



Colorado Clean Trucking Strategy



Medium and Heavy-Duty Vehicle Impacts

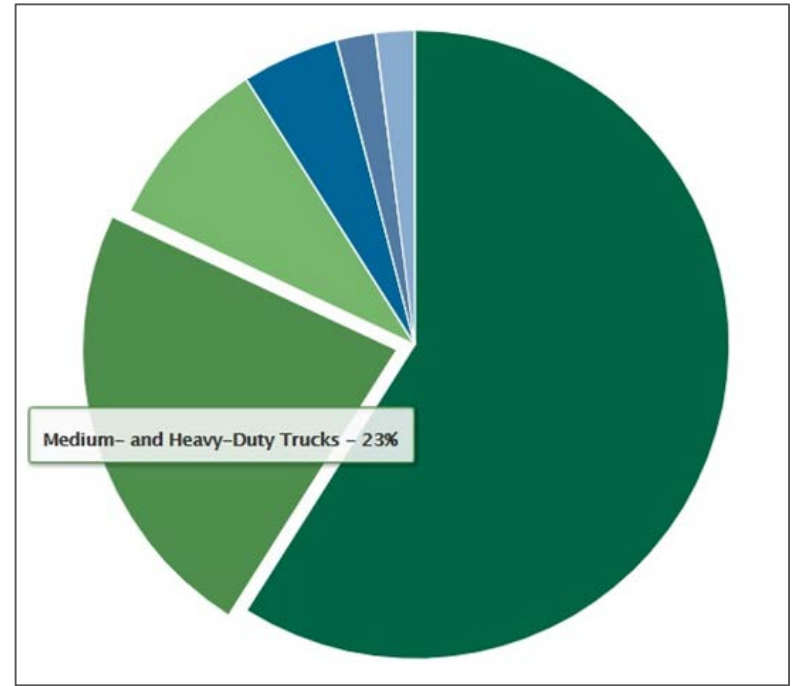


- The freight sector represents a critical element of the state economy, moving more than \$341 billion worth of products into, out of, and within Colorado in 2016 alone. The COVID-19 pandemic has only underlined the importance of keeping this flow moving even in the most challenging of times.
- CDOT and its agency partners have worked closely with the freight sector over many years to adapt to changing conditions in our state and plan collaboratively for the future. Improving air quality and reducing GHG emissions will be key focus areas for Colorado in the coming years.

Medium and Heavy-Duty Vehicle Impacts

- After passenger cars and light-duty trucks, medium- and heavy-duty trucks and buses are the next largest source of transportation sector greenhouse gas emissions.
- Diesel truck and bus emissions contribute heavily to ozone pollution and continue to be a major cause of poor air quality that disproportionately harms the health of our low-income communities and communities of color that are often located near trucking corridors and distribution hubs.
- Denver is facing a downgrade to severe non-attainment status for ozone; transportation is the largest source of NO_x precursors.

2018 US Transportation GHG Emissions by Source



What are Zero-Emission Vehicles?

- Battery Electric Vehicles (BEVs): use batteries which can be charged externally and store recovered braking energy. BEVs use an electric motor as opposed to an internal combustion engine.
- Plug-In Hybrid Electric Vehicles (PHEVs): use both an internal combustion engine and an electric motor, whose battery can be recharged by its combustion engine, regenerative braking, or externally by the power grid.
- Hydrogen Fuel Cell Electric Vehicles (FCEVs): produce electricity using hydrogen gas and produce no harmful tailpipe emissions, just water vapor.
- Other Options: renewable natural gas (RNG) and other renewable fuel types *may* be zero-emission, depending on the method of fuel production. Other tools such as hybrid refrigeration units could also help reduce emissions.

Colorado Clean Trucking Strategy: Elements

CEO, CDOT and CDPHE will begin a public process to work with the industry and community stakeholders to develop a broad set of strategies to reduce emissions from heavy-duty vehicles:

- Accelerating opportunities for fleet turnover within the conventional truck fleet, including diesel emissions reduction strategies
- Developing infrastructure to support zero emission vehicles in medium and heavy duty fleets
- Incorporating clean technologies into key freight corridors and highway projects and developing a strategy for medium/heavy duty ZEV fueling infrastructure along these critical routes
- Exploring opportunities for cleaner national fleets, including electrification of refrigerated trailers

Colorado Clean Trucking Strategy: Elements (cont.)

