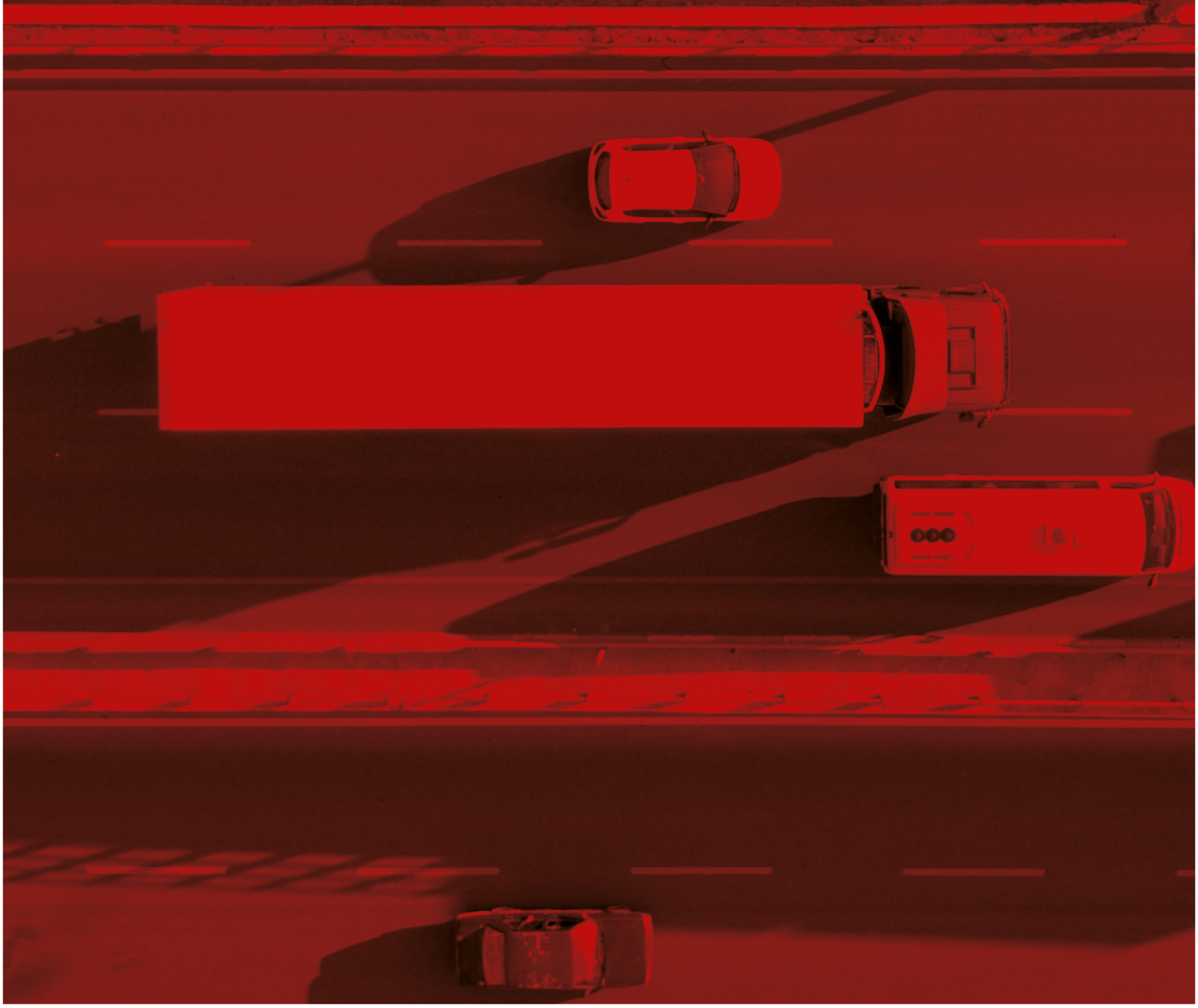
Smart Freight Centre

15 October 2025

Data Insights to Inform Truck Electrification Along the I-10 Corridor

An analysis of the driving patterns of heavy-duty diesel trucks



Collaborative authorship of this report

This report is the product of a collaboration between Smart Freight Centre (SFC), Altitude by Geotab and Terawatt Infrastructure — each bringing distinct expertise to the challenge of freight electrification.

Smart Freight Centre (SFC) is a globally active non-profit organization driving climate action in the freight sector. Its mission is to mobilize the global logistics ecosystem — particularly its members and partners — to track and reduce greenhouse gas emissions. SFC works to accelerate emissions reductions in line with 1.5°C pathways, aiming for a zero-emission global logistics sector by 2050 or earlier. Along the I-10 corridor, SFC has convened a shipper–carrier consortium to test and accelerate battery-electric truck adoption.

Altitude by Geotab is a data platform that uses aggregated, anonymized commercial vehicle telematics to generate insights into real-world commercial vehicle behavior. For this report, Altitude data provides a quantitative lens on how trucks operate along the corridor, helping assess the readiness of battery-electric trucks to move freight today and in the future.

Terawatt Infrastructure owns, develops, operates, and maintains charging sites and operational solutions that form the backbone of commercial EV transport in the U.S. Terawatt powers electrified fleets with the most reliable network of private, high-powered, secure charging solutions designed for medium- and heavy-duty electric vehicles.

Together, SFC, Altitude by Geotab, and Terawatt offer more than theory: this partnership delivers comprehensive, data — research that validates the business case for electrification and outlines a scalable roadmap for the wider industry.

Contents

Summary

Electrifying heavy-duty trucks along the I-10 corridor is closer to reality than many assume. An analysis of aggregated telematics data from more than 72,000 heavy-duty trucks, using Geotab's Altitude platform, over a one-year period, shows that the majority of operations already fit within the capabilities of today's battery-electric trucks. With strategically placed charging hubs, much of this corridor could transition now — saving fuel costs, reducing emissions, and demonstrating what's possible for long-haul freight across North America.

The analysis provides three key findings:

