parking Shortage

- 98% of truck drivers experienced difficulty finding a safe place to park in 2019, up from 75% in 2015
- Drivers park in unauthorized/unsafe locations: ramps, shoulders, parking lots with no security, inadequate lighting
- Difficult to recruit and retain drivers, especially women
- Causes a loss of productivity
  - Truck drivers give up an average of 56 minutes of available drive time per day
  - $5,500 in direct lost compensation—or a 12% cut in annual pay
- Local bans on parking in driveways or residential streets

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Truck Parking Shortage: Solutions

- Federal funding: Almost the entire federal-aid highway formula program and several grant programs
  - FHWA issued recent guidance
- Real-time parking information systems
- NIMBY/zoning laws prevent new or expanded truck stops
- Review local parking restrictions

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Trucking's Top 10
The View from the Road

Jeff Short

Vice President

American Transportation Research Institute

ATRI

Trucking industry's not-for-profit research organization

- Safety
- Mobility
- Economic Analysis
- Technology
- Environment

www.TruckingResearch.org

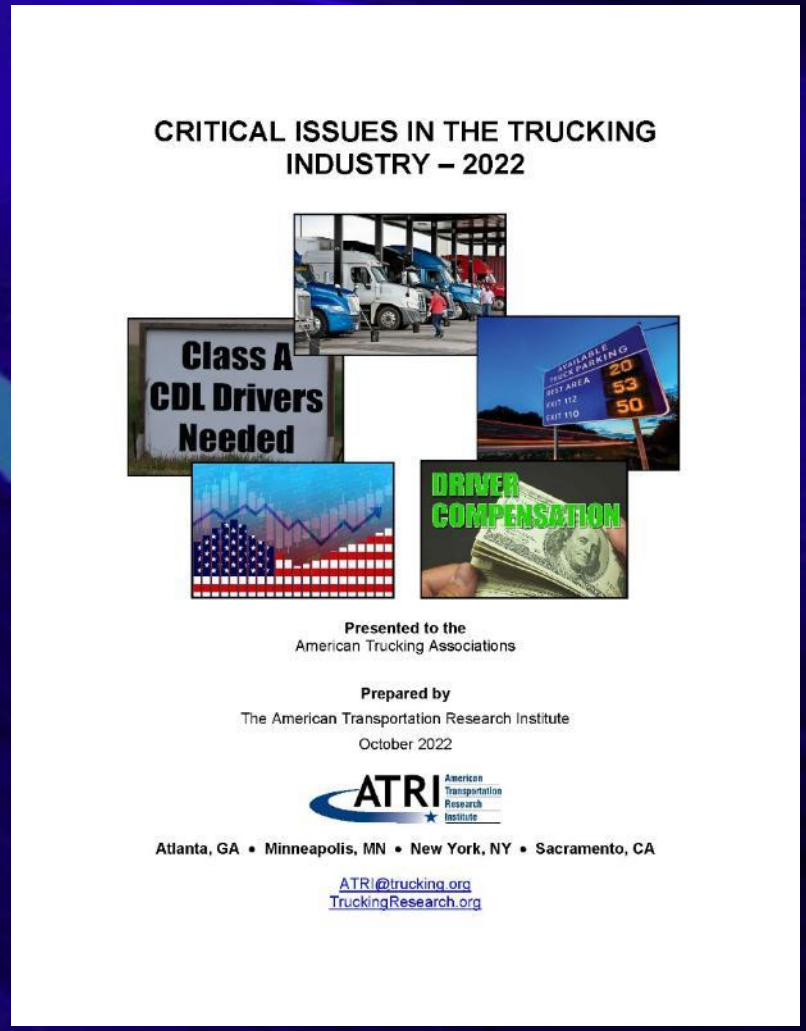
ATRI American Transportation Research Institute

Board of Directors

Research Advisory Committee

2022 Top Industry Issues

1. **Fuel Prices (#8 in 2013)**
2. **Driver Shortage (1)**
3. **Truck Parking (5)**
4. **Driver Compensation (3)**
5. **Economy (#8 in 2020)**
6. **Detention / Delay at Customer Facilities (7)**
7. **Driver Retention (2)**
8. **Compliance, Safety, Accountability (6)**
9. **Speed Limiters**
10. **Lawsuit Abuse Reform (4)**



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2022 Top Industry Issues

Rank	Commercial Drivers	Motor Carriers
1	Truck Parking	Driver Shortage
2	Fuel Prices	Driver Retention
3	Driver Compensation	Fuel Prices
4	Detention / Delay at Customer Facilities	Compliance, Safety, Accountability
5	Speed Limiters	Economy
6	Economy	Lawsuit Abuse Reform
7	HOS Rules	Insurance Cost / Availability
8	ELD Mandate	Diesel Technician Shortage
9	Driver Training Standards	Detention / Delay at Customer Facilities
10	Transportation Infrastructure / Congestion / Funding	Truck Parking

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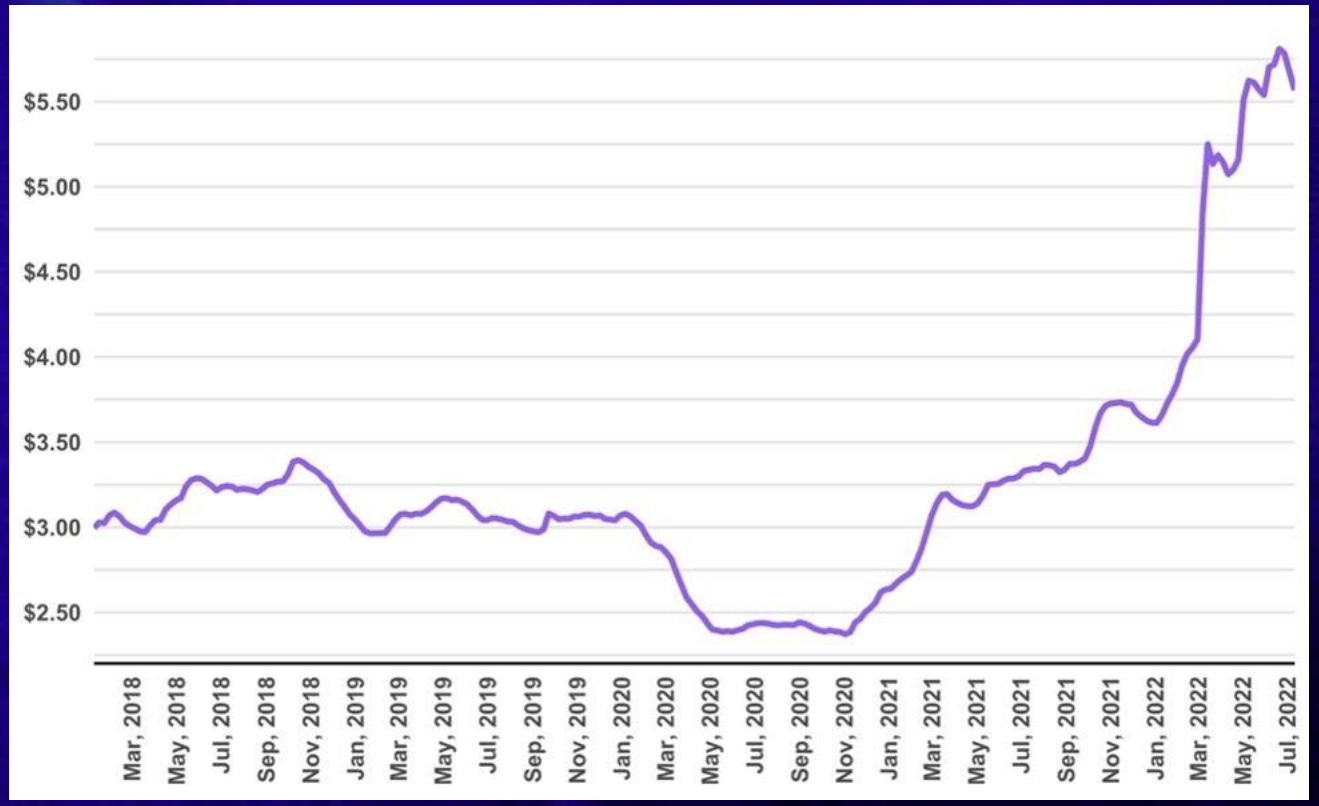
Fuel Prices

- Back in the top 10 for the first time since 2013
- Top-ranked issue among Owner-Operator respondents
- ATRI's Ops Costs research documented increase of 35.4% from 2020 to 2021