- Exploring potential adoption of Advanced Clean Truck standards for medium and heavy trucks, including potential regulatory flexibilities
- Exploring emission reductions for last mile freight delivery and pickup in downtown areas using sustainable options
- Working with and assisting truck dealerships and private maintenance shops in supporting workforce development and ZEV implementation
- Encouraging private fleets to become partners in the voluntary EPA SmartWay Program
- State of Colorado leading by example through green procurement

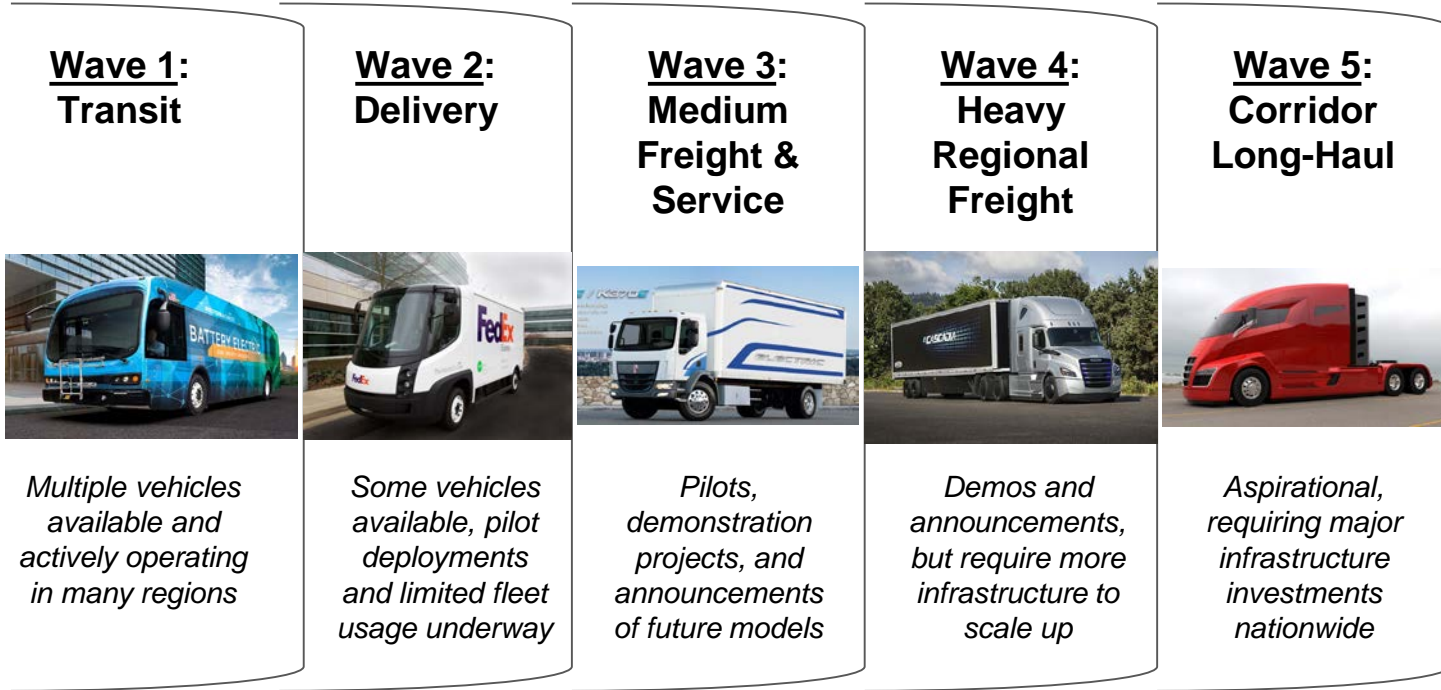
Multistate Partnership

- On July 14th, Colorado announced a Clean Trucking Strategy that includes an MOU with 14 other states and the District of Columbia aimed at boosting the market for electric medium- and heavy-duty vehicles and phasing out diesel-powered trucks by 2050.
- The long-term target is a 100% ZEV market share for new MHD vehicles by 2050
- The mid-term target is a 30% ZEV market share for new MHD vehicles by 2030



Zero Emission Vehicle Phase-In

ZEVs are likely to be adopted in multiple “waves”, but we need to prepare our policies and investments now in order to maximize the benefits in future years.



