Trucking Industry Research Update

Alex Leslie, Ph.D.

Research Associate

American Transportation Research Institute

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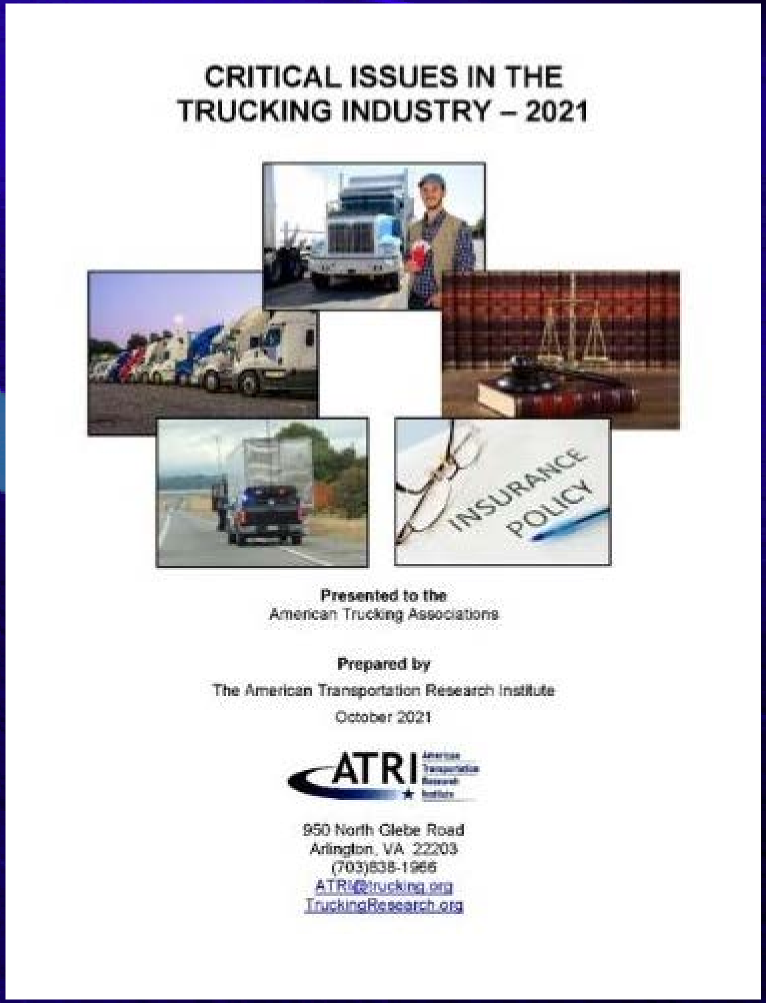
2021 Top Industry Issues

1. Driver Shortage (1)
2. Driver Retention (6)
3. Driver Compensation (2)
4. Lawsuit Abuse Reform (7)
5. Truck Parking (3)
6. Compliance, Safety, Accountability (4)
7. Detention / Delay at Customer Facilities (9)
8. Transportation Infrastructure / Congestion / Funding (#9 in 2019)
9. Insurance Cost / Availability (5)
10. Diesel Technician Shortage


CRITICAL ISSUES IN THE TRUCKING INDUSTRY – 2021

Presented to the
American Trucking Associations

Prepared by
The American Transportation Research Institute
October 2021

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The More Things Change…

2005	2021
1. Fuel Costs	1. Driver Shortage
2. Driver Shortage	2. Driver Retention
3. Insurance Costs	3. Driver Compensation
4. HOS	4. Lawsuit Abuse Reform
5. Tolls / Highway Funding	5. Truck Parking
6. Tort Reform / Legal Issues	6. CSA
7. Overlapping / Burdensome Regulations	7. Detention / Delay at Customer Facilities
8. Congestion	8. Transportation Infrastructure / Congestion / Funding
9. Environmental Issues	9. Insurance Cost / Availability
10. Truck Security	10. Diesel Technician Shortage

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2021 Top Industry Issues

Rank	Commercial Drivers		Motor Carriers
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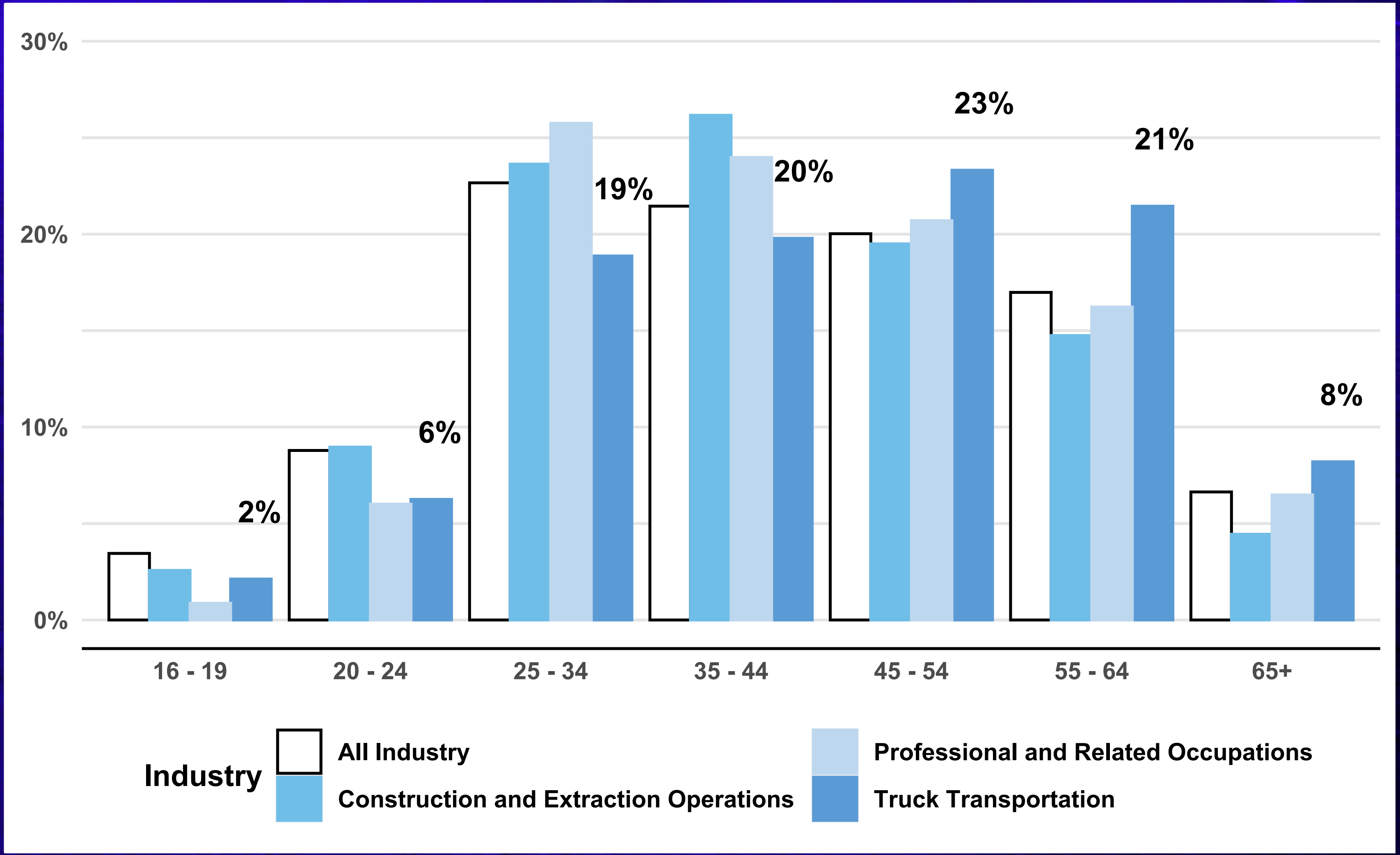
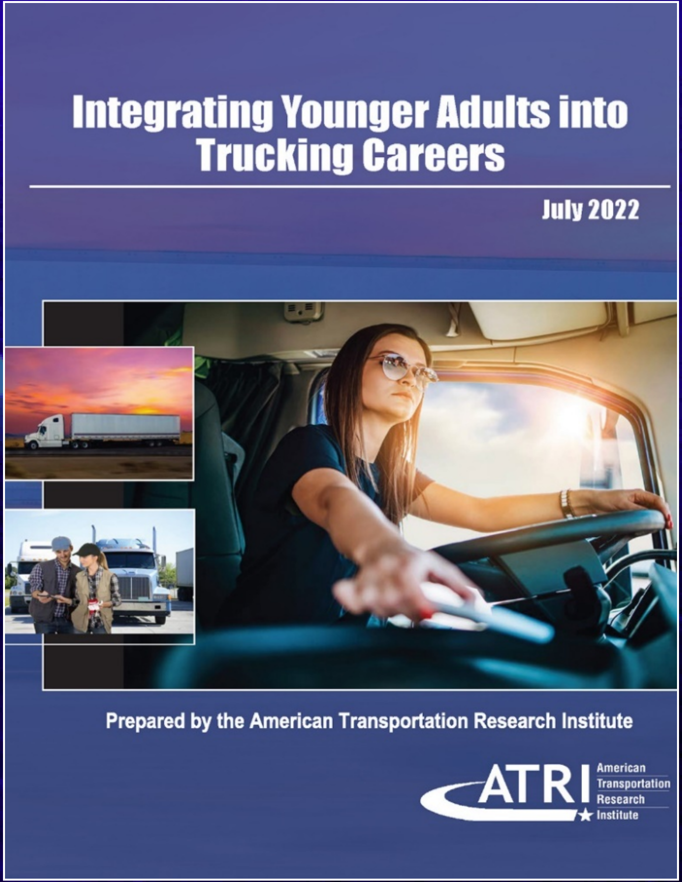
Trucking's Age Demographic Challenge



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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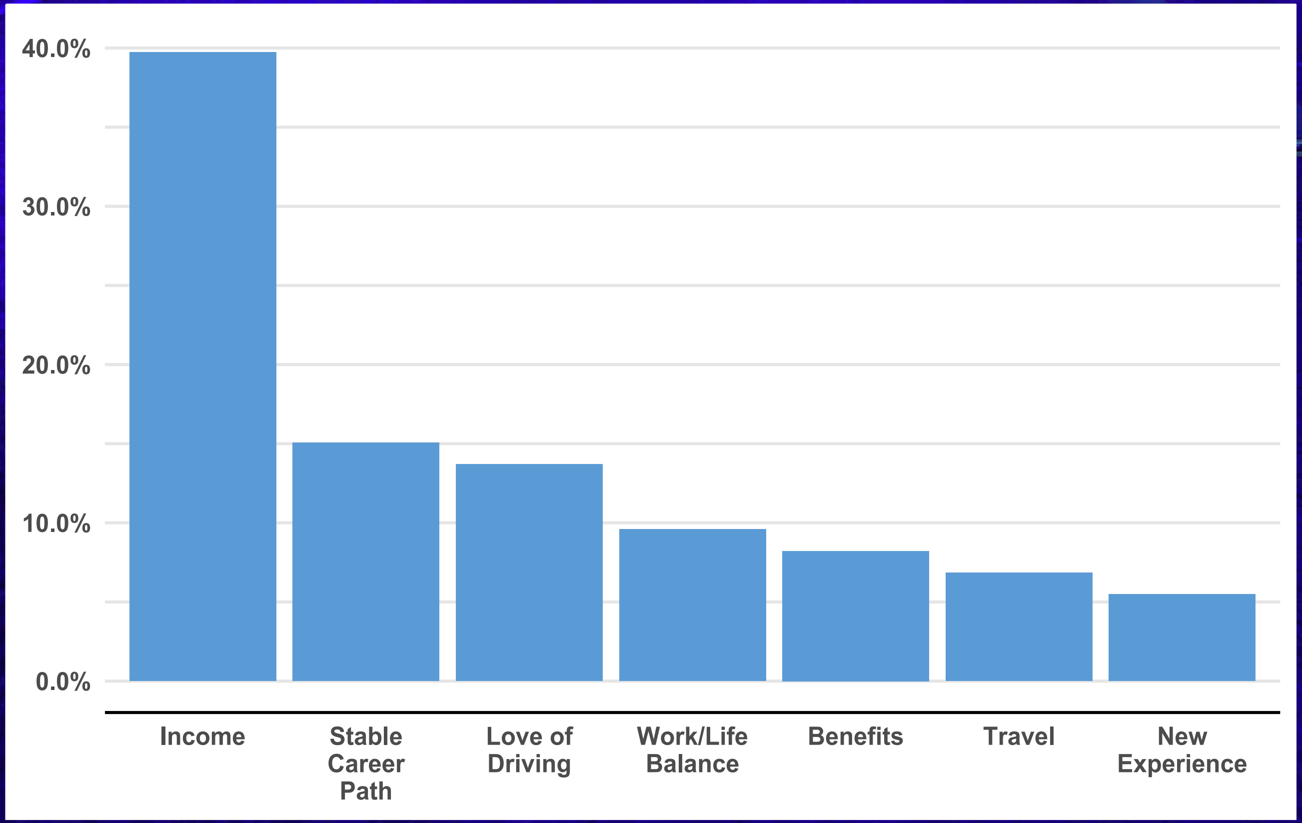
Younger Employee Recruitment