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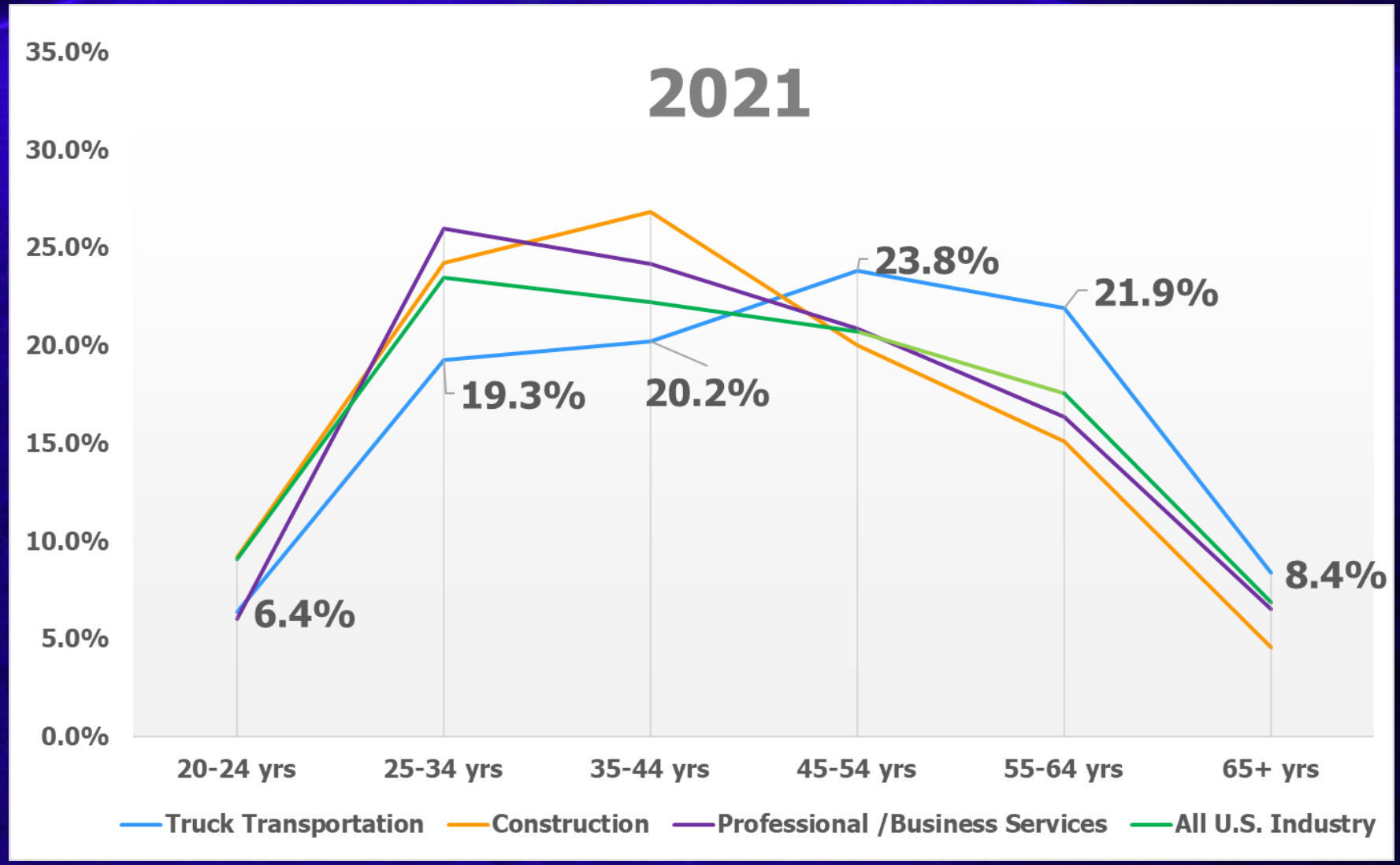
Truck Driver Age Demographics



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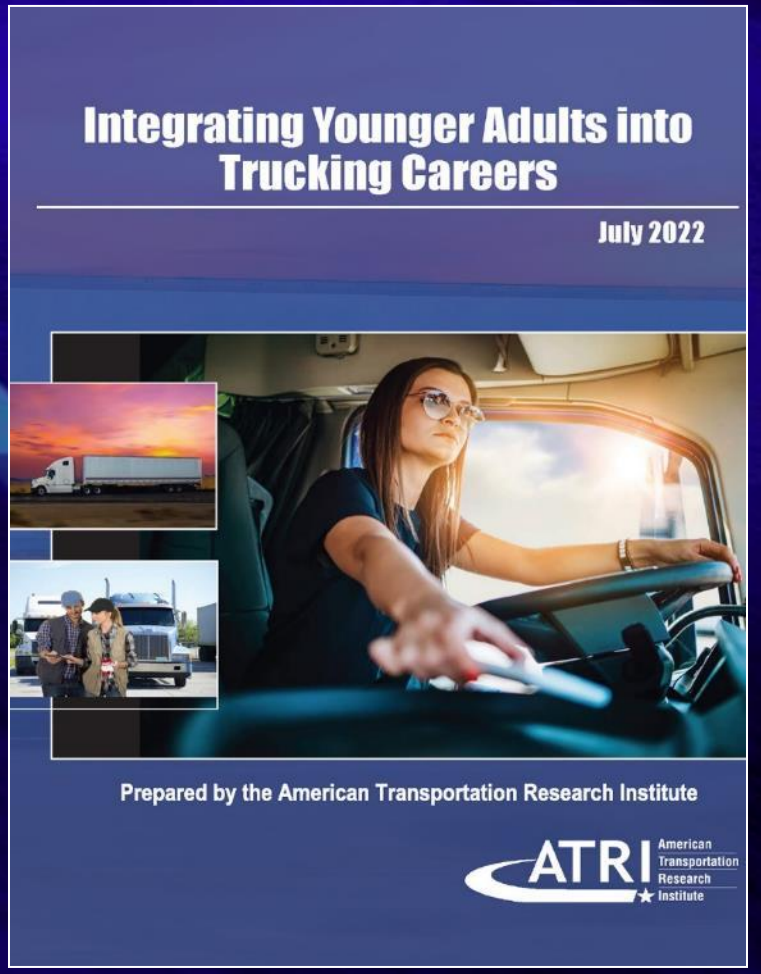
Integrating Younger Adults into Trucking Careers

- Top RAC priority in 2021
- Examines best practices for recruiting, training, retaining younger adults
- Research included younger driver interviews, motor carrier case studies and survey



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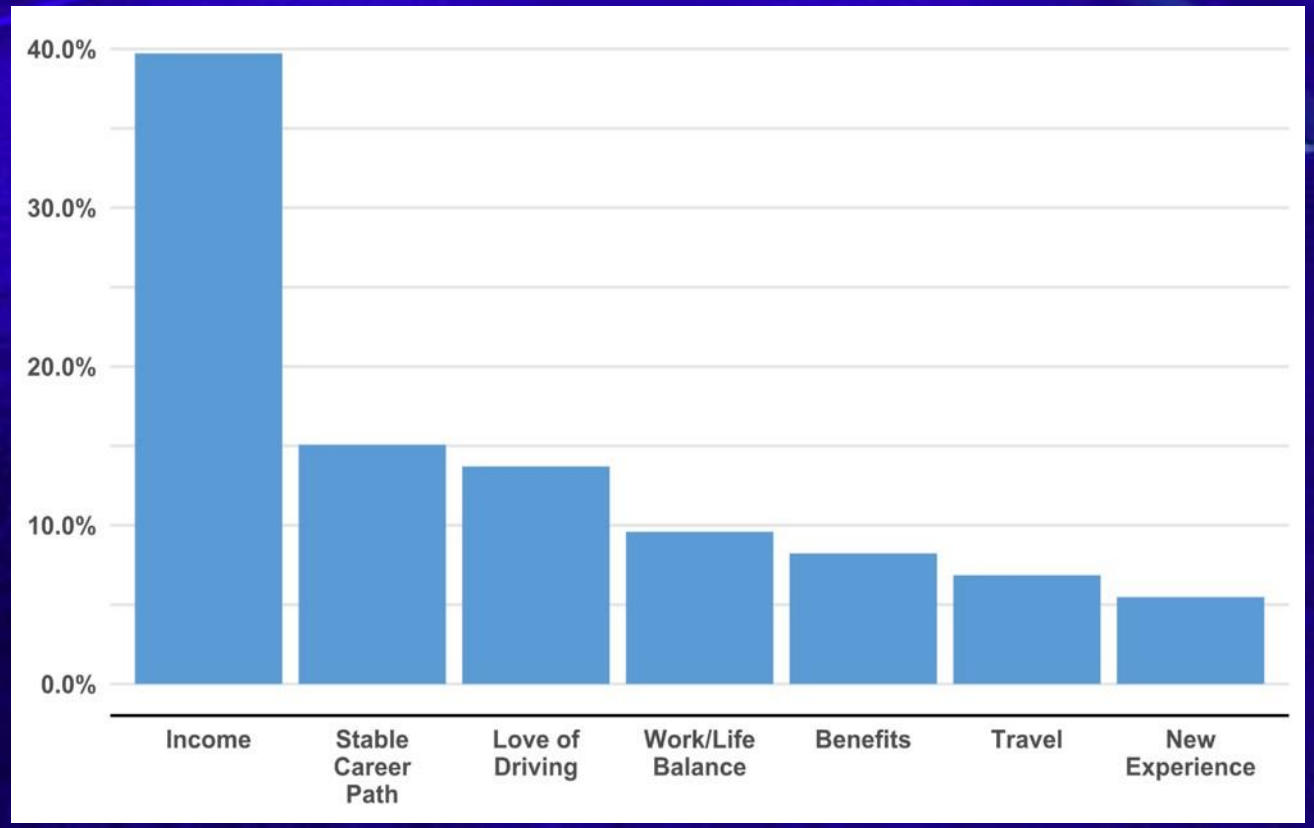
Younger Employee Recruitment



Top Factors Motivating Younger Drivers to Choose Trucking

- Pay is important, but it isn't everything: 60% of younger drivers say another factor was equally or more important
- 84% of younger drivers consider company culture important
- Accessible, transparent promotional materials directed at younger adults help potential employees discover and understand the industry

