An Analysis of the Operational Costs of Trucking: 2018 Update

October 2018

Prepared by the American Transportation Research Institute

ATRI American Transportation Research Institute

An Analysis of the Operational Costs of Trucking: 2018 Update

October 2018

Alan Hooper
Research Associate
American Transportation Research Institute
Atlanta, GA

Dan Murray
Vice President, Research
American Transportation Research Institute
Minneapolis, MN

950 N. Glebe Road, Suite 210
Arlington, Virginia 22203
TruckingResearch.org

ATRI BOARD OF DIRECTORS

Ms. Judy McReynolds
Chairman of the ATRI Board
Chairman, President and Chief Executive Officer
ArcBest Corporation
Fort Smith, AR

Mr. Andrew Boyle
Co-President
Boyle Transportation
Billerica, MA

Mr. Mike Ducker
President and CEO
FedEx Freight
Memphis, TN

Mr. Rich Freeland
President and COO
Cummins Inc.
Columbus, IN

Mr. Darren D. Hawkins
Chief Executive Officer
YRC Worldwide
Overland Park, KS

Mr. Dave Huneryager
President and CEO
Tennessee Trucking Association
Nashville, TN

Mr. Derek Leathers
President and CEO
Werner Enterprises
Omaha, NE

Mr. Robert E. Low
President and CEO
Prime Inc.
Springfield, MO

Mr. Rich McArdle
President
UPS Freight
Richmond, VA

Mr. Benjamin J. McLean
Chief Executive Officer
Ruan Transportation Management Systems
Des Moines, IA

Mr. Dennis Nash
Executive Chairman of the Board
Kenan Advantage Group
North Canton, OH

Mr. Gregory L. Owen
Head Coach and CEO
Ability/Tri-Modal Transportation Services
Carson, CA

Mr. James D. Reed
President and CEO
USA Truck
Van Buren, AR

Ms. Annette Sandberg
President and CEO
Transsafe Consulting, LLC
Davenport, WA

Ms. Rebecca Brewster
President and COO
ATRI
Atlanta, GA

Mr. Chris Spear
President and CEO
American Trucking Associations
Arlington, VA

ATRI RESEARCH ADVISORY COMMITTEE

Karen Rasmussen, RAC
Chairman
Chief Executive Officer
HELP Inc.

Jon Blackham
Policy and Government Affairs
Canadian Trucking Alliance

Amy Boerger
Vice President, Sales
Cummins, Inc.

Bill Brown
Manager of Fleet Telematics
Southeastern Freight Lines

Bob Costello
Senior Vice President and
Chief Economist
American Trucking
Associations

Tom Cuthbertson
Vice President, Regulatory
Compliance
Omnitracs, LLC

Dennis Dellinger
President
Cargo Transporters

Chip Duden
Vice President, Strategic
Business Analytics
Werner Enterprises

Paul J. Enos
Chief Executive Officer
Nevada Trucking Association

Thomas Fansler
President
Trimble Transport Mobility

Scott George
Chief Executive Officer
TCW, Inc.

Mike Golias
Director for Research,
Intermodal Freight
Transportation Institute
University of Memphis

Victor Hart
Director of Safety
DOT Transportation, Inc.

Sanford Hodes
Ryder System, Inc.
Senior Vice President and
Deputy General Counsel

Ken Howden
Director, 21st Century Truck
Partnership
U.S. Department of Energy

Kelly Killingsworth
Vice President of Inbound
Transportation
Wal-mart Stores, Inc.

Victoria King
Vice President Public Affairs
UPS

Dustin Koehl
Vice President, Sales and
Marketing
Total Transportation of
Mississippi

Caroline Mays
Director, Freight and
International Trade Section
Texas DOT

Lisa Mullings
President and CEO
National Association of Truck
Stop Operators

Tom Murtha
Senior Planner
Chicago Metropolitan Agency
for Planning

Brenda Neville
President
Iowa Motor Truck Association

Dean Newell
Vice President, Safety
Maverick, Inc.

Steve Raetz
Director of Research and
Market Intelligence
C.H. Robinson Worldwide, Inc.

Wellington F. Roemer, III
President and CEO
Wellington F. Roemer
Insurance, Inc.

Lee Sarratt
Director of Safety
J.B. Hunt

Mark Savage
Deputy Chief
Colorado State Patrol

Andrea Sequin
Director, Regulatory Services
Schneider National, Inc.

Carl Stebbins
Corporate Director of
Admissions and Marketing
New England Tractor Trailer
Training School

Harold Sumerford, Jr.
Chief Executive Officer
J&M Tank Lines

James E. Ward
President and CEO
D.M. Bowman

Tom Weakley
Director of Operations
Owner-Operator Independent
Drivers Association
Foundation

TABLE OF CONTENTS

FIGURES AND TABLES

LIST OF ACRONYMS

ATA	American Trucking Associations
ATRI	American Transportation Research Institute
BLS	Bureau of Labor Statistics
CFO	Chief Financial Officer
CNG	Compressed Natural Gas
CPH	Cost per Hour
CPM	Cost per Mile
CSA	Compliance, Safety, Accountability
EIA	Energy Information Administration
ELD	Electronic Logging Device
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FPM	Freight Performance Measures
HOS	Hours-of-Service
LCV	Longer Combination Vehicles
LNG	Liquefied Natural Gas
LTL	Less-than-Truckload
MC	Marginal Cost
MPH	Miles per Hour
NDA	Non-Disclosure Agreement
P&D	Pick-up and Delivery
RAC	Research Advisory Committee
R&M	Repair and Maintenance
TL	Truckload
VMT	Vehicle Miles Traveled

INTRODUCTION

Since 2008, the American Transportation Research Institute (ATRI) has published *An Analysis of the Operational Costs of Trucking,* an annual report that provides more accurate marginal cost data on motor carrier operations. In the inaugural study in 2008, ATRI identified outside historical research that reported industry cost calculations ranging from $22 per hour to over $370 per hour[1] – figures which were considered unreasonably high or low by many in the trucking industry. Other studies calculated costs using highly subjective "value-of-time" calculations that may extend far beyond direct operational costs, resulting in dramatic variability for industry costs.

Consequently, ATRI undertook research to document and quantify motor carriers' key operational costs stratified by fleet size, sector, and region of operation. The objective of this research was to collect and promulgate current operational costs generated from real-world data provided directly by motor carriers. The resulting analyses could then be used by both motor carriers as a high-level benchmarking tool, and by public sector agencies for various transportation impact assessments.

This research was initially identified as a top research priority by ATRI's Research Advisory Committee (RAC).[2] The RAC sought more accurate cost data to better inform policymakers on the impact that new and potentially inefficient transportation funding strategies could have on freight movement. The trucking industry, which is heavily reliant on the 4 million miles of public roadway in the United States,[3] has a vested interest in the efficient, effective, and equitable funding and maintenance of the nation's transportation system.

Since its original publication in 2008, ATRI has received over 16,000 requests for the *Analysis of the Operational Cost of Trucking* reports. Based on the continued demand for this research, ATRI has updated the "ops cost" data on an annual basis, making minor adjustments and improvements to the data collection methodology as needed. Over the years, these improvements have led to a more streamlined process for obtaining sensitive and proprietary fleet cost data on an annual basis. This report includes the most recent 2017 cost data.

[1] Trego, Todd. "An Analysis of the Operational Costs of Trucking". American Transportation Research Institute. Arlington, VA. 2008

[2] The American Transportation Research Institute (ATRI) Research Advisory Committee (RAC) is comprised of industry stakeholders representing motor carriers, trucking industry suppliers, labor and driver groups, law enforcement, federal government, and academics. The RAC is charged with annually recommending a research agenda for the Institute.

[3] Table HM-20 *Public Road Length – Miles by Functional Class*. Highway Statistics Series 2016. Federal Highway Administration, United States Department of Transportation. Available online: https://www.fhwa.dot.gov/policyinformation/statistics/2016/pdf/hm20.pdf.

RESEARCH OBJECTIVE

This research is predicated on the need for accurate and timely operational cost data in the trucking industry. Although previous studies conducted by consultants and academic entities have attempted to quantify these costs, the use of modeled data or highly subjective value-of-time metrics produced inconsistent results that were considered inaccurate or political by industry stakeholders. These disparate results can be detrimental to both the trucking industry and public sector transportation planners seeking objective, standardized data. For instance, lower operational cost estimates have been used to downplay the value or significance of certain transportation investments, while unreasonably high figures have been used to minimize the financial impact that innovative financing initiatives have on trucking companies and drivers.

Continued improvements in ATRI's operational cost methodology from 2008 through 2017[4] have resulted in more precise cost metrics. The results of this research are based on a standardized data collection methodology that captures and analyzes sensitive motor carrier operational costs. The data presented in this report reflects 2017 cost data collected from a wide range of motor carriers. ATRI has now collected ten years (2008 – 2017) of detailed operational cost data, providing an invaluable presentation of changing industry costs over time.

[4] Hooper, A. and Dan Murray. "An Analysis of the Operational Costs of Trucking: A 2017 Update." American Transportation Research Institute. Arlington, VA. 2017.

METHODOLOGY

The present analysis utilized a data collection methodology similar to previous years. Two questions were added to this year's data collection form to provide additional insight into the operational characteristics of ATRI's respondent base, while an existing question was altered to account for changing equipment types within the industry (Figure 1).

Figure 1: New and Expanded Data Collection Questions

New Questions

What was your fleet's IFTA mileage in 2017? (Include Owner-Operator miles reported for IFTA purposes**)**

_____

How many drivers did your company employ in 2017 for each type of equipment and employment arrangement?

	Company Driver / Company Truck	Leased Driver / Company Truck	Owner-Operator
Truck-Tractor – Single Driver			
Truck-Tractor – Team Drivers			
Straight Truck			
Other (please specify):			

Expanded Question

What was your company's fleet size, average age and average number of miles traveled (including owner operators) in 2017 for each equipment type?

Trailer Type	Number of Assets	Average Age (in years)
28' Trailer		
33' Trailer		
45' Trailer		
48' Trailer		
53' Trailer		
Tank		
Flatbed		
Auto Transporter		
Refrigerated Trailer		
Other (please specify):		
Other (please specify):		
Other (please specify):		

The specific additions and changes to the 2018 data collection form are:

- New Question #1: Respondents were asked to submit their fleets' IFTA mileage. This question was added to provide a more precise calculation for the overall mileage traveled by the vehicles in ATRI's sample.
- New Question #2: Respondents were asked to provide the number of drivers employed by type of equipment for company drivers in a company truck, leased drivers in a company truck, and owner-operators. This question was added to capture the different types of employment arrangements that exist between drivers and motor carriers.
- Expanded Question #1: 33' Trailers were added to the list of trailer types for which asset count and equipment age data were collected. This trailer option was added in acknowledgement of its inclusion in the U.S. Department of Transportation's most recent truck size and weight study.[5]

In addition to numerous demographic queries, the data collection form solicited common industry operational and financial metrics, and was pre-tested with motor carriers. Specifically, the research team solicited technical guidance and review from industry financial officers or those with working knowledge of motor carrier cost structures.

Due to the highly competitive nature of the trucking industry and the extreme sensitivity associated with corporate financials and expenditures, the operational cost information was collected confidentially from motor carriers, and the data is presented in aggregate form only. ATRI also provided respondents with non-disclosure agreements (NDA) as requested.

Data collection efforts commenced in April 2018, with data collection forms being sent electronically to a representative group of for-hire carriers which included truckload (TL), less-than-truckload (LTL), and specialized fleets. ATRI also solicited carrier participation through targeted industry mailings and emails, a news alert, and coverage in major industry news outlets. Many of the 50 state trucking associations also solicited carrier participation from their respective memberships. Participants were provided several options for submitting data to ATRI: utilizing the online response form, or transmitting the data to ATRI via email or fax. All responses were carefully reviewed by the research team for clarity, and the research team contacted respondents to clarify any ambiguous responses as needed. Responses were collected through the end of August 2018.

The survey's composition was primarily focused on components and sub-components of carriers' marginal costs per mile (CPM), which allows for comparative analyses across the different industry business models. In order to convert line-item CPM figures into marginal cost per hour (CPH) calculations, a GPS-generated, industry-vetted average operational speed of 39.42 miles per hour (MPH) was used in these calculations. It should be noted that this speed relates to moving trucks only, and includes all roadway speeds rather than solely highway speeds.[6]

[5] "Comprehensive Truck Size and Weight Limits Study." U.S. Department of Transportation Federal Highway Administration. April 2016. Available online: https://ops.fhwa.dot.gov/FREIGHT/sw/map21tswstudy/ctsw/CTSLWS%20Report%20to%20Congress%20FINAL.pdf

[6] ATRI derived this speed using data from the ATRI Freight Performance Measures (FPM) program. ATRI analyzed one full week of national FPM data in each of the four quarters in 2017 (February, May, August, October). This dataset consisted of

To ensure representativeness, ATRI then weighted survey responses to reflect industry-standard shares of the major for-hire trucking sectors. Compared to national averages, LTL carriers were over-represented in the survey sample while Specialized and TL carriers were slightly under-represented (Table 1). As noted, cost data were re-weighted to national industry averages to yield more representative results.

