



GEOTAB[®]

State of Commercial Transportation: Rewind 2022 + Fast Forward 2023

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Preface

Digital technology, AI and data intelligence are transforming the transportation sector, often with nuanced impacts, year over year. New technologies create opportunities for effective fleet maintenance management practices, amplified with data gathered from around the world, and these practices are delivering enhanced efficiency, safety and sustainability for the commercial transportation sector. Yet, with multiple touchpoints from where data is first collected to when it can drive real insight, trust in data has a tendency to break down. If you haven't already, it might be time to ask ***what the real value of your data is, and just what is it doing for you?***

This inaugural State of Commercial Transportation Report sets out to help businesses answer that question by sharing our expertise and understanding of digital technology and the tools available to the transportation sector, in concert with critical analysis on future policies that are unfolding from evidence of past trends. This is the first report published by Geotab, and it is part of a growing body of our research aimed at helping companies become more resilient in a time of global uncertainty.

All data is not created equally; despite the advanced vehicle and infrastructure data trends that evolved significantly in the past year, challenges for fleet owners remain. ***Fleet optimization, improvements to safety, and sustainability requires quality telematics data, meaning the use of AI for data analysis and prescriptive actions will become normal and imperative.*** With the quantity of data that has been seen up until this point, what we are learning is that the value of data increases when quality is considered at the stage of input, during its derivatives, as well as at the output, and we continue to see how data intelligence translates into real benefits for commercial transportation leaders. As management teams shift in a digital direction, use of trusted data will be in high

demand and sophisticated teams may even have data scientists as permanent members of the organization.

Safety is undeniably one of the primary drivers for telematics, and we expect it to advance even better analysis in the next year. Data driven intelligence identifies higher risk drivers and transit ways, and it analyzes how autonomous vehicles are performing. At Geotab, we continue to prioritize safety with several new capabilities that further reduce collisions, generated from trusted data.

In 2022 we started to see long term impacts on the way we move that evolved from the global disruptions of living post-pandemic, the war in Ukraine, inflation, climate change and supply chain issues. Disruptions are being felt in key areas including the types of vehicles that dominate new acquisitions; in how telematics are creating safer roads for drivers and our communities; improvements to productivity and optimization in the industries that are core to commercial transportation; and sustainability through telematics giving shape to transportation decarbonization efforts and reporting. Companies that are able to capitalize on trusted data to ride out these disruptions will continue to move forward in 2023, while those with 'bad data' risk financial and operational loss, and more.

As countries around the world continue to enact deadlines banning diesel and gas vehicles to meet national targets and combat global carbon emissions, stricter climate mandate reporting will be critical to demonstrate progress. The transportation sector accounts for 25% of global carbon emissions, and EVs in regular use, like those in commercial and public transportation sectors, may be considered a higher priority for limited resources given their ability to impact a reduction in carbon emissions. Demand for EVs, reprioritization of existing battery and materials supply chains will place focus on where the biggest impact can be made. The pressure for increased sustainability will be felt across the

supply chain, and the confidence of decision-makers will build through data-driven insights that empower fleets to measure, act upon, and scale efforts to reduce emissions.

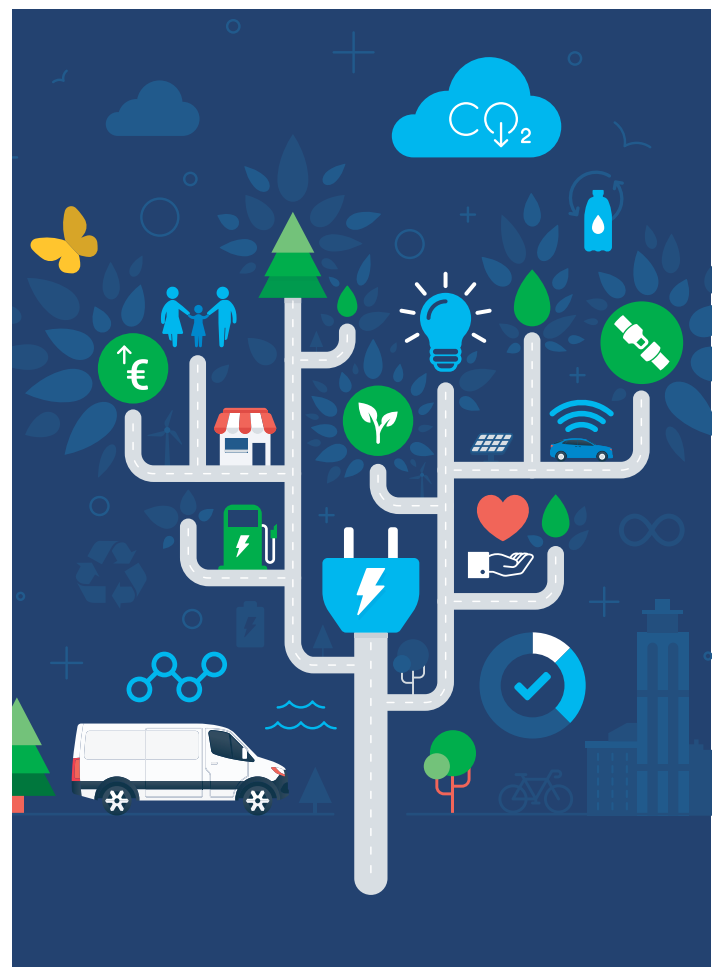
Quality data builds resiliency and prepares you for tomorrow. Ultimately, fleet managers need better tools to assess their fleet's current impact, and to identify areas that can be improved on, while monitoring progress. Data intelligence will accelerate fleet intelligence in leaps and bounds for those who can master it. This report is the first step in sharing our mobility expertise with the industry.