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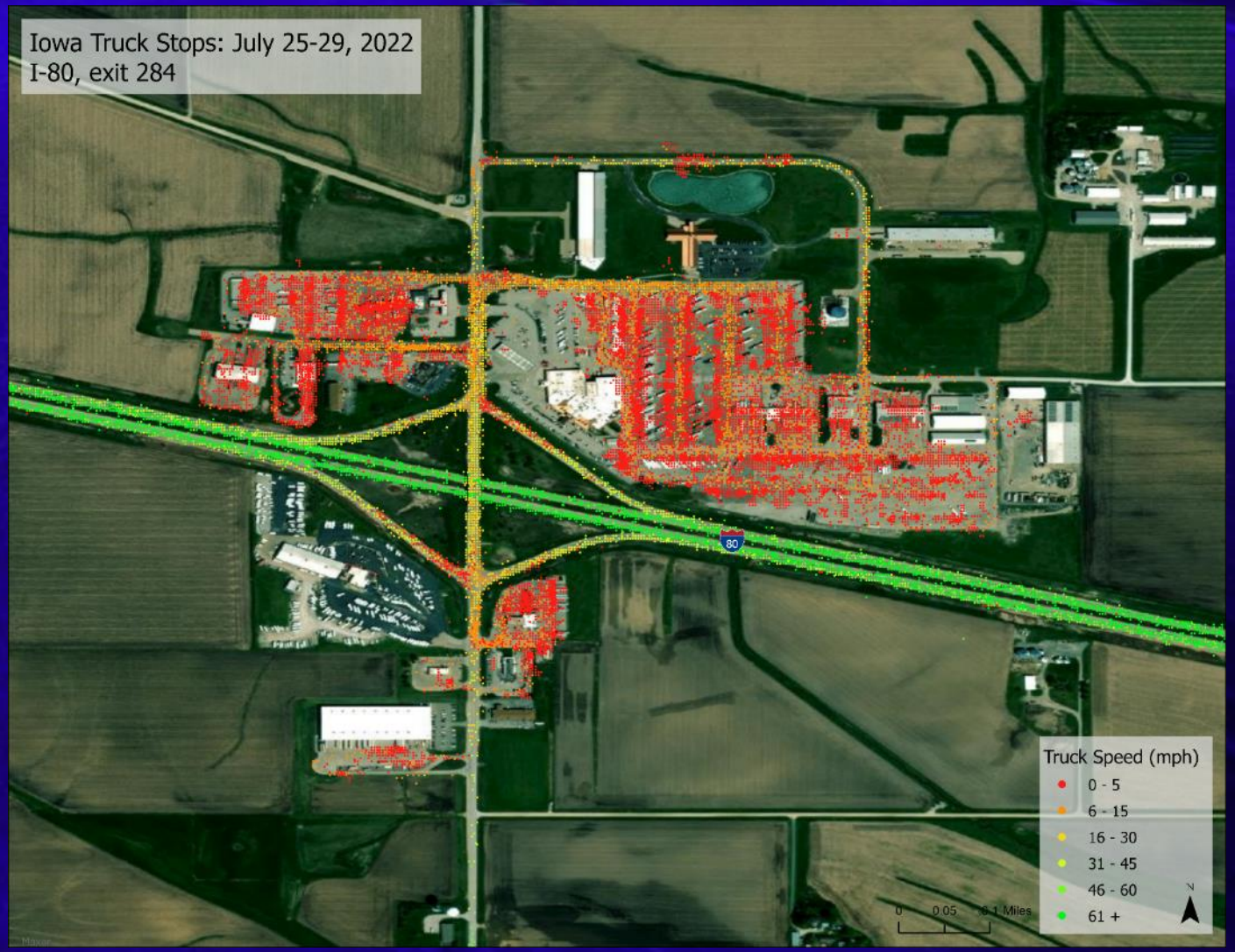
No Vacancy



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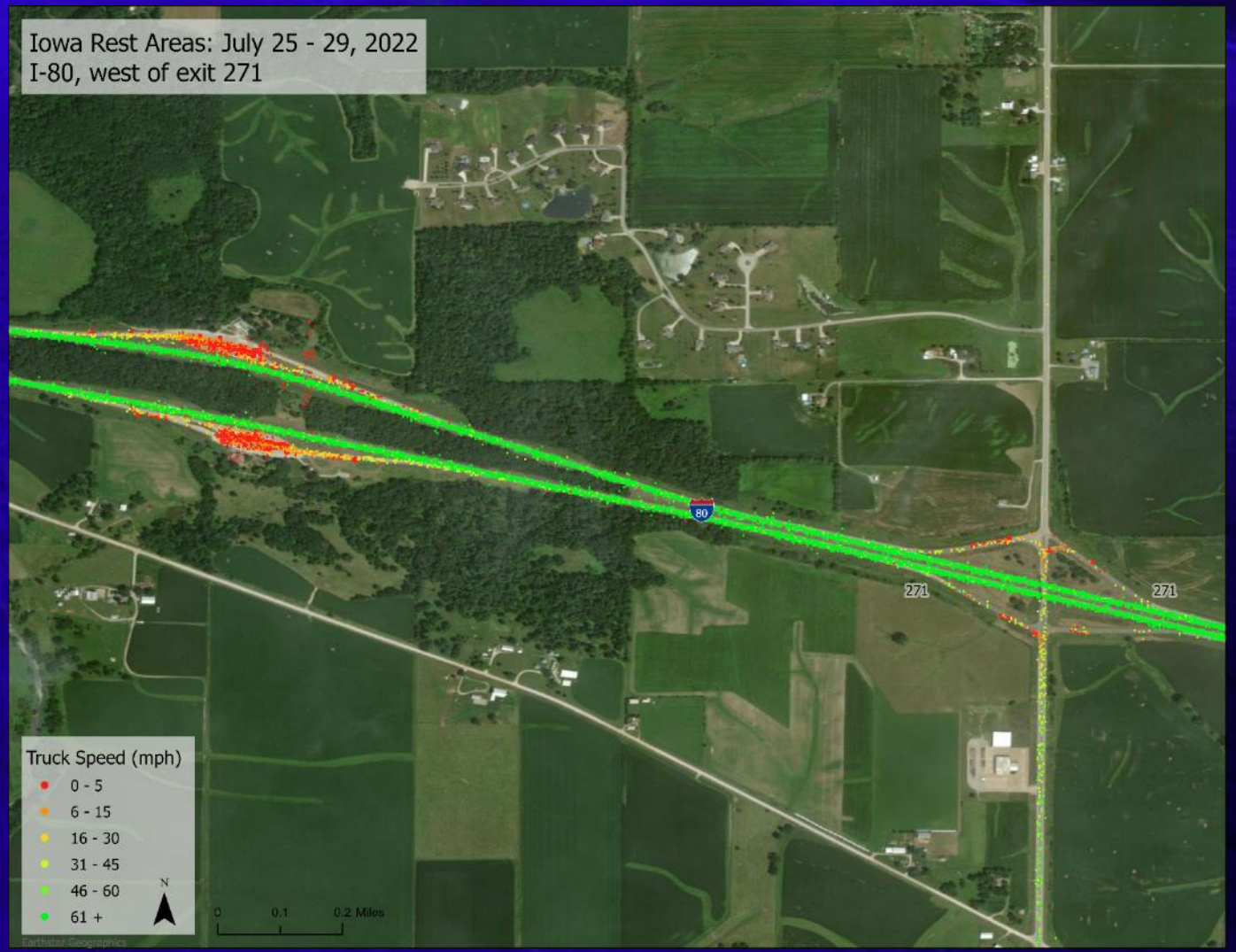

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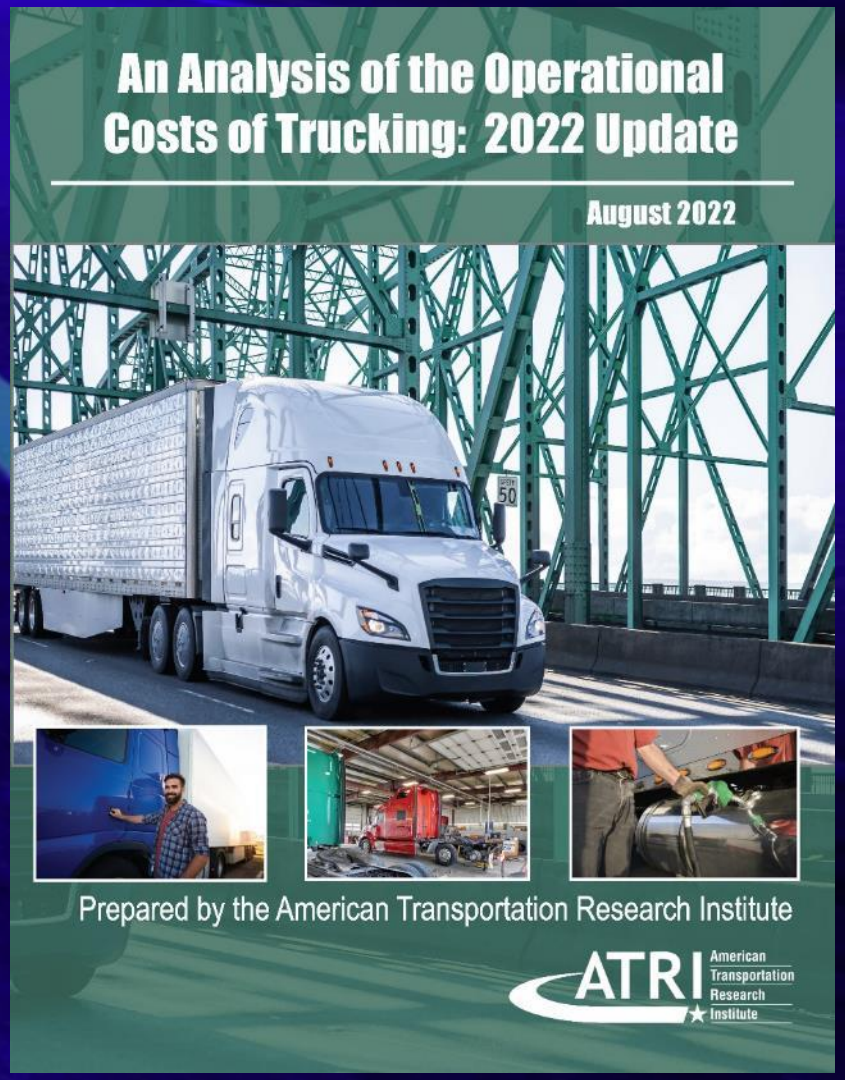
Operational Costs of Trucking

- Collects and analyzes real-world motor carrier operational data
- Covers data 2008-2021
- Calculates costs by mile and by hour
- Includes sector, regional analyses
  - TL, LTL, Specialized/Other
  - Small vs Large Fleets