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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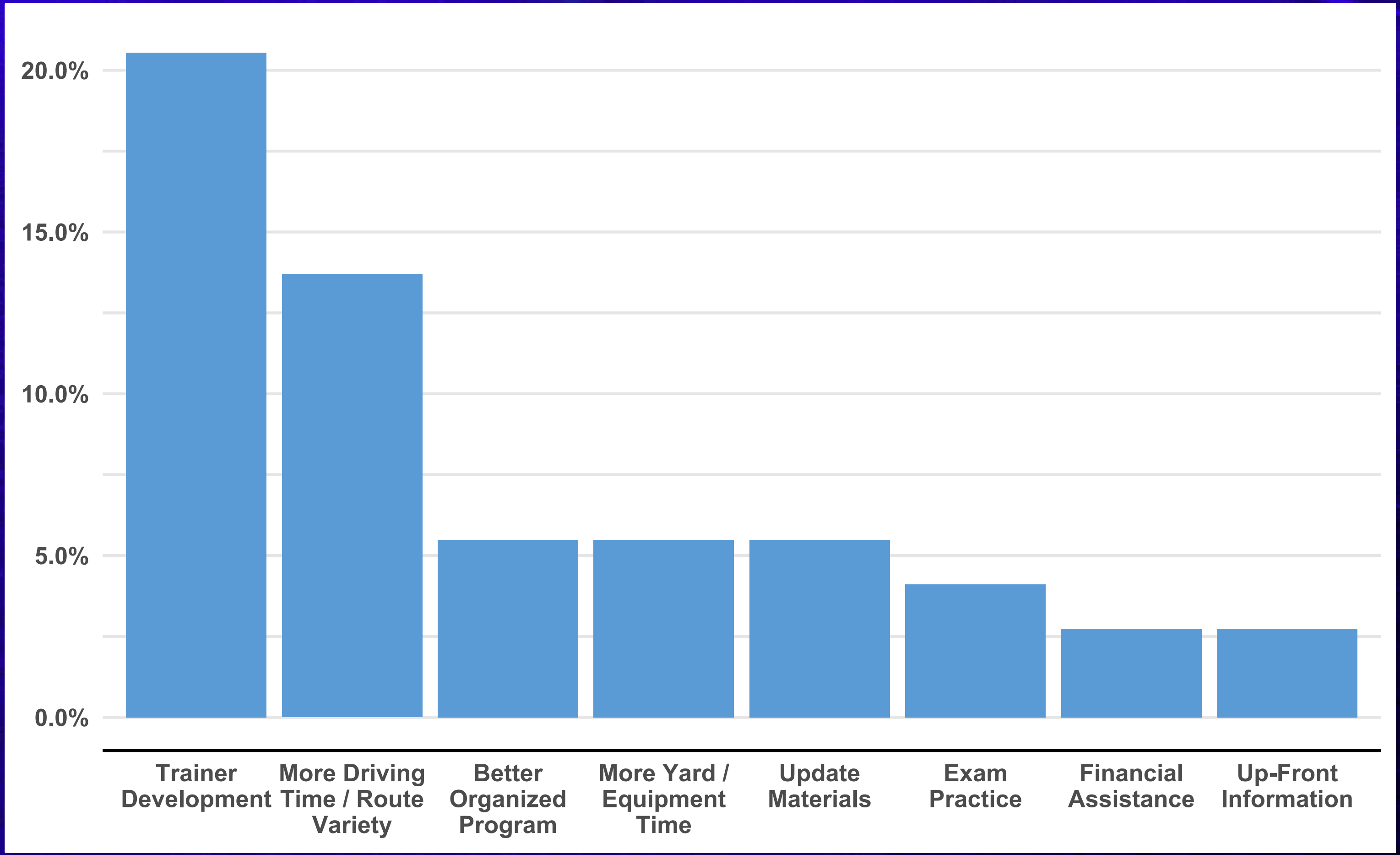
Younger Driver Training



Younger drivers' top suggestions for improving training programs

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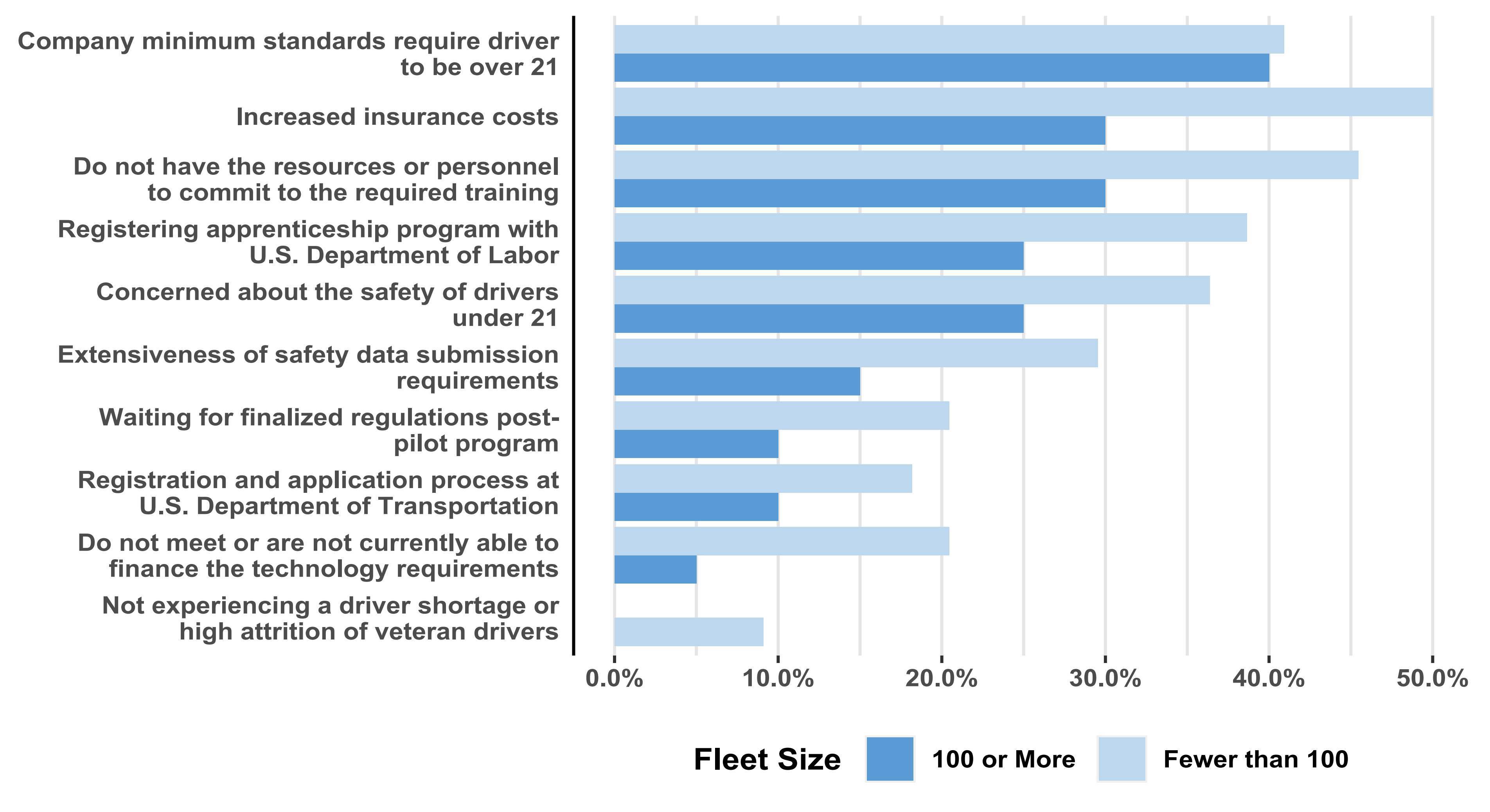
Younger Employee Retention

- **Millennial and Gen Z drivers:**
  - **Prioritize income potential over the span of a stable career rather than just thinking short-term**
  - **Appreciate schedule flexibility and consistency**
  - **Value more opportunities, formal and informal, to learn from veteran drivers**
  - **Want opportunities to understand their carrier's current situation or direction and to communicate their perspectives or concerns to management**

Barriers to SDAP Participation



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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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Operational Costs of Trucking

Average Carrier Costs per Mile

Motor Carrier Costs	2017	2018	2019	2020	2021
Vehicle-based					
Fuel Costs	$0.368	$0.433	$0.384	$0.308	$0.417
Truck/Trailer Lease or Purchase Payments	$0.264	$0.265	$0.256	$0.271	$0.279
Repair & Maintenance	$0.167	$0.171	$0.149	$0.148	$0.175
Truck Insurance Premiums	$0.075	$0.084	$0.071	$0.087	$0.086
Permits and Licenses	$0.023	$0.024	$0.020	$0.016	$0.016
Tires	$0.038	$0.038	$0.039	$0.043	$0.041
Tolls	$0.027	$0.030	$0.035	$0.037	$0.032
Driver-based					
Driver Wages	$0.557	$0.596	$0.554	$0.566	$0.627
Driver Benefits	$0.172	$0.180	$0.190	$0.171	$0.182
TOTAL	**$1.691**	**$1.821**	**$1.699**	**$1.646**	**$1.855**

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Motor Carrier Costs	Annual Change 2020-2021
Vehicle-Based	
Fuel Costs	**35.4%**
Truck/Trailer Lease or Purchase Payments	**3.0%**
Repair & Maintenance	**18.2%**
Truck Insurance Premiums	**-1.1%**
Permits & Licenses	**0.0%**
Tires	**-4.7%**
Tolls	**-13.5%**
Driver-Based	
Driver Wages	**10.8%**
Driver Benefits	**6.4%**
TOTAL	**12.7%**

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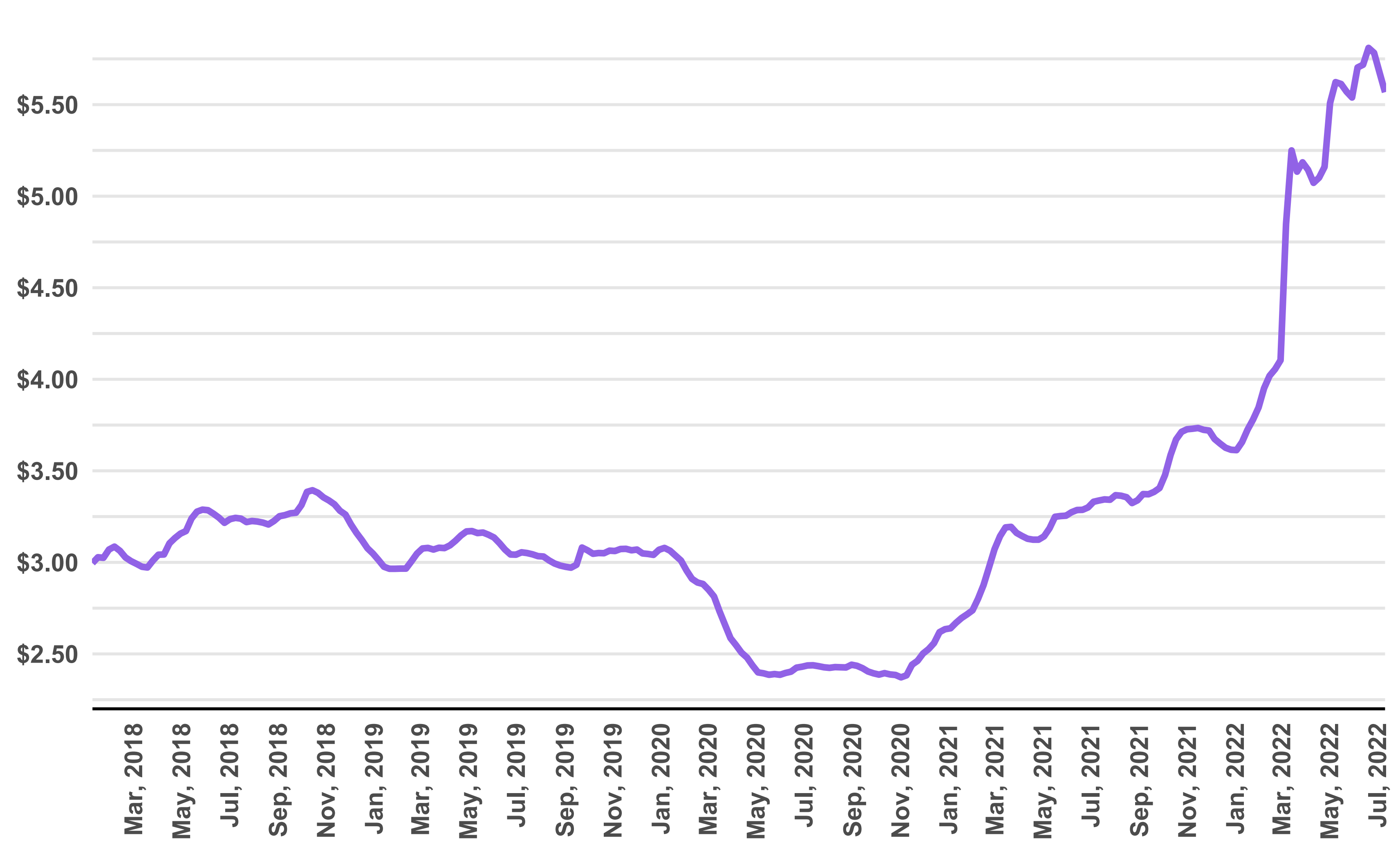
Diesel Price