For more information about this report, contact:

Hanna Corrente

Geotab Inc.

hannacorrente@geotab.com



Introduction

Geotab is thrilled to release its inaugural State of Commercial Transportation Report to the industry. The world of connected, autonomous, shared and electric vehicles is rapidly changing around us and now more than ever, we are empowered with rich data and insight from these vehicles which is helping create safer, more sustainable means of transportation, allowing business to be more efficient and productive on a daily basis. With over 3.2 million connected commercial vehicles across the globe and over 55 billion data points processed on a daily basis, Geotab is well-positioned to have a strong pulse on the commercial mobility market. This report aims to provide insight into trends from 2022, and what we believe this means for the transportation industry in 2023.

This report is global in nature, however in areas of this document where global data is presented, it should be noted that the data will be most heavily skewed toward North America due to the uneven distribution of Geotab-equipped vehicles being in this area.

Rewind: 2022

2022 was a tumultuous year for the economy and the technology sector. Coming out of a global pandemic and re-adjusting yet again, the way we work in a post-pandemic era, has been challenging across the board. With the uncertainty in Ukraine, and the massive impact that has had on the European economy, and the globe at large, we look to data to help us better understand and navigate what's to come. At Geotab, we are at the heart of the connected vehicle economy and have a strong pulse on connected commercial transportation and mobility trends from 2022.

In this inaugural report, we'll be exploring a few key trends from 2022 that had an impact on the way we move. The 2022 report is divided into four key areas.

- **Global vehicle acquisition trend:** Find out what types of vehicles or makes and models were dominating new vehicle acquisitions into fleets in 2022.
- **Safety:** Find out how telematics has been contributing toward creating safer roads for our drivers and the community.
- **Productivity and Optimization:** Find out what trends we've been observing when it comes to productivity in fleets in industries that are core to commercial transportation.
- **Sustainability:** Find out how telematics is helping to shape transportation decarbonization and the impact that has been had in 2022.



The Global Vehicle Acquisition Trend

In 2022, Electric and Hybrid vehicles represented 7.1% of new vehicles on-boarded into Geotab’s connected vehicle ecosystem - an increase of 3.92% from 2021.

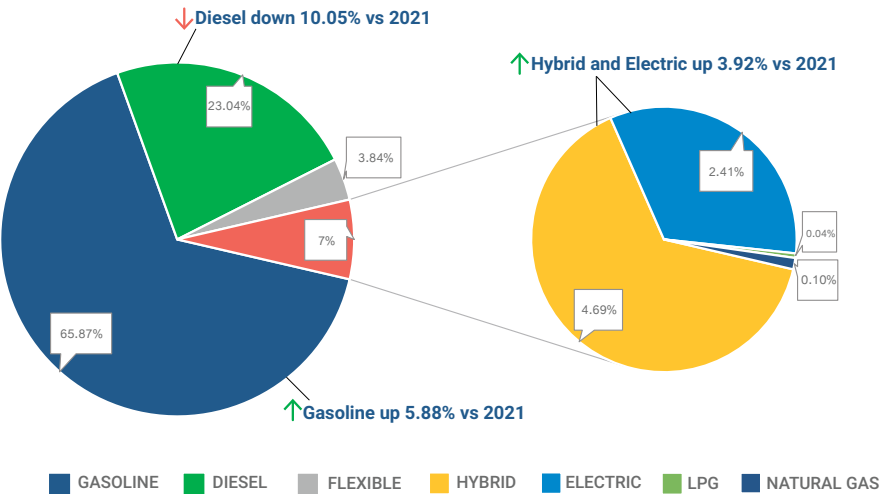
Let’s review what 2022 data told us in terms of commercial vehicle uptake. What kinds of new vehicles were dominating purchases in 2022 as compared to 2021? In Figure 1, we’ve highlighted the top 10 2022 and 2023 model years that dominated the Geotab-connected commercial ecosystem last year versus the 2021 and 2022 model years from the year prior. We’ve also sliced out demand on new model years by fuel type to illustrate the observed trend as new model years are added to fleets. Once again, this represents net new vehicles added versus looking at the entire fleet. This provides us with an outlook on what the market is demanding in the commercial sector.

This year saw the Ram 1500 rise 8 spots in the top 10 new in-demand commercial fleet vehicles, with a few new entrants in the top 10: Nissan Altima, Volvo VNL, Freightliner M2 106 Medium Duty.