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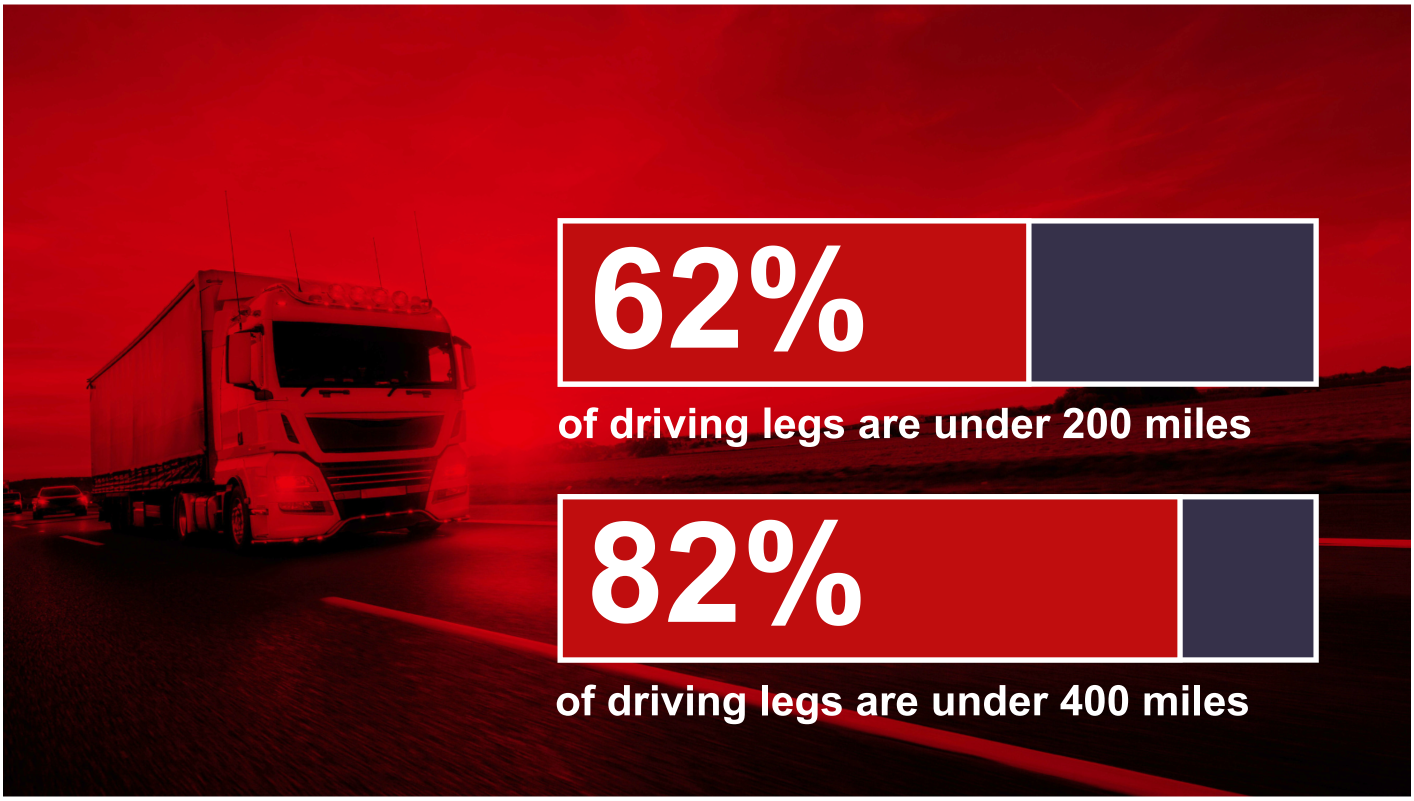
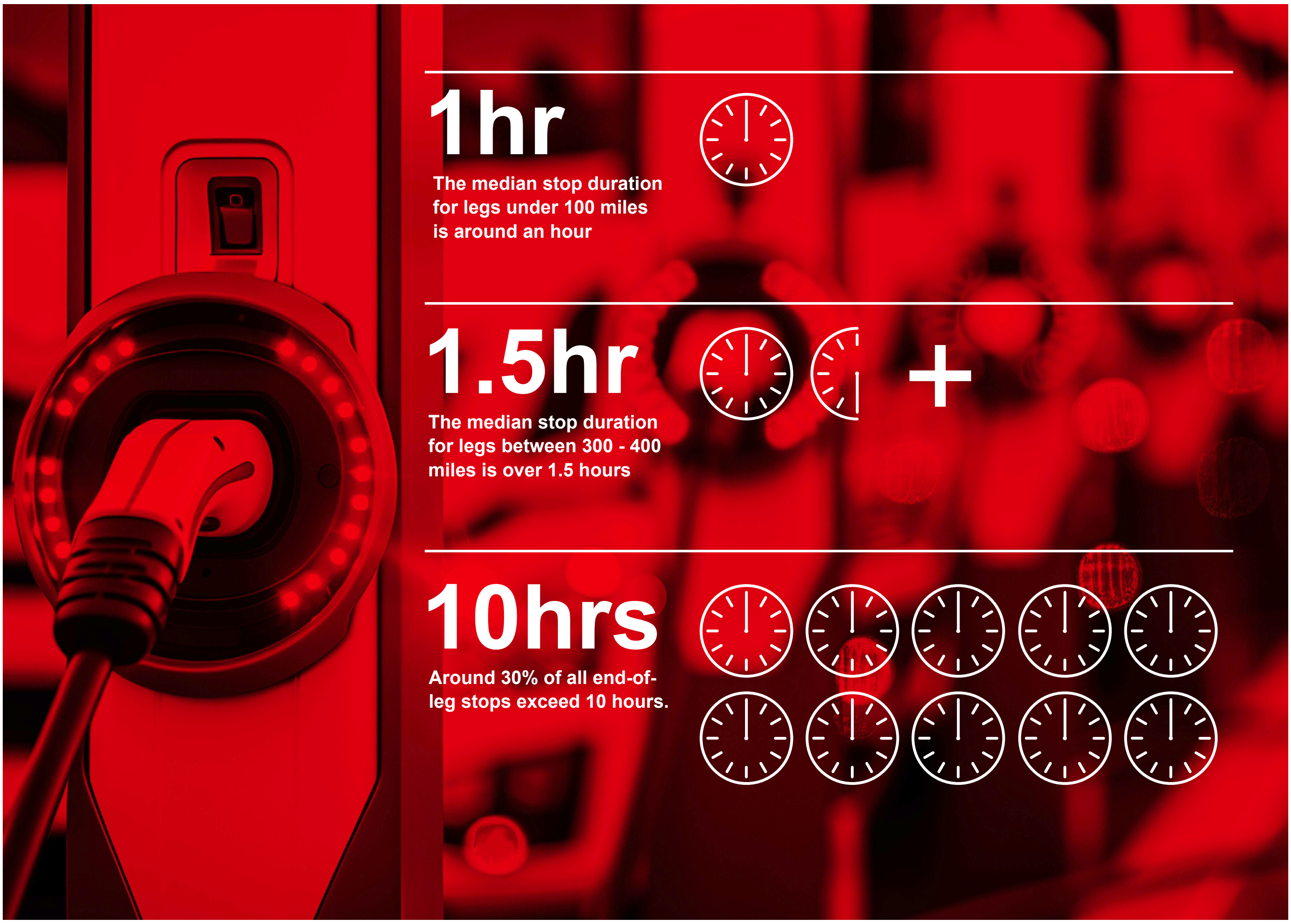
1 The majority of freight movements on the I-10 can be electrified today



While the I-10 corridor spans 800 miles between Los Angeles and El Paso, most heavy-duty truck routes cover only a portion of that distance. Our analysis reveals that the driving legs between significant stops (45 minutes or longer) cover relatively short distances, making them prime candidates for electrification.

These distances align with the capabilities of today's battery-electric trucks, which typically offer 150-250 miles, with some newer models reaching up to 500 miles.[1,2] This means that electric trucks can satisfy the distance requirements for most driving legs on this corridor, provided adequate charging is available at the start and end points.

