THE STATE OF
SUSTAINABLE FLEETS

MARKET BRIEF 2026

TITLE SPONSORS

PENSKE | Rental Leasing Logistics

VOLVO

SUPPORTING SPONSORS

exelon®

S&P Global Mobility

TRC
Member of WSP

AUTHORSHIP AND USES

This assessment was prepared by TRC Companies, Inc. (TRC), now a member of WSP, a global environmental consulting and energy engineering firm providing services to the energy, environment, and infrastructure industries for 60 years. The opinions and analysis expressed herein are those of the authors and do not necessarily reflect the views of project sponsors. Reference herein to any commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by sponsoring organizations or TRC. No part of this work shall be used or reproduced by any means, electronic or mechanical, without first receiving the express written permission of TRC.

Suggested citation: TRC Companies, Inc. (TRC), “State of Sustainable Fleets 2026 Market Brief”, May 2026, Santa Monica, CA. Available at: https://www.stateofsustainablefleets.com/.

RELATED MATERIAL

State of Sustainable Fleets produces an annual evaluation of the clean commercial transportation market. Now in its seventh year, the annual Market Brief provides readers with historic data and analysis on leading advanced technologies for vehicle fleet operators and significant developments from the past year on the markets for these technologies.

TRC produces a short “Fleet Miniguide” on four drivetrains (natural gas vehicles, battery-electric vehicles, propane vehicles, and hydrogen vehicles) updated with data from the Market Brief each year. Trend Briefs on other topics are also produced occasionally. Finally, regular fleet education webinars and emails round out the portfolio of ongoing education and updates on this rapidly changing marketplace. Notably, State of Sustainable Fleets Academies offer complementary industry education on charging infrastructure and also on renewable fuels through a short series of webinars.

ACKNOWLEDGEMENTS

Preparation of this assessment was performed with sponsorship support by Penske Transportation Solutions, Volvo Trucks North America, S&P Global Mobility, and Exelon Corporation. TRC gratefully acknowledges the essential support of and content contributions from these organizations.

Authors, Designers, and Project Leads:

Nate Springer, Vice President, Market Development (Project Lead / Lead Researcher / Editor)

Mindy Long, Mindy Long Freelance LLC (Lead Author / Editor)

Amanda King, Program Manager (Project Manager / Researcher)

Rachel Clevers, Program Manager, Technical Services (Researcher)

Leigh Middleton, Senior Program Manager, Technical Services (Researcher)

Jonah Berg-Ganzarain, Strategic Communications Manager, Communications Strategy (Media Relations)

Rodger Lueras, Art Director (Lead Designer)

Kristina Ishchenko, Senior Digital Campaign Manager, Engagement Marketing (Marketing Manager)

With additional thanks to TRC's Rebecca Schenker, Brianna Lawrence, Nathan Hart, and Cary Welsh for their research and writing contributions to the Policy and Funding Chapter, and Patrick Couch, JoAnne Golden, Peter Ogundele, and Erik Neandross for their technical, market, and writing input.

Individuals from many organizations provided important inputs for this report, and/or generally assisted with the research. These organizations included, but were not limited to, S&P Global Mobility, Engine Technology Forum (ETF), Hexagon Agility, Optimus Technologies, Cummins, Inc., The Transport Project, Propane Education and Research Council (PERC), Edison Electric Institute (EEI), and California Hydrogen Business Council (CHBC).

TABLE OF CONTENTS

ABOUT THE 7TH ANNIVERSARY MARKET BRIEF

The 2026 Market Brief is the seventh annual technology-neutral analysis of key insights and critical trends for today's leading on-road clean vehicle technologies produced by the State of Sustainable Fleets.

Building on seven years of market reporting and more than 50 years of TRC and WSP's industry leadership, the 2026 edition provides concise insights and data on key trends and developments in the digital, vehicle, fuel, and infrastructure segments of clean commercial transportation.

By gathering real-world data directly from early adopter fleets and industry, the State of Sustainable Fleets provides sector-specific insights into the adoption of leading clean medium- and heavy- duty vehicle technologies — drivetrains powered with compressed natural gas, electric batteries, propane, and hydrogen — and renewable fuels and electricity against a baseline of diesel technology. The comprehensive findings within this document represent government and private sector fleets and are gathered across several sectors including school, shuttle, state/county/municipal, urban delivery, refuse, utility, transit, regional-haul, long-haul, drayage, and off-road cargo handling.

ABOUT THE 2026 FLEET SURVEY

At its core, the 2026 Market Brief is informed by a robust fleet survey capturing input on artificial intelligence, clean vehicles, and infrastructure from over 200 fleet managers and decision-makers.

Building upon a rich data source covering a broad range of real-world fleets in every stage of technology adoption ensures that this Brief provides a comprehensive representation of today's fleet landscape.

USING THE FINDINGS

The Market Brief is a guide for fleet operators and the industry as it navigates a time of historic change. Developments in the vehicle and fuel markets are occurring so rapidly that an exact assessment is impossible. Transformation in policy, regulation, and geopolitics has also introduced exceptional change and uncertainty for this industry. Each year, the survey results are complemented by secondary data and input from the industry's leading experts (see Methodology). This methodology yields the most comprehensive and robust reflection of the industry available today, supporting — but not substituting for — the custom evaluations that fleet owners must do to identify the best-fit solution for their business.

The State of Sustainable Fleets produces additional fleet and industry education materials regularly, including concise Fleet Miniguides on each of the leading sustainable technologies covered in the Market Brief, Trend Briefs on important developments affecting fleet adoption of clean technologies, such as new regulations or greenhouse gas emissions requirements, regular educational Academy and other webinars, and email campaigns. All of these are constantly updated and posted on the website.

To remain ahead of industry developments with a credible partner, please sign up for updates: [The State of Sustainable Fleets].

GLOSSARY

45Z: Clean Fuel Production Tax Credit, a federal credit

ACF: Advanced Clean Fleets, a California law

ACT: Advanced Clean Trucks, a California law

AFTC: Alternative Fuel Tax Credit

AFV: Alternative Fuel Vehicle

BD: Biodiesel

B5: Fuel blend with up to 5% biodiesel

B20: Fuel blend with between 6% and 20% biodiesel

B99 or B100: Nearly- or pure-biodiesel fuel

BEV: Battery-electric vehicle

CAA: Clean Air Act, a federal law

CARB: California Air Resources Board, a California agency

CI: Carbon intensity, a measure of lifecycle greenhouse gas emissions

CNG: Compressed natural gas

DGE: Diesel gallon equivalent (a unit of measure)

EO: Executive Order from a President of the United States

FCEB: Fuel cell electric bus

FCET: Fuel cell electric tractor, a Class 8 vehicle

FCEV: Fuel cell electric vehicle

GGE: Gasoline gallon equivalent (a unit of measure)

GHG: Greenhouse gas; synonym for carbon, carbon-equivalent, or CO2e

HD: Heavy-duty

ICE: Internal combustion engine

IIJA: Infrastructure Investment and Jobs Act, a federal law

IRA: Inflation Reduction Act, a federal law

ISR: Indirect Source Rule, a local regulation

LCFS: Low Carbon Fuel Standard

MD: Medium-duty

NGV: Natural gas vehicle

NZE: Near-zero emission

OEM: Original equipment manufacturer

R99/RD99: Fuel blend with up to 99% renewable diesel, the standard maximum blend

RD: Renewable diesel

RFS: Renewable Fuel Standard, a federal program

RNG: Renewable natural gas

TCO: Total cost of ownership

WAIRE: Warehouse Actions and Investments to Reduce Emissions, a program of South Coast Air Quality Management District's ISR

ZE: Zero-emission

ZEV: Zero-emission vehicle

INTRODUCTION

INDUSTRY CONTINUES NAVIGATING PEAK UNCERTAINTY

The seventh annual State of Sustainable Fleets arrives as the industry continues navigating exceptional uncertainty and a prolonged freight recession. Last year's Market Brief introduced the concept of peak uncertainty, and, if anything, the current operating environment is facing even more unknowns related to tariffs, geopolitics, and the economy.

The past year saw significant changes to federal policies, including the rollback of federal greenhouse gas (GHG) vehicle standards, the expiration of commercial zero-emission vehicle (ZEV) tax credits, cancellation of federal funding, and the nullification of California's clean truck regulations. What had been a federally driven acceleration toward clean transportation has given way to a more decentralized, state- and market-led system.

At the same time, 25% tariffs on MD and HD trucks and components, a Supreme Court ruling that struck down broad-based tariffs, and the potential for future tariffs all added costs and complicated fleet planning. Costs are also expected to increase due to the Clean Trucks Plan. While the final rule has not been released, costs are likely to increase $8,000 to $18,000 per vehicle.

> **Available funding remains significantly above what it was just five years ago at more than $5 billion estimated annually.**

Uncertainty, increased costs, and a prolonged freight recession suppressed new vehicle orders across all drivetrain types throughout 2025.

Despite this turbulence, state, local, and utility programs continue to support near-zero emission (NZE) and ZEV infrastructure rollout and vehicle deployments. More than $1 billion in California grant funding remained active for on-road trucks and buses in 2025. Low-carbon fuel programs in California, Oregon, Washington, and New Mexico, continue to generate meaningful revenue streams for industry growth. Plus, more than 650 electric utilities now offer programs available to fleet customers. While these programs cannot fully replace what has been withdrawn at the federal level, available funding remains significantly above what it was just five years ago at more than $5 billion estimated annually, on average.

ADVANCED FLEET TECHNOLOGY MARKETS CONTINUE TO MATURE ACROSS FUEL TYPES

The markets for clean fleet technologies are maturing across fuel types. The Cummins X15N 15-liter natural gas engine completed its first full commercial year of use and has delivered diesel-equivalent performance and compelling fuel cost savings. The U.S. continues to lead the world in the use of compressed and liquefied natural gas for commercial vehicles, a competitive

> **"Artificial intelligence continued to advance and AI moved from pilots to support mainstream solutions such as optimization and maintenance."**

advantage built over years of fleet adoption and infrastructure investment.

Battery-electric vehicle (BEV) registrations in the medium-duty (MD) and heavy-duty (HD) segment grew 21% in 2025, and fleets running MD BEVs reported operational cost savings compared to the vehicles they replaced. Global growth of BEVs has also signaled that benefits improve as BEVs scale. On the diesel side, use of renewable diesel (RD) and biodiesel (BD) remains strong. Together, the fuels displaced nearly three-quarters of conventional diesel used in California's large transportation market. Autonomous trucking also

continued to advance, and artificial intelligence (AI) moved from pilot projects to support mainstream technology being used across route optimization, predictive maintenance, freight matching, safety systems, and more.

Hydrogen remains the notable exception. The cancellation of Regional Clean Hydrogen Hub funding, the exit of two prominent Class 8 fuel cell truck startups, high fuel prices, and limited refueling infrastructure have left the sector in a genuinely difficult position. Unlike other clean transportation technologies, hydrogen still requires coordinated government investments in research, development, and infrastructure that private capital alone will not provide. Even still, several original equipment manufacturers (OEMs) are moving forward with fuel cell technology, and the market is finding ways to continue.

> **State of Sustainable Fleets data and analysis helps fleets understand costs of technologies - and of doing nothing.**

DATA-DRIVEN DIVERSIFICATION AS A RISK MANAGEMENT STRATEGY

What emerged from this year's data and analysis is a picture of an industry in continued flux, which makes diversification an essential part of fleets' strategies. The operating environment in 2025 and early 2026 has illustrated how quickly external shocks, including international conflicts, tariff disruptions, and regulatory reversals, can change the economics and total cost of ownership (TCO) of any single technology, including incumbent technology. Fleets that diversify across technology pathways are showing resilience to absorb market shocks as compared to those that have waited for a single perfect solution to emerge.

For fleet managers and equipment and technology providers, navigating ongoing uncertainty is challenging, but they make better decisions with better information. The State of Sustainable Fleets will continue to provide technology-neutral data, analysis, and stakeholder perspectives to help fleets understand the costs and risks — both of the technologies themselves and of doing nothing — to navigate uncertainty and prepare for what lies ahead.

KEY FINDINGS

SPECIAL BRIEF: AI adoption expands and supports autonomous pilots.

AI has emerged as an important tool in fleet management, and adoption is expected to grow rapidly. About half of the fleets in the State of Sustainable Fleets survey reported using AI, primarily in route planning and dispatching, maintenance diagnostics, and preventive maintenance applications. Users reported cost savings, greater uptime, and increased utilization. By 2027, respondents expect the share of their fleet that is AI-enabled will grow to 35%. However, gaps between adoption and widespread use remain, and respondents estimated that only 20% of their fleets have been enabled by AI as of 2025, and 49% said none of their fleet has been enabled by AI. Autonomous trucking, which relies on AI technology, is advancing quickly, with driverless light-duty vehicles (LDVs) logging millions of miles and HD vehicles hitting the road in 2025. Broader rollouts are expected by the end of 2026.

POLICY AND FUNDING: Federal cuts reshape the funding landscape. States and markets take the lead.

The policy and funding landscape for clean transportation experienced a major transition in 2025 and early 2026. Federal agencies rolled back funding and eliminated commercial ZEV tax credits, along with many policies aimed at curbing air pollution. One of the biggest cuts to impact fleets was the expiration of ZEV tax credits of up to $7,500 for eligible LDVs and up to $40,000 for eligible MD and HD vehicles.

The DOT's National Electric Vehicle Infrastructure (NEVI) program to support states in building public charging infrastructure was suspended for six months, and the DOE slashed funding for its Vehicle Technologies Office by approximately 90% and rescinded $2.2 billion in hydrogen research and development funding.

While the cuts have been significant, available funding for clean fleet projects remains significantly above historical pre-Biden levels with more than $5 billion of state, local, and utility programs estimated annually through 2028. Low-carbon fuel markets on the West Coast and in New Mexico provide additional support for multiple clean technologies.

Federal policy changes, including the rollback of California's major ZEV mandates, created significant uncertainty related to emissions and fuel-economy standards. Many of the changes are still subject to legal proceedings. Given the policy changes at the federal level, regulations on GHGs and pollutants are expected to move to the state level.

DIESEL VEHICLES: Fleets and OEMs report fuel efficiency gains. RD and BD use increases.

An ongoing and historic freight recession, tariffs, and economic and regulatory uncertainty slowed demand for trucking equipment, resulting in a 16% decline in new Class 8 tractor registrations. Fleets and OEMs have focused on diesel efficiency, and more than one-third of survey respondents reported using efficiency technologies. Use of RD and BD has increased with more than half of respondents in the annual fleet survey reporting use of the fuels. RD and BD combined to displace 74% of conventional diesel used in California transportation in 2024 and 71% in the first three quarters of 2025. Production capacity of RD increased in 2025, and more fleets are adopting B99 BD. The Environmental Protection Agency's (EPA's) Clean Trucks Plan for MD and HD NOx and PM standards remains on track for MY 2027 implementation with an expected incremental cost of $8,000 - $18,000 per vehicle, but final warranty and useful-life provisions are still pending.

NATURAL GAS VEHICLES: 15-liter gives fleets more choice. RNG use expands nationally.

The Cummins X15N 15-liter natural gas engine completed its first full year of commercial availability and delivered cost savings compared to diesel and relative to other natural gas vehicles (NGVs). Total MD and HD NGV registrations fell 15% in 2025, in part due to the freight recession and delivery timelines as fleets transitioned to the first full year of 15-liter sales. Straight truck registration comprised 82% of 2025 NGV registrations followed by transit buses and tractor trucks at 10% and 7%, respectively. Among fleets using NGVs, renewable natural gas (RNG) use continues to increase. In 2025, it accounted for 97% of all natural gas fuel used in California transportation. Among CNG-using fleets in the survey, 65% report RNG use and they estimate that it accounts for 78% of their total fueling volume.

PROPANE VEHICLES: Adoption continues in school, delivery, upfit industries while supporting fuel diversification.

The school bus and upfitter markets remain key drivers of propane adoption. The number of propane vehicles in operation grew by 3% in 2025, and the market consumed an estimated 1.8 million more propane gallons than in 2024. The fuel offers cost advantages to many fleets, and 39% of propane fleets reported operational cost savings on their propane vehicle operations as compared to vehicles they replaced. Users of propane report increased use of renewable propane, with 32% of propane-using fleets using it in 2025, up from 10% in 2023. Propane has also found a new role powering EV charging infrastructure, offering fleets a cost-effective and faster alternative to grid charging that can cut installation costs by up to 75% compared to utility-connected options.

BATTERY-ELECTRIC VEHICLES: MD registrations set new record while OEMs refocus. Tractor indicators suggest future growth.

Registration of MD and HD BEVs increased in 2025, led by higher registrations of trucks and delivery vans. Although BEVs are improving the TCO in some MD applications, the record number of MD registrations is unlikely to continue in 2026 given the loss of the EV tax credit and pivots announced by manufacturers. The Class 8 tractor segment has been slower to develop and was down in 2025 but shows signs of growth. California's Hybrid and Zero Emission Truck and Bus Voucher Incentive Project (HVIP) approved more than 1,000 vouchers in late 2025 that are a sign of future sales. The electric yard tractor market revealed cost-savings compared to diesel options and signs of maturity for growth. The global market context suggests that MD and HD adoption will grow as markets mature. BEVs now represent 22% of China's HD truck market, and battery costs in that market have fallen to $90/kWh, a level that many experts say is very competitive.

HYDROGEN VEHICLES: Funding cuts cloud the long-term outlook, but early deployments continue.

The hydrogen vehicle sector experienced its most challenging year to date and faces the greatest uncertainty among ZEV technologies. MD and HD hydrogen fuel cell electric vehicle (FCEV) registrations dropped 12%. Cuts to hydrogen funding, including hydrogen hub programs, created new challenges given the industry's early stages and need for significant research and development investments. Hydrogen technology is expected to be suited for HD long-haul applications. Hyundai, Toyota, Honda, and Cummins have fuel cell modules and vehicle programs. However, the long-term success of hydrogen projects likely depends on federal funding to help reduce risks and costs and while scaling infrastructure.

ARTIFICIAL INTELLIGENCE IN FLEET MANAGEMENT

AI HAS JUST BEGUN ENTERING THE FLEET MANAGER PORTFOLIO AND IS POISED FOR RAPID ACCELERATION

Artificial intelligence has moved from an emerging concept to embedded reality in many aspects of fleet management over the past decade. AI-powered tools are now integrated across the operational portfolio, including route planning and safety systems, predictive maintenance, and freight matching platforms, and are used in everything from the vehicles themselves to the technology and software that managers use in their daily operations.[1] While adoption is increasing, it is unfolding unevenly across the industry.

Executives are monitoring and evaluating the emergence of AI in the fleet industry, and about half — 48% — of the practitioners and fleet managers responding to the annual State of Sustainable Fleets survey said they use AI today for their responsibilities. Those using AI said the applications are concentrated in route planning and dispatching (21%), maintenance diagnostics (19%), and preventative maintenance management (19%). Overall survey data shows modest adoption in some applications. Use in areas such as AI for customer intake, autonomous operations, or fleet replacement planning remains at 5%.

> **Nearly half of fleet managers (48%) use AI, especially for route optimization, diagnostics, and preventative maintenance.**

The gap between adoption and widespread use is notable. Survey respondents estimate that only 20% of their fleets have been enabled by AI as of late 2025, and 49% said none of their fleet had been enabled by AI at all. In many cases, AI is active behind the scenes, embedded in hardware and software systems in ways that are not always visible to front-line fleet managers. Many benefit from the capabilities of AI without realizing it.

Fleet managers expect AI adoption to accelerate. By 2027, respondents anticipate the share of their fleet that is AI-enabled will grow from 20% today to 35%. At the same time, the share of managers reporting no AI use is expected to fall from 49% to 29%, according to the survey.

Executive leadership is leaning into implementation. In Penske's 2025 survey of transportation company leadership, A Road to AI Adoption, 70% of executives said they adopted AI solutions.[2] Fleet executives said they'd experienced improvements in fleet planning, route optimization, and operational efficiency as the top gains in 2024. However, 94% of respondents still rely on traditional annual forecasting tools, even as 97% agreed that benchmarking and real-time data will become essential in navigating an evolving industry.

AI already enhances route optimization. Today, it can adapt routes in real time, accounting for weather, traffic, construction history, and other operational variables.[3,4] Penske's study found that approximately 40% of fleets that adopted AI-powered route optimization reported savings of at least 50% in fuel costs, operational expenses, and distance traveled.[5] For BEV fleets, route optimization capabilities extend further to incorporate charging needs and energy consumption into daily operations, enabling more confident ZEV deployments.[6]

> **By 2027, fleet managers anticipate the share of their fleet that is AI-enabled will grow from 20% today to 35%.**

> **A Penske study found that AI-powered route optimization can save at least 50% in costs.**

Telematics providers have moved quickly to integrate AI capabilities. Verizon's fleet tracking software now delivers high-resolution maps to improve fuel efficiency and route accuracy, provide accurate routes and arrival times, and monitor vehicle diagnostics and maintenance needs.[7] Geotab's GO telematics devices integrate precise GPS tracking, vehicle health data, collision detection, real-time data transmission, and in-vehicle driver coaching for mixed fleets.[8] The additional information is particularly helpful for reducing operational costs for time-sensitive operations, such as last-mile delivery.[9]

Just under half of fleets — 44% — in the annual fleet survey expect safety improvements from AI. Yet, AI-powered systems can already monitor and coach driver behavior in real time, flagging patterns that increase fuel consumption and safety risks.[10,11] AI is enhancing the use and performance of automated driver assistance systems (ADAS) such as adaptive cruise control and collision avoidance, which have been associated with a 40% decrease in HD truck collisions.[12,13] Fleets that improve safety, reduce preventable collisions, and have fewer insurance claims could gain a secondary benefit of lower insurance premiums.[14]

Predictive maintenance is one of the most compelling applications of AI in fleet management. Systems can help managers schedule maintenance proactively, optimize maintenance schedules to minimize downtime, and extend the vehicle's lifespan.[15,16,17] The technology's capabilities allow it to draw on large databases of similar repairs to better guide service technicians, reduce repeat maintenance, and improve parts procurement.[18,19,20,21] Volvo Trucks uses AI to detect which vehicles need software updates, then automatically installs them over the air, resulting in a 24% reduction in unplanned stops.[22] Industry estimates suggest AI-enabled maintenance systems can reduce maintenance costs by 12%, lower roadside breakdowns by 20%, increase vehicle uptime by 8%, and improve technician efficiency by 9%.[23]

Fleet technology providers are also developing AI-powered analytics platforms to provide deeper operational insights. Penske's Catalyst AI analyzes large datasets generated by fleet operations to deliver insights at the fleet, location and vehicle-level, supporting better decision-making.[24,25] Using the technology, fleets can benchmark performance against similar fleets across maintenance, fuel efficiency and vehicle uptime in real time.[26,27,28] Penske's Fleet Insight serves as the interface where these insights are accessed along with other fleet management capabilities.[29]

AI is already reshaping freight operations. AI-driven decision-making tools help trucking and logistics companies optimize daily operations by choosing the best loads, locations, and pricing to improve profitability and efficiency.[30] By leveraging data and machine learning, dispatch and planning systems can better align shipments with truck and load capacity, improve delivery timetables, and streamline cargo and inventory management.[31,32] Some AI-powered freight platforms now serve as automated brokers capable of analyzing market conditions to generate pricing recommendations and match loads with carriers.[33] Yard inefficiencies alone are estimated to generate more than $6.7 billion in avoidable costs annually, and automated gate systems can capture data on 99.9% of yard incidents while improving security and operational efficiency.[34]

SIDEBAR: AI CAN ENHANCE FLEET SUSTAINABILITY

Across routing, maintenance, and logistics operations, AI identifies waste that conventional management can miss. In the annual fleet survey, 61% of fleets said they expect AI to advance their sustainability initiatives, especially through route optimization and better maintenance.

> **61% of fleet managers expect AI to advance sustainability initiatives, especially through route optimization and better maintenance.**

Key ways AI ties into sustainable supply chains:

- **Reducing Unnecessary Miles:** AI systems can determine the most efficient delivery routes by analyzing traffic patterns, weather conditions, and fuel consumption to reduce unnecessary miles and time spent idling in traffic.
- **Optimizing Supply Chain Networks:** AI-driven network optimization helps companies design supply chain networks that minimize distance, transportation time, and energy use. AI can reduce fuel consumption, lower carbon emissions, and improve overall resource efficiency.
- **Improving Fuel Economy:** Data from equipment, telematics devices, and vehicle sensors can detect maintenance issues, such as clogged air filters, air leaks, and improper tire pressures, that can quietly drain fuel economy across a fleet.

AUTOMATION COULD BE THE MOST TRANSFORMATIVE AI-BASED TECHNOLOGY FOR FLEET MANAGERS

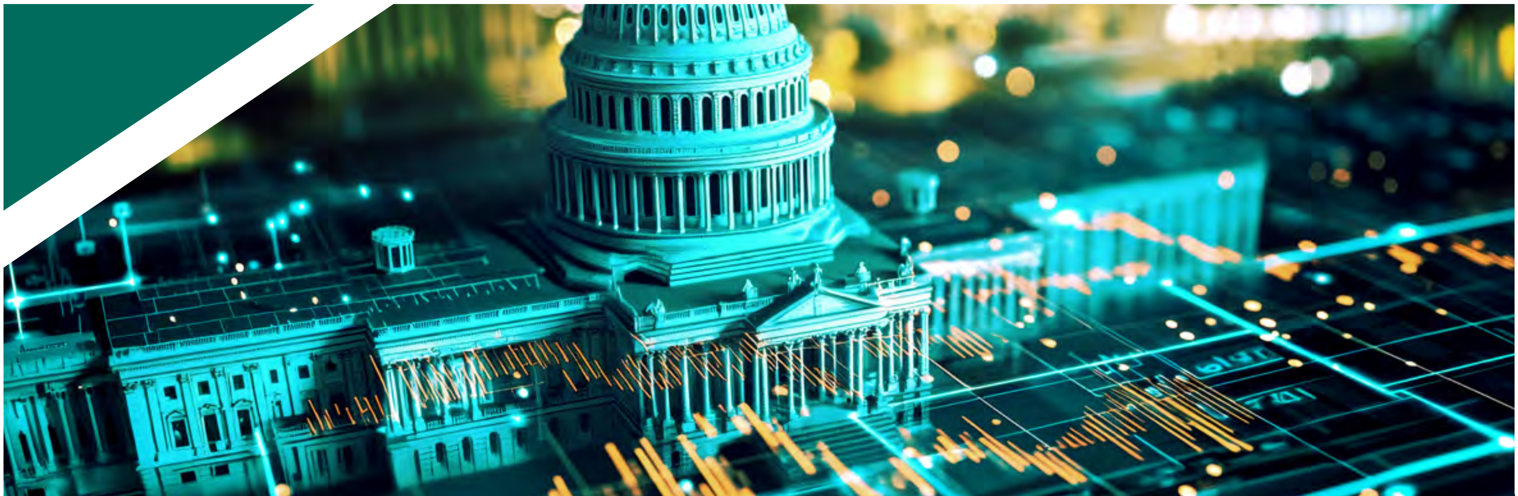
While most current AI applications focus on analytics and optimization, automation is widely viewed as the most transformative long-term use of AI in HD transportation. Autonomous trucking development is progressing through a series of industry partnerships between technology companies, vehicle manufacturers, and logistics providers.

Volvo Autonomous Solutions (V.A.S.) has partnered with Aurora Innovation and Waabi to develop and commercialize autonomous transport solutions in the United States.[35,36,37] The partnerships are focused on integrating the self-driving technologies of Aurora and Waabi with the Volvo VNL Autonomous—Volvos' first autonomous truck engineered from the ground with redundancies for critical safety functions. The Volvo VNL Autonomous, integrated with the Aurora Driver, is already operating on public roads, delivering loads for customers such as DHL and Uber Freight in Texas.[38] The first integration of the Waabi Driver with the Volvo VNL Autonomous was completed in 2025, with road testing planned for 2026.[39] Aurora has also announced own plans to expand its autonomous routes across the southwestern U.S., targeting a 1,000-mile corridor from Texas to Arizona, and expects to deploy a fleet of approximately 200 vehicles by the end of 2026.[40]

> **The Volvo VNL Autonomous, integrated with the Aurora Driver, is already operating on public roads, delivering loads for customers such as DHL and Uber Freight in Texas.**

Other players are scaling hardware and software capabilities to support autonomous deployment. PlusAI secured a $25 million commitment from Traton Group to augment production of autonomous trucks for key freight corridors in the U.S. and Europe.[41] In March 2026, PlusAI released the latest version of its autonomous driving software engineered for commercial-scale deployment, SuperDrive 6.0. The version introduces new capabilities for commercial freight operations, including night driving and construction zone handling.

Kodiak AI entered a partnership with Bosch to scale its technology platform, with plans to deploy its driverless system on public roads by the end of 2026.[42] In yard operations, ISEE and TICO deployed a fully integrated autonomous yard truck powered by ISEE's AI-driven autonomy stack at a Fortune 100 logistics hub in 2025.[43] See the Battery-Electric Vehicle Chapter for more on autonomous vehicles.



FEDERAL, STATE, AND LOCAL POLICY AND FUNDING

POLICY AND TAX CHANGES SIGNAL PRICING UNCERTAINTY AND INCREASED PRICES

The policy and funding landscape for clean transportation shifted dramatically in 2025 and into 2026. Federal incentives have narrowed, state regulatory authority is being challenged, and national standards are in flux. After several years of historic federal investment through the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA), fleets now face a very different landscape that is transitioning from federally driven acceleration to a more decentralized, state- and market-led funding system.

At the same time, federal trade and foreign policy introduced increased costs and pricing uncertainty in the MD and HD vehicle markets. Trucks, including Class 3 to 8 vehicles, truck parts, engines, transmissions, tires, and chassis were subject to a 25% import tariff effective November 2025.[44,45] Tariffs were applied to the full value of MD and HD trucks that do not qualify for preferential tariff treatment under the United States-Mexico-Canada Agreement (USMCA).[46] For MD and HD trucks that qualify for preferential tariff treatment under the USMCA, the tariff only applied to the value of the non-U.S. content in the vehicle.[47]

> **Federal trade and foreign policy introduced increased costs and pricing uncertainty in the MD and HD vehicle markets.**

Additionally, a 10% tariff was placed on imported buses, including school buses and transit buses.[48] In February 2026, the Supreme Court struck down the broad-based global tariffs, but the future remains unclear as the tariffs may be reinstated under alternative legal authorities.[49]

The war with Iran in early 2026 ushered in new costs and uncertainties as diesel and gasoline fuel prices shot upwards and vacillated daily.[50] Diesel prices spiked in mid-March due to a combination of geopolitical supply disruptions and already tight market conditions. The fuel averaged $5.07 per gallon the week of March 16, 2026, the 33rd time in history the average has exceeded $5.00 and the first occurrence since 2022.[51] It continued to rise, reaching $5.38 the week of March 23.[52]

In addition to higher costs related to tariffs, the EPA's criteria pollutant regulation under the Clean Trucks Plan (CTP), is projected to increase HD vehicle costs starting with MY 2027. CTP requires 0.035 g per brake-horsepower-hour (mg/bhp-hr) NOx and 0.05 g/hp-hr PM emissions for criteria pollutants in MD and HD engines and emission reduction targets of 13% and 17% for LD and MD vocational trucks.[53] OEMs' new engines may require different technology including updated after-treatment systems, enhanced thermal systems, new sensors, and new maintenance requirements to reduce maintenance complexity.[54,55]

> **EPA's final Clean Trucks Plan could add $8,000 - $18,000 per truck.**

Industry stakeholders originally estimated cost increases of $20,000–$25,000 or more per truck under this EPA rule.[56,57] However, EPA could still adjust warranty and useful life requirements, which would drop the potential increase to $8,000–$18,000 per truck. The agency is expected to publish any proposed adjustments in 2026.[58,59] For fleets, which are also navigating a prolonged freight recession, these tariff- and technology-related cost increases, coupled with pricing volatility, complicate procurement and capital decisions.

FEDERAL AGENCIES ROLL BACK CLEAN TRANSPORTATION FUNDING AND R&D SUPPORT

Cost pressures coincide with a broader withdrawal of federal funding. In 2025, federal agencies began dismantling or pausing many of the clean transportation funding programs established under IIJA and IRA. For fleets that had relied on these incentives to bridge the cost gap between zero-emission (ZE) and conventional technologies, the shift represents one of the most immediate financial impacts of federal policy change.

The EPA, Department of Energy (DOE), and Department of Transportation (DOT) all saw their clean transportation funding paused, challenged, and cut, leaving a landscape that is significantly less ZEV-focused and, in some cases, one that heavily awarded low- and near-zero-emission projects over battery-electric applications (Figure 1).

STATUS AND RISK PROFILE OF SELECT FEDERAL GRANTS AND INCENTIVE PROGRAMS

Program	Original Allocation	Timing	Risk
Alternative Fuel Vehicle Refueling Property Credit (30C)	N/A	With passage of OBBB, placed into service date moved up to June 30, 2026 from 2032	Entities have until June 30, 2026 to place into service the eligible property (i.e., infrastructure)
Commercial Clean Vehicle Tax Credit (45W)	N/A	With passage of OBBB, placed into service date moved up to September 30, 2025 from 2032	Entities had to have acquired the vehicle by Sept. 30, 2025 to qualify by placing a purchase order; vehicles can be deployed at a later date
DOE Hydrogen Hubs (H2Hubs)	$7,000,000,000	Not fully allocated; phase one allocation complete	Extremely high risk; 2 H2 Hubs have been cancelled, 5 are rumored to be cancelled
DOT Charging and Fueling Infrastructure (CFI)	$2,500,000,000	Not fully allocated; next round is TBD	Awarded and contracted projects at some risk; Future funding remains at some risk pending ongoing litigation between State awardees and the US DOT to release funds
EPA Clean Heavy-Duty Vehicle (CHDV)	$932,000,000	One-time allocation complete; Pass-through grants are being released	Contracted awardees at lower risk; Awardees that did not contract by January 2025 at higher risk
EPA Climate Pollution Reduction Grant (CPRG)	$4,600,000,000	One-time allocation complete	Contracted awardees at lower risk
EPA Clean Ports Program (CPP)	$3,000,000,00	Not fully allocated; next and final round is expected in 2026	Contracted awardees at lower risk
National and State Clean Diesel Programs	$90,000,000 annually	Varies	Funding passed in January
EPA Clean School Bus (CSB) Grants and Rebates	$5,000,000,000	Not fully allocated; next and final round is expected in 2026	Contracted awardees at lower risk; EPA released an RFI for public comments in Q1 2026; A final funding round is expected to open Q2 2026 that will favor NZE projects
DOT Reduction of Truck Emissions at Port Facilities	$400,000,000	Not fully allocated; next and final round is expected in 2026	Contracted awardees at lower risk; A final funding round is expected to open Q2 2026 that will favor NZE projects
National Electric Vehicle Infrastructure (NEVI) Program	$5,000,000,000	New rounds are not fully allocated; Contracting varies by state	Contracted awardees at lower risk; Future funding rounds were at higher risk before litigation forced Administration to release funds
Volkswagen Settlement Programs	$2,925,000,000	Varies	Not tied to IIJA/IRA; no associated risk
Funds from States and Local Agencies	>$10,000,000,000	Varies	Not tied to IIJA/IRA; no associated risk

High Risk · Medium Risk · Low Risk

Figure 1: Sample funding programs and their relative risk of rollback or termination in 2026. Source: TRC's Funding360 public incentive monitoring, tracking, preparation service.

The single largest direct impact on commercial fleets from federal policy changes is the expiration of ZEV tax incentives rolled out under the IRA. Commercial ZEV tax credits of up to $7,500 for eligible LDVs and up to $40,000 for eligible MD and HD vehicles under Internal Revenue Code Sections 30D and 45W were terminated after September 30, 2025, requiring vehicles to be ordered by this date rather than delivered.[60]

The Alternative Fuel Vehicle Refueling Property Credit (Section 30C), which provides up to $100,000 per charging port or fueling dispenser for EV charging, natural gas, propane, or hydrogen infrastructure, expires June 30, 2026.[61,62,63]

Beyond the loss of tax credits, administrative changes at EPA in 2025 resulted in tens of billions of dollars in canceled and paused grants.[64] This included a broad pause in grant administration that halted new solicitations from the Diesel Emission Reduction Act (DERA) and Targeted Airshed programs, as well as the $5 billion Clean School Bus (CSB) Program. The CSB Rebate Program had $2 billion remaining as of 2025. A funding round that closed in January 2025 with $965 million designated for electric, propane, CNG, and hydrogen buses will not be awarded, and a revised final round of the program is expected summer 2026.

EPA awarded several significant one-time grant programs in 2024, and the effects will ripple into 2026 and beyond. EPA's Clean Heavy-Duty Vehicles (CHDV) program awarded $621 million for ZE MD and HD vehicles to be deployed over the next few years. In addition, EPA awarded nearly $8 billion across the Clean Ports Program (CPP) and Climate Pollution Reduction Grants (CPRG). A portion of CPRG will fund ZE MD and HD vehicles and charging and hydrogen infrastructure projects in Southern California, Northern Texas, Utah, and along the East Coast. These include ZE Class 4 to 8 trucks, electric school buses, ZE cargo-handling equipment, and battery-electric locomotives. CPP will fund ZE trucks, cargo handling equipment, rail, marine, and infrastructure in ports throughout the country.