Fig. 1: Top 10 2022/2023 Commerical Vehicle Purchases

Rank 2022 (2021)	Make / Model	Change
1 (10)	2022 Ram 1500	↑ +8
2 (1)	2022 Ford Transit	↓ -1
3 (5)	2022 Ram 2500	↑ +2
4 (8)	2022 Chevrolet Colorado	↑ +3
5 (4)	2022 Chevrolet Silverado	↓ -1
6 (3)	2022 Ford F-150	↓ -3
7 (6)	2022 Ford F-250	↓ -1
8 (-)	2022 Nissan Altima	New
9 (-)	2022 Volvo VNL	New
10 (-)	2022 Freightliner M2 106 Medium Duty	New

Fig. 2: Fuel Type as Percentage of Onboarded Commercial Vehicles (2022, %)



We can clearly see a growing demand for hybrids and electric vehicles (both BEV and PHEV) from the market with a combined growth in year-over-year demand of 3.92% (Fig. 2) from representing 3.18% of commercial vehicles onboarded in 2021 to 7.1% in 2022.



Safety

Geotab-Connected Commercial Vehicles see a global average improvement of 17.45% in millions of miles driven prior to a collision (from 0.91M miles in 2021 to 1.06M miles in 2022) with an average increase of 10.3% in Safety Insights utilization through its platform.

What a year it's been for safety. As each year passes, the availability of new technologies to help keep our transportation networks as safe as possible increases incrementally. From looking at how [autonomous vehicles](#) are performing on the road to new [AI models](#) that identify higher risk drivers. This all drives to a single outcome - how well are collisions being reduced? This year, Geotab has introduced a number of new capabilities to help our fleet customers in their journey to reducing collisions:

- **Safety Benchmarking and Peer Comparisons:** Geotab leverages AI to look at comparable fleets based on their vehicle mix and driving patterns. By comparing apples to apples, it enables fleets to see and quantify where their opportunities are for improvement. This helps drive safety policy and intervention as needed toward the goal of collision reduction.
- **Enhanced Collision Detection:** You cannot manage what you don't measure. Measuring collision events is often done with an accelerometer and can be a tricky thing leading to many false positives and providing low visibility into baselining how you're actually performing. Geotab has introduced AI that focuses on enhancing the quality of this data via pulling in contextual elements into the determination of a collision, weeding out false positives considerably and allowing fleets to better manage their safety programs.
- **Tighter Integration with Video:** Geotab integrates video into its platform from over 19 camera vendors and has moved to tighter integration not only of video but of insights from video that feed its safety insights providing additional context from a number of camera vendors in the market.

Across the US

Across the board, we are certainly seeing an uptick in the usage of Geotab's safety capabilities with APIs that drive safety insight up by 16.2% in 2022 in the United States (compared to figures for 2021). Safety is undeniably one of the primary drivers for telematics and to illustrate the impact that it is having, we've taken the approach of looking at how many millions of miles need to be driven prior to one collision occurring. As a point of reference based on 2021 data from [NHTSA](#) and [FHWA](#), there is an automobile crash for approximately every 0.65M miles driven in the United States. This number is representative of holistic driving and includes the entire population. In looking at commercial fleets, and driven from over 150M miles each day from Geotab-connected vehicles, we have observed that number to be 1.08M miles prior to a collision in 2022 (which is a noticeable improvement of 12.8% from 2021 where 0.96M miles were driven prior to a collision). Both figures are indeed better than the overall national average, which is likely attributable to use of telematics and the safety programs put in place by commercial fleets.