2 Today's dwell times accommodate charging needs and capabilities

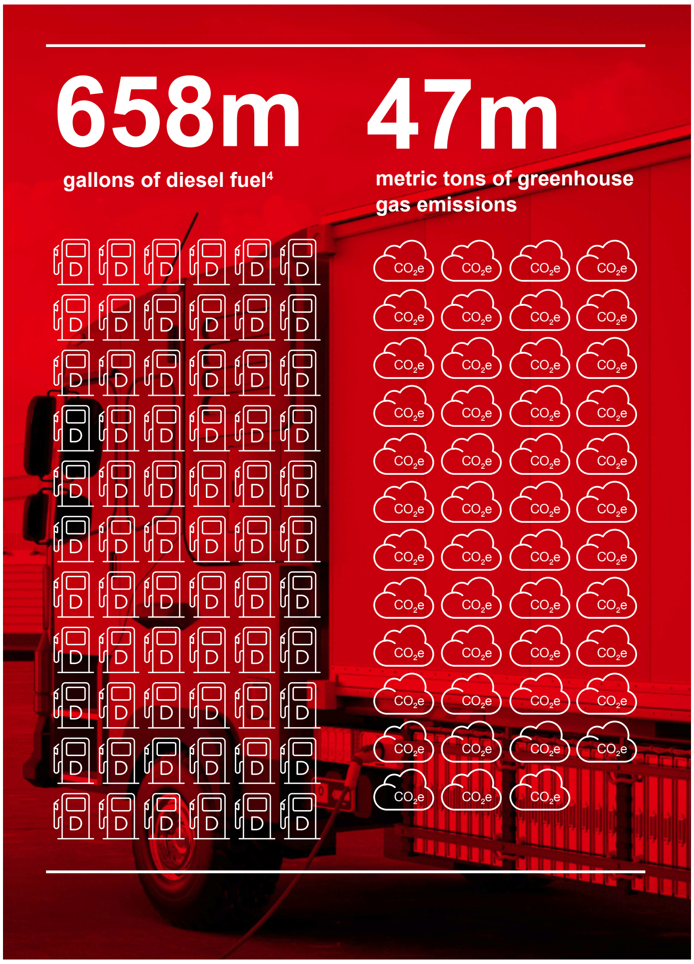


With charging a key consideration for electrification, our analysis shows that the length of stop duration concluding a driving leg increases with the length of the leg, providing longer charging times when batteries would be most depleted. In other words, the longer the leg a driver drives, the longer the concluding stop will be, and the more opportunity for charging there is.

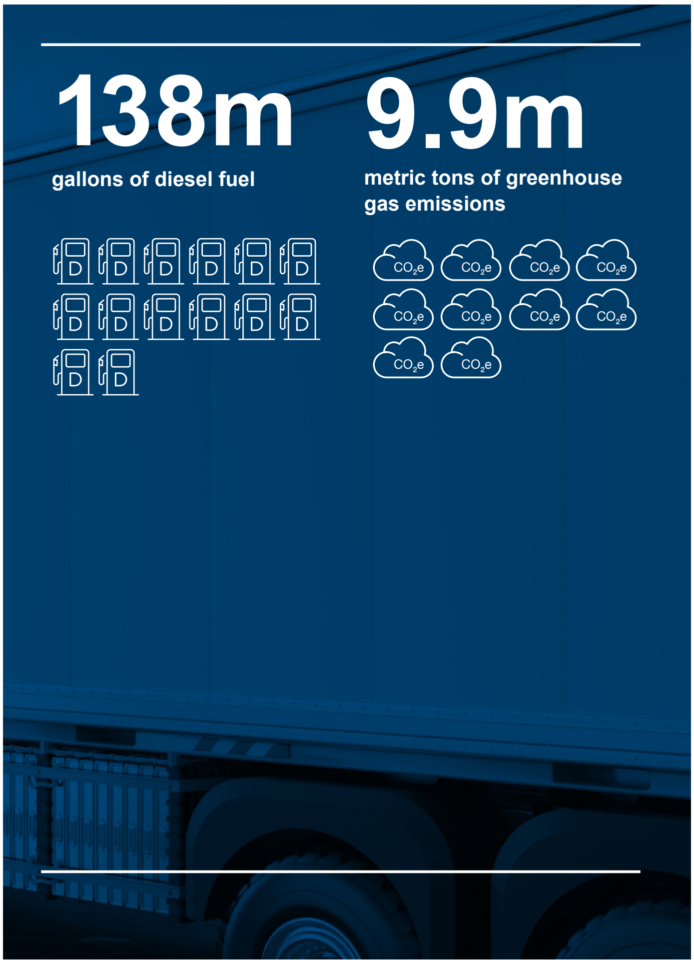
This indicates that integrating charging into existing dwell or stop locations could minimize or eliminate additional downtime, aligning fleet electrification with current operational schedules.

3 Significant economic and environmental opportunity

The I-10 corridor is a critical artery for North American freight, with heavy-duty trucks traveling an estimated 4.6 billion miles annually.[3] **This current diesel-powered traffic comes with significant costs:**



Electrifying just the driving legs shorter than 200 miles, which account for roughly 21% of the total miles driven on the corridor, presents a significant opportunity. Doing so could save:



Ultimately, this analysis reveals that the I-10's operational realities make it an ideal model for scalable, zero-emission freight today, providing a blueprint for electrification across North America's freight backbone.

Background

The I-10 Corridor

Decarbonizing transportation is essential to global climate action. Heavy-duty trucks make up only about 7% of vehicles on U.S. roads but account for nearly 25% of transportation greenhouse gas emissions.[5,6] They also face significant economic pressure, with fuel representing 20-40% of fleet operating costs — leaving profit margins highly vulnerable to diesel price volatility.[7] Electrification offers a more cost-stable energy source and an opportunity to reduce both emissions and operating costs, making it one of the most impactful shifts the sector can undertake.

The I-10 corridor serves as a critical component of the U.S. freight system and a major economic engine, stretching more than 800 miles from Los Angeles to West Texas and beyond. It is among the busiest freight routes in the nation, carrying an estimated 8-10% of total U.S. freight volume and linking major ports of Southern California to a vast network of distribution centers and consumer markets, particularly within the Inland Empire — one of the nation's largest logistics hubs. Its strategic location and high volume of heavy-duty truck traffic make it an ideal proving ground to demonstrate the scalability and viability of long-haul electric trucking, with lessons that can inform national and even cross-border electrification strategies. Yet successful electrification of this corridor hinges on overcoming substantial barriers: the high upfront cost of electric trucks, the limited range of current battery technology, and — most critically — the absence of a robust and reliable charging network.

