GLOBAL COMMERCIAL VEHICLE DRIVE TO ZERO | A PROGRAM OF CALSTART

Electrifying urban freight transport and the California experience

Global EV Pilot City Forum 2019
15 November 2019

CALSTART is a consortium of over 220 members to advance clean transportation solutions

GOALS

- Mitigate climate change
- Reduce air pollution
- Reduce oil dependence
- Create high-quality jobs

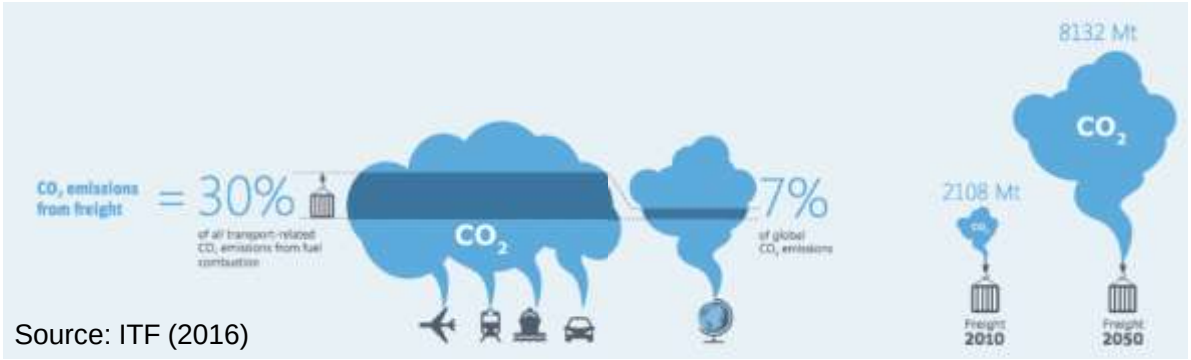
MISSION

- Support and expand clean transportation technology industry
- Drive faster commercialization
- Tech and fuel neutral
- Operating since 1992



DRIVE TO ZERO

Heavy-duty vehicles are important contributors to climate change and urban air pollution



Source: ITF (2016)



11%
of global on-road fleet are HDVs



46%
of on-road fuel consumption by HDVs



71%
of on-road particulates by HDVs



- Freight fuel consumption and GHGs are forecasted to grow four-fold through 2050.
- Urban regions suffer the worst impacts of air pollution in an increasingly urbanized world.
- Despite being relatively small in number, HDVs represent a disproportionate share of energy consumption and emissions.

DRIVE TO ZERO

Electric freight vehicles come in phases, and urban applications such as city deliveries or refuse collection will be deployed first.

Wave 1 Transit

ZE transit buses
Available now





ZE industrial lifts
Available now

Wave 2 Delivery

Chanje Class 5 Delivery Van
Available now



Fuso ECanter
Available now



Orange EV yard tractor
Available now



Wave 3 Medium Freight

E-Fuso Vision One
Announced 2021



Freightliner eM2
Demo now
Announced 2021



Wave 4 Heavy Regional Freight

Freightliner e-Cascadia
Demo Now; Announced 2021



Volvo VNR
Demo now; 2019 Europe; 2021 NA?



Mack e-Refuse
Demo 2020; Coming 2022?



Tesla demo
Coming 2021?



Corridor Longhaul

Nikola FC tractor
Coming 2022?



Similar drivetrain and component sizing can scale to early near applications

Expanded supply chain capabilities and price reductions enable additional applications

Steadily increasing volumes and infrastructure strengthen business case and performance confidence

DRIVE TO ZERO

Drive to Zero is an international multi-stakeholder initiative to accelerate the growth of zero-emission commercial vehicles

2025

Near- and zero-emission MHDVs are commercially viable and cost-competitive in first-success applications and first-mover regions.

2040

Zero-emission MHDVs dominate in their segments.

DRIVE TO ZERO

Drive to Zero's theory of change focuses on the "HOW"

1. **TARGET ACTION.** Target first-success beachhead applications where electrification works now. Typically urban applications where vehicles travel along known routes and return to base for charging.

2. **BUILD ECOSYSTEMS.** Build supporting "ecosystems" of success in key first-mover regions made up of aligned policies, incentives, infrastructure, and pilot projects.

3. **COLLABORATE.** Work concurrently and collaboratively between regions and industry worldwide to encourage global supply chain of critical components and manufacturers.

4. **EXPAND.** Expand to succeeding success markets as supply chain grows, costs decrease, and business case expands.

DRIVE TO ZERO

Drive to Zero focuses on 6 action areas

MODELS ARE AVAILABLE
A large range of ZEFVs is available for all types of goods transport.
Key stakeholder: manufacturers.