Miles Driven Prior to Collision, USA, 2022

0.85M



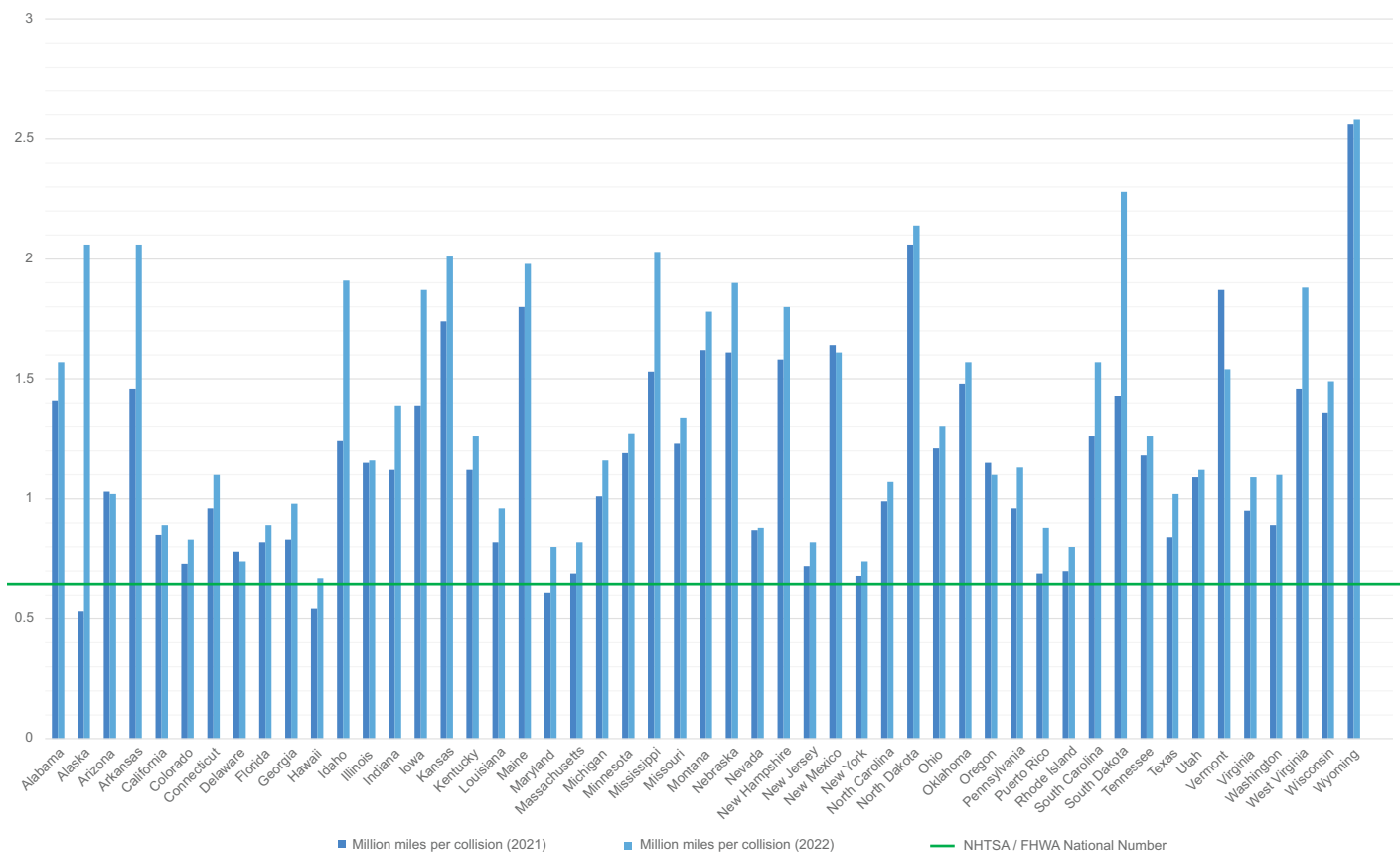
URBAN

2.30M



FREEWAY

Fig. 3: Millions of Miles Driven by Commercial Vehicles Prior to One Collision (2021 - 2022, US by State)



Looking at the results by state (Fig. 3), we can observe similar patterns of improvement with 90% of states seeing an increase in the number of miles driven prior to a collision occurring. It is important to note that some states will have fewer collective driving miles than others and so a collision (or absence of a collision) will have a larger impact on the numbers in these regions.

Most Miles Driven Prior to a Collision (Top 5 States)

1. Wyoming - 2.58M miles
2. South Dakota - 2.28M miles
3. North Dakota - 2.14M miles
4. Arkansas - 2.06M miles
5. Alaska - 2.06M miles

Biggest Movers (% Improvement 2021 to 2022)

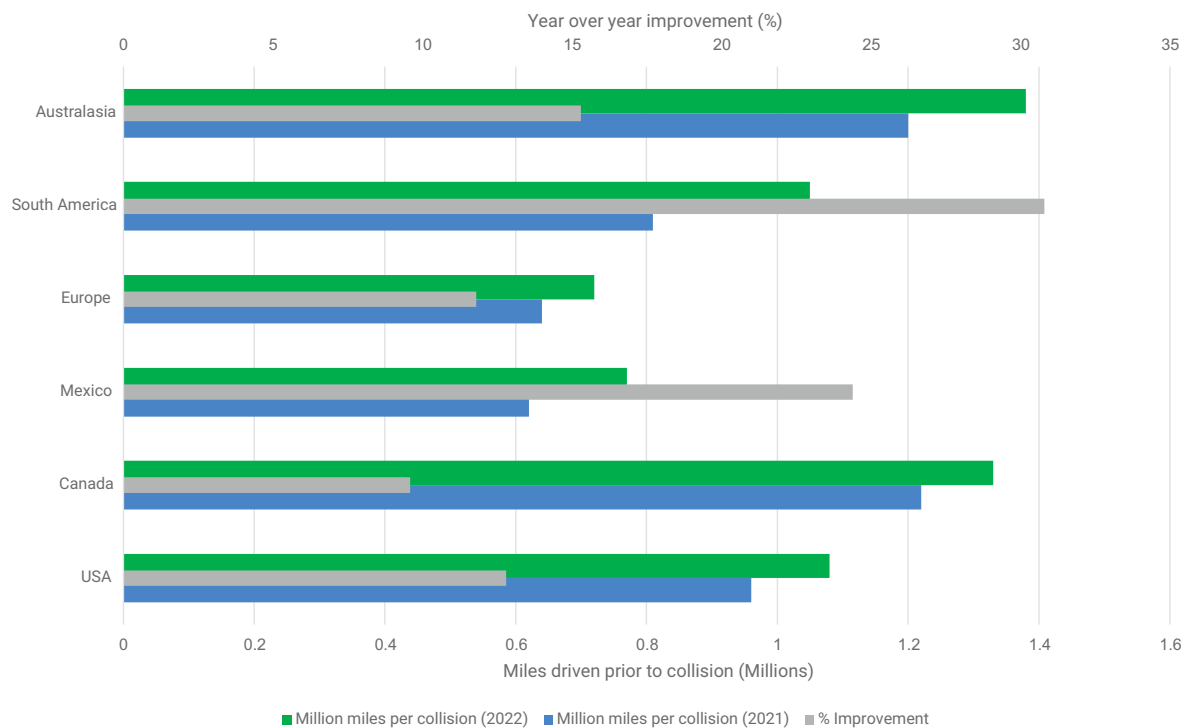
1. Alaska - 290%
2. South Dakota - 59.3%
3. Idaho - 54.6%
4. Arkansas - 40.6%
5. Iowa - 34.3%

As expected, it should be noted that states with a higher degree of urban areas tend to have fewer miles driven prior to a collision because there is a higher proportion of distance driving in the urban environment. In fact, in the United States in 2022, when splitting the road class by freeway versus urban driving we see 0.85M miles driven prior to a collision on urban roads, while this is much higher at 2.30M miles driven prior to a collision on freeways.