Like EPA, DOE announced broad cuts to advanced energy-related funding programs established through the IRA and IIJA in 2025.[65] Unlike EPA's cuts, however, these cuts will likely have long-term effects and impacts that will not be felt for years as technology development pipelines thin and R&D partnerships dissolve. DOE slashed funding for its Vehicle Technologies Office by approximately 90%, with direct impacts on technology acceleration programs, advanced manufacturing, battery recycling, and HD vehicle initiatives such as the popular Super Truck program.[66,67] DOE also rescinded $2.2 billion in funding for hydrogen production in California and the Pacific Northwest. These so-called 'Hydrogen Hub' projects were expected to jump-start hydrogen production, expand refueling infrastructure, and catalyze demand for hydrogen FCEVs, especially Class 8 trucks, buses, and industrial fleets, as reported in previous Market Briefs. The program and hubs in other states are still facing uncertainty and litigation even while these programs remain on hold.

> **"DOE cut 90% of funding for its Vehicle Technologies Office with impacts on technology acceleration, advanced manufacturing, battery recycling, and HD vehicle initiatives."**

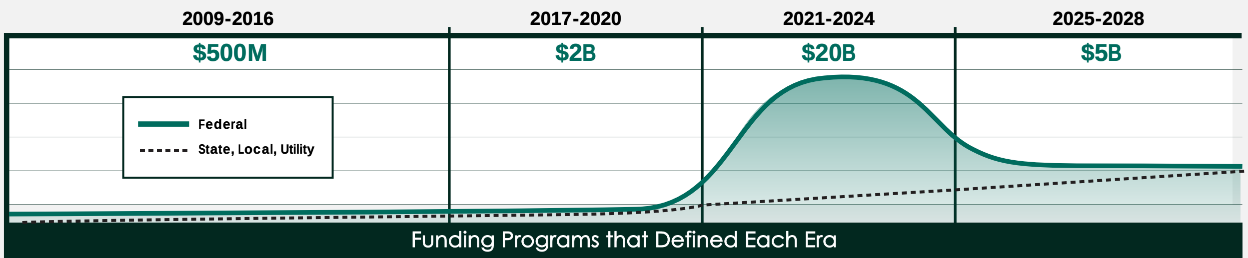
At DOT, the $5 billion National Electric Vehicle Infrastructure (NEVI) program to support states in building public charging infrastructure was suspended for six months and became the subject of litigation with multiple states before funds were released following a court order.[68] Those funds are now being released and allocated to new projects, after DOT updated requirements that allowed some states to solicit MD and HD vehicle projects.[69] Meanwhile, DOT has refused to obligate new funds or award new grants under the Charging and Fueling Infrastructure (CFI) program, which is intended to support EV charging and hydrogen fueling infrastructure along major freight corridors. A coalition of 16 states has filed suit to compel DOT to administer previously awarded CFI projects, many of which were designed to support MD and HD vehicle deployments by establishing publicly accessible

EV charging and hydrogen refueling stations along major U.S. corridors.[70]

A revealing signal of federal priorities came from one of the DOT's largest legacy grant program, the Federal Transit Administration's Grants for Buses and Bus Facilities and Low or No Emission Vehicle programs. It awarded more than $2 billion in the latest round in 2025. Funded fuel types were NZE NG and propane, hybrid, and diesel projects, excluding ZE projects completely.[71]

Despite this transformation of the national funding landscape, funding levels remain higher than they were less than a decade ago with more than $5 billion estimated annually through 2028 (Figure 2).

AVERAGE ANNUAL PUBLIC INCENTIVE FUNDING 2009 - 2028



EPA's Diesel Emissions Reduction Act (DERA) Program provided recurring federal and state clean transportation funding. Some state and local airshed programs were announced.

Volkswagen (VW) Settlement Funding enabled states and federal tribes to stand up incentive programs to deploy clean transportation technologies. State and local programs provided growing funding. First utility programs announced.

IIJA and IRA established historic levels of clean transportation funding including flagship programs like the Clean Vehicle Tax Credit, Clean School Bus, and Clean Ports. California provides $1-2B annually, on average. Utility programs begin distributing $1-2B annually.

State, Local, Utility In the wake of significant federal funding shifts, the incentives landscape is characterized by state, local, and utility programs that provide more than $5B estimated annually.

Figure 2: Funding program levels across different funding eras. Source: TRC's Funding360 public incentive monitoring, tracking, preparation service.

FEDERAL ROLLBACK OF EFFICIENCY, CLIMATE STANDARDS, AND CALIFORNIA CLEAN AIR AUTHORITY USHER NEW ERA OF UNCERTAINTY

In 2025 and early 2026, the EPA moved to relinquish federal authority to regulate GHGs from vehicle emission standards. In July 2025, the Trump Administration initiated a rulemaking to revoke the EPA's 2009 Endangerment Finding, which found that emissions from GHGs harm public health and are therefore part of the Clean Air Act.[72,73]

In February 2026, EPA finalized the removal process, enabling the immediate repeal of U.S. vehicle GHG emission standards for all classes of vehicles, specifically the GHG portion of EPA's CTP.[74,75,76,77,78] Multiple environmental organizations, states, and industry stakeholders filed lawsuits, and more legal challenges are expected.[79,80,81,82]

Ongoing litigation, combined with long manufacturing lead times, leaves OEMs and fleets uncertain which regulatory framework will ultimately govern vehicle production and compliance.[83] Fleets and buyers need to continue buying certified truck and engine products, which are trending toward less stringent requirements, and OEMs will need to navigate these changes while continuing to certify products to the legally available standards.[84]

Changes at the federal level also included the National Highway Traffic Safety Administration's revision to existing fuel economy and efficiency standards for LD Corporate Average Fuel Economy (CAFE) standards and MD and HD trucks.[85,86,87] Shortly after that guidance was released, the midyear budget reconciliation eliminated civil penalties for OEMs failing to comply with LD CAFE standards.[88]

In December, less stringent LD CAFE standards were announced, with the National Highway Traffic Safety Administration publishing a proposed rule to shift the average fuel economy to 34.5 MPG by 2031, down from the existing 50.4 MPG target for MY2031 onward.[89,90,91] Final fuel-economy standards are anticipated sometime in 2026 following proposed rules and public comment periods. It will be up to fleets and OEM partnerships to determine how this rollback may affect product-specific fuel economy projections and pricing.

SHIFTING STATE-LEVEL REGULATIONS AND AUTHORITY

As federal regulations change, initiative for regulating GHG and criteria pollutants is expected to move to the state-level, as states look for other ways to control local emissions and weather-related resiliency costs within their borders.[92] While states are currently constrained from using previous low- and zero-emission regulations, legislators and regulators are trying to identify new paths to achieve local priorities.

> **Industry stakeholders are unlikely to receive clarity on whether they must comply with California's emission standards before late 2026.**

In mid-2025, President Trump signed three resolutions under the Congressional Review Act (CRA) that prohibit California's zero- and low-emission vehicle rules, including H.J.Res. 87, covering the Advanced Clean Trucks (ACT) regulation, ZE Airport Shuttle, and ZEP Certification; H.J.Res. 88, covering Advanced Clean Cars II (ACCII); and H.J.Res. 89, covering the Omnibus Low NOx rule.[93,94,95] On the same day, California Attorney General Rob Bonta filed a lawsuit asserting the resolutions constituted an unlawful use of the CRA.[96] Colorado, Delaware, Massachusetts, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, and Washington joined the lawsuit.[97]

The case is still undergoing legal proceedings, and industry stakeholders are unlikely to receive clarity on whether they must comply with California's emission standards before late 2026 at the earliest.[98] While the lawsuit is pending, OEMs have been granted an injunction preventing CARB from enforcing provisions of its agreements with manufacturers regarding the clean truck standards.[99] CARB has moved to clarify applicable emissions rules amid this legal limbo, but unprecedented ambiguity remains around which standards apply and what will ultimately be enforceable.[100]

Federal impediments to California's emission reduction programs directly threaten the state's ability to meet federally mandated National Ambient Air Quality Standards. A failure to meet those standards could result in federal sanctions and the loss of highway funding.[101] In response, CARB released an executive order and policy roadmap outlining its ongoing commitments across the Low Carbon Fuel Standard (LCFS) and Cap & Invest programs, incentives, infrastructure, fuel pricing, indirect source regulations, and ZEV-first procurement policies.[102,103] The roadmap represents a general direction rather than specific regulation. Concrete rules, internal policies, and funding programs will need to be established at individual agencies and during the 2026 legislative session.

> **"Ongoing litigation and long manufacturing lead times leaves OEMs and fleets uncertain which regulatory framework will ultimately govern vehicle production and compliance."**

Initial CARB workshops in 2025 signaled an openness to multiple policy approaches. While CARB is aligning with the 2027 federal NOx and PM standards for now, they are focused on workshops and decisions around: developing new OEM engine and vehicle standards, setting fleet requirements (utilizing green zones, establishing a HD clean mile standard, or emission targets), and setting green contracting requirements for hiring entities such as shippers and third-party logistics providers. CARB may also re-examine how natural gas vehicles using RNG could contribute to state goals, asking staff to look at how revisions to the definition of Near Zero Emission Vehicle (NZEV)

could facilitate uptake of clean vehicles.[104] CARB staff plans to hold workshops in 2026 and 2027, and draft regulations should go before the board in 2027.

SOME CALIFORNIA RULES STAND, OTHER STATES MAY FOLLOW SUIT

Despite the federal rollback of California's major ZEV mandates, some California regulations remain fully in effect, creating additional cost implications for many fleets operating in the state. Requirements covering public agency fleets, warehouse emissions, and HD emissions testing all continue to apply, and California is actively developing alternative policy tools to pursue its air quality and climate goals.

In September 2025, CARB approved amendments to the Advanced Clean Fleets (ACF) ZEV regulation, which apply to California's public state and local government agency (SLGA) fleets.[105] The amendments provide more structured guidance on procurement timelines, extended the 50% ZEV purchase plan schedule by three years, and shifted the start of the 100% ZEV Purchase Requirement from 2027 to 2030. CARB also made updates to provisions governing 'traditional utility-specialized vehicles' and to Usage, ZEV Purchase, and Mutual Aid Exemptions. Additional amendments and Board approvals are anticipated in 2026.[106] For SLGA fleets, the rule is expected to increase costs despite emerging TCO benefits of certain ZEV types and applications as detailed in the Battery-Electric Vehicle chapter.

> **California requirements covering public agency fleets, warehouse emissions, and HD emissions testing all continue to apply.**

> **California, New Jersey, New York, and Illinois are considering WAIRE-type and other warehouse emission reduction requirements.**

California's Clean Truck Check Program, the state's HD vehicle inspection and maintenance regulation, remains in full effect. The program is designed to ensure that emission control systems on MD and HD engines in trucks operating within the state continue to function at required emission levels, but the EPA is proposing to remove emission credit benefits for non-California vehicles, and potentially signaling additional challenges in the future.[107,108] In 2025, Colorado also revised and strengthened its HD emission inspection program. Although it is more limited in scope than California's, it signals a broader interest among some states in vehicle-level emissions enforcement, and fleets should monitor for similar efforts in the many states with HD inspection and maintenance programs.[109]

Southern California's regional Warehouse Actions and Investments to Reduce Emissions (WAIRE) program, Rule 2305, remains in effect for warehouse owners and equipment operators in the South Coast Air Quality Management District (AQMD), and enforcement has increased over the past year.[110] Warehouses larger than 100,000 square feet must calculate fee obligations based on the number of diesel truck visits each year. Fees can be reduced or eliminated through a menu of compliance options, including installing EV charging or solar panels, operating ZE or NZE equipment, or submitting an approved compliance plan. The WAIRE program is influencing policy discussions across and outside of California.

At the state level, California, New Jersey, New York, and Illinois are considering WAIRE-type and other warehouse emission reduction requirements. Regional jurisdictions in San Diego and Denver both decided against new indirect-source type rules for warehousing, though New York City is signaling ongoing policy interest.[111,112,113]

MANY STATES, LOCAL GOVERNMENTS, AND UTILITIES CONTINUE TO FUND PROJECTS

States and local agency programs have always played a leading role in building the market for clean vehicle technologies, predating and, in many cases, exceeding the scale of programs established by the federal government. Even though they cannot easily replace the funding lost to federal rollbacks, state and local agencies are evaluating how to incentivize fleets to help meet local air quality and climate goals by deploying clean vehicles through new or reinvigorated grant and rebate programs. Together, these state, local, and utility programs are estimated to provide more than $5 billion for projects annually, higher even than five years ago (Figure 2).

> **State, local, and utility programs are estimated to provide more than $5 billion for projects annually, higher even than five years ago.**

California continues to serve as a dominant funding and deployment driver of MD and HD ZEVs. The state had approximately $1 billion in grant funding for on-road trucks and buses in 2025, and millions more dedicated to public and private ZE infrastructure, a level that was boosted by one-time allocations, such as a $132 million Hino settlement funneled into the HVIP program.

California's HVIP remains a driver of MD and HD ZEV adoption in the state. Since the program began, it has funded more than 5,765 Class 2b to Class 8 BEVs and 226 hydrogen FCEVs.[114] HVIP released two funding waves in 2025, resulting in private and public fleets reserving $592 million in vouchers for 3,569 Class 2b–8 ZEVs by February 2026. Tesla captured the largest market share among OEMs in this latest round, with 1,003 vouchers representing 28% of all HVIP vouchers processed in 2025.

The draft Governor's budget explicitly allocated $200 million in one-time special funds for a new LD ZEV incentive to backfill expired federal tax credits.[115,116] For MD and HD ZEVs, CARB anticipates allocating its funding from the State budget to non-road projects through CORE rather than on-road projects via the HVIP program, which has historically received new funds each year.[117] As of early April 2026, HVIP still has close to $200 million in remaining funds from allocations made available in September and December 2025. The new Clean Fuel Rewards program will likely rival and work with HVIP in funding millions of dollars towards MD and HD ZEV purchases in the state. The program may supplement HVIP-style funding in FY 2026-27 if the voucher incentive program receives no new funds.

Not all California programs rely on the state budget. The Carl Moyer Program is funded through smog abatement and tire fees and local contributions. The Clean Fuel Rewards Program mentioned above is funded by LCFS credit revenue from the Investor Owner Utilities and not reflected in the state budget. Additionally, SCAQMD's WAIRE Mitigation Program uses mitigation fees collected from the WAIRE Program which was adopted in 2021. Similarly, the Port of Los Angeles is expected to release their own incentive program targeting Class 8 battery electric truck deployments, using fees collected from the Clean Truck Fee and supplemented with EPA funding.

Beyond California, states with MD and HD vehicle funding in 2025 will continue funding similar projects

> **"New York, Texas, Oregon, Washington, New Jersey, Illinois, Michigan, Pennsylvania, Colorado, and California will continue funding projects."**

> **"For the past seven years, California's three major utilities have collectively funded more than $650 million in fleet electrification upgrades and customer-side costs.."**

in 2026. This includes New York, Texas, Oregon, Washington, New Jersey, Illinois, Michigan, Pennsylvania, and Colorado. Washington's zero emission incentive program, WA-ZIP, is expected soon and is modeled after California's HVIP, with $126 million for MD and HD vehicles.[118]

Texas has historically and continues to offer a robust portfolio of programs targeting Class 4 through 8 commercial vehicles and off-road equipment. The Texas Volkswagen Environmental Mitigation Program (TxVEMP) All-Electric program represents the final deployment of remaining Volkswagen settlement funds, incentivizing fleets to scrap and replace their oldest on-road vehicles (engine MY 2009 or older), school buses, and off-road equipment with upwards of hundreds of thousands of dollars per deployment. Other Texas grants, including Rebates Grants, Clean Fleet, and Emission Reduction Incentive Grants, are projected to return as soon as Q2 2026 and through early 2027, which would fund the deployment of new ZE and NZE vehicles and off-road equipment, with less strict scrappage model years compared to the TxVEMP program.

Electric utilities remain a critical component of the electrification journey for fleets transitioning to BEVs. For the past seven years, California's three major Investor-Owned Utilities (IOUs) — SCE, PG&E, and SDG&E — have collectively funded more than $650 million in fleet electrification upgrades and customer-side costs. However, the programs will sunset in 2026, with application deadlines in mid-2026 and contracts required by the end of the year.

IOUs in California, particularly SCE, are pivoting to new offerings, including a Shared Fleet Charging Rebate that provides $250 to $500 per kilowatt deployed for multi-fleet and public-access sites, and a ZE Drayage Truck Rebate offering up to $150,000 per Class 8 truck.[119,120] Outside of California, utilities such as ComEd, Illinois's largest electric utility, will continue supporting Class 3-8 MD and HD rebates ranging from $7,500 to $150,000 starting in 2026 through 2028 or while funding remains.[121] In the Northeast, the Joint Utilities of New York's Pilot Program for MD and HD vehicles continues to be implemented by utilities, including Con Edison and National Grid, through Make-Ready programs.

STATE LOW-CARBON FUEL PROGRAMS CONTINUE TO UNDERPIN CLEAN VEHICLE GROWTH

Alongside grant and rebate programs, low-carbon fuel programs, which operate independent of federal regulation and support, continue to drive clean transportation deployment and market development. California's LCFS is the nation's largest clean fuel marketplace.

The 2024 amendments to California's LCFS increased the stringency of its carbon intensity (CI) benchmark, introduced an auto-adjustment mechanism in response to supply growth, and added new restrictions on combustion-fuel technologies, including RNG and RD. Although the changes were designed to lift credit prices, prices remained soft through Q3 2025, averaging a high of $71 per metric ton in Q4 2024 before falling to an average low of $52 in Q3 2025. There were modest signs of recovery to $53.48 by the end of that quarter. Credit generation trading volume between Q4 2024 and Q3 2025 reached over 31 million credits, representing an annual market value of approximately $1.8 billion.

> **RD, electricity, and RNG ranked first, second, and third, respectively, by credit volume on California's LCFS in 2025.**

RD generated the most credit volume in 2025, but a shift in the market benchmark is poised to increasingly benefit EV technologies, especially those using renewable electricity through the Zero-CI Pathway. RD, electricity, and bio-CNG/RNG ranked first, second, and third, respectively, by credit volume in 2025.[122] The 2024 rule change also newly permitted private charging to generate ZEV infrastructure credits, benefiting developers and fleet operators building behind-the-fence charging infrastructure.

California continues to influence other states. Oregon and Washington are aligning their programs with California's updated structure. Oregon initiated a rulemaking in 2025 that should be finalized this year, and Washington updated its Clean Fuel Standard. Both programs are likely to support MD and HD clean vehicle and infrastructure adoption, especially for ZEVs.

Additionally, New Mexico has officially entered the low-carbon fuel market and adopted the Clean Transportation Fuel Program that passed the state legislature in March 2024. It is the first market-based mechanism in the Southwest to reduce transportation-related GHG emissions. The program took effect April 1, 2026.

At the federal level, the EPA proposed record-high volume standards for 2026 to 2027 under the Renewable Fuel Standard (RFS), waived 2025 cellulosic biofuel requirements, and reduced Renewable Identification Number (RIN) values for foreign biofuels. The changes are expected to boost the domestic value of renewable fuels and EV charging for producers and users of those technologies.

DIESEL VEHICLES

FLEET MARKET DATA

MD & HD VEHICLES

- **New registrations for Class 8 diesel tractors declined 16%** between 2024 – 2025
- **38% of fleets use efficiency** technologies and practices
- **46% of fleets plan to increase use of efficiency** technologies and practices in the next two years
- Fleets in the logistics industry report **8.5 MPG average MPG**

FUELING

- Diesel at public stations **averaged $3.72 per gallon nationally** in 2025
- Diesel at public stations **averaged $5.18 during the first four weeks of the U.S. invasion of Iran**
- **Gasoline at public stations averaged $3.60 per gallon** nationally in 2025
- **Biodiesel (B99/B100) at public stations averaged $4.55 per DGE** in 2025, a -6% change from 2024
- **Renewable diesel prices at California public stations averaged $4.95 per DGE** in 2025, a -5% change from 2024

SUSTAINABILITY / EMISSIONS

- **56% of fleets report using renewable diesel or biodiesel** in 2025
- **Renewable diesel and biodiesel provided 74% of diesel fueling** in California in 2024
- **Renewable diesel** used in California **offered a 57% lifecycle GHG reduction** in 2025 compared to conventional diesel
- **Lifecycle GHG emissions from renewable diesel increased 2%** in California between 2024-2025
- **Biodiesel** used in California **offered a 63% lifecycle GHG reduction** in 2025 compared to conventional diesel
- **Lifecycle GHG emissions from biodiesel increased 17%** in California between 2024-2025

DIESEL VEHICLES MARKET DEVELOPMENTS: 2025 – 2026

FREIGHT RECESSION, TARIFFS, AND NEW REGULATIONS REDUCE DEMAND, INCREASE COSTS

A severe freight recession persisted throughout 2025, which continued to depress demand for trucking services and new equipment. The downturn began in mid-2022 as consumers shifted spending from goods to services, softening freight volumes and leading to an inventory glut.[123] At the same time, equipment orders remained strong and private fleets expanded, leading to a prolonged period of excess trucking capacity.[124,125] While new tariffs on most imports triggered a brief front-loading surge in early 2025 as importers rushed goods ahead of implementation, tariff uncertainty, including the introduction of automotive tariffs, further suppressed freight demand, amplifying an already difficult market.[126]

Transportation stocks faced significant pressure throughout 2025 with major carriers, including UPS, FedEx, Saia, and Old Dominion Freight Line, citing steep weekly volume drops. Freight capacity continued to leave the market at a rapid pace. According to S&P Global Mobility data, registrations for Class 8 tractors declined by 16%. Dozens of trucking companies filed for bankruptcy or laid off employees in 2025, due to reduced demand, high operating costs, and elevated debt payments from COVID-era fleet investments.[126,127,128,129,130] The same conditions are expected to persist into 2026 amid continued regulatory uncertainty.[131]

> **"According to S&P Global Mobility data, registrations for Class 8 tractors declined by 16% in 2025 during a severe freight recession."**

Nearly all manufacturers supplying the freight market experienced significant order and sales declines in 2025, leading to production scale backs and layoffs.[132] Daimler Truck North America (DTNA) said it would temporarily lay off 2,000 production staff.[133] In Q4 alone, DTNA sales fell 27.5% year over year.[134] International Motors announced a 300 headcount reduction after truck and bus sales were down 30% in 2025.[135] PACCAR, maker of Peterbilt and Keworth, announced more than 700 job cuts between December 2024 and October 2025, reducing production at one plant from 96 to 18 per day.[136]

On the regulatory front, the Clean Trucks Plan, which requires MD and HD engine manufacturers to reduce nitrogen oxide (NOx) emissions by more than 80% and particulate matter (PM) by approximately 50% starting with model year 2027, remained a major source of uncertainty throughout the year. Combined with new extended warranty and useful life provisions, the new requirements were projected to add tens of thousands to the cost of a new diesel vehicle. Many industry experts anticipated the rule would follow a pattern of dismantling other efficiency and emissions standards by the current administration. Regulatory shifts combined with the ongoing freight recession softened demand for fleets to pre-buy before the new EPA rule took effect.[137,138]

However, in November 2025, EPA said its Clean Trucks Plan engine emissions standard will remain largely unchanged, maintaining the 0.035 g/hp-hr standard and 2027 implementation date. The final rule is expected to be published in the Federal Register in 2026 and will be available for public comment.[139,140] Stakeholders believe the final rule will curtail warranty and useful life provisions, which should reduce up to $30,000 in incremental costs projected under the original rule, as reported in previous Market Briefs, to an estimated $8,000 to $18,000 per vehicle.[141,142] All major manufacturers have developed at least one HD engine capable of meeting the requirements.[143]

> **"Renewable diesel makes the single biggest carbon reduction of all alternative fuels in use, and at no additional cost over petroleum diesel."**
>
> \- **Richard Battersby**, Assistant Director, City of Oakland Public Works

> **In 2025, EPA said its Clean Trucks Plan engine emissions standard will remain largely unchanged, maintaining the 0.035 g/hp-hr standard and 2027 implementation date.**

Although uncertainty around the EPA 2027 rule compressed the pre-buy window considerably, new build slots are already selling out for the third and fourth quarters of 2026.[144,145] An anticipated "pre-buy, no-buy" dynamic is expected throughout 2026 and 2027, with fleets rushing to finalize purchases in 2026, possibly slowing or halting vehicle demand in 2027.[146]

ANNOUNCEMENTS AND NEW INNOVATIONS PUSH DIESEL EFFICIENCY FURTHER

Fleets and manufacturers are finding new opportunities to reduce costs and emissions through efficiency innovations. On-highway Class 8 tractors achieved as much as 10 to 11 MPG while carrying heavy loads in 2025 showcasing what is possible in truck efficiency. What's more, two Class 8 tractors in NACFE's Run on Less - Messy Middle demonstration achieved an average of 11.6 MPG running 22,550 miles over 18 days in September 2025.[147,148]

These results compare to just 6.5 MPG in 2008 when using the latest aerodynamics, engine improvements, smarter transmissions, and driver behaviors for maximum efficiency.[149] The demonstration reaffirms that diesel efficiency gains once considered aspirational are now achievable at scale with advanced technology and best practices.

Fleets are responding, and the State of Sustainable Fleet survey data confirms the growing adoption of diesel efficiency technologies. Among respondents, 38% of fleets are currently using efficiency technologies and practices, up from 20% in the 2025 Market Brief. Nearly half of fleets — 46% — said they plan to increase their usage over the next two years. Logistics-sector fleets, the segment that tends to adopt efficiency technologies at the highest rates, report an average fuel economy of 8.5 MPG in the survey.

> **"We have been using RD99 since 2017 with great success in all of our on-road and off-road units. The number of DPF cleanings has decreased substantially."**
>
> - **David Renschler**, Fleet Division Manager, City of Fairfield

Manufacturers continue to invest in diesel efficiency. Volvo's VNL, launched in 2024, demonstrated its efficiency potential in real-world operations in 2025. Engine component changes account for a 3% improvement in fuel economy. Aerodynamic enhancements, including a wedge-shaped cab design and a curved and bonded windshield, push that figure to 10%.[150] A new "Eco Roll" disengages the driveline on downhill grades so the truck can coast, with the VNL reaching 23.5 MPG in some downhill tests.[151] Volvo's new VNR Class 8 regional haul tractor achieved up to a 7.5% fuel efficiency improvement through an updated D13 VGT engine and aerodynamic cab redesign. It also features Eco Roll.[152]

In April 2025, Mack debuted the Class 8 Mack Pioneer, calling it the company's most

> **Logistics-sector fleets report an average fuel economy of 8.5 MPG in the annual survey.**

aerodynamic highway truck to date.[153] Designed for long-haul and regional operations, the Pioneer delivers up to 11% better fuel efficiency than the previous Mack Anthem, combining a redesigned aerodynamic cab profile with an updated MP13 engine that delivers a 4% efficiency gain over its predecessor.[154]

Aftermarket aerodynamic devices are also driving efficiency gains and accumulating real-world proof. ConMet's TruckWings drag-reduction product surpassed 1.5 billion real-world miles across fleet deployments in December 2025.[155] The system manages airflow to improve stability and fuel efficiency, is compatible with all vehicle configurations, and can be installed in two hours or less.[156] A Frito-Lay tractor featured the TruckWings system alongside a BD system from Optimus Technologies that allowed the tractor to maintain mileage while running on B99.

> **Manufacturers and innovators see new efficiency potential in hybrids, which are generating increased interest as a cost-effective path between conventional diesel and longer-term electrification.**

Manufacturers and innovators see new efficiency potential in hybrids, which are generating increased interest as a cost-effective path between conventional diesel and longer-term electrification. Range Energy, in collaboration with ZF, has developed an electrified trailer system that converts existing diesel tractors into hybrid-electric configurations to improve fuel efficiency, reduce emissions, and extend range. It advertises savings of up to $20,000 per trailer and up to 70% in emissions reductions.[157] In September 2025, Petaluma Egg Farm placed an order for the Range system following a 2024 pilot, reporting 100% trailer uptime and 70% MPG improvements per route.[158]

Exelon, the largest regulated electric utility company in the U.S., uses a combination of EVs, plug-in hybrids, and vehicles with plug-in idle mitigation units to reduce fuel consumption and emissions. Bucket trucks equipped with idle mitigation can shut off their diesel engines and use plug-in batteries to power equipment for aerial work, lighting, air conditioning, and heating, reducing park-idling, which typically accounts for 65% of the truck's operating hours.[159]

> **"The city is currently replacing all front-line police Ford Interceptors with hybrid models; the fuel savings and idle time reduction is incredible. Running 24 hrs. per day 7 days per week the patrol vehicles was using on average 8 gallons of fuel per shift, we are now averaging 4 gallons per shift."**
>
> \- **John Hyatt**, Fleet Manager, City of Dublin, OH

LD and MD markets are also pivoting toward hybrid powertrains. Ford announced plans to indefinitely halt production of its F-150 Lightning electric truck in October 2025 for a pivot to gas and hybrid models, which achieve ranges and operational flexibility, especially when towing, that are currently out of reach for pure battery-electric trucks in this weight class.[160,161] The manufacturer will offer hybrid LD and MD vehicles through 2030, with an updated Super Duty hybrid powertrain expected in 2026 and extended range electric vehicle (EREV) options, including a relaunch of the Lightning as an EREV, beginning in 2027.[162]

SIDEBAR: EFFICIENCY FUNDAMENTALS REMAIN CRUCIAL TO CUTTING FLEET COSTS, FUEL, AND EMISSIONS

Tried-and-true fundamentals are proven to minimize fuel costs and consumption, according to Penske's "Fundamentals for Fuel Efficiency" report.[163]

Key practices include:

- **Measure and Improve Driver Skill:** Driver behavior is the leading factor in fuel efficiency, contributing an estimated 20% or more to overall fuel efficiency.
- **Spec Vehicle Appropriately:** Evaluating how vehicles will be used throughout their lifecycle help determines the appropriate vehicles for the job and opportunities for smaller, more efficient engines to do the work.
- **Understand Your Transmission Technologies:** Ensuring engines operate according to their transmission types and that shifting occurs in the appropriate RPM range enhances fuel efficiency with 1% to 3% in fuel economy estimated from automatic manual transmissions alone.
- **Check Vehicle Aerodynamics:** Side skirts, mud flaps, wheel covers, and trailer tails reduce drag, measurably improving fuel efficiency. Most have been proven time and again over the past decade to deliver results.
- **Implement Preventative Maintenance:** Missed, worn, or dragging brakes or leaking air and exhaust systems negatively affect fuel economy, and under-inflated tires can account for 30+% of fuel efficiency losses. Proper maintenance programs can achieve fuel savings of 5% to 10%.
- **Reduce Idle Time:** Technologies, such as auxiliary power units, can reduce idling by 10% to 30%.
- **Optimize Routes and Loads:** Establishing baselines for optimal routes reduces unnecessary miles. Understanding and increasing load efficiency can further reduce wasted miles.

RENEWABLE DIESEL AND BIODIESEL SEE INCREASED UPTAKE, PROOF POINTS

As reported in previous Market Briefs, RD and BD have been gaining ground in fleet operations for half a decade, and 2025 marked another year of expanded supply, growing use, and real-world validation. According to the annual fleet survey, 56% of fleets reported using RD or BD in 2025, up significantly from 27% in 2023. Additionally, 21% reported utilizing both.

As a result of increased supply and fleet uptake, RD and BD have combined to displace 74% of conventional diesel used in California transportation in 2024 and 71% in the first three quarters of 2025.[164] The two fuels generate more carbon credits under the LCFS in the state than any other fuel type.[165]

RD supply grew in 2025. Production capacity increased to 308,000 barrels per day in 2025, up from 282,000 in 2024, even though the number of operating RD plants declined from 22 to 19 over the same period.[166] Net imports and consumption of RD are expected to decline in 2026, but production is slated to increase.[167]

RD and BD have combined to displace 74% of conventional diesel used in California transportation in 2024 and 71% in the first three quarters of 2025.

> **"Our fleet has been utilizing Renewable diesel (RD99) for a decade and has been extremely happy with the results and will continue to utilize it moving forward due to the fact our maintenance costs have gone down since the transition."**
>
> \- **David Mesa**, Fleet Manager, City of San Jose

RD infrastructure has also expanded geographically. The Port of Stockton and BWC Terminals opened a new renewable fuels terminal following a 500% expansion over five years to meet growing California demand.[168] T Bros Oil & Gas Co. opened a renewable diesel depot in Barstow, California, in June 2025, serving as a critical distribution point for the Kinder Morgan CALNEV pipeline, producing ultra-low sulfur diesel and RD for fleets.[169] Penske Truck Leasing has been distributing RD on the West Coast since 2022, with California fueling locations making up roughly 10% to 15% of its total bulk fuel sales.[170]

Chemically equivalent to petroleum diesel and certified to the same ASTM D975 standard, RD combusts more cleanly than conventional diesel, resulting in fewer diesel particulate filter (DPF) changes.[171] RD and BD continued to outperform conventional diesel by wide margins in terms of carbon intensity. Lifecycle CI of RD on California's LCFS averaged 43.02 gCO2e/MJ in 2025, a 57% lifecycle GHG reduction compared to diesel fuel, and a 2% change compared to 2024.[172] Lifecycle CI of BD on California's LCFS averaged 36.97 gCO2e/MJ in 2025, a 63% lifecycle GHG reduction compared to diesel, and a 17% increase compared to 2024.[173]

When produced at the highest standards, RD has a cloud point around -10°C (+14°F), with critical fuel properties similar to No. 2 diesel, making it suitable for year-round use when fleet managers apply the same cold-weather best practices as with conventional diesel.[174] As more producers have entered the market, RD properties have shown greater variance. As a result, some supplies available today carry a higher cloud point.[175] Some fuelers blend high-quality, low-cloud-point BD with RD to offer superior cold-weather performance and better lubricity than RD or BD alone.[176]

BD is experiencing its own momentum and may see a renaissance following technological

> **When produced at the highest standards, RD has a cloud point around -10°C (+14°F), with critical fuel properties similar to No. 2 diesel, making it suitable for year-round use.**

> **"We have been operating three 100% biodiesel class 8 trucks for the last 10 months with great success."**
>
> - **Matt McLelland**, VP of Sustainability and Innovation, Covenant Logistics

breakthroughs and new infrastructure despite declining supplies. It remains one of the most widely available alternative fuels in the U.S. and is already blended in small quantities, typically 2% to 5%, across much of the national fuel supply.[177,178] The number of online U.S. BD plants fell to 48 in 2025 from 56 in 2024, and production capacity decreased to 130 million barrels per day from 136 million.[179]

Most suppliers cap blending at 20% BD content, called B20.[180] Technology developed by Optimus Technologies more than a decade ago makes it possible for fleets to use up to 99% BD as either a retrofit or specification for a new build.[181] High-profile fleet adoptions of the company's Vector System accelerate BD's credibility for HD operations. PepsiCo partnered with Optimus Technologies in June 2025 to deploy 20 Class 8 trucks using the system.[182] Covenant Logistics and ADM Trucking have also deployed equipment from Optimus Technologies.[183]

Availability of higher BD blends is also growing. Pilot opened the first U.S. B99 retail offering for fleets at its Decatur, Illinois, location in March 2025, in collaboration with PepsiCo, ADM and Optimus Technologies.[184] By September, Pilot had added B99 in Des Moines, Iowa, and Dallas, Texas.[185]

Installation of Optimus Technologies' Vector System does not void OEM warranties, but OEMs retain the right to investigate BD-related issues. Optimus offers a $50,000 per-engine warranty for failures attributable to the system.[186] In April 2025, Optimus Technologies announced its OEM-integrated new build offering with International Motors, making the Vector System available for integration into trucks with the International S13 engine platform.[187] Cold-weather performance, historically a concern for BD, was validated in a road test conducted in Indiana with an International Motors truck upfitted with the Optimus system, demonstrating seamless operation in temperatures as low as -30°F.[188]

For fleets, renewable fuels offer low- or no-cost "drop-in" emissions reduction for diesel vehicles. Diesel fuel prices in 2025 averaged $3.72 per gallon, a 5% decline from 2024, while gasoline averaged $3.60 per gallon, down 6% from the previous year. During the first four weeks of the 2026 U.S. invasion of Iran, diesel prices averaged $5.18 and gasoline prices averaged $3.63.[189] Private fueling agreements can bring even greater savings.[190]

B99 and B100 averaged $4.55 per diesel gallon equivalent (DGE) in 2025, a 6% decline from 2024.

> **Pilot opened the first U.S. B99 retail offering for fleets in 2025, in collaboration with PepsiCo, ADM and Optimus Technologies.**

RD prices in LCFS states remain competitive, and in many cases, at cost parity with conventional diesel because low-carbon fuel credits are available.[191] RD prices in LCFS state, California, averaged $4.95 per DGE in 2025, a 5% decrease from 2024.[192] Fleets using RD can also experience additional benefits, including fewer DPF changes and maintenance savings of approximately $0.015–$0.02 per mile.[193,194]

Federal policy is reinforcing the economics. The 45Z Clean Fuel Production Tax Credit was extended and modified following the budget reconciliation bill.[195] Producers of low-emission diesel fuel can now receive $1.00 per gallon for qualifying renewable fuels when prevailing wage and apprenticeship requirements are met, with additional credit available contingent on GHG emissions performance.[196]

INDUSTRY PERSPECTIVE: ENGINE TECHNOLOGY FORUM

This past year – 2025 – will be remembered as an unprecedented time for trucking fleets.