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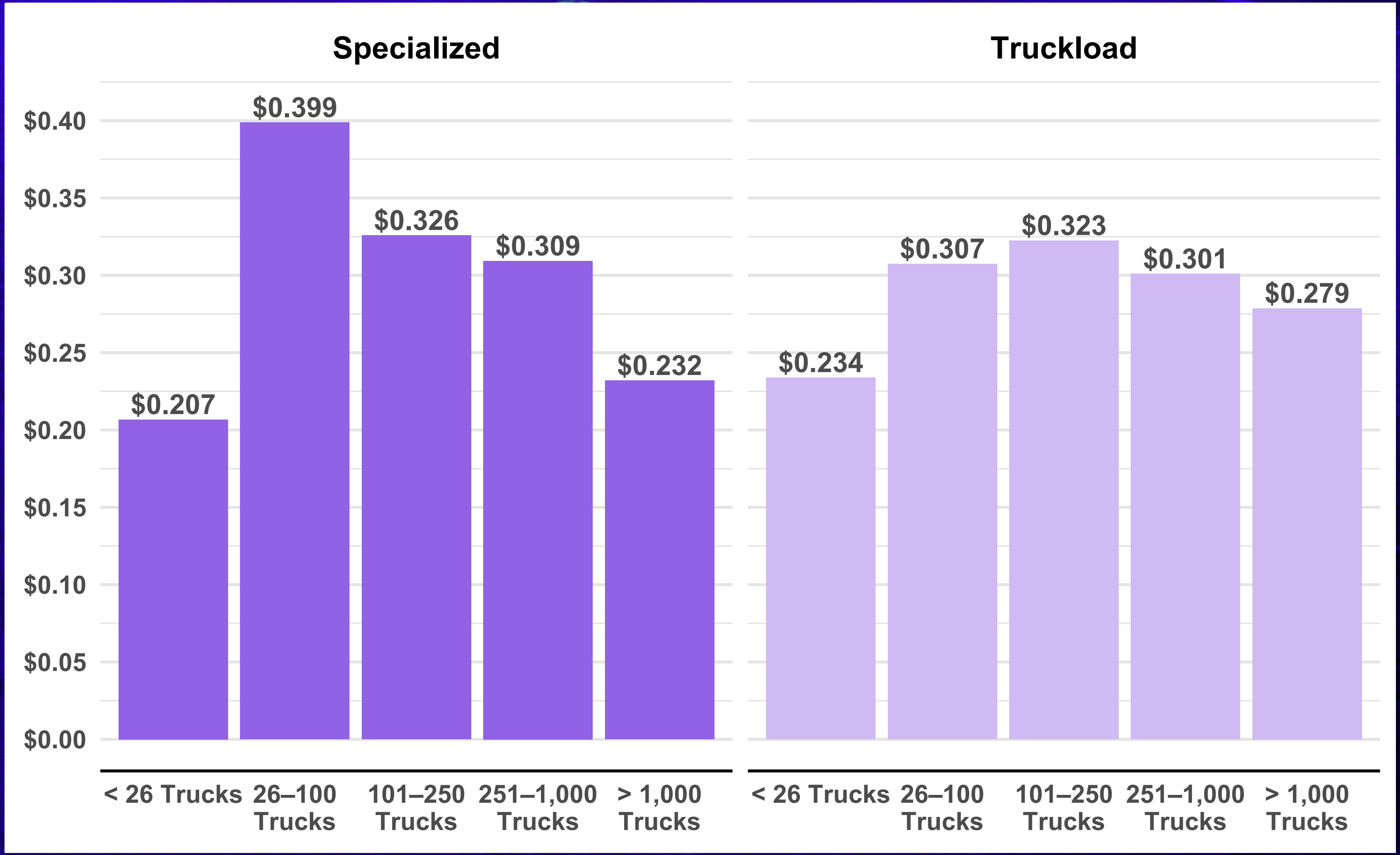
Fleet Breakdowns: Truck and Trailer Costs



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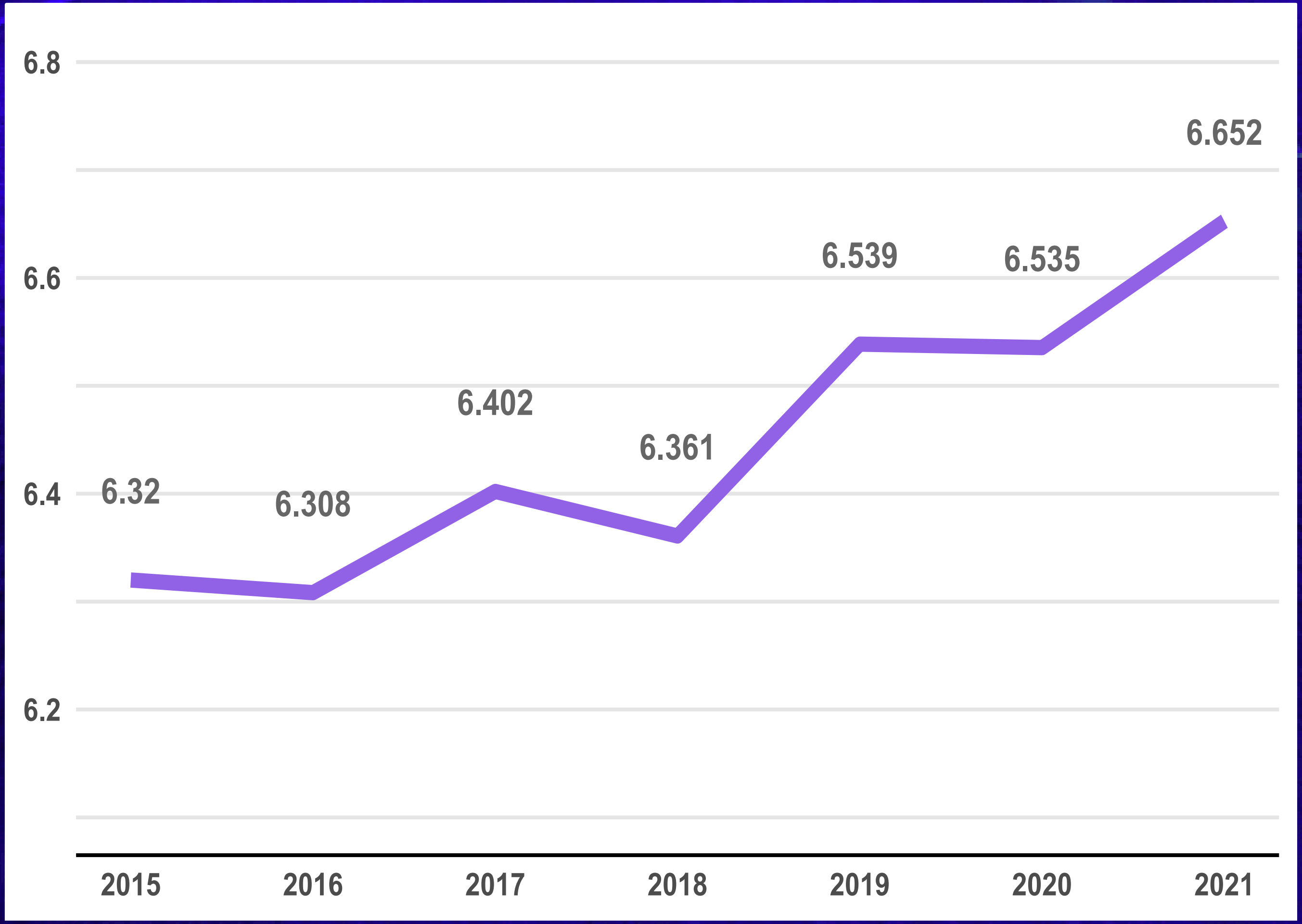
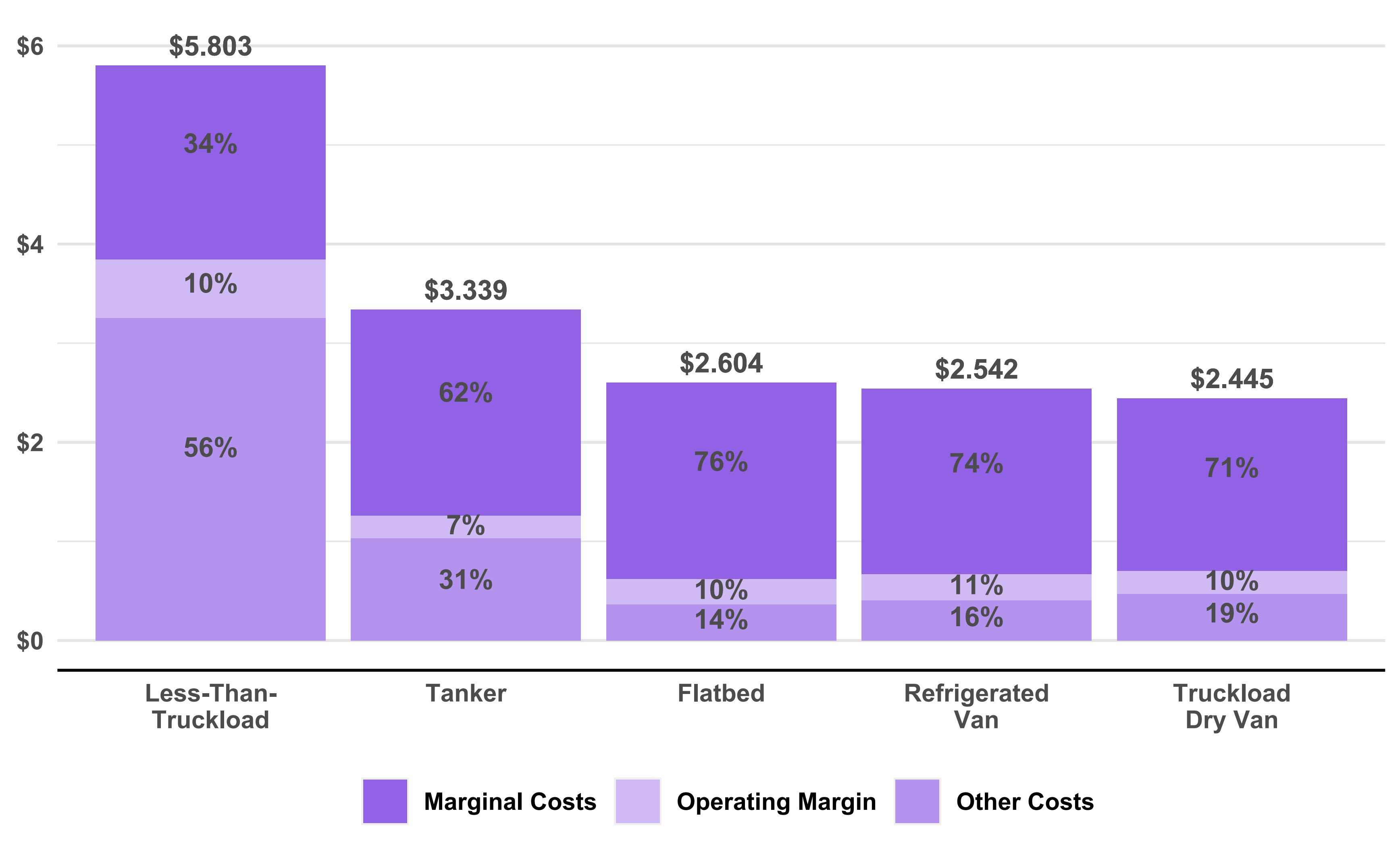
Improved Efficiencies



- **MPG on the rise (left)**
- **Deadhead mileage declined to 14.8 %**
- **Trailers-per-truck ratio of 2.82 remained higher than in the 2010s**

Per-Mile Revenue Breakdown



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2021 Top Industry Issues

<table>
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</table>

Predicting Truck Crash Involvement: 2022 Update

- Latest update to ATRI's Crash Predictor model; prior reports in 2005, 2011, and 2018
- Examines likelihood of crashes based on specific violations, convictions, and crash involvement
- Analysis includes over 580,000 drivers

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Top 10 Crash Predictor Behaviors

Driver Behavior	Future Crash Likelihood Increase
Failure to Yield Right-of-Way violation	141%
Failure to Use / Improper Signal conviction	116%
Past Crash	113%
Reckless Driving violation	104%
Failure to Obey Traffic Sign conviction	85%
Failure to Keep in Proper Lane conviction	78%
Improper or Erratic Lane Changes conviction	77%
Reckless / Careless / Inattentive / Negligent Driving conviction	62%
Improper Lane / Location conviction	61%
Failure to Obey Traffic Signal / Light conviction	55%

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Top 5 Stable Predictors of Crash Risk