Across the Globe

The pattern of improvement that we are seeing in the United States is not alone; we see this improvement across the globe (Fig. 4, page 10) with Australasia taking the lead in most miles driven prior to a collision (at 1.38M) and South America with the biggest increase at 30.8% up to 1.05M miles prior to a collision. We also observed an increase in utilization of Geotab's safety insights across the board (but most prominent in Mexico at 15.9% and the United States at 16.2%).

Fig. 4: Millions of Miles Driven by Commercial Vehicles Prior to One Collision (2021 - 2022, Global)



Productivity and Optimization

As fuel costs soared to record highs in 2022, Geotab-connected fleets looked to optimize. We saw an increase in average daily trips by 5.64% while also seeing a decrease in average daily vehicle operating hours by 7.71%—yielding more output on average with fewer vehicle operating hours.¹

2022 saw record prices at the pumps and fleets took to optimizing the way they operate to conserve fuel (usually by planning more efficient routes, optimizing hubs for shorter trips, reducing vehicle idling, and more). How productive a commercial fleet is varies a lot by the industry and sector, and while each business certainly has its own measures for productivity, Geotab has looked at the industry at an aggregate level to compare year-over-year trends to assess productivity and optimization at a birds-eye view to provide some insight into what's going on in the world of commercial transportation.

What we have observed is that there has been an overall decline in average daily vehicle operating hours, but an increase in the number

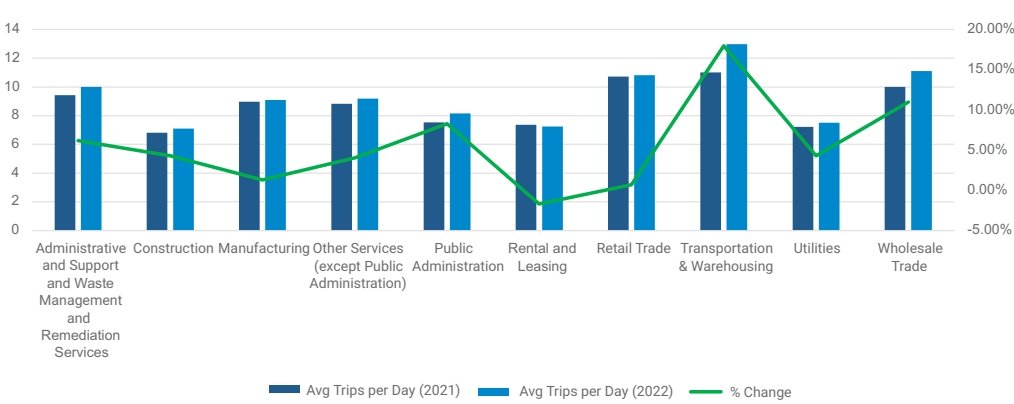
of trips made. One possible explanation for this is that given the cost of fuel, fleets are looking to optimize routes for their workers to be as productive as possible. As such, they are finding opportunities to service their customers in a more efficient manner, meaning less hours on the road, less distance being traveled, but more trips being made. This is a pattern that we have observed across nearly every one of the top 10 industries serviced by Geotab—leading to a general trend of “do more with less”.

To help fleets optimize themselves and keep their vehicles on the road and reduce downtime, Geotab has introduced a number of capabilities in predictive and preventative maintenance. In 2022, Geotab released a number of insights designed to let fleet owners know when there

¹ Globally across top 10 industries from Geotab-connected fleets

may be a problem with the health of their fleet (which could impact vehicle uptime). These range from detecting water in the fuel line through to engine overheating from coolant system problems, electrical systems issues, and more.

Fig. 5: Average Trips Per Day in Top Ten Industries (Geotab-connected Fleets, 2021-2022)



Number of Daily Trips on the Rise

Across the globe, of the top 10 industries that Geotab services (Fig. 5), only one industry had a decline in the average daily trips and that was the rental and leasing industry. In this industry, however, one is subject to the consumer or business renting/leasing the vehicle, so the ability to control this factor is typically not something the fleet owner is able to do. If you look at the remaining industries, however, you will see a marked increase in average trips per day across the board by an average of 5.64% from 2021 to 2022 across all industries shown.