An abrupt end to nearly all federal public policy and financial support for GHG emissions clouds the future for ZE vehicles and infrastructure. The U.S. EPA's rejection of the Clean Air Act waiver for California's clean truck program also ends similar requirements in ten additional states that had opted into California's rules.

With federal policy and funding support for reducing GHG emissions eliminated, attention has returned to diesel and natural gas-powered options. With the expected relaxation of some aspects of upcoming emissions standards and the elimination of the Phase 1-3 GHG emissions requirements, new diesel and natural gas engines could see lower costs. There are important new developments to consider:

The 2027 heavy-duty emissions rule is still on track, but with modifications. While EPA announced it is retaining most aspects of the 2027 rule, including the implementation schedule, new HD diesel engines will still be required to reduce emissions of nitrogen oxides by about 80% compared to current levels. Other modifications, expected to be announced in late spring 2026, including adjustments to warranty requirements, are expected to reduce the expected incremental cost increase on new engines for truckers.[197] Should you buy now or wait until the 2027 models come out? Only fleets can answer this question.

DEF and SCR aren't going away, but the fix is in for engine derates and inducements. Selective catalytic reduction (SCR) systems using diesel exhaust fluid (DEF) were first introduced in 2010 and are now virtually standard equipment on all new HD vehicles. SCR allows the engine to be tuned and optimized for the highest fuel efficiency, while DEF treats the nitrogen oxide emissions, reducing them to very low levels. Concerns about DEF sensors and other aspects of the system that can lead to engine derates and unexpected downtime caught the ear of EPA in 2025.

New guidance was issued to manufacturers to adjust the systems and increase the time for fleets to evaluate and make repairs to vehicles.[198] This includes relaxation of vehicle speed and torque derates when operating without urea solutions, new requirements for model year 2027 diesel on-road trucks to avoid sudden power loss after DEF depletion, and revised DEF system software to prevent sudden engine shutdowns related to SCR system malfunctions. Also being implemented are inducement strategies that allow for higher speeds and a longer time frame for the system to activate. Finally, phased-in derating strategies for HD trucks and RVs will have final limits after 8,400 miles or 160 hours.

As fleets consider the timing and type of investments in new vehicles, the age and condition of the existing fleet introduce other concerns. Recent economic conditions have resulted in lower fleet investment in new vehicles, but there remains a continued need to keep vehicles on the road. Fleets can further their sustainability credentials by choosing remanufactured engines. Reman engines replace worn engines to new or better levels of performance. The result saves energy and raw materials from new production while giving fleets a warranted, like-new engine replacement that saves money and keeps a productive vehicle on the road.[199]

Fuel is always a major consideration for fleets: its cost, availability of supply, and environmental impact. Renewable diesel, biodiesel, and renewable natural gas are gaining more attention from fleets after the elimination of mandates and incentives for ZEVs. Federal renewable fuels policy, when finalized in 2026, is expected to establish important new growth parameters that boost biobased diesel fuels by about 8% over 2025 levels.[200] Federal tax policy to implement the new producer tax credit is under review and is expected to drive further investments by producers and expand fuel supply for fleets.

Renewable biobased diesel fuels offer an increasingly available, affordable, and compelling option for fleets to reduce GHG and other emissions without new vehicles or fueling infrastructure. According to the latest information from the California Air Resources Board, renewable diesel fuel accounted for over 2.7 million gasoline-gallon equivalents.[201] According to the U.S. Energy Information Administration, renewable diesel production is forecast at 260,000 barrels per day in 2026, with consumption running at 220,000 barrels per day. Oregon, Washington, and New Mexico now have low-carbon fuel requirements in place, which will drive further access to these fuels beyond California. Washington state just reported first-year results from its Clean Fuel Standard program, estimating 2 million tons of greenhouse gases reduced at a cost of less than 1 cent per gallon of gasoline.[202]

A particular bright spot for fleets is the growing opportunity for natural gas. The growing success of the Cummins X15 natural gas engine, introduced in 2024, coupled with growth in RNG, provides fleets with an unmatched ability to reduce the carbon intensity of their fuel by over 100% compared to conventional natural gas and diesel.[203]

Outcomes of multiple legal challenges against new emissions rules and related policies – including the recent repeal of the GHG endangerment finding – hang in the balance until well into 2027. Court decisions could alter the outcomes of EPA's new approach to emissions regulation, adding further uncertainty. Regardless, fleets must still deliver, and advanced diesel or natural gas engines continue to provide fleets with the most proven, available, and versatile option to get the job done.

All opinions in the above Industry Perspective represent the opinion of the aforementioned organization and do not reflect the opinions of TRC Companies, Inc. (TRC) or the report sponsors.

NATURAL GAS VEHICLES

FLEET MARKET DATA

MD & HD VEHICLES

- **Total new natural gas vehicle registrations declined 15%** between 2024-2025
- **New straight truck (mostly refuse) registrations increased 27%** and new tractor trucks decreased 83%
- **71% of fleets using the X15N reported cost savings** relative to diesel
- **59% of fleets using the X15N reported cost savings** relative to other NGVs
- **38% of fleets currently using NGV** intend to increase its use

FUELING

- **CNG averaged $3.43 per diesel-gallon-equivalent nationally** at public stations in 2025
- **Cost savings over diesel averaged 8%** in 2025 and climbed to 36% in March 2026
- **65% of CNG users reported using RNG** for 78% of their fueling volume

SUSTAINABILITY / EMISSIONS

- **65% of CNG users reported using RNG** for 78% of their fueling volume
- **RNG replaced nearly all conventional natural gas** used in California transportation since 2023
- **RNG replaced 97% of natural gas used** in California the first three quarters of 2025
- **RNG used in California offered a 301% GHG reduction in 2025** compared to diesel on a lifecycle basis
- **Lifecycle GHG emissions from RNG were 13% lower** in California between 2024-2025

NATURAL GAS VEHICLES MARKET DEVELOPMENTS 2025-2026

X15N DELIVERS BENEFITS WHILE THE INDUSTRY ALIGNS TO SUPPORT SALES

The Cummins X15N 15-liter natural gas engine entered full production in late 2024 promising higher efficiency and lower weight compared to the 12-liter natural gas engine, and it demonstrated its capabilities across the HD fleet market throughout 2025.[204] In its first full year of commercial availability, early adopters reported measurable performance gains, fuel cost savings, and operational experiences that closely mirror diesel. Within the annual fleet survey, 71% of fleets using the X15N reported cost savings relative to diesel, and nearly three-fifths — 59% — reported cost savings relative to other NGVs. One fleet announced that they expect a 1.5-year return on investment in the X15N due to their very high tractor utilization and consumption of lower-price CNG relative to California's high-cost diesel market.[205]

In-the-field performance has shown the engine's strengths. NACFE's Run on Less – Messy Middle event showcased the X15N in several models. Diesel-like power, torque, and range were tracked over 20,739 miles on the X15N during the event, at times hauling doubles and triples at over 120,000 GVW.[206,207,208] One participant, Kleysen Group, LTD., used the X15N in a 2025 Kenworth T880 for routes in Alberta, Canada, and logged 100% uptime, ran multiple different routes, and drivers reported that the vehicle drove like a diesel.[209, 210]

> **71% of fleets using the X15N reported cost savings relative to diesel, and nearly three-fifths — 59% — reported cost savings relative to other NGVs.**

J.B. Hunt reported that the X15N achieves 3% to 5% better miles per gallon in their operations compared to the prior 12-liter model.[211] The engine's technical specifications and years of development and testing underpin these results. It delivers up to 500 horsepower and 1,850 lb-ft of torque and is certified at 0.05g NOx, meeting EPA and CARB regulations and producing 75% less NOx than required by the EPA.[212, 213, 214, 215]

Fuel providers and equipment and vehicle manufacturers came together to support sales of the X15N, and it is commercially available through Freightliner, Kenworth, and Peterbilt, providing fleet buyers with competitive choice in the tractor market for the first time.[216] DTNA announced the availability of the X15N in its fifth-generation Freightliner Cascadia in April 2025, with full production launching that summer.[217,218,219] For Peterbilt, the X15N is available in its 579, 567, and 520 models.[220] The X15N is fully integrated into Kenworth's T680 and T880 model, and Allison Transmission's fully automatic transmission was integrated with the Cummins X15N in Kenworth T880 tractors.[221, 222]

> **"We have a fleet of 15 Cummins X15N and 20 Cummins ISX12N Class 8 tractors. We've enjoyed the extended maintenance intervals and excellent performance of the new powertrain. We run our trucks 24/7 and our uptime for the new platform far exceeds our expectations."**
>
> - **Rich Mulder**, Chief Commercial Officer, Ozinga Renewable Energy Logistics

> **"We are experts with RNG as a fuel and CNG engines. We have successfully deployed the natural gas-powered trucks with multiple customers across several states for the past 15+ years."**
>
> - **Jared Stedl**, CCO, Paper Transort

Fuel providers also moved to accelerate adoption. Clean Energy Fuels launched a demonstration program running through at least 2028 offering Peterbilt and Freightliner tractors equipped with the X15N, and fueled by Clean Energy's nationwide RNG network.[223,224] In September 2025, Hexagon Agility, Clean Energy Fuels, and Cummins partnered to launch Pioneer Clean Fleet Solutions, a leasing company offering turnkey packages that include natural gas trucks, fuel, and service.[225]

NGV REGISTRATIONS IN 2025 AFFECTED BY FREIGHT RECESSION, DROP 15%

According to S&P Global Mobility, total vehicle registrations for MD and HD vehicles declined 15% to 5,839 total units in 2025. Compared with 2024, registrations of straight trucks, mostly refuse vehicles, increased 27%, and tractor trucks decreased -83%, year over year. Despite the overall drop, the segment composition of NGV registrations reflects continued strength in core markets. Straight trucks led all categories with 4,815 units, or 82% of all 2025 NGV registrations, likely for refuse. Transit buses accounted for 584 units (10%), and tractor trucks came in at 389 units (7%). The strong showing in straight trucks underscores the durability of the refuse market as a key anchor for natural gas demand. Tractors were down while manufacturer production of X15N-powered trucks came online through 2025 and fleets delayed orders due to plans by Cummins to fully replace the 12-liter with the 15-liter in its product lineup.

Order activity for the X15N during 2025 was strong. Full commercial production of the X15N resulted in orders from leading Class 8 tractor fleets including Walmart, Amazon, UPS, FedEx, Werner, Knight Swift, Food Express, Cemex, and Mullen Group.[226] In July 2025, Hexagon Agility received a single order of 60 fuel systems with the X15N engine for a leading American consumer goods manufacturer.[227] Two months later, the company announced a combined order book of $4.2 million in fuel system orders to support 10 Class 8 fleets deploying X15N engines in the U.S. and Canada.[228] Cummins reported in early 2026 that 1,000 units were already in customer hands or in production for delivery.[229]

Transit fleets also showed strong continued interest in CNG. Hexagon Agility secured an order from Gillig to provide 476 CNG fuel systems for the Dallas Area Rapid Transit bus fleet in Texas.[230] The Regional Transportation Commission of Southern Nevada announced the purchase of 46 New Flyer Xcelsior CNG transit buses.[231] The order was supported, in part, by more than $460 million awarded to transit agencies for CNG bus purchases through the Federal Transit Administration's Low- and No-Emission Grant Award and Grants for Buses and Bus Facilities programs in 2025, representing 23% of the program total.[232]

> **According to S&P Global Mobility, total vehicle registrations for MD and HD natural gas vehicles declined 15% to 5,839 total units in 2025.**

> **Leading fleets including Walmart, Amazon, UPS, FedEx, Werner, Knight Swift, Food Express, Cemex, and Mullen Group placed orders for the X15N.**

FUEL COSTS REMAIN STABLE AND LOW, DELIVERING CONSISTENT BENEFITS TO FLEETS

CNG prices in 2025 remained reliably low and demonstrated the stability that has long distinguished it from diesel. Publicly posted CNG prices averaged $3.43 per diesel-gallon equivalent (DGE) in 2025, representing an 8% savings over the average diesel price for the year.[233] The national average peaked in April at $3.51 DGE and steadily subsided to $3.43 per DGE as of July 2025 and $3.37 per DGE by end of year 2025. Over the past decade, public CNG prices have only risen above $3.50 per DGE briefly, while diesel has spent extended periods averaging above $4.00 and more than $5.00 following the U.S. war in Iran.[234,235] Fleets using CNG have consistently reported strong cost savings at retail stations, and savings can be even greater through private, dedicated, or shared fueling arrangements.[236]

Fleets' experiences support the aggregate price data. WM estimated it saved at least $93.5 million from its fleet of approximately 14,000 natural gas vehicles in 2024 compared to diesel at an average price of $3.76 per gallon.[237] WM also reported savings after adding the X15N alongside the L9N and ISX12N engines.[238] NACFE's results echo WM's cost-savings, finding that fleet operational savings come from fuel costs and not MPG.[239]

> **Over the past decade, public CNG prices have only risen above $3.50 per DGE briefly, while diesel has spent extended periods averaging above $4.00 and topping $5.00 following the Iran war.**

J.B. Hunt noted that, in the best-case use scenario, CNG can reduce fuel costs by as much as 50% compared to diesel, even accounting for CNG's lower energy density.[240]

Fuel cost savings were cited as the top benefit of CNG by adopters in the 2024 annual fleet survey, a finding that has remained consistent every year since the survey was founded in 2020.[241] Fleets can fuel at more than 620 public CNG stations nationally or work with fuel and infrastructure providers to build even lower-cost private and dedicated fueling.[242] More details on capturing cost saving from various fueling options in the Sidebar below.

RNG ACCESS KEEPS GROWING, REPLACING SIGNIFICANT SHARE OF CNG USE

Supply of renewable natural gas has expanded dramatically for most of the last decade, and the RNG market continued its rapid expansion in 2025. The industry opened its 500th production facility during the year, a milestone made possible in part by the 163 projects that were under construction, as noted in last year's Market Brief.[243,244] Supply was up an estimated 23% between 2023 and mid-2025 according to one study, and a separate projection estimates the global RNG market will grow 44% between 2023 and 2028.[245,246]

> **RNG used in California transportation displaced most conventional natural gas the past three years, reaching 97% of all natural gas fuel use in the first three quarters of 2025.**

In 2024, 86% of all CNG dispensed for transportation nationally was renewable, totaling 774 million gasoline-gallon equivalents (GGE), according to the Transport Project and the RNG Coalition.[247] Just over half of public CNG stations — 51% — now offer RNG, expanding access for more fleets.[248] RNG has displaced nearly all conventional natural gas used in California transportation for the past three years, reaching 97% of all natural gas fuel use in the first three quarters of 2025.[249] Among the fleets surveyed for the 2026 Market Brief, 65% of CNG users reported fueling with RNG, which they estimate accounts for 78% of their total fueling by volume. More than one-third of CNG users — 38% — predict their RNG use will increase over the next two years.

From a feedstock perspective, landfill gas and wastewater projects dominate national RNG supply because their lower production costs make them more cost effective than animal, food waste, and biomass thermal conversion projects. Landfill projects supply the majority of RNG used nationally, while animal waste supplies the majority of RNG used in California transportation.[250] WM, which utilizes its own landfills to operate one of the largest vertically integrated RNG networks in the country, expects to fuel its entire CNG fleet with low-cost, internally produced RNG by 2026.[251] The company invested more than $1.4 billion between 2022 and 2026 to build 20 new RNG facilities and generate an additional 25 million MMBtus of RNG annually.

A mid-year revision to the federal tax code provided meaningful benefits to RNG.[252] Landfill and wastewater-based RNG can generate a credit up to $0.20/GGE, depending on the specific source. Producers who develop projects with prevailing wage and apprenticeship programs can generate up to $1.00/GGE extra. Additionally, RNG sourced from animal waste will be the only renewable fuel source – across all fuel types (e.g. diesel, natural gas, hydrogen) – eligible for the carbon-negative credit value. The Treasury Department is finalizing guidance on dairy- and hog-specific emissions values that will garner higher credit amounts for their carbon-negative values.

While RNG provides the greatest emissions reductions among the leading commercially available renewable fuels for transportation, the average lifecycle CI of RNG in each state is highly influenced by state low carbon fuel programs. The CI of RNG on California's LCFS averaged -201.96 gCO2e/MJ, a 301% lifecycle GHG reduction compared to diesel fuel and a change of -13% compared to California RNG in 2024.[253] The CI of RNG on Oregon's low-carbon fuel program averaged -111.05 gCO2e/MJ, a 211% lifecycle GHG reduction compared to diesel fuel and a -52% change compared to Oregon RNG in 2024.[254] Oregon's high credit prices relative to California and Washington in 2025 and recent approvals of carbon-negative pathways have attracted growing volumes of ultra-low RNG from animal wastes.

> **"WM operates the largest alternative fuel fleet in the industry in North America, offering a unique opportunity to drive substantial emissions reduction impact by transitioning a majority of our fleet from diesel to natural gas."**
>
> - **Marty Tufte**, Corporate Fleet Director, WM

> **RNG sourced from animal waste will be the only renewable fuel source – across all fuel types (e.g. diesel, natural gas, hydrogen) - eligible for a carbon-negative tax credit value.**

> **"We are a fleet of 47 class 8 tractors. We have been using CNG and RNG since 2015 and have cut down our carbon footprint substantially and reduced our diesel fuel by 1.2 million+ gallons every year."**
>
> - **Stan Ledwon**, Fleet Maintenance, Tops Markets

Lifecycle carbon intensity of RNG in Washington's low-carbon fuel program averaged 18.41 gCO2e/MJ, an 82% lifecycle GHG reduction compared to diesel fuel and a 38% change compared to Washington RNG in 2024.[255] Washington's persistently low credit prices relative to California and Oregon have translated into supplies dominated by landfill-derived RNG.

SIDEBAR: FUEL PROVIDERS HELP FLEETS ACHIEVE VERY LOW COSTS OF ADOPTION AND OPERATION

Fueling providers can tailor arrangements based on a fleet's size, routes, and funding levels. Options typically include:

- **Private, Dedicated Stations:** Behind-the-fence, private facilities are accessible only to the fleet or station operator. Upfront investments can be significant, but many infrastructure providers can carry or help finance the capital costs. Private dedicated stations are the backbone of large-scale NGV programs at companies like WM, which has 213 NG fueling stations, and UPS.[256]
- **Shared Stations:** With a shared station, the fueling provider typically carries the full development cost while so-called 'anchor tenants' commit to being the primary customer. As the primary customer, anchor tenants have access to dedicated fueling windows and preferential pricing. Mullen Group served as an anchor fleet for a $70 million joint development to build up to 20 shared public-access CNG stations across Canada.[257]
- **Discounted Costs at Public Stations:** Fuel providers may offer discount packages comparable to diesel fueling cards, such as volume discounts on a per-unit price basis for minimum volume commitments, fixed discounts against diesel spot prices, or cost-plus arrangements with discounts based on the provider's cost plus a negotiated margin. Clean Energy Fuels signed agreements with several fleets in 2025, including United Dairymen of Arizona, Paper Transport, and Giant Oil.[258]
- **Vehicle Funding Programs:** Some fuel providers now offer incentives that cover much of the incremental costs of natural gas vehicles as part of a fueling agreement.[259] These types of programs have enabled small fleets or those testing the technology with a few trucks to make the switch with minimal upfront capital. Pioneer Clean Fleet Solutions bundles vehicle leasing, fueling, maintenance, and fleet management into a single package tied to a fueling agreement.
- **Fast vs. Slow Fill:** Slow fill is the most cost-effective option.[260] It works best for operations with long dwell times and depot-based fleets where vehicles return to base each night. Fast-fill offers a diesel-like fueling experience in which the vehicles pull up, fill in minutes, and return to service. Fast-fill is typically more expensive than slow fill, but still costs less than diesel.

INDUSTRY PERSPECTIVE: THE TRANSPORT PROJECT (TTP)

It's easy to assume that affordability and clean vehicle technology are mutually exclusive, but more and more fleets are proving they can coexist. Proven clean transportation solutions that both reduce emissions and lower operational costs are available today. RNG is one of them.

RNG offers an immediate, real-world solution for HD trucking, one of the hardest sectors to decarbonize. Transitioning to RNG lowers fuel costs for fleets, cuts transportation emissions, improves local air quality and helps keep consumer prices down by reducing the cost of moving goods and people. It also delivers quieter trucks and buses in frontline communities and supports investment and job creation in clean energy technologies.

Brightening Regulatory Pathway

Significant public policy adjustments since January 2025 have impacted regulatory schemes that once propped up misguided barriers to expanded NGV deployment in favor of other technologies.

The endangerment finding was rescinded and, with it, U.S. EPA's onerous GHG Phase 3 rule revoked. This Biden-era rule slowed progress on an all-of-the-above clean vehicle deployment approach and added unwarranted burdens to trucking fleets. The elimination of GHG Phase 3 promotes vehicle choice and fleet flexibility and ensures an uninterrupted and affordable flow of goods and services.

Using its Congressional Review Act powers, the U.S. Congress repealed special waivers afforded to California that allowed the state to impair the growth of ultra clean natural gas transportation solutions. Today Advanced Clean Truck and Omnibus are gone, while Advanced Clean Fleet only applies to State and Local Government Agency Fleets and the Clean Truck Partnership is paused.

And all signals suggest that U.S. EPA's new Clean Truck NOx standard will be preserved while technical fixes are made to troubling provisions regarding warranty, cold start, and compliance, further encouraging fleets to adopt new clean air technologies like RNG.

Heavy Heavy-Duty Technology

This brighter regulatory outlook is enhancing product offerings. Cummins launched the highly anticipated 15L X15N engine in 2024. Today it is available in Peterbilt, Kenworth, and Freightliner chassis and joins a suite of Cummins natural gas engines including the B6.7N, L9N, and ISX12N.

This engine delivers up to 500 hp and 1850 lb-ft of torque, with better low-end torque than previous 12-liter models; meets 2024 EPA and CARB low NOx regulations, with potential for carbon-neutral or negative emissions when using RNG; and offers up to a 10 percent improvement in fuel economy over the previous 12-liter natural gas engine. Lighter than previous 15-liter diesel engines, the X15N features nearly 40 percent more engine braking power than the ISX12N.

In NACFE's most recent Run on Less demonstration, the X15N proved its worth in the most grueling applications, capable of hauling up to 140,000 lbs. gross combination weight at ranges nearing 1,000 miles between fills.[261]

Late last year Westport Fuel Systems announced that through its Cespira joint venture with Volvo Group, it would be bringing its high-pressure direct injection HPDI engine popular in Europe to North America for the first time as a CNG application, with pilot deployments throughout Canada.[262]

Total Cost of Ownership (TCO)

Sourced domestically, natural gas motor fuel is less volatile to global market swings, providing price stability and savings to fleets of all sizes compared to gasoline or diesel. Over time this fuel savings – combined with reduced operational maintenance and service expenses – offsets the incremental cost of natural gas over traditional diesel engine technology.

Fleets contracting for RNG often see even more savings as they can benefit from economic value associated with using this cleaner fuel that now accounts for more than 86 percent of the fuel consumed by natural gas vehicles.[263] TTP expects that the production and use of RNG will continue to grow thanks to favorable federal and state policies. Under the U.S. EPA's Renewable Fuel Standard Program, RNG sales generate renewable identification numbers (RINs) that can be sold to obligated parties (e.g. fuel marketers and fleet users), sometimes for several dollars per gallon equivalent. In 2026, the U.S. EPA is expected to revise RFS requirements that will encourage greater use of RNG.

Clean fuel standard programs – currently operational in California, New Mexico, Oregon, and Washington with live proposals in Hawaii, Illinois, Massachusetts, Michigan, Minnesota, New Jersey, New York, Pennsylvania, and Vermont – add stackable benefits on top of the federal RINs.

The federal Section 45Z Clean Fuel Production Tax Credit – originally passed under the Inflation Reduction Act – was preserved, extended, and improved for RNG in Pub. L. No. 119-21. Separate from the RFS program, 45Z provides additional incentive for RNG transportation fuel investment. Future guidance is expected to enhance the value of these credits, further strengthening demand for RNG.

For fleets moving to RNG trucks, ensuring that they are negotiating with fuel suppliers for a portion of the value of these credits can be critical to achieving a lower overall TCO and accelerating payback.

Further, TTP continues to advance its top federal priority – the reinstatement and expansion of our demand side, end-user Alternative Fuel Tax Credit to include a $1.00/gallon RNG Incentive Act Credit; both would complement the supply side 45Z producer credit and be paid out at point of dispensing.

Shifting Federal Incentives

Changing administrations have also changed federal funding priorities. Over one-quarter of all competitive Federal Transit Administration Low/No Grant Funding this year was awarded to CNG bus projects. And just recently the U.S. EPA announced plans to revamp its Clean School Bus Program in the 2021 infrastructure law to expand support for biofuel-, natural gas-, and hydrogen-fueled buses starting in FY 2026.

The Takeaway

RNG production and use for transportation is expected to grow exponentially as new federal policies and incentives come into play. Today's natural gas trucks are more powerful, more fuel efficient and more environmentally friendly than ever. RNG can help fleets cut tailpipe emissions and sharply reduce pollutants linked to asthma and heart disease all while saving money and reducing expenses. NGVs fueled by RNG offer a cost-effective, less disruptive yet still progressive compliance schedule for commercial fleets of all shapes and sizes.

All opinions in the above Industry Perspective represent the opinion of the aforementioned organization and do not reflect the opinions of TRC Companies, Inc. (TRC) or the report sponsors.

PROPANE VEHICLES

FLEET MARKET DATA

MD & HD VEHICLES

- **Total propane vehicles in operation increased 3%** between 2024-2025
- **Type C school buses in operation declined -7% and upfitting service vehicles increased 8%** between 2024-2025
- **41% of fleets currently operating propane intend to increase its use**

FUELING

- **Private fueling prices reported in 2025 range from $1.32-2.91** per gasoline-gallon-equivalent
- Private fueling prices showed a **19–63% savings over gasoline**
- **39% of propane fleets reported operational cost savings** as compared to vehicles they replaced
- **32% of propane users** report fueling with renewable propane

SUSTAINABILITY / EMISSIONS

- **Renewable propane users estimate it accounts for 83%** of their propane volume
- **More than 2/3 of renewable propane users** use it for all of their propane fueling
- **Renewable propane** used in California **offered a 59% lifecycle GHG reduction** in 2025 compared to gasoline

PROPANE VEHICLES MARKET DEVELOPMENTS: 2025 – 2026

PROPANE PROVIDES A RELIABLE, COST-EFFECTIVE OPPORTUNITY FOR MD AND SOME HD VEHICLES

Propane, also known as liquified petroleum gas (LPG) or propane autogas, is a proven option for school bus, pickup trucks, paratransit, and delivery fleets, and the fuel continues to see modest but steady growth. In 2025, the market experienced an estimated increase of over 1.8 million propane gallons consumed across all vehicle classes and an increase of nearly 2,000 vehicles in operation over 2024.

The technology is well-established, and users report ease of fueling, emissions benefits, and generally low operating costs.[265] Many fleets remain committed to the fuel, and the annual fleet survey found that 41% of fleets currently operating propane vehicles intend to increase their use of the technology .

Private fueling agreements dominate and 76% of fleets operating propane vehicles fuel with private infrastructure, according to the annual survey, supplemented by a large public fueling network. Direct agreements with fueling providers typically result in lower fueling costs, with school districts across the Midwest reporting fueling agreements that range from $1.32-1.90 per GGE, a 47-63% savings over gasoline's average price of $3.60 for 2025.[266,267,268,269] The DOE also reported that private fueling averaged $2.91 per GGE in January 2025.[270,271] In the survey, 39% of fleets running propane vehicles report operational cost savings on their propane vehicle operations compared to vehicles they replaced.

> **"41% of fleets currently operating propane vehicles intend to increase their use of the technology."**

Establishing private fueling infrastructure is one of the least capital-intensive investments among all alternative fuel types, and a new fueling operation can be set up in as little as a day, not including permitting.[272] For larger fleets of 50 or more propane vehicles, supplier-owned private fueling stations can range from $5,000 to $75,000 for site preparation, while smaller operations cost $1,500 to $15,000. Fleet-owned private stations can incur similar costs for site prep and an additional $60,000 to $225,000 for larger operations of 50 or more vehicles or $20,000 to $60,000 for smaller setups. Temporary and mobile fueling are also an option for fleets that want to avoid making permanent changes to their sites. Fleets can also take advantage of nearly 1,500 publicly accessible propane stations for supplemental fueling coverage nationwide.[273]

One of the most notable developments in the propane fleet market in recent years is the increased use of renewable propane. Among respondents, 32% of propane-using fleets reported using renewable propane in 2025, up from just 10% two years prior. Among renewable propane users, the fuel accounts for about 83% of their total propane fueling by volume. What's more, more than two-thirds of renewable propane users in the survey have replaced 100% of their conventional propane with renewable sources. According to PERC, marketers reported 15 million gallons of renewable propane sold in 2025, including blends. All active propane pathways that generate LCFS credits in California are derived from renewable feedstock. In 2025, renewable propane on the LCFS offered an average carbon intensity of 41.7 gCO2e/MJ, a 59% lifecycle GHG reduction compared to gasoline.[274]

> **School districts across the Midwest reported fueling agreements that range from $1.32-1.90 per GGE, a 47-63% savings over gasoline's average price.**

> **Among renewable propane users, the fuel accounts for about 83% of their total propane fueling by volume.**

SCHOOL AND UPFITTER MARKETS ARE ROBUST, LEADING PROPANE ADOPTION BY FLEETS

The propane school bus market remains one of the largest and most established segments of the technology. There were approximately 24,000 Type A propane-powered school buses in operation nationally during 2025.[275] Blue Bird and ROUSH CleanTech dominate the market, with more than 22,000 ROUSH CleanTech-equipped propane school buses in operation as of April 2025.[276] Blue Bird offers both Type A and Type C propane school buses utilizing ROUSH CleanTech fuel systems.[277]

New registrations of propane school buses fell 7% to 1,586 units in 2025, down from 2024 , according to S&P Global Mobility. All new registrations in 2025 were Type C school buses. Despite the dip in new registrations, individual fleet deployments continued nationwide. Notable additions of Blue Bird Vision Type C buses in 2025 included 43 for the City of Philadelphia, 35 for California's San Juan School District, five for Virginia's Prince William County Public Schools, bringing their total to 60, and four for Indiana's Seymour School District, bringing their total to eight.

> **Approximately 24,000 Type A propane-powered school buses were in operation nationally during 2025.**

One of the main drivers of cleaner vehicles being adopted by school districts over the last 4 years has been the federal Clean School Bus Program, which was on pause all of 2025. While the program was written to require 50% of funds for ZE project and the other 50% to any fuel type, including ZEV, zero-emission projects captured >90% of funds to date.[278] Experts expect the program will bring a more balanced approach to ZE and NZE projects and propane school buses could capture hundreds of millions more in funding like its counterpart funding program for transit buses did in 2025 (See Natural Gas and Battery Electric Vehicle chapters).

> **"We have been using propane fuel in our transit system for 20+ years."**
>
> \- **Austin Comp**, Senior Fleet Maintenance Supervisor City of Laguna Beach

> **9,574 upfitted propane service vehicles were registered in 2025, up 7.4%.**

Beyond school buses, the upfitter market also drives meaningful propane vehicle activity, and PERC reported that 9,574 upfitted propane service vehicles were registered in 2025, increasing the rolling stock 7.4%.[279] ROUSH CleanTech provides propane fuel systems for Ford vehicles.[280] Fisk offers upfitting for propane tank trucks across a wide range of configurations, including rail options, box styles, and lift gate designs.[281] Custom Truck One Source serves the utility, construction, and rail industries, while Katech Engineering and Stanadyne provide aftermarket and manufacturing services to support fleet upfitting needs.[282]

PROPANE PROVIDES MD VOCATIONAL, TRANSIT OPTIONS WITH HEAVIER TRUCKS ON THE WAY

Historically, propane's vehicle offerings were concentrated in LD and MD applications, but that is changing. Blue Bird released a propane Class 5 and 6 stripped chassis for medium- and long-range delivery applications in partnership with ROUSH CleanTech in February 2025.[283] Morgan Olson announced the availability of propane Class 4 to 7 step van configurations in May 2025, targeting the beverage industry.[284] Additionally, Fisk released a comprehensive propane truck guide in July 2025 detailing its lineup of knuckle boom, stick boom, long-range, and service trucks, and announced a series of new propane tank truck options, including new rail designs and storage configurations.[285,286]

ROUSH CleanTech propane engines MY 2023 and newer are CARB certified as of October 2025, expanding access for fleets operating in California and other states that follow CARB standards.[287] A significant technology development occurred at ACT Expo 2025, where PERC, Stanadyne, and Katech announced a collaboration on a propane direct-injection fuel system for pickup trucks, showcased in a 2023 Chevrolet Silverado 2500 HD. The system is designed to reduce emissions while requiring minimal engine modifications.[288]

On the HD side, Nexio has had successful European deployments since 2021 and plans to bring its propane bobtail to the U.S. market in late 2026 or early 2027.[289] PERC approved funding in August 2025 to support the introduction while Nexio seeks EPA and CARB certification for its Class 7 propane bobtail.[290] Nexio has said it will offer Class 7 and Class 8 tractor and stripped-chassis configurations, achieving the lowest emissions for the MD market by meeting or exceeding EPA and CARB standards for ultra-low-emission engine certification.[291]

Propane is gaining traction across a wider range of fleet types outside of its traditional school bus stronghold. Paratransit fleets in Maine, Florida, Missouri, and North Carolina are opting for propane, citing reliable range, customizable fueling options, reduced maintenance and fuel costs, and emissions reductions.[292] PERC reported that 242 additional propane paratransit vehicles registered in 2025, leaving 8,748 in operation in total.

> **Class 7 and Class 8 tractor, stripped-chassis, and bobtail configurations are seeking EPA and CARB certifications.**

Mountain Line Transit Authority in West Virginia initiated a 2024 pilot program to address diesel fuel sourcing challenges and brought five propane Ford E-450s into service by the end of 2025, aiming for emissions reductions that exceed EPA standards by 90%.[293] Hope Network Transportation and Rapid Bus System, Michigan-based transit agencies, have continued to deploy propane buses, citing emissions benefits, lower maintenance costs, and strong cold-weather performance.[294]

West Basin Container Terminal at the Port of Los Angeles operates one of the largest propane-powered yard tractor fleets in the U.S. The terminal converted to propane more than 20 years ago and reports 99.9% NOx and 75% hydrocarbon emissions reductions compared to pre-conversion levels, along with annual fuel cost savings of around 25% and improved operational planning from better fuel availability.[295]

SIDEBAR: ACHIEVE COST REDUCTIONS WITH A PROPANE ADOPTION ROADMAP

The following roadmap from industry group PERC outlines steps for fleet owners to evaluate, implement, and optimize propane across their operations:

- **Assess Fleet Composition and Duty Cycles:** Start by identifying where propane can deliver the greatest impact by evaluating fleet size, routes, vehicle classes, replacement and procurement timelines, and daily fuel consumption. Compare projected fuel, maintenance, and emissions savings across alternatives to ensure propane is deployed where it delivers the strongest return on investment.
- **Identify Propane-Ready Vehicles and Upfitting Partners:** Once you determine the right platforms for your operation, select OEM propane vehicles or compatible gasoline models certified for dedicated or bi-fuel conversion. Partner with qualified dealers and EPA- and CARB-certified upfitters and confirm warranty coverage and maintenance support.
- **Design a Refueling Strategy That Fits Your Operation:** Plan fueling infrastructure based on expected volume and operational needs. Evaluate tank and dispenser space requirements, weigh leasing versus purchasing equipment, and establish a reliable fuel supply agreement early.
- **Review Incentives and Funding Opportunities:** Explore available tax credits, grants, and state or local incentives. Model long-term savings based on fuel price stability, reduced maintenance, and cost-per-mile comparisons with diesel, gasoline, and electric alternatives.
- **Train Drivers and Technicians:** Proper training and operational alignment are critical to successful deployments. Provide drivers with safe handling and refueling guidance, ensure technicians receive propane-specific technical training, and implement the best safety practices for storage, fueling, and daily operations.
- **Deploy, Monitor, and Optimize:** Once vehicles are in service, track performance, fuel use, maintenance costs, uptime, cost-per-mile, and emissions reductions. The data can position propane as a strategic advantage for your fleet.

PROPANE POWERS CLEANER FLEETS IN NEW, INNOVATIVE WAYS SUPPORTING ONSITE FLEET OPERATIONS

As use of clean fuels expands, propane is finding a new, complementary role powering EV charging infrastructure. Propane-powered mobile chargers, linear generators, and microgrids can provide stable, self-contained charging solutions for EV fleets and those using a mix of propane and electric vehicles.

> **Propane-powered mobile chargers, linear generators, and microgrids can provide stable, self-contained charging solutions for EV and mixed fleets.**

Linear generators are among the more versatile applications for all gaseous fuels. These modular systems can be configured for single vehicle deployments, site-level energy needs, or grid-scale operations.[296]

Launched at ACT Expo 2025, Hyliion's KARNO Power Module, a 200-kilowatt stackable generator, is optimized for continuous 24/7 operation and can run on more than 20 different fuels, including propane.[297] The module successfully demonstrated a dynamic fuel switch between natural gas and propane while maintaining continuous power generation.[298] Mainspring Energy also manufactures linear generators capable of operating on zero-emission, low-emission, and conventional fuels, as well as any gas, including propane, natural gas, or hydrogen.