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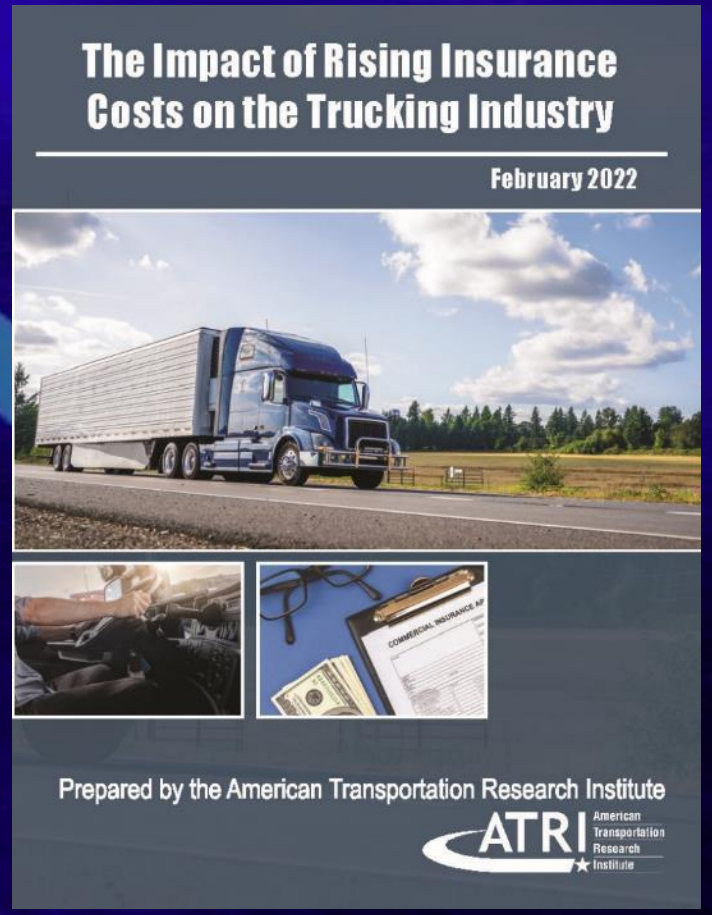
The Impact of Rising Insurance Costs on the Trucking Industry

- ATRI Ops Costs documented multiple years of substantial insurance cost growth
- RAC identified as top priority in 2020 to provide a more granular analysis of insurance costs
- Data collected from motor carriers and insurers



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Insurance Costs Over Time

Premium cost per mile up 47% over the last 10 years

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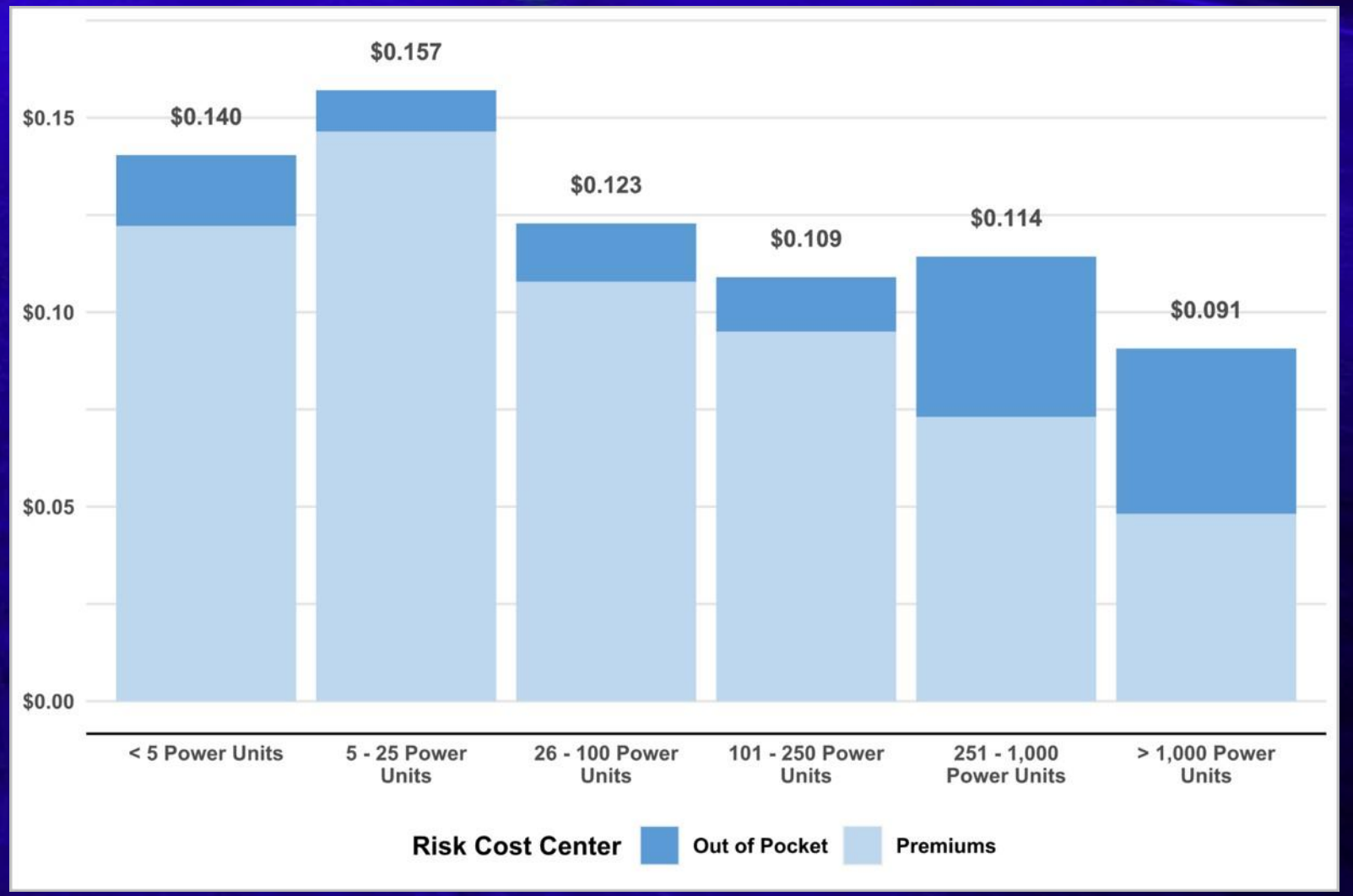
Insurance Cost Impacts by Fleet Size



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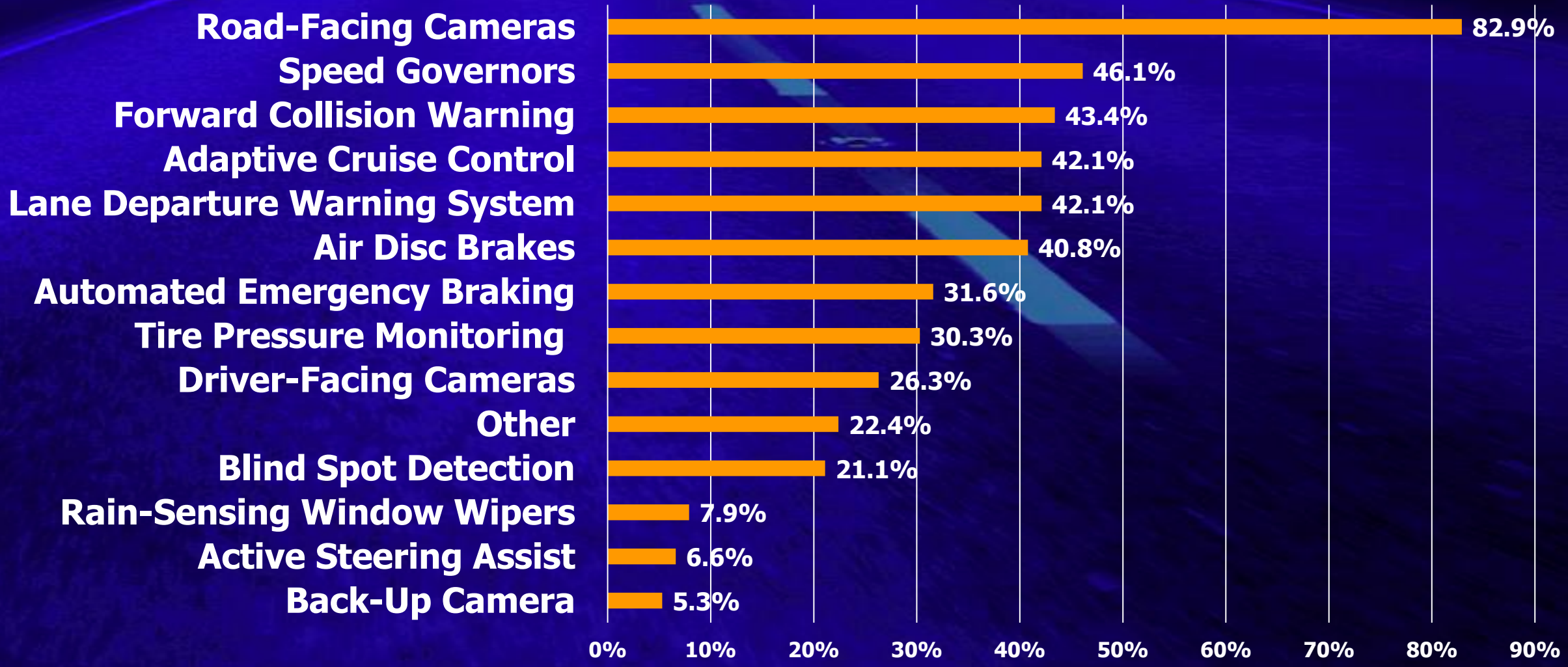
Safety Technology Deployment 2018 - 2020



