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What Matters Most to Drayage Companies When Considering a Zero-Emission Truck: Insights from Small and Large Fleet Operators

Youngeun Bae, Ph.D., Stephen G. Ritchie, Ph.D., Craig R. Rindt, Ph.D.
Institute of Transportation Studies, University of California, Irvine

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Issue

Drayage trucks (i.e., heavy-duty trucks that move containers and bulk freight between ports and rail facilities, distribution centers, and other nearby locations) are a critical part of port operations, however, they also adversely affect air quality.[1] In California, drayage fleets are facing strict regulatory pressure under the Advanced Clean Fleets (ACF) regulations. Starting in January 2024, all newly registered drayage trucks in the CARB Online System must be zero-emission vehicles (ZEVs), so either a battery electric truck (BET) or hydrogen fuel cell electric truck (HFCET). By 2035, every drayage truck operating in California must be zero-emission.[2]

To successfully meet this policy goal, it is important to understand the viewpoints of drayage fleet operators. However, there is limited knowledge about how fleets of various sizes, especially small fleets with 20 or fewer vehicles[3] (which make up 70% of the sector), are responding to ZEVs and related policies. To bridge this gap, we surveyed both small and large drayage fleet operators at the Ports of Los Angeles and Long Beach, with 71 companies participating. As part of the survey, fleet operators were asked to choose a preferred truck under different scenarios. In the first scenario, they chose between different ZEV trucks; in the second scenario, they chose between ZEVs, diesel, or natural gas trucks, shedding light on potential reasons which fleets might delay ZEV adoption if they still prefer diesel or natural gas trucks. We analyzed around 650 choice observations using statistical models to explore these preferences, as well as other survey items regarding their perceptions.

Key Research Findings

Small and large fleets generally rated their knowledge level on ZEVs as average. While fleet operators reported slightly higher familiarity with BETs than HFCETs, awareness levels varied widely across both groups. This underscores the need for enhanced outreach efforts to improve ZEV knowledge for both fleet sizes.

One-third of both small and large fleets reported limited awareness of the ACF policy. About 70% of both small and large fleets reported being fully aware of the policy, while around 30% had heard of it but lacked detailed understanding. A few small fleets were completely unaware of the policy. This highlights the need for more proactive outreach and education to increase ZEV policy awareness across all fleets.

Driving range is a critical factor for fleet operators. Our analysis revealed that the longer the range, the more likely operators would choose a ZEV truck, whether they were under a mandate to acquire a ZEV truck or not. Currently, BETs offer 120 to 250 miles of range, and HFCETs provide 350 to 500 miles,[4] both of which fall short compared to diesel or natural gas trucks, which exceed 700 miles. In particular, BETs' limited range, along with reduced payload and long charging time, raised concern among some fleet operators about meeting the performance of diesel trucks (e.g., needing two or three BETs to replace one diesel truck).

Construction costs of on-site charging infrastructure are a crucial factor. The cost of installing on-site charging facilities was important for fleet operators' decisions,

especially when they had the option to stick with diesel or natural gas trucks. This means that, without financial incentives, the high costs associated with setting up on-site charging facilities for BETs may deter fleets from making the switch. This emphasizes the critical need for continued policy support to make these infrastructure investments more feasible for fleets.

Vehicle purchase cost is another key decision factor. Fleet operators would be more likely to choose a ZEV truck, the lower the purchase cost, whether they were mandated to do so or not. This highlights the need for continued policy support, such as purchase incentives, to reduce the upfront cost gap between ZEV trucks and conventional trucks.

Large fleet operators are more sensitive to operating costs compared to small fleets. Operating costs were found to be a significant factor for large fleets, especially under the mandate. Large fleets' greater sensitivity likely arises from their higher total mileage, making operating costs a larger part of their overall expenses, and/or more thorough cost calculation processes. This underscores the need for tailored policy support, such as targeted outreach for large fleets to emphasize the operating cost benefits of BETs and educational efforts for small fleets to improve their cost evaluations.

For small drayage companies, offsite charging stations are important. Small drayage companies, those with 20 or fewer trucks and under $15 million in annual revenue,3 were highly affected by the availability of offsite charging stations, especially under a mandate to acquire ZEV trucks. Our analysis found that having these stations near the operator's base had a greater impact on their decision to adopt a ZEV truck than a 100-mile improvement in vehicle range. This highlights the importance of targeted infrastructure support for small operators, including offsite charging options and other innovative solutions (e.g., charging-as-a-service).

Small fleets tend to be more negatively affected by the ACF policy in their business plans than large fleets. Most small fleet operators planned to delay or avoid ZEV adoption, with some even considering relocating to another state. In contrast, large fleets were more proactive in acquiring ZEVs. Both groups voiced concerns about the disproportionate impact of the ACF policy on small fleets. One participant remarked, "Eventually, the very small fleets will be gone, and the drayage market will be shared by the big companies which have the capital and land." Targeted policy support is critical to ensuring equitable adoption for smaller fleets.

More Information

This policy brief is drawn from two papers "A Choice Experiment Survey of Drayage Fleet Operator Preferences for Zero-Emission Trucks" and "Small and Large Fleet Perceptions on Zero-emission Trucks and Policies" prepared by Youngeun Bae, Ph.D., Stephen G. Ritchie, Ph.D., and Craig R. Rindt, Ph.D., for the 104th Annual Meeting of the Transportation Research Board, Washington, D.C., 2025. Find preprint versions of these papers along with other publications on the UC Institute of Transportation Studies website: www.ucits.org. For more information about the findings presented in this brief, or the papers, please contact Youngeun Bae, Ph.D., at youngeub@uci.edu.

[1]U.S. EPA. (2024). Drayage truck best practices to improve air quality. https://www.epa.gov/ports-initiative/drayage-truck-best-practices-improve-air-quality

[2]California Air Resources Board (CARB). (2023). Advanced Clean Fleets regulation - detailed drayage truck requirements. https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-fleets-regulation-detailed-drayage-truck-requirements

[3]CARB. (2022). Innovative Small E-Fleet set-aside appendix F to the FY21-22 implementation manual.

[4]CARB. (2024). California HVIP eligible vehicles. https://californiahvip.org/vehicle-category/heavy-duty/

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