Propane-powered mobile charging stations that can be integrated into portable generators, mobile trailers, and microgrids to replace traditional diesel generators are also gaining commercial traction.[299,300] They give fleets using propane and EVs a quick-fueling solution and a reliable power source for charging.[301] Pioneer eMobility's e-Boost system offers a charging range of 30–300 kW and has been deployed in collaboration with a U.S. propane distributor to provide off-grid power for rural propane vehicle filling stations.[302,303,304]

Industry estimates suggest that propane-powered EV charging infrastructure can cut installation costs by up to 75% compared to grid-tied alternatives, while avoiding the 12- to 22-month utility upgrade lead times that many fleets face when installing high-power charging.[305] Clarus Energy Systems' Volt Express integrates EV charging with combined heat and power (CHP) capabilities, delivering on-demand electricity and thermal energy from a single mountable mobile unit.[306] Eco Power Equipment's mobile fuel trailer hosts an integrated power distribution system and can run for 77 hours at 50% load or 52 hours at 100% load.[307]

> **Propane-powered EV charging infrastructure can cut installation costs by up to 75% compared to grid-tied alternatives.**

For fleets requiring larger-scale energy storage, propane microgrids can provide assurance for electrical grid infrastructure. The systems range in length from 15 to 53 feet.[308] In light commercial applications, systems under 100 kW, propane fuel cells can produce near-zero NOx and carbon monoxide emissions and achieve a 24% reduction in CO2 emissions compared to diesel. For larger commercial systems, those above 100 kW, the CO2 reduction is estimated at 16% compared to diesel.[309] Pioneer eMobility's e-Boost POD, a containerized charging unit, provides 4.2 MWh of energy, which equals about 600 gallons of propane.[310]

Los Angeles' Department of Transportation uses a propane microgrid to charge its bus fleet, consuming approximately 144 kWh or 20 gallons of propane per vehicle per night.[311] At ports, including the West Basin Container Terminal at the Port of Los Angeles, microgrids can provide electrical power to a docked ship, allowing the vessel to maintain fundamental functions without running auxiliary engines and burning diesel fuel while in port, port facilities, and buildings, enhancing grid resilience while reducing emissions.[312]

INDUSTRY PERSPECTIVE: PROPANE EDUCATION AND RESEARCH COUNCIL (PERC)

Hedging Against Uncertainty: The Strategic Role of Propane Autogas in a Diversified Fleet Portfolio
With more than 63,000 vehicles operating across the U.S. and more than 25 million vehicles worldwide, propane autogas is an established, affordable, and reliable energy source for fleets of all types.

As fleet operators navigate an increasingly fractured transportation landscape, it's apparent that relying on a single fuel source is no longer financially or operationally viable. Propane autogas is an available-now, commercially proven energy solution, driven by its ability to provide fleets with lower TCO, independence from the electric grid, and significant, measurable emissions reductions without disrupting operations.

Market Momentum

Propane autogas adoption is ideal for LD and MD fleets balancing sustainability goals and moderate power needs, with regular return-to-base routes that drive high fuel usage, and tight schedules that demand centralized refueling and consistent uptime. The highest rates of adoption include:

School Transportation: Propane autogas firmly anchors the student transportation sector as its most widely used alternative fuel. Today, more than 23,000 propane school buses operate across 1,100 districts in 49 states reliably delivering safe, near-zero emission rides for over 1.3 million students every single day.

Corporate and Commercial Service:
The adoption of propane by autogas-powered service

and vocational fleets surged by an impressive 7.4% in 2025. Propane autogas vehicles are available across a broad range of Class 3-7 commercial applications, including step vans, box trucks, utility and municipal service vehicles, and regional delivery platforms. Certified fuel systems integrated on Ford and GM chassis provide fleets with purpose-built powertrains aligned with return-to-base, high-utilization duty cycles.

Paratransit and Shuttles: More than 8,700 propane autogas-powered vehicles currently support vital paratransit services. For these fleets, propane autogas delivers consistent torque for frequent stops and passenger loads, making it an unbeatable operational fit that maximizes vehicle uptime and ensures continuous service without mid-shift interruptions.

Reliable Performance Without Compromise

Propane autogas delivers consistent performance across all routes, duty cycles, and climates. With a range up to 400 miles and rapid refueling, it ensures maximum uptime without mid-shift delays. This reliability extends to extreme cold, providing reliable engine starts at temperatures as low as -44 degrees Fahrenheit.

Propane autogas significantly streamlines fleet maintenance by eliminating the complex diesel emissions aftertreatment systems that frequently cause downtime. Because propane autogas is cleaner at the point of combustion, it reduces overall engine wear and leaves fewer components to service.

These EPA- and CARB-certified systems are certified to an ultra-low NOx level of 0.02 g/bhp-hr, meeting standards ahead of 2027 requirements. And because they are built on trusted OEM chassis and proven gasoline platforms, the learning curve for service teams is manageable when they receive technical training on propane autogas.

The Economic Advantage

Propane autogas delivers an exceptional TCO with daily fuel costs up to 50% lower than diesel and 40% lower than gasoline. Because 90% of U.S. propane is domestically produced, operators are insulated from global market shocks, and many fleets can establish long-term fuel contracts to create more budget certainty.

Lower acquisition costs enable fleets to leverage a 3:1 purchasing advantage — deploying three propane autogas-powered vehicles for the price of one electric alternative.

Based on their specific needs, fleets can use established public refueling networks or set up scalable on-site stations, which can be installed quickly and for a lower cost than most alternative fueling infrastructures.

Expanding Deployment Through EPA-Certified Bi-Fuel Systems

For fleets looking to immediately advance their sustainability targets without waiting for new vehicle procurement cycles, EPA-certified bi-fuel systems offer a powerful pathway to decarbonize existing assets. Engineered aftermarket upfits significantly expand propane autogas deployment across a broader range of light- and medium-duty vehicle platforms.

These advanced conversion systems are designed to seamlessly modify existing fleet vehicles to operate primarily on clean propane autogas while maintaining a reliable gasoline reserve.

Vehicle Technology Advancements

Recent innovations deliver diesel-like power while easily meeting stringent future emissions regulations. Key breakthroughs include:

- The NEXIO 7.2L Supercharged V8: Delivers 330 hp and 775 lb-ft of torque, officially extending propane autogas into high-uptime Class 7 and 8 applications.
- Stanadyne Direct Injection: Developed in partnership with Katech and the Propane Education & Research Council, this 200-bar injection system delivers 401 hp and 464 lb-ft of torque while meeting the 2027 EPA ultra-low emissions standards.
- Blue Bird Class 5-6 Chassis: Designed for step vans and last-mile delivery, this turnkey stripped chassis integrates a ROUSH CleanTech system, boasting up to a 23,000 lb GVWR, and features a 55-degree wheel cut to optimize urban maneuverability.

Decarbonization Through Renewable Propane

The decarbonization potential of propane autogas is expanding as renewable propane is commercialized. Renewable propane is scaling rapidly, with production approaching 25 million gallons in 2025.[313]

Renewable propane is a 100% drop-in fuel, which means fleet operators see immediate lifecycle carbon reductions with absolutely no new infrastructure, no expensive vehicle modifications, and no change in driver or technician behavior.

With a CI score up to five times lower than diesel and four times lower than conventional propane, fleets using renewable propane can achieve deep lifecycle greenhouse gas reductions of up to 80%.[314] Ultimately, this provides fleets with a seamless, available-now pathway to near-zero emissions while fully preserving their existing vehicle and fueling infrastructure investments.

A Diversified Energy Strategy

With major utility upgrades often taking years to complete, relying on a single energy source exposes fleets to infrastructure bottlenecks and volatile costs. By integrating propane autogas, fleet managers hedge against these disruptions and build a reliable, mixed-energy portfolio.

Propane autogas serves as the ultimate fail-safe during severe weather and power outages, ensuring 24/7 readiness and actively protecting fleets against outages.

Propane Autogas: A Future-Forward Energy Solution

As fleets navigate performance, cost, and decarbonization objectives simultaneously, propane autogas offers a commercially proven platform that delivers long-term cost stability, operational continuity, and measurable emissions reductions.

For operators seeking a high-performing solution that addresses today's economic and environmental challenges while scaling seamlessly for tomorrow, propane autogas remains the definitive, available-now energy solution.

All opinions in the above Industry Perspective represent the opinion of the aforementioned organization and do not reflect the opinions of TRC Companies, Inc. (TRC) or the report sponsors.

BATTERY-ELECTRIC VEHICLES

FLEET MARKET DATA

MD & HD VEHICLES

- **New registrations for MD and HD BEVs increased 21%** between 2024-2025
- **Electric pickup trucks comprised 51% of total 2025 MD and HD** new BEV registrations
- **Delivery vans comprised 39% of total 2025 MD and HD** new BEV registrations
- **54% of fleets operating BEVs plan to increase usage** in the next two years

FUELING

- **57% of fleets reported operational cost savings on MD EVs** compared to vehicles they replaced
- **BEV users estimate that renewable electricity accounts for 57% of their total fueling** by volume on average
- **35% of fleets operating BEVs report using renewable electricity**

SUSTAINABILITY / EMISSIONS

- **Electricity for charging in California offered a 59% GHG reduction in 2025** compared to diesel on a lifecycle basis
- **Lifecycle GHG emissions from charging were 10% lower in California** between 2024-2025

BATTERY-ELECTRIC VEHICLES MARKET DEVELOPMENTS: 2025 – 2026

2025 RECORD MDV REGISTRATIONS UNLIKELY TO REPEAT IN 2026 DURING MANUFACTURER PIVOTS

Total MD and HD vehicle registrations grew by 21% between 2024 and 2025 to 50,095 total units, according to S&P Global Mobility registration data. The highest number of 2025 vehicle registrations were in pickup trucks (25,640, 50%) and cargo vans (19,625 units, 39%). The removal of the $7,500 EV tax credit from the Inflation Reduction Act drove a small spike in most MD and HD registrations before the credit expired in September 2025, including electric transit, school buses, tractors, and pickups. Monthly pickup and cargo van registrations that have led the rapid rise of BEVs fell in the fourth quarter of 2025, ending at an annual low for both in December. Despite changes in the market, 54% of fleets in the annual survey said they intend to increase their use of BEVs in the next two years.

The MD BEV industry pivoted throughout 2025, resulting in fewer manufacturers and models. The total number of MD electric models, including pickups, dropped to 33 from 62 the prior year.[315] Several high-profile MD BEV manufacturers faced challenges in 2025. Bollinger Motors, owned by Mullen Automotive, faced financial difficulties throughout the year and closed permanently in November 2025, following ongoing litigation and unpaid wages.[316,317] GM halted production of its BrightDrop delivery van in mid-2025.[318] Rivian trailed its competitors most of the year and ended the year down 18%.[319,320] As of October 2025, Ford Lightning sales were up 1% for MY 2026, but Ford paused production indefinitely following a plant fire and lackluster sales after the federal tax credit expired.[321,322] The company later announced that it would revive the Lightning model as an extended range EV in 2027.[323]

> **"Recent EV extended range developments have made it easier to solve integration issues like range anxiety with our customers and overall helped keep maintenance costs down through decreased labor hours."**
>
> \- **Marc Zamora**, Fleet Superintendent, City of Santa Monica

Startup Workhorse and Motiv announced a merger aimed at improving affordability and accelerating EV adoption.[324] Even though manufacturers have faced challenges, annual sales of MD BEVs reached new highs, with pickups up 26% and cargo vans up 34% year-over-year, according to S&P Global Mobility registration data.

> **The total number of MD electric models, including pickups, dropped to 33 from 62 the prior year.**

Fleet satisfaction with first generation MD products has led to new partnerships that suggest future growth. In 2025, 57% of fleets currently operating MD BEVs report operational cost savings compared to the vehicles they replaced in the annual survey. Walmart reports operating approximately 2,000 EVs for last-mile deliveries from stores and describes EVs as its 'cheapest option' in many cases when evaluating vehicle and charging price, resale value, maintenance, and fuel costs.[325] In 2025, Amazon had more than 30,000 custom-built Rivian Electric Delivery vehicles in use across the U.S. and Europe, 50% more than at the end of 2024.[326] Harbinger raised over $160 million in funding led by FedEx, Thor Industries, and Capricorn Investment

> **Annual sales of MD BEVs reached new highs, with pickups up 26% and cargo vans up 34% year-over-year, according to S&P Global Mobility.**

> **Walmart reports operating approximately 2,000 EVs for last-mile deliveries, describing EVs as its 'cheapest option' in many cases.**

Group and secured an order for 53 trucks for FedEx, which were scheduled for delivery by the end of 2025.[327] This followed a 4,000-vehicle pre-order the prior year from Bimbo Bakeries, valued at over $400 million.[328]

Existing manufacturers see an opportunity. Peterbilt announced three new MD models, the 536EV and 537EV for regional delivery and service and utility applications, and the 548EV for 4x2 tractor and vocational applications.[329] Blue Bird showcased an electric delivery step van at ACT Expo 2025.[330] ZM Trucks unveiled its ZM8 SWB model featuring a dual ePTO system for auxiliary equipment integration. Rizon offers purpose-built Class 4 and 5 trucks with ePTO for specialized equipment add-ons.[331] In February 2025, Isuzu announced a new production facility in South Carolina and said it is slated to begin production in 2027 for N-Series and F-Series vehicles. In March 2025, Isuzu confirmed plans to launch electric Class 6/7 F-Series trucks, also planned for 2027.[332,333] Isuzu currently offers a Class 5 electric model, the NRR-EV.[334] Ford and Rivian are both hoping to revive sales with new options.[335,336] Ford has a $30,000 mid-size electric pickup scheduled for 2027 while Rivian plans a 2026 launch of the R2, a smaller, less expensive alternative to their R1S SUV.

CLASS 8 TRUCK REGISTRATIONS DIP, SHOW PROMISING SIGNS OF 2026 GROWTH

Total new Class 8 electric tractor registrations reached just 671 in 2025, a 24% decline from the prior year, according to S&P Global Mobility data. The freight recession has put extra pressure on fleets reliant on HD trucks and their OE partners, resulting in lower sales across all drivetrain types in 2025.[337] International (formerly Navistar) reported Q3 losses with sales reduced by 64% year-over-year, and announced the cancellation of its eRH battery electric tractor program.[338] More details on the effects of the freight market on HD tractor manufacturers can be found in the Diesel Vehicles Chapter.

Volvo, despite overall freight-related losses, announced that it had sold 5,700 electric trucks globally since 2019 and held a 40% share of the HD electric truck market in the U.S. and Canada with 700 VNR Electric trucks in operation.[339,340] Later in the year, Volvo reported that more than 700 VNR Electric units in U.S. customer hands had collectively logged 20 million miles.[341] Mack announced the release of its electric Pioneer tractor in April 2025, aimed at regional haul, drayage, and hub-and-spoke operations.[342] PACCAR's Peterbilt brand offers the T680E tractor with flexible wheelbase configurations and three battery options reaching 200+ miles with the largest 500 kWh pack.[343]

New products and partnerships suggest future tractor sales growth. In Q4 2025, deliveries of Tesla Class 8 tractors began growing and are expected to increase throughout 2026 following completion of major elements of its Nevada factory.[344,345] Updated base pricing was leaked and also revealed in HVIP data in early 2026, showing the 500-mile-range version was being quoted at $290,000 – 300,000 with the 300-mile version at $260,000.[346] Should those figures be confirmed, they would be a significant increase from the original estimates – even considering inflation – but nonetheless lower than most equivalent electric tractor products on the market today. In early 2026, Pilot Travel Centers announced that it would install Semi chargers at select Pilot locations along I-5, I-10, and several major corridors in California, Georgia, Nevada, New Mexico and Texas, where the need for HD charging is highest. Construction is scheduled to begin in the first half of 2026 with the first sites opening in the summer 2026.[347]

> **Volvo announced in 2025 that it had sold 5,700 electric trucks globally since 2019 and held a 40% share of the HD electric truck market in the U.S. and Canada.**

> **Annual EV tractor deliveries in the U.S. have never surpassed 900 in a single year, but 2026 or 2027 may finally break that ceiling.**

Demand signals are accumulating. Tesla captured the largest market share among OEMs in this latest round, with 1,003 vouchers representing 28% of all HVIP vouchers processed in 2025 and the strongest single indicator yet of committed fleet demand for the Semi. To qualify for the HVIP program, buyers and sellers must enter into binding Purchase Orders, making the program a strong indicator of sales and upcoming production. Deliveries are expected throughout 2026 and 2027.[348,349]

New entrants are also adding options. Windrose, a China-based Tesla Semi competitor, announced plans to bring its R700 BEV tractor to the U.S. market in 2026, partnered with Joyride to deploy units in Arizona, and reported a $60 million order from an undisclosed California logistics company.[350] But the company faced significant financial challenges in 2025, including reports of being 90 days overdue on payroll, raising questions about near-term viability.[351,352]

The Center for Green Market Activation and Nevoya are planning an approximately 40-truck pilot deployment of Class 8 electric tractors to establish an all-electric freight corridor between Houston and Dallas, Texas, in 2026 and 2027.[353] The deployment will use a so-called 'book and claim' system where companies can book BEVs and receive verified environmental credits.

> **"Data from our 8+ years of experience with battery electric terminal tractors inform our belief that the yard is the best use case for battery electrification of heavy-duty transportation today."**
>
> - **Chris Bennett**, Vice President of EV, Energy, and Sustainability, Lazer Logistics

Annual BEV tractor deliveries in the U.S. (via registration data) have never surpassed 900 in a single year, according to S&P Global Mobility, but 2026 or 2027 may finally break that ceiling if these factors converge to deliver a new wave of trucks.

The Class 8 electric yard tractor market has been quietly maturing and gaining a foothold while other segments steal the spotlight. According to a 2024 study, electric yard tractors already represent 4.8% of the fleet market, and the electric yard hostler population has nearly doubled since 2022.[354] Another report cited maintenance cost reductions of 60% to 75% compared to newer diesel units equipped with DPF and SCR aftertreatment systems.[355] Lazer Logistics, North America's largest outsourced yard management provider, surpassed 2.5 million ZE miles with its Orange EV yard tractor fleet and reported over $5 million in fuel and maintenance savings, with some customer sites achieving ROI in under two weeks.[356]

Orange EV has been the segment's primary growth driver: by late 2025, the manufacturer's products surpassed 10 million operating hours, with over 1,600 trucks across 40 states and four Canadian provinces.[357] Yard truck market leader Kalmar Ottawa entered the third generation of its electric lineup in early 2025, officially beginning sales of its OT2 EV in March 2025.[358]

The refuse segment continued to make progress in 2025, driven by new products. Mack's LR Electric, a purpose-built refuse truck, was deployed in California, Illinois, and New York to support technical education and emissions reduction.[359] McNeilus, a business unit of Oshkosh, unveiled the Volterra ZFL front loader in January 2025, complementing the ZSL electric refuse side loader introduced in 2024.[360] Shortly after the launch, McNeilus fulfilled a 100-unit order for Republic Services.[361] Republic subsequently announced the nation's first fully ZE refuse operation in partnership with the City of Louisville, Colorado.[362] Despite successful deployments with Republic, the ZFL faced recall challenges in 2025.[363] Battle Motors LET2, which was introduced in 2023, also faced NHTSA recall actions in 2025, limiting near-term options in the market.[364]

TRANSIT AND SCHOOL BUS VOLUMES SURGE, BUOYED BY GRANT-FUNDING WITH SHORT LIFESPAN

Transit buses remain one of the most mature commercial vehicle applications for BEVs, and expansion continued in 2025. In total, 1,500 electric transit buses were registered in

2025, up 154%, according to S&P Global Mobility. Many of the buses purchased in 2025 were supported by the pipeline of the federal Low or No Emission grant program, which has funded thousands of BEV transit projects in the past few years.[365]

New York's MTA placed an order for 265 battery-electric buses from New Flyer in early 2025, and the Maryland Transit Administration placed orders totaling 117 low- and zero-emission Xcelsior buses.[366,367] Gillig deployed electric transit buses in Hawaii and Michigan, enabled by the Federal Transit Agency (FTA) program.[368,369] A California transit fleet, the Santa Monica Big Blue Bus, placed its 20th electric Gillig bus into service in 2025 as it pursues a fully ZE fleet by 2030.[370]

Despite the growth in 2025, deployments are expected to slow amidst evaporating federal support. When USDOT announced $1.1 billion in awards to 165 transit agencies in November 2025, none of the grants appeared to include BEVs.[371,372] This aligned with a July 2025 USDOT announcement encouraging Low or No Emission Grant applicants to change project proposals from 'no emissions' to 'low emissions.[373]

In school buses, the EPA Clean School Bus Program, which has historically funded thousands of electric bus procurements, is withholding funds for 2024 projects, and the current administration has yet to release further information on award statuses.[374,375] Even with the shift in funding, prior funding is showing results. As reported in the 2025 Market Brief, grant-funded projects were likely to drive a surge in electric school bus production over the next few years, and the 2025 data confirmed that trajectory. In total, 2,289 new electric school buses were registered in 2025, up

> **1,500 electric transit buses were registered in 2025, up 154%, according to S&P Global Mobility. Despite growth, deployments are expected to slow amidst evaporating federal support.**

59% from the previous year, according to S&P Global Mobility.

In addition to the federally funded surge, states and utilities are supporting electric school bus deployments through new and updated grant programs that help reduce procurement costs. Illinois, Michigan, New Jersey, and New Mexico all provided state funds for electric school bus projects in 2025.[376,377,378,379] Illinois' ComEd awarded nearly $1 million for one local school district to add 27 electric buses and 28 chargers to its fleet.[380]

Blue Bird reported an all-time record revenue and profit for the fourth fiscal quarter and year in 2025.[381] The company delivered 901 electric-powered buses in FY 2025, and, by the end of the fiscal year, had about 680 EV buses in its firm order backlog, which supports its EV sales target for 2026.[382] The unionization of Blue Bird's Georgia plant in 2024 enabled the company to access an $80 million Domestic Manufacturing Conversion Grant specifically to expand electric school bus production and improve union jobs, which has also contributed to its successful year.[383]

> **In addition to a federally funded but temporary surge, states are deploying electric school buses through new and updated grant programs.**

Thomas Built announced its first electric Type D school bus in October 2025, available for order with deliveries scheduled for early 2026.[384] International continues its CE Series electric bus success, offering bundled consulting, financing, and maintenance services. After filing for bankruptcy protection in the United States and seeking creditor protection in Quebec in late 2024, Lion Electric shut down its Illinois manufacturing plant and auctioned off its equipment in May 2025.[385] That same month, a group of investors acquired the company and rebranded it as LION.[386] The company now produces electric school buses in Quebec.[387] It continues to honor warranties for Quebec customers, but U.S. school districts that had previously purchased its buses were left without warranty coverage or ongoing support.

THE GLOBAL COMMERCIAL BEV MARKET GROWS, HIGHLIGHTING THE BENEFITS OF SCALE AND DOMESTIC SUPPLY CHAINS

While State of Sustainable Fleets is dedicated to the U.S. MD and HD vehicle markets, lessons from other geographies can sometimes provide insight for the domestic market. China accounts for more than 90% of the commercial electric truck market globally, and sales in China have more than tripled just since the beginning of 2024.[388] Reaching scale has enabled MD and HD electric vehicles sales to capture a substantial share of the total market: 22% of the entire Chinese heavy-truck market is BEVs, with dump trucks and tractors capturing at least 30% of their respective segments.[389] The EU is also growing its commercial EV market, which is itself larger than the U.S. market.[390]

Although direct comparisons are difficult to make, downward pricing for batteries and vehicles in China and the EU demonstrates the opportunities at scale. In the U.S., median prices for Class 7 and 8 tractors increased in 2025, and Class 2b to 6 straight trucks increased for MY 2026.[391] U.S. transit bus prices increased between 2020 and 2025. However, in the EU, median prices for Class 7 and 8 tractors decreased in 2025, Class 2b to 6 trucks decreased with 2025 and 2026 model years, and Class 7 and 8 transit buses decreased between 2020 and 2025. In China, electric buses and commercial EVs had the lowest volume-weighted average pack price in 2024 at $90/kWh.[392] In contrast, the U.S. DOE estimates battery costs for LD vehicles, SUVs, pickup trucks, and Class 3 vans at $128–$133/kWh, and for Class 4 to 8 vehicles, battery costs range from $162–$206/kWh.[393]

The scale of these markets explains some of the advantages that have led Chinese manufacturers to dominate the market share. Lithium iron phosphate (LFP) is preferred by the Chinese market due to its low cost and ease of production.[394,395] Although LFP has lower energy density compared to nickel manganese cobalt (NMC) batteries, it is estimated to be 33% lower cost, and supplies are dominated by Chinese manufacturers such as BYD and CATL, such that U.S. OEMs often need to import batteries from China to secure sufficient volumes.

> **22% of the entire Chinese heavy-truck market is BEVs, with dump trucks and tractors capturing at least 30% of their respective segments.**

> **“We expect and have experienced that each tranche of new BEVs will have fewer technical issues and more range options.”**
>
> \- **Chris Rodilosso**, President, Strange Trip Inc

Other advantages of LFP battery chemistry include longer life, enhanced safety, and supply chains that are less dependent on importing critical minerals.[396] Efforts are underway to bridge the gap and bring these benefits onshore for U.S. fleets. Amplify Cell Technologies, a joint venture of Accelera by Cummins, Daimler, and PACCAR, which broke ground in mid-2024 on a plant in Mississippi to produce LFP-based batteries domestically, remains on track to open in 2027.[397] Additionally, Nuvve has launched a battery-as-a-service offering to help cut electric costs and create grid resiliency.[398]

PUBLIC AND FLEET CHARGER ROLLOUT SUPPORTED BY NEW UTILITY PROGRAMS CONTINUES TO GROW, BUT AT A SLOWER PACE

For 2025, S&P Global Mobility’s forecasted annual EV charging station installations between 2020 and 2030 were 8-10% lower than its 2024 forecast.[399] In North America, approximately 120,000 public and semi-public EV chargers were expected to be installed in 2025, down from a 2024 estimate of 160,000.[400] S&P Global Mobility estimates the cumulative number of public/semi-public chargers in operation by 2030 will be approximately 18.4 million, down from a 2024 forecast of 20 million.

Charging locations at truck stops and dedicated locations intended for MD and HD fleet customers are increasingly opening for business. Leading developers Greenlane, Terrawatt, EV Realty, Forum Mobility, and Watt EV opened new or expanded charging hubs for fleet customers, helping many of them with truck financing.[401,402,403,404,405] These new site openings occurred despite Prologis significantly refocusing its Prologis Mobility business on other activities and the bankruptcy of GageZero in 2025, which was subsequently acquired by EV Realty.[406]

Utilities continue to play a crucial role in BEV adoption by designing programs and incentives to support users or by navigating grid constraints and new stresses on the grid, such as data centers.[407] As of February 2026, more than 650 utility programs were available to fleets.[408] ComEd continues to scale one of the largest utility EV portfolios in the country and has delivered over $160 million in EV rebates to enable 9,800 charging ports and over 3,300 electric fleet vehicles since launching in 2024. Pepco and Delmarva Power received a Commission Order in January 2026 for Phase II EV programs structured around make-ready infrastructure, public charging, and load management. To manage system impacts, both utilities are advancing EV Time-of-Use rates and an expanded Smart Charge Management Program, which encourage off-peak charging through customer education and financial incentives. BGE offers make-ready incentives, providing up to $150,000 per site for MD and HD fleets and $40,000 per site for LD fleets, with eligibility for up to two sites per customer. BGE also offers an EV Advisory service that provides early, detailed site assessments, grid

> **"Electric vehicle adoption has exponentially increased with the fleet in Pasadena. Many employees on the fence quickly embrace how great EVs can be in the field for regular job duties."**
>
> \- **Evan Johnson**, Electrification Program Manager, City of Pasadena

upgrade cost estimates, and project timelines—helping fleet customers make faster, better-informed decisions while reducing the risk of rework or delays.

Meanwhile, utilities are also developing new tools and resources for long-term planning, forecasting, and proactive grid upgrades. A December 2025 National Association of Regulatory Utility Commissioners report highlighted proactive planning approaches in California, Colorado, Massachusetts, Minnesota, and New York to manage load uncertainty and reduce energization delays for EV charging installations.[409] Utilities increasingly support customers and fleet operators plan for electrification by releasing load capacity maps. All of Exelon's utilities have published theirs online with details on grid conditions at the circuit level and estimates of EV charging thresholds that can be easily accommodated without grid capacity upgrades.[410,411,412,413]

> **Charging locations at truck stops and dedicated locations intended for MD and HD fleet customers are increasingly opening for business.**

Charging growth by fleets is also associated with lower emissions. Lifecycle carbon intensity of electricity for vehicle charging on California's LCFS averaged 41.36 gCO_2e/MJ, a 59% lifecycle GHG reduction compared to diesel fuel and change of -10% compared to California electricity in 2024.[414, 415] Additionally, 35% of users of BEVs in the State of Sustainable Fleets survey report charging with renewable electricity.

SIDEBAR: CHARGING PLANNING AND MANAGEMENT ARE CRUCIAL TO COST SAVINGS FOR FLEETS

Charging planning and management are key to achieving a ROI from BEVs and can be the difference between a significant, unrecouped investment and significant ongoing savings and near-term ROI. Best practices include:

- **Right-Sizing Equipment by Prioritizing Smaller Capacities:** While the industry has prioritized higher capacity charging in the past few years, 75 kW capacity is sufficient for most HD charging. Prioritizing L2 and even ultra-low-level L1 charging can offer significant savings and help fleets avoid costly site capacity upgrades.
- **Maximizing Charging Windows:** Doubling or tripling charging windows can cut capital and fueling costs by more than half. Charge at the lowest power rating (kW) necessary to deliver the required charge in the available dwell time, and utilize multiple charging windows throughout the day, if possible.
- **Charging Multiple Vehicles per Station:** Increasing the station-to-vehicle ratio above 1.5 or even 2 substantially cuts capital costs. Evaluate the optimal ratio of charging stations with longer charging windows to ensure you are not overbuilding or sacrificing charging times.

- **Shifting Loads to Off-Peak Periods:** Fleets can save up to 30% by shifting to off-peak hours according to one study, charging from approximately 9pm to 7am could reduce the cost per mile from 36¢ to 26¢ for a HD truck, far undercutting the 70¢ per mile of a diesel equivalent, even in high-cost electricity markets such as Los Angeles.[416]
- **Limiting Maximum Load:** Demand charges are included in utility bills to reflect the peak electricity loads during billing period. Reducing the highest cumulative charging load by always setting limits on the number of vehicles or rate of charging during the billing period will save on these charges, which can constitute half or more of total energy costs.
- **Utilize Charging Management:** Networked chargers with cloud-based services enable visualization, analysis, and automated load management to ensure charging occurs at lowest levels and during off-peak rate periods.

AUTONOMOUS RIDE HAILING FLEETS PICK ELECTRIC AS THEIR DRIVETRAIN OF CHOICE

State of Sustainable Fleets focuses primarily on MD and HD commercial fleet vehicles, but adoption trends in the LD sector can provide important leading indicators for future commercial vehicles. One of the most noteworthy developments in the LD industry is that virtually all autonomous ride-hailing fleets have chosen BEVs as their operational platform. All-electric ride-hailing fleets have crossed 100 million cumulative autonomous miles. In California in 2025, over 4.1 million miles were in fully autonomous mode, a significant increase from over 500,000 miles in 2024.[417,418]

> **One of the most noteworthy developments in the LD industry is that virtually all autonomous ride-hailing fleets have chosen BEVs as their operational platform.**

Waymo leads the field with all-electric operations, now providing more than 250,000 rides covering 2 million miles per week, but Tesla's Cybercab and Amazon's Zoox are top competitors.[419] Waymo's initial Chrysler Pacifica hybrid fleet has been replaced entirely by electric Jaguar I-PACE vehicles, and the company plans to introduce new electric models, including Zeekr RT minivans and Hyundai IONIQ 5s.[420,421,422,423,424] Amazon's Zoox received an exemption from federal vehicle safety standards in August 2025 for its purpose-built driverless vehicle as it has no steering wheel or pedals and four inward-facing seats.[425,426,427]

The convergence of BEVs and autonomous vehicles is not accidental. Robotaxis can spend 40% to 80% of a 24-hour day driving, which is significantly higher than private passenger vehicles, which average less than 5% of the day. High annual mileage of 70,000–80,000 miles align with the economic profile that favors BEV's total cost of ownership.[428,429,430] Most hybrids and electric vehicles are configured for drive-by-wire and brake-by-wire architecture that is structurally compatible with autonomous control systems, while ICE vehicles require more complex retrofitting that makes autonomous integration more complex and potentially less reliable.[431,432] Autonomous vehicles' heavy onboard data processing requirements also align well with the electronics architecture already built into BEVs.[433] Additionally, self-driving vehicles tend to operate in urban areas where charging stations are more readily available, and emission requirements are often more strict in dense urban settings.[434,435]

> **High annual mileage for ride hailing vehicles of 70,000–80,000 miles align with the economic profile that favors BEV's total cost of ownership.**

Autonomous technology in HDs remains predominantly diesel-powered.[436] Kodiak has doubled its fully driverless Class 8 fleet to 10 autonomous trucks and surpassed 5,200 hours of paid driverless operation. The manufacturer is on track for long-haul commercial driverless launches in late 2026 pending safety validation, customer readiness, and regulatory alignment.[437,438,439] Aurora and PlusAI are pursuing hub-to-hub freight automation strategies that focus on highway segments between distribution centers where operational conditions are more predictable.[440,441,442] PlusAI has tested its technology by driving more than 5 million miles globally and achieved an 86%

safety readiness standard in the first half of 2025. Aurora reported over 100,000 driverless miles completed without safety incidents. Meanwhile, autonomous trucking developer Gatik continues its focus on shorter, repeatable distribution routes, allowing the company to control more operational variables during early deployments.[443]

> **"Our battery electric yard trucks have been a great investment. They have lower operating costs and less downtime. Our drivers state they are also more comfortable to operate."**
>
> \- **Nick Chase**, Sr. Manager, Bolthouse Fresh Foods

Autonomous vehicles are already pairing with BEVs in several localized logistics applications. Companies developing short-haul autonomous freight systems frequently cite the compatibility of the two technologies. Gatik has described the pairing of autonomous vehicles and electric drivetrains as a "match made in heaven" for shorter routes, once charging infrastructure expands.[444] Swedish technology company Einride reported that by 2025 its autonomous freight platform had accumulated more than 11 million electric miles, executed over 350,000 shipments, and logged more than 1,700 hours of driverless operations in contracted customer deployments.[445,446] Einride has also maintained a commercial autonomous freight deployment with GE Appliances at its Selmer, Tennessee facility since the partnership began in 2023.[447] In early 2026, MD BEV manufacturer Harbinger also announced the acquisition of autonomous software company Phantom AI and said it had lined up customer for Phantom's advanced driver assistance technology.[448]

Battery electric autonomous trucks and yard tractors are also becoming a growing component of port operations, especially for yard operations and port-to-warehouse transportation. Although U.S. ports have adopted these technologies more slowly than ports in Europe and Asia, deployments are gradually expanding.[449,450] The Ports of Los Angeles and Long Beach have operated autonomous container trucks since 2019.[451] Artificial intelligence–driven freight automation could reduce fleet-level total cost of ownership by 8%–13%, compared with the approximately 3% average savings achieved through diesel-to-BEV replacement alone.[452] Autonomous technology could also improve the economics of BEV freight vehicles by increasing utilization and operational predictability, lowering the cost per mile.[453]

> **AI–driven freight automation of EVs could reduce fleet-level TCO by 8%–13%, compared with the approximately 3% average savings achieved through diesel-to-BEV replacement alone.**

INDUSTRY PERSPECTIVE: EDISON ELECTRIC INSTITUTE (EEI)

Fleet electrification is an important strategy for policymakers and for commercial and public fleet operators seeking to transition to sustainable transportation. The electric power sector continues its commitment to provide reliable and resilient energy to power all sectors of the economy, including transportation, while keeping costs as low as possible for customers. Today, nearly 42 percent of the nation's electricity comes from zero-emitting resources like nuclear, hydropower, wind, and solar energy, and electric companies also are deploying natural gas resources to help balance the energy system. Electric power sector carbon emissions have been declining for the last decade and are now nearly 17 percent below transportation sector emissions. As adoption of EVs increases, customers and local communities can see reduced emissions and environmental, health, and cost benefits.

Electric companies are well-positioned to support corporate and public fleet customers. EEI member companies are investing more than $6 billion in customer programs to support charging infrastructure and other actions to serve customers and efficiently incorporate EVs into the grid. A significant portion of this investment is available for advisory services and charging needs for commercial and public fleets. Some of these programs help to reduce the customer cost of installing charging infrastructure by providing rebates, "make-ready" infrastructure for customers, and/or end-to-end charging solutions. Fleet customers can find more information on these programs in EEI's EV Program Database, which catalogs more than 650 offerings from EEI member companies.[454]

On the policy front, due to shifting federal priorities, some of the federal regulations and funding programs that supported transportation electrification have ended. However, state governments have continued to lead on innovative policies. States like New York are reimagining how electric companies invest in the grid to support electric transportation via their proactive planning proceeding. Colorado and California have both approved innovative new methods for assessing where and when electric companies can invest to support customer electrification plans, including fleet electrification. The National Association of Regulatory Utility Commissioners recently published a report that lays out the value of these emerging policies, which make it easier for electric companies to upgrade the grid so that fleets and charging providers can rapidly and efficiently deploy infrastructure needed to power electric vehicles.[455]

Electric companies are also implementing bridge solutions while larger investments are being made to help fleets and charging providers get connected to the grid faster. In California, Pacific Gas & Electric and Southern California Edison both offer flexible service connections that allow customers to take advantage of available grid capacity immediately while they wait for upgrades to be completed. By utilizing technology, electric companies can limit electric demand when capacity is constrained but otherwise unlock existing capacity so that customers can get their EVs on the road faster. Xcel Energy in Colorado is in the process of developing its own flexible service connection offering and Minnesota also plans to incorporate the concept into their proactive investment framework.