2020

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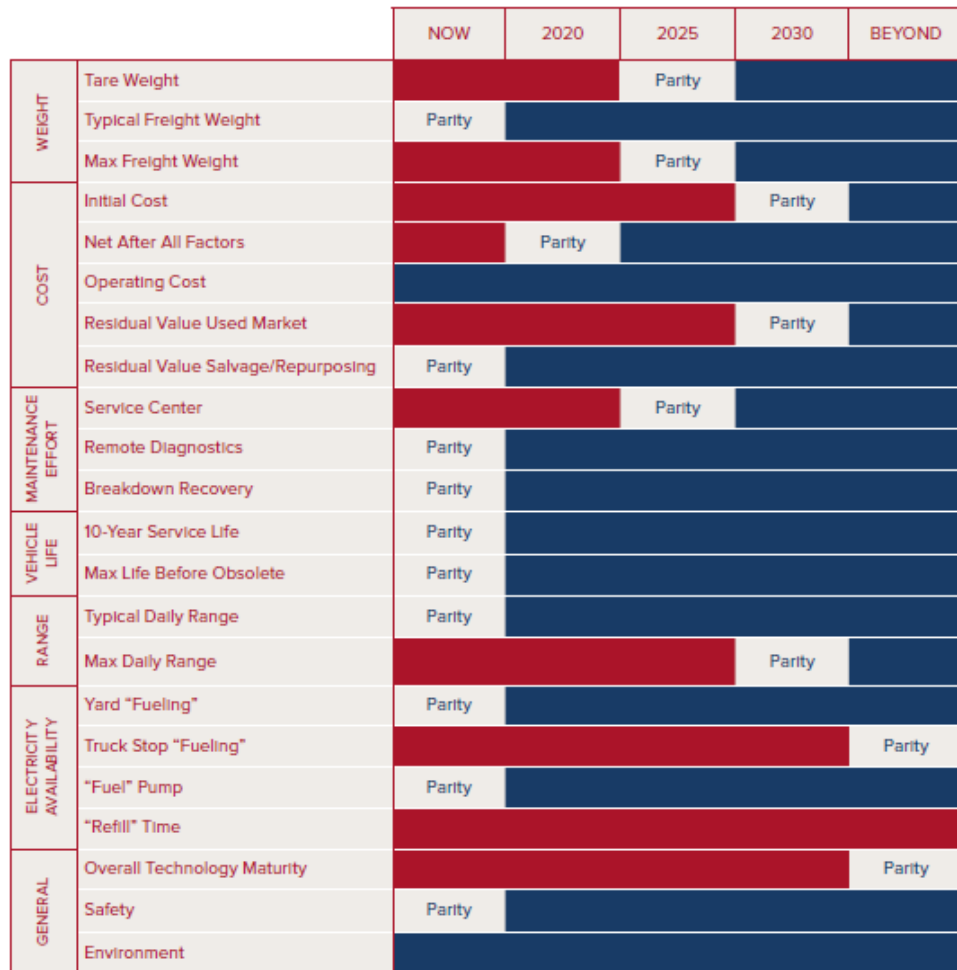
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2050

Medium-Duty Cost and Performance Parity

Studies evaluating the cost, performance, and availability of MHD ZEVs conclude that widespread deployment of MHD ZEVs is possible in the near term for some vehicle types:

- Vehicles operating primarily in urban environments with predictable daily miles and centralized fueling
- Municipal fleets (transit, school bus, refuse)
- Small commercial vehicles (shuttle buses, small delivery vans)

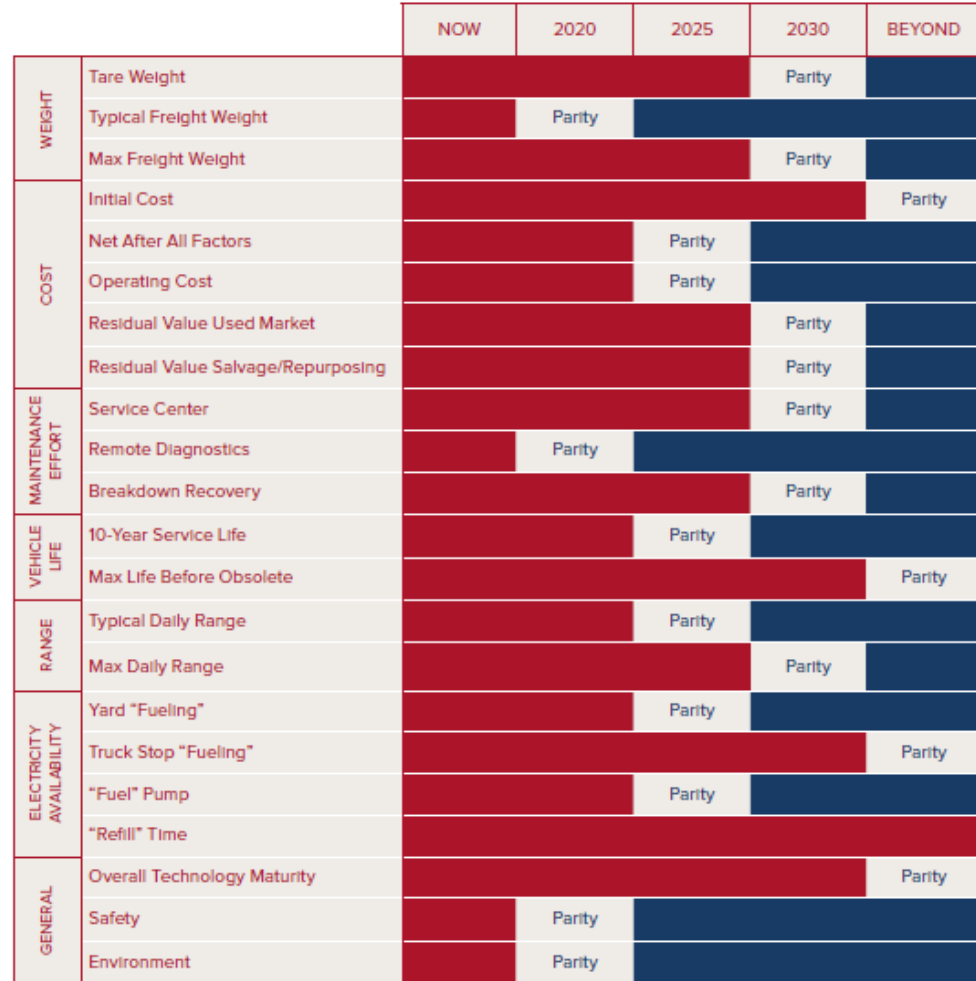


Key: Comparison to "Equivalent" Diesel Baseline: ■ Worse ■ Parity ■ Better

Heavy-Duty Cost and Performance Parity

- Freight trucks carrying heavy loads and potentially traveling long distances will take longer to convert to ZEVs
 - Short and Long Haul Tractors
 - Large Box Trucks
- Current limitations include:
 - Range
 - Energy Density of Batteries
 - Charging Infrastructure Build-out
 - Product Availability
- Despite current limitations, even these segments are anticipated to be ZEV candidates in the post-2035 timeframe.

CLASS 7 AND 8 CBEV PARITY VS. DIESEL SYSTEM (NACFE)



Key: Comparison to "Equivalent" Diesel Baseline: ■ Worse ■ Parity ■ Better

Next Steps: Input Opportunities

- Public Meetings
- Freight Advisory Council
- Fleets
- Electric Utilities
- Vehicle Manufacturers
- Local Governments
- Environmental Advocacy Groups
- Environmental Justice Groups
- Alternative Fuel Stakeholders
- Others



Questions?