Driver Behavior	Median Crash Likelihood Across All Four ATRI Crash Predictor Models
Reckless Driving violation	114%
Failure to Use / Improper Signal conviction	89%
Past Crash	88%
Failure to Yield Right-of-Way violation	85%
Improper or Erratic Lane Changes conviction	79%

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Gender Analysis

- Female drivers outperformed males in every statistically significant behavior
- Male drivers 14% more likely to be involved in a crash, down from 20% in 2018 report

Behavior	Relative to Females, Likelihood for Males Increased by
Improper Lane conviction	221%
Medical Certificate violation	91%
Seat Belt violation	76%
Driving Too Fast for Conditions conviction	57%
Failure to Obey Traffic Sign conviction	51%

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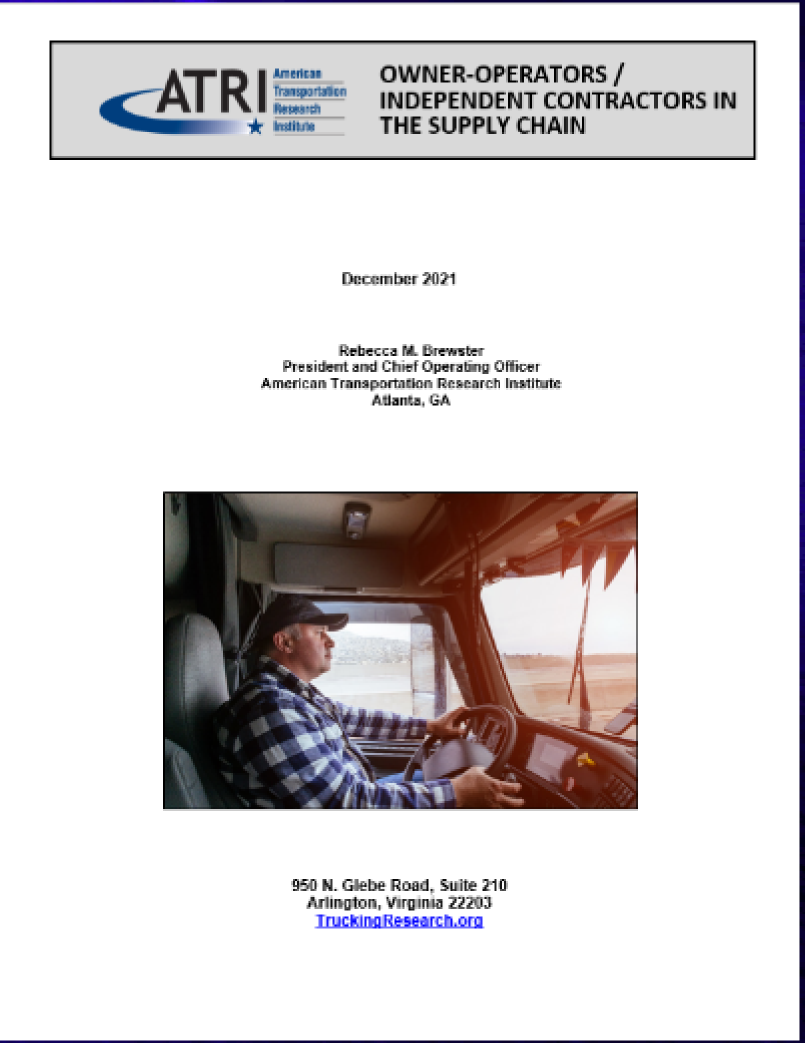
10 Top Tier States

Rank	State	Number of Traffic Enforcement Inspections	% of Total	Number of Crashes	% of Total	Safety Metric (% Difference)
1	Washington	57,286	5.13%	4,396	1.24%	3.89%
2	Indiana	72,251	6.47%	10,710	3.01%	3.46%
3	New Mexico	41,007	3.67%	1,806	0.51%	3.16%
4	Arizona	39,382	3.53%	5,663	1.59%	1.93%
5	Massachusetts	28,810	2.58%	3,646	1.03%	1.55%
6	Georgia	55,869	5.00%	12,735	3.58%	1.42%
7	Pennsylvania	64,625	5.79%	15,579	4.38%	1.41%
8	Illinois	61,349	5.49%	15,138	4.26%	1.24%
9	California	97,037	8.69%	26,590	7.48%	1.21%
10	Michigan	45,661	4.09%	10,669	3.00%	1.09%

OO/IC in the Supply Chain

- Top RAC priority 2020
- Research to identify what motivates drivers to become Company Drivers or OO/IC
- Are expectations being met?
- Potential impacts from reclassification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OWNER-OPERATORS / INDEPENDENT CONTRACTORS IN THE SUPPLY CHAIN

December 2021

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President and Chief Operating Officer
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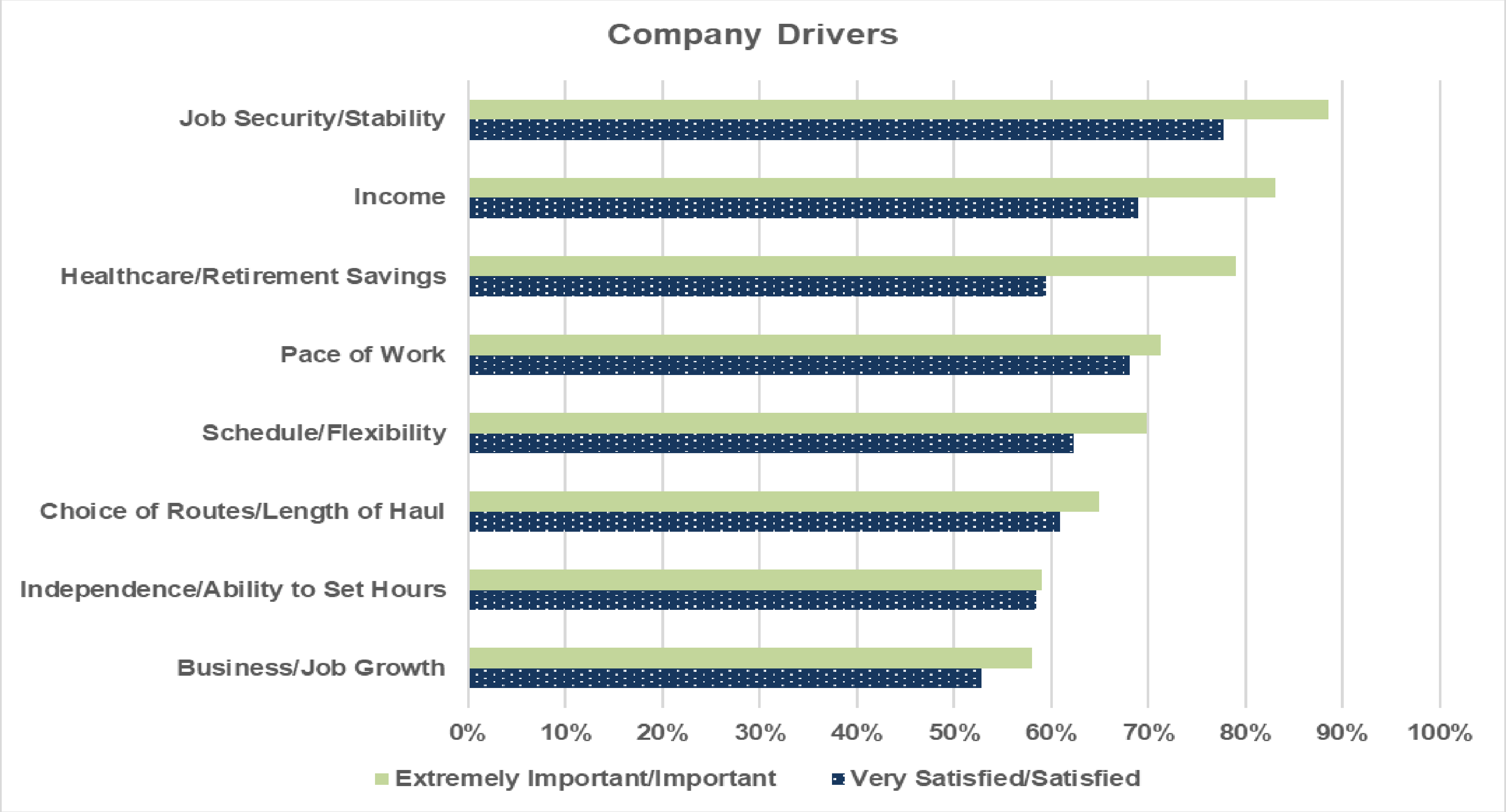
Company Drivers – Motivators/Level of Satisfaction



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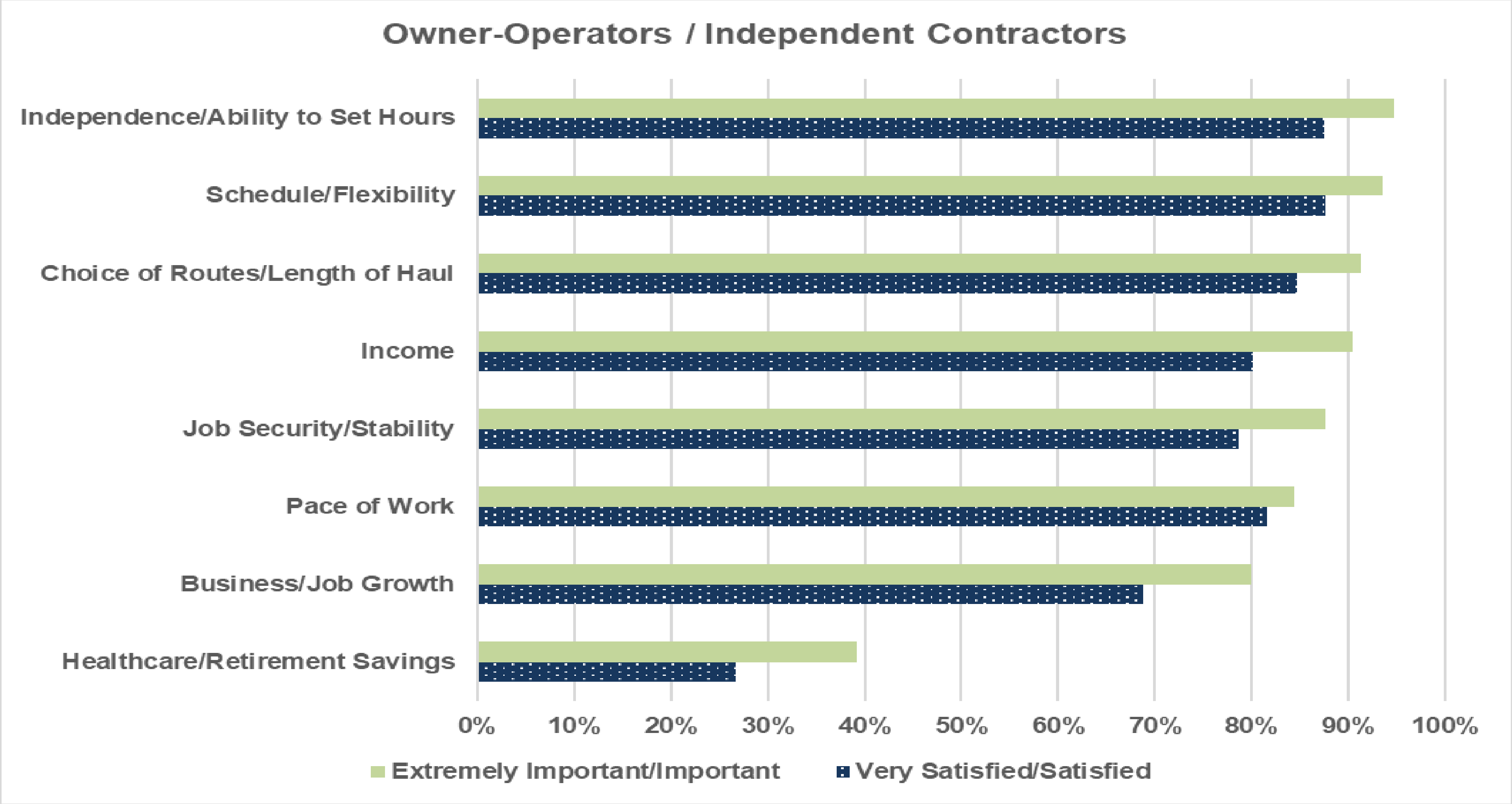