Table 1: For-Hire Industry Sector Breakout

Industry Sector	ATRI Survey Respondents	U.S. Trucking Industry[7]
Truckload	43%	52%
Less-than-Truckload	36%	24%
Specialized/Other	21%	24%

Where applicable, cost data were cross-tabulated by factors such as fleet size, operating sector, and operating region. Again, the data collected are presented in aggregate form in order to protect proprietary carrier information.

Representativeness

The "ops cost" data collection form was generally completed by high-level managers and executives who have extensive knowledge of the financial workings of the organizations; namely presidents, chief financial officers (CFOs), general managers, business intelligence analysts, and/or fleet owners. The fleets represented include long-haul to local pick-up and delivery, and carry a vast assortment of commodities across the U.S. Additionally, the fleets cover the continuum of fleet size and revenue levels. As such, ATRI considers the data to be an adequately representative sample of the industry population from which to draw current operational cost data.

nearly 500 million truck speed data points. The 39.42 MPH figure is an update to the 39.98 MPH figure used in previous iterations of this report, which was based on truck speed data from 2010. The average speed figure was also validated by multiple motor carriers from various sectors of the industry. This speed figure more accurately represents an average operational speed since it includes speeds in all types of operational conditions.

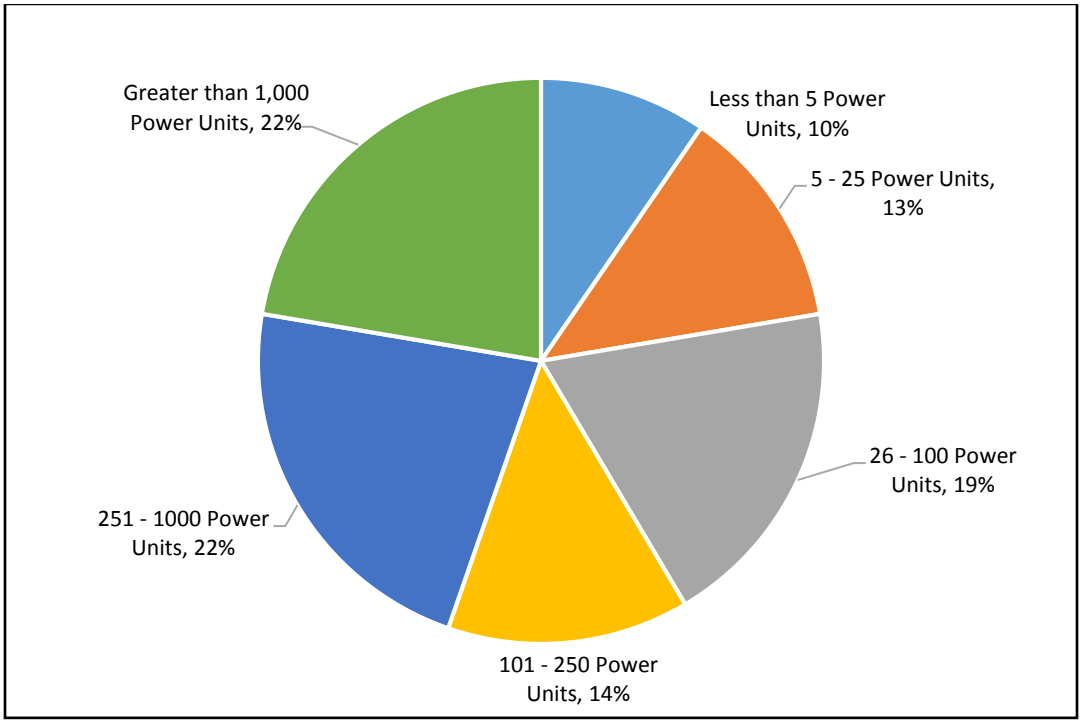
[7] 2002 Vehicle Inventory and Use Survey. United States Department of Commerce, Economics and Statistics Administration, United States Census Bureau. Available online: https://www.census.gov/svsd/www/vius/2002.html.

RESPONDENT DEMOGRAPHICS

Size of Operation

Motor carriers submitting data for the 2018 Operational Costs of Trucking data collection accounted for 178,926 truck-tractors, 4,773 straight-trucks, and 360,434 total trailers, and accumulated over 9.4 billion miles in 2017 across a variety of industry segments and fleet sizes. 20.7 percent of these miles were non-revenue or "dead-head" miles, up slightly from the 19.5 percent reported by respondents in 2016 and in-line with figures reported in previous years. The mean fleet size in the sample was 1,766 power units, though responses remain skewed toward smaller carriers as indicated by the median fleet size of 114 power units. To this end, a majority (55.3%) of respondents were smaller carriers operating fleets with 250 or fewer power units (Figure 2). The remaining 44.7 percent of respondents were split evenly between carriers operating between 251 and 1,000 power units and fleets with 1,000 or more power units.

Figure 2: Respondent Fleet Size



The large gap between the mean annual trucking-related revenue reported for 2017 ($284,401,056) and the median ($23,040,000) also reflect the relatively greater proportion of smaller fleets in the sample (Table 2). Very large operations in the respondent pool can ultimately skew averages for metrics like fleet size and revenue upward, so statistical measures such as the median can more accurately reflect the broader survey sample.

Table 2: Respondent Revenue Statistics

Percentile	Revenue
75th Percentile	$86,589,628
50th Percentile (Median)	$23,040,000
25th Percentile	$5,100,000
Average (Mean)	$284,401,056

Type of Operation

As trip lengths across the industry continue to decrease, the respondents in this year's sample were again predominantly focused on local and regional pick-ups and deliveries where the average haul lengths were less than 500 miles per trip. An average of 62 percent of respondent trips were of the local and regional variety, up from 55 percent of respondent trips in the 2011 data sample. The increase in local and regional truck trips has come at the expense of inter-regional trips, as 19 percent of the respondents' trips were inter-regional in 2017 compared to 26 percent in 2011. The remaining 19 percent of the respondents' trips were national or long-haul trips in excess of 1,000 miles traveled (Table 3).

Table 3: Respondent Trip Types, 2011 to 2017 Comparison

Trip Type	2011	2017
Local pick-ups and deliveries (less than 100 miles)	19%	25%
Regional pick-ups and deliveries (100-500 miles)	36%	37%
Inter-regional pick-ups and deliveries (500-1,000 miles)	26%	19%
National (over 1,000 miles)	19%	19%

Comparing respondents' 2017 share of U.S. vehicle miles traveled (VMT) by region to commercial truck registrations by region provides another indication of the representativeness of the ATRI survey sample. As can be seen in Table 4, the share of respondents' operations in each U.S. region roughly aligns with the share of truck registrations by region. The Midwest and Southwest were again under-represented in this year's sample, while the Northeast and Southeast were slightly over-represented. This finding may highlight the common occurrence of motor carriers having different headquarter locations from where they actually base their fleet for cost-saving purposes.

When asked to identify the primary commodities hauled in respondents' operations, responses were concentrated in general freight, retail store/general merchandise, agricultural products, automotive parts and vehicles, and construction/building materials.

Table 4: Respondent Truck VMT and National Truck Registrations by Region

Region	Survey Respondent Share of Miles Traveled[8]	Share of U.S. Truck Registrations[9]
Midwest	29%	39%
Northeast	11%	8%
Southeast	24%	20%
Southwest	11%	13%
West	22%	20%

Equipment

The trucking industry hauls a majority of freight in the United States, accounting for 70.2 percent of the nation's freight tonnage and 79.3 percent of freight revenues.[10] Similar to the previous year's analysis, the 2017 data shows a sizable majority of responding fleets operated truck-tractors as their primary type of power unit. A typical truck-tractor in the ATRI sample was reported to have driven 89,804 miles per year, compared to just 24,067 miles for straight trucks. As expected, 28- and 53-foot trailers remained the most prevalent among respondents' fleets, combining to account for over three-quarters of the trailers in the sample; responding carriers also reported a sizable number of Refrigerated Trailers (17,032) and Tank Trailers (14,017) (Table 5).

Analyzing reported trade cycles can provide insight into the equipment characteristics of survey respondents. Respondents reported holding truck-tractors for more years compared to the previous year's analysis, although the trucks were logging fewer miles. This indicates that trucks are being used less intensively each year, allowing motor carriers to hold on to these power units for longer due to the slower accumulation of wear and tear. To this end, truck-tractors were held for 7.6 years, on average, before replacement, up from 6.3 years in 2016. Trailers were held for 12.7 years in 2017 compared to 12.4 years during the previous year. However, respondents reported an average of 695,000 miles before replacing truck-tractors, down from 754,000 during the previous year (Table 6).

[8] Column total will not sum to 100 percent since roughly 2 percent of VMT were reported in Canada.
[9] "Table MV-9: Truck and Truck-Tractor Registration." 2016 Highway Statistics Series. Office of Highway Policy Information, Federal Highway Administration, United States Department of Transportation. December 2017. Available online: http://www.fhwa.dot.gov/policyinformation/statistics/2016/mv9.cfm
[10] "American Trucking Trends 2018." American Trucking Associations. Arlington, VA. 2018.

Table 5: Respondent Equipment Characteristics

Equipment Type	Number of Trucks/ Trailers	Average Age (Years)	Average Miles Driven per Year per Truck
Straight Trucks	4,773	9.2	24,067
Truck-Tractors	178,926	4.9	89,804
Total Trucks	**183,699**		
28' Trailers	158,348	9.0	
33' Trailers	716	4.5	
45' Trailers	3,235	8.4	
48' Trailers	35,145	8.2	
53' Trailers	114,802	6.5	
Tank Trailer	14,017	17.7	
Flatbed Trailer	5,513	6.5	
Auto Trailer	109	5.0	
Refrigerated Trailer	17,032	4.3	
Other Trailers	11,517	10.0	
Total Trailers	**360,434**		

The equipment usage trends observed in the 2017 data reflect the steady recovery of the freight market in 2017. Less intensive equipment utilization may also reflect the effects of the driver shortage on constrained freight supply, as many motor carriers were unable to boost utilization rates as they dealt with driver recruiting and retention issues.

Table 6: Respondent Equipment Trade Cycle

Equipment Type	Average Number of Years Until Replacement	Average Miles Driven Until Replacement
Truck-Tractors	7.6	695,000
Trailers	14.3	

The growing pace of new Class 8 truck orders and sales observed at the end of 2017 also demonstrates the impact of growing demand for truck transportation on carriers' equipment usage decisions. Although overall sales in 2017 were roughly level with the Class 8 sales in 2016, there was a significant increase in truck sales in the fourth quarter of 2017.[11] The end-of-year uptick in new vehicle sales also contributed to the declining truck-tractor age in the ATRI sample.

[11] Gilroy, Roger. "Class 8 Sales Jump 43% in December to Cap Strong 2017." Transport Topics. January 12, 2018. Available online: https://www.ttnews.com/articles/class-8-sales-jump-43-december-cap-strong-2017.

Alternative Fuels

The percentage of respondents reporting the use of at least some alternative fuel vehicles in their fleet in 2017 was roughly the same as in 2016 – with 10 percent of respondents reporting vehicles that use a fuel other than diesel or bio-diesel blends. However, alternative fuel vehicles account for a small percentage of respondents' overall fleet numbers. Similar to previous years, compressed natural gas (CNG) and liquefied natural gas (LNG) were the predominant alternative fuels in use by motor carriers, consistent with the increase in sales of Class 8 natural gas trucks between 2016 and 2017.[12] Nonetheless, adoption of CNG- and LNG-fueled vehicles is still far away from meeting the Energy Information Administration's (EIA's) projection that medium- and heavy-duty vehicles will become the largest consumers of LNG by 2040.[13]

The emergence of e-commerce has altered the landscape for alternative fuel vehicles in the trucking industry, as package deliveries and other local distribution operations may serve as a case study for the feasibility of these vehicles.[14] The relatively predictable routes of urban package deliveries could provide a boost to the adoption of electric vehicles, as the start-and-stop nature of these routes allow for battery replenishment. At the same time, operations within a tight delivery radius will not strain the vehicle's range as much as longer hauls, while vehicles will be able to return to local charging stations each night. Indeed, a number of fleets have demonstrated their desire to test out electric vehicles, as made evident by the growing number of fleets placing orders for electric Class 8 trucks produced by Tesla[15] and the hydrogen-electric model produced by Nikola.[16]

Nonetheless, the adoption of alternative fuel vehicles will continue to be dictated by diesel fuel prices and the fuel efficiency of new diesel truck models. Increasing diesel prices would make the adoption of alt-fuel trucks a more financially attractive proposition. Increases in the fuel efficiency of diesel trucks, however, can counter increases in diesel prices as more fuel-efficient trucks would allow carriers to stretch their costs over more miles. Although diesel prices increased in 2017 from depressed levels in 2016, they have yet to reach a level where alternative fuels become a more viable option for motor carriers. Taken together, the outlook for adoption of alternative fuel vehicles in the trucking industry remains subdued outside of the emerging "last mile"/ e-commerce niche.