GOVERNMENTS ADOPT ENABLING POLICIES.
Agencies adopt and implement a portfolio of carrots and sticks to drive faster ZEFV adoption.
Key stakeholder: governments.

FITTING INFRASTRUCTURE IS IN PLACE
Urban and interoperable user friendly energy infrastructure is available for all vehicle types in all regions.
Key stakeholder: utilities.

VEHICLES ACHIEVE COST PARITY
ZEFVs have an attractive total cost of ownership (TCO) and cost parity.
Key stakeholders: financing institutions, government, manufacturers.

FLEETS SUPPORT ZEFVs
Fleets understand which ZEFV models are available and best suited for their operations, can build the business case to invest, and train workforce.
Key stakeholder: fleets.

FREIGHT USERS DEMAND ZERO EMISSIONS
Investors and freight users support and encourage the use of ZEFVs over fossil fuels.
Key stakeholders: freight users, investors.

DRIVE TO ZERO

California counts of a comprehensive set of policy tools to support zero-emission freight vehicles

POLICY TARGET



VEHICLES



FUELS



INFRASTRUCTURE

POLICY TYPE



REGULATIONS



FINANCIAL INSTRUMENTS

DRIVE TO ZERO

Statewide GHG Emissions Cap & Trade Program

- California's Cap-and-Trade system was implemented in 2013 to reduce GHG emissions and develop low-carbon technologies and economies, including the funding of low-carbon transportation projects
- Extended thru 2030
- Requires that the state's 410 leading emitters reduce their emissions and give them the option of purchasing emission credits.
- In the 2017-19 period, the program generated on average about $3 billion per year that is used to support GHG reduction measures.

California policies targeting ZE freight vehicles

POLICY	DESCRIPTION
REGULATIONS	
Innovative Clean Transit Rule	By 2028, all new transit buses sold in California must be zero emission.
Fleet Purchase Mandate – Airport Shuttle Buses	By 2026, 33% of all airport shuttle buses must be zero emission. By 2035, all airport shuttle buses in California must be zero emission.
Advanced Clean Truck Rule (proposed)	California is proposing a rule in Dec/19 to require increasing sales shares of ZE trucks in California over the next decade.
FINANCIAL INSTRUMENTS	
Funding for ZE Truck and Bus Pilot Projects	More than $250 million provided to global truck OEM's to deploy and test ZE trucks – including BYD, Volvo, Kenworth, and Tesla
Purchase incentives for near- and ZE buses, trucks, off-road equipment	More than $400 million to support purchases of nearly 8,000 zero and near-zero emission trucks and buses. Plus new $40 million incentive program aimed at ZE off-road freight equipment, including yard tractors and warehouse trucks, launched in 2019.

California Advanced Clean Truck Rule (proposed)

ZEV Sales Percentage Schedule by Model Year (MY) – PROPOSAL DRAFT

MY	Class 2b-3 Group*	Class 4-8 Group**	Class 7-8 Tractor Group
2024	3%	7%	3%
2025	5%	9%	5%
2026	7%	11%	7%
2027	9%	13%	9%
2028	11%	24%	11%
2029	13%	37%	13%
2030+	15%	50%	15%
*Excludes pickups until 2027 MY			
**Excludes Class 7-8 Tractors, Includes Yard Tractors			

DRIVE TO ZERO

California Low Carbon Fuel Standards (LCFS)

- Designed to encourage production and use of cleaner low-carbon fuels in California, and reduce GHGs.
- Based on the principle that each fuel has "life cycle" GHGs including CO2, CH4, N2O and others.
- Includes direct emissions associated with fuel production, transportation, and use, and indirect emissions associated with land use changes (for some biofuels).
- Expressed in terms of the "carbon intensity" of gasoline and diesel fuel and their respective substitutes.
- The carbon intensity scores assessed for each fuel are compared to a declining CI benchmark for each year. Low carbon fuels below the benchmark generate credits, while fuels above the CI benchmark generate deficits.

California policies targeting ZE infrastructure

POLICY	DESCRIPTION
Utility investment and support for Zero Emission Fleets	3 major investor-owned utilities authorized to invest approx. $700 million in ratepayer funds to support “make ready” infrastructure for commercial bus and trucks fleets.
Clean Transportation Investment Plan	The CA Energy Commission has set aside $48 million to support charging or hydrogen fueling infrastructure for buses, trucks, and freight equipment in CA.
Zero Emission Fleet Infrastructure Solutions and Assistance	The California Energy Commission’s draft investment plan for 2020 calls for a $30 million program to help electric truck and bus fleets address their infrastructure challenges.
CA SB350	Increase renewable electricity (solar, wind, biomass, geothermal, etc) procurement goal from 33 percent by 2020 to 50 percent by 2030.

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Thank you!

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For more information:
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