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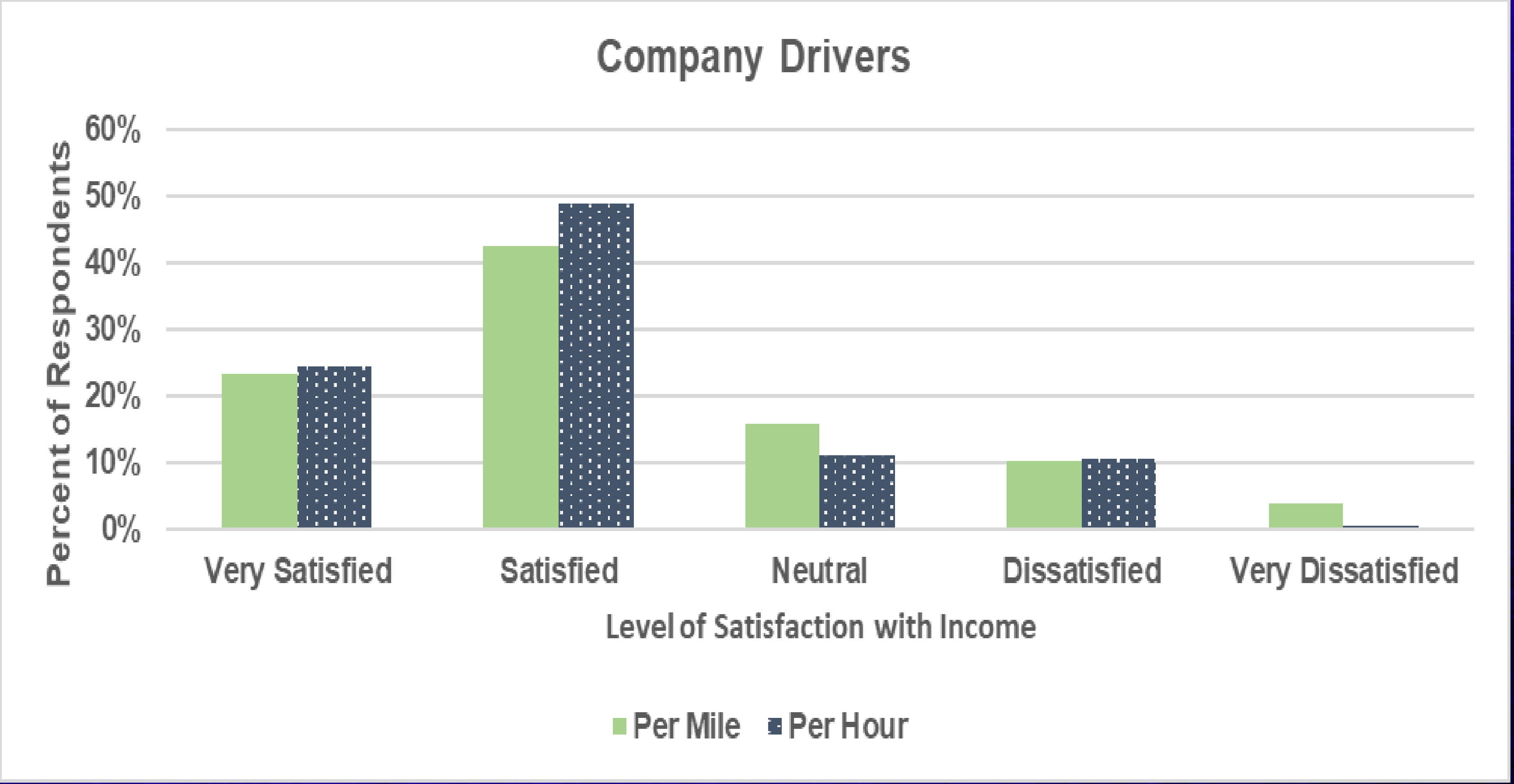
Level of Satisfaction with Income



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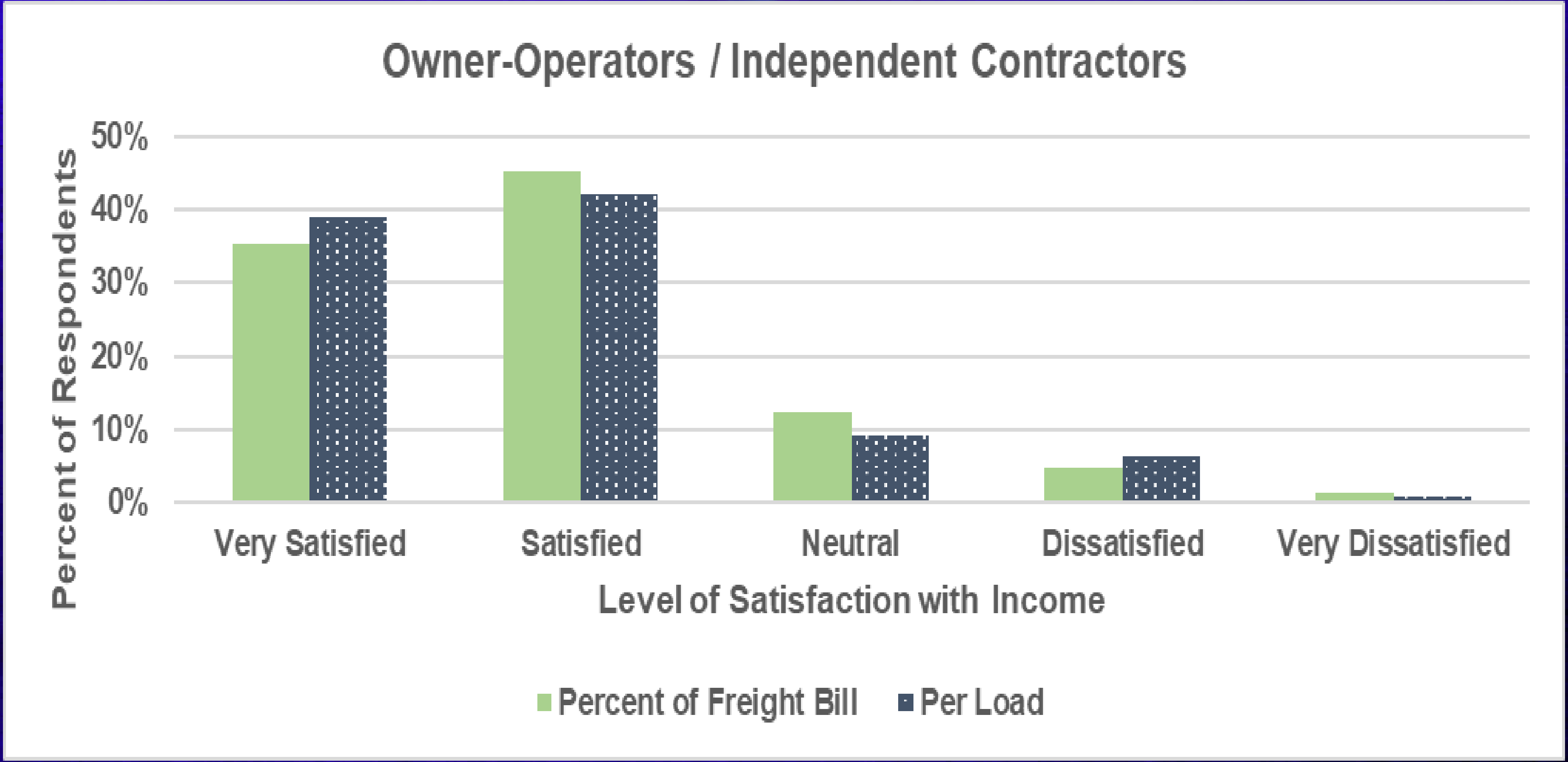

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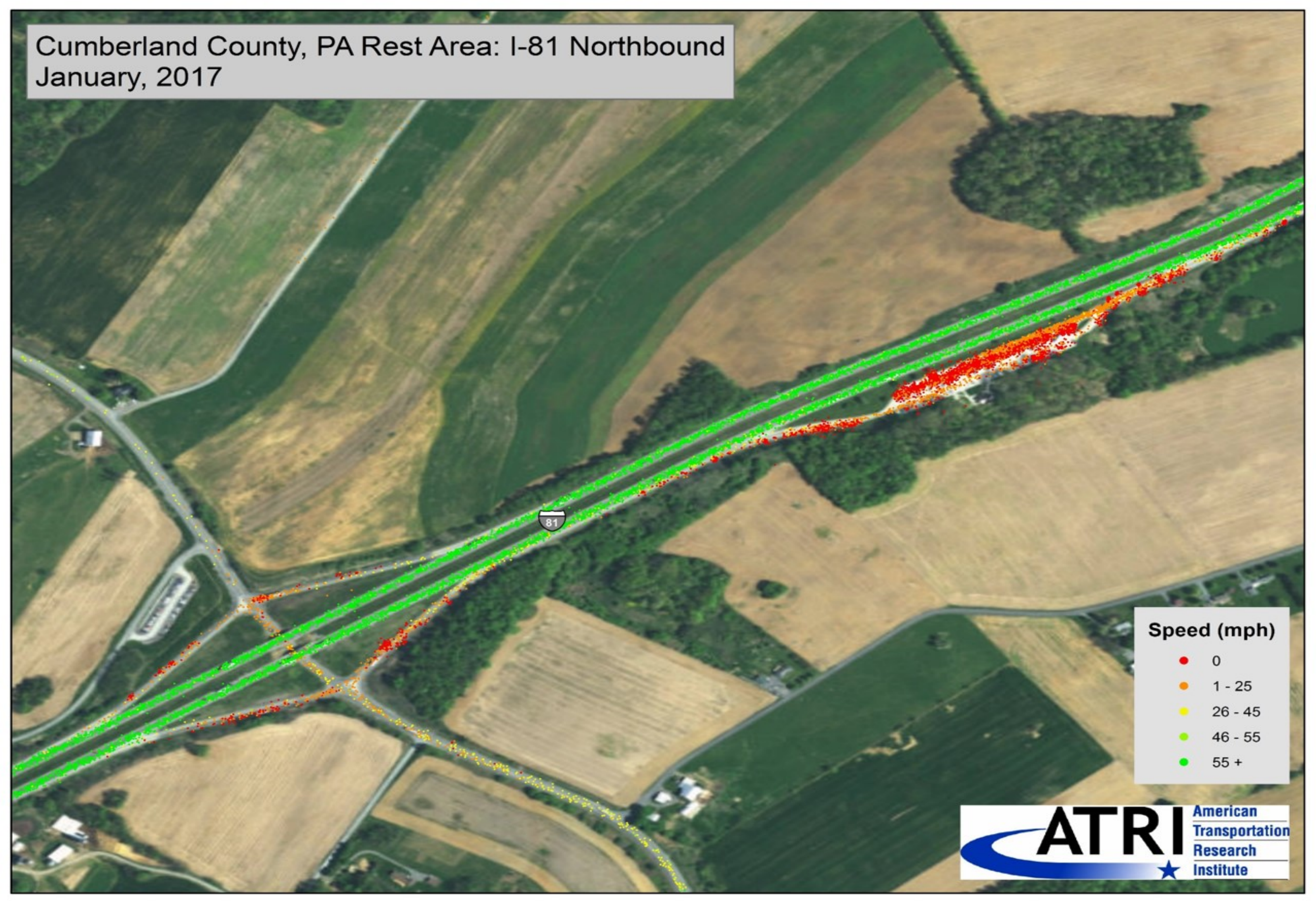
No Vacancy

No Vacancy


Cumberland County, PA Rest Area: I-81 Northbound
January, 2017
81
Speed (mph)
0
1 - 25
26 - 45
46 - 55
55 +
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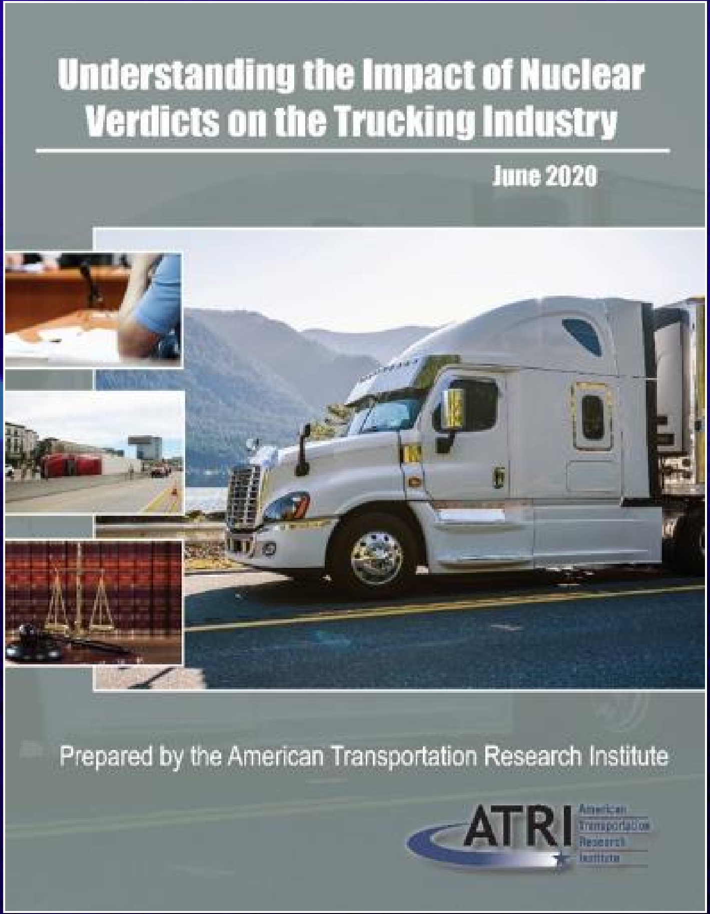
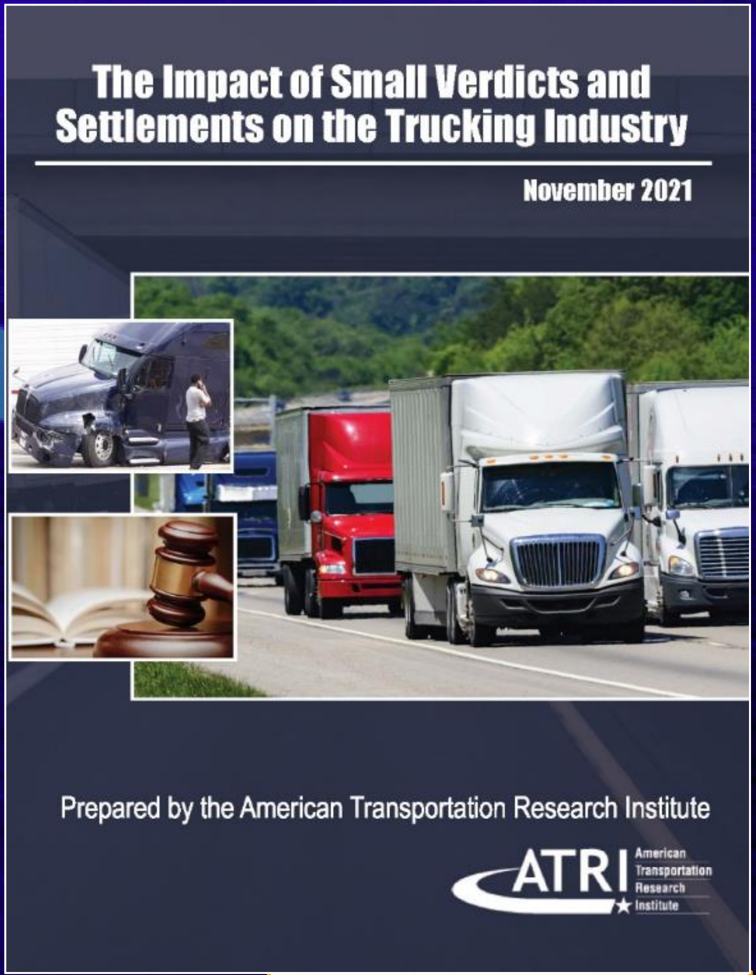
Nuclear Verdict Impacts