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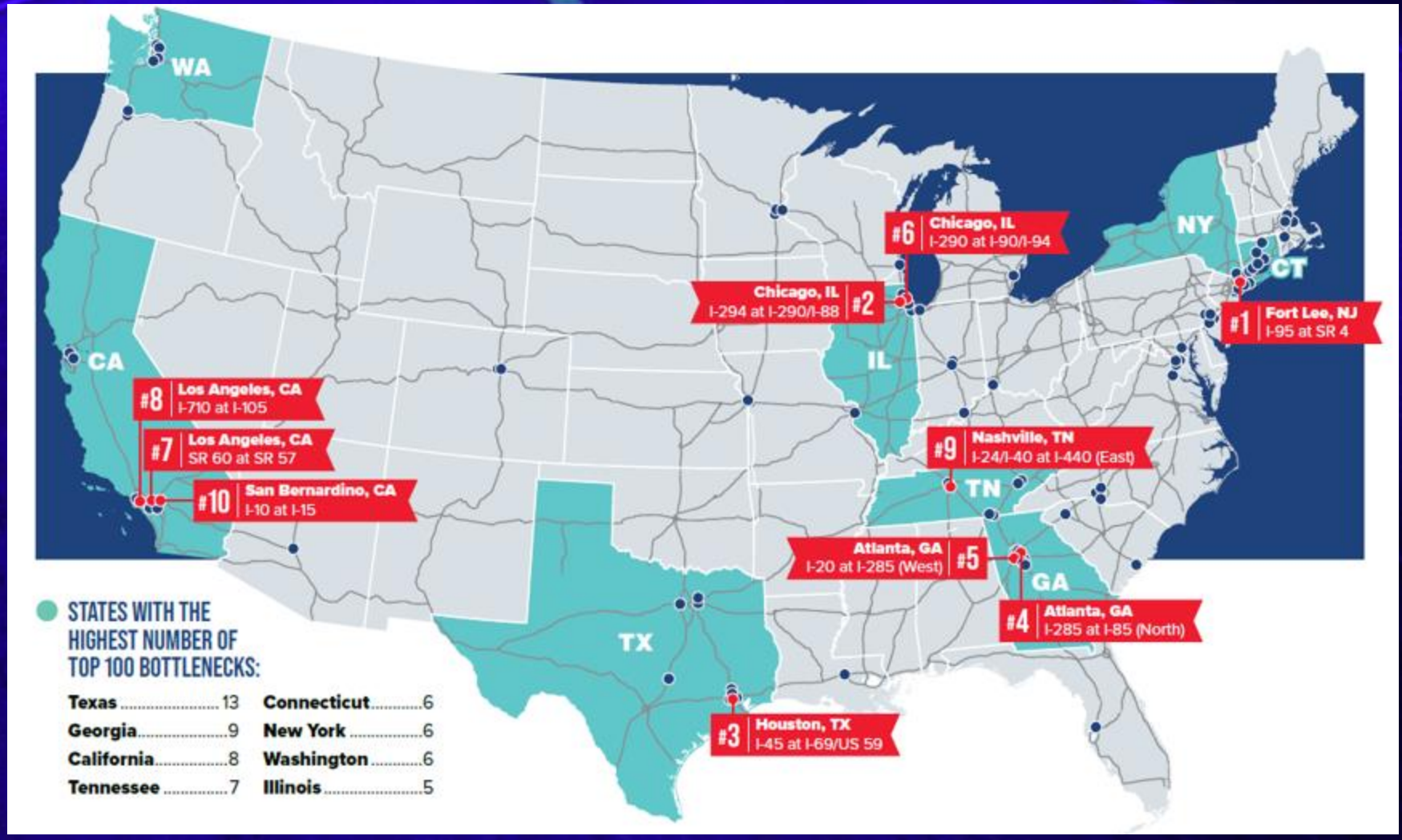
2023 Top Truck Bottlenecks



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2023 Top 10 Truck Bottlenecks

Rank	Location	Average Peak Speed	Y-o-Y Change in Average Peak Speed
1	Fort Lee, NJ: I-95 at SR 4	20.2	-9.9%
2	Chicago, IL: I-294 at I-290/I-88	37.8	-5.9%
3	Houston, TX: I-45 at I-69/US 59	21.7	-11.0%
4	Atlanta, GA: I-285 at I-85 (North)	28.5	-6.2%
5	Atlanta, GA: I-20 at I-285 (West)	36.3	-2.6%
6	Chicago, IL: I-290 at I-90/I-94	18.2	-10.3%
7	Los Angeles, CA: SR 60 at SR 57	35.7	-3.1%
8	Los Angeles, CA: I-710 at I-105	28.5	-32.6%
9	Nashville, TN: I-24/I-40 at I-440 (East)	30.6	-12.5%
10	San Bernardino, CA: I-10 at I-15	34.1	-4.6%

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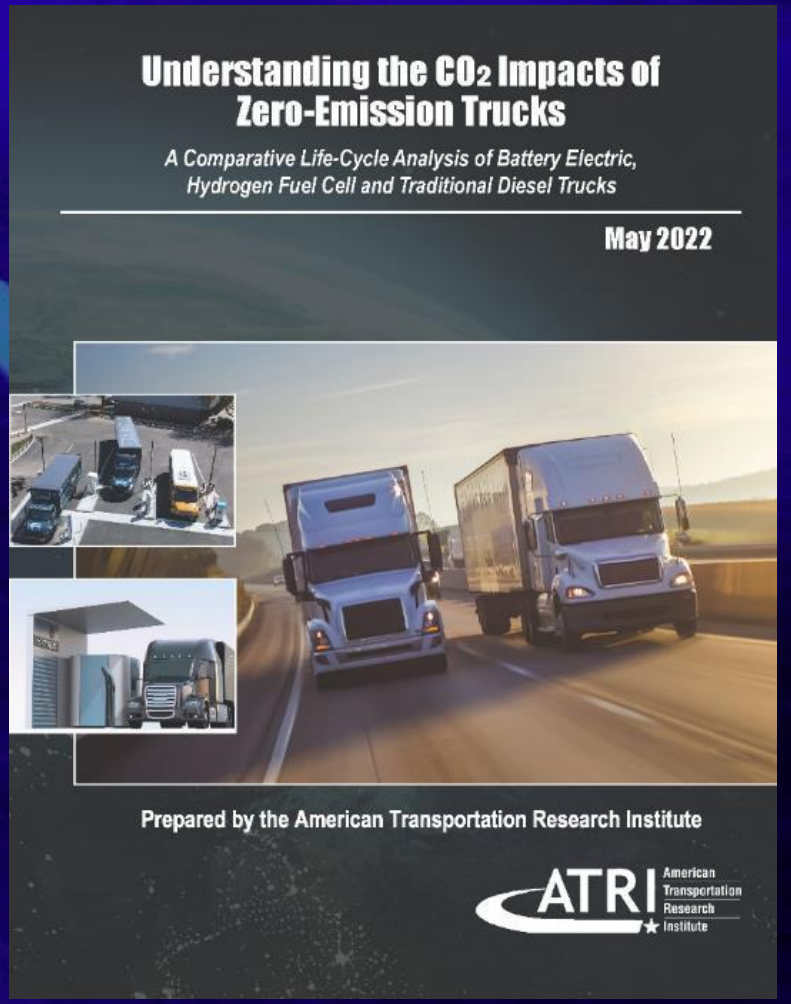
Understanding the CO_2 Impacts of Zero-Emission Trucks

- Life-cycle CO_2 emissions study for:
  - Internal combustion engine (ICE) trucks powered by diesel
  - Battery electric vehicle (BEV) trucks powered by electricity
  - Fuel cell electric vehicle (FCEV) trucks powered by hydrogen
- Compares CO_2 emissions across from the full vehicle life-cycle:
  - Vehicle production
  - Energy production and consumption
  - Vehicle disposal/recycling



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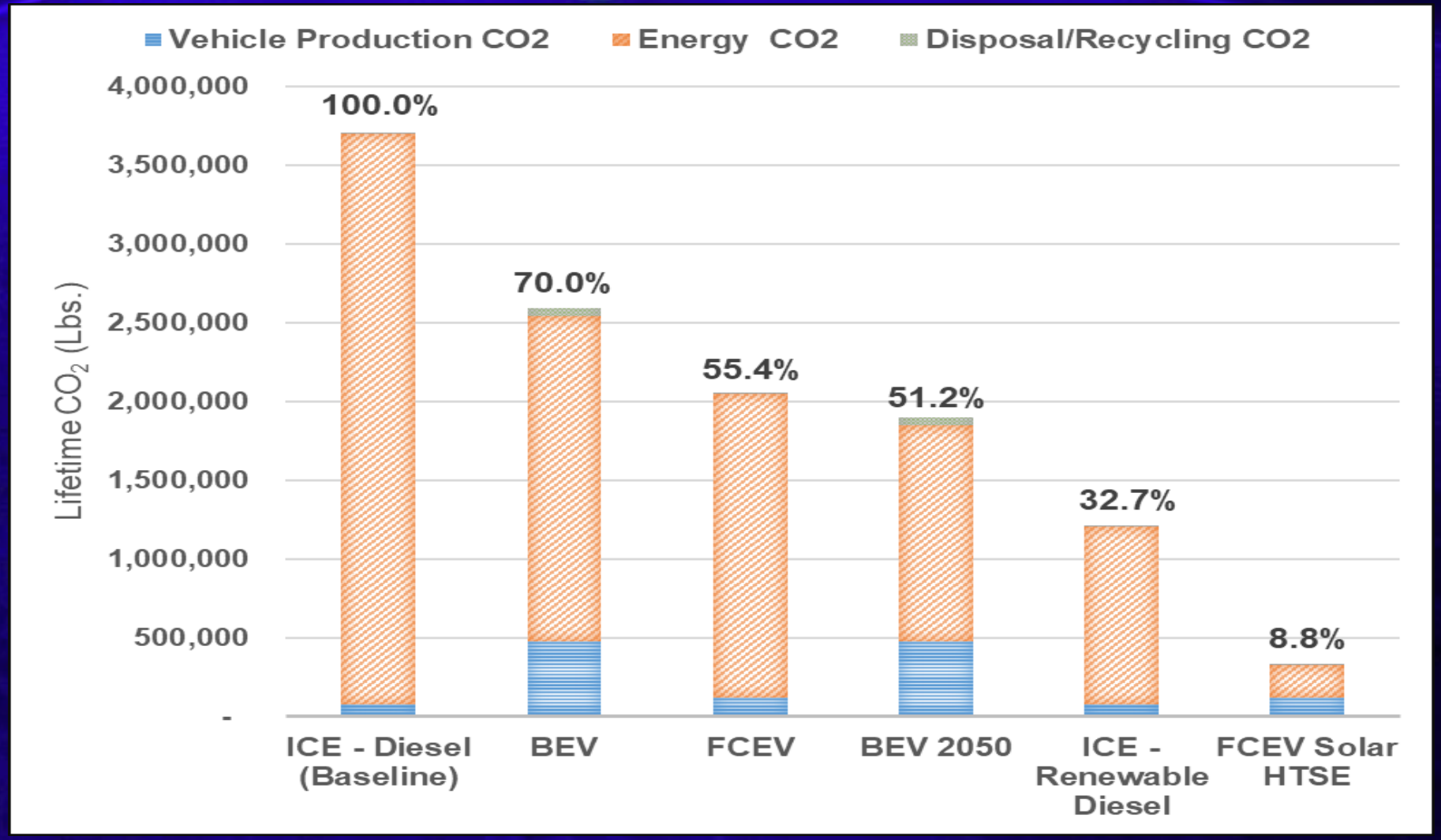
Key Findings