The tools available to fleets, charging providers, and electric companies are more varied and comprehensive than ever before. EPRI, with support from automotive partners and electric companies, has launched several products aimed at streamlining fleet electrification. These include eRoadMap, an interactive map designed to estimate the power and energy needs for electrifying transportation at the local level; and GRIDFast, an information exchange platform that helps commercial customers, such as fleets and public charging providers, engage early and efficiently with utilities to accelerate charging infrastructure energization. For fleets that have already deployed EVs, multiple providers offer services to optimize charging schedules to reduce costs and lower the demand on the grid, limiting the need for additional upgrades.

As electric companies invest in the grid to enable customer growth—whether from data centers, manufacturing, or electrification—the additional usage of the system can help support affordability for all customers. An upcoming study commissioned by Powering America's Commercial Transportation (PACT) demonstrates how the increased deployment of MD and HD electric vehicles can provide benefits for all electric customers. This effect is further demonstrated by Pacific Gas & Electric's recent Electrification Impacts Study, which found that load growth from electrification of transportation and buildings may provide downward pressure on rates by as much as 25 percent by 2040.

The work to prepare the grid for transportation electrification has already led to some notable commitments and deployments from the nation's largest fleets. Rivian has delivered more than 30,000 vans to Amazon for last-mile delivery operations, putting Amazon well on its way to meeting its goal of deploying 100,000 electric delivery vans by 2030. Amazon is supporting their fleet operations with the installation of thousands of charging stations and is already the largest operator of private charging infrastructure in the United States. First Student, the nation's largest provider of student transportation, plans to deploy 30,000 electric school buses by 2035 and has already logged more than 5 million miles on the electric buses currently in their fleet. The Tesla Semi is scheduled to begin volume production this year and will offer a class 8 electric truck that is competitively priced with comparable diesel vehicles and has already been demonstrated as a reliable, effective replacement for diesel trucks by major fleets.

Electric companies are preparing for the coming wave of fleet electrification while navigating supply chain constraints and an always-shifting policy landscape. These challenges only heighten the need for early collaboration between fleet customers and their electric company partners to ensure a seamless rollout. With more product offerings on the horizon and deployments among early adopters beginning to scale, the future of fleet electrification is bright.

All opinions in the above Industry Perspective represent the opinion of the aforementioned organization and do not reflect the opinions of TRC Companies, Inc. (TRC) or the report sponsors.

HYDROGEN VEHICLES

FLEET MARKET DATA

MD & HD VEHICLES

- **Registrations for new MD and HD hydrogen FCEVs declined 12%** between 2024-2025
- **Registrations of new transit buses increased 24%** and registrations for tractors declined 41%
- **12% of fleets operating hydrogen intend to increase usage** over the next two years

FUELING

- Fleets report **hydrogen fuel prices averaged $18.86/kg** in 2025
- **Hydrogen fuel prices showed a 89-135% premium over diesel** in 2025
- **48% of surveyed hydrogen users** reported using renewable hydrogen

SUSTAINABILITY / EMISSIONS

- **Hydrogen fuel** in California offered a **64% GHG reduction** in 2025 compared to diesel on a lifecycle basis
- **Lifecycle GHG emissions for hydrogen were 23% lower** in California between 2024-2025
- **Renewable hydrogen** fuel in California offered a **78% GHG reduction** in 2025 compared to diesel on a lifecycle basis
- **Lifecycle GHG emissions of renewable hydrogen** in California **increased 651%** between 2024-2025

HYDROGEN VEHICLES MARKET DEVELOPMENTS: 2025-2026

UNCERTAINTY IN FEDERAL SUPPORT FOR REGIONAL CLEAN HYDROGEN HUBS AND TAX CREDITS PERSISTS THROUGH 2025

Changes in federal policy during 2025 created uncertainty for hydrogen research and development efforts across the U.S. Several initiatives intended to accelerate domestic hydrogen market development, including the Regional Clean Hydrogen Hubs (H2 Hubs) program and the Clean Hydrogen Production Tax Credit (45V), experienced changes and delays that affected project timelines and funding.

The Department of Energy's H2 Hubs program, which was designed to create geographically concentrated networks of hydrogen production, distribution, and end-use, announced that it would terminate $7.56 billion in active and awarded grants. The cuts included $1.2 billion for California's Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES), causing the hub to pause all activities in response to the changes in federal funding.[457,458]

> **DOE's H2 Hubs program announced that it would terminate $7.56 billion in active and awarded grants.**

An additional $1 billion in DOE funding for the Pacific Northwest Hydrogen Hub was terminated, impacting hydrogen production in Washington, Oregon, and Montana.[459,460,461] Texas' Gulf Coast Hydrogen Hub and the three-state Appalachian Hydrogen Hub in West Virginia, Ohio, and Pennsylvania, which are focused on creating blue hydrogen from natural gas with carbon capture, were not among those targeted for termination.[462,463,464]

Industry estimates suggested that the cancellation or delay of these projects could impact billions of dollars in planned private investment and thousands of potential jobs.

The California Governor's office said the cancellation of ARCHES alone would impact more than $10 billion in primarily private sector investments and 200,000 new jobs.[465] Other industry estimates suggest that the funding cut for hubs would eliminate 330,000 jobs.[466]

A portion of these cuts has since been deemed unlawful, with a federal judge ruling that the cuts violated the Fifth Amendment's guarantee of equal protection of the laws, citing that all the awardees except one were "based in states whose majority of citizens casting votes did not support President Trump in the 2024 election." The ruling blocked the agency from terminating seven grants that were a part of the presented court case, but funding for the hydrogen hubs remains on hold since the ruling did not specifically reverse Hydrogen Hub terminations.[467] Officially, the California and Pacific Northwest hubs remain terminated while litigation over DOE's authority to terminate Congressionally-appropriated funds continues in 2026.

Additionally, the uncertainty surrounding 45V in 2024 led to some investment delays throughout 2025, as first noted in the 2025 Market Brief. The 45V tax credit was expected to accelerate growth in renewable hydrogen's market share, which comprises a small fraction of overall hydrogen production in the U.S. Legislative changes in 2025 enacted through H.B. 1 shortened the timeline for the credit, which was originally available through 2033. Now it will phase out for facilities constructed after January 1, 2028, creating a narrower window for developers to secure financing and begin construction.[468,469] Because large-scale hydrogen production projects typically require many years of planning and development, the shorter timeline may limit the number of projects able to take advantage of the incentive, and most predict the industry will not begin to see production volumes until at least the early 2030s.

"Hydrogen fuel cell buses provide a distance range comparable to CNG"

- **Julio Ortiz**, Senior Director of Fleet Administration, Regional Transportation Co.

Final regulations issued in early 2025 clarified that the 45z tax credit can provide up to $3 per kilogram of hydrogen produced.

Despite these policy changes, final regulations issued in early 2025 clarified the structure of the tax credit. The incentive can provide up to $3 per kilogram of hydrogen produced, with the credit level determined by the lifecycle carbon intensity of the production process as well as compliance with other credit requirements, such as prevailing wage and apprenticeship bonuses.[470,471] Hydrogen produced from electricity, natural gas with carbon capture, or other low-carbon pathways remains eligible if lifecycle emissions remain below 4 kilograms of CO_2-equivalent per kilogram of hydrogen.[472,473]

Together, these policy developments and uncertainties signal greater reliance on private investments in the cancelled hubs and shifts in investment opportunities to the states.[474]

STARTUPS STUMBLE, MANUFACTURING LEADERS RENEW THEIR COMMITMENTS TO HYDROGEN TRUCKS

The HD hydrogen vehicle sector experienced notable challenges of its own in 2025. Total vehicle registrations fell 12% in 2025 to 146 total units compared with 2024, and registration for tractor trucks declined by 41%, according to S&P Global Mobility data. Transit agencies remained the most active segment for hydrogen vehicle deployment in 2025 with 93 units, accounting for 64% of all registrations. New Flyer continues to innovate its electric transit bus model, announcing the launch of an extended-range hydrogen fuel-cell electric bus piloted by the Humboldt Transit Authority in 2025.[475]

On the Class 8 tractor side, two of the most prominent hydrogen Class 8 tractor startups exited the industry. Nikola declared bankruptcy in early 2025 just after the collapse of fellow hydrogen tractor startup Hyzon.[476] Despite the setbacks, some of the vehicles deployed by these companies remain in service. Hydrogen trucking company Hyroad acquired portions of Nikola's truck inventory and assets. Nikola customers, which collectively operate dozens of fuel cell tractors, learned midyear that the so-called "trucking-as-a-service" company would continue to service their vehicles.[477,478,479] Hyroad also picked up Nikola's remaining inventory of 113 trucks that will form part of its operations in California and Texas. Tractor trucks accounted for 36% of 2025 registrations with 53 units.

> **Transit agencies accounting for 64% of all registrations in 2025 with 93 units, according to S&P Global Mobility.**

Some established OEMs also faced hurdles advancing fuel cell truck programs. Kenworth postponed production of its fuel cell electric tractor due to infrastructure gaps.[480] Peterbilt also delayed the start of production for a fuel cell configuration of its flagship Model 579 on-highway tractor.[481] Daimler Trucks North America dialed back its near-term commitment to hydrogen and BEVs in July 2025 as part of its updated "Stronger 2030" strategy.[482] However, in early 2026 Daimler said it would produce 100 units of its Mercedes-Benz NextGen H2 Truck that would be deployed in Europe beginning in late 2026.[483]

> **"We're an early adopter of hydrogen fuel cell class 8 tractors. Great adoption phase, but rough period given recent manufacturer bankruptcies."**
>
> \- **Jim Gillis**, President, Pacific Region, IMC Logistics

Even still, leading manufacturers continued to invest in hydrogen technologies in 2025. Hyundai introduced its XCIENT fuel cell Class 8 truck to the North American market at ACT Expo 2025, highlighting its potential for long-haul freight applications.[484] The trucks, which were developed specifically for the North American market, have been operating in demonstration projects at the Ports of Oakland and Richmond, accumulating more than 450,000 miles of operations since 2023.[485] The OEM also launched fuel cell refuse trucks internationally, broadening its hydrogen product portfolio.[486] Hyundai also announced a partnership with Plus to develop a Class 8 hydrogen-powered truck with a Level 4 autonomous driving system that will support hub-to-hub trucking routes where hydrogen fueling infrastructure could be built incrementally along major freight corridors.[487] TIME named the truck one of its Best Inventions of the Year for its potential to redefine sustainable long-haul freight.[488]

Toyota expanded its hydrogen strategy, announcing plans to deploy fuel cell Class 8 trucks within its own logistics fleet and is testing hydrogen fuel cell MD and HD trucks capable of providing 450 miles of range, which is ideal for shorter routes.[489] Other OEM activity included Cenntro announcing its second-generation hydrogen fuel cell electric Class 8 truck for the U.S. market, and Honda, showcasing its next-generation fuel cell module during ACT Expo 2025. The new module is set for production in 2027 and designed to cut production costs in half while increasing durability and power.[490,491]

In addition to HD trucks, manufacturers are experimenting with hydrogen technologies in other vehicle segments. Toyota plans to release an updated version of the LD pickup truck, the Hilux, which will be launched as a standard ICE configuration, capable of being powered by hybrid-electric, electric, and fuel cell power. The model will be available in select markets in 2026.[492]

> **Major manufacturers Hyundai and Toyota continued to invest in hydrogen technologies. Hyundai introduced its Class 8 fuel cell truck to North America at ACT Expo 2025.**

> **"We are taking delivery of two Symbio Class 8 FCEV on a Mack chassis next month with plans to scale to 70 units by Jan 1, 2028. These are the lightest FCEV developed to date and are expected to have limited payload change."**
>
> - **Tyler Flynn**, Sr Director, Equipment, Savage Services

Toyota is also developing two hydrogen concept models for the LD market: a fuel cell generator version of the Tundra, which functions as a stationary power source for facility equipment, and a fuel-cell powered Tacoma that has been retrofitted with a Mirai powertrain to pilot off-road travel in remote locations. The Tacoma is powered by a 210 kW hydrogen fuel cell system and delivers an estimated driving range of up to 528 miles with a full payload.

While hydrogen fuel cells have received the majority of investment and development, stakeholders are also exploring hydrogen internal combustion engines (ICE). The Universities of Riverside and Michigan launched the Hydrogen Engine Alliance of North America in 2025.[493] The alliance brings together academic researchers and industry stakeholders, including Cummins and Daimler, to lead hydrogen fuel innovation and increase competitiveness with international peers.

HIGH FUEL COSTS AND INADEQUATE INFRASTRUCTURE REMAIN A CENTRAL CHALLENGE FOR HYDROGEN ADOPTION

Beyond federal policy uncertainty, economics remain a hurdle, with fuel supply and pricing being significant barriers to large-scale adoption. In 2025, the DOE hydrogen prices averaged $39.13 per diesel gallon equivalent, representing roughly a 996% premium compared to diesel fuel.[494,495]

Respondents in the State of Sustainable Fleets survey report paying substantially less due to incentives and contractual pricing agreements. On average, fleets reported paying $18.86 per kilogram of hydrogen after incentives. Even at these reduced prices, hydrogen remains significantly more expensive than diesel on an energy-equivalent basis, a premium of roughly 89-135%. Industry analysts estimate that hydrogen must fall to approximately $8–$10 per kilogram for fuel cell trucks to achieve cost parity with diesel.

Recent fuel consumption trends illustrate the challenges facing the market. Data from California's LCFS program shows that hydrogen dispensed for transportation declined from 2.66 million gasoline gallon equivalents between Q4 2023 and Q3 2024 to 2.16 million GGE between Q4 2024 and Q3 2025, suggesting slower growth in demand during a period of market uncertainty.[496]

Even though hydrogen faces price challenges, hydrogen available today offers significant environmental benefits. Hydrogen fuel cell vehicles produce zero tailpipe emissions of climate and criteria pollutants, including GHGs, NOx, and PM. Hydrogen used in California's LCFS program averaged a lifecycle carbon intensity of 36.54 gCO2e/MJ in 2025, delivering a 64% lifecycle reduction in greenhouse gas emissions compared with diesel.[497,498] Renewable hydrogen achieved an even lower average carbon intensity of 22.36 gCO2e/MJ, representing a 78% lifecycle reduction compared with diesel in California in 2025.[499] Approximately 47.8% of hydrogen users in the survey report using renewable fuel.

> **On average, fleets reported paying $18.86 per kilogram of hydrogen after incentives (compared to $8-10/kg expected cost parity).**

> **Data from California's LCFS program shows that hydrogen dispensed for transportation declined to 2.16 million GGE between Q4 2024 and Q3 2025.**

OEMs are increasingly investing in fueling infrastructure alongside vehicles. During ACT Expo 2025, Hyundai announced plans to launch a scalable hydrogen production and dispensing facility for Class-8 HD ZEVs in Savannah, Georgia. It can produce 1.2 tons of hydrogen per day, scalable to up to 4,200 kilograms per day to meet future demand.[500] Toyota said it plans to open a new fueling station on its North America Parts Center California campus in partnership with Air Liquide and Iwatani.[501] The company also invested in FirstElement Fuel, one of the largest hydrogen fueling station operators in California.[502]

Not all infrastructures progressed, however. On-site hydrogen fuel producer Modern Hydrogen, a decade-old venture backed by Bill Gates, announced projects in the Seattle and San Antonio areas in 2025 before laying off nearly all of its staff late in the year.[503, 504, 505] Nikola's HYLA fueling brand also left the market last year. The HYLA fueling stations were not included in Hyroad's bankruptcy auction purchase of Nikola's assets. In late 2025, Hyroad announced a partnership with OneH2 and Pacific Clean Fuels to construct a hydrogen refueling station in Long Beach to fuel Hyroad trucks under an exclusive agreement. Commercial operations were expected to begin in January 2026.[506]

> **"We currently have a three-year pilot program with five FCEBs and a gaseous mobile trailer."**
>
> \- **John Van Camp**, Maintenance Superintendent, SJRTD

INDUSTRY PERSPECTIVE: CALIFORNIA HYDROGEN BUSINESS COUNCIL (CHBC)

The story of hydrogen transportation in the United States in 2025 was shaped by regulatory reversals, market instability, and shifting policy landscapes, particularly in California, where hydrogen deployment has historically been strongest. The year opened with a major setback for the HD hydrogen trucking sector when the California Air Resources Board withdrew its federal waiver request for the Advanced Clean Fleets rule as it applied to private fleets. This action effectively removed the ZE purchase mandate for private trucking companies in the state, eliminating one of the most powerful regulatory drivers for hydrogen truck adoption. Fleets that had been evaluating hydrogen fuel-cell trucks — and already grappling with high adoption costs — suddenly faced no regulatory requirement to transition, weakening demand at a moment when the industry was already under pressure.[507]

Industry dynamics shifted in February 2025 when Hyzon Motors, one of the few active U.S. manufacturers of fuel-cell electric trucks, ceased operations.[508] Hyzon's collapse removed a key player from the market and signaled deeper financial challenges facing hydrogen truck OEMs. Later that same month, Nikola Corporation entered bankruptcy, and its fuel-cell truck assets and intellectual property were acquired by Hyroad Energy, which also assumed responsibility for servicing and warranty support for the Nikola trucks already deployed in the field.[509, 510] While Hyroad's involvement ensured continuity for existing customers, the bankruptcy underscored the fragility of the hydrogen trucking ecosystem and the difficulty of sustaining operations in a market with limited demand, high capital requirements, and uncertain policy support.

Mid-year, federal policy developments added both clarity and complexity. Congress clarified the three-tiered lifecycle GHG intensity thresholds in the 45V tax credit, tightened temporal matching requirements for electrolytic hydrogen, and accelerated the phase-in of hourly renewable energy matching.[511] It also required producers to use updated modeling for lifecycle emissions calculations and established stricter verification requirements for upstream methane leakage.

These changes were intended to ensure that hydrogen receiving the highest tax credit tiers were genuinely low-carbon, but they also introduced new compliance burdens for producers planning projects in 2025 and 2026. For transportation end-uses, the 45V changes created uncertainty about the future cost of clean hydrogen, particularly for stations planning for electrolytic supply.

California policy developments continued to shape the market throughout the year. In July 2025, the state implemented significant changes to the LCFS, tightening the CI reduction requirements for gasoline and diesel. The updated schedule required deeper CI reductions beginning in 2026, increasing the number of deficits generated by fossil fuels. As deficits rise, LCFS credit demand will increase, placing upward pressure on LCFS credit prices. This shift improved the long-term economics for low-carbon fuels — including hydrogen — produced from low-CI supplies. While the LCFS changes did not immediately translate into large-scale hydrogen transportation growth, they strengthened the long-term value proposition for hydrogen producers and station operators by improving credit revenue potential.

Meanwhile, several federally funded hydrogen hubs were canceled or restructured during 2025, reflecting shifting state participation, cost concerns, and evolving federal priorities. These cancellations reduced expectations for near-term hydrogen fueling infrastructure expansion, particularly for HD transportation, where the lack of reliable, high-capacity fueling stations remains one of the most significant barriers to adoption. The cancelations are now being challenged in court.

In September after nine months of inactivity, California's popular HVIP program reopened with approximately $335 million in new funding. However, the program was nearly fully subscribed the same day it launched. A major driver of this rapid depletion was the surge of voucher requests for the Tesla Semi, which reportedly exceeded 600 voucher submissions on the first day. The combination of pent-up demand and the scale of Tesla's fleet orders quickly exhausted available funds, leaving most fleets unable to access incentives.

Early stages of a recovery began in December when HVIP was replenished with $125 million from the Hino emissions-related settlement. This new funding remained available going into 2026, offering a more stable foundation for future fuel-cell truck deployments and giving fleets renewed confidence that incentives would be accessible. The settlement funding also included carve-outs for specific vehicle categories, helping ensure that hydrogen trucks and buses remained eligible for meaningful support.

Despite the turbulence of 2025, several developments point toward renewed momentum in 2026 and beyond. In California, the ACF rule remains fully in effect for state and local government fleets, preserving a strong policy driver for hydrogen refuse trucks, public works vehicles, and other municipal applications. This carve-out ensures that hydrogen remains a viable compliance pathway for public agencies with demanding duty cycles that favor fuel-cell technology. Fuel-cell refuse trucks will begin testing in 2026 through a South Coast AQMD grant awarded to Symbio, marking one of the first large-scale demonstrations of hydrogen in refuse collection and offering an opportunity to validate the technology in one of the most challenging heavy-duty applications.

Fuel-cell buses also remain a popular choice among California transit agencies, which must still comply with the Innovative Clean Transit (ICT) regulation requiring a full transition to ZE buses. There is broad agreement among agencies that hydrogen buses offer operational advantages for long-range, high-duty-cycle routes where battery-electric buses face limitations. As transit agencies continue to scale their ZE fleets, hydrogen buses are expected to play a significant role in meeting ICT requirements, particularly in regions with long routes, steep grades, or limited depot charging capacity.

Even after a difficult year, the combination of remaining mandates, renewed incentives, LCFS strengthening, and ongoing federal strategy work provides a foundation for cautious optimism. While 2025 exposed the vulnerabilities of the hydrogen transportation sector, it also clarified where hydrogen is most likely to succeed: in high-duty-cycle, high-utilization applications where batteries face operational constraints. With new funding available, municipal mandates intact, and policy signals strengthening, hydrogen transportation enters 2026 with a more focused and realistic pathway for growth.

All opinions in the above Industry Perspective represent the opinion of the aforementioned organization and do not reflect the opinions of TRC Companies, Inc. (TRC) or the report sponsors.

METHODOLOGY

The State of Sustainable Fleets study relies on data published in industry, state, and federal databases; industry reports; proposed and enacted policies; primary interviews with stakeholders; and the responses of over 200 fleet managers in a national, industry-wide survey. Information is gathered and analyzed by expert clean transportation and energy consultants at TRC. Sources of public data are cited throughout the report. This section describes the scope and methodology for primary data collection.

SCOPE OF STUDY

The study is focused on government- and private-sector fleets operating Class 2a-8 vehicles in the U.S. in the following sectors: school, shuttle, state/county/municipal, urban delivery, refuse, utility, transit, regional-haul, long-haul, and off-road cargo handling. Renewable fuels considered in this study include alternatives in the diesel, natural gas, electricity, and hydrogen markets. Hybrid technologies are not studied.

APPROACH TO DATA

Throughout this study, a variety of data points are collected from fleets, vehicle technology manufacturers, fuel providers, and industry stakeholders including S&P Global Mobility, Cummins, Engine Technology Forum (ETF), Natural Gas Vehicles for America (NGVA), The Transport Project, Edison Electric Institute (EEI), Propane Education and Research Council (PERC) and California Hydrogen Business Council (CHBC). TRC's funding data is generated regularly through its Funding 360 service to clients that gathers and analyzes information directly from utilities and federal, state, and local agencies. TRC's policy assessment is generated from ongoing policy analysis through its comprehensive policy and compliance consulting practice.

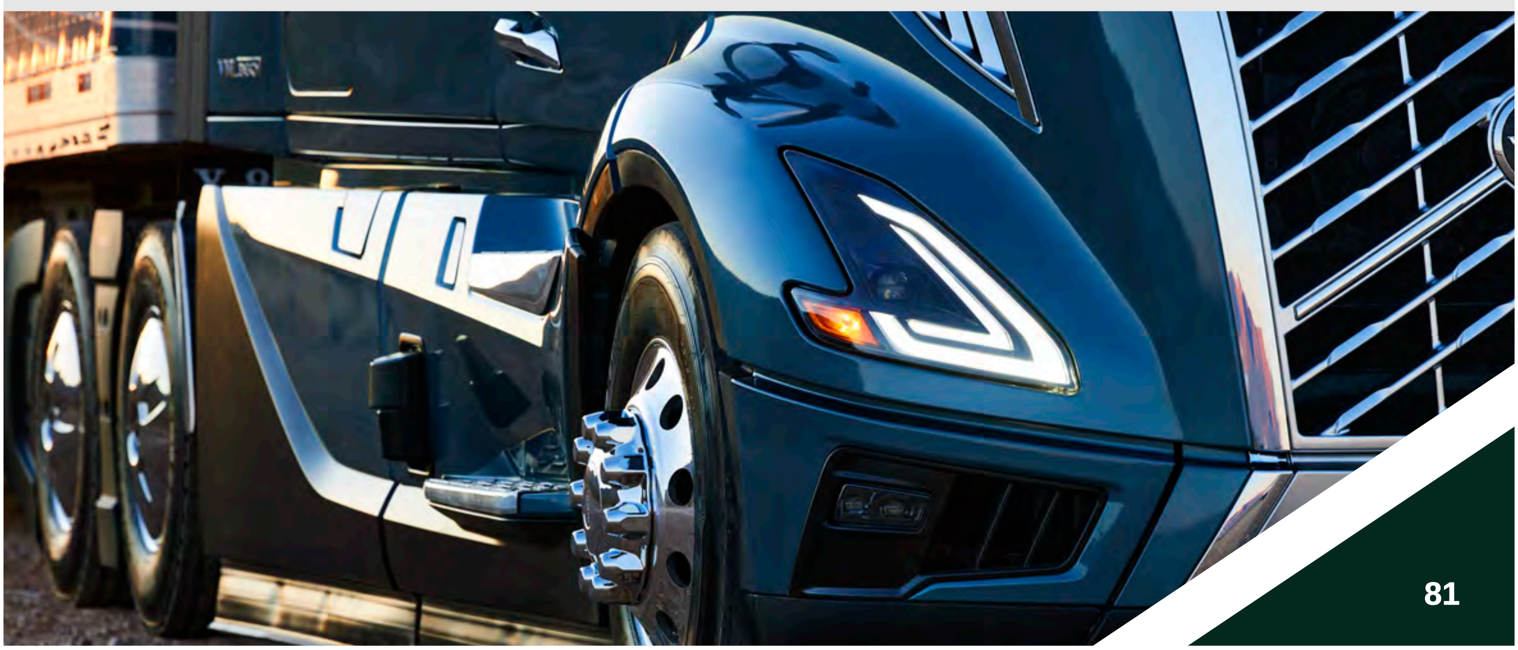
Vehicle registration, order, and deployment estimates are based on data from S&P Global Mobility and PERC, state and federal grant awards won by TRC for clients, publicly available information on other awards, press releases, and TRC's direct communications with fleets and their project partners. All 2026 sponsors review a draft of the report for technical accuracy. TRC maintains editorial control and decisions over which data, feedback, and examples to publish. Only data that are credible and accurate to the best available knowledge of the assembled experts are included. Typically, that includes data validated by multiple credible and public third-party sources.

The State of Sustainable Fleets 2026 Market Brief represents a comprehensive, technology-neutral analysis of the best data available today for on-road commercial fleets and the state of the market for these technologies. Future assessments will update the analysis as new, credible data become available.

California's Low Carbon Fuel Standard quarterly credit data provides the largest and most reliable data on carbon intensity of fuels and electricity used in U.S. transportation. All references to California carbon intensities for GHG analysis and comparisons on a lifecycle basis are based on this data set. Since Q4 data from the previous year are not available in time for publication, the Market Brief uses Q4 2024 – Q3 2025 data for all references to CIs for 2025. TRC standardized to this timeframe for its annual calculations starting in 2023.

SURVEY METHODOLOGY

TRC administered its seventh annual online survey over a six-week period in September and October 2025 to operators of medium- and heavy-duty vehicle fleets. The survey asked respondents to identify trends and operational performance insights from their use of artificial intelligence, clean vehicle drivetrains (propane, natural gas, electric, and fuel cell electric), renewable natural gas, electricity and hydrogen, and fueling infrastructure. Additionally, respondents were asked about their use of fuel-efficient technologies and practices, renewable diesel, and biodiesel with their diesel vehicles. Fleet respondents were asked to compare each against a baseline of incumbent fleet vehicle technologies operating on conventional diesel and gasoline fuels. The survey did not ask for comparisons between the clean vehicle drivetrain and infrastructure technologies. For the first time, the 2026 survey asked about fleet use of artificial intelligence.



ENDNOTES

[1] Lockridge, Deborah. Why AI Could Be the Cure for Trucking's Tech Fatigue. Heavy Duty Trucking, 1 October 2025, https://www.truckinginfo.com/10248858/why-ai-could-be-the-cure-for-truckings-tech-fatigue

[2] Korpics, Tana. Charting Progress: Fleet Leaders Lean into AI to Navigate the Road Ahead. Penske, 11 May 2025, https://www.gopenske.com/blog/lease/charting-progress-fleet-leaders-lean-into-ai-to-navigate-the-road-ahead/

[3] Wilkens, Ben. Unlocking the Potential of AI in the Trucking Industry: Opportunities and Risks. National Motor Freight Traffic Association (NMFTA), 6 December 2024, https://nmfta.org/unlocking-the-potential-of-ai-in-the-trucking-industry-opportunities-and-risks/

[4] Noregon. AI Trends in the Trucking Industry. Noregon, https://www.noregon.com/ai-trends-in-the-trucking-industry/

[5] Korpics, Tana. Charting Progress: Fleet Leaders Lean into AI to Navigate the Road Ahead. Penske, 11 May 2025, https://www.gopenske.com/blog/lease/charting-progress-fleet-leaders-lean-into-ai-to-navigate-the-road-ahead/

[6] Hofvendahl, Kajsa. Six ways AI is impacting trucking and road transportation. Volvo Trucks, 15 December 2025, https://www.volvotrucks.com/en-en/news-stories/insights/articles/2025/dec/how-ai-is-impacting-trucking-and-transport_msm_moved.html

[7] Verizon Connect. Advanced GPS Fleet Tracking Software. Verizon Connect, https://www.verizonconnect.com/v/fleet/gpsfleet/gps-fleet-tracking-software/

[8] Geotab. Advanced GPS Vehicle Tracking Devices. Geotab, https://www.geotab.com/vehicle-tracking-device/

[9] Linger, Kevin. Samsara, Rivian Partners for Integrated Data Solutions. Fleet Equipment Magazine, 4 June 2025, https://www.fleetequipmentmag.com/samsara-rivian-integration-fleet-management/

[10] Hofvendahl, Kajsa. Six ways AI is impacting trucking and road transportation. Volvo Trucks, 15 December 2025, https://www.volvotrucks.com/en-en/news-stories/insights/articles/2025/dec/how-ai-is-impacting-trucking-and-transport_msm_moved.html

[11] Noregon. AI Trends in the Trucking Industry. Noregon, https://www.noregon.com/ai-trends-in-the-trucking-industry/

[12] Ibid.

[13] Wilkens, Ben. Unlocking the Potential of AI in the Trucking Industry: Opportunities and Risks. National Motor Freight Traffic Association (NMFTA), 6 December 2024, https://nmfta.org/unlocking-the-potential-of-ai-in-the-trucking-industry-opportunities-and-risks/

[14] Kelley, David. The ROI of 24/7 Fleet Monitoring. Forbes, 17 October 2025, https://www.forbes.com/councils/forbesfinancecouncil/2025/10/17/the-roi-of-247-fleet-monitoring/

[15] Hofvendahl, Kajsa. Six ways AI is impacting trucking and road transportation. Volvo Trucks, 15 December 2025, https://www.volvotrucks.com/en-en/news-stories/insights/articles/2025/dec/how-ai-is-impacting-trucking-and-transport_msm_moved.html

[16] Fang, Yu. The Next AI Frontier in Automotive Isn't Autonomy: It's Maintenance.Forbes, 6 October 2025, https://www.forbes.com/councils/forbestechcouncil/2025/10/06/the-next-ai-frontier-in-automotive-isnt-autonomy-its-maintenance/

[17] Kelley, David. The ROI of 24/7 Fleet Monitoring. Forbes, 17 October 2025, https://www.forbes.com/councils/forbesfinancecouncil/2025/10/17/the-roi-of-247-fleet-monitoring/

[18] Kesari, Ganes. The Future of Fleets: AI Predictive Maintenance Prevents Breakdowns. Forbes, 7 July 2025, https://www.forbes.com/sites/ganeskesari/2025/07/07/the-future-of-fleets-ai-predictive-maintenance-prevents-breakdowns/

[19] Clark, Jane. Clark: How AI Is transforming fleet maintenance and reducing costly breakdowns in trucking operations. FleetOwner, 6 October 2025, https://www.fleetowner.com/perspectives/ideaxchange/blog/55320460/clark-how-ai-is-transforming-fleet-maintenance-and-reducing-costly-breakdowns-in-trucking-operations

[20] Clark, Jane. Clark: How AI Is transforming fleet maintenance and reducing costly breakdowns in trucking operations. FleetOwner, 6 October 2025, https://www.fleetowner.com/perspectives/ideaxchange/blog/55320460/clark-how-ai-is-transforming-fleet-maintenance-and-reducing-costly-breakdowns-in-trucking-operations

[21] Kesari, Ganes. The Future of Fleets: AI Predictive Maintenance Prevents Breakdowns. Forbes, 7 July 2025, https://www.forbes.com/sites/ganeskesari/2025/07/07/the-future-of-fleets-ai-predictive-maintenance-prevents-breakdowns/

[22] Clark, Jane. Clark: How AI Is transforming fleet maintenance and reducing costly breakdowns in trucking operations. FleetOwner, 6 October 2025, https://www.fleetowner.com/perspectives/ideaxchange/blog/55320460/clark-how-ai-is-transforming-fleet-maintenance-and-reducing-costly-breakdowns-in-trucking-operations

[23] Ibid.

[24] Heavy Duty Trucking. Penske's Next-Generation AI Platform Gives Insights Down to Vehicle Level. Heavy Duty Trucking, 23 May 2025,https://www.truckinginfo.com/10241334/penskes-next-generation-ai-platform-gives-insights-down-to-vehicle-level

[25] Penske. AI in Fleet Management. Penske, https://www.pensketruckleasing.com/resources/resource-library/ai-in-fleet-management/

[26] Penske. Catalyst AI™ – Revolutionizing Fleet Management & Performance. Issuu, 29 March 2024, https://issuu.com/docs/e7472256344809791c964531148f3a05

[27] Penske. Comparative Insights Premium – Powered by Catalyst AI™, Issuu, https://issuu.com/docs/133557042f6993f6baf9b71f884f3552?fr=sYTEzZjg0NzYyNjU

[28] Penske. Catalyst AI™ - Compare your fleet to similar fleets. Penske, https://www.pensketruckleasing.com/digital-experience/catalyst-ai/

[29] Villano, Matt. Penske is using AI to get ahead of costly truck maintenance issues. Business Insider, 2 July 2025, https://www.businessinsider.com/penske-uses-ai-technology-to-enhance-truck-maintenance-cost-savings-2025-6

[30] Long, Mindy. AI Optimization and Trucking. Transport Topics, 24 February 2025, https://www.ttnews.com/articles/ai-optimization-trucking

[31] Davis, Grant. AI in Trucking is Transforming the Way Goods Are Shipped – Here Are the Opportunities and Risks. The Fast Lane Truck, 23 June 2025, https://tfltruck.com/2025/06/potential-of-ai-in-the-trucking-industry/

[32] Noregon. AI Trends in the Trucking Industry. Noregon, https://www.noregon.com/ai-trends-in-the-trucking-industry/

[33] Long, Mindy. The Freight Broker of the Future. Transport Topics, 25 July 2025, https://www.ttnews.com/articles/future-freight-broker

[34] Guthrie, Dana. Outpost launches gate automation platform. The Trucker, 15 August 2025, https://www.thetrucker.com/trucking-news/business/outpost-launches-gate-automation-platform

[35] Volvo Autonomous Solutions. Volvo Autonomous Solutions and Aurora: A partnership primed to scale with safety built-in. Volvo Autonomous Solutions, 29 April 2025, https://www.volvoautonomoussolutions.com/en-en/news-and-insights/insights/articles/2025/apr/vas-and-aurora-a-partnership-primed-to-scale-with-safety-built-in.html

[36] ACT News. Volvo, DHL Partner on Autonomous Operations. ACT News, 13 December 2024, https://www.act-news.com/news/volvo-dhl-partner-on-autonomous-operations/

[37] DC Velocity Staff. Volvo deepens partnership with Waabi for self-driving truck tech. DC Velocity, 4 February 2025, https://www.dcvelocity.com/transportation/trucking/autonomous-trucks/volvo-deepens-partnership-with-waabi-for-self-driving-truck-tech

[38] Volvo Autonomous Solutions. Autonomous freight, real-world impact: On the road with Volvo and Uber Freight. Volvo Autonomous Solutions, 24 October 2025, https://www.volvoautonomoussolutions.com/en-en/news-and-insights/stories/2025/oct/autonomous-freight--real-world-impact--on-the-road-with-volvo-and-uber-freight.html

[39] Volvo Autonomous Solutions. Volvo VNL Autonomous, powered by the Waabi Driver sets new standard for Level 4 Autonomy. Volvo Autono mous Solutions, 30 October 2025, https://www.volvoautonomoussolutions.com/en-en/news-and-insights/stories/2025/oct/waabi-and-volvo-demonstrate-the-future-of-autonomous-trucking.html

[40] Avila, Larry. Aurora focuses on Southwestern US driverless route growth,Trucking Dive, 27 February 2026, https://www.truckingdive.com/news/aurora-innovation-q4-2025-earnings-expansion-routes/812161/

[41] Avila, Larry. PlusAI shores up OEM partnership ahead of public offering. Trucking Dive, 30 January 2026, https://www.truckingdive.com/news/plusai-av-public-offering-traton-group-volkswagen-international/810671/

[42] Avila, Larry. Kodiak AI partners with Bosch to scale autonomous trucking hardware. Trucking Dive, 9 January 2026, https://www.truckingdive.com/news/kodiak-bosch-scale-autonomous-production/809111/

[43] Business Wire. ISEE and TICO Announce Strategic Partnership to Deliver Industry-First Fully Integrated Autonomous Yard Trucks to Customer Operations. Business Wire, 29 April 2025, https://www.businesswire.com/news/home/20250429823517/en/ISEE-and-TICO-Announce-Strategic-Partnership-to-Deliver-Industry-First-Fully-Integrated-Autonomous-Yard-Trucks-to-Customer-Operations

[44] Shepardson, David. Trump imposing new 25% large truck tariff starting Nov. 1. Reuters, 7 October 2025, https://www.reuters.com/business/autos-transportation/trump-says-25-tariff-medium-heavy-duty-trucks-start-nov-1-2025-10-06/

[45] Fact Sheet: President Donald J. Trump Addresses the Threat to National Security from Imports of Medium and Heavy-Duty Vehicles, Parts, and Buses. The White House, 17 October 2025, https://www.whitehouse.gov/fact-sheets/2025/10/fact-sheet-president-donald-j-trump-addresses-the-threat-to-national-security-from-imports-of-medium-and-heavy-duty-vehicles-parts-and-buses/

[46] Ibid.

