

NorCAL ZERO

Transforming The Freight Sector to ZERO



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About CTE



- **Who We Are: 501(3)(c) non-profit** engineering and planning firm
- **Our Focus: Zero-Emission** Transportation Technologies
- **Our Mission:** Improve the **health of our communities and the planet**
- **Portfolio - >\$800 million; 117 Active Projects** totaling over **\$316 million**
- **National Presence**
Atlanta, Berkeley, Los Angeles, Minneapolis/St. Paul

86 CTE Members



Leadership Circle Members



Members



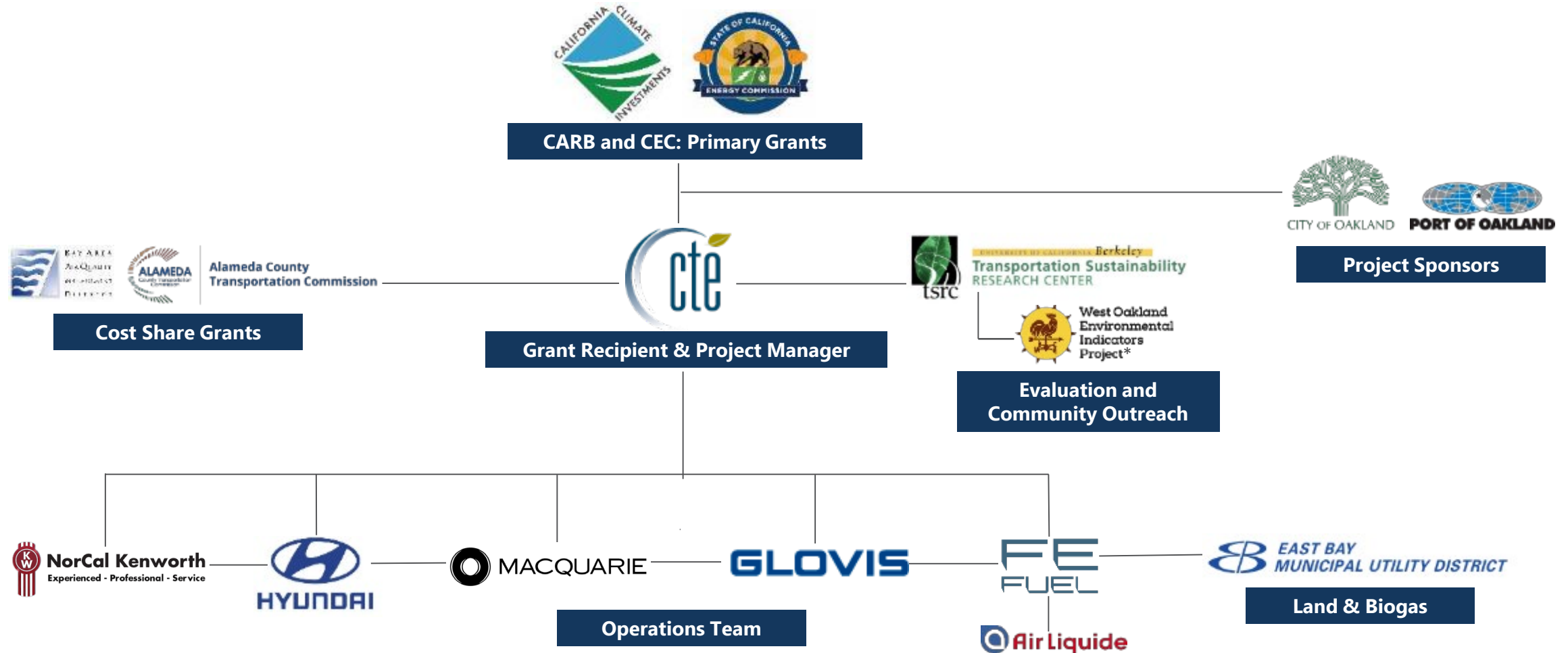
NorCAL ZERO Project – \$52 million

- **Goal: To Demonstrate Commercial Viability of FCETs to Fleet Operators**
- **30 Fuel Cell Electric, Class 8 Drayage Trucks Operating from Port of Oakland**
 - Range of up to 500 miles
- **Hydrogen Fueling Station @ EBMUD in Oakland**
 - 10- to 20-minute 60 kg fills; Up to 60 trucks
- **Service and Repair Facility: NorCal KW in San Leandro**
 - Local Workforce

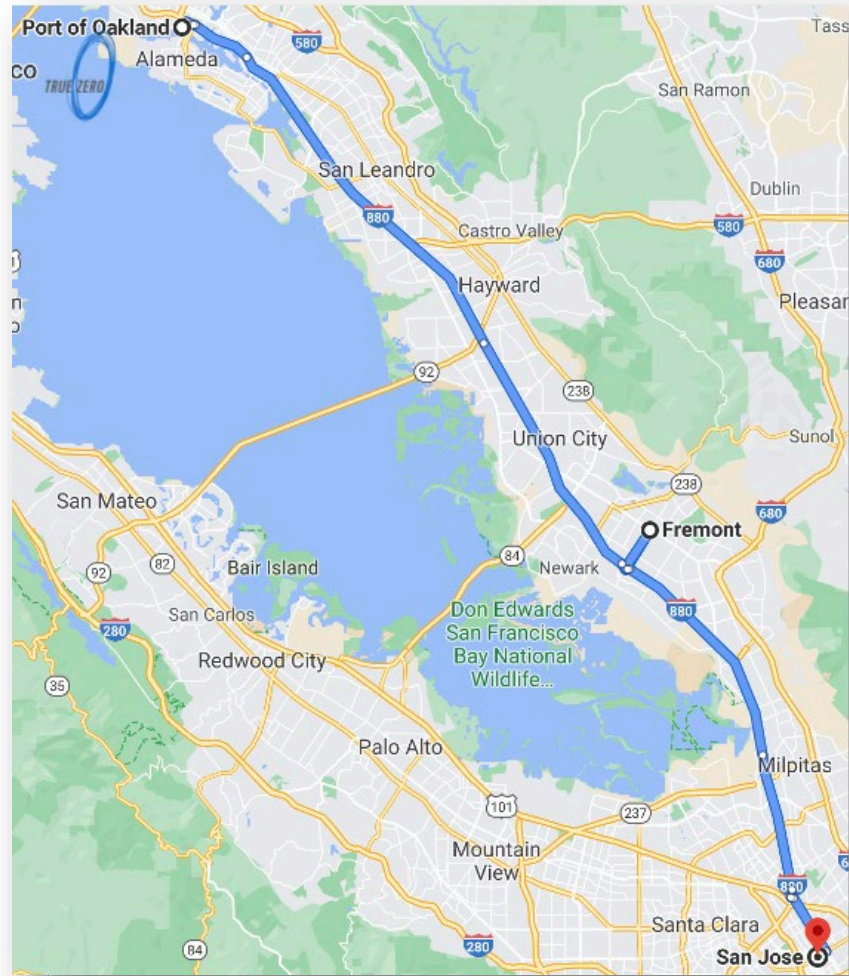
Date	Milestone
June 15, 2023	Trucks fully deployed
June 14, 2024	Conclude 1-Year Performance Evaluation
June 14, 2029	Six Years of Truck Service