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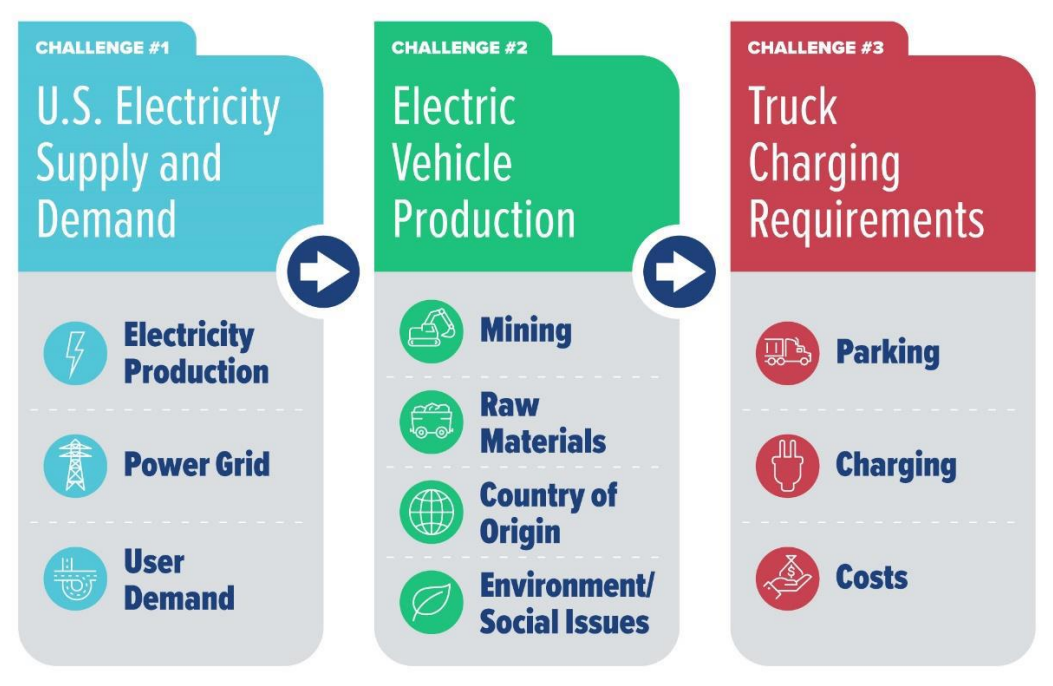
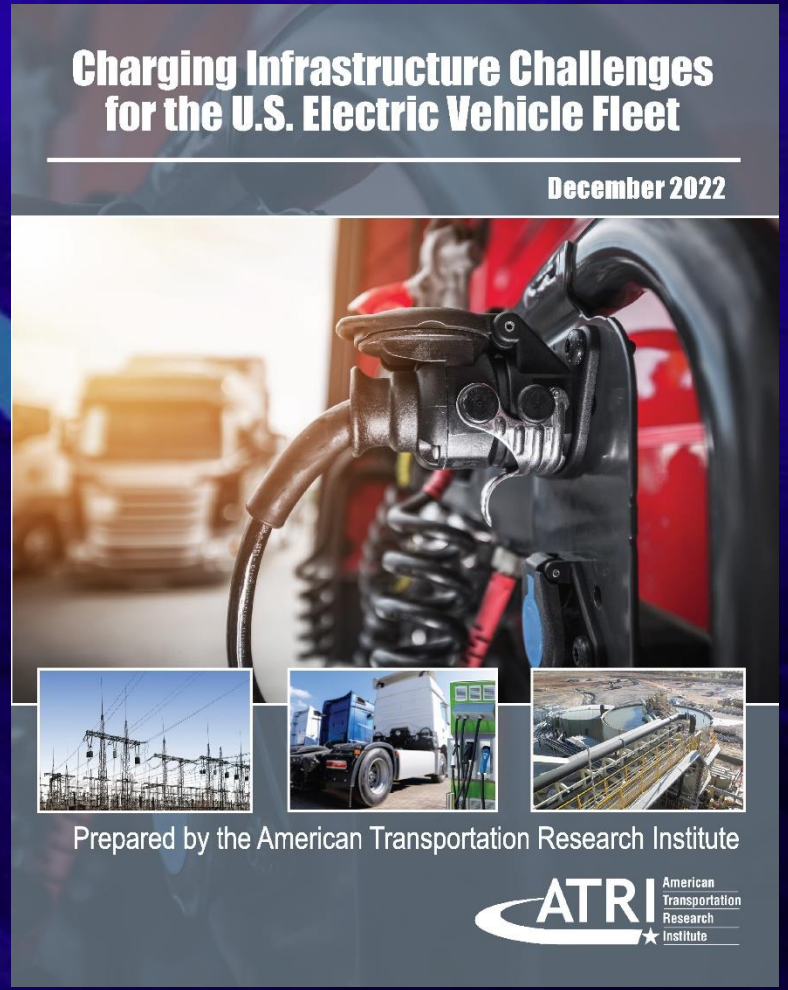
Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet

- **Analysis of three distinct challenges for EVs – with a focus on trucking**





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U.S. Electricity Supply and Demand

- **U.S. Vehicle Fleet**
  - **Autos: >253 million cars/light duty trucks**
    - **Electricity Needs: 1,039.9 billion kWh representing 26.3% of total U.S. consumption**
  - **Trucks: >12 million medium- and heavy-duty trucks**
    - **Electricity Needs: 553.5 billion kWh representing 14% of U.S. consumption**
    - **10.6% for 2.95 million combo trucks**
  - **Total: 1,593.8 billion kWh representing 40.3% of U.S. consumption**

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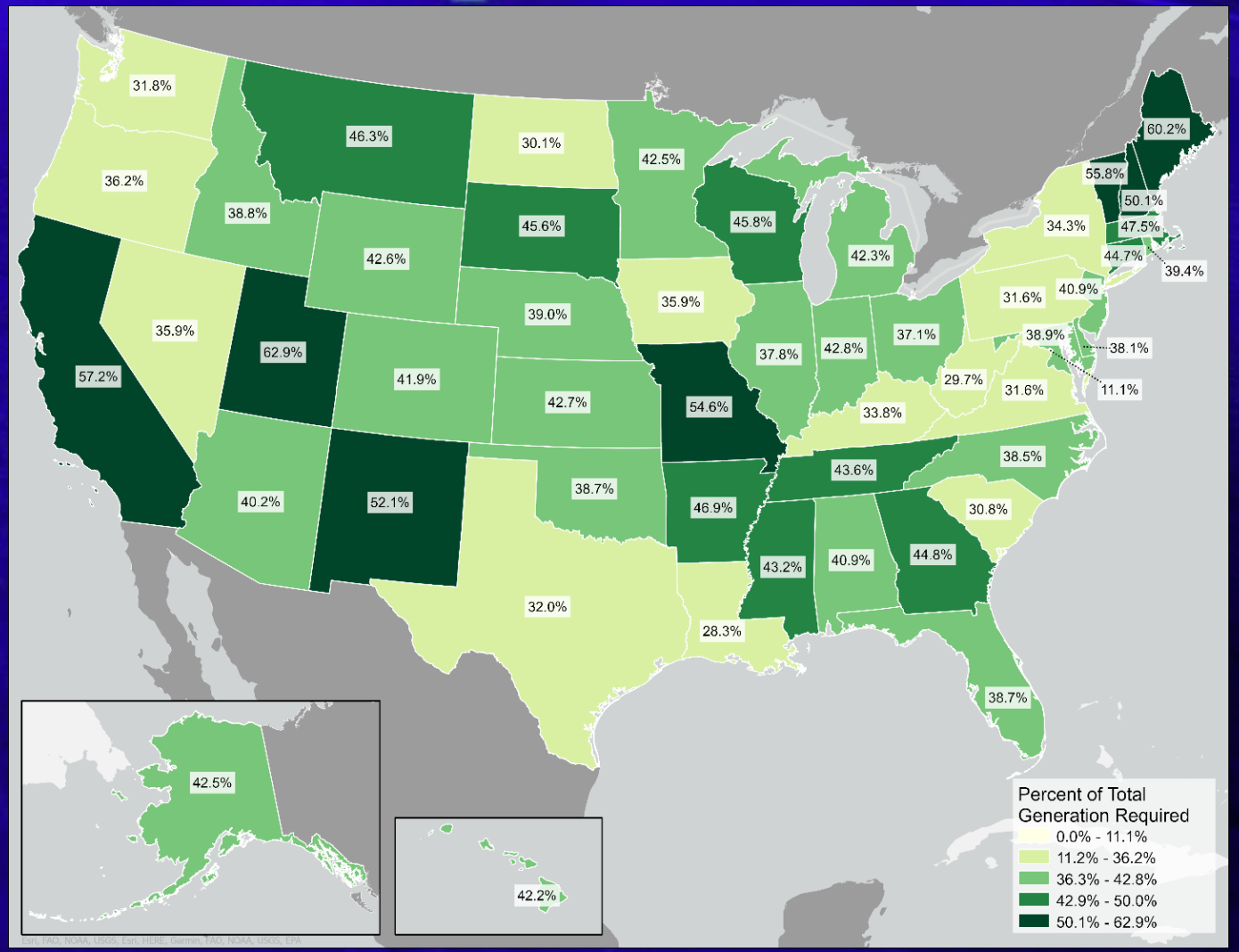
U.S. Electricity Supply and Demand