[47] Ibid.

[48] Ibid.

[49] Whitehurst, Lindsay. Supreme Court Strikes Down Trump's Sweeping Tariffs. Transport Topics, 20 February 2026, https://www.ttnews.com/articles/scotus-no-trump-tariffs

[50] Bussewitz, Cathy, Anderson, Mae, et al. How the Iran War Is Affecting Diesel and Gasoline Prices. Transport Topics, 10 March 2026, https://www.ttnews.com/articles/iran-war-diesel-gas-prices

[51] Kingston, John. Diesel benchmark moves above $5/g for first time since 2022. Freight Waves, 17 March 2026, https://www.freightwaves.com/news/diesel-benchmark-moves-above-5-g-for-first-time-since-2022

[52] Baertlein, Lisa. Spiking US diesel prices keep trucking industry stuck in years-long slump. Reuters, 27 March 2026, https://www.reuters.com/business/energy/spiking-us-diesel-prices-keep-trucking-industry-stuck-years-long-slump-2026-03-27/

[53] American Trucking Associations (ATA). Trucking Industry Calls on EPA to Delay and Reconsider Federal NOx Standard. ATA, 13 August 2025, https://www.trucking.org/news-insights/trucking-industry-calls-epa-delay-and-reconsider-federal-nox-standard

[54] Kirbo, Allison. EPA To Keep 2027 NOx Emissions Standards. Rush Truck Centers, 9 December 2025, https://www.rushtruckcenters.com/blog/2025/12/epa-to-keep-2027-nox-emissions-standards

[55] Ibid.

[56] Ibid.

[57] TRC. State of Sustainable Fleets 2024 Market Brief. The State of Sustainable Fleets, 2024, https://www.stateofsustainablefleets.com/

[58] Shakir, Vincent. Trump EPA Announces Reevaluation of the Clean Trucks Plan. Truck Driver News, 13 March 2025, https://truckdrivernews.com/trump-epa-announcing-reevaluation-of-the-clean-trucks-plan/

[59] Miller, James. EPA Sticks to 2027 Deadlines for Tougher NOx Emission Standards on Heavy-Duty Trucks. Get Transport, 2 December 2025, https://blog.gettransport.com/news/epa-2027-nox-emission-standards/

[60] Internal Revenue Service (IRS). Commercial Clean Vehicle Credit. IRS, 13 November 2025, https://www.irs.gov/credits-deductions/commercial-clean-vehicle-credit

[61] U.S. Congress. H.R.1 - An act to provide for reconciliation pursuant to title II of H. Con. Res. 14. Congress.gov, 4 July 2025, https://www.congress.gov/bill/119th-congress/house-bill/1/all-actions

[62] Cornell Law School Legal Information Institute (LII). 26 U.S. Code § 30C - Alternative fuel vehicle refueling property credit LII, https://www.law.cornell.edu/uscode/text/26/30C

[63] IRS. Alternative Fuel Vehicle Refueling Property Credit. IRS, 27 February 2026, https://www.irs.gov/credits-deductions/alternative-fuel-vehicle-refueling-property-credit

[64] Igini, Martina. Appeals Court Allows Trump's EPA to Cut $20bn in Climate Grants. Earth.org, 3 September 2025, https://earth.org/appeals-court-allows-trumps-epa-to-cut-20bn-in-climate-grants/

[65] Clean Air Task Force (CATF). The high cost of retreat: Impacts of Department of Energy project cuts. CATF, 21 November 2025, https://www.catf.us/2025/11/high-cost-retreat-impacts-department-energy-project-cuts/

[66] Diaz, Melissa N. DOE's Vehicle Technologies Office in the 119th Congress. Congressional Research Service, 26 September 2025, https://www.everycrsreport.com/files/2025-09-26_IN12612_4925ebb53cd879421dee86521d4b0c1987fadee5.pdf

[67] Ibid.

[68] U.S. Government Accountability Office (GAO). U.S. Department of Transportation, Federal Highway Administration—Application of the Impoundment Control Act to Memorandum Suspending Approval of State Electric Vehicle Infrastructure Deployment Plans. GAO, 22 May 2025, https://www.fhwa.dot.gov/environment/nevi/resources/state-plan-approval-suspension.pdf

[69] FTA. National Electric Vehicle Infrastructure Formula Program Guidance. Federal Register, 13 August 2025, https://www.federalregister.gov/documents/2025/08/13/2025-15370/national-electric-vehicle-infrastructure-formula-program-guidance

[70] CNBC. States Sue Trump Administration Again Over Withheld EV Funds. CNBC, 16 December 2025, https://www.cnbc.com/2025/12/16/states-sue-trump-admin-again-withheld-ev-funds.html

[71] Federal Transit Administration (FTA). FY25 FTA Bus and Low- and No-Emission Grant Awards. FTA, 20 January 2026, https://www.transit.dot.gov/funding/grants/fy25-fta-bus-and-low-and-no-emission-grant-awards

[72] U.S. EPA. Proposed Rule: Reconsideration of 2009 Endangerment Finding and Greenhouse Gas Vehicle Standards. EPA, 13 February 2026, https://www.epa.gov/regulations-emissions-vehicles-and-engines/proposed-rule-reconsideration-2009-endangerment-finding

[73] EPA Press Office. EPA Releases Proposal to Rescind Obama-Era Endangerment Finding, Regulations that Paved the Way for Electric Vehicle Mandates. EPA, 29 July 2025, https://www.epa.gov/newsreleases/epa-releases-proposal-rescind-obama-era-endangerment-finding-regulations-paved-way

[74] EPA. Final Rule: Rescission of the Greenhouse Gas Endangerment Finding and Motor Vehicle Greenhouse Gas Emission Standards Under the Clean Air Act. EPA, 4 March 2026,https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-rescission-greenhouse-gas-endangerment

[75] EPA Press Office. EPA Releases Proposal to Rescind Obama-Era Endangerment Finding, Regulations that Paved the Way for Electric Vehicle Mandates. EPA, 4 March 2026, https://www.epa.gov/newsreleases/epa-releases-proposal-rescind-obama-era-endangerment-finding-regulations-paved-way

[76] ACT News. EPA Proposes to Rescind 2009 Endangerment Finding, Potentially Rolling Back GHG Rules. ACT News, 29 July 2025, https://www.act-news.com/news/epa-proposes-to-rescind-2009-endangerment-finding-potentially-rolling-back-ghg-rules/

[77] ACT News. Trump EPA Scraps 2009 Climate Findings, Eliminates Federal Vehicle GHG Standards ACT News, 12 February 2026, https://www.act-news.com/news/trump-eliminates-federal-vehicle-ghg-standards/

[78] U.S. EPA. Final Rule: Rescission of the Greenhouse Gas Endangerment Finding and Motor Vehicle Greenhouse Gas Emission Standards Under the Clean Air Act. U.S. EPA, 4 March 2026, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-rescission-greenhouse-gas-endangerment

[79] Environmental Defense Fund. EDF Files Lawsuit to Get Records About EPA Administrator's Recommendation to Reverse Endangerment Finding. Environmental Defense Fund, 3 March 2025, https://www.edf.org/media/edf-files-lawsuit-get-records-about-epa-administrators-recommendation-reverse-endangerment

[80] Hijazi, Jennifer. EPA Hit With Another Suit Over Missing GHG Endangerment Records. Bloomberg Law, 14 April 2025, https://news.bloomberglaw.com/environment-and-energy/epa-hit-with-another-suit-over-missing-ghg-endangerment-records

[81] Worland, Justin. The EPA's Anti-Climate Move Leaves Industry Confused. Time, 1 August 2025, https://time.com/7306966/epa-endangerment-finding-industry-impact/

[82] Hijazi, Jennifer. Endangerment Finding Rollback Draws First Legal Challenges. Bloomberg Law, 18 February 2026, https://news.bloomberglaw.com/environment-and-energy/epa-endangerment-finding-rollback-draws-first-legal-challenges

[83] Worland, Justin. The EPA's Anti-Climate Move Leaves Industry Confused. Time, 1 August 2025, https://time.com/7306966/epa-endangerment-finding-industry-impact/

[84] ACT News. Industry, Environmental Leaders Respond to EPA Rollback of 2009 Climate Finding. ACT News, 13 February 2026, https://www.act-news.com/news/industry-respond-to-epa-rollback/

[85] U.S. DOT. Trump's Transportation Secretary Sean P. Duffy Announces Key Step Toward Making Cars Affordable in America Again. U.S. DOT, 6 June 2025, https://www.transportation.gov/briefing-room/trumps-transportation-secretary-sean-p-duffy-announces-key-step-toward-making-cars

[86] NHTSA. Resetting the Corporate Average Fuel Economy Program. Federal Register, 11 June 2025, https://www.federalregister.gov/documents/2025/06/11/2025-10586/resetting-the-corporate-average-fuel-economy-program

[87] Ibid.

[88] Fact Sheet: President Donald J. Trump Announces the Reset of Corporate Average Fuel Economy (CAFE) Standards. The White House, 3 December 2025, https://www.whitehouse.gov/fact-sheets/2025/12/fact-sheet-president-donald-j-trump-announces-the-reset-of-corporate-average-fuel-economy-cafe-standards/

[89] Ibid.

[90] ACT News. CAFE Standards Reset Signals Major Shift in Federal Fuel Economy Policy. ACT News, 3 December 2025, https://www.act-news.com/news/cafe-standards-reset-signals-major-shift-in-federal-policy/

[91] NHTSA. The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule III for Model Years 2022 to 2031 Passenger Cars and Light Trucks. Federal Register, 5 December 2025, https://www.federalregister.gov/documents/2025/12/05/2025-22014/the-safer-affordable-fuel-efficient-safe-vehicles-rule-iii-for-model-years-2022-to-2031-passenger

[92] Chemnick, Jean. Killing EPA climate rule could backfire on industry. E&E News, 5 August 2025, https://www.eenews.net/articles/killing-epa-climate-rule-could-backfire-on-industry/

[93] U.S. Congress. H.J.Res.87 - Providing congressional disapproval under chapter 8 of title 5, United States Code, of the rule submitted by the Environmental Protection Agency relating to "California State Motor Vehicle and Engine Pollution Control Standards; Heavy-Duty Vehicle and Engine Emission Warranty and Maintenance Provisions; Advanced Clean Trucks; Zero Emission Airport Shuttle; Zero-Emission Power Train Certification; Waiver of Preemption; Notice of Decision". Congress.gov, 12 June 2025, https://www.congress.gov/bill/119th-congress/house-joint-resolution/87

[94] U.S. Congress. H.J.Res.88 - Providing congressional disapproval under chapter 8 of title 5, United States Code, of the rule submitted by the Environmental Protection Agency relating to "California State Motor Vehicle and Engine Pollution Control Standards; Advanced Clean Cars II; Waiver of Preemption; Notice of Decision". Congress.gov, 12 June 2025, https://www.congress.gov/bill/119th-congress/house-joint-resolution/88

[95] U.S. Congress. H.J.Res.89 - Providing congressional disapproval under chapter 8 of title 5, United States Code, of the rule submitted by the Environmental Protection Agency relating to "California State Motor Vehicle and Engine and Nonroad Engine Pollution Control Standards; The 'Omnibus' Low NOX Regulation; Waiver of Preemption; Notice of Decision". Congress.gov, 12 June 2025, https://www.congress.gov/bill/119th-congress/house-joint-resolution/89

[96] Kingston, John. Trump signs bill killing California ZEV-related waivers, state immediately files lawsuit. FreightWaves, 13 June 2025, https://www.freightwaves.com/news/trump-signs-bill-killing-california-zev-related-waivers-state-immediately-files-lawsuit

[97] California Attorney General. California Will Not Waver in Defending Itself from Federal Overreach: Attorney General Bonta Sues Trump Administration for Attack on California's Clean Vehicles Program. State of California Department of Justice Office of the Attorney General, 12 June 2025, https://oag.ca.gov/news/press-releases/california-will-not-waver-defending-itself-federal-overreach-attorney-general

[98] Genovese, Christopher C. Proceed With Caution: California Emissions Case Slowly Moving Forward. Nelson Mullins, 11 November 2025, https://www.nelsonmullins.com/insights/blogs/driving-forward-developments-in-transportation-law-and-innovation/all/proceed-with-caution-california-emissions-case-slowly-moving-forward

[99] Cannon, John. OEMs win first round of CARB's Clean Truck lawsuit. Commercial Carrier Journal, 3 November 2025, https://www.ccjdigital.com/regulations/article/15770811/oems-granted-injunction-in-suit-against-carbs-clean-truck-deal

[100] Lockridge, Deborah. What Standards Apply? CARB Moves to Clarify Emissions Rules Amid Legal Limbo. Heavy Duty Trucking, 16 September 2025, https://www.truckinginfo.com/news/what-standards-apply-carb-moves-to-clarify-emissions-rules-amid-legal-limbo

[101] CARB. Federal actions impede California's clean air efforts and endanger public health. CARB, 23 October 2025, https://ww2.arb.ca.gov/news/federal-actions-impede-californias-clean-air-efforts-and-endanger-public-health

[102] Executive Department State of California. Executive Order N-27-25. Governor Gavin Newsom, 12 June 2025, www.gov.ca.gov/wp-content/uploads/2025/06/CRA-Response-EO-N-27-25_-bl-formatted-GGN-Signed-6-11-954pmFinal.pdf

[103] CARB, et al. Report to the Governor in Response to Executive Order N-27-25 on Zero-Emission Vehicle Deployment. CARB, August 2025, https://ww2.arb.ca.gov/sites/default/files/2025-08/August%202025%20Report%20to%20the%20Governor%20in%20Response%20to%20Executive%20Order%20on%20ZEV%20Deployment%20FINAL_0.pdf

[104] CARB. July 24, 2025, Board Meeting Agenda. CARB, https://ww2.arb.ca.gov/ma072425

[105] CARB. CARB adds flexibility to truck fleet requirements with amendments to help owners continue zero-emission progress. CARB, 25 September 2025, https://ww2.arb.ca.gov/news/carb-adds-flexibility-truck-fleet-requirements-amendments-help-owners-continue-zero-emission

[106] Ibid.

[107] CARB. Clean Truck Check (HD I/M). CARB, 10 March 2026, https://ww2.arb.ca.gov/our-work/programs/CTC

[108] EPA Press Office. EPA Takes Action to Deny California's Latest Illegal Power Grab on Heavy-Duty Vehicles. EPA, 25 August 2025, https://www.epa.gov/newsreleases/epa-takes-action-deny-californias-latest-illegal-power-grab-heavy-duty-vehicles

[109] Colorado Department of Public Health & Environment (CDPH&E), Emissions inspections for diesel-powered vehicles. CDPH&E, 16 January 2025, https://cdphe.colorado.gov/motor-vehicle-emissions/emissions-inspections-for-diesel-powered-vehicles

[110] South Coast Air Quality Management District (South Coast AQMD). WAIRE - Compliance & Enforcement Activity. South Coast AQMD, https://www.aqmd.gov/home/rules-compliance/compliance/waire-program/compliance

[111] Duginski, Jake, et al. "Indirect Source Rules: A New and Evolving Frontier of State and Local Vehicle Regulation." Beveridge & Diamond, 11 April 2025, www.bdlaw.com/publications/indirect-source-rules-a-new-and-evolving-frontier-of-state-and-local-vehicle-regulation/

[112] San Diego County Air Pollution Control District (SDAPCD). Warehouse Working Group. SDCAPCD, www.sdapcd.org/content/sdapcd/rules/warehouse-work-group.html

[113] Colorado Regional Air Quality Council (RAQC). Indirect Source Emissions Reductions. RAQC, https://raqc.org/control-strategies/indirect-source-rule/

[114] California Clean Truck and Bus Voucher Incentive Project (California HVIP). HVIP Impact. California HVIP, https://californiahvip.org/impact/

[115] State of California Governor Gavin Newsom. Governor's Budget Summary 2026-27. California Department of Finance, 9 January 2026, https://ebudget.ca.gov/2026-27/pdf/BudgetSummary/FullBudgetSummary.pdf

[116] IRS. FAQs for modification of sections 25C, 25D, 25E, 30C, 30D, 45L, 45W, AND 179D under Public Law 119-21, 139 Stat. 72 (July 4, 2025), commonly known as the One, Big, Beautiful Bill (OBBB). IRS, 21 August 2025, https://www.irs.gov/newsroom/faqs-for-modification-of-sections-25c-25d-25e-30c-30d-45l-45w-and-179d-under-public-law-119-21-139-stat-72-july-4-2025-commonly-known-as-the-one-big-beautiful-bill-obbb

[117] CARB. Drive Forward Incentives/AQIP Funding Plan Public Workshop (March 25, 2026). CARB, 25 March 2026, https://ww2.arb.ca.gov/sites/default/files/2026-03/HD%20Drive%20Forward%20Incentives-Funding%20Plan%20Workshop%20%28March%2025%202026%29_0.pdf

[118] Goldstein-Street, Jake. $126M Incentive Program for Zero-Emission Trucks Nears Launch in Washington. OPB, 6 January 2026, https://www.opb.org/article/2026/01/06/126m-incentive-program-for-zero-emission-trucks-nears-launch-in-washington/

[119] Southern California Edison (SCE). Shared Fleet Charging Rebate Program Handbook. SCE, 11 December 2025, https://www.sce.com/sites/default/files/custom-files/PDF_Files/SFCR_Program_Handbook_Final_12-11-25.pdf

[120] SCE. Drayage Truck Rebates. SCE, https://commercialevrebates.sce.com/consumer/drayage

[121] ComEd. Business & Public Sector Electric Vehicle Rebate Program. ComEd, https://www.comed.com/about-us/clean-energy/electric-vehicle-rebate-program

[122] TRC analysis of quarterly LCFS data from Q4 2024 – Q3 2025. The release of quarterly data is delayed past Market Brief publication date. As of 2023, State of Sustainable Fleets began using this timeframe in its quarterly analysis of carbon intensity and fuel volumes.

[123] Zimmerman, Sarah. A tidal wave of inventory walloped retailers in 2022. Supply Chain Dive, https://www.supplychaindive.com/news/inventory-shortages-glut-2022-year-in-review/639128/

[124] Morgan, Jason. Heavy-Duty Trucking Market Stalls in 2025. Could 2026 Deliver a Reset?. Fleet Equipment Magazine, 17 December 2025, https://www.fleetequipmentmag.com/heavy-duty-trucking-market-2025/

[125] Wex, Inc. Freight Recession and Tariffs: Impact on Trucking 2025. 9 December 2025, WEX, https://www.wexinc.com/resources/blog/freight-recession-tariffs-impact-trucking-2025/

[126] Soyres, François de, et al. Racing Against Tariffs: Global Impacts of Frontloading. Board of Governors of the Federal Reserve System, 1 August 2025, https://www.federalreserve.gov/econres/notes/feds-notes/racing-against-tariffs-global-impacts-of-frontloading-20250801.html

[127] The Birmingham Free Press. 1,000 Laid Off Overnight: Montgomery Transport's Fall Rattles Alabama. The Birmingham Free Press, 10 October 2025, https://birminghamfreepress.com/2025/10/10/montgomery-transport-collapse-strands-hundreds-birmingham-faces-trucking-job-crisis-after-sudden-bankruptcy/

[128] Fuller, Craig. Two Minnesota Carriers Shut Down, Idling 200 Drivers. FreightWaves, 6 December 2025, https://www.freightwaves.com/news/two-minnesota-carriers-shut-down-idling-200-drivers

[129] Maracina, Charlotte. STOPPED IN TRACKS Troubled trucking company among 17 forced to shut down immediately or file for bankruptcy already this year. The Sun, 15 August 2025, https://www.the-sun.com/motors/14982788/trucking-industry-american-trucking-association/

[130] AMB Logistic. Layoffs, Closures, and Chapter 11: What the 2026 Wave of U.S. Logistics Bankruptcies Tells Us About the "Great Freight Recession". LinkedIn, 17 January 2026, https://www.linkedin.com/pulse/layoffs-closures-chapter-11-what-2026-wave-us-logistics-5z68e/

[131] Griffin, Matthew. Transport Stocks Face Worst Week Since April on Tariffs Reports. Bloomberg, 1 August 2025, https://www.bloomberg.com/news/articles/2025-08-01/transport-stocks-face-worst-week-since-april-on-tariffs-reports

[132] Cawthon, Haley. Daimler Truck North America orders fall by more than 50% in Q2. Trucking Dive, 7 August 2025 https://www.truckingdive.com/news/daimler-trucks-north-america-q2-orders/756972

[133] Daimler Truck Layoff NC. Transport Topics, 14 July 2025, https://www.ttnews.com/articles/daimler-truck-layoff-nc

[134] Greenhalgh, Keiron. DTNA to Temporarily Lay Off 2,000 Production Plant Staff. Transport Topics, 16 January 2026, https://www.ttnews.com/articles/dtna-truck-bus-sales-q4-2025

[135] Volvo Trucks North America (VTNA). "Smartphones on Wheels" – Volvo Trucks Accelerates Automatic Software Updates. VTNA, 16 March 2026, https://www.volvotrucks.us/news-and-stories/press-releases/2026/march/smartphones-on-wheels-volvo-trucks-accelerates-automatic-software-updates/

[136] Lombaerde, Geert De. PACCAR Cuts 300 More Jobs at Quebec Plant Amid Tariffs and Weak Truck Demand. FleetOwner, 29 October 2025, https://www.fleetowner.com/equipment/news/55326236/paccar-cuts-300-more-jobs-at-quebec-plant-amid-tariffs-and-weak-truck-demand

[137] Morgan, Jason. Heavy-Duty Trucking Market Stalls in 2025. Could 2026 Deliver a Reset?. Fleet Equipment Magazine, 17 December 2025, https://www.fleetequipmentmag.com/heavy-duty-trucking-market-2025/

[138] Wex, Inc. Freight Recession and Tariffs: Impact on Trucking 2025. WEX, 9 December 2025, https://www.wexinc.com/resources/blog/freight-recession-tariffs-impact-trucking-2025/

[139] Kelly, Patrick. What the Pending Federal NOx Standards Mean for Trucking. American Trucking Associations, 20 November 2025, https://www.trucking.org/news-insights/what-pending-federal-nox-standards-mean-trucking

[140] Mulero, Eugene. EPA to Proceed with 2027 NOx Rules. Transport Topics, 19 November 2025, https://www.ttnews.com/articles/epa-proceed-2027-nox-rules

[141] Ibid.

[142] TRC. State of Sustainable Fleets 2024 Market Brief. The State of Sustainable Fleets, 2024, https://www.stateofsustainablefleets.com/

[143] TRC. State of Sustainable Fleets 2025 Market Brief. The State of Sustainable Fleets, 2025, https://www.stateofsustainablefleets.com/

[144] Roberts, Jack. Is a 2027 Truck PreBuy Still in the Cards? Heavy Duty Trucking, 30 June 2025, https://www.truckinginfo.com/10243143/is-a-2027-truck-prebuy-still-in-the-cards

[145] Babb, Kirsten. The Pre-Buy Is Back - and Fleets Can't Afford to Wait This Time!. Fleet Advantage, 10 December 2025, https://blog.fleetadvantage.com/the-pre-buy-is-back-and-fleets-cant-afford-to-wait-this-time

[146] National Automobile Dealers Association (NADA). EPA's ZEV Truck Mandate Will Result in Dramatic Pre-Buy, No-Buy. NADA, 4 September 2025, https://www.nada.org/legislative/atd-legislative-affairs-epas-zev-truck-mandate-will-result-dramatic-pre-buy-no-buy

[147] North American Council for Freight Efficiency (NACFE). Run on Less – Messy Middle. NACFE, https://runonless.com/

[148] ACT News. 13 Fleets Hit the Road for NACFE's 2025 Run on Less - Messy Middle. ACT News, 15 September 2025, https://www.act-news.com/news/13-fleets-hit-the-road-for-nacfes-2025-run-on-less-messy-middle/

[149] Parham, Wayne. 2026 Fuel Outlook: Diesel. Work Truck,15 January 2026, https://www.worktruckonline.com/10253055/2026-fuel-outlook-diesel

[150] Cannon, Jason. Volvo shows off updated, 'about 90%' new, next-generation VNL. Commercial Carrier Journal, 6 November 2025, https://www.ccjdigital.com/trucks/article/15662569/volvo-rolls-out-redesigned-volvo-vnl

[151] CCJ Staff. Test Driving Volvo's All-New VNL. Commercial Carrier Journal, 10 October 2025, https://www.ccjdigital.com/trucks/video/15768679/test-drive-of-volvos-allnew-vnl#transcript-15768679

[152] FleetOwner Staff. 2026 Vehicle Guide: Heavy Duty. FleetOwner, 10 November 2025, https://www.fleetowner.com/equipment/media-gallery/55328769/2026-vehicle-guide-heavy-duty

[153] Freeze, Michael. Mack Trucks Launches Pioneer Class 8 Tractor. Transport Topics, 8 April 2025, https://www.ttnews.com/articles/mack-trucks-pioneer-debut

[154] Morgan, Jason. First Look: The New Mack Trucks Class 8 Pioneer. Fleet Equipment Magazine, 9 April 2025, https://www.fleetequipmentmag.com/first-look-mack-trucks-class-8-pioneer/

[155] ConMet. TruckWings® technology reaches 1.5 billion miles as fleet adoption accelerates. ConMet, 18 December 2025, https://conmet.com/truckwings-active-aerodynamic-technology-1-5-billion-miles/

[156] Hume, Jenna. Product Spotlight: The Latest Trucking Aerodynamics Products Enhancing Efficiency. FleetOwner, 8 September 2025, https://www.fleetowner.com/product-spotlight/article/55311034/product-spotlight-the-latest-trucking-aerodynamics-products-enhancing-efficiency

[157] ZF Newsroom. Range Energy and ZF Partner to Scale Electric Trailers Across North American Commercial Fleets. ZF, 4 February 2025, https://press.zf.com/press/en/releases/release_81026.html

[158] Business Wire. Petaluma Egg Farm Orders Range Energy's Electric-Powered Trailer System. Business Wire, 17 September 2024, https://www.businesswire.com/news/home/20240917559114/en/Petaluma-Egg-Farm-Orders-Range-Energys-Electric-Powered-Trailer-System

[159] Exelon. Exelon Sustainability Report 2024, https://www.exeloncorp.com/sustainability/interactive-csr/Documents/2024/esr-year-2024.pdf

[160] Johnson, Peter. Ford Halts F-150 Lightning Production, Focus on Gas and Hybrids. Electrek, 23 October 2025, https://electrek.co/2025/10/23/ford-halts-f-150-lightning-production-focus-on-gas-and-hybrids/

[161] Ma, Adrian. F-150 Lightning Range Improvements and What to Expect in 2027. MSN, 23 October 2025, https://www.msn.com/en-us/autos/autos-trucks/f-150-lightning-range-improvements-and-what-to-expect-in-2027/ar-AA1WPjsZ

[162] Foote, Brett. Ford Still Plans to Offer Hybrid Option for Every Model by 2030. Ford Authority, 20 June 2025, https://fordauthority.com/2025/06/ford-still-plans-to-offer-hybrid-option-for-every-model-by-2030/

[163] Penske Truck Leasing. Advancing Fleet Fuel Efficiency. Penske Truck Leasing, https://www.pensketruckleasing.com/resources/resource-library/advancing-fleet-fuel-efficiency/

[164] CARB. Low Carbon Fuel Standard Data Dashboard. CARB, https://ww2.arb.ca.gov/applications/lcfs-data-dashboard

[165] Traugott, Jay. Bio, renewable diesel consumption to surpass 5 billion gallons in 2025. Clean Trucking, 9 January 2025, https://www.cleantrucking.com/alt-fuels/biodiesel/article/15711224/biodiesel-and-renewable-diesel-use-will-increase-in-2025

[166] Krueger, Erin. EIA Maintains Renewable Diesel, Biodiesel, and SAF Forecasts For 2025-2026. Biodiesel Magazine, 14 October 2025, https://biodieselmagazine.com/articles/eia-maintains-renewable-diesel-biodiesel-and-saf-forecasts-for-2025-2026

[167] Traugott, Jay. Bio, renewable diesel consumption to surpass 5 billion gallons in 2025. Clean Trucking, 9 January 2025, https://www.cleantrucking.com/alt-fuels/biodiesel/article/15711224/biodiesel-and-renewable-diesel-use-will-increase-in-2025

[168] Workman, Hannah. Port of Stockton and BWC Terminals unveil expanded terminal, new dock. Recordnet, 25 April 2025, https://www.recordnet.com/story/news/politics/government/2025/04/25/port-of-stockton-unveils-landmark-renewable-fuels-terminal/83218644007/

[169] Sapp, Meghan. T-Bros Oil & Gas Co. Opens Bulk Renewable Diesel Depot in California. The Digest, 3 June 2025, https://www.biofuelsdigest.com/bdigest/t-bros-oil-gas-co-opens-bulk-renewable-diesel-depot-in-california/

[170] Long, Mindy. Trucking Fleets Turn to Renewable Diesel for Cleaner Runs. Transport Topics, 14 November 2025, https://www.ttnews.com/articles/truck-fleets-renewable-diesel

[171] U.S. DOE. Alternative Fuels Data Center: Renewable Diesel. U.S. DOE, https://afdc.energy.gov/fuels/renewable-diesel

[172] CARB. Low Carbon Fuel Standard Data Dashboard. CARB, https://ww2.arb.ca.gov/applications/lcfs-data-dashboard

[173] Ibid.

[174] Chevron et al. Understanding Renewable Diesel. Renewable Energy Group (REGI), www.regi.com/resources/insights/understanding-renewable-diesel

[175] Ibid.

[176] Chevron REGI. UltraClean Blend Fact Sheet, 2024. Chevron, https://www.regi.com/filesimages/Fact%20Sheet/RDBD_fact_sheet_7_-_2024.pdf

[177] U.S. Energy Information Administration (EIA). Biofuels explained: Biodiesel, renewable diesel, and other biofuels. U.S. EIA, 26 February 2024, https://www.eia.gov/energyexplained/biofuels/biodiesel-rd-other-use-supply.php

[178] U.S. EIA. U.S. Biodiesel Plant Production Capacity. U.S. EIA, 26 September 2025, https://www.eia.gov/biofuels/biodiesel/capacity/

[179] Ibid.