[12] Abt, Neil. "Natural gas returning as a smart transportation fuel." FleetOwner. April 23, 2018. Available online: https://www.fleetowner.com/fuel/natural-gas-returning-smart-transportation-fuel.
[13] *Annual Energy Outlook 2015 with Projections to 2040.* U.S. Energy Information Administration, Office of Integrated and International Energy Analysis, U.S. Department of Energy. Washington D.C. April 2015. Available online: http://www.eia.gov/forecasts/aeo/pdf/0383(2015).pdf
[14] Long, Mindy. "Electric Truck to Power Fleets' Urban, Regional Needs First." Transport Topics. May 23, 2018. Available online: https://www.ttnews.com/articles/electric-trucks-power-fleets-urban-regional-needs-first.
[15] Clevenger, Seth. "Major Fleets Line Up to Test Tesla Semi." Transport Topics. November 21, 2017. Available online: https://www.ttnews.com/articles/major-fleets-line-test-tesla-semi.
[16] Gilroy, Roger. "Anheuser-Busch Orders 800 Nikola Hydrogen-Electric Trucks." Transport Topics. Available online: https://www.ttnews.com/articles/nikola-supply-anheuser-busch-many-800-electric-trucks.

Fuel Efficiency

Although new truck models are improving in terms of fuel efficiency, the strength of fuel economy improvements has lagged in the data. The overall fuel economy of the ATRI sample ticked up slightly to 6.4 MPG in 2017 from 6.3 MPG in 2016, and is still comparable to the median heavy-duty fleet fuel economy of 6.5 MPG found in a 2016 report by the University of Michigan Transportation Research Institute and ATRI.[17] Though a number of factors influence fuel economy, such as operating weight and speed, overall fuel economy can still be expected to improve in future years as motor carriers replace their existing trucks with newer models. Alternatively, the growth in both urban freight deliveries and traffic congestion may offset any fuel efficiency gains associated with newer vehicles.

Operating speeds, in particular, are one of the most important factors that can influence a fleet's fuel efficiency. With this in mind, a large majority of respondents (86%) continue to report the use of speed governors, with more than three-quarters of respondents utilizing governors across their entire fleet. The impact of speed governor usage on fuel efficiency is borne out in the data; fleets that use speed governors reported an average fuel efficiency of 6.5 MPG, while those that do not use speed governors reported markedly worse fuel economy (5.6 MPG).

To better understand fuel economy in the 2017 data sample, MPG figures were broken down by operating weight. As detailed in Table 7, fleets that reported loaded operating weights between 40,001 and 60,000 pounds had the highest fuel economy (7.2 MPG), followed by fleets operating between 20,001 and 40,000 pounds (6.8 MPG). Unsurprisingly, LCV fleets typically operating at weights in excess of 80,000 pounds reported the worst fuel economy, with an average of 4.9 MPG.

Table 7: Respondent Reported Fuel Economy Compared to Typical Operating Weight

Typical Operating Weight	MPG
Less than 20,000 lbs	6.3
20,001 - 40,000 lbs	6.8
40,001 - 60,000 lbs	7.2
60,001 - 80,000 lbs	6.3
Greater than 80,000 lbs	4.9

[17] Schoettle, Brandon, Sivak, Michael, and Michael Tunnel. "A Survey of Fuel Economy and Fuel Usage by Heavy-Duty Truck Fleets." Sustainable Worldwide Transportation and American Transportation Research Institute. Ann Arbor, MI. October 2016.

MOTOR CARRIER COSTS

There are a number of factors that can influence motor carrier operational costs, which can complicate efforts to measure and analyze costs on a line-item basis. For instance, labor costs can be impacted by driver experience, performance, and different compensation models. Similarly, insurance is another highly variable cost center within the industry due to rate structures that vary between industry segments and different risk preferences across motor carriers. However, ATRI has worked closely with motor carriers and panels of industry experts to identify those driver and vehicle costs that effectively represent a motor carrier's marginal costs (MC).

In order to remain consistent with the previous operational cost analyses, marginal costs were divided into two general categories, vehicle- and driver-based, comprised of the following line items:

- Vehicle-based
  - Fuel
  - Truck/Trailer Lease or Purchase Payments
  - Repair and Maintenance
  - Truck Insurance Premiums
  - Permits and Special Licenses
  - Tolls

- Driver-based
  - Wages
  - Benefits

FINDINGS

Average Marginal Costs

Overall, the 2017 costs incurred by motor carriers were up for nearly every major cost center in 2017, resulting in the average CPM increasing more than 6 percent to $1.691. For example, fuel prices rebounded from their lowest levels in a decade, exerting upward pressure on motor carrier costs in concert with continued increases in driver wages and benefits (Table 8). On a time-oriented basis, the average cost per hour for motor carriers increased to $66.65 in 2017 (Table 9). Moreover, the growth in line-item costs has pushed overall carrier costs above the ten-year average for the time period during which ATRI has collected operational cost data.

Table 8: Average Marginal Costs per Mile, 2009-2017

Motor Carrier Costs	2009	2010	2011	2012	2013	2014	2015	2016	2017
Vehicle-based									
Fuel Costs	$0.405	$0.486	$0.590	$0.641	$0.645	$0.583	$0.403	$0.336	$0.368
Truck/Trailer Lease or Purchase Payments	$0.257	$0.184	$0.189	$0.174	$0.163	$0.215	$0.230	$0.255	$0.264
Repair & Maintenance	$0.123	$0.124	$0.152	$0.138	$0.148	$0.158	$0.156	$0.166	$0.167
Truck Insurance Premiums	$0.054	$0.059	$0.067	$0.063	$0.064	$0.071	$0.074	$0.075	$0.075
Permits and Licenses	$0.029	$0.040	$0.038	$0.022	$0.026	$0.019	$0.019	$0.022	$0.023
Tires	$0.029	$0.035	$0.042	$0.044	$0.041	$0.044	$0.043	$0.035	$0.038
Tolls	$0.024	$0.012	$0.017	$0.019	$0.019	$0.023	$0.020	$0.024	$0.027
Driver-based									
Driver Wages	$0.403	$0.446	$0.460	$0.417	$0.440	$0.462	$0.499	$0.523	$0.557
Driver Benefits	$0.128	$0.162	$0.151	$0.116	$0.129	$0.129	$0.131	$0.155	$0.172
TOTAL	**$1.451**	**$1.548**	**$1.706**	**$1.633**	**$1.676**	**$1.703**	**$1.575**	**$1.592**	**$1.691**

Table 9: Average Marginal Costs per Hour, 2009-2017

Motor Carrier Costs	2009	2010	2011	2012	2013	2014	2015	2016	2017
Vehicle-based									
Fuel Costs	$16.17	$19.41	$23.58	$25.63	$25.78	$23.29	$16.13	$13.45	$14.50
Truck/Trailer Lease or Purchase Payments	$10.28	$7.37	$7.55	$6.94	$6.52	$8.59	$9.20	$10.20	$10.39
Repair & Maintenance	$4.90	$4.97	$6.07	$5.52	$5.92	$6.31	$6.23	$6.65	$6.58
Truck Insurance Premiums	$2.15	$2.35	$2.67	$2.51	$2.57	$2.89	$2.98	$3.00	$2.95
Permits and Licenses	$1.15	$1.60	$1.53	$0.88	$1.04	$0.76	$0.78	$0.88	$0.92
Tires	$1.14	$1.42	$1.67	$1.76	$1.65	$1.76	$1.72	$1.41	$1.50
Tolls	$0.98	$0.49	$0.69	$0.74	$0.77	$0.90	$0.79	$0.97	$1.05
Driver-based									
Driver Wages	$16.12	$17.83	$18.39	$16.67	$17.60	$18.46	$19.95	$20.91	$21.97
Driver Benefits	$5.11	$6.47	$6.05	$4.64	$5.16	$5.15	$5.22	$6.18	$6.78
TOTAL	**$58.00**	**$61.90**	**$68.21**	**$65.29**	**$67.00**	**$68.09**	**$62.98**	**$63.66**	**$66.65**

Between 2016 and 2017, total average marginal costs in the trucking industry grew a brisk 6.2 percent – more than three times the core inflation rate – driven by relatively large increases in vehicle costs and driver compensation (Table 10).[18] Diesel fuel prices, which were the primary factor in carrier cost declines between 2014 and 2016, began to rebound in 2017, while driver pay and benefits both increased for the fifth consecutive year. Equipment lease and purchase payments, repair and maintenance, permits and license costs, and tolls also increased from 2016.

Table 10: Annual Change of Average Marginal Costs

Motor Carrier Costs	2016-2017 Change
Vehicle-based	
Fuel Costs	9.3%
Truck/Trailer Lease or Purchase Payments	3.3%
Repair & Maintenance	0.3%
Truck Insurance Premiums	0.0%
Permits and Licenses	6.4%
Tires	7.8%
Tolls	9.9%
Driver-based	
Driver Wages	6.6%
Driver Benefits	11.2%
TOTAL	**6.2%**

Driver wages held firmly as the number one cost center for the third consecutive year, accounting for one-third of carriers' marginal costs; including driver benefits, driver-based compensation represented 43 percent of total average marginal costs (Table 11). Fuel costs held steady at 22 percent, the second-lowest percentage for fuel observed since this study's inception. The share of total costs represented by the remaining cost centers were unchanged from the shares observed in 2016.

Acknowledging the different operating conditions and business models prevalent in each industry segment (e.g. Truckload, Less-than-Truckload), this analysis also stratifies motor carrier costs by operating sector where applicable.

Carriers in the Other category, which include operations as varied as Specialized – Oversized/Overweight, Tank haulers, Flatbed carriers, and Parcel/Express operations, reported the highest CPM for the fourth year in a row (Table 12). This has been driven by higher driver compensation, as well as elevated repair and maintenance costs relative to other industry segments. On the other end of the continuum are TL carriers, which operated at considerably lower costs than other industry sectors. Truckload costs were markedly lower than other sectors for repair and maintenance, as well as driver compensation, as these costs are spread over a larger mileage base. Meanwhile, costs for LTL carriers increased nearly six percent from 2016 and 2017.

[18] "CPI-All Urban Consumers (Current Series). U.S. Bureau of Labor Statistics, U.S. Department of Labor. 2018.

Table 11: Share of Total Average Marginal Cost, 2009-2017

Motor Carrier Costs	2009	2010	2011	2012	2013	2014	2015	2016	2017
Vehicle-based									
Fuel Costs	28%	31%	35%	39%	38%	34%	26%	21%	22%
Truck/Trailer Lease or Purchase Payments	18%	12%	11%	11%	10%	13%	15%	16%	16%
Repair & Maintenance	8%	8%	9%	8%	9%	9%	10%	10%	10%
Truck Insurance Premiums	4%	4%	4%	4%	4%	4%	5%	5%	4%
Permits and Licenses	2%	3%	2%	1%	2%	1%	1%	1%	1%
Tires	2%	2%	2%	3%	2%	3%	3%	2%	2%
Tolls	2%	1%	1%	1%	1%	1%	1%	2%	2%
Driver-based									
Driver Wages	28%	29%	27%	26%	26%	27%	32%	33%	33%
Driver Benefits	9%	10%	9%	7%	8%	8%	8%	10%	10%
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 12: Average Total Marginal Costs by Sector, 2009-2017

Sector	2009	2010	2011	2012	2013	2014	2015	2016	2017
LTL	$1.43	$1.76	$1.93	$1.79	$1.84	$1.83	$1.60	$1.74	$1.84
Other	$1.67	$1.61	$1.79	$1.73	$1.67	$1.85	$1.72	$1.83	$1.95
TL	$1.36	$1.43	$1.57	$1.51	$1.60	$1.58	$1.50	$1.42	$1.49

Line-Item Costs

Driver Compensation

Driver compensation, inclusive of wages, benefits and bonuses, has been the biggest source of cost increases incurred by motor carriers since 2012. Even when overall marginal costs were declining due to falling diesel fuel prices, increases in driver wages and benefits served as mitigating factors. At the same time, driver bonuses, while not a marginal cost, have been robust as carriers seek to entice new entrants into the industry, retain their existing workforce, and reward drivers for excellent safety and operational performance.