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Electric Vehicle Production

- **Electric battery materials are the central issue**
  - **Mining: Cobalt, Graphite, Lithium, Nickel**
    - Project cost/lead time
    - Energy use and emissions (pollution and CO_2)
    - Geopolitical and social issues
  - **Refining of raw materials**
    - Heating, cooling, corrosive chemical reactions, mostly done in China
  - **Transportation sector requires staggering amount of these materials**

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Electric Vehicle Production: Annual Mining

	Rank	Country	Production (Tons)	Percent of Total Production
Cobalt	1	Congo (Kinshasa)	132,277	70.6%
	2	Russia	8,378	4.5%
	3	Australia	6,173	3.3%
Graphite	1	China	903,894	82.0%
	2	Brazil	74,957	6.8%
	3	Mozambique	33,069	3.0%
Lithium	1	Australia	60,627	55.0%
	2	Chile	28,660	26.0%
	3	China	15,432	14.0%
Nickel	1	Indonesia	1,102,310	37.0%
	2	Philippines	407,855	13.7%
	3	Russia	275,578	9.3%

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Electric Vehicle Production: Known Reserves

	Rank	Country	Reserves (Tons)	Percent of Total Reserves
Cobalt	1	Congo (Kinshasa)	3,858,085	46.1%
	2	Australia	1,543,234	18.4%
	3	Indonesia	661,386	7.9%
	4	Cuba	551,155	6.6%
	5	Philippines	286,601	3.4%
Graphite	1	Turkey	99,207,900	28.1%
	2	China	80,468,630	22.8%
	3	Brazil	77,161,700	21.9%
	4	Madagascar	28,660,060	8.1%
	5	Mozambique	27,557,750	7.8%
Lithium	1	Chile	10,141,252	41.8%
	2	Australia	6,283,167	25.9%
	3	Argentina	2,425,082	10.0%
	4	China	1,653,465	6.8%
	5	United States	826,733	3.4%
Nickel	1	Australia	23,148,510	23.1%
	2	Indonesia	23,148,510	23.1%
	3	Brazil	17,636,960	17.6%
	4	Russia	8,267,325	8.3%
	5	Philippines	5,291,088	5.3%

Tons of Material Needed versus Global Reserves

	Cobalt	Graphite	Lithium	Nickel
Global Reserves (Tons)	8,377,556	352,739,200	24,250,820	> 100,000,000
Total U.S. Vehicle Fleet Needs	5,396,733	29,586,708	3,842,239	18,807,908
Fleet Needs as a Percent of Known Reserves	64.4%	8.4%	15.8%	< 18.8%

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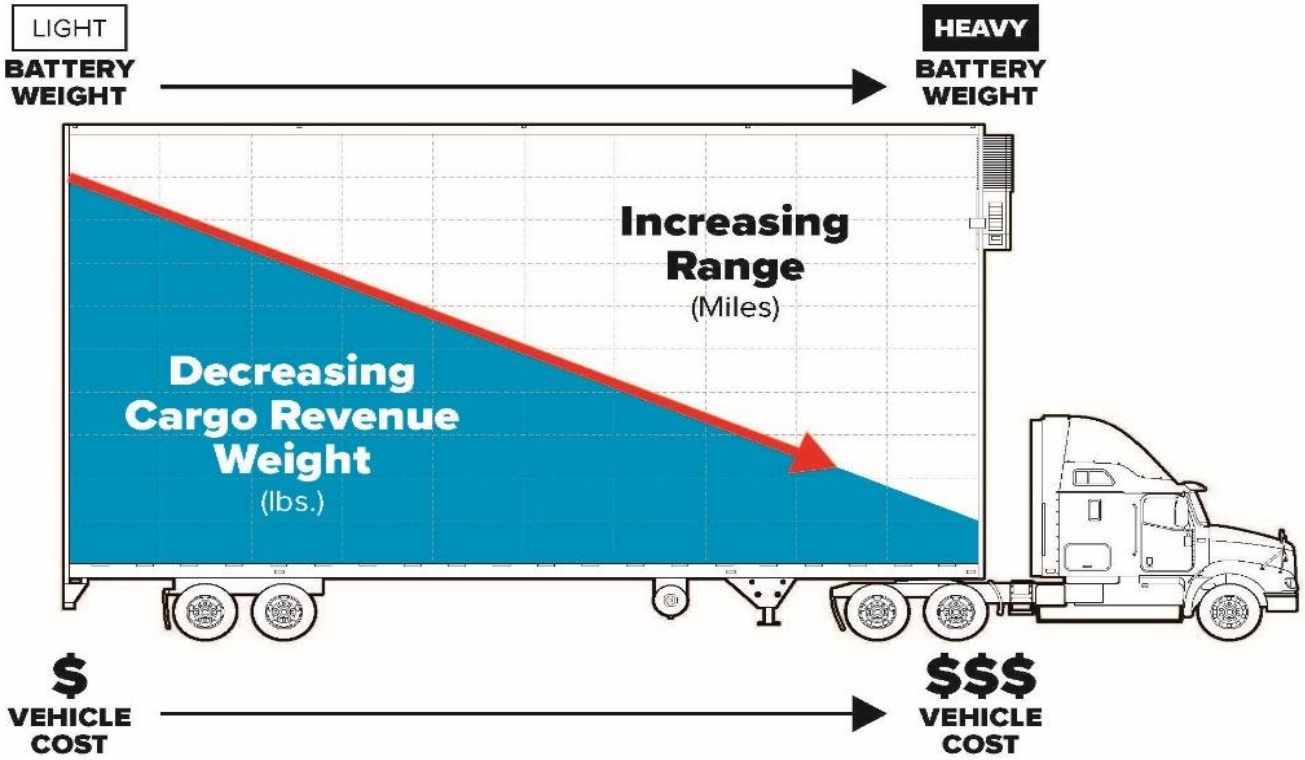
BEV Truck Conundrum



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Long-Haul Truck Charging Requirements

- Truck Charging Availability = Truck Parking Crisis 2.0
- BEV charging impacted by federal hours-of-service rules and parking availability
- At minimum every truck parking space would need a charger – 313,000 spaces
  - Initial equipment, installation costs – $35 billion

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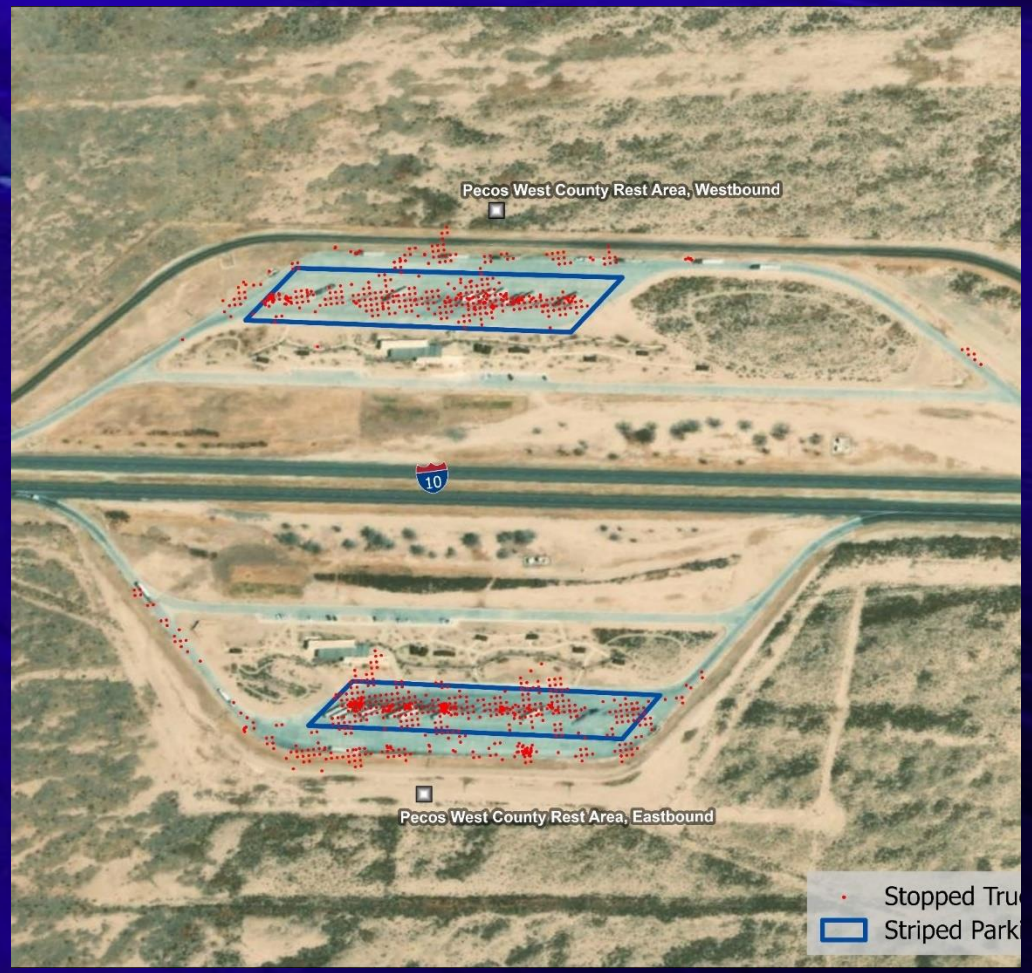
Parking Case Study

- Requires enough daily electricity to power more than 5,000 U.S. households for 126 truck charging events



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Long-Haul Truck Charging

- Using today's trucking and charging requirements, more chargers will be needed than there are parking spaces
- Regardless of advances in battery capacity or charge rates, BEV charging will be limited by HOS and parking availability
- Other barriers include laws preventing commercial charging at public rest areas and the remoteness of many truck parking locations

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ATRI Research on Zero-Emission Vehicles

NEW REPORT!