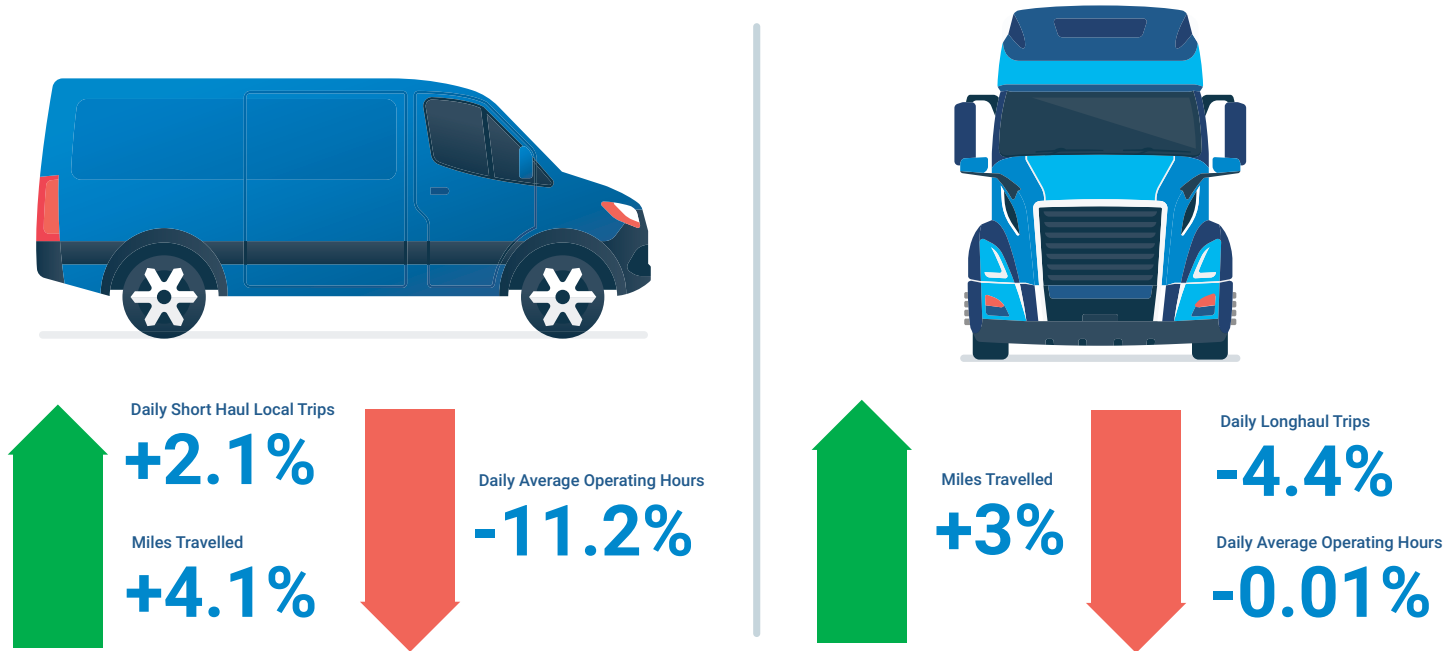
Understanding the Impact of a Vehicle’s Vocation

As we look at the breakdown by industry, it is important to keep in mind that each industry

comprises a broad set of vehicle behaviours. For example, there are both long haul and short haul behaviours in the transportation and warehousing sector. Geotab uses machine learning to automatically classify these behaviours into what we call vehicle vocations which forms the basis for benchmarking and insights provided to Geotab-equipped fleets.

Let’s take the Transportation & Warehousing industry as an example (Fig. 6). When we look into this sector by vocation, we see a 2.1% increase in the average number of daily short-haul local trips, but with a decrease in average daily operating hours by 11.2% and miles traveled by 4.1% (down to an average of 114.9 daily miles traveled in 2022 from 119.8 miles in 2021). Contrast this with the long-haul vocation

Fig. 6: Optimization and Productivity Gains in Short-haul Local Operations vs Long-haul Operations, Transportation & Warehousing (2022)



in the same sector where we see negligible difference in the average daily operating hours, and in fact an increase of 3% in the average daily miles traveled. What this tells us is that from 2021 to 2022, there were larger gains from an optimization and productivity perspective in short-haul local operations in the sector with a larger decrease in operating hours and distance traveled, yet an increase in number of trips.

For the purposes of this report, however, we have aggregated the data at the industry level to observe the broader trend as shown in Figures 7-9.

Fig. 7: Average Daily Hours of Operation, Top 10 Industries (2021-2022)

Industry	Avg Daily Hours of Operation, 2021	Avg Daily Hours of Operation, 2022	% Change
Rental and Leasing	3.82	3.07	-19.65%
Transportation & Warehousing	5.10	4.38	-14.22%
Administrative and Support and Waste Management and Remediation Services	3.80	3.50	-7.89%
Wholesale Trade	3.73	3.46	-7.37%
Other Services (except Public Administration)	3.10	2.90	-6.45%
Utilities	2.42	2.28	-5.86%
Public Administration	2.71	2.58	-4.62%
Construction	2.55	2.44	-4.25%
Retail Trade	3.28	3.13	-4.33%
Manufacturing	3.08	3.01	-2.43%

Fig. 8: Trips-to-Hours Ratio, Top 10 Industries (2021-2022)

Industry	Trips-to-Hours Ratio (2021)	Trips-to-Hours Ratio (2022)	% Change
Transportation & Warehousing	2.16	2.97	37.50%
Rental and Leasing	1.93	2.36	22.34%
Wholesale Trade	2.68	3.21	19.82%
Administrative and Support and Waste Management and Remediation Services	2.48	2.85	15.30%
Public Administration	2.78	3.16	13.54%
Other Services (except Public Administration)	2.85	3.17	11.24%
Utilities	2.98	3.30	10.77%
Construction	2.67	2.91	8.91%
Retail Trade	3.28	3.45	5.25%
Manufacturing	2.91	3.02	3.83%

Trips Up. Operating Hours Down.