- Comprehensive analysis of 600+ cases spanning 15 years
- Documents growth in frequency and size of large verdicts
- In-depth interviews with defense and plaintiff attorneys, as well as insurance industry and safety experts
- Detailed analysis of litigation financing



Impact of Small Verdicts and Settlements on Trucking

- Focuses on verdicts and settlements <$1 million
- Settlement payments 37.7% larger than verdicts
- Rise in crash severity
  - Fatality cases 393% more likely to result in settlements
  - Incidents involving a severe injury 217% more likely to settle and 199% more likely to result in payments to plaintiffs over $600,000
- Litigious states like CA, MI, NJ, and NC have 50% higher payments



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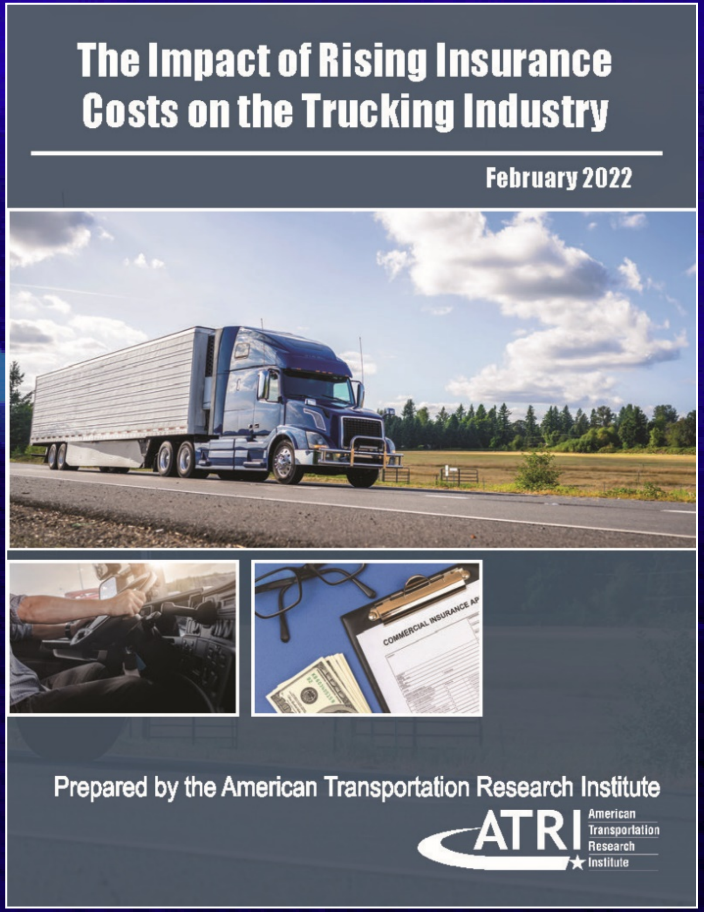
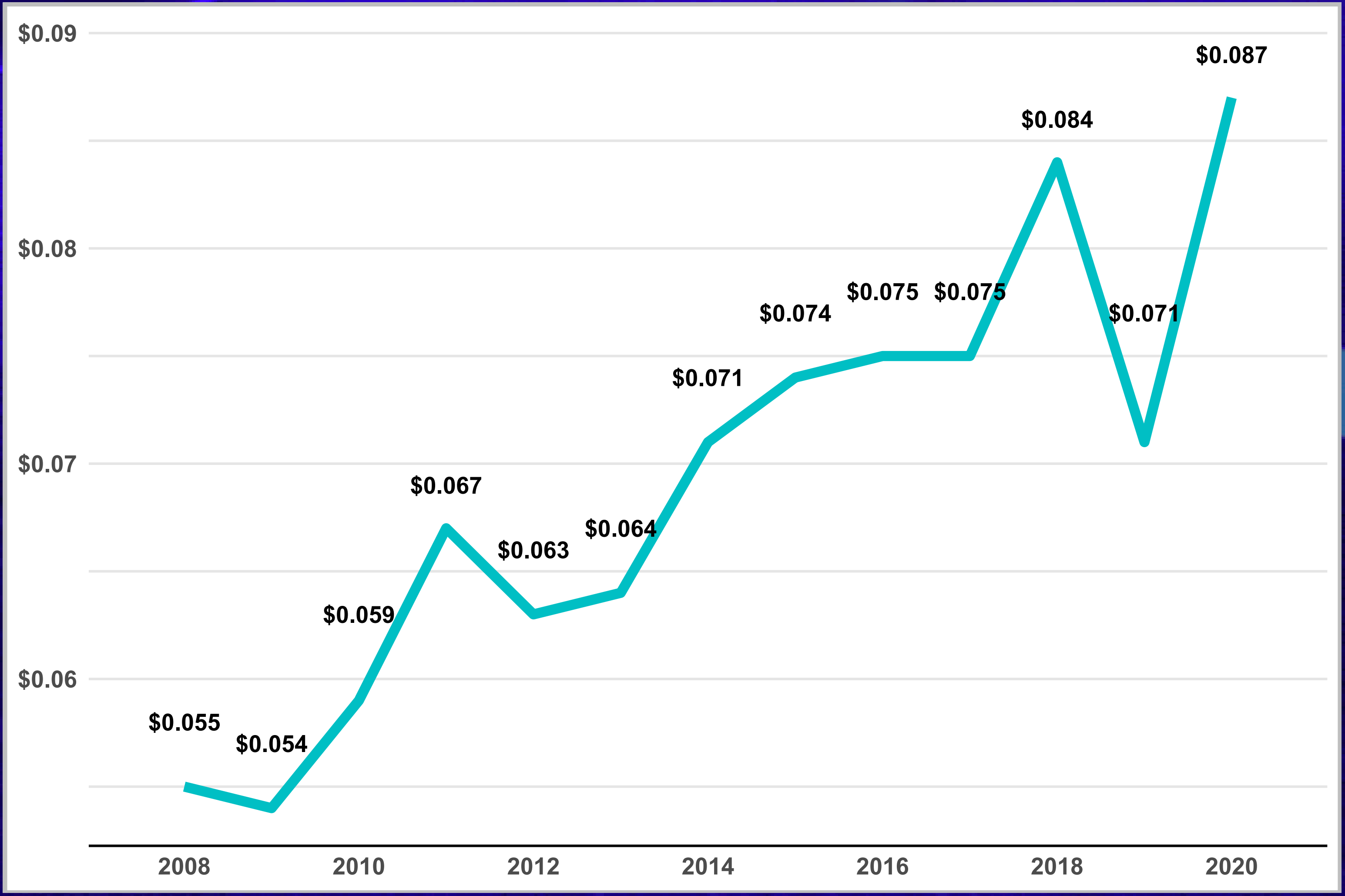
The Impact of Rising Insurance Costs on the Trucking Industry

- 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



Insurance Costs Over Time



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

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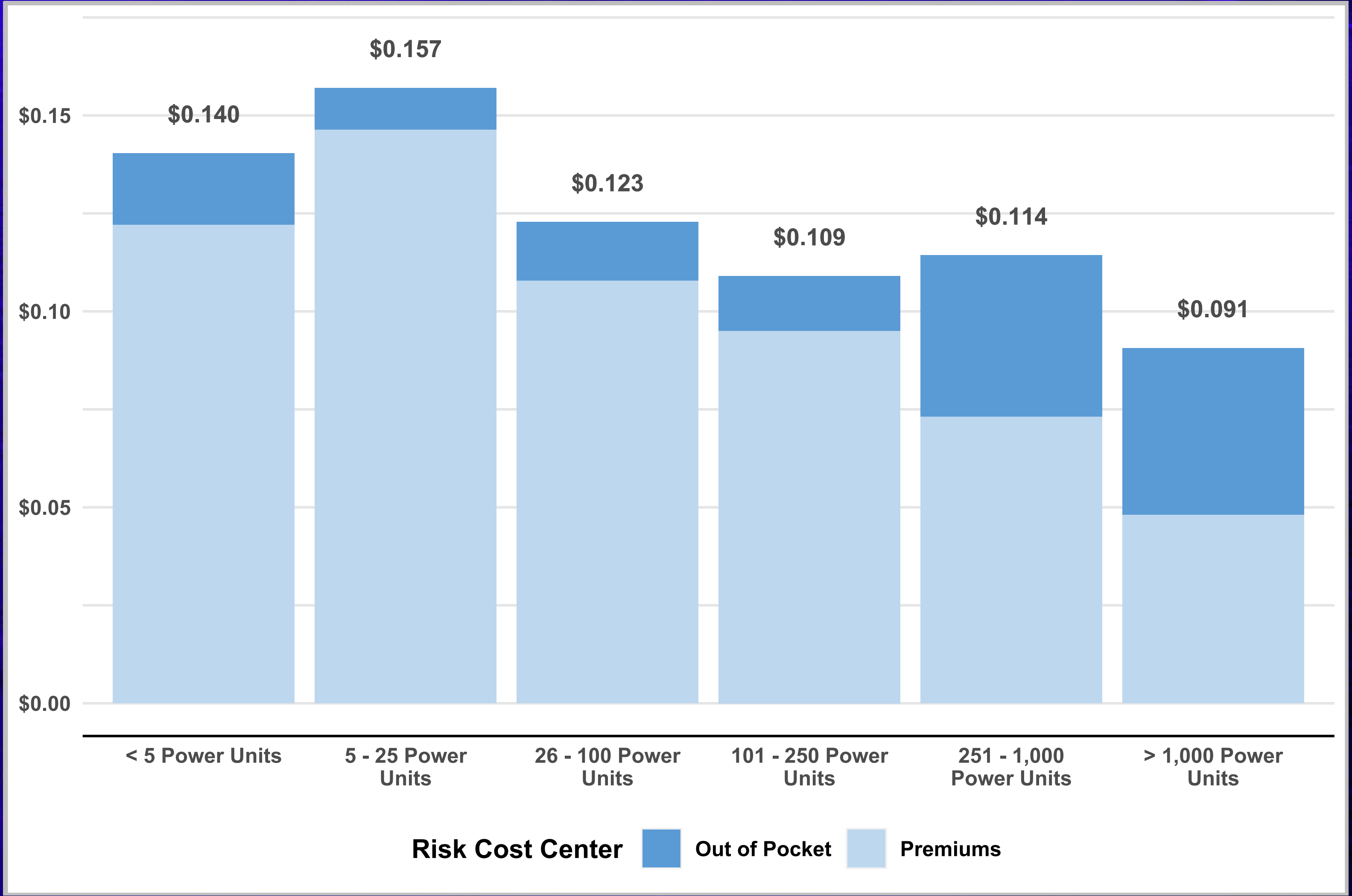
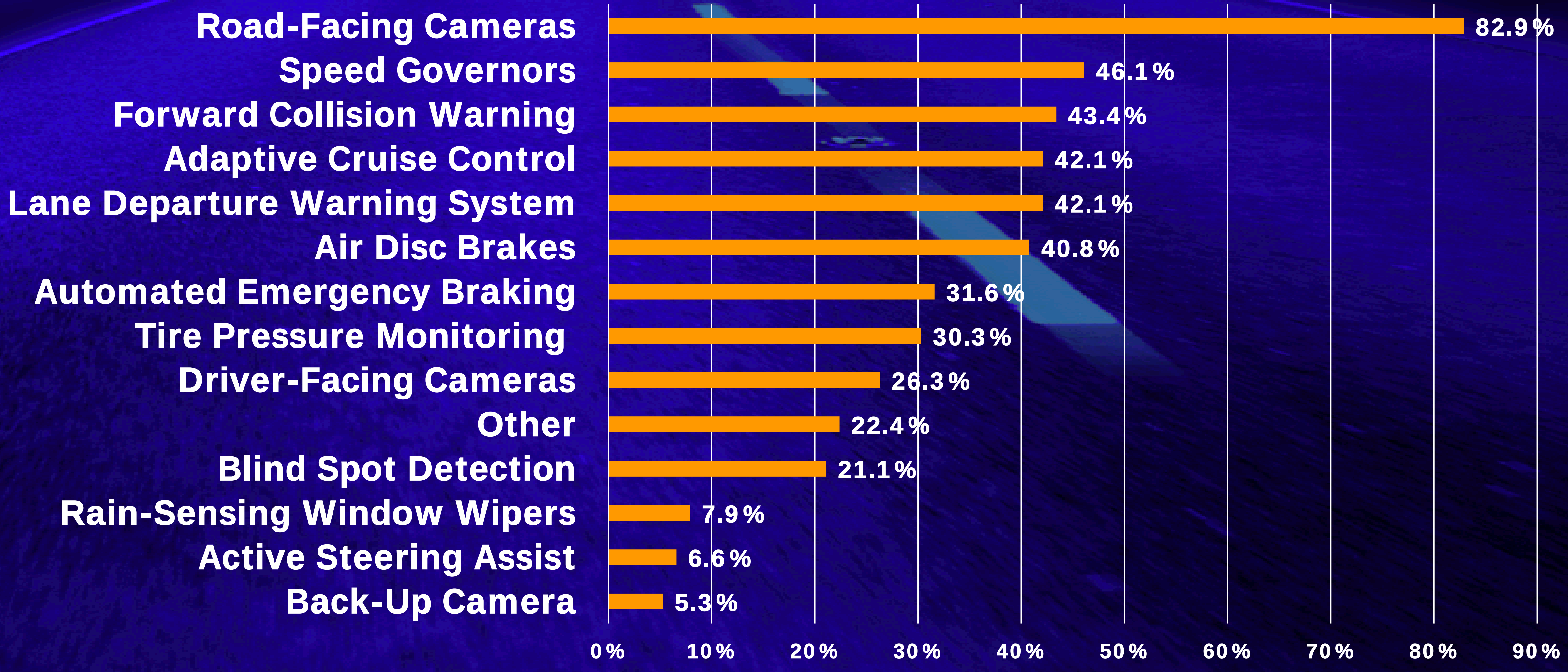
Insurance Cost Impacts by Fleet Size