[180] U.S. DOE. Biodiesel Blends. Alternative Fuels Data Center. U.S. DOE, https://afdc.energy.gov/fuels/biodiesel-blends

[181] Huwyler, Colin. Immediate Carbon Reduction for Fleets is Achievable – Just Ask Nature. Food Shippers of America, 7 October 2024, https://blog.foodshippers.org/immediate-carbon-reduction-for-fleets-is-achievable-just-ask-nature

[182] Michigan Advanced Biofuels Coalition. PepsiCo Announces Game-Changing Breakthrough With Long-Haul Trucking Fleet. Michigan Advanced Biofuels Coalition, 24 June 2025, https://www.miadvancedbiofuels.com/2025/06/pepsico-announces-game-changing-breakthrough-with-long-haul-trucking-fleet/

[183] Long, Mindy. Trucking Fleets Turn to Renewable Diesel for Cleaner Runs. Transport Topics, 14 November 2025, https://www.ttnews.com/articles/truck-fleets-renewable-diesel

[184] Pilot Company Newsroom. Pilot Becomes First Travel Center Network to Offer B99 Biodiesel for Fleets. Pilot Company Newsroom, 18 March 2025, https://newsroom.pilotcompany.com/pilot-becomes-first-travel-center-network-to-offer-b99-biodiesel-for-fleets/

[185] Gignac, Rachel. Pilot now offers B99 biodiesel for fleets in Illinois, Iowa and Texas. CSP Daily News, 19 September 2025, https://www.cspdailynews.com/fuels/pilot-now-offers-b99-biodiesel-fleets-illinois-iowa-texas

[186] Traugott, Jay. Biodiesel conversion does not void OEM warranties, Optimus Technologies CEO confirms. Clean Trucking, 23 May 2024, https://www.cleantrucking.com/alt-fuels/biodiesel/article/15671189/biodiesel-conversion-does-not-void-oem-warranties-optimus-ceo-confirms

[187] Optimus Technologies Newsroom. Optimus Technologies Launches Vector System for International S13 Platform. PR Newswire, 22 April 2025, https://www.prnewswire.com/news-releases/optimus-technologies-launches-vector-system-for-international-s13-platform-302434675.html

[188] North Dakota Soybean Council. The Cold Truth: Making Biodiesel Work for Everyone. North Dakota Soybean Council, October 2024, https://ndsoybean.org/wp-content/uploads/2024/11/Making-Biodiesel-Work-for-Everyone-Social-Media-OCT-2024.pdf

[189] Energy Information Administration (EIA). Gasoline and Diesel Fuel Update. U.S. DOE, accessed 3 April 2026, https://www.eia.gov/petroleum/gasdiesel/

[190] U.S. DOE. Alternative Fuels Data Center Fuel Prices. U.S. DOE, https://afdc.energy.gov/fuels/prices.html

[191] Penske Energy. Renewable Diesel's Benefits Go Beyond Decarbonization. LinkedIn, 18 December 2025, https://www.linkedin.com/pulse/renewable-diesels-benefits-go-beyond-decarbonization-penskeenergy-unkpe/

[192] U.S. DOE. Alternative Fuels Data Center Fuel Prices. U.S. DOE, https://afdc.energy.gov/fuels/prices.html

[193] Bennett, Stephen. US Trucking Embraces Renewable Diesel for Cleaner Operations. Transport Topics, 2 August 2024, https://www.ttnews.com/articles/trucking-renewable-diesel

[194] Christensen. Can Renewable Diesel (R99) Reduce Maintenance Costs?. Christensen, https://christensenusa.com/resources/renewable-diesel-reduce-maintenance-costs/

[195] RSM US. The OBBBA is relatively kind to clean fuel producers. What should they do now?
The OBBBA extends and modifies key clean fuel provision. RSM US, 11 July 2025, https://rsmus.com/insights/services/business-tax/obbba-tax-clean-fuels.html

[196] IRS. Section 45Z Clean Fuel Production Credit. Federal Register, 4 February 2026, https://www.federalregister.gov/documents/2026/02/04/2026-02246/section-45z-clean-fuel-production-credit

[197] U.S. EPA. Proposed Rule and Related Materials for Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards. U.S. EPA, https://www.epa.gov/regulations-emissions-vehicles-and-engines/proposed-rule-and-related-materials-control-air-1

[198] U.S. EPA. Diesel Exhaust Fluid. U.S. EPA, https://www.epa.gov/regulations-emissions-vehicles-and-engines/diesel-exhaust-fluid

[199] Richter, Zachary. How much does it cost to replace a semi-truck engine? FreightWaves Ratings, 6 August 2024, https://ratings.freightwaves.com/replace-semi-truck-engine/

[200] U.S. EPA. Proposed Renewable Fuel Standards for 2026 and 2027. U.S. EPA, 13 June 2025, https://www.epa.gov/renewable-fuel-standard/proposed-renewable-fuel-standards-2026-and-2027

[201] CARB. Low Carbon Fuel Standard Data Dashboard. CARB, https://ww2.arb.ca.gov/applications/lcfs-data-dashboard

[202] Halter, Caroline. Ahead of the Curve: Washington's Clean Fuel Standard Exceeded Expectations During its First Year. State of Washington Department of Ecology, 5 January 2026, https://ecology.wa.gov/about-us/who-we-are/news/2026/ahead-of-the-curve-washington-s-clean-fuel-standard-exceeded-expectations-during-its-first-year

[203] CCJ Staff. Fuel solutions provider notes $4M spike in natural gas orders. Commercial Carrier Journal, 2 September 2025, https://www.ccjdigital.com/alternative-power/article/15754294/cummins-x15n-drives-spike-in-natural-gas-orders

[204] Cummins. X15N (2024). Cummins, https://www.cummins.com/engines/x15n-2024

[205] TRC. Webinar 2: Optimizing Transportation with RNG and 15L. State of Sustainable Fleets, 3 March 2026, https://www.stateofsustainablefleets.com/webinar/webinar-3-optimizing-transportation-with-rng-and-15l/

[206] NACFE. NACFE Releases Initial Findings From Run on Less – Messy Middle. NACFE, 23 October 2025, https://nacfe.org/news/nacfe-releases-initial-findings-from-run-on-less-messy-middle-2/

[207] Traugott, Jay. NACFE warns truck makers are stretched thin as electric, hydrogen, and diesel tech collide. Clean Trucking, 14 November 2025, https://www.cleantrucking.com/white-papers/article/15770845/run-on-less-2025-shows-truckings-tech-challenges

[208] What Run on Less Revealed About Real-World Natural Gas Performance. Fleet Equipment Magazine, 20 November 2025, https://www.fleetequipmentmag.com/run-on-less-natural-gas/

[209] Participant Profile: Kleysen Group, LTD. Run on Less, https://runonless.com/participants-2025/kleysen/

[210] Morgan, Jason. What Run on Less Revealed About Real-World Natural Gas Performance. Fleet Equipment Magazine, 20 November 2025, https://www.fleetequipmentmag.com/run-on-less-natural-gas/

[211] Taube, David. RNG Seeks to Revolutionize the Fuel Industry with Evolving Upgrades. Trucking Dive, 21 November 2025, https://www.truckingdive.com/news/rng-ata-mce-2025-panel/805983/

[212] Cummins. X15N (2024). Cummins, https://www.cummins.com/engines/x15n-2024

[213] Morgan, Jason. Cummins X15N Natural Gas Engine Brings Diesel-Level Performance with Lower Emissions. Fleet Equipment Magazine, 27 April 2025, https://www.fleetequipmentmag.com/cummins-x15n-natural-gas-engine/

[214] Miller, James. Evaluating the Performance of the Cummins X15N Engine. Get Transport, 20 June 2025, https://blog.gettransport.com/news/cummins-x15n-engine-review-logistics-impact/

[215] Quimby, Tom. Natural gas lineup gives fleets more options to cut costs. Cummins, 24 October 2025, https://www.cummins.com/news/2025/10/24/natural-gas-lineup-gives-fleets-more-options-cut-costs

[216] Clean Energy. X15N Affordability and Sustainability - Together at Last. Clean Energy Fuels, www.cleanenergyfuels.com/x15n

[217] DTNA. Daimler Truck North America to Start Production of Freightliner Cascadia Featuring Cummins X15N Natural Gas Engine. DTNA, 28 April 2025, https://northamerica.daimlertruck.com/news-stories/2025/daimler-truck-north-america-to-start-production-of-freightliner-cascadia-featuring-cummins-x15n-natural-gas-engine

[218] Crissey, Alex. Freightliner to Offer Next-Gen Cascadia with Cummins X15N. Fleet Equipment Magazine, 28 April 2025, https://www.fleetequipmentmag.com/freightliner-to-offer-next-gen-cascadia-with-cummins-x15n/

[219] Heavy Duty Trucking. Cummins X15N Natural Gas Engine Available in Fifth Generation Freightliner Cascadia. Heavy Duty Trucking, 28 April 2025, https://www.truckinginfo.com/10239927/cummins-x15n-natural-gas-engine-available-in-fifth-generation-freightliner-casca

[220] Peterbilt. Peterbilt Expands Alternative Fuel Solutions with New Cummins X15N Natural Gas Engine Now Available with Models 579, 567 & 520. Peterbilt, 26 March 2024, https://www.peterbilt.com/news-and-events/press-releases/peterbilt-expands-alternative-fuel-solutions-with-new-cummins-x15n-natural-gas-engine-now-available-with-models-579-567-and-520

[221] Kenworth. Kenworth Highlights Diversified Powertrain Lineup, Product Line Expansion and New Driver-Focused Technologies at ACT Expo 2025. Kenworth, 28 April 2025, https://www.kenworth.com/about-us/news/kenworth-highlights-diversified-powertrain-lineup-product-line-expansion-and-new-driver-focused-technologies-at-act-expo-2025/

[222] Allison Transmission, Inc. Allison Transmission 4500 RDS Model Now Pairs with Cummins X15N Natural Gas Engine, Delivering Enhanced Performance and Efficiency. PR Newswire, 6 October 2025, https://www.prnewswire.com/news-releases/allison-transmission-4500-rds-model-now-pairs-with-cummins-x15n-natural-gas-engine-delivering-enhanced-performance-and-efficiency-302576228.html

[223] Heavy Duty Trucking. J.B. Hunt Testing Natural Gas Cummins ISXN in New Clean Energy Program. Heavy Duty Trucking, 18 September 2024, https://www.truckinginfo.com/10228372/j-b-hunt-testing-natural-gas-cummins-isxn-in-new-clean-energy-program

[224] Heavy Duty Trucking. New Clean Energy RNG Demo Truck Program Features Cummins X15N in Latest Cascadia. Heavy Duty Trucking, 22 October 2025, https://www.truckinginfo.com/10249285/new-clean-energy-rng-demo-truck-program-features-cummins-x15n-in-latest-cascadia

[225] Hexagon Agility. Hexagon Agility Forms Strategic Relationship with Industry Leaders to Accelerate the Adoption of Natural Gas. Cision, 28 July 2025, https://news.cision.com/hexagon-composites-asa/r/hexagon-agility-forms-strategic-relationship-with-industry-leaders-to-accelerate-the-adoption-of-nat,c4227347

[226] Heavy Duty Trucking. New Clean Energy RNG Demo Truck Program Features Cummins X15N in Latest Cascadia. Heavy Duty Trucking, 22 October 2025, https://www.truckinginfo.com/10249285/new-clean-energy-rng-demo-truck-program-features-cummins-x15n-in-latest-cascadia

[227] Hexagon Agility. Hexagon Agility Forms Strategic Relationship with Industry Leaders to Accelerate the Adoption of Natural Gas. Cision, 28 July 2025, https://news.cision.com/hexagon-composites-asa/r/hexagon-agility-receives-fuel-systems-order-for-x15n-natural-gas-powered-trucks-from-a-leading-ameri,c4211750

[228] Hexagon Agility. Hexagon Agility receives new wave of orders for natural gas fuel systems for North American heavy-duty trucks. Cision, 2 September 2025, https://news.cision.com/hexagon-composites-asa/r/hexagon-agility-receives-new-wave-of-orders-for-natural-gas-fuel-systems-for-north-american-heavy-du,c4228054

[229] TRC. Webinar 2: Optimizing Transportation with RNG and 15L. State of Sustainable Fleets, 3 March 2026, https://www.stateofsustainablefleets.com/webinar/webinar-3-optimizing-transportation-with-rng-and-15l/

[230] Hexagon Agility. Hexagon Agility to Deliver Fuel Systems for New Fleet of CNG Buses in Dallas, Texas. Cision, 26 June 2025, https://news.cision.com/hexagon-composites-asa/r/hexagon-agility-to-deliver-fuel-systems-for-new-fleet-of-cng-buses-in-dallas--texas,c4169370

[231] NFI Group. RTC of Southern Nevada Contracts New Flyer for 46 Xcelsior CNG 40-Foot Transit Buses. Mass Transit Magazine, 1 August 2025, https://www.masstransitmag.com/bus/vehicles/gas-diesel-cng-lng/press-release/55307139/nfi-group-rtc-of-southern-nevada-contracts-new-flyer-for-46-xcelsior-cng-40-foot-transit-buses

[232] Gage, Dan. Over $460 Million in Federal CNG Transit Investments Made. Transport Project, 25 November 2025, https://transportproject.org/2025/11/25/over-460-million-in-federal-cng-transit-investments-made/

[233] U.S. DOE. Alternative Fuels Data Center Fuel Prices. U.S. DOE, https://afdc.energy.gov/fuels/prices.html

[234] Ibid.

[235] U.S. DOE. Clean Cities and Communities Alternative Fuel Price Report July 2025. U.S. DOE, July 2025, https://afdc.energy.gov/files/u/publication/alternative_fuel_price_report_july_2025.pdf

[236] TRC. State of Sustainable Fleets 2025 Market Brief. The State of Sustainable Fleets, 2025, https://www.stateofsustainablefleets.com/

[237] Cummins. Natural gas lineup gives fleets more options to cut costs. Cummins, 24 October 2025, https://www.cummins.com/news/2025/10/24/natural-gas-lineup-gives-fleets-more-options-cut-costs

[238] Ibid.

[239] Morgan, Jason. What Run on Less Revealed About Real-World Natural Gas Performance. Fleet Equipment Magazine, 20 November 2025, https://www.fleetequipmentmag.com/run-on-less-natural-gas/

[240] Taube, David. RNG Seeks to Revolutionize the Fuel Industry with Evolving Upgrades. Trucking Dive, 21 November 2025, https://www.truckingdive.com/news/rng-ata-mce-2025-panel/805983/

[241] TRC. State of Sustainable Fleets 2025 Market Brief. The State of Sustainable Fleets, 2025, https://www.stateofsustainablefleets.com/

[242] Staff Writer. Where Can Fleets Find Natural Gas Refueling Stations for Heavy-Duty Trucks? Heavy Duty Trucking, 15 December 2025, https://www.truckinginfo.com/10251950/where-can-fleets-find-natural-gas-refueling-stations-for-heavy-duty-trucks#/find/nearest?fuel=CNG,+LNG

[243] TRC. State of Sustainable Fleets 2025 Market Brief. The State of Sustainable Fleets, 2025, https://www.stateofsustainablefleets.com/

[244] Hexagon Agility. RNG Revolution Gains Momentum with 500th Facility. LinkedIn, 1 February 2026, https://www.linkedin.com/posts/hexagon-agility_circulareconomy-rng-decarbonization-activity-7405248156822765568-DS3V

[245] Wang, Dulles, and Patterson, Natalia. North America's RNG Market Set for Continued Growth in 2025 After Historic Year. Wood Mackenzie, 20 June 2025, https://www.woodmac.com/news/opinion/rng-market-set-for-continued-growth-in-2025-after-historic-year/

[246] Green Gas, Inc. Renewable Natural Gas Market. Green Gas Inc., https://greengasinc.com/energy/renewable-natural-gas-market/

[247] The Transport Project and Coalition for Renewable Natural Gas, June 2025, Drive Fleets Forward, https://transportproject.org/wp-content/uploads/2025/06/TP-RNG-Decarbonize-2024-rev-6-27.pdf

[248] Where Can Fleets Find Natural Gas Refueling Stations for Heavy-Duty Trucks? Heavy Duty Trucking, 15 December 2025, https://www.truckinginfo.com/10251950/where-can-fleets-find-natural-gas-refueling-stations-for-heavy-duty-trucks#/find/nearest?fuel=CNG,+LNG

[249] Renewable Natural Gas Market: Hidden Growth Drivers Through 2025. Green Gas Inc., 19 August 2025, https://greengasinc.com/energy/renewable-natural-gas-market/

[250] American Gas Foundation. Renewable Natural Gas Supply Assessment. American Gas Foundation. July 2025, https://gasfoundation.org/wp-content/uploads/2025/07/AGF-RNG-Study_FINAL-09022025.pdf

[251] Quimby, Tom. Natural gas lineup gives fleets more options to cut costs. Cummins, 24 October 2025, https://www.cummins.com/news/2025/10/24/natural-gas-lineup-gives-fleets-more-options-cut-costs

[252] RSM US. The OBBBA is relatively kind to clean fuel producers. What should they do now?
The OBBBA extends and modifies key clean fuel provision. RSM US, 11 July 2025, https://rsmus.com/insights/services/business-tax/obbba-tax-clean-fuels.html

[253] CARB. Low Carbon Fuel Standard Data Dashboard. CARB, https://ww2.arb.ca.gov/applications/lcfs-data-dashboard

[254] Oregon Department of Environmental Quality (ODEQ). Clean Fuel Pathways. ODEQ, https://www.oregon.gov/deq/ghgp/cfp/Pages/Clean-Fuel-Pathways.aspx

[255] State of Washington Department of Ecology. Clean Fuel Standard Fuel Pathways and Carbon Intensity. State of Washington Department of Ecology, https://ecology.wa.gov/air-climate/reducing-greenhouse-gas-emissions/clean-fuel-standard/fuel-pathways-and-carbon-intensity

[256] WM. 2025 Sustainability Report. WM, https://sustainability.wm.com/downloads/WM_2025_Sustainability_Report.pdf

[257] Tourmaline Oil Corp and Clean Energy Fuel Corp. Tourmaline and Clean Energy Open New CNG Stations, Advancing Western Canada's First Commercial Grade Natural Gas Fueling Corridor. Clean Energy Fuels, 22 October 2024, https://investors.cleanenergyfuels.com/news-events/press-releases/detail/436/tourmaline-and-clean-energy-open-new-cng-stations-advancing-western-canadas-first-commercial-grade-natural-gas-fueling-corridor

[258] Clean Energy Fuel Corp. Cross-Sector Fleets Sign Fuel Deals with Clean Energy to Supply Clean Renewable Natural Gas. Clean Energy Fuels, 30 October 2025, https://cleanenergyfuels.com/press-room/cross-sector-fleets-sign-fuel-deals-with-clean-energy-to-supply-clean-renewable-natural-gas

[259] Clean Energy Fuels. Grants & Incentives. Clean Energy Fuels, 13 February 2026, www.cleanenergyfuels.com/grants-incentives

[260] Clean Energy Fuels. The Best Fuel for the Planet. And Your Budget. Clean Energy Fuels, www.cleanenergyfuels.com/fleets

[261] NACFE. Run on Less – Messy Middle. NACFE, https://nacfe.org/research/run-on-less/messy-middle/

[262] Westport Fuel Systems Newsroom. Westport Reveals CNG Solution for Natural Gas HPDI™ Engines and North America's Clean Transportation Future. Westport Fuel Systems, 6 November 2025, https://investors.westport.com/news/news-details/2025/Westport-Reveals-CNG-Solution-for-Natural-Gas-HPDIEngines-and-North-Americas-Clean-Transportation-Future/default.aspx

[263] The Transport Project and Coalition for Renewable Natural Gas. RNG to Decarbonize 2024. The Transport Project, June 2025, https://transportproject.org/wp-content/uploads/2025/06/TP-RNG-Decarbonize-2024-rev-6-27.pdf

[264] EPA Press Office. EPA Announces Path Forward to Revamp the Clean School Bus Program to Provide Safe, Affordable, Efficient Transportation for America's Youth. U.S. EPA, 19 February 2026, https://www.epa.gov/newsreleases/epa-announces-path-forward-revamp-clean-school-bus-program-provide-safe-affordable

[265] Wolfe, Matt. Propane Powers Ahead for Medium Duty Sector. Mobility Engineering Technology, 1 April 2025, https://www.mobilityengineeringtech.com/component/content/article/52909-sae-ma-07561

[266] Nodaway County School Board Notes. Maryville Forum, 3 March 2026, https://www.maryvilleforum.com/news/nodaway-county-school-board-notes/article_6c2c6b44-029f-4b2e-a831-5a346fc9130f.html

[267] Newton, Claudia. Transportation Director Shares How Propane Buses Benefit Special Needs Routes. School Transportation News, 8 November 2025, https://stnonline.com/news/transportation-director-shares-how-propane-buses-benefit-special-needs-routes/

[268] Atchison County Mail. Atchison County Commission. Atchison County Mail, 7 October 2025, https://farmerpublishing.com/2025/10/07/atchison-county-commission-231/

[269] Ladysmith News. Rusk County Community Watch. Ladysmith News, 3 December 2025, https://www.ladysmithnews.com/news/article_ae15ed75-0b7f-407e-8999-127e0c388478.html

[270] U.S. DOE. Clean Cities and Communities Alternative Fuel Price Report January 2025. U.S. DOE, January 2025, https://afdc.energy.gov/files/u/publication/alternative_fuel_price_report_january_2025.pdf

[271] U.S. DOE. Clean Cities and Communities Alternative Fuel Price Report October 2025. U.S. DOE, October 2025, https://afdc.energy.gov/files/u/publication/alternative_fuel_price_report_october_2025.pdf

[272] Propane Education & Research Council (PERC). Propane Vehicle Refueling Guide. PERC, 2022, https://propane.com/wp-content/uploads/2022/06/21PERC0390_6671-BR-21_Refueling-Guide_v1_HR.pdf

[273] U.S. DOE. Alternative Fuels Data Center: Propane Fueling Station Locations. U.S. DOE, https://afdc.energy.gov/stations#/find/nearest?fuel=LPG

[274] TRC analysis of CARB LCFS quarterly data Q4 2024 – Q3 2025.

[275] PERC, interview with TRC, 15 January 2026

[276] ROUSH CleanTech Propane School Bus Fact Sheet. ROUSH CleanTech, April 2025, https://roushcleantech.com/wp-content/uploads/sites/all/themes/roushcleantech/pdf/Fact_Sheet_Propane_School_Bus_2025.pdf

[277] Ibid.

[278] U.S. EPA. Request Information: EPA Clean School Bus Program. U.S. EPA, https://www.epa.gov/cleanschoolbus/request-information

[279] PERC, interview with TRC, 15 January 2026.

[280] Work Truck Staff. ROUSH CleanTech Celebrates 15 Years of Clean Transportation Innovation. Work Truck Online, 16 October 2025, https://www.worktruckonline.com/10248995/roush-cleantech-celebrates-15-years-of-clean-transportation-innovation

[281] Fisk Tank Carrier Co. Options for Your Propane Hauler: Fisk Tank Carrier Co. Fisk Tank Carrier Co, 27 Aug. 2025, www.fiskinc.net/options/

[282] Custom Truck One Source. About Custom Truck One Source. Custom Truck One Source, 23 July 2024, www.customtruck.com/about-us/

[283] Blue Bird Corporation. Blue Bird Presents its Latest Zero and Low Emission Commercial Vehicle Solutions at Work Truck Week. Blue Bird, 27 February 2025, https://www.blue-bird.com/blue-bird-presents-its-latest-zero-and-low-emission-commercial-vehicle-solutions-at-work-truck-week/

[284] Linger, Kevin. Morgan Olson Step Van Unveiled. Fleet Equipment Magazine, 15 May 2025, https://www.fleetequipmentmag.com/morgan-olson-step-van-unveiled/

[285] Fisk Tank Carrier Co. The Complete Guide to Different Types of Propane Trucks. Fisk Tank Carrier Co,18 July 2025, https://www.fiskinc.net/the-complete-guide-to-different-types-of-propane-trucks/

[286] LP Gas Sponsor. New Propane Truck Innovations by Fisk. LP Gas Magazine, 1 July 2025, https://www.lpgasmagazine.com/new-propane-truck-innovations-by-fisk/

[287] LP Gas. ROUSH CleanTech Propane Engines Now California Air Resources Board Certified. LP Gas Magazine, 15 October 2025, https://www.lpgasmagazine.com/roush-cleantech-propane-engines-now-california-air-resources-board-certified/

[288] Fischer, Sydney. PERC to Debut New Propane Direct Injection Fuel System at ACT Expo. LP Gas Magazine, 25 April 2025, https://www.lpgasmagazine.com/perc-to-debut-new-propane-direct-injection-fuel-system-at-act-expo/

[289] Richesson, Brian. What's Next for Nexio's Propane-Powered Bobtail? LP Gas Magazine, 20 October 2025, https://www.lpgasmagazine.com/whats-next-for-nexios-propane-powered-bobtail/

[290] Richesson, Brian. Nexio, Blue Bird Among Approved PERC Projects. LP Gas Magazine, 4 August 2025, https://www.lpgasmagazine.com/nexio-blue-bird-among-approved-perc-projects/

[291] ACT News. Driving the Future with New Propane Autogas Technology. ACT News, 13 August 2025, https://www.act-news.com/news/driving-the-future-with-new-propane-autogas-technology/

[292] PERC. Cleaner Transportation for America's Favorite Destinations. PERC, 16 July 2025, https://propane.com/2025/07/16/cleaner-transportation-foramericas-favorite-destinations/

[293] PERC. Paratransit. PERC, 17 December 2025, https://propane.com/2025/12/17/paratransit/

[294] Ritchey, Isaac. Propane Power: A Quiet Innovation Revolutionizes Transit for Michigan's Most Vulnerable. MLive, 22 September 2025, https://www.mlive.com/news/grand-rapids/2025/09/propane-power-a-quiet-innovation-revolutionizes-transit-for-michigans-most-vulnerable.html

[295] AJOT. West Basin Container Terminal Cuts Emissions, Grid Strain with Propane at Port of LA. American Journal of Transportation, 26 August 2025, https://www.ajot.com/news/west-basin-container-terminal-cuts-emissions-grid-strain-with-propane-at-port-of-la

[296] Mainspring Energy. Mainspring Energy Expands Operations to Texas with Agreement to Deploy Linear Generators at Five Lineage Facilities. Nasdaq, 18 September 2024, https://www.nasdaq.com/press-release/mainspring-energy-expands-operations-texas-agreement-deploy-linear-generators-five

[297] ACT News. Hyliion Unveils Fuel-Agnostic KARNO Power Module. ACT News, 29 April 2025, https://www.act-news.com/news/hyliion-unveils-fuel-agnostic-karno-power-module/

[298] Hyliion Holdings Corp. Hyliion Demonstrates Dynamic Fuel Switching in KARNO™ Power Module, Showcasing the Future of Flexible, Fuel Agnostic Power. Business Wire, 17 November 2025, https://www.businesswire.com/news/home/20251117939252/en/Hyliion-Demonstrates-Dynamic-Fuel-Switching-in-KARNO-Power-Module-Showcasing-the-Future-of-Flexible-Fuel-Agnostic-Power

[299] PERC. A Two-Pronged Power Solution. PERC, 18 July 2024, https://propane.com/2024/07/18/a-two-pronged-power-solution/

[300] PERC. The Benefits of Propane-Powered EV Charging. PERC, 5 May 2025, https://propane.com/2025/05/05/the-benefits-of-propane-powered-ev-charging/

[301] PERC. A Two-Pronged Power Solution. PERC, 18 July 2024, https://propane.com/2024/07/18/a-two-pronged-power-solution/

[302] Ibid.

[303] Pioneer eMobility. E-Boost Mobile. Pioneer eMobility, www.pioneer-emobility.com/products/e-boost-mobile

[304] Pioneer Power Solutions, Inc. Pioneer Power Expands Mobile Power and Charging Footprint. Business Wire, 9 September 2025, https://www.businesswire.com/news/home/20250909356584/en/Pioneer-Power-Expands-Mobile-Power-and-Charging-Footprint

[305] PERC. The Benefits of Propane-Powered EV Charging. PERC, 5 May 2025, https://propane.com/2025/05/05/the-benefits-of-propane-powered-ev-charging/

[306] PERC. Propane Takes the Stage at PowerGen International 2025. PERC, 18 March 2025, https://propane.com/2025/03/18/powergen-international-2025/

[307] Ibid.

[308] PERC. Propane Microgrids Make Recharging Electric Vehicles Fast and Easy. PERC, 9 April 2025, https://propane.com/2025/04/09/propane-microgrids-make-recharging-electric-vehicles-fast-and-easy/

[309] PERC. Propane Autogas Provides Certainty in an Uncertain World. ACT News, 6 October 2025, https://www.act-news.com/news/propane-autogas-provides-certainty-in-an-uncertain-world/

[310] PERC. Propane Microgrids Make Recharging Electric Vehicles Fast and Easy. PERC, 9 April 2025, https://propane.com/2025/04/09/propane-microgrids-make-recharging-electric-vehicles-fast-and-easy/

[311] Ibid.

[312] Bunsey, Jim. Ports Are Getting Closer to Zero Emissions with Propane. ACT News, 2 May 2025, https://www.act-news.com/news/ports-are-getting-closer-to-zero-emissions-with-propane/

[313] U.S. EPA. Spreadsheet of RIN Generation and Renewable Fuel Volume Production by Fuel Type for the Renewable Fuel Standard. U.S EPA, 19 March 2026, https://www.epa.gov/fuels-registration-reporting-and-compliance-help/spreadsheet-rin-generation-and-renewable-fuel-0

[314] CARB. LCFS Pathway Certified Carbon Intensities. CARB, https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities?corr

[315] TRC analysis of alternative fuel vehicle database.

[316] Wasson, Thomas. Bollinger Motors Shuts Down Amid Financial Woes. FreightWaves, 2 December 2025, https://www.freightwaves.com/news/bollinger-motors-shuts-down-amid-financial-woes

[317] Borrás, Jo. Bollinger Motors Is Dead Again, Probably for Good This Time. Electrek, 28 November 2025, https://electrek.co/2025/11/28/bollinger-motors-is-dead-again-probably-for-good-this-time/

[318] Charniga, Jackie. GM Storing Electric Vans in Michigan. USA Today, 29 March 2025, https://www.usatoday.com/story/money/business/2025/03/29/gm-storing-electric-vans-michigan/82700941007/

[319] Debord, Matthew. Ford, GM Crushing Rivian Electric Pickup Sales. Jalopnik, 15 October 2025, https://www.jalopnik.com/1997923/ford-gm-crushing-rivian-electric-pickup-sales/

[320] George, Patrick. Rivian Q4 2025 Sales Data. InsideEVs, 4 January 2026, https://insideevs.com/news/783363/rivian-q4-2025-sales-data/

[321] Alaniz, Anthony. Ford Lightning Production Paused. Motor1, 24 October 2025, https://www.motor1.com/news/776904/ford-lightning-production-paused/

[322] Foote, Brett. Ford F-150 Lightning Production to Remain Paused Indefinitely. Ford Authority, 24 October 2025, https://fordauthority.com/2025/10/ford-f-150-lightning-production-to-remain-paused-indefinitely/

[323] Nichols, Dave. Ford Retools the Lightning into a 700-Mile Extended Range Electric Truck. GreenCars, 18 December 2025, https://www.greencars.com/news/ford-retools-the-lightning-into-a-700-mile-extended-range-electric-truck

[324] FleetOwner. Trucking Industry Innovates as Workhorse and Motiv Merge; Hexagon Agility Expands CNG Solutions; RoadFlex Enhances Fleet Payment Systems. FleetOwner, 18 August 2025, https://www.fleetowner.com/emissions-efficiency/news/55310154/trucking-industry-innovates-as-workhorse-and-motiv-merge-hexagon-agility-expands-cng-solutions-and-roadflex-enhances-fleet-payment-systems

[325] Giles, Jim. Walmart Last-Mile EV Playbook. Trellis, 31 October 2025, https://trellis.net/article/walmart-last-mile-ev-playbook/

[326] Dnistran, Iulian. Amazon Rivian Electric Van Fleet 2025 Update. InsideEVs, 16 February 2025, https://insideevs.com/news/787405/amazon-rivian-electric-van-fleet-2025-update/

[327] Taylor, Glenn. FedEx Fuels Harbinger's $160M Raise While Einride Goes Public in New Wave of Electric Trucking Bets. MSN, January 2026, https://www.msn.com/en-us/money/companies/fedex-fuels-harbingers-160m-raise-while-einride-goes-public-in-new-wave-of-electric-trucking-bets/ar-AA1QFYz4

[328] Benzinga. EV Startup Harbinger Snags $400M in Commercial Vehicle Chassis Orders. Benzinga, 21 May 2024, https://www.benzinga.com/news/24/05/38945242/ev-startup-harbinger-snags-400m-in-commercial-vehicle-chassis-orders

[329] Peterbilt. Peterbilt Expands Electric Vehicle Portfolio with All-New Medium-Duty Models 536EV, 537EV, and 548EV. Peterbilt, 9 December 2025, https://www.peterbilt.com/news-and-events/press-releases/peterbilt-expands-electric-vehicle-portfolio-with-all-new-medium-duty-models-536ev-537ev-and-548ev

[330] Blue Bird. Blue Bird Showcases Zero and Low Emission Commercial Vehicle Platforms at 2025 ACT Expo. Blue Bird, 30 April 2025, https://www.blue-bird.com/blue-bird-showcases-zero-and-low-emission-commercial-vehicle-platforms-at-2025-advanced-clean-transportation-act-expo/

[331] The EV Report. Rizon Expands Electric Truck Deliveries. The EV Report, 27 June 2025, https://theevreport.com/rizon-expands-electric-truck-deliveries
[332] Heavy Duty Trucking. Isuzu Announces South Carolina Truck Assembly Plant. Heavy Duty Trucking, 12 February 2025, https://www.truckinginfo.com/10235847/isuzu-announces-south-carolina-truck-assembly-plant
[333] Linger, Kevin. Isuzu Piedmont Facility Tour. Fleet Equipment Magazine, 25 November 2025, https://www.fleetequipmentmag.com/isuzu-piedmont-facility-tour/
[334] Greenhalgh, Keiron. Isuzu Battery Electric. Transport Topics, 31 March 2025, https://www.ttnews.com/articles/isuzu-battery-electric
[335] Welch, David. The Electric Pickup Truck Boom Turned into a Big Bust. MSN, October 2025, https://www.msn.com/en-us/autos/trucks/the-electric-pickup-truck-boom-turned-into-a-big-bust/ar-AA1Kuki3
[336] Debord, Matthew. Ford, GM Crushing Rivian Electric Pickup Sales. Jalopnik, 15 October 2025, https://www.jalopnik.com/1997923/ford-gm-crushing-rivian-electric-pickup-sales/
[337] Wingfield, Adam. Are We in the Great Trucking Recession?. FreightWaves, 19 August 2025, https://www.freightwaves.com/news/are-we-in-the-great-trucking-recession-a-look-at-the-numbers-the-pain-and-what-comes-next
[338] Greenhalgh, Keiron. International Earnings Q3 2025. Transport Topics, 30 October 2025, https://www.ttnews.com/articles/international-earnings-q3-2025
[339] Greenhalgh, Keiron. Volvo Earnings Q3 2025. Transport Topics, 17 October 2025, https://www.ttnews.com/articles/volvo-earnings-q3-2025
[340] VTNA. Volvo Trucks Leads Heavy-Duty Electrification. VTNA, 28 October 2025, https://www.volvotrucks.us/news-and-stories/press-releases/2025/october/volvo-trucks-leads-heavy-duty-electrification/
[341] Greenhalgh, Keiron. Volvo's VNR Electric Reaches 20 Million Customer Miles. Transport Topics, 26 October 2025, https://www.ttnews.com/articles/volvo-vnr-electric
[342] Elmore, Chad. Mack Trucks to Offer Battery-Electric Pioneer. Power Progress, 30 April 2025, https://www.powerprogress.com/news/mack-trucks-to-offer-battery-electric-pioneer/8056096.article?zephr_sso_ott=hRlfqO
[343] Cooper, Casey. Does Kenworth Make an Electric Semi-Truck? The T680E Model and How It Compares to Tesla's. SlashGear, 3 June 2025, https://www.slashgear.com/1871013/does-kenworth-make-electric-semi-truck-t680e-model-how-compares-tesla/
[344] DHL Newsroom. DHL Supply Chain Takes Delivery of First Tesla Semi. Heavy Duty Trucking, 16 December 2025, https://www.truckinginfo.com/10252066/dhl-supply-chain-takes-delivery-of-first-tesla-semi
[345] Alvarez, Simon. Elon Musk Confirms Tesla Semi Will Enter High-Volume Production This Year. Teslarati, 9 February 2026, https://www.teslarati.com/elon-musk-confirms-tesla-semi-high-volume-production
[346] Lambert, Fred. Tesla Is Quoting $290,000 for Its 500-Miles Electric Semi Truck. Electrek, 10 February 2026, https://electrek.co/2026/02/10/tesla-quoting-price-500-miles-electric-semi-truck/
[347] Pilot Company Newsroom. Pilot Partners with Tesla on Semi Charger Network for Fleets. Pilot Company Newsroom, 27 January 2026, https://newsroom.pilotcompany.com/pilot-partners-with-tesla-on-semi-charger-network-for-fleets/
[348] Mihelic, Rick. The Tesla Elephant in Trucking's Room. Commercial Carrier Journal, 10 November 2025, https://www.ccjdigital.com/alternative-power/article/15771390/is-the-tesla-semi-the-trucking-disruptor-weve-been-waiting-for
[349] TRC analysis of funding opportunities monitored through Funding360 service supporting clients in capturing public incentive funds.
[350] Windrose CEO Wen Han's Bold U.S. Market Plan Is Underway. Clean Trucking, 5 May 2025, https://www.cleantrucking.com/battery-electric/article/15744704/windrose-ceo-confirms-us-production-start-date
[351] Electrek. Windrose Lines Up $60M Electric Semi Truck Order Plus South American Expansion. Electrek, 30 July 2025, https://electrek.co/2025/07/30/windrose-lines-up-60m-electric-semi-truck-order-plus-south-american-expansion/
[352] Greenhalgh, Keiron. JoyRide Zero Emission Partnerships. Transport Topics, 30 May 2025, https://www.ttnews.com/articles/joyride-zero-emission-partnerships
[353] Cannon, Jason. Largest Known Deployment of Class 8 Battery Electric Trucks Set for Texas Under Unique Arrangement. Commercial Carrier Journal, 15 January 2026, https://www.ccjdigital.com/alternative-power/article/15814778/all-electric-motor-carrier-nevoya-adding-40-trucks-in-texas
[354] Fisher, Josh. Orange EV blossoms in Kansas City. FleetOwner, 29 January 2024, https://www.fleetowner.com/emissions-efficiency/article/21281640/electric-truck-maker-orange-ev-expands-to-build-more-zero-emission-yard-dogs-in-kansas-city
[355] NACFE. Emerging Technologies. NACFE, https://nacfe.org/emerging-technology/electric-trucks-2/terminal-tractors/
[356] Traugott, Jay. Inside Lazer Logistics' data-proven EV strategy for yard management. Clean Trucking, 20 October 2025, https://www.cleantrucking.com/battery-electric/article/15769015/lazer-logistics-ev-strategy-for-yard-management
[357] Orange EV Newsroom. What messy middle? Orange EV has logged 10M all-electric hours! Orange EV, 8 October 2025, https://orangeev.com/blog/what-messy-middle/
[358] Segreteria. Kalmar Ottawa starts selling next-gen electric terminal tractor. Sustainable Truck&Van, 14 March 2025, https://www.sustainabletruckvan.com/kalmar-ottawa-electric-terminal-tractors/

[359] Mack LR Electric Powers Republic Services Group's First Electric Refuse Fleet in Chicago. Volvo Group, 15 August 2025, https://www.volvogroup.com/en/news-and-media/news/2025/aug/mack-lr-electric-powers-republic-services-groups-first-electric-refuse-fleet-in-chicago.html

[360] McNees, Marissa. McNeilus Unveils Volterra ZFL Refuse and Recycling Collection Vehicle at CES 2025. Recycling Today, 7 January 2025, https://www.recyclingtoday.com/news/mcneilus-unveils-volterra-zfl-refuse-recycling-colleciton-vehicle-ces-2025/

[361] Business Wire. Oshkosh Corporation Secures Order from Republic Services for 100 McNeilus Volterra Electric Refuse Trucks After Successful Operation of Initial Units. Business Wire, 3 October 2024, https://www.businesswire.com/news/home/20241003340711/en/Oshkosh-Corporation-Secures-Order-from-Republic-Services-for-100-McNeilus-Volterra-Electric-Refuse-Trucks-After-Successful-Operation-of-Initial-Units

[362] Blue Nation Online. Republic Is a Leader with First Fully Electric Collection Fleet in Louisville, CO. Blue Nation Online, 5 August 2024, https://bluenationonline.com/republic-is-a-leader-with-first-fully-electric-collection-fleet-in-louisville-co/

[363] NHTSA. Recalls, www.nhtsa.gov/recalls?nhtsaId=25V800000

[364] NHTSA. Recalls, www.nhtsa.gov/recalls?nhtsaId=25V342000

[365] FTA Low-No 2025 EC Webinar Slides. Electrification Coalition, 18 June 2025, https://electrificationcoalition.org/wp-content/uploads/2025/06/FTA-Low-No-2025-EC-Webinar-Slides.pdf

[366] Globe Newswire. New York's MTA further electrifies fleet with order for 265 battery-electric buses from NFI subsidiary New Flyer. Globe Newswire, 14 February 2025, https://www.globenewswire.com/news-release/2025/02/14/3026564/0/en/New-York-s-MTA-further-electrifies-fleet-with-order-for-265-battery-electric-buses-from-NFI-subsidiary-New-Flyer.html

[367] New Flyer. New Flyer Secures Two Maryland Transit Administration Orders for Total of 117 Low and Zero Emission Xcelsior Buses. New Flyer, 24 March 2025, https://www.newflyer.com/2025/03/new-flyer-secures-two-maryland-transit-administration-orders-for-total-of-117-low-and-zero-emission-xcelsior-buses/

[368] Morris, Charles. New Gillig Battery Electric Buses Arrive in Hawai'I, Charged EVs, 25 July 2025, https://chargedevs.com/newswire/new-gillig-battery-electric-buses-arrive-in-hawaii/

[369] Capital Area Transit Authority. CATA Unveils First Full-Size Electric Bus. Capital Area Transit Authority, 20 November 2025, https://www.cata.org/About/News/cata-unveils-first-full-size-electric-bus