While there is an observed trend in increasing trips, it is clear that there is an appetite to better optimize trips by reducing hours of operation. One could argue that this strategy was also accelerated due to driver shortages and having to find ways to service customers through better fleet optimization. As such, there was a marked reduction in the average daily vehicle operating hours across all industries (Fig. 7).

Trips as an Indicator of Work Output

If we consider a trip to be an output of work and we look at the trip-to-hours ratio (Fig. 8), we start to see a pattern emerge of increasing work being performed in fewer operating hours. We are of course looking at this in the aggregate and while a trip may be a unit of productive work, it may also be non-productive as well (i.e. a trip to the gas station, a trip to get lunch, etc.)



Sustainability

EV adoption amongst Geotab-connected fleets is slowly increasing with adoption being much higher in Europe² at an average of 2.03% of total fleet vehicles vs. 0.45% in North America.³ Over 60% of fleets that adopt Geotab's transportation decarbonization tools saw reduction in per-mile emissions in 2022.

When we talk about sustainability, our focus has really been on transportation decarbonization and how we can truly help move the needle for commercial fleets. Throughout 2022, we have conducted a number of studies that highlight insights for key pieces of infrastructure that will enable this transformation at scale. In a [comprehensive first-in-the-nation study](#) between National Grid, Geotab, CALSTART, RMI, and Stable Auto, we looked at the importance of the confluence between vehicle movement and high voltage power lines to inform the grid of the future to support heavy duty electric trucks. A [preceding study with The Ray](#) also showed the importance of looking at truck movement

patterns to help guide State Departments of Transportation planning and funding of electric vehicle charging infrastructure.

Yet, Geotab's biggest opportunity to move this needle in transportation decarbonization has been in helping fleets along their decarbonization journey. From the onset, helping them reduce fuel consumption in Internal Combustion Engine (ICE) vehicles through to helping them transform through movement to electric vehicles.

Amongst the top 10 industries that Geotab services, we saw a 9.69% average daily reduction in vehicle idling (Fig. 9) during a trip, with Transportation and Warehousing sector seeing the biggest drop at 41.28% drop from an average of 54.6 minutes of mid-trip idling per vehicle per day in 2021 to 31.8 minutes in 2022.

In order to fuel this reduction in idling and emissions, Geotab's [Green Fleet Dashboard](#) has been used to help benchmark and reduce fuel consumption, in turn reducing carbon emissions. Over 60% of Green Fleet Dashboard users saw reductions in per-mile emissions in 2022. Once fleets have made the decision to invest in EVs, to help them transition with EV adoption, Geotab's [Electric Vehicle Suitability Assessment](#) (EVSA) helps fleets identify

Fig. 9: Mid-Trip Idling in Hours, Top 10 Industries (2021-2022)

Industry	Mid-Trip Idling (Hours, 2021)	Mid-Trip Idling (Hours, 2022)	% Change
Transportation & Warehousing	0.91	0.53	-41.28%
Wholesale Trade	0.62	0.54	-12.16%
Construction	0.30	0.27	-11.11%
Administrative and Support and Waste Management and Remediation Services	0.76	0.70	-7.69%
Retail Trade	0.40	0.38	-6.25%
Utilities	0.32	0.30	-5.26%
Manufacturing	0.33	0.32	-5.00%
Other Services (except Public Administration)	0.40	0.38	-4.17%
Public Administration	0.42	0.40	-4.00%
Rental and Leasing	0.30	0.30	-

² Aggregate 2022 data from UK, Spain, Germany, Italy, and France

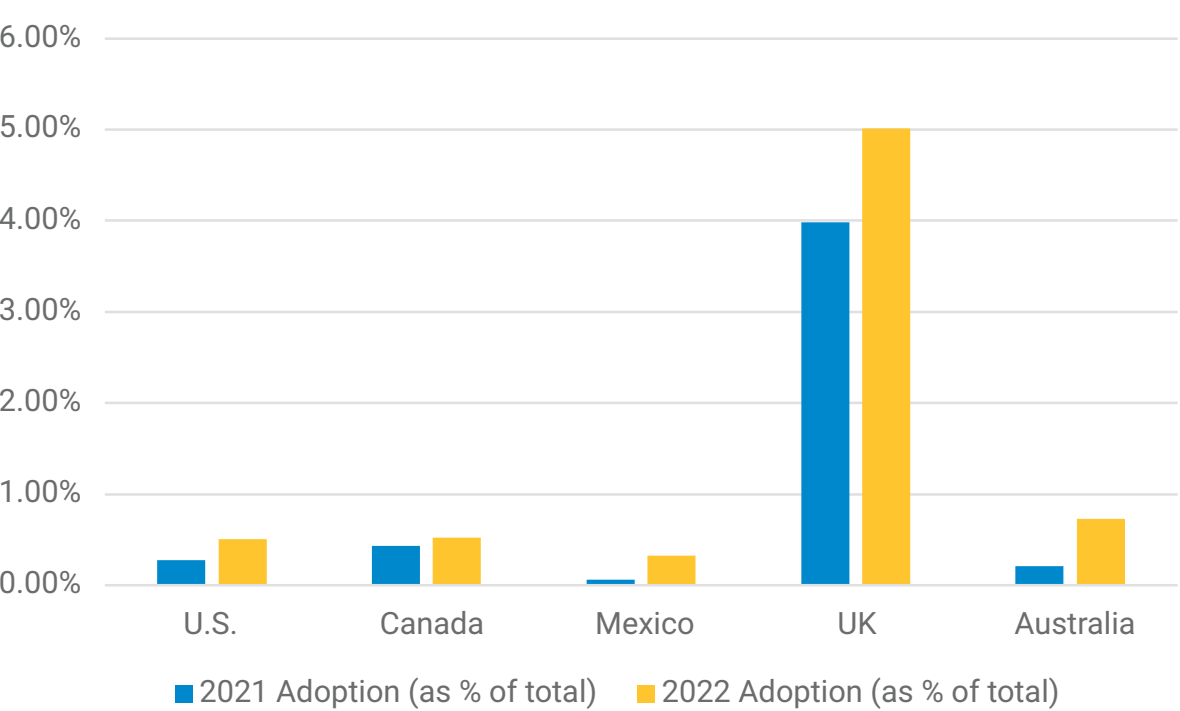
³ Aggregate 2022 data from U.S., Canada, and Mexico