This report, a collaborative effort between Smart Freight Center, Altitude by Geotab and Terawatt investigates how readily today's I-10 trucking operations could transition to electric. Using aggregated vehicle telematics data from Altitude by Geotab, we examine how trucks currently operate along the corridor. The chart below shows the distribution of total daily distances driven, highlighting that trips exceeding 700 miles in a single day are rare. The analysis that follows explores these driving patterns in detail, revealing how truck travel is actually comprised of shorter, more manageable driving legs,
well suited for today's electric truck technology.

Figure 1: **Daily distance covered by heavy-duty trucks on the I-10 Corridor**

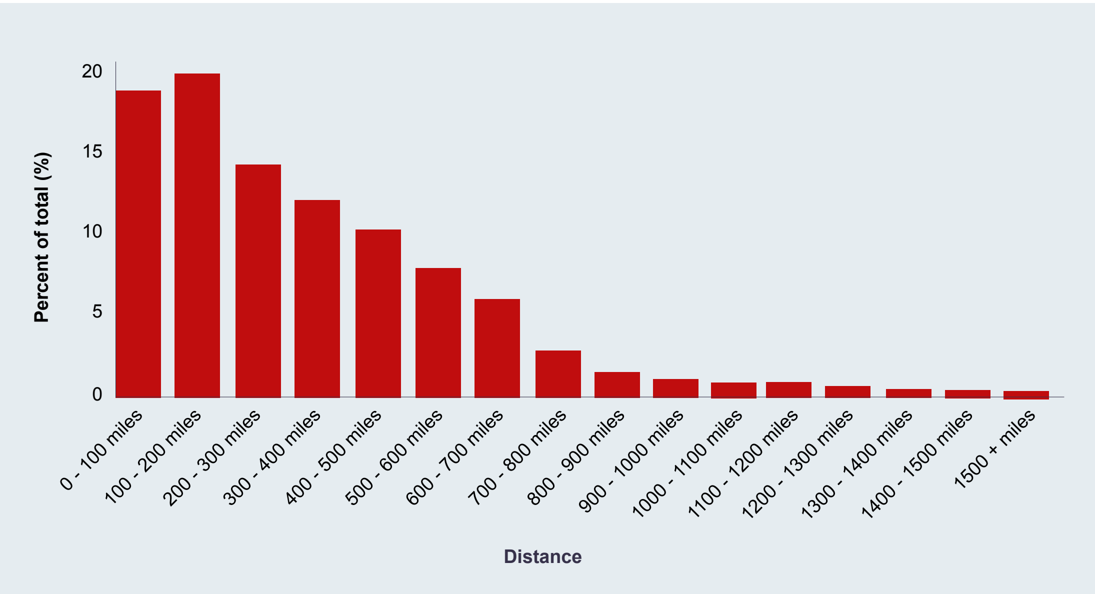


Chart depicts:

- **Distribution of daily driving distances for heavy-duty trucks along the I-10 corridor between Los Angeles and El Paso.**
- **While some daily distances can be quite long, our analysis shows that most journeys are actually made up of shorter, more manageable driving legs.**

Data from Altitude by Geotab

Background (Continued)

Today's electric truck market

Today's electric trucks pose a powerful alternative to internal combustion engines by eliminating tailpipe emissions. While legitimate concerns exist about the ability of electric trucks to fulfill the entire spectrum of current operations due to range capabilities and charging readiness, these challenges are not insurmountable and should not be confused with insufficiency. Electric trucks have been successfully adopted by many fleets around the country for a wide variety of applications that align with their capabilities (see NACFE's Run on Less for detailed data from operational electric trucks in North America).

The electric heavy-duty truck market has expanded significantly over the last few years, with over a dozen different class 7 and 8 models now available in the U.S. across various manufacturers[9] (though it is important to note that most are day cabs, and sleeper cab options are still limited). While upfront costs for battery powered trucks are higher than their internal combustion engine counterparts, they are becoming increasingly competitive from a total cost of ownership perspective in some applications, due to lower fueling and maintenance costs. Beyond the operational benefits, many drivers report that the fume-free cab environment, combined with the elimination of engine noise and vibration, creates a less fatiguing and more comfortable workspace. By replacing internal combustion engine trucks with battery electric vehicles, fleets can directly reduce their carbon footprint, accelerating progress towards decarbonization across their operations.

Efficiency and range

For electric vehicles, range is defined as the number of miles that can be traveled on a single charge. The electric ranges of heavy-duty trucks on the market currently vary between 100 and 500 miles on a single charge.[10] While a shorter range is often sufficient for duty cycles like local delivery and drayage, longer ranges of 200 miles or more are essential for many regional and long-haul applications.

However, electric range is not a fixed number. It can vary with driving speed, temperature, weather conditions, payload, auxiliary load, roadway grade, and driving style (regenerative braking, for example, can meaningfully contribute to additional range). This inherent variability can lead to lack of confidence in a truck's range capability, particularly for trucks in uncertain conditions. Real-world range estimation is enabled through advanced vehicle telematics and software systems that can account for these variables, providing fleets with a high level of confidence in a truck's ability to complete its route.

For the sake of this analysis, we will use a simplified framework that accounts for these real-world factors. We consider up to 200 miles to be an achievable range for a mid-range battery electric truck operating in typical variable conditions, and up to 400 miles to be achievable for a long-range truck.[11] While only a few models currently exceed the 400-mile mark, these figures showcase the leading edge of current battery electric vehicle technology. Our assumptions are therefore not just a forward-looking model, but also a viable benchmark for long-haul operations on the I-10 corridor today.

Data

Altitude by Geotab

Altitude by Geotab is a data platform that provides aggregated, anonymized, and privacy-safe insights from a vast volume of commercial vehicle telematics data. This provides critical context on operational behaviors like routes, mileage and stop times, which is essential for our analysis. The data underlying this analysis is heavy-duty truck (GVWR Class 7-8) trips on the I-10 corridor between Los Angeles, California, and El Paso, Texas. In the analysis below we show statistical results for 72,000 trucks with Geotab devices that have spent any portion of their route traveling on the I-10 between July 2024 through June 2025. This captures a complete range of seasonal and economic variations in freight movement, and accounts for about 27% of the total truck volume on the corridor (i.e., about one in four heavy-duty trucks that operate on the corridor leverage Geotab telematics).[12]

Driving Legs

In analyzing heavy-duty freight, a traditional "trip" is an operationally inconsistent unit of measure. A single journey can span multiple days, involve numerous short stops for drop-offs, or be segmented by driver shift changes. Because this analysis is focused specifically on aligning driving distance with viable charging windows and electric truck suitability, the standard Altitude by Geotab trip definition — which ends a trip after a three-minute stop — is too granular and would misrepresent operational reality.