Underpinning the growing driver compensation has been the much-discussed truck driver shortage, an issue that has plagued the industry for decades, and ranks as the top issue in ATRI's 2017 Top Industry Issues report.[19] For reference, the American Trucking Associations (ATA) estimated that the driver shortage would reach 50,000 drivers by the end of 2017, and if current trends were to continue, the shortage could grow to 174,000 drivers by 2026.[20] The ongoing driver shortage has been exacerbated by the industry's recovery from the freight recession in 2016, as burgeoning demand for truck transportation presses up against industry capacity constraints.

Beyond a shortage of qualified drivers, another challenge facing the industry is the changing demographics of the industry's workforce. ATRI's 2014 study on driver demographic trends identified that the trucking industry is failing to attract younger drivers to replace retiring baby boomers. With 56.9 percent of its workforce 45 and older, and less than five percent of its workforce in the 20 to 24 year old age bracket, the driver shortage will continue to worsen as these older drivers approach retirement age.[21] Taken together, the confluence of these forces in the industry has continued to drive up wages and benefits throughout the trucking industry.

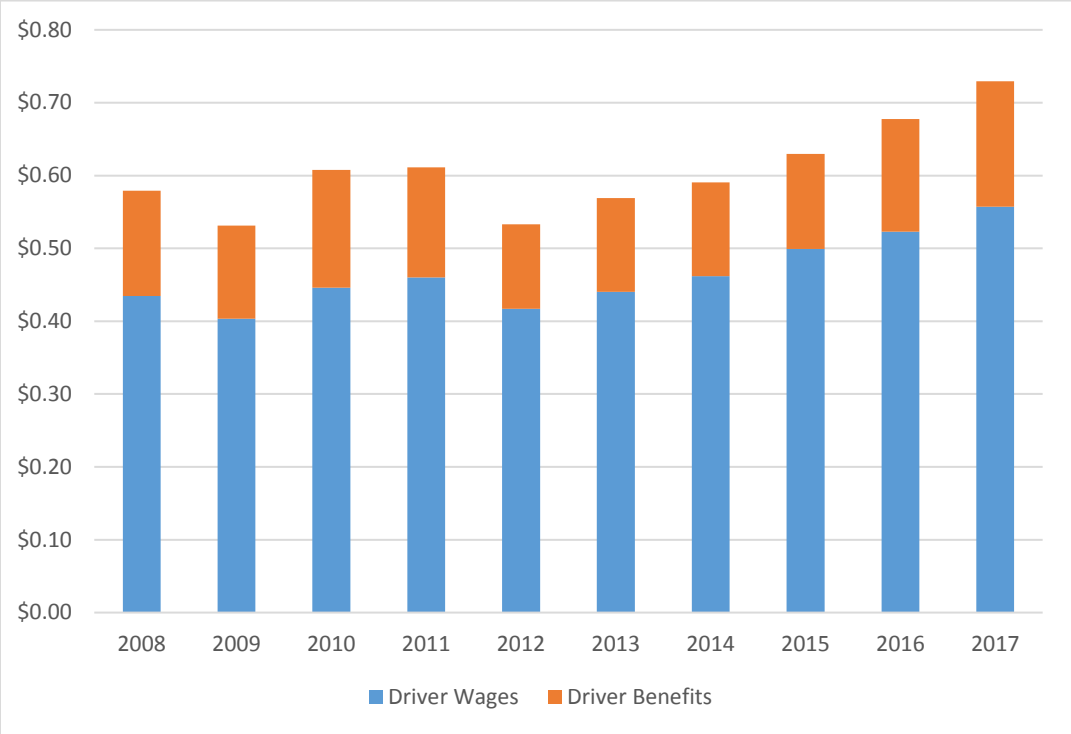
Driver Wages and Benefits

In response to the growing driver shortage as well as wage losses associated with increasing regulations and traffic congestion, driver wages and benefits have steadily increased since 2012. During this five-year time period, driver wages have risen 33.6 percent to nearly 56 cents per mile in 2017, and rank as the largest cost center for the third consecutive year. At the same time, driver benefits have surged to 17.2 cents per mile, with total driver compensation reaching 73 cents per mile in 2017 (Figure 3). This indicates that in addition to offering higher base pay, carriers recognize that benefits and other indirect rewards and incentives can play a critical role in driver recruitment and retention. Respondents to this year's survey listed benefits ranging from full medical, dental, and vision coverage, to 401(k)

[19] "Critical Issues in the Trucking Industry – 2017." American Transportation Research Institute (ATRI). October 2017. Arlington, VA.
[20] "New Report Says National Shortage of Truck Drivers to Reach 50,000 This Year." American Trucking Associations. October 20, 2017. Available online: https://www.trucking.org/article/New%20Report%20Says-National-Shortage-of-Truck-Drivers-to-Reach-50,000-This-Year.
[21] Short, Jeffery. "Analysis of Truck Driver Age Demographics Across Two Decades." American Transportation Research Institute. Arlington, VA. Published in 2014, data updated in 2017.

matching. Although most of these benefits don't show up as direct compensation in a driver's wallet, they can lead to significant improvements in quality of life.

Figure 3: Driver Wages and Benefits per Mile, 2008-2017



Broken out by sector, driver wages were highest in the "Other" category at 67.7 cents per mile, reflecting the specialized skills and credentials that carriers in this group require. For instance, many Tank haulers are involved in the movement of hazardous materials, which require a special endorsement on a driver's CDL. Average driver pay in the TL sector was the lowest amongst the three categories, although the typical driver in this industry segment is likely to run more miles each year than other drivers throughout the industry. Finally, survey respondents indicated that average truck driver pay per mile in the LTL sector was 58.1 cents per mile in 2017, which translated to $22.90 per hour.

Driver Bonuses

Another cost center which is growing quickly is in the amount and types of bonuses employers offer to drivers. A growing majority (62.7%) of respondents indicated that they pay drivers some type of financial incentive or bonus beyond wages. Respondents listed their most common incentives and bonuses as: safe driving, on-time delivery performance, and additional financial incentives to attract and retain qualified drivers (Table 13).

Respondents reported paying drivers an average bonus of almost $1,300 for safe driving in 2017, a decrease from the $1,500 paid out to drivers in 2016. On the other hand, drivers who met the criteria for on-time delivery bonuses were rewarded handsomely in 2017, receiving an

average annual bonus of approximately $2,500, well above the rate of $1,950 observed in 2016.

Table 13: Single Driver Bonus Pay by Type

Bonus Type	2016	2017	Annual Change (%)
Safety	$1,499	$1,317	-12.1%
On-Time Delivery	$1,946	$2,542	30.6%
Starting	$979	$1,401	43.1%
Retention	$1,143	$974	-14.8%

Other bonuses are designed specifically to address the driver shortage and a carrier's ability to recruit and retain the best drivers. In 2017, starting bonuses received a huge boost as carriers looked to expand capacity in light of recovering freight demand; the average starting bonus paid to drivers increased from roughly $980 to $1,400 between 2016 and 2017. Retention bonuses held relatively steady, declining to nearly $975 over the year. As these bonus levels convey, the competition between motor carriers to attract good drivers from a shrinking driver pool is likely to continue into the future.

Moving Forward

While the freight market in 2017 saw freight demand improvements from 2016, the freight market has boomed in 2018. With this strong demand for truck transportation, shippers are experiencing severe truck capacity constraints due in part to the driver shortage.[22] As a consequence, numerous reports indicate that carriers have had to increase driver pay and expand benefits packages yet again in 2018 in an effort to recruit and retain truck drivers.[23] Additionally, a majority of motor carriers now offer sign-on/stay-on bonuses to improve recruitment and retention efforts, while other carriers are forced to raise their bonus offer to remain competitive.[24] As a result, the overall compensation package offered to drivers can be expected to improve further in 2018, boosting the related line-item marginal cost centers.

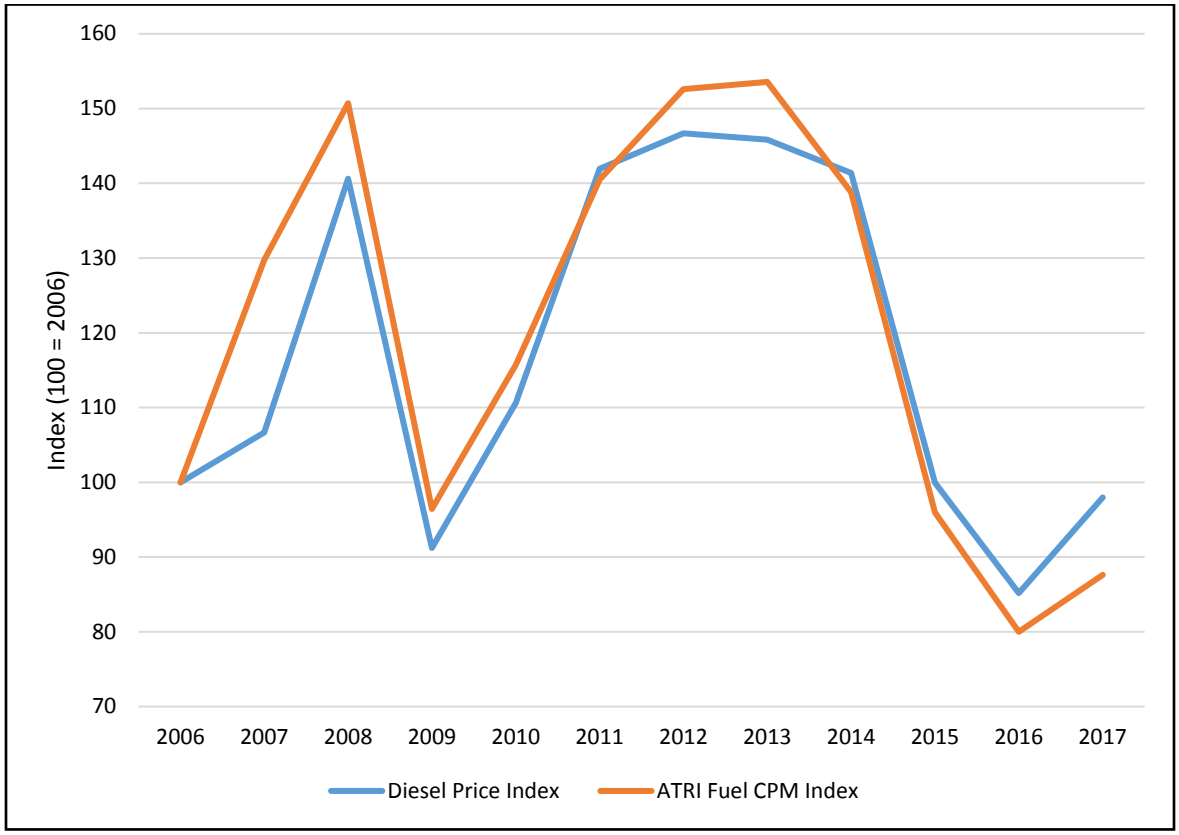
Fuel Costs

Fuel costs rank consistently as one of the biggest cost centers for motor carriers on an annual basis. In order to standardize the collection of fuel costs, responding motor carriers were asked to provide fuel cost data that excluded any revenue from fuel surcharges. Since fuel surcharges are negotiated as a fuel "subsidy" between two parties, excluding fuel surcharge reveals the actual dollar amount carriers spent directly on fuel.

[22] Lamb, Eleanor. "ATA's Bob Costello Says Driver Shortage Will Press Fleets." Transport Topics. February 22, 2018. Available online: https://www.ttnews.com/articles/atas-bob-costello-says-driver-shortage-will-press-fleets.
[23] Phillips, Erica E. "Truck Driver Salaries Rising on Surging Freight Demand." The Wall Street Journal. March 28, 2018. Available online: https://www.wsj.com/articles/truck-driver-salaries-rising-on-surging-freight-demand-1522253864.
[24] Simpson, Burney. "Driver Pay, Bonuses Rise as Carriers Seek Scarce Truckers." Transport Topics. March 28, 2018. Available online: https://www.ttnews.com/articles/driver-pay-bonuses-rise-carriers-seek-scarce-truckers.