which duty cycles in their fleet are best suited for electrification. Over 60% of fleets who ran the EVSA saw per-mile emission reductions in 2022 and we've helped double the number of EVs among fleets who've run the EVSA.

As electric vehicles begin to gain popularity in fleets, there is certainly a slow but upward trend which tends to be more pronounced in Europe.

Figure 10 shows EV adoption by fleet as a percentage of the total Geotab-connected fleet size in the country. Additionally, it represents the top 5 regions where Geotab-connected vehicles are deployed and the percentage of vehicles which are electric (either BEV or PHEV) alongside the year-over-year adoption increase. One thing is certain, EVs are on a consistent upward adoption trend across fleets.

Fig. 10: EV Adoption by Fleet as Percentage of Total Geotab-connected Fleet Size, Top 5 Regions (2021-2022)



Fast Forward: 2023

Getting data quality right allows you to build for tomorrow. Advanced vehicle and infrastructure data trends have evolved significantly in the past year, yet challenges for fleet owners remain. 2023 will illustrate how trusted data can be a key differentiating factor for success, it will bring business into the future, and it will identify who the winners are in understanding its benefits. Fleet optimization and sustainability requires quality telematics data, meaning that the use of AI and data intelligence for analysis and prescriptive actions will become normal and imperative.

Geotab's top trends to watch out for in 2023 include:



Greater emphasis on the value of data: All data is not created equally - the value of

data increases when quality is considered at the stage of input, during its derivatives, as well as at the output. Well managed data intelligence improves the quality of decisions companies make daily to navigate their futures, with bad data leading to financial and operational loss and more.



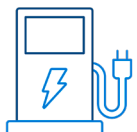
Intelligent fleets embrace data intelligence: As it

becomes increasingly clear that the surest way to fleet optimization and sustainability is through telematics data, the use of AI and data intelligence for analysis and prescriptive actions will become the norm. Use of trusted data will be in high demand from fleet management teams, and sophisticated teams may even have data scientists as permanent fixtures.



Outgrowing EV growing pains:

Countries around the world will continue to enact deadlines banning diesel and gas vehicles to meet national targets and combat global carbon emissions. This is helping to pave the way for EVs to overtake traditional fuel models.



The power of a strategically placed plug-in: In order to properly service

the growing numbers of EVs, municipalities need to follow a data-driven approach for the planning and installation of charging infrastructure. Placing the right charger at the right location, such as Level 3 chargers at highway service stations, is key to addressing range anxiety and efficiently allocating charging resources. Instead of locating chargers in small retail locations where stops are typically short, deploying them to sites where people leave their cars for long durations – such as parking garages and employer lots – would result in greater usage and utility.



Accelerating battery innovation: 5-minute EV charging and improvements to

battery life and management, like silicon anodes, will take off. Battery swapping, and off-street charging will become more available and common.



Demanding more from the supply chain: Increasing

pressure to reduce 'Scope 3' emissions will force many companies to scrutinize their supply chains and demand more sustainability efforts from their suppliers.



Prioritizing EV supply chain and end users: With

skyrocketing demand for EVs, reprioritization of existing battery and materials supply chains will place focus on where the biggest impact can be made. Keeping in mind the transportation sector accounts for 25% of global carbon emissions, EVs in regular use, like those in commercial and public transportation sectors, may be considered a higher priority for limited resources given the significant impact they can have in reducing carbon emissions.



Shift to shared vehicle ownership:

Across company cars and fleets, increasing shared vehicle ownership and mobility will further drive sustainability, reducing expenses and road congestion.



Pressure for sustainability reporting and insights:

Governments will also continue to adopt stricter climate mandates, and reporting will become critical to demonstrate progress. To lead in electrification, the confidence of decision-makers will build through data-driven insights that empower fleets to measure, act upon, and scale efforts to reduce emissions.



This white paper is intended to provide information and encourage discussion on topics of interest to the telematics community. Geotab is not providing technical, professional or legal advice through this white paper. While every effort has been made to ensure that the information in this white paper is timely and accurate, errors and omissions may occur, and the information presented here may become out-of-date with the passage of time.