To overcome this ambiguity and create a metric directly relevant to the charge-and-drive cycle of an electric vehicle, this analysis centers on the **"driving leg."** We define a driving leg as:

- *The continuous driving distance a heavy truck travels between stops of 45 minutes or longer.*

This methodological choice is deliberate and serves two key purposes:

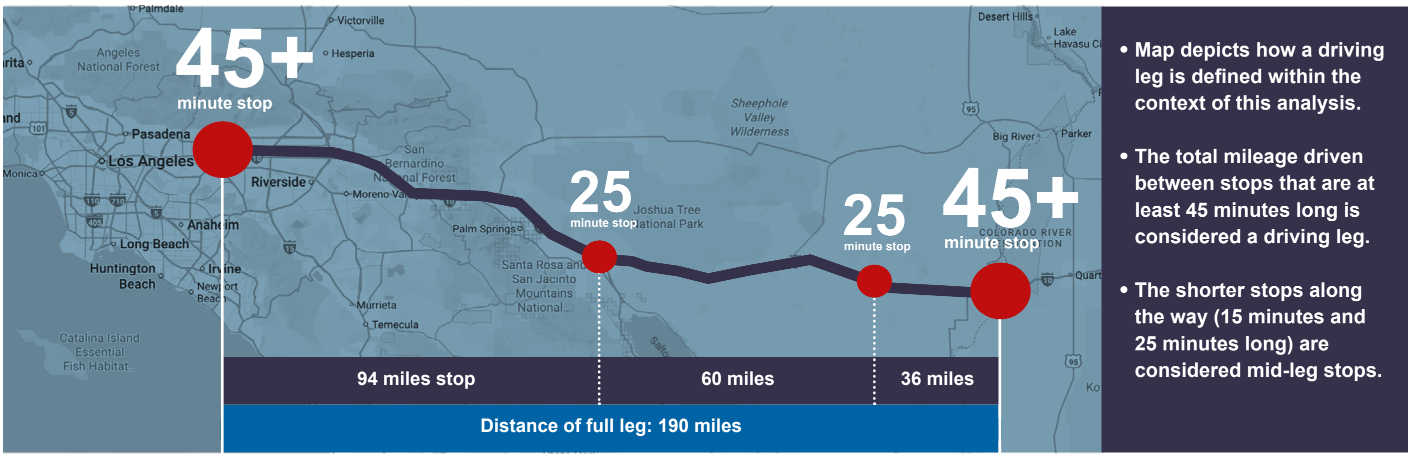
1. Isolates operationally significant segments: By filtering out brief pauses, our methodology models all freight activity as a collection of driving legs. This approach classifies a journey based on its operational reality:

- A complex, multi-day trip is broken down into a series of discrete segments.
- A straightforward journey made without any stops of 45 minutes or more is captured as one complete, single driving leg.

2. Aligns with a viable charging window: The 45-minute stop duration serves as a proxy for a meaningful charging opportunity. Shorter stops may be insufficient for a meaningful top-up charge of the vehicles.

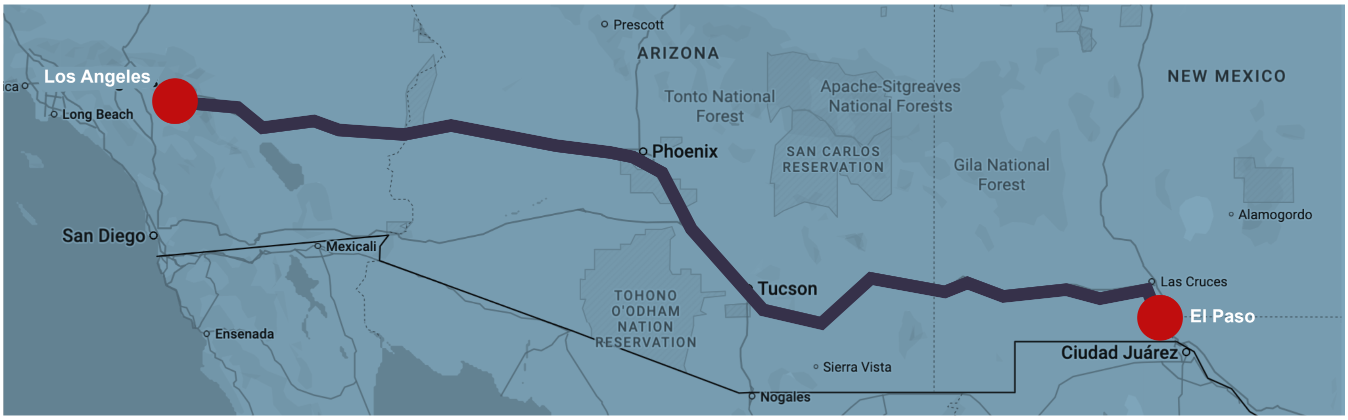
Ultimately, this approach measures the real-world distances traveled between potential viable charging events.

Figure 2: **Defining a Driving Leg on the I-10 Corridor**



Results
Freight movement on the I-10 corridor

Figure 3: **The I-10 corridor between Los Angeles and El Paso.**



Travel distance

Our analysis illustrates that the majority of heavy-duty truck operations on the I-10 are not full Los Angeles to El Paso journeys, but a series of shorter movements that are highly compatible with current EV technology. In fact, trucks rarely exceed 700 miles per day (see Figure 1) and only about 6% of the observed journeys covered the full distance in a single day. This makes sense, given that shippers do not all move freight to the same final destinations, and carriers often increase efficiency by making multiple stops along a corridor. To better understand the distance requirements of truck operations, we broke down journeys into driving legs, defined as the total mileage between stops lasting 45 minutes or longer. Figure 4 illustrates that these shorter movements present a clear opportunity for electrification.

Overall, 44% of driving legs on the corridor are shorter than 100 miles, and a remarkable 62% of all driving legs are under 200 miles. This is a range that can be served by most electric truck models available today, under a variety of operating conditions. Furthermore, 82% of all driving legs are less than 400 miles, which is achievable by long-range models. This data indicates that for a majority of current operations, range is not a prohibitive barrier, provided that charging is available at trucks' existing stopping points. Only around 18% of driving legs exceeded 400 miles, representing a more challenging long-haul segment that may require future technological advancements.

Figure 4 **Distribution of driving leg distances for heavy-duty trucks on the I-10 Corridor**

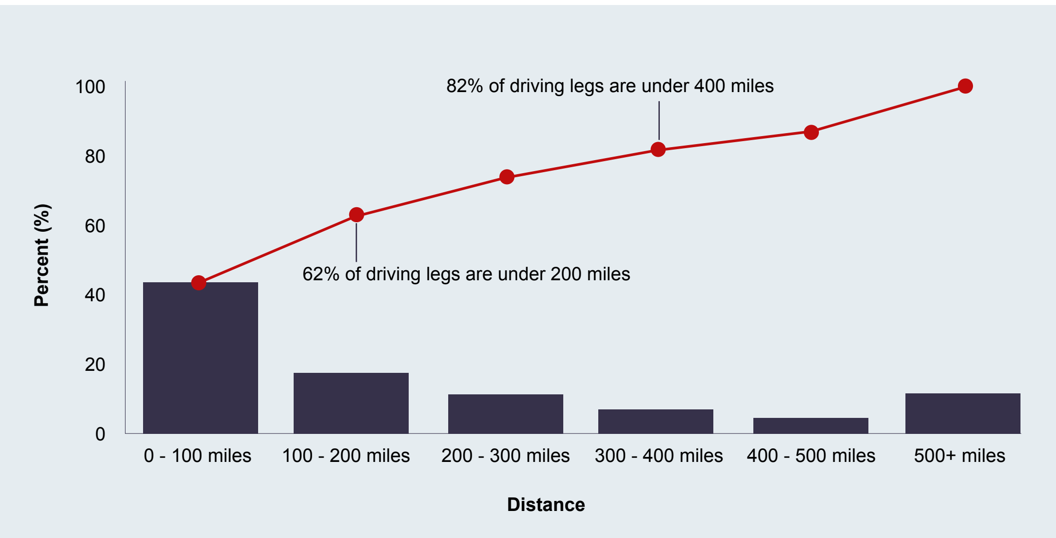


Chart depicts:

