Institute of Transportation Studies | UNIVERSITY OF CALIFORNIA

Heavy-Duty Vehicle Sector

Stephen Ritchie
Director, Institute of Transportation Studies

Professor of Civil and Environmental Engineering, UC Irvine
sritchie@uci.edu

ITS·IRVINE Institute of Transportation Studies

How is the Heavy-Duty Vehicle Sector Different?

- Not well understood from public agency perspective
- Greater complexity (supply chains, distributed decision-making)
- Paucity of data, much of it proprietary
- Lack of tools for policy analysis

Small Number of Vehicles, Big Impact

In California:

- Approx. 275,000 registered Class 8 (GVWR>33,000lbs) trucks (98% use diesel)
- Medium / heavy-duty trucks represent:
  - 7% of on-road vehicles
  - 35% of NOx emissions
  - 20% of HD (CARB/Class 4-8) GHG emissions in the transportation sector

Heavy-Duty Vehicle Attributes to Consider When Developing Policy

- Class
- Vocations
- Commodities carried
- Age distribution
- Auxiliary power equipment and refrigeration units
- Large vs small fleet size
- Activity patterns

Policy should recognize potential economic impacts on owner operators

California has:

- 140,000+ “employed” heavy & tractor-trailer drivers
- 70,000+ independent owner operators
  - Operate primarily Class 8 trucks
  - Median net income about $50,000

California ports rely heavily on owner operators

- ~1/4+ of full container moves at Port of Los Angeles in January 2021 made by drayage trucks from fleets of 20 vehicles or less

Will Fleet Owners Buy Alternative Fuel Trucks?

Factors that influence purchase decisions:

- **Technology characteristics**
  - Availability & suitability
  - Total cost of ownership
  - Fuel price and infrastructure
- **Organization characteristics**
  - Environmental consciousness
  - Commitment to a specific fuel (e.g., CNG)
- **Other influences**
  - Regulations
  - Financial incentives

In Conclusion: Many Uncertainties & Data Gaps

- Should specific segments of the heavy-duty vehicle sector be *prioritized* for ZEVs? If so which ones, and with what objectives?
- What combinations of regulations and incentives should be used while maintaining simplicity, coordination, consistency and flexibility?
- What will the demand be for heavy-duty ZEVs, and evolution through 2050?
- Will owner operators be impacted and react differently from larger fleets?
- How will policy be reassessed based on slower / faster evolution of ZEV technology and cost?
- How will heavy-duty fleet electrification and charging impact increasingly decarbonized electric grids in California, and TCO of HD ZEVs?

Institute of Transportation Studies | UNIVERSITY OF CALIFORNIA

Thank you

sritchie@uci.edu