Understanding the CO_2 Impacts of Zero-Emission Trucks

New research from the American Transportation Research Institute (ATRI) analyzed the environmental impacts of Class 8 zero-emission trucks (ZETs). The research utilized federal and industry-sourced data to identify and compare full life-cycle CO_2 emissions for a range of truck types:

- Internal combustion engine (ICE) trucks powered by diesel
- Battery electric vehicle (BEV) trucks powered by electricity
- Fuel cell electric vehicle (FCEV) trucks powered by hydrogen

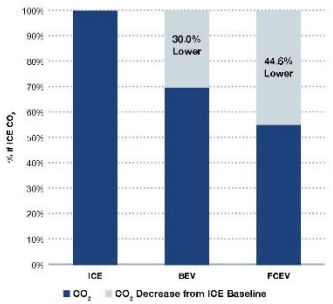
ATRI's analysis compared CO_2 emissions across the full vehicle life-cycle:

- Vehicle production
- Energy production and consumption
- Vehicle disposal/recycling

The study found that full life-cycle CO_2 emissions for the battery electric truck would only generate 30 percent fewer emissions than the standard diesel truck.

The marginal environmental benefits of electric trucks are due, in large part, to lithium-ion battery production – which generates more than six times the carbon of diesel truck production. ATRI's research concludes that hydrogen fuel cell trucks (FCEV) are ultimately the most environmentally friendly truck type, although the technology is not presently feasible for long-haul operations.

Lifetime CO_2 Emissions for Class 8 Diesel Truck (ICE) vs BEV & FCEV



Realities of Zero-Emission Trucks

VEHICLE COST
ZET vehicle costs will be a strong barrier to entry. While a new Class 8 diesel truck tractor may cost roughly $135,000 to $150,000, the purchase price of a new Class 8 BEV can be as much as $450,000. The same issue will likely impact the FCEV. Estimates for fuel cell truck costs range from $200,000 to $600,000 with 60 percent of the overall cost solely credited to the fuel cell propulsion system.

SOURCING OF MATERIALS AND SUPPLY CHAIN ISSUES
There are several key raw materials needed for lithium-ion batteries; depending on the battery chemistry, these might include lithium, graphite, cobalt, manganese and nickel. While these materials are critical for batteries and for the production of a large BEV national fleet, the U.S. is almost entirely dependent on other countries for these materials. Over the past decade, the U.S. has imported nearly 100 percent of the critical minerals needed for battery production from countries including China, Australia, Chile and the Democratic Republic of Congo.

REFUELING INFRASTRUCTURE
There currently is no U.S. network where over-the-road trucks can stop for rest breaks and recharging at the same time. In a forthcoming report, ATRI is documenting the infrastructure requirements of a nationwide truck charging network and the electricity sector's ability to power the U.S. truck fleet.

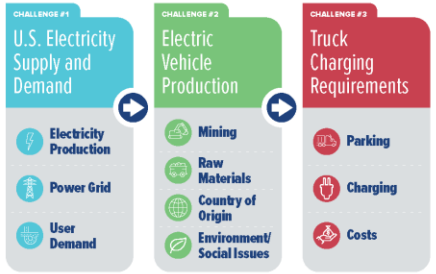
BATTERY LIFE
It is well understood that lithium-ion batteries begin to slowly degrade once the charging and discharging process commences, and battery degradation is greatly influenced by the number of charge cycles. Separate from the number of charging cycles, there is evidence that the *rate* at which a BEV is charged could impact battery life. Because of operational constraints – such as driver hours-of-service – and the large energy capacity of a truck battery, faster charging may be necessary.

NEW REPORT!

Charging Infrastructure Challenges for the U.S. Electric Vehicle Fleet

New research from the American Transportation Research Institute (ATRI) provides an assessment of the infrastructure needs for electrification of the U.S. vehicle fleet, with an emphasis on the trucking industry. This analysis focuses on three infrastructure components that may prove challenging for electrifying the nation's vehicle fleet:

1. U.S. Electricity Supply and Demand
2. Electric Vehicle Production
3. Truck Charging Requirements



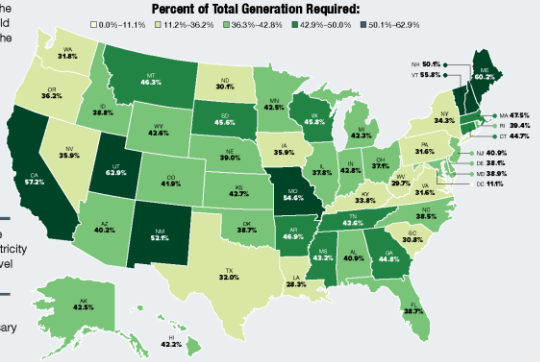
ATRI's research identified key findings in each of these three infrastructure components.

ELECTRICITY NEEDS ARE SIGNIFICANT
Full electrification of the U.S. vehicle fleet would require a large percentage of the country's existing electricity generation including:

- 26.3 percent for passenger cars and trucks
- 14 percent for all freight trucks, including 10.6 percent for long-haul trucks
- 40.3 percent for all vehicles

Some states would need more than 50 percent of current electricity generation to meet vehicle travel needs (see map at right).

Large-scale infrastructure investment would be a necessary precursor to electrification.



Questions?

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February Freight Initiatives Committee

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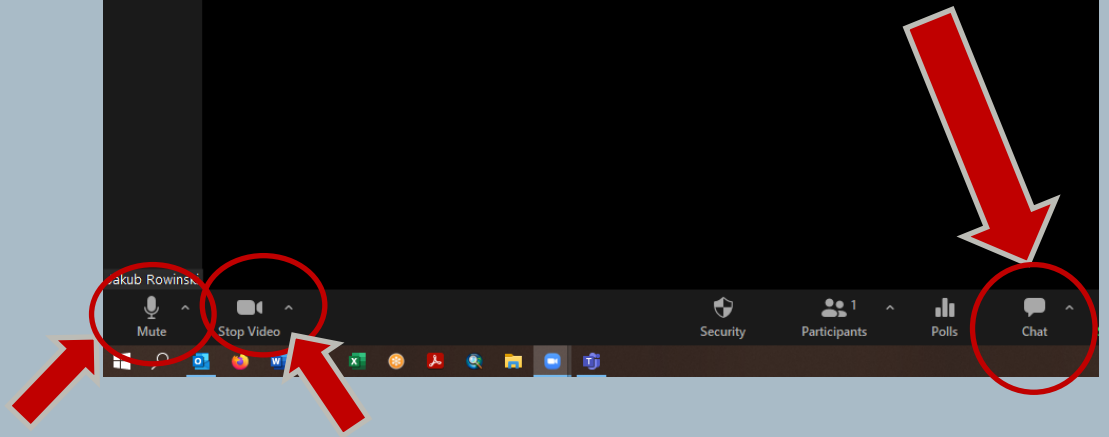

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NJTPA

February Freight Initiatives Committee Agenda

- Roll Call of Members
- Approval of Minutes
- Update on NJTPA Freight Division Activities
- Annual Trucking Industry Update
- Two-Minute Reports on Freight Activities from Committee Members
- Next Meeting: **Monday, April 17, 2023** – Annual Port Industry Update
- Adjournment

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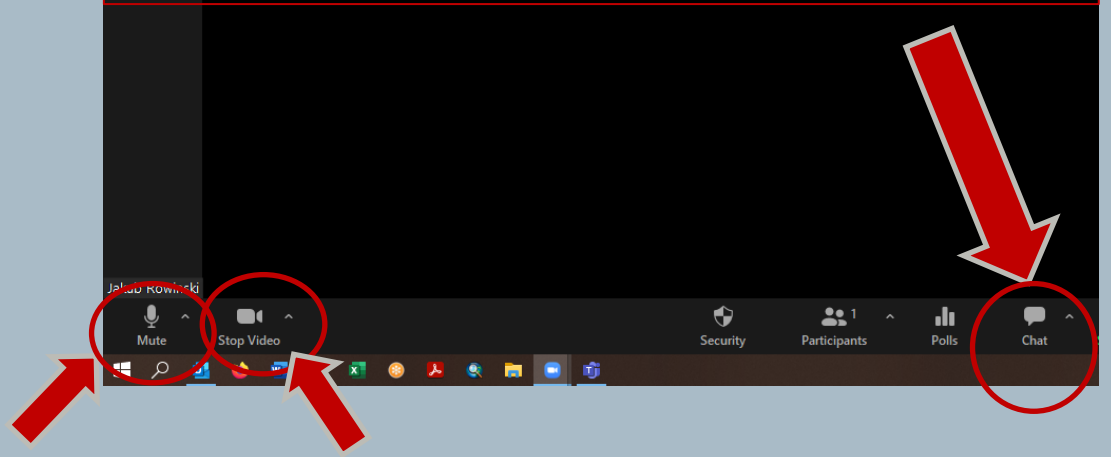

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