- **The distribution of distances for heavy-duty truck driving legs along the I-10 corridor.**
- **A driving leg is defined as a continuous period of travel between two stops lasting 45 minutes or longer.**
- **The red line indicates the cumulative percentage, illustrating the total share of driving legs that are shorter than the given distance.**

Data from Altitude by Geotab

Results

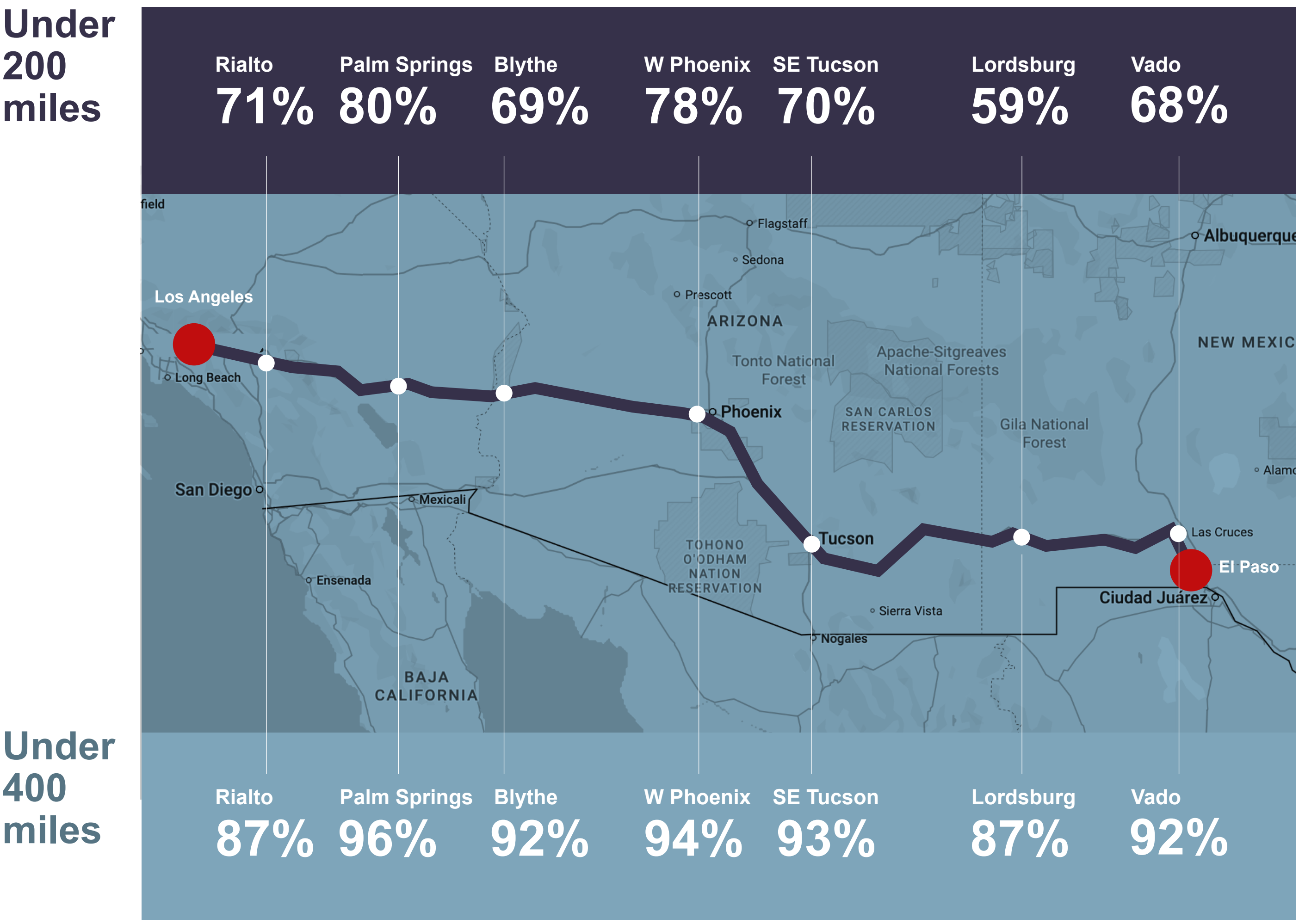
Freight movement on the I-10 corridor (Continued)

Travel behavior at future charging sites

A network of high-powered charging hubs is emerging along I-10, including Terawatt's network between Los Angeles and El Paso. These sites, spaced approximately 150 miles apart (see map below), allow us to move beyond a corridor-wide average and focus on specific trucking behavior in the geographic area surrounding each charging hub.

With this local lens, we observed that driving legs passing Palm Springs and Phoenix have the shortest distances, with 78% and 80% being under 200 miles, respectively. Trucks passing Lordsburg and Rialto have the longest distances; even so, 87% of driving legs are under 400 miles for these locations.

Figure 5: **Share of driving legs under 200 and 400 miles, for trucks traveling past proposed charging hubs**