[370] Santa Monica Daily Press. Big Blue Bus Adds 20th Electric Vehicle to Fleet; 14 More Coming This Summer. Santa Monica Daily Press, 28 May 2025, https://smdp.com/news/transportation/big-blue-bus-adds-20th-electric-vehicle-to-fleet-14-more-coming-this-summer/

[371] U.S. DOT. Trump's Transportation Secretary Sean P. Duffy Invests $2 Billion Modernizing America's Transit Buses. U.S. DOT, 20 November 2025, https://www.transportation.gov/briefing-room/trumps-transportation-secretary-sean-p-duffy-invests-2-billion-modernizing-americas

[372] Davis, Jeff. FTA Announces $2 Billion in New Transit Bus Grants. ENO Transportation Foundation, 21 November 2025, https://enotrans.org/article/fta-announces-2-billion-in-new-transit-bus-grants/

[373] U.S. DOT. U.S. Transportation Secretary Duffy Unleashes American Energy, Saves American Public. U.S. DDOT, 25 July 2025, https://www.transportation.gov/briefing-room/us-transportation-secretary-duffy-unleashes-american-energy-saves-american-public

[374] Barajas, Selina, and Ojas Shanghi. Local Opinion: Freedom to Ride Means Clean School Buses for All. Tuscon Opinion, 23 September 2025, https://tucson.com/opinion/column/article_b8cbb526-72a3-4b46-a1f6-417000e0df66.html

[375] Muller, Joann. Clean School Bus Transition Gets Clogged Up. MSN, October 2025, https://www.msn.com/en-us/news/us/clean-school-bus-transition-gets-clogged-up/ar-AA1LxuGI

[376] Westerheide, Carla. Michigan Awards $35.9M for 87 New Electric School Buses. Electrive, 20 October 2025, https://www.electrive.com/2025/10/20/michigan-awards-35-9mn-for-87-new-electric-school-buses/

[377] New Jersey Department of Environmental Protection (NJDEPA). New Jersey Electric School Bus Award. NJDEPA, 17 September 2025, https://dep.nj.gov/newsrel/25_0040/

[378] The EV Report. GreenPower Secures $5M School Bus Contract. The EV Report, 4 August 2025, https://theevreport.com/greenpower-secures-5m-school-bus-contract

[379] Illinois Governor's Office. Gov. Pritzker Announces Funding for 46 New All-Electric School Buses. Illinois Governor's Office, 11 July 2025, https://gov-pritzker-newsroom.prezly.com/gov-pritzker-announces-funding-for-46-new-all-electric-school-buses

[380] Business Wire. ComEd Awards Nearly $1 Million in EV Rebates to West Aurora School District 129. Business Wire, 17 November 2025, https://www.businesswire.com/news/home/20251117538299/en/ComEd-Awards-Nearly-%241-Million-in-EV-Rebates-to-West-Aurora-School-District-129

[381] MSN. Blue Bird Sets Records for FQ4, Reaffirms FY26 Guidance. MSN, December 2025, https://www.msn.com/en-us/money/topstocks/blue-bird-sets-records-for-fq4-reaffirms-fy26-guidance/ar-AA1R4qLg

[382] Blue Bird. Blue Bird Reports Fiscal 2025 Fourth Quarter and Full-Year Results; Beats Guidance With Record Results. Blue Bird, 24 November 2025, https://investors.blue-bird.com/news-financial-reporting/press-releases/news-details/2025/Blue-Bird-Reports-Fiscal-2025-Fourth-Quarter-and-Full-Year-Results-Beats-Guidance-With-Record-Results/default.aspx

[383] Capital & Main. The Georgia Electric School Bus Factory Shows the Far-Reaching Consequences of Trump's Federal Funding Cuts. Fast Company, 11 June 2025, https://www.fastcompany.com/91348296/the-georgia-electric-school-bus-factory-shows-the-far-reaching-consequences-of-trumps-federal-funding-cuts

[384] Borrás, Jo. Here It Is: The First Ever Electric Type D School Bus from Thomas Built. Electrek, 28 October 2025, https://electrek.co/2025/10/28/here-it-is-the-first-ever-electric-type-d-school-bus-from-thomas-built/

[385] Schoenberg, Nara. Electric School Bus Maker Lion Very Likely to Be Liquidated. GovTech, 7 May 2025, https://www.govtech.com/education/k-12/electric-school-bus-maker-lion-very-likely-to-be-liquidated

[386] Randall, Chris. Lion Electric Finds Buyer Ahead of Bankruptcy. Electrive, 19 May 2025, https://www.electrive.com/2025/05/19/lion-electric-finds-buyer-ahead-of-bankruptcy/

[387] Electric School Bus Initiative. FAQs About Lion Electric and Electric School Buses. Electric School Bus Initiative, 17 September 2025, https://electricschoolbusinitiative.org/frequently-asked-questions-about-lion-electric-and-electric-school-buses

[388] Smart Freight Centre and BloombergNEF. Zero-Emission Commercial Vehicles Accelerating the Transition: 2025 Factbook for Investors. Smart Freight Centre and BloombergNEF, 18 September 2025, https://assets.bbhub.io/professional/sites/24/Zero-Emission-Commercial-Vehicles-Factbook-2025.pdf

[389] Mao, Shiyue, et al., Zero-Emission Medium- and Heavy-Duty Vehicle Market in China, H1 2025. The International Council of Clean Transportation, September 2025, https://theicct.org/wp-content/uploads/2025/09/ID-463-%E2%80%93-China-ZE-MHDVs-H1-2025_market-spotlight_final-1.pdf

[390] Smart Freight Centre and BloombergNEF. Zero-Emission Commercial Vehicles Accelerating the Transition: 2025 Factbook for Investors. Smart Freight Centre and BloombergNEF, 18 September 2025, https://assets.bbhub.io/professional/sites/24/Zero-Emission-Commercial-Vehicles-Factbook-2025.pdf

[391] Xie, Yihao, and Minjares, Ray. Working Paper ed., Battery Electric Commercial Vehicle Pricing in the United States. The International Council of Clean Transportation, September 2025, https://theicct.org/wp-content/uploads/2025/09/ID-422-%E2%80%93-BEV-pricing-commercial-vehicles_working-paper_final.pdf

[392] Smart Freight Centre and BloombergNEF. Zero-Emission Commercial Vehicles Accelerating the Transition: 2025 Factbook for Investors. Smart Freight Centre and BloombergNEF, 18 September 2025, https://assets.bbhub.io/professional/sites/24/Zero-Emission-Commercial-Vehicles-Factbook-2025.pdf

[393] Vehicle Technologies Office, 2025 Incremental Purchase Cost Methodology and Results for Clean Vehicles. U.S. Department of Energy Vehicle Technologies Office, January 2025, https://www.energy.gov/sites/default/files/2025-01/2025.01.13_DOE_Incremental_Cost_Report_for_publication.pdf

[394] McKinsey & Company. The Future of Electric Vehicles & Battery Chemistry. McKinsey & Company, 17 December 2024, https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/the-battery-chemistries-powering-the-future-of-electric-vehicles

[395] Wolfe, Jeremy. How OEMs Are Reducing Commercial EV Battery Prices for Fleets. FleetOwner, 2 June 2025, https://www.fleetowner.com/emissions-efficiency/article/55293547/how-oems-are-reducing-commercial-ev-battery-prices-for-fleets

[396] Cummins. Accelera by Cummins, Daimler Truck and PACCAR Form Joint Venture to Advance Battery Technology. Cummins, 6 September 2023, https://www.cummins.com/news/releases/2023/09/06/accelera-cummins-daimler-truck-and-paccar-form-joint-venture-advance

[397] Wolfe, Jeremy. How OEMs Are Reducing Commercial EV Battery Prices for Fleets. FleetOwner, 2 June 2025, https://www.fleetowner.com/emissions-efficiency/article/55293547/how-oems-are-reducing-commercial-ev-battery-prices-for-fleets

[398] Willing, Nicole. Nuvve Launches Battery as a Service to Help Cut Electric Costs and Create Grid Resiliency. ChargedEVs, 14 May 2025, https://chargedevs.com/newswire/nuvve-launches-battery-as-a-service-to-help-cut-electric-costs-and-create-grid-resiliency/

[399] Jayanthan, Srikant. Expansion of EV Charging Infrastructure Slows as EV Demand Moderates. S&P Global, 19 November 2025, https://www.spglobal.com/automotive-insights/en/blogs/2025/11/expansion-of-ev-charging-infrastructure-slows

[400] Ibid.

[401] Greenlane. Greenlane Opens Flagship Charging Hub in SoCal, Advancing Zero-Emission Freight on I-15. Greenlane, 24 April 2025, https://www.drivegreenlane.com/news/greenlane-opens-flagship-charging-hub-in-socal-advancing-zero-emission-freight-on-i-15/

[402] PR Newswire. Terawatt Infrastructure Opens Heavy-Duty Charging Site on I-10 in Rialto. PR Newswire, 14 November 2025, https://www.prnewswire.com/news-releases/terawatt-infrastructure-opens-heavy-duty-charging-site-on-i-10-in-rialto-302615041.html

[403] EV Realty. EV Realty Raises $75 Million from NGP to Scale Fleet Charging, Breaks Ground on Major Charging Hub in San Bernardino. EV Realty, 18 September 2025, https://evrealtyus.com/2025/09/ev-realty-raises-75-million-from-ngp-to-scale-fleet-charging-breaks-ground-on-major-charging-hub-in-san-bernardino/

[404] Forum Mobility. Forum Mobility Celebrates Grand Opening of FM Harbor, the Largest Port-Based Electric Truck Charging Depot in the U.S. Forum Mobility, 23 January 2025, https://forummobility.com/news/forum-mobility-celebrates-grand-opening-of-fm-harbor-the-largest-port-based-electric-truck-charging-depot-in-the-us/

[405] Globe NewsWire. WattEV Doubles Capacity, Adds Megawatt Chargers at its Busiest Depot to Meet Growth in Electric Truck Charging Demand. WattEV, 28 January 2026, https://wattev.com/san-bernardino-electric-truck-charging-depot-expansion/

[406] EV Realty. EV Realty Acquires EV Charging Platform Gage Zero's Assets to Scale Truck Fleet Charging and Meet Long-Term Market Demand. EV Realty, 6 March 2025, https://evrealtyus.com/2025/03/ev-realty-acquires-ev-charging-platform-gage-zeros-assets-to-scale-truck-fleet-charging-and-meet-long-term-market-demand/

[407] Noblet, Stacy. The Utility's Evolving Role In America's EV Ecosystem. Forbes, 24 April 2025, https://www.forbes.com/sites/stacynoblet/2025/04/24/the-utilitys-evolving-role-in-americas-ev-ecosystem/

408 Edison Electric Institute. EV Programs. Edison Electric Institute, https://www.eei.org/issues-and-policy/electric-transportation/EVPrograms

409 Enterline, Shawn, et al., Proactive Distribution System Investment Strategies That Support Transportation Electrification. National Association of Regulation Utility Commissioners, December 2025, https://pubs.naruc.org/pub/0D82F4C1-0DA0-FEEB-22EF-881C144EC5A6

410 Delaware FirstMap; VGIN; Esri; TomTom; Garmin; SafeGraph; CGIAR; USGS; FAO; METI/NASA; EPA; NPS; USFWS. EV Dashboard. Exelon Utilities, https://exelonutilities.maps.arcgis.com/apps/dashboards/5bbc65640e0749a8a3f391af5f9188b4

411 Exelon Utilities, EV Map. Exelon, https://exelonutilities.maps.arcgis.com/apps/webappviewer/index.html?id=8d4f22be2a3b47b0bb86ca5438a8dd69

412 Esri; CGIAR; USGS; Fairfax County, VA; MNCPPC; VGIN; Esri; TomTom; Garmin; SafeGraph; FAO; METI/NASA; USGS; EPA; NPS; USFWS. EV Map. Exelon Utilities, https://exelonutilities.maps.arcgis.com/apps/webappviewer/index.html?id=3388d9b757a64147b84bd5ee8c3a7e1a

413 Esri; CGIAR; USGS, County of Chester; data.pa.gov; Esri; TomTom; Garmin; SafeGraph; METI/NASA; USGS; EPA; NPS; USDA; USFWS. PECO Available Distribution Capacity Map. Exelon Utilities, https://exelonutilities.maps.arcgis.com/apps/webappviewer/index.html?id=31eaa2fc01524785bf4bd6805f7e402d

414 CARB. Low Carbon Fuel Standard Data Dashboard. CARB, https://ww2.arb.ca.gov/applications/lcfs-data-dashboard

415 The comparisons to diesel fuel are on a gCO2e/MJ basis and do not account for energy economy ratio (EER) adjustments on a fuel/application basis (i.e., the fuel efficiency within a given drivetrain has not been included). These EER adjustments, especially for electricity, are at least if not more efficient than diesel fuel and result in additional GHG emissions reduction benefits.

416 Westhoff, Gerad, et al. How Electric Truck Fleets Can Save Money with Smarter Charging, Solar Power, and Batteries. RMI, 31 January 2025, https://rmi.org/how-electric-truck-fleets-can-save-money-with-smarter-charging-solar-power-and-batteries/

417 California DMV. Over 4 Million Test Miles Logged by Autonomous Vehicle Permit Holders in California. California DMV, 31 January 2025, https://www.dmv.ca.gov/portal/news-and-media/over-4-million-test-miles-logged-by-autonomous-vehicle-permit-holders-in-california/

418 Anderson, Will. California DMV Releases Autonomous Vehicle Report, Nine Million Miles Logged in Testing. Action News Now, 20 February 2026, https://www.actionnewsnow.com/news/california-dmv-releases-autonomous-vehicle-report-nine-million-miles-logged-in-testing/article_9105cec0-870d-4631-b790-0a5406eb2609.html

419 Wessling, Brianna. Waymo Reaches 100M Fully Autonomous Miles Across All Deployments. The Robot Report, 18 July 2025, https://www.therobotreport.com/waymo-reaches-100m-fully-autonomous-miles-across-all-deployments/

420 Perry, Tristan. Will All Autonomous Vehicles be EVs? Green Car Future, 27 May 2025, https://www.greencarfuture.com/electric/will-all-autonomous-vehicles-be-evs

421 Chow R., Andrew. Waymo's Self-Driving Future Is Here. Time, 26 June 2025, https://time.com/collections/time100-companies-2025/7289599/waymo/

422 The Economist. The self-driving taxi revolution begins at last. The Economist, 24 November 2025, https://www.economist.com/business/2025/11/24/the-self-driving-taxi-revolution-begins-at-last

423 Ibid.

424 Ohnsman, Alan. Waymo Is A Trillion-Dollar Opportunity. Google Just Needs To Seize It. Forbes, 4 September 2025, https://www.forbes.com/sites/alanohnsman/2025/09/03/waymo-could-be-a-trillion-dollar-opportunity/

425 Chow R., Andrew. Waymo's Self-Driving Future Is Here. Time, 26 June 2025, https://time.com/collections/time100-companies-2025/7289599/waymo/

426 The Economist. The self-driving taxi revolution begins at last. The Economist, 24 November 2025, https://www.economist.com/business/2025/11/24/the-self-driving-taxi-revolution-begins-at-last

427 Laing, Keith. Amazon's Zoox Driverless Car Gets Clearance From US Regulator. Bloomberg, 6 August 2025, https://www.bloomberg.com/news/articles/2025-08-06/amazon-s-zoox-driverless-car-gets-clearance-from-us-regulator

428 Gardner, Greg. Why most self-driving cars will be electric. USA Today, 19 September 2016, https://www.usatoday.com/story/money/cars/2016/09/19/why-most-self-driving-cars-electric/90614734/

429 S&P Global Mobility. Unrestricted Autonomous Vehicles Aren't Coming Soon. S&P Global Mobility, 25 September 2023, https://cdn.ihsmarkit.com/www/prot/pdf/0923/autonomy-forecast-special-report.pdf

430 Gavin, William; Ji, Christine. Less traffic, more lounge time, cheaper homes? How robotaxis promise a whole new world. Morningstar, 24 December 2025, https://www.morningstar.com/news/marketwatch/20251224122/less-traffic-more-lounge-time-cheaper-homes-how-robotaxis-promise-a-whole-new-world

431 Gardner, Greg. Why most self-driving cars will be electric. USA Today, 19 September 2016, https://www.usatoday.com/story/money/cars/2016/09/19/why-most-self-driving-cars-electric/90614734/

432 Pery, Tristan. Will All Autonomous Vehicles be EVs?. Green Car Future, 27 May 2025, https://www.greencarfuture.com/electric/will-all-autonomous-vehicles-be-evs

433 The Economist. The self-driving taxi revolution begins at last. The Economist, 24 November 2025, https://www.economist.com/business/2025/11/24/the-self-driving-taxi-revolution-begins-at-last

[434] Gardner, Greg. Why most self-driving cars will be electric. USA Today, 19 September 2016, https://www.usatoday.com/story/money/cars/2016/09/19/why-most-self-driving-cars-electric/90614734/

[435] Ibid.

[436] Babcock, Stephane. Inside the Autonomous Freight Race: Three Paths, One Destination. ACT News, 14 October 2025, https://www.act-news.com/news/inside-the-autonomous-freight-race-three-paths-one-destination/

[437] ACT News. Kodiak AI Reports Strong Q3 as Driverless Truck Fleet Doubles. ACT News, 13 November 2025, https://www.act-news.com/news/kodiak-ai-reports-strong-q3/

[438] Babcock, Stephane. Inside the Autonomous Freight Race: Three Paths, One Destination. ACT News, 14 October 2025, https://www.act-news.com/news/inside-the-autonomous-freight-race-three-paths-one-destination/

[439] Avila, Larry. Kodiak sets sights on next phase of growth after showing revenue gains. Trucking Dive, 25 November 2025 https://www.truckingdive.com/news/kodiak-jbhunt-crengland-atlas-energy-autonomous-growth/806368/

[440] ACT News. Aurora Expands Driverless Operations, Surpasses 100,000 Miles as It Scales Toward 2026. ACT News, 3 November 2025, https://www.act-news.com/news/aurora-expands-driverless-operations/

[441] World Economic Forum and Boston Consulting Group. Autonomous Vehicles: Timeline and Roadmap Ahead. World Economic Forum, April 2025, https://reports.weforum.org/docs/WEF_Autonomous_Vehicles_2025.pdf

[442] Plus.AI. PlusAI Announces Key Performance Indicators for Commercial Readiness. Plus.AI, 31 July 2025, https://plus.ai/news-and-insights/plusai-announces-key-performance-indicators-for-commercial-readiness

[443] Babcock, Stephane. Inside the Autonomous Freight Race: Three Paths, One Destination. ACT News, 14 October 2025, https://www.act-news.com/news/inside-the-autonomous-freight-race-three-paths-one-destination/

[444] Ibid.

[445] Bishop, Richard. Einride to Go Public; Powering Deployment of EV/AV Freight Services. Forbes, 12 November 2025, https://www.forbes.com/sites/richardbishop1/2025/11/12/einride-to-go-public-powering-deployment-of-evav-freight-services/

[446] Wasson, Thomas. Einride to go public via SPAC through merger with Legato Merger Corp. III. FreightWaves, 12 November 2025, https://www.freightwaves.com/news/einride-to-go-public-via-spac-through-merger-with-legato-merger-corp-iii

[447] Einride. How GE Appliances is making the switch – and driving transformation. Einride, 21 November 2023, https://www.einride.tech/insights/how-ge-appliances-is-making-the-switch-and-driving-transformation

[448] O'Kane, Sean. Harbinger Acquires Autonomous Driving Company Phantom AI. TechCrunch, 25 February 2026, https://techcrunch.com/2026/02/25/harbinger-acquires-autonomous-driving-company-phantom-ai/

[449] Bugdhan, Phil. Autonomous trucking: The impact of self-driving trucks in the freight industry. Geotab, 30 June 2025, https://www.geotab.com/blog/autonomous-trucks/

[450] U.S. GAO. GAO-24-106498 Port Infrastructure: U.S. Ports have Adopted Some Automation Technologies and Reported Varied Effect. Report to Congressional Committees, March 2024, https://www.gao.gov/assets/d24106498.pdf

[451] Varghese, Romy. Middle Trade War: Port of Los Angeles Terminal Gets Ready for Robots. Transport Topics, 22 May 2019, https://www.ttnews.com/articles/middle-trade-war-port-los-angeles-terminal-gets-ready-robots

[452] Einride. Einride Unveils Breakthrough Technology Platform Innovations at 'Spring Update'. Einride, 28 May 2025, https://www.einride.tech/press/einride-unveils-breakthrough-technology-platform-innovations-at-spring-update

[453] Babcock, Stephane. Inside the Autonomous Freight Race: Three Paths, One Destination. ACT News, 14 October 2025, https://www.act-news.com/news/inside-the-autonomous-freight-race-three-paths-one-destination/

[454] EEI. EEI Member Company Electric Vehicle Program Database. EEI, https://www.eei.org/issues-and-policy/electric-transportation/EVPrograms

[455] Enterline, Shawn, et al. Proactive Distribution System Investment Strategies that Support Transportation Electrification. National Association of Regulatory Utility Commissioners, December 2025, https://pubs.naruc.org/pub/0D82F4C1-0DA0-FEEB-22EF-881C144EC5A6?_gl=1*4ircmb*_ga*OTE4MDU4MTIzLjE3NzEzNjg5Mjk.*_ga_QLH1N3Q1NF*czE3NzEzNjg5MjgkbzEkZzAkdDE3NzEzNjg5MjgkajYwJGwwJGgw

[456] Ellis, Benjamin C. PACIFIC GAS AND ELECTRIC COMPANY'S (U 39 E) ELECTRIFICATION IMPACTS STUDY PART 2 REPORT. State of California Public Utilities Commission, 28 January 2026, https://www.ethree.com/wp-content/uploads/2026/02/PGE_EIS.pdf

[457] Phillis, Michael and Daly, Matthew. White House Cancels Nearly $8B in Clean Energy Projects in Blue States. PBS NewsHour, 2 October 2025, https://www.pbs.org/newshour/politics/white-house-cancels-nearly-8b-in-clean-energy-projects-in-blue-states

[458] Baustin, Noah Hydrogen Hub Pauses Operations in Wake of Federal Funding Cuts. E&E News, 5 November 2025, https://www.eenews.net/articles/california-hydrogen-hub-pauses-operations-in-wake-of-federal-funding-cuts/

[459] Wixey, Will. Trump Admin Cancels $1 Billion for WA Energy Projects, Pacific NW Hydrogen Hub. Fox 13 Seattle, 2 October 2025, https://www.fox13seattle.com/news/trump-cancels-1-billion-wa-energy-projects

[460] U.S. DOE. Pacific Northwest Hydrogen Hub (PNWH2). U.S. DOE, https://www.energy.gov/oced/pacific-northwest-hydrogen-hub-pnwh2

[461] Natter, Ari. U.S. to cancel billions for West Coast 'hydrogen hubs' amid shutdown. Los Angeles Times, 2 October 2025, https://www.latimes.com/environment/story/2025-10-02/us-to-cancel-billions-for-west-coast-hydrogen-hubs-amid-shutdown

[462] Daly, Matthew and Phillis, Michael. Trump administration cuts nearly $8B in clean energy projects in states that backed Harris. AP News, 2 October 2025, https://apnews.com/article/trump-clean-energy-hydrogen-hub-newsom-0223cb4469508bcea4f689c18c9ab65d

[463] Gillies, Andrew. Trump Administration Announces Targeted Energy Funding Terminations Including California's Multi-Billion Dollar Hydrogen Hub. KEYT, 3 October 2025, https://keyt.com/news/california/2025/10/03/trump-administration-announces-selective-terminations-of-hydrogen-projects-nationwide/

[464] Marshall, Christa. What DOE cuts mean for 'clean' hydrogen. E&E News, 14 October 2025, https://www.eenews.net/articles/what-doe-cuts-mean-for-clean-hydrogen/

[465] California Governor's Office. Governor Newsom Statement on Trump Administration's Decision to Cut Hydrogen Hub Funding. California Governor's Office, 1 October 2025, https://www.gov.ca.gov/2025/10/01/governor-newsom-statement-on-trump-administrations-decision-to-cut-hydrogen-hub-funding/

[466] Marshall, Christa. What DOE cuts mean for 'clean' hydrogen. E&E News, 14 October 2025, https://www.eenews.net/articles/what-doe-cuts-mean-for-clean-hydrogen/

[467] Plumer, Brad. Trump Cuts to Energy Projects in Blue States Were Unlawful, Judge Rules. The New York Times, 12 January 2026, https://www.nytimes.com/2026/01/12/climate/trump-energy-department-grant-cuts-unlawful.html

[468] Latham, Kelsey, et al. What's New in Energy Credits for 2026. KPMG, 12 January 2026, https://kpmg.com/kpmg-us/content/dam/kpmg/taxnewsflash/pdf/2026/01/tnf-wnit-energy-credits-jan-12-2026.pdf

[469] RSM US. The OBBBA is relatively kind to clean fuel producers. What should they do now? The OBBBA extends and modifies key clean fuel provisions. RSM US, 11 July 2025, https://rsmus.com/insights/services/business-tax/obbba-tax-clean-fuels.html

[470] U.S. Department of Treasury Internal Revenue Service. Credit for Production of Clean Hydrogen and Energy Credit. Federal Register 26 CFR Part I, 10 January 2025, https://www.federalregister.gov/documents/2025/01/10/2024-31513/credit-for-production-of-clean-hydrogen-and-energy-credit

[471] U.S. Department of the Treasury. Treasury Press Release JY2768. U.S. Department of the Treasury, 3 January 2025, https://home.treasury.gov/news/press-releases/jy2768

[472] U.S. Department of Treasury Internal Revenue Service. Credit for Production of Clean Hydrogen and Energy Credit. 26 CFR Part I, 10 January 2025, https://www.federalregister.gov/documents/2025/01/10/2024-31513/credit-for-production-of-clean-hydrogen-and-energy-credit

[473] U.S. Department of the Treasury. Treasury Press Release JY2768. U.S. Department of the Treasury, 3 January 2025, https://home.treasury.gov/news/press-releases/jy2768

[474] Baustin, Noah. Trump's hydrogen bombshell. Politico, 2 October 2025, https://www.politico.com/newsletters/california-climate/2025/10/02/trumps-hydrogen-bombshell-00592461

[475] New Flyer. New Flyer Launches Extended Range Option for Xcelsior Charge FC Hydrogen Fuel Cell Electric Bus. New Flyer, 17 July 2025, https://www.newflyer.com/2025/07/new-flyer-launches-extended-range-option-for-xcelsior-charge-fc-hydrogen-fuel-cell-electric-bus/

[476] TRC. State of Sustainable Fleets 2025 Market Brief. The State of Sustainable Fleets, 2025, https://www.stateofsustainablefleets.com/

[477] Wolfe, Jeremy. HyRoad Acquires Nikola Hydrogen Trucks and Assets in Bankruptcy Auction. FleetOwner, 26 August 2025, https://www.fleetowner.com/emissions-efficiency/news/55312260/hyroad-acquires-nikola-hydrogen-trucks-and-assets-in-bankruptcy-auction

[478] HyRoad Energy. HyRoad Energy Acquires Hydrogen Fuel Cell Trucks to Accelerate Deployment of Zero Emission Commercial Vehicles. HyRoad Energy, 8 August 2025, https://www.hyroadenergy.com/post/hyroad-energy-acquires-hydrogen-fuel-cell-trucks-to-accelerate-deployment-of-zero-emission-commercia

[479] Hargreaves, Libby. HyRoad Energy, Nikola: Bringing Back Sustainable EV Trucks. EV Magazine, 25 November 2025, https://evmagazine.com/news/hyroad-energy-nikola-bringing-back-sustainable-ev-trucks

[480] Westerheide, Carla. Kenworth Truck Postpones Start of Production of H2 Tractor. Electrive, 15 April 2025, https://www.electrive.com/2025/04/15/kenworth-truck-postpones-start-of-production-of-h2-tractor/

[481] Greenhalgh, Keiron. Daimler Truck Hydrogen Fuel. Transport Topics, 17 November 2025, https://www.ttnews.com/articles/daimler-truck-hydrogen-fuel

[482] ACT News. DTNA Recalibrates Strategy, Prioritizes Diesel Over Alternative Fuels. ACT News, 14 July 2025, https://www.act-news.com/news/dtna-recalibrates-strategy-prioritizes-diesel-over-alternative-fuels/

[483] Daimler Truck. Daimler Truck Presents Mercedes-Benz NextGenH2 Truck with Small Series Production Planned from End of 2026. Daimler Truck, 26 January 2026, https://www.daimlertruck.com/en/newsroom/pressrelease/daimler-truck-presents-mercedes-benz-nextgenh2-truck-with-small-series-production-planned-from-end-of-2026-53330597

[484] ACT News. ACT Expo 2025. ACT News, https://www.act-news.com/

[485] Hyundai. Hyundai Motor Unveils the New XCIENT Heavy-Duty Fuel Cell Truck at ACT Expo 2025. Hyundai, 29 April 2025, https://www.hyundai.com/worldwide/en/newsroom/detail/hyundai-motor-unveils-the-new-xcient-heavy-duty-fuel-cell-truck-at-act-expo-2025-0000000949

[486] Fuel Cells Works. Hyundai Launches Hydrogen-Powered Refuse and Hook Lift Trucks for Zero Emission Waste Collection. Fuel Cells Works, 2 July 2025, https://fuelcellsworks.com/2025/07/02/fuel-cells/hyundai-launches-hydrogen-powered-refuse-and-hook-lift-trucks-for-zero-emission-waste-collection

[487] Heavy Duty Trucking. Hyundai, Plus Show Concept for Autonomous Hydrogen Freight Ecosystem. Heavy Duty Trucking, 29 April 2025, https://www.truckinginfo.com/10240003/hyundai-plus-show-concept-for-autonomous-hydrogen-freight-ecosystem

[488] PlusAI, Inc. Hyundai Motor and PlusAI Recognized in TIME's Best Inventions 2025 for Autonomous Hydrogen Fuel Cell Truck. PR Newswire, 09 October 2025, https://www.prnewswire.com/news-releases/hyundai-motor-and-plusai-recognized-in-times-best-inventions-2025-for-autonomous-hydrogen-fuel-cell-truck-302579689.html

[489] Hevesy, Alex. Toyota Test Track Behind the Scenes: Scion 01 Concept. SlashGear, 15 December 2025, https://www.slashgear.com/2052672/toyota-test-track-behind-the-scenes-scion-01-concept/

[490] Truck News. Cenntro Developing Second Gen Hydrogen Fuel Cell Electric Class 8 Truck. Truck News, 9 July 2025, https://www.trucknews.com/sustainability/cenntro-developing-second-gen-hydrogen-fuel-cell-electric-class-8-truck/1003199383/

[491] American Honda Motor Co., Inc. Next-Gen Honda Fuel Cell Module to Make North American Debut at ACT Expo 2025. PR Newswire, 22 April 2025, https://www.prnewswire.com/news-releases/next-gen-honda-fuel-cell-module-to-make-north-american-debut-at-act-expo-2025-302434179.html

[492] Smith, Fred. Road & Track. 2026 Toyota Hilux Global Truck Boasts ICE, Hydrogen and Electric Variants. Road & Track, 10 November 2025, https://www.roadandtrack.com/news/a69307897/2026-toyota-hilux-global-truck-boasts-ice-hydrogen-and-electric-variants/

[493] Aiello, Art. New Alliance Between Academia and Industry Looks to Advance H2 in North America. Power Progress, 21 March 2025, https://www.powerprogress.com/news/new-alliance-between-academia-and-industry-looks-to-advance-h2-in-north-america/8054423.article

[494] U.S. DOE. Alternative Fuels Data Center Fuel Prices. U.S. DOE, https://afdc.energy.gov/fuels/prices.html

[495] U.S. DOE. Clean Cities and Communities Alternative Fuel Price Report October 2025. U.S. DOE, October 2025, https://afdc.energy.gov/files/u/publication/alternative_fuel_price_report_october_2025.pdf

[496] CARB. Low Carbon Fuel Standard Data Dashboard. CARB, https://ww2.arb.ca.gov/applications/lcfs-data-dashboard

[497] Ibid.

[498] The comparisons to diesel fuel are on a gCO2e/MJ basis and do not account for energy economy ratio (EER) adjustments on a fuel/application basis (i.e., the fuel efficiency within a given drivetrain has not been included). These EER adjustments, especially for electricity, are at least if not more efficient than diesel fuel and result in additional GHG emissions reduction benefits.

[499] CARB. Low Carbon Fuel Standard Data Dashboard. CARB, https://ww2.arb.ca.gov/applications/lcfs-data-dashboard

[500] PR Newswire. Hyundai Announces HTWO Energy Savannah, the Industry's First Dual-Energy Hydrogen and Electric Station. PR Newswire, 28 April 2025, https://www.prnewswire.com/news-releases/hyundai-announces-htwo-energy-savannah-the-industrys-first-dual-energy-hydrogen-and-electric-station-to-support-heavy-duty-zero-emission-vehicles-in-the-savannah-region-302439200.html

[501] Toyota. Toyota Expands Commitment to Hydrogen Society with Fleet, Infrastructure, and Next-Gen System Debut. Toyota, 28 April 2025, https://pressroom.toyota.com/toyota-expands-commitment-to-hydrogen-society-with-fleet-infrastructure-and-next-gen-system-debut/

[502] Ibid.

[503] Puget Sound Energy (PSE). PSE and Modern Hydrogen Forge Decarbonization Path with Hydrogen Technology. PSE, 29 January 2025, https://www.pse.com/en/press-release/details/PSE-and-Modern-Hydrogen-forge-decarbonization-path-with-hydrogen-technology

[504] FCW Team. CPS Energy and Modern Hydrogen Launch U.S. Clean Power Pilot Using Hydrogen. Fuel Cells Works, 22 July 2025, https://fuelcellsworks.com/2025/07/22/clean-energy/cps-energy-and-modern-hydrogen-launch-u-s-clean-power-pilot-using-hydrogen

[505] Stiffler, Lisa. Bill Gates-Backed Modern Hydrogen Lays Off Most of Its Employees After Decade-Long Pursuit of Clean Energy. GeekWire, 2 December 2025, https://www.geekwire.com/2025/bill-gates-backed-modern-hydrogen-lays-off-most-of-its-employees-after-decade-long-pursuit-of-clean-energy/

[506] Hyroad Energy. HyRoad Energy Forms Strategic Partnership to Accelerate Hydrogen Trucking Operations in California. PR Newswire, 19 November 2025, https://www.prnewswire.com/news-releases/hyroad-energy-forms-strategic-partnership-to-accelerate-hydrogen-trucking-operations-in-california-302618777.html

[507] Sidley Austin LLP. California Withdraws EPA Waiver Request for Advanced Clean Fleets Regulations. Sidley, 17 January 2025, https://www.sidley.com/en/insights/newsupdates/2025/01/california-withdraws-epa-waiver-request-for-advanced-clean-fleets-regulations

[508] Automotive World. Hyzon officially ceases operations. Automotive World, 20 February 2025, https://www.automotiveworld.com/articles/hyzon-officially-ceases-operations/

[509] Nikola Corporation. Nikola Initiates Comprehensive Voluntary Chapter 11 Sale Process. PR Newswire, 19 February 2025, https://www.prnewswire.com/news-releases/nikola-initiates-comprehensive-voluntary-chapter-11-sale-process-302380185.html

[510] Hyroad Energy. Hyroad Energy Acquires Hydrogen Fuel Cell Trucks to Accelerate Deployment of Zero-Emission Commercial Fleets. Hyroad, 8 August 2025, https://www.hyroadenergy.com/post/hyroad-energy-acquires-hydrogen-fuel-cell-trucks-to-accelerate-deployment-of-zero-emission-commercia

[511] U.S. Congress. Statutes at Large and Public Laws. Congress.gov, https://www.congress.gov/public-laws/119th-congress

[512] CARB. 2025 LCFS Amendment Implementation FAQ. CARB, 15 September 2025, https://ww2.arb.ca.gov/resources/fact-sheets/2025-lcfs-amendment-implementation-faq

[513] Fuel Cell Works. California Shelves ARCHES Green Hydrogen Hub After White House Axes $1.2Bn Funding. Fuel Cell Works, 5 November 2025, https://fuelcellsworks.com/2025/11/05/clean-energy/california-shelves-arches-green-hydrogen-hub-after-white-house-axes-1-2bn-funding

[514] California HVIP. Email Announcement. https://mailchi.mp/6ad28312e656/hvip-opens-september-9th?e=bc8d307435

[515] CARB. New Funding Availability: The Clean Truck and Bus Voucher Incentive Project (HVIP) is reopening with $125 Million. CARB, 12 December 2025, https://content.govdelivery.com/accounts/CARB/bulletins/3fdf084#:~:text=Reopening%20on%20December%2016%2C%2020,districts%2C%20and%20similar%20public%20entities

[516] CARB. Advanced Clean Fleets. CARB, https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets

[517] Fuel Cell Works. Utility Global and Symbio North America Announce Strategic Alliance to Advance Zero-Emission Hydrogen Mobility. Fuel Cell Works, 11 November 2025, https://fuelcellsworks.com/2025/11/11/energy-innovation/utility-global-and-symbio-north-america-announce-strategic-alliance-to-advance-zero-emission-hydrogen-mobility

[518] CARB. Innovative Clean Transit. CARB, https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit

THE STATE OF
SUSTAINABLE
FLEETS

stateofsustainablefleets.com