Safety Technology Deployment 2018 – 2020



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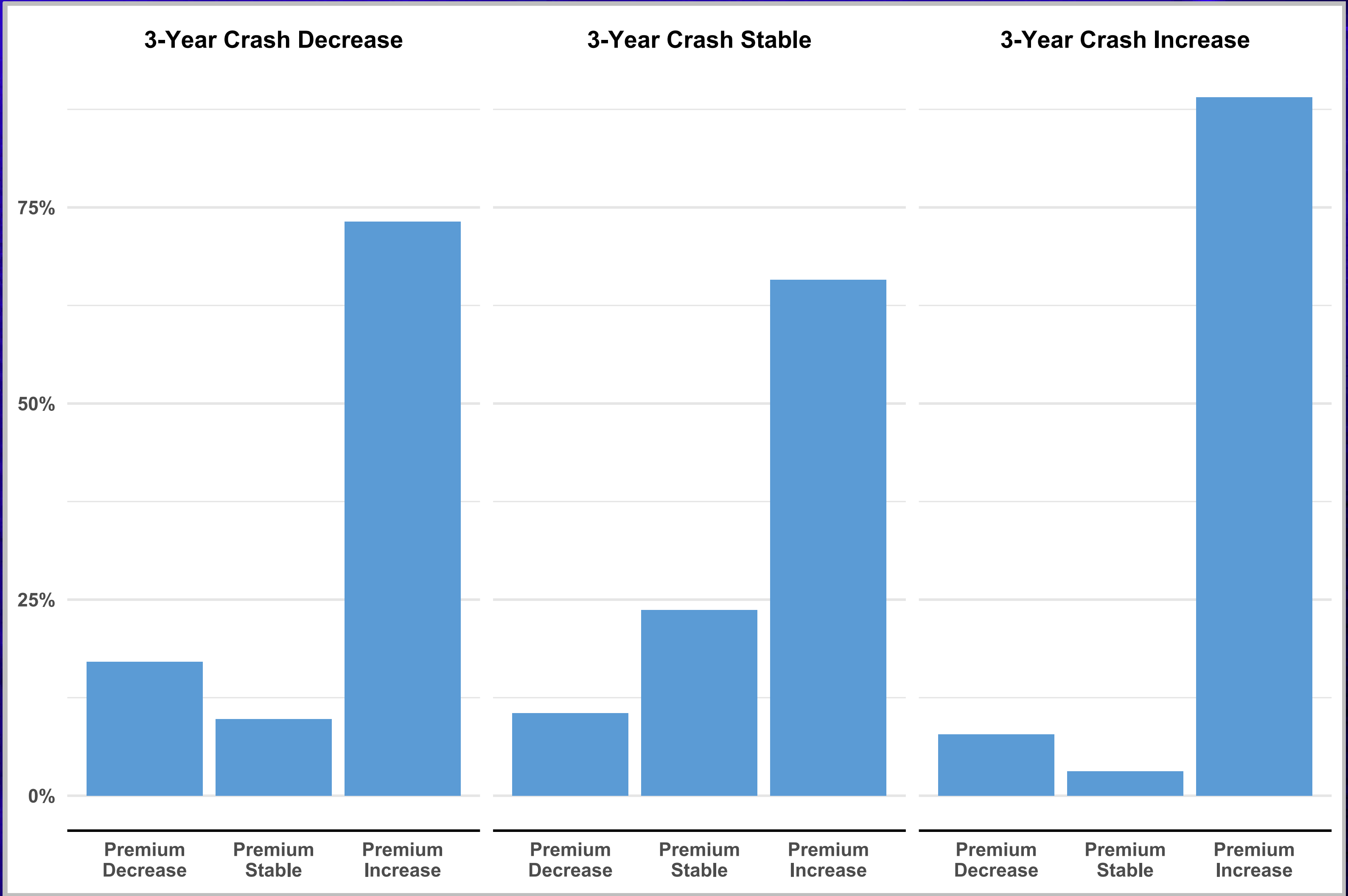
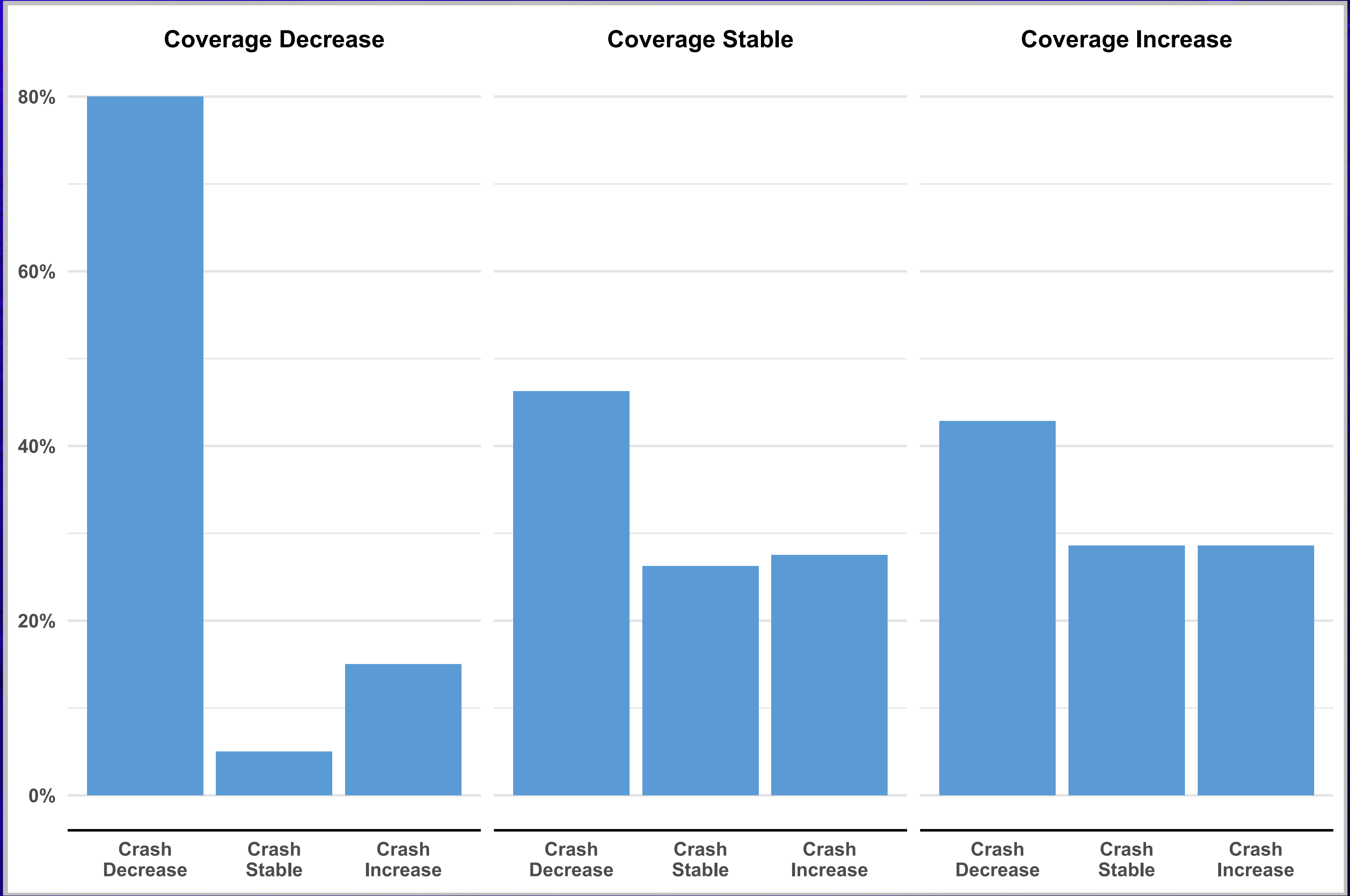
Impact of 3-Year Crash Rate on Premiums



Impact of Coverage Changes on Crashes



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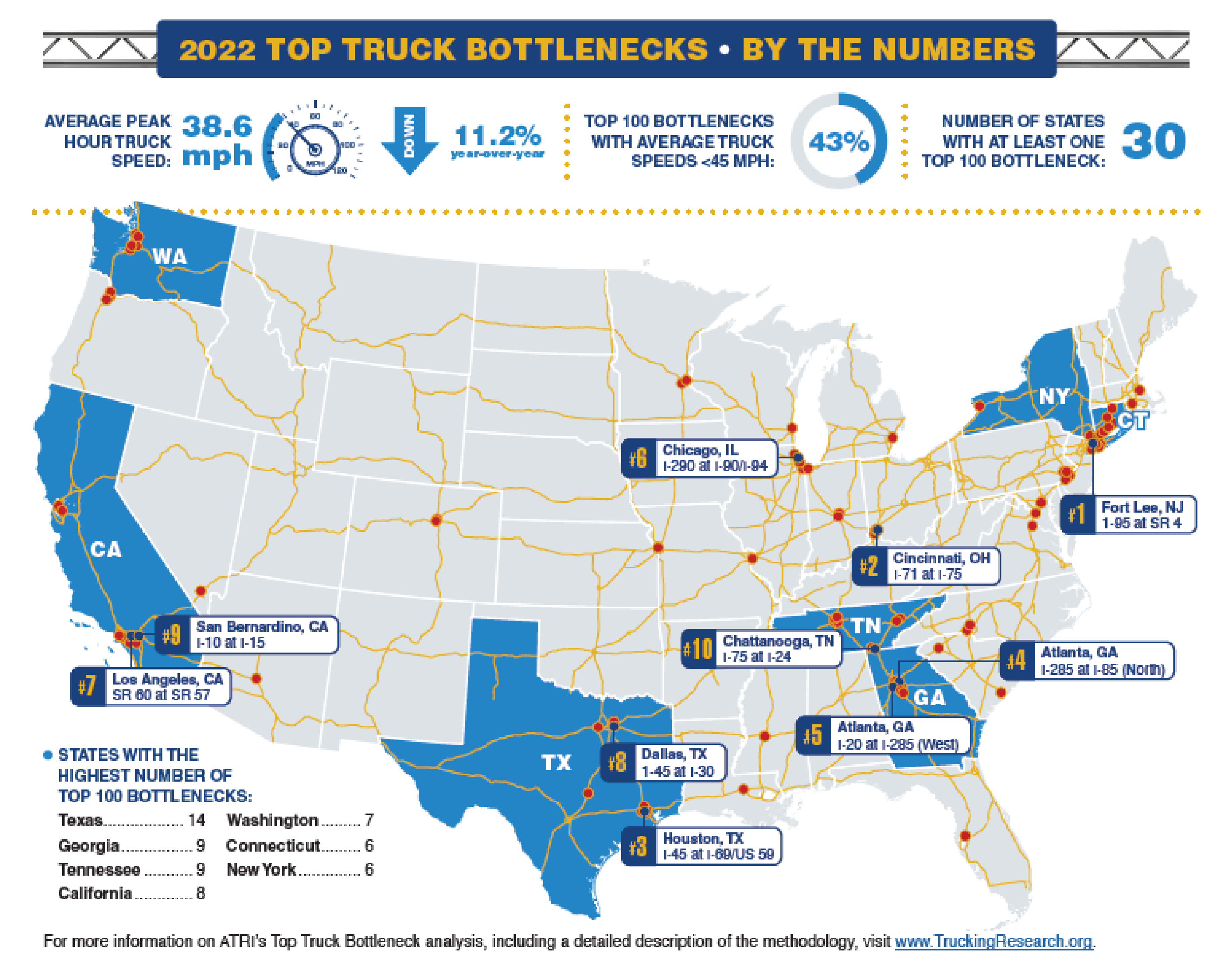
2022 Top Truck Bottlenecks



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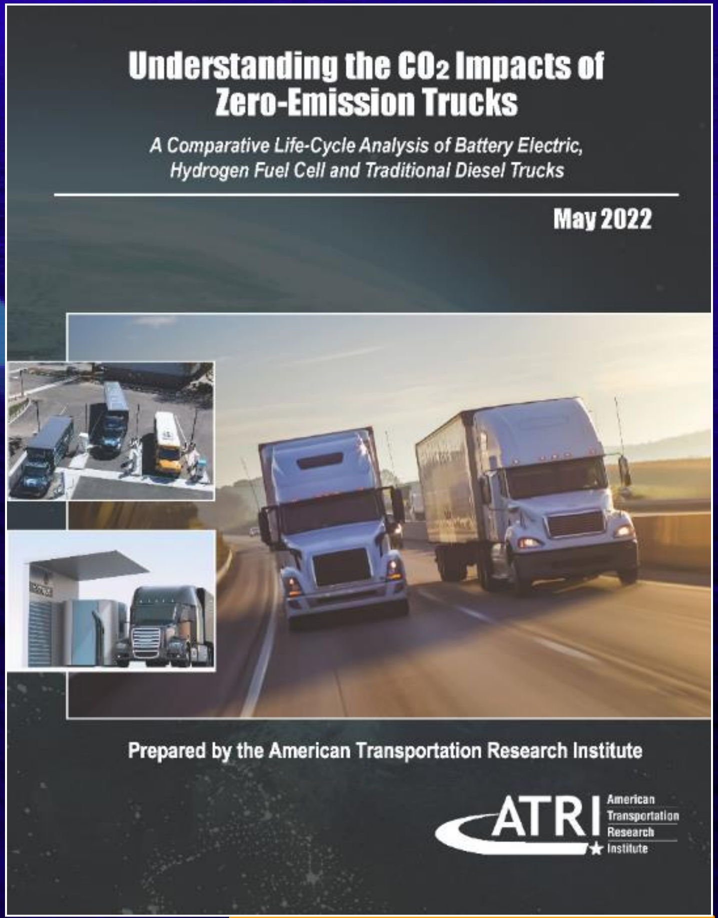
2022 Top 10 Truck Bottlenecks

Rank	Location	Average Peak Speed	Y-o-Y Change in Average Peak Speed
1	Fort Lee, NJ: I-95 at SR 4	22.4	-28.2%
2	Cincinnati, OH: I-71 at I-75	33.6	-16.3%
3	Houston, TX: I-45 at I-69/US 59	24.4	-22.4%
4	Atlanta, GA: I-285 at I-85 (North)	30.4	-11.7%
5	Atlanta, GA: I-20 at I-285 (West)	37.2	-9.0%
6	Chicago, IL: I-290 at I-90/I-94	20.3	-20.0%
7	Los Angeles, CA: SR 60 at SR 57	36.9	-12.1%
8	Dallas, TX: I-45 at I-30	27.3	-18.6%
9	San Bernardino, CA: I-10 at I-15	35.7	-12.1%
10	Chattanooga, TN: I-75 at I-24	45.8	-2.3%

Understanding the CO_2 Impacts of Zero-Emission Trucks

- 2021 RAC Priority
- 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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Realities

- Vehicle costs – new Class 8 BEV truck could cost over $400,000
- No refueling infrastructure
- CO_2 emissions are still substantial
- Material sourced from outside U.S.
  - Lithium, graphite, cobalt, manganese, and nickel

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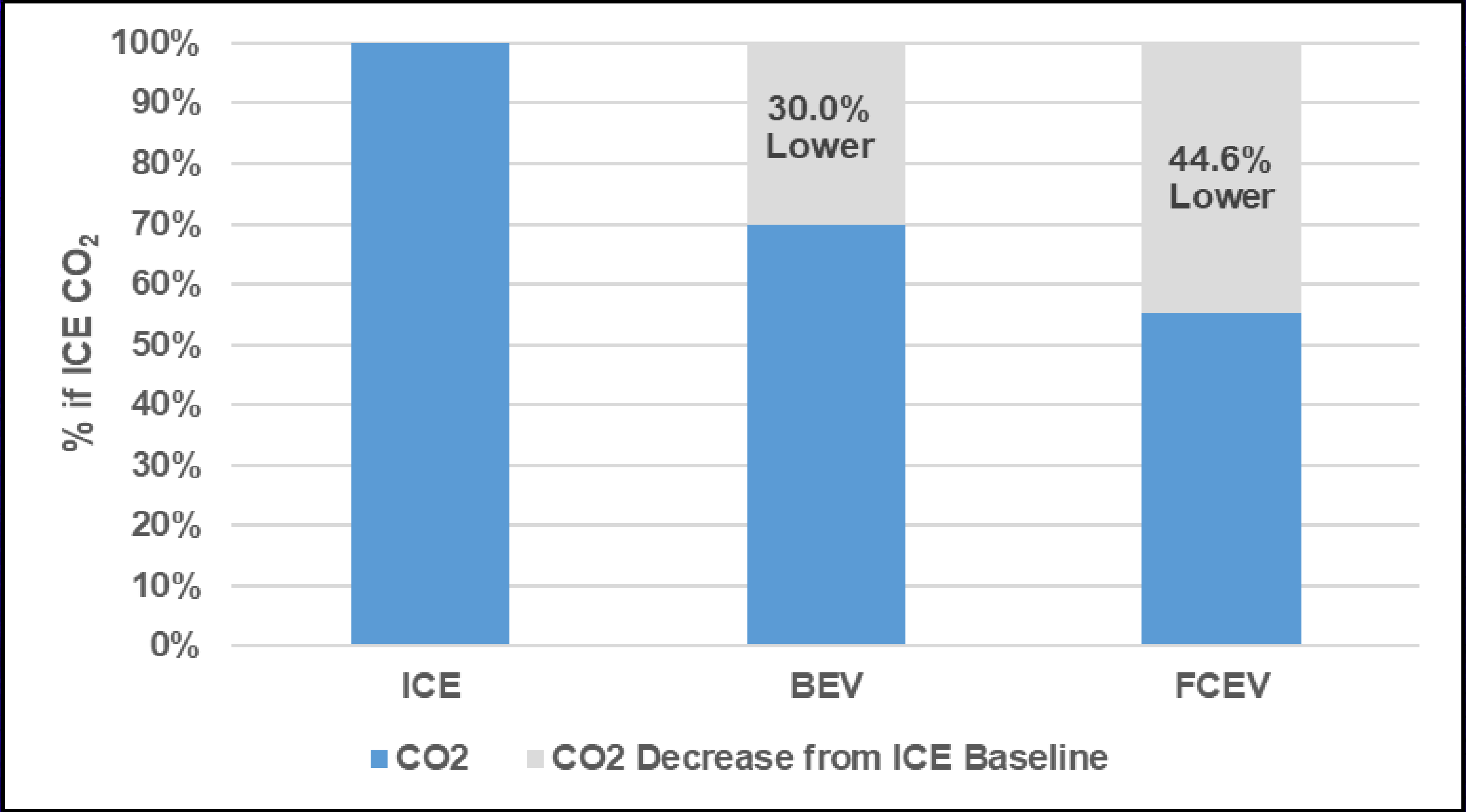
ICE Life-Cycle CO_2 vs. BEV & FCEV



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Lost Revenue Weight Analysis

Weight (lbs.)	ICE	BEV	FCEV
Maximum Gross Weight	80,000	80,000	80,000
Tractor Weight	18,216	32,016	21,337
Trailer Weight	11,264	11,264	11,264
Vehicle Tare Weight	29,480	43,280	32,601
Available Revenue Weight	50,520	36,720	47,399
Lost Revenue Weight from Baseline		-13,800	-3,121

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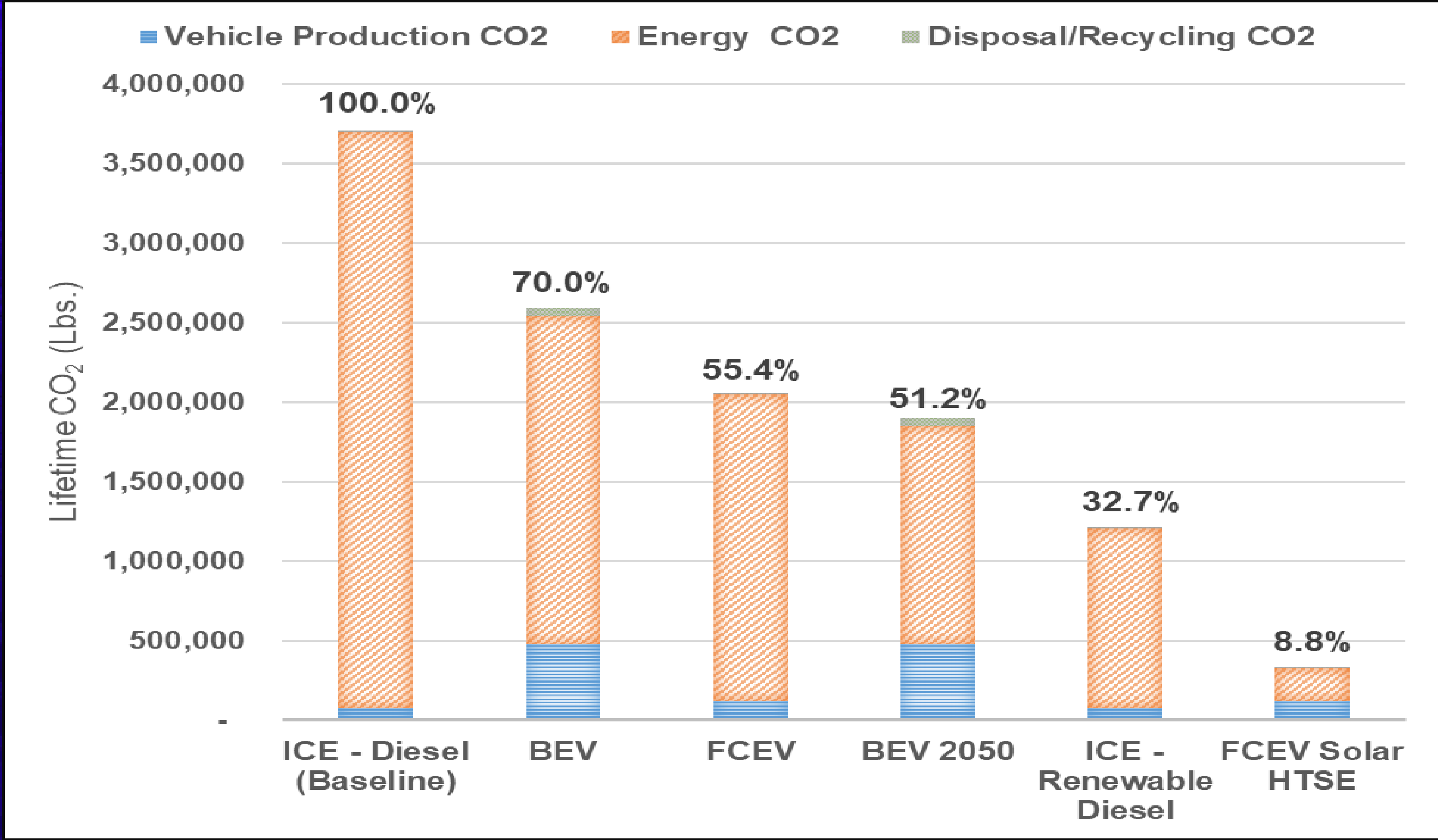
Key Findings



2022 Top Research Priorities

- Marijuana and Other Drugs: Impacts of Decriminalization on the Trucking Industry
- Quantifying Industry Impacts from Predatory Towing
- Efficacy of Driver Training on Safety Outcomes and Driver Retention
- Utilizing EB-3 Work Permits to Help Mitigate the Driver Shortage
- SEC Climate Rule Impacts on the Trucking Industry

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