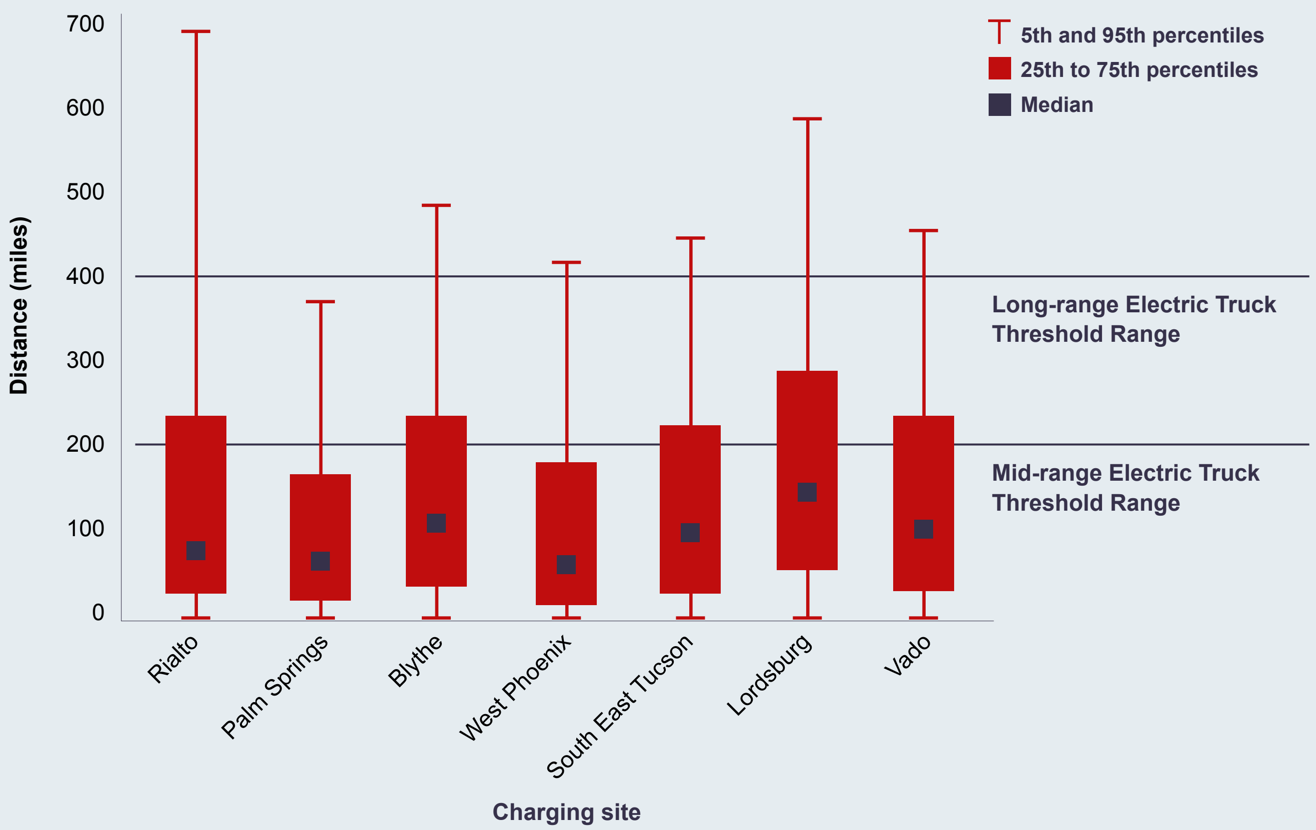


Results

Freight movement on the I-10 corridor (Continued)

The data provides a critical insight: a significant percentage of driving legs around these new hub locations are well within the capabilities of today's electric trucks. This shows that the network will do more than just support a few long-haul fleets; it establishes an essential, shared charging infrastructure for the entire region. With access to shared charging hubs along the I-10, fleets could bypass their own depots, increasing flexibility for electric operations.

Figure 6: **Truck driving leg distance by proposed charging hubs**



Data from Altitude by Geotab

Chart depicts:

- **The distribution of driving leg distances passing each of Terawatt's current and planned charging hubs.**
- **The vast majority of driving legs are under 200 miles.**

Results

Freight movement on the I-10 corridor
(Continued)

Stop duration

Beyond just how far trucks travel, a critical factor for electrification is how long they stop. To understand how disruptive vehicle charging would be compared to today's operations, we investigated the stopping behavior of Class 7-8 trucks. The chart below shows the median stop duration at the end of driving legs of various distances. Crucially, stop durations correlate with the distance of the preceding drive. For example, the median stop duration following a 100-mile leg is approximately 60 minutes, while the median stop following a 300+ mile leg increases to over 90 minutes. This natural operational rhythm means that trucks requiring more energy after a long drive tend to already be stopped for a longer time.

Additionally, we analyzed the distribution of stop durations after all of the driving legs in this analysis. We observed that 49% of these stops are between 45 minutes and 2 hours, and 30% of all end of leg stops are more than 10 hours long, allowing for ample recharging opportunity.

If charging is unavailable at or near end-of-leg stops, this does not mean electrification is unachievable. For trucks with established routes and predictable stops, the focus shifts to ensuring charging is available at their destination. For other vehicles, having en-route access to charging hubs on the I-10 corridor can be leveraged as part of their existing operational rhythm to add a significant amount of range.

Figure 7: **Truck stop durations at the end of driving legs on the I-10**

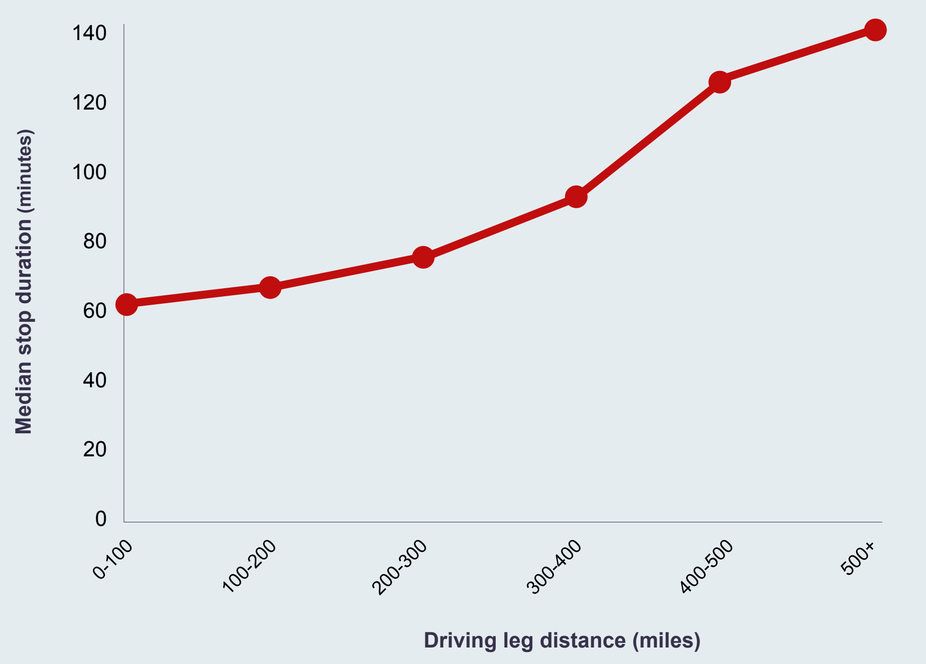


Chart depicts:

- **The median stop durations at the end of driving legs of various distances.**
- **The results indicate that stop duration increases with the driving leg distance preceding the stop.**

Data from Altitude by Geotab

Results

Freight movement on the I-10 corridor
(Continued)