Trends in motor carrier fuel costs link up closely to diesel fuel prices, a relationship that has held up since the inception of this study (Figure 4). However, 2017 coincides with an extremely volatile period for diesel prices, and as such, motor carrier fuel costs have fluctuated dramatically. U.S. diesel prices peaked at almost $4.80 per gallon in the summer of 2008 before a precipitous fall to roughly $2.00 per gallon by March of the following year; motor carrier fuel costs per mile fell from 63.3 cents to 40.5 cents during this time period.[25]

Figure 4: Diesel Price and ATRI Fuel Cost per Mile Index, 2006-2017

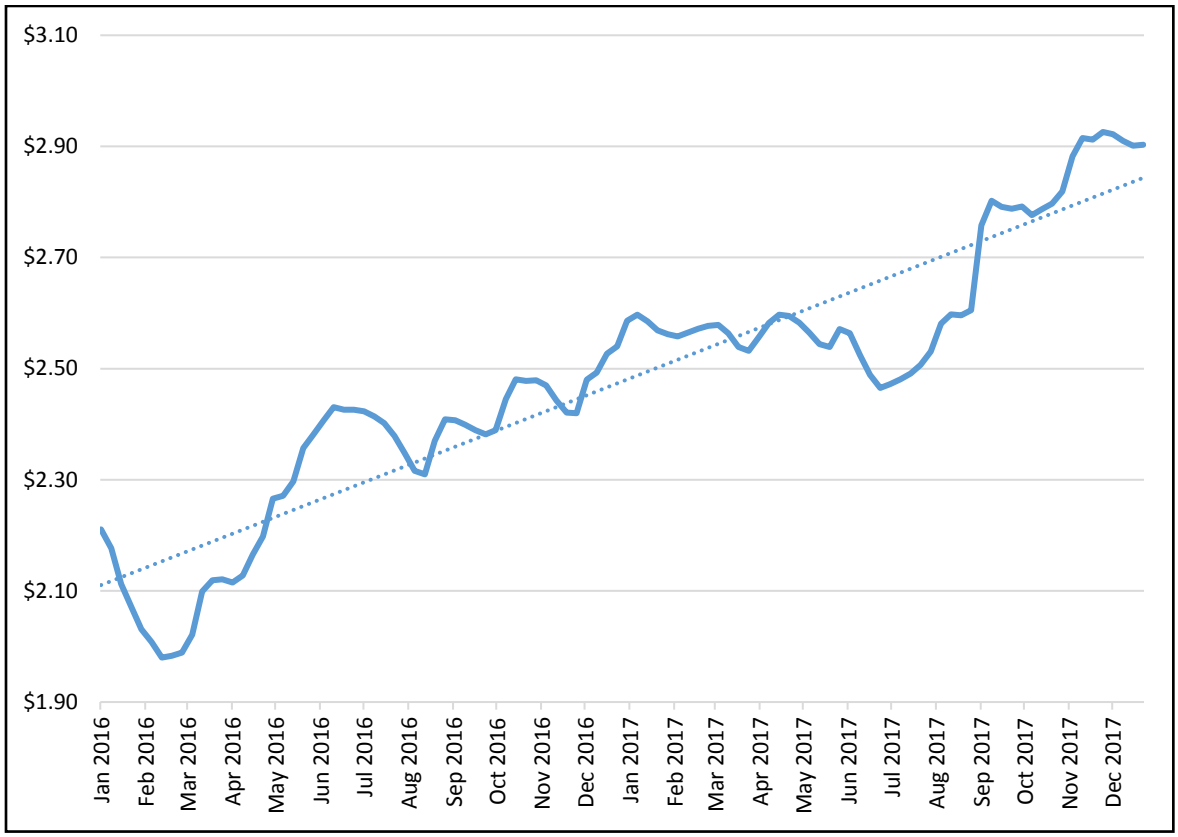


[25] Gasoline and Diesel Fuel Update. U.S. Energy Information Administration. Available Online: http://www.eia.gov/petroleum/gasdiesel.

As the economy recovered from the Great Recession, diesel prices started to rise again, increasing through 2010 before stabilizing in the $3.75-$4.15 range between 2011 and mid-2014 – with carrier fuel costs hovering between 58 and 65 cents per mile. At that time, the emergence of U.S. shale oil induced a global supply glut that resulted in plummeting diesel prices for the next two years until reaching a bottom price of $1.98 in February 2016, during which time carrier fuel costs fell 25 cents per mile, or 42 percent.[26]

After hitting the trough at $1.98 per gallon in February 2016, fuel prices rose steadily throughout the year, reaching a peak of $2.54 per gallon in the last week of December 2016 (Figure 5).[27] Nonetheless, diesel prices remained well below the average from the previous 10 years ($3.31 per gallon) for the duration of 2016.[28]

Figure 5: Monthly U.S. On-Highway Diesel Prices, 2016-2017



Since that time, a number of factors have contributed to the continued increase in diesel fuel prices. The Organization of the Petroleum Exporting Countries (OPEC) implemented production cuts to reduce the glut of oil supply at the beginning of 2017, providing strong support for higher oil prices, and hence, diesel prices climbed.[29]

[26] Ibid.
[27] Ibid.
[28] Ibid.
[29] Lawler, A., El Gamal, R., and Shadia Nasralla. "OPEC, Russia agree oil cut extension to end of 2018." Reuters. November 30, 2017. Available online: https://www.reuters.com/article/us-opec-meeting/opec-russia-agree-oil-cut-extension-to-end-of-2018-idUSKBN1DU0WW.

Additionally, Hurricane Harvey shut down up to one-quarter of U.S. refining capacity in August 2017,[30] resulting in diesel prices reaching $2.90 by the end the year.[31] As a result, fuel costs incurred by motor carriers increased 9.3 percent to nearly 37 cents per mile between 2016 and 2017.

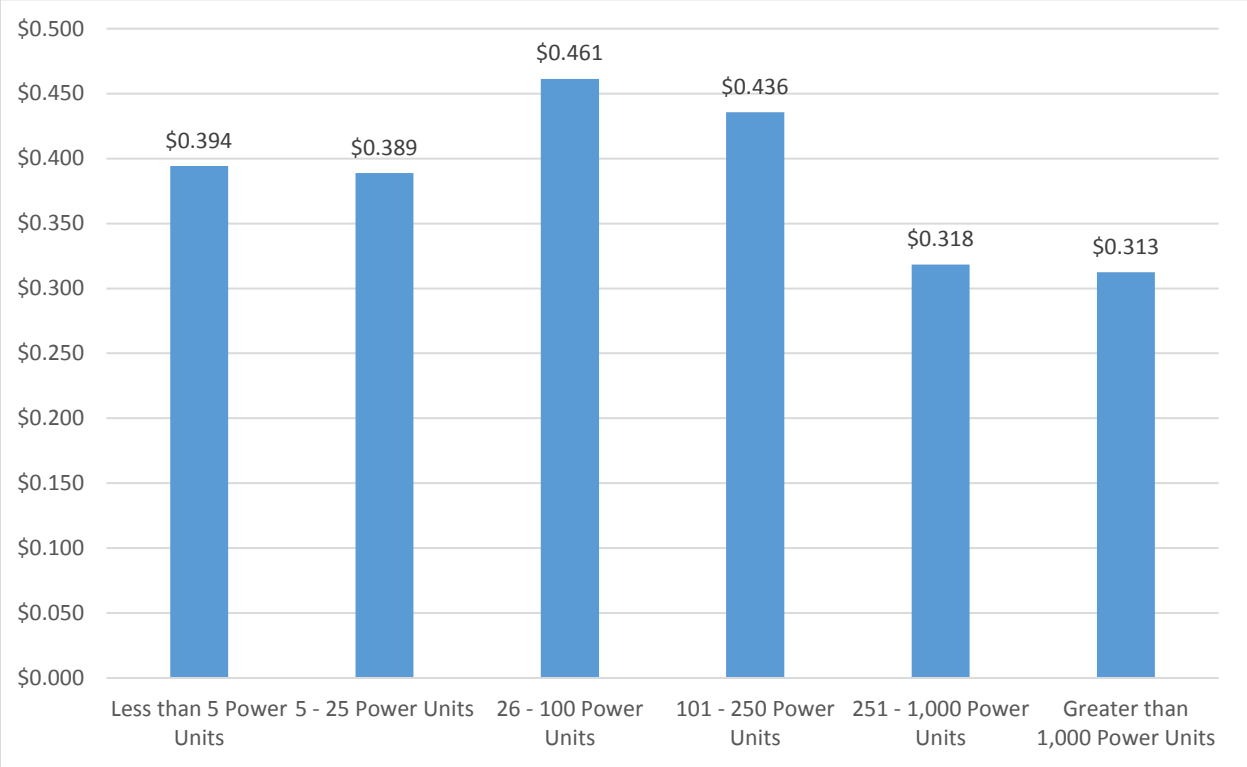
Prior to the collapse in oil markets between 2014 and 2016, fuel costs were consistently the biggest line-item expense for motor carriers, accounting for approximately 30 to 40 percent of a motor carrier's CPM.[32] However, fuel costs have since been surpassed by driver wages for the past three years, as the recent rebound in fuel prices has not offset the steep decline in diesel prices from the preceding years; fuel costs account for 22 percent of total annual carrier costs, the second-lowest ratio observed since this study's inception. These trends in for-hire fuel costs align with the private fleet benchmarking produced by the National Private Truck Council (NPTC). In the 2018 report, private fleets reported that per-mile fuel costs increased more than eight percent from 37 cents to 43 cents over the year, but remain well below the level of 62 cents per mile observed in 2014.[33]

While fuel costs are known to vary based on a number of operational characteristics, operating sector is a critical factor that can influence a carrier's fuel costs. Analyzed by sector, carriers in the "Other" category had the highest per-mile fuel costs at 43.2 cents, followed by LTL carriers at 38.3 cents, and TL carriers at 33.1 cents.

Fleet size is another important characteristic that can affect a carrier's fuel costs, as larger fleets are able to leverage their size in terms of diesel buying power, and can engage in more sophisticated price hedging strategies or use technology to distribute their fleet's trips in a more fuel-efficient manner. Accordingly, fuel costs per mile are expected to decrease as fleet size increases, a fact that has been corroborated by ATRI's survey sample for a number of years. This holds true again in 2017, as fleets operating 250 or fewer power units registered fuel costs at least seven cents higher on a per-mile basis than larger fleets in the data sample (Figure 6).

[30] Saefong, Myra P. "Here's why oil prices bounced back so fast from Hurricane Harvey." MarketWatch. September 15, 2017. Available online: https://www.marketwatch.com/story/heres-why-oil-prices-bounced-back-so-fast-from-hurricane-harvey-2017-09-15.
[31] Gasoline and Diesel Fuel Update. U.S. Energy Information Administration. Available Online: http://www.eia.gov/petroleum/gasdiesel.
[32] Hooper, A. and Dan Murray. *An Analysis of the Operational Costs of Trucking: A 2017 Update*. American Transportation Research Institute. Arlington, VA. 2017.
[33] *Benchmarking Survey Report 2018*, p.48. National Private Truck Council. Arlington, VA. August 2018. Available only to NPTC members.

Figure 6: Respondent Fuel Cost per Mile by Fleet Size



Moving Forward

At the time of this writing, national diesel prices are $3.26 per gallon, up 23 percent from the average price observed across 2017.[34] Moreover, diesel prices are projected by the EIA to remain near this level for the remainder of the year.[35] Although fuel prices are known to be highly volatile due to geopolitical concerns and unpredictable supply disruptions, it is clear that motor carriers can expect fuel costs to continue to exert upward pressure on overall line-item marginal costs in next year's report.

Equipment

The age, type and turnover rates of a motor carrier's equipment have both direct and indirect effects on several key cost centers for motor carriers. Equipment-related decisions made by carriers have a direct impact on lease and purchase payments, repair and maintenance outlays, and tire costs. These decisions can also indirectly effect other operational costs like fuel costs, insurance premiums, and permits and special licensure.

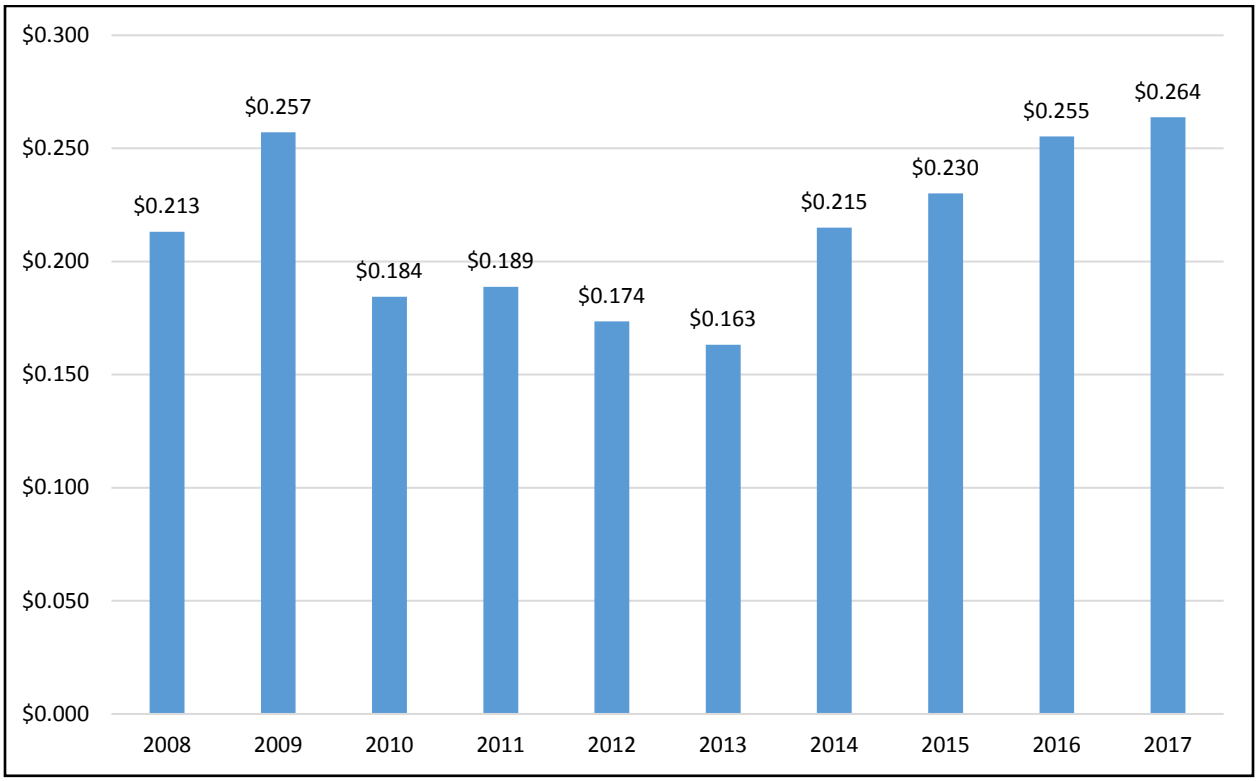
[34] Gasoline and Diesel Fuel Update. U.S. Energy Information Administration. Available Online: http://www.eia.gov/petroleum/gasdiesel.
[35] Short-Term Energy Outlook. U.S Energy Information Administration. Available Online: http://www.eia.gov/forecasts/steo/.

Truck/Trailer Lease and Purchase Payments

Truck and trailer payments were classified as a quasi-operational cost since many motor carriers purchase trucks and trailers in response to capacity constraints in strong economic periods; those payments continue whether the truck is operated or not, but are paid for with operating revenue. Motor carriers have reported that truck and trailer payments have risen steadily since 2013, and these costs increased once again between 2016 and 2017. Respondents reported that these per-mile costs increased 3.3 percent to 26.4 cents over the year, influenced in part by growing equipment costs (Figure 7).

For instance, the prices received by U.S. producers of new Class 8 trucks increased 2.1 percent between 2016 and 2017, while trailer costs edged up 0.6 percent during this time period.[36] Over the last five years, Class 8 prices have increased 13.9 percent while trailer prices are up 3.5 percent, accounting for a sizable portion of the 60 percent jump in truck and trailer payments per mile observed during this time period.[37]

Figure 7: Respondent Lease/Purchase Payments per Mile, 2008-2017



The volume of equipment purchases and leases will also influence a carrier's annual costs. The soft freight market in 2016 affected retail truck sales through the first half of 2017, although strong demand in the final quarter of 2017 kept overall truck sales about

[36] Producer Price Indexes. U.S. Bureau of Labor Statistics, U.S. Department of Labor. 2018.
[37] Ibid.

level with the number sold in 2016.[38] As such, the increase in truck and trailer purchase payments observed over the past year are primarily attributable to the growing cost of new truck models.

Truckload carriers reported the highest lease or purchase CPM again in 2017, with costs reaching nearly 29 cents per mile. Carriers in the Other category were close behind with costs of 28.1 cents per mile, followed by LTL carriers who reported lease or purchase costs of 19.6 cents per mile in 2017.

Repair and Maintenance

Repair and maintenance (R&M) costs are another important component of a carrier's equipment-related costs that have steadily increased almost continuously since this study's inception. In fact, R&M costs per mile have increased by more than 60 percent to 16.7 cents per mile between 2008 and 2017, having declined on an annual basis in just two of the past ten years (2012, 2015). Growth in R&M costs was minimal between 2016 and 2017, increasing by just 0.3 percent. There are several inter-related factors driving the longer-term increase in R&M costs, while also explaining the slower pace of cost increases observed between 2016 and 2017.

A carrier's decisions regarding equipment usage will have the most direct effect on R&M costs on an annual basis. When fleets utilize their equipment more intensively, R&M costs typically increase due to greater wear and tear over the course of the year. However, carriers in the 2017 data sample indicated that trucks were used less intensively during the year, as the average miles driven by truck-tractors declined 13.6 percent to 89,804 (Table 14). As such, equipment was accumulating less of the wear and tear that requires repairs and maintenance, limiting the extent of the increase in R&M costs on an annual basis.

Table 14: Change in Annual VMT per Truck

	Average Miles Driven Per Year Per Truck		Percentage Change in Miles Driven Per Year Per Truck
Equipment Type	**2016**	**2017**	
Truck-Tractors	103,945	89,804	-13.6%

However, there are several trends within the industry that underpin the longer-term increase in industry R&M costs. For instance, newer equipment models are more expensive to repair and maintain due to the growing technological sophistication of both power units and trailers. Many of the advanced features and technologies that were luxury add-ons just five or ten years ago are becoming standard components, or even mandated systems, of newer models.[39] This adds up to more R&M costs because the

[38] Gilroy, Roger. "Class 8 Sales Jump 43% in December to Cap Strong 2017." Transport Topics. January 12, 2018. Available online: https://www.ttnews.com/articles/class-8-sales-jump-43-december-cap-strong-2017.
[39] Phillips, Erica E. "Trucks Shift Into Higher Gear With New Technology." The Wall Street Journal. July 25, 2018. Available online: https://www.wsj.com/articles/trucks-shift-into-higher-gear-with-new-technology-1532527764.

adoption of new technologies is creating costs that didn't exist before; technologies like collision mitigation systems add a new layer of equipment and technology that can break down and require expensive repair and maintenance.

Labor costs are another factor influencing the increase in R&M costs over the past decade, bringing to light the second major labor shortage affecting the trucking industry – the diesel technician shortage. In fact, it is estimated that demand for diesel technicians will grow by 10 percent between 2016 and 2026, faster than the seven percent growth expected for all occupations.[40] However, the industry has struggled to recruit enough diesel technicians to offset the growing demand for their labor. This shortage is exacerbated by new training requirements needed to address the proliferation of new systems and sensors. This requires more diagnostics and expensive parts to ensure proper operations. As such, the diesel technician shortage plays a large role in the continued increases of carriers' R&M costs.

Different vehicle configurations used by carriers can also affect repair and maintenance costs, as can be seen in the breakout of R&M costs by sector. Carriers in the "Other" category, which represents carriers utilizing a variety of vehicle configurations (e.g. Specialized – OS/OW, Tanker, Flatbed), experienced a sizable increase in R&M costs between 2016 and 2017. These costs increased 4 cents per mile to 22 cents per mile during this time period (Table 15). Meanwhile, R&M costs fell for LTL carriers over the year, although these costs are at their third-highest level observed since this study's inception. The long-term increase in R&M costs for LTL carriers reflects the pressures of more frequent pickup and delivery operations attributable to the growing influence of e-commerce, in addition to continued deteriorations in urban traffic conditions. Finally, TL carriers reported the lowest R&M costs, with these costs holding steady at 13 cents per mile in 2017.

Table 15: Repair and Maintenance Costs by Sector, 2009-2017

Sector	2009	2010	2011	2012	2013	2014	2015	2016	2017
LTL	$0.16	$0.15	$0.18	$0.18	$0.18	$0.19	$0.17	$0.23	$0.19
Other	$0.14	$0.14	$0.16	$0.14	$0.13	$0.18	$0.17	$0.18	$0.22
TL	$0.10	$0.11	$0.14	$0.11	$0.14	$0.13	$0.14	$0.13	$0.13

Moving Forward

Many of the trends boosting R&M costs for motor carriers are expected to continue into 2018. Orders for new trucks have burgeoned in 2018, with record orders and sales pushing manufacturing backlogs into 2019.[41] This should contribute to further increases in Lease/Purchase payments reported by carriers in 2018, and may drive up R&M costs further depending on the technologies installed on these new vehicle models. At the same time, the diesel technician shortage remains pervasive throughout the industry. As such, R&M labor costs should continue to rise in the year ahead.

[40] Hurt, Emma. "The Lesser-Known Trucking Labor Shortage: Diesel Technicians." Trucks.com. December 12, 2017. Available online: https://www.trucks.com/2017/12/12/trucking-labor-shortage-diesel-technicians/.
[41] Gilroy, Roger. "Class 8 Orders in July Reach All-Time High of 52,400." Transport Topics. August 2, 2018. Available online: https://www.ttnews.com/articles/class-8-orders-july-reach-all-time-high-52400.

Truck Insurance Premiums

Commercial insurance is a very complex and volatile cost center for motor carriers of all sizes. Many internal and external factors impact a carrier's rates and costs – often independent of the carrier's crash history and safety ratings. In almost all instances, carriers rationally and regularly assess the relationship between insurance costs, deductible levels and crash/liability risks, and engage in a tenuous balancing act between managing risk and cost.

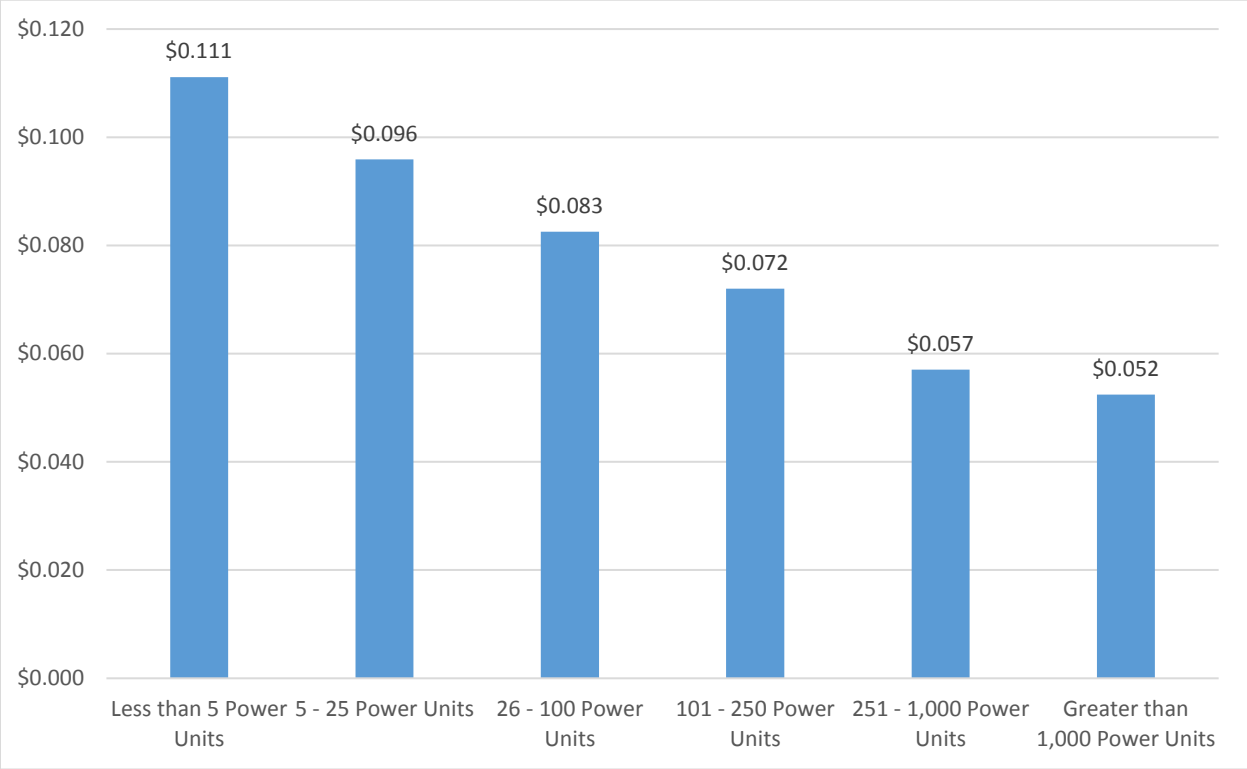
Based on the data provided by the motor carrier respondents, commercial truck insurance premiums held steady at 7.5 cents per mile in 2017. These costs were substantially higher for carriers in the "Other" category, who reported an average of 8.8 cents per mile in 2017. Costs in the diverse "Other" category reflect the higher insurance rates associated with Specialized – OS/OW and Tanker carriers. Meanwhile, Truckload and LTL carriers reported average insurance premium CPM of 7 cents and 7.3 cents, respectively.

Similar to 2016, the data reported in 2017 reflect the strategies carriers employ to balance insurance costs with operational risks. Larger fleets often self-insure or utilize high deductibles, creating the appearance of lower overall and per-mile insurance costs. In some instances, larger fleets' insurance costs are indirectly transferred to other line-items such as onboard safety technologies, or driving simulator training. Smaller fleets will also attempt to hedge insurance rate increases in similar ways, such as increasing per-truck deductibles by 20 to 50 percent or joining a "captive" insurance group – which distributes risk and cost across a wider safety net than any one fleet could financially accrue.

While an economic softening in 2016 played some role in lower exposure and lower equipment values, the strategies detailed above are the primary reason the insurance line-item has held steady after several years of considerable insurance cost increases. This demonstrates that motor carriers are better managing costs – and risk – and indicate that carriers are masking the ongoing insurance rate increases by assuming higher risk and lowering bottom-line insurance costs.

These trends can also be seen in the distribution of insurance costs across fleet sizes, as larger fleets are able to leverage their size to spread out their operational risk. This allows them to assume larger deductibles, which helps to explain why carrier-reported insurance costs decrease as a function of fleet size (Figure 8). Similar to previous years, carriers operating fewer than 100 power units reported the highest insurance CPM, while the largest fleet operators reported substantially lower costs of 5.2 cents per mile in 2017.

Figure 8: Respondent Truck Insurance Premium Costs per Mile by Fleet Size



Tires

While market demand for new trucks and trailers are known to influence the price of tires, petroleum prices have also demonstrated a relatively strong linear relationship with tire prices over the ten years of this research. This relationship holds true again in 2017, as the 7.3 percent increase in carrier tire CPM over the year is on par with the 9.3 percent increase observed in fuel costs. Carriers in the "Other" category reported the highest CPM on this category, with the average carrier spending 4.9 cents per mile in 2017. LTL carriers reported the second highest tire costs at 3.6 cents per mile, followed by TL carriers with per-mile tire costs of 3.4 cents.

Tolls

Depending on a carrier's region of operation, tolls can be a significant cost for motor carriers. Many carriers and drivers attempt to avoid tolls whenever possible since shippers rarely reimburse carriers or drivers for toll-related expenses. Similar to 2016, respondents to this year's data collection reported a relatively sharp increase in toll expenditures, with tolls increasing nearly 10 percent from 2.4 cents per mile to 2.7 cents per mile over the year. Toll costs remain elevated in the Northeast (4.1 cents per mile)

and lowest in the West (2.4 cents per mile). With states such as Rhode Island[42] and Indiana[43] looking at tolls as a potential means to fund infrastructure improvement, these costs can ultimately be expected to grow in the coming year.

Permits and Special Licenses

The average permitting and licensing CPM for all carrier respondents was 2.3 cents per mile in 2017, reflecting a 6.4 percent increase over permitting and licensing observed during the prior year. However, permit and special license costs remain below the levels observed in 2010 and 2011. Permit and licensing expenses remain one of the most volatile cost centers for carriers over the past ten years of this research as these costs are highly dependent on state budget conditions, type of carrier operations and geographic coverage.

Permit and special licensure costs were highest among LTL carriers in 2017 at 2.7 cents per mile. TL carriers reported the second-highest costs at 2.3 cents per mile, while carriers in the "Other" carrier category were close behind with costs at 2.2 cents per mile in 2017.

Costs by Region

Average marginal costs were also calculated by U.S. operating region (Table 16).[44] Carriers with operations concentrated in the Southwest and Southeast reported the lowest operating costs in 2017. The highest costs were incurred by carriers out West where trip lengths are longer and traffic congestion can be challenging, and the Northeast which has extremely dense population centers, major toll facilities, and untenable levels of traffic congestion.

[42] Amaral, Brian. "R.I. to start collecting tolls from tractor-trailers next week; truckers pledge to sue." Providence Journal. June 5, 2018. Available online: http://www.providencejournal.com/news/20180605/ri-to-start-collecting-tolls-from-tractor-trailers-next-week-truckers-pledge-to-sue.
[43] Lamb, Eleanor. "Trucks Targeted for Toll Increase in Indiana's Infrastructure Plan." Transport Topics. September 6, 2018. Available online: https://www.ttnews.com/articles/trucks-targeted-toll-increase-indianas-infrastructure-plan.
[44] See survey in Appendix A for regional definitions; Canada was excluded from this analysis.

Table 16: Average Marginal Cost per Mile by Region, 2017

Motor Carrier Costs	Midwest	Northeast	Southeast	Southwest	West
Vehicle-based					
Fuel Costs	$0.350	$0.336	$0.327	$0.314	$0.377
Truck/Trailer Lease or Purchase Payments	$0.238	$0.300	$0.242	$0.253	$0.230
Repair & Maintenance	$0.158	$0.163	$0.145	$0.128	$0.180
Truck Insurance Premiums	$0.077	$0.071	$0.061	$0.064	$0.078
Permits and Licenses	$0.024	$0.025	$0.018	$0.021	$0.028
Tires	$0.038	$0.031	$0.034	$0.039	$0.039
Tolls	$0.027	$0.040	$0.022	$0.023	$0.014
Driver-based					
Driver Wages	$0.530	$0.575	$0.543	$0.564	$0.498
Driver Benefits	$0.150	$0.194	$0.160	$0.129	$0.172
TOTAL	**$1.591**	**$1.735**	**$1.553**	**$1.536**	**$1.616**

Industry Sector in Focus: Tank Trucks

As a new addition to ATRI's Operational Cost of Trucking analysis, ATRI is attempting to expand the industry sectors for which cost information are published. On a year-by-year basis, ATRI will determine the industry sectors for which statistically sufficient data have been submitted by carriers to produce robust estimates of line-item marginal costs. Depending on data submission levels, future iterations of this report may contain several additional breakouts for different industry sectors and vehicle configurations in a format similar to the truck-tractor data analyzed earlier. In this 2018 report, ATRI received sufficient data to analyze operational costs for Tank Truck fleets.

Table 17: Tank Truck Average Marginal Costs per Mile, 2017

Motor Carrier Costs	Average Marginal Cost per Mile	Share of Total Average Marginal Costs per Mile
Vehicle-based		
Fuel Costs	$0.43	23%
Truck/Trailer Lease or Purchase Payments	$0.26	14%
Repair & Maintenance	$0.23	12%
Truck Insurance Premiums	$0.08	4%
Permits and Licenses	$0.03	1%
Tires	$0.04	2%
Tolls	$0.03	1%
Driver-based		
Driver Wages	$0.65	35%
Driver Benefits	$0.12	7%
TOTAL	**$1.86**	**100%**

Tank Truck fleet responses represented nearly 10,000 truck-tractors and almost 20,000 tank trailers in 2017. These respondents reported an average marginal cost of $1.86 in 2017, considerably higher than the $1.69 reported for truck-tractors overall (Table 17). These relatively higher operating costs can be attributed to elevated costs at several key cost centers.

- Fuel costs for tank trucks were reported to be 17.5 percent higher than the average for all truck-tractors.
- R&M costs for tank trucks are also considerably higher (37%) than the overall average, attributable in part to the specialized equipment associated with hauling corrosive and hazardous materials. Additionally, the average tank trailer in the ATRI sample was 17 years old in 2017, which would likely require extra R&M.
- Driver wages are also higher for tank trucks, reflecting the premium for drivers with the hazmat endorsements on their CDLs. However, the relatively higher driver wages are offset by the lower benefit outlays reported by Tank Truck fleets in 2017.

CONCLUSION

ATRI has once again documented and updated the marginal operational costs that carriers experienced in 2017 using financial data provided directly from motor carriers. This research continues to provide important benchmarking inputs, allowing carriers to discern and compare their performance against other fleets. Additionally, carriers can compare select line-item costs to fleets of similar sizes, operating regions, and industry sectors. Beyond strictly serving as a motor carrier benchmarking tool, an additional objective of this research is to ensure that accurate, real-world data inputs are available for public sector transportation planning and investment models in order to generate realistic costs and benefits that accrue to commercial vehicle operators on the nation's transportation system.

Based on data collected from motor carrier survey respondents, the average marginal cost per mile in 2017 was $1.691 for the for-hire sector of the trucking industry, up more than 6 percent from what was reported by motor carriers in 2016. The uptick in costs can largely be attributed to a strengthening economy exacerbating longstanding labor shortages within the industry, as well as a modest rebound in diesel fuel prices throughout the year. Driver costs retained their position as the largest cost center for motor carriers in 2017, as the persistent driver shortage continues to exert upward pressure on wages.

With current evidence indicating that the driver shortage remains firmly in place in 2018, and the expectation for further increases in diesel prices, it is highly likely that the average marginal costs faced by motor carriers will continue to grow in the year ahead.

APPENDIX A

OPERATIONAL COSTS OF TRUCKING SURVEY

OPERATIONAL COSTS OF TRUCKING DATA COLLECTION

The American Transportation Research Institute (ATRI) is again conducting its annual data collection of **for-hire** motor carriers to acquire information on trucking industry operational costs in order to update ATRI's ongoing *Operational Costs of Trucking* report. ATRI is seeking cost data **from 2017** associated with operating a truck. The final report, which will be made available in early Fall, will support studies related to industry productivity, driver issues, and fuel efficiency. Please note that the questions below are focused on TRUCK-TRACTORS. If your fleet also operates STRAIGHT TRUCKS, you will have an opportunity at the end of the form to submit separate cost information for the straight trucks in your fleet.

The data collected will be kept completely **confidential**. Personal, organizational, or financial information will never be released for public use under any circumstances, and will only be used internally for research analyses. The final report will only be presented in an aggregated, non-identifying format. As needed, ATRI will sign a Confidentiality Agreement.

The data collection form can be completed online at: https://atri.checkboxonline.com/OpCosts2018.aspx

or by completing this form and returning it via email to ahooper@trucking.org, via fax to 770-432-0638, or by mail to ATRI, 2060 Franklin Way SE Suite 201, Marietta, GA 30067.

All respondents submitting a completed, usable data collection form will receive an *advance* copy of the 2018 *Operational Costs of Trucking* report.

If you have any questions please contact Alan Hooper at ahooper@trucking.org or 770-432-0628.

CONTACT INFORMATION

Please enter your contact information below. Occasionally ATRI will follow up with respondents to clarify answers. Your information will be kept strictly confidential**. All respondents will receive an advance copy of the report.**

Company	Contact Name
Street Address	Position/Title
City, State	Zip
Phone	Email

DEMOGRAPHIC DATA

1) **What was your fleets IFTA mileage in 2017?** *(Include Owner-Operator miles reported for IFTA purposes)*
_____

2) **What was your company's annual trucking-related revenue in 2017?** *(Exclude brokerage/logistics revenue)*
$_____

3) **What is your primary for-hire business operation type?** *(Select one)*

Truckload	☐
Less-Than-Truckload	☐
Specialized – Oversize/Overweight	☐
Flatbed	☐
Tanker	☐
Express / Parcel Service	☐
Intermodal Drayage	☐
Automotive Transportation	☐
Household Goods Mover	☐
Other (please specify):	☐

4) **What are the three primary types of commodities that your company hauls?** *(While your company may haul multiple commodities, select only the top 3 most frequently hauled commodities.)*

☐ Agricultural Products	☐ Livestock
☐ Automotive Parts	☐ Manufactured Goods
☐ Construction/Building Materials	☐ Mine Ores
☐ Finished Vehicles	☐ Modular/Mobile Homes
☐ Forest Products	☐ Paper Products
☐ Garbage or Sanitation	☐ Petroleum Products
☐ General Freight	☐ Refrigerated Food
☐ Hazardous Materials	☐ Retail Store/General Merchandise
☐ Heavy Machinery/Equipment	☐ U.S. Mail/Parcel Service
☐ Household Goods	☐ Other (please specify):
☐ Industrial Gases	_____
☐ Intermodal Containers	☐ Don't Know

5) Are any of the trucks in your fleet speed limited or governed?

☐ Yes	☐ No	☐ Don't Know

If yes, please provide the maximum speed setting and the percent of your fleet governed at that speed.

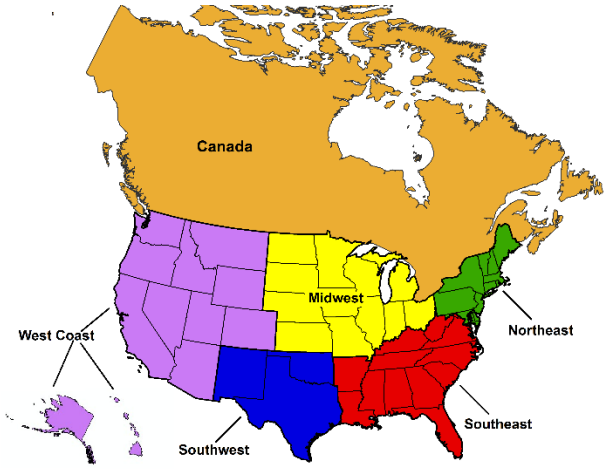
Maximum Speed (MPH)	Percent of Trucks

6) Based on your fleet's IFTA miles, what percentage of your drivers' trips were in the following categories in 2017? *(Total must sum to 100%)*

Local pickups and deliveries (less than 100 miles)	
Regional pickups and deliveries (100 – 500 miles)	
Inter-regional pickups and deliveries (500 – 1,000 miles)	
National (greater than 1,000 miles)	
Total	**100 %**

7) Please estimate the percentage of miles traveled by your fleet (include Owner-Operator miles) in the following regions during 2017. (*Total must sum to 100%*)

Region	% of Total Miles
Midwest	
Northeast	
Southeast	
Southwest	
West	
Canada	
Total	**100%**



8) How many drivers did your company employ in 2017 for each type of equipment and employment arrangement?

	Company Driver / Company Truck	Leased Driver / Company Truck	Owner-Operator
Truck-Tractor – Single Driver			
Truck-Tractor – Team Drivers			
Straight Truck			
Other (please specify):			

TRUCK-TRACTOR DATA

9) What was your company's fleet size, average age and average number of miles traveled (including Owner-Operators) in 2017?

Power Unit	Number of Assets	Average Age (in years)	Average Miles per Year per Unit
Truck-Tractor			

Trailer Type	Number of Assets	Average Age (in years)
28' Trailer		
33' Trailer		
45' Trailer		
48' Trailer		
53' Trailer		
Tank		
Flatbed		
Auto Transporter		
Refrigerated Trailer		
Other (please specify):		
Other (please specify):		
Other (please specify):		

10) For your fleet of TRUCK-TRACTORS, what is your typical operating weight in pounds?

_____ LBS

11) While your vehicles were in motion, what was your average TRUCK-TRACTOR travel speed in miles per hour (MPH)?

_____ MPH

12) How long do you typically keep your equipment? *(Specify years or miles)*

Equipment Type	Avg. Trade Cycle	Years	Miles
Truck-Tractors		☐	☐
Trailers		☐	☐

13) Are any of the TRUCK-TRACTORS in your fleet powered by an alternative fuel (i.e. do not run exclusively on diesel or gasoline)?

☐ Yes	☐ No	☐ Don't Know

If yes, please indicate the number of TRUCK-TRACTORS in your fleet that use each of the alternative fuels listed below.

Alternative Fuel Type	Number of Trucks
Compressed Natural Gas (CNG)	
Liquefied Natural Gas (LNG)	
Battery - Electric	
Hybrid Engine	
Other (please specify):	

14) Based on your fleet's IFTA data for TRUCK-TRACTORS, what was your fuel economy in miles per gallon (MPG) for 2017 (i.e. real miles driven divided by gallons of fuel purchased)?

_____MPG

14) What percent of your total annual TRUCK-TRACTORS miles were non-revenue/dead-head miles in 2017?

____ % of total 2017 miles

15) What was your average loading/dwell time per trip involving TRUCK-TRACTORS at shipper / receiver facilities in 2017? *(Average time in hours)*

____ hours per trip

16) Please list the pay per mile ($/mile)* or pay per hour ($/hour) for SINGLE TRUCK-TRACTOR drivers in 2017. *(If there are multiple pay rates for the same type of driver please use the average pay rate.)*

	Company Driver / Company Truck	Leased Driver / Company Truck	Owner-Operator
Pay per Mile[1]			
Benefits per Mile[2]			
Pay per Hour[1]			
Benefits per Hour[2]			

[1] Pay – Include only base pay. Do not include benefits, incentives and bonuses.
[2] Benefits – Include employer contributions to medical insurance, per diem and other financial benefits to the driver that are a standard part of employment. Do not include incentives and bonuses.
* Note – If your drivers are paid by the load, please convert these costs into a per mile figure. To convert this figure, calculate Total Driver Pay = (Total Loads Delivered in 2017) x (Pay Rate per Load). Then calculate Pay per Mile = Total Driver Pay / IFTA Miles.

Please list the benefits you provide to drivers that were included in the calculation above:

_____

17) Do you provide any additional financial incentives and/or bonus pay for SINGLE TRUCK-TRACTOR drivers that are not part of their regular wages?

☐ Yes	☐ No	☐ Don't Know

If yes, what was the average incentive and/or bonus pay paid per driver in 2017? (*Please report as an annual average paid per driver.)*

Type of Bonus	Company Driver / Company Truck	Leased Driver / Company Truck	Owner-Operator
Safety Bonus			
On-Time Delivery Bonus			
New / Starting Driver			
Retention Bonus			

18) Do you employ team drivers?

☐ Yes	☐ No	☐ Don't Know

If yes, please list the pay per mile ($/mile)* or pay per hour ($/hour) rates for the following types of TRUCK-TRACTOR drivers who drove as part of a TEAM in 2017. *(Please use the pay rate for each individual driver, not the team rate. If there are multiple pay rates for the same type of driver, please use the average pay rate.)*

	Company Driver / Company Truck	Leased Driver / Company Truck	Owner-Operator
Pay per Mile[1]			
Benefits per Mile[2]			
Pay per Hour[1]			
Benefits per Hour[2]			

[1] Pay – Include only base pay. Do not include benefits, incentives and bonuses.
[2] Benefits – Include employer contributions to medical insurance, per diem and other financial benefits to the driver that are a standard part of employment. Do not include incentives and bonuses.
* Note – If your drivers are paid by the load, please convert these costs into a per mile figure. To convert this figure, calculate Total Driver Pay = (Total Loads Delivered in 2017) x (Pay Rate per Load per Driver). Then calculate Pay per Mile = Total Driver Pay / IFTA Miles.

Please list the benefits you provide to drivers that were included in the calculation above:

_____

19) Do you provide any additional financial incentives and/or bonus pay for TEAM TRUCK-TRACTOR drivers that are not part of their regular wages?

☐ Yes	☐ No	☐ Don't Know

If yes, what was the average incentive and/or bonus pay paid per individual driver in 2017? *(Please report as an annual average paid per driver.)*

Type of Bonus	Company Driver / Company Truck	Leased Driver / Company Truck	Owner-Operator
Safety Bonus			
On-Time Delivery Bonus			
New / Starting Driver			
Retention Bonus			

20) Please list your 2017 <u>average TRUCK-TRACTOR cost per mile</u> for the following key cost centers, calculated using IFTA miles: *(If the amount equals zero, please enter 0. If the line-item does not apply to your operation, please enter N/A.)*

Expense Type	2017 Cost per Mile
Repair & Maintenance • Include R&M costs for all trucks and trailer; do not include tire-related expenses.	$
Tires • Include all purchase, maintenance, re-treading, and replacement costs.	$
Fuel Costs • Include all transportation fuel. <u>Do not</u> include fuel surcharge revenue.	$
Truck Insurance Premiums • Include all liability, cargo, and excess liability policy premiums related to insuring the truck. <u>Do not</u> include workers compensation costs/insurance, physical damage, jury awards, or out-of-court settlements.	$
Truck and Trailer Lease or Purchase Payments • Include all payment costs, and interest and fees associated with the payments. <u>Do not</u> include depreciation tax benefits.	$
Tolls	$
Permits & Special Licenses • Include permits for oversize/overweight, HazMat, etc.	$
Other • Please specify: _____	$
Total	**$**

<u>STRAIGHT TRUCK DATA</u>

21) Does your fleet operate <u>STRAIGHT TRUCKS</u>?

☐ Yes	☐ No

IF YOU ANSWERED NO TO QUESTION 21, YOU HAVE COMPLETED THE SURVEY. THE REMAINING QUESTIONS RELATE TO STRAIGHT TRUCK OPERATIONS ONLY. THANK YOU FOR YOUR PARTICIPATION!

---

22) What was the number, average age and average number of miles traveled in 2017 for <u>STRAIGHT TRUCKS</u> in your fleet?

Power Unit	Number of Assets	Average Age (in years)	Average Miles per Year per Unit
Straight Truck			

23) How long do you typically keep <u>STRAIGHT TRUCKS</u>? *(Specify years or miles)*

Equipment Type	Avg. Trade Cycle	Years	Miles
Straight Truck		☐	☐

24) For your fleet of <u>STRAIGHT TRUCKS</u>, what is your typical operating weight in pounds?

_____ LBS

25) While your vehicles were in motion, what was your average <u>STRAIGHT TRUCK</u> travel speed in miles per hour (MPH)?

_____ MPH

26) Are any of the STRAIGHT TRUCKS in your fleet powered by an alternative fuel (i.e. do not run exclusively on diesel or gasoline)?

☐ Yes	☐ No	☐ Don't Know

If yes, please indicate the number of STRAIGHT TRUCKS in your fleet that use each of the alternative fuels listed below.

Alternative Fuel Type	Number of Trucks
Compressed Natural Gas (CNG)	
Liquefied Natural Gas (LNG)	
Battery - Electric	
Hybrid Engine	
Other (please specify):	

27) Based on your fleet's IFTA data for STRAIGHT TRUCKS, what was your fuel economy in miles per gallon (MPG) for 2017 (i.e. real miles driven divided by gallons of fuel purchased)?

_____MPG

28) What percent of your total annual STRAIGHT TRUCK miles were non-revenue/dead-head miles in 2017?

____ % of total 2017 miles

29) What was your average loading/dwell time per trip involving STRAIGHT TRUCKS at shipper / receiver facilities in 2017? *(Average time in hours)*

____ hours per trip

30) Please list the pay per mile ($/mile)* or pay per hour ($/hour) for STRAIGHT TRUCK drivers in 2017. *(If there are multiple pay rates for the same type of driver please use the average pay rate.)*

	Company Driver / Company Truck	Leased Driver / Company Truck	Owner-Operator
Pay per Mile[1]			
Benefits per Mile[2]			
Pay per Hour[1]			
Benefits per Hour[2]			

[1] Pay – Include only base pay. Do not include benefits, incentives and bonuses.
[2] Benefits – Include employer contributions to medical insurance, per diem and other financial benefits to the driver that are a standard part of employment. Do not include incentives and bonuses.
* Note – If your drivers are paid by the load, please convert these costs into a per mile figure. To convert this figure, calculate Total Driver Pay = (Total Loads Delivered in 2017) x (Pay Rate per Load). Then calculate Pay per Mile = Total Driver Pay / IFTA Miles.

Please list the benefits you provide to drivers that were included in the calculation above:

_____

31) Do you provide any additional financial incentives and/or bonus pay for STRAIGHT TRUCK drivers that are not part of their regular wages?

☐ Yes	☐ No	☐ Don't Know

If yes, what was the average incentive and/or bonus pay paid per driver in 2017? (*Please report as an annual average paid per driver.)*

Type of Bonus	Company Driver / Company Truck	Leased Driver / Company Truck	Owner-Operator
Safety Bonus			
On-Time Delivery Bonus			
New / Starting Driver			
Retention Bonus			

32) Please list your 2017 average STRAIGHT TRUCK cost per mile for the following key cost centers, calculated using IFTA miles: *(If the amount equals zero, please enter 0. If the line-item does not apply to your operation, please enter N/A.)*

Expense Type	2017 Cost per Mile
Repair & Maintenance • Include R&M costs for all trucks and trailer; do not include tire-related expenses.	$
Tires • Include all purchase, maintenance, re-treading, and replacement costs.	$
Fuel Costs • Include all transportation fuel. Do not include fuel surcharge revenue.	$
Truck Insurance Premiums • Include all liability, cargo, and excess liability policy premiums related to insuring the truck. Do not include workers compensation costs/insurance, physical damage, jury awards, or out-of-court settlements.	$
Truck and Trailer Lease or Purchase Payments • Include all payment costs, and interest and fees associated with the payments. Do not include depreciation tax benefits.	$
Tolls	$
Permits & Special Licenses • Include permits for oversize/overweight, HazMat, etc.	$
Other • Please specify: _____	$
Total	**$**

Thank you! We greatly appreciate your participation.

Please return completed data collection forms to ATRI via (**770-432-0638)**, email (**ahooper@trucking.org**), or mail (**ATRI, 2060 Franklin Way SE Suite 201, Marietta, GA 30067)**

950 N. Glebe Road
Arlington, VA
(703) 838-1966
atri@trucking.org
TruckingResearch.org