Figure 8: **Truck stop durations provide ample charging opportunities**

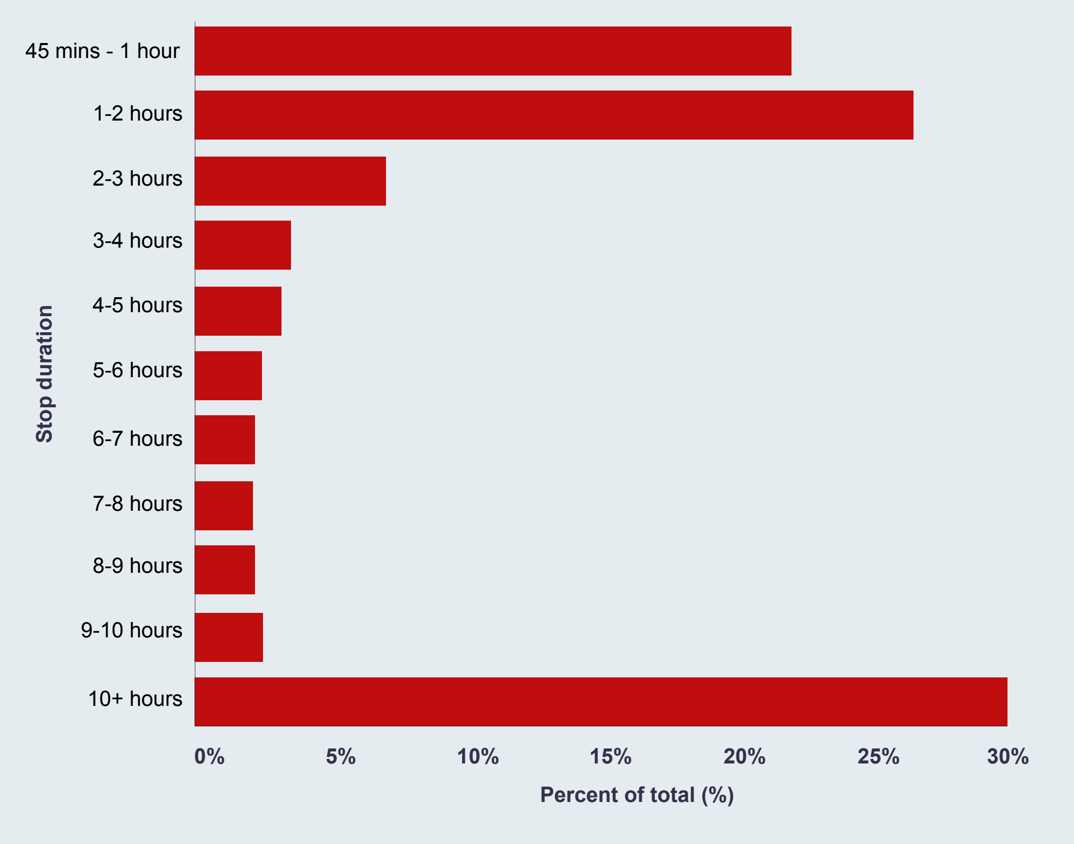


Chart depicts:

- **The distribution of driving leg stop durations.**
- **While our threshold of end-of-leg is 45 minutes, many stops exceed this, allowing even greater opportunity to recharge.**
- **30% of all end-of-leg stops are more than 10 hours long.**

Data from Altitude by Geotab

Fuel and Emissions Savings

Covering 4.6 billion miles a year, heavy-duty trucks on the corridor spend approximately $2.5 billion on diesel fuel and generate 47 million metric tons of greenhouse gas emissions. The operational realities of the I-10 corridor present a significant opportunity for economic and environmental benefits. By focusing on driving legs of 200 miles or less, which account for roughly 21% of the total miles driven on or around this artery, we can calculate a potential saving of over 138 million gallons of diesel fuel, and 9.9 million metric tons of greenhouse gas emissions.[13]

Limitations

While this analysis provides a helpful contextualized understanding of heavy-duty truck travel and its potential for electrification on the I-10 corridor, it is important to acknowledge certain limitations. The scope of this report simplifies the complex operational realities of a commercial vehicle fleet. We focused exclusively on travel and travel segments that occurred on the I-10 at any point during a given journey, without following the trucks on days they operated in other regions. In reality, a vehicle's full operational profile — including all of its diverse trips and day-to-day requirements — must be considered for a successful electrification strategy. Our analysis of stops does not differentiate stops taken for a driver's federally mandated hours of service (HOS), which may not perfectly align with the optimal charging times or locations. A labor-focused assessment would be needed for a more in-depth picture of a fleet's true charging needs and operational efficiency. Therefore, this analysis should be viewed as a foundational assessment of a significant opportunity, rather than a definitive roadmap for fleet-wide electrification.

Conclusion

The data in this analysis challenges the narrative that electrifying long-haul corridors is unattainable with today's technology. Our findings reveal a clear and present opportunity on the I-10, demonstrating that the majority of trucking operations are not monolithic treks, but a series of shorter, serviceable driving legs. With 62% of these legs under 200 miles, and 82% under 400 miles, a significant portion of the I-10's freight movement can be serviceable by today's electric trucks, with the right infrastructure in place.

Furthermore, the challenge of charging downtime is mitigated by existing truck behavior. As a clear correlation exists between driving leg distance and stop duration, and with 50% of end-of-leg stops lasting over two hours, charging can be integrated into current schedules with minimal disruption. The strategic development of high-speed charging infrastructure is the final key to abating significant volumes of fuel and millions of tons of greenhouse gas emissions.

Realizing this opportunity now requires coordinated action:

- Fleets and shippers can begin by mapping their own routes and identifying segments already within electric range.
- Infrastructure providers should align investments with actual stopping patterns to maximize utility and accelerate adoption.
- Policymakers and financiers can de-risk early projects by targeting incentives and capital where the data shows readiness.

The I-10 can serve as a blueprint for other freight corridors in North America. By combining telematics-driven insights, collaborative industry action, and strategic investment, the pathway to zero-emission freight is not only possible — it is already within reach.

For More Information

If you are a shipper or carrier interested in joining the SFC's I-10 Consortium, contact fleet.electrification.coalition@smartfreightcentre.org

To learn more about Altitude's data-driven feasibility studies or to assess the electrification suitability of your own fleet's routes and duty cycles in the US or Canada, visit http://altitude.geotab.com/ or contact altitude@geotab.com.

For EV commercial fleets, including those charging in the LA Basin, or shippers in search of freight movement options, particularly along the I-10 Corridor, please contact Terawatt Infrastructure at bd@terawattinfrastructure.com.

Footnotes

1 CALSTART Zero Emission Technology Inventory tool. 2025.
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2 North American Council for Freight Efficiency Scaling BEVs Report. 2024.
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10 CALSTART Zero Emission Technology Inventory tool. 2025.
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11 North American Council for Freight Efficiency Run-on-Less. 2025. https://runonless.com/ and Geotab telematics EV data.

12 Based on comparison of Altitude observed roadway volumes and Annual Average Daily Traffic counts from
https://www.fhwa.dot.gov/policyinformation/hpms.cfm

13 Calculated using an estimated diesel truck efficiency of 7mpg from the US Energy Information Administration's (EIA) Annual Energy Outlook Reference Case 2025 https://www.eia.gov/outlooks/aeo/data/browser/#/?id=58-AEO2025&cases=ref2025&sourcekey=0 and an estimated diesel fuel cost of $3.75/gallon https://gasprices.aaa.com/state-gas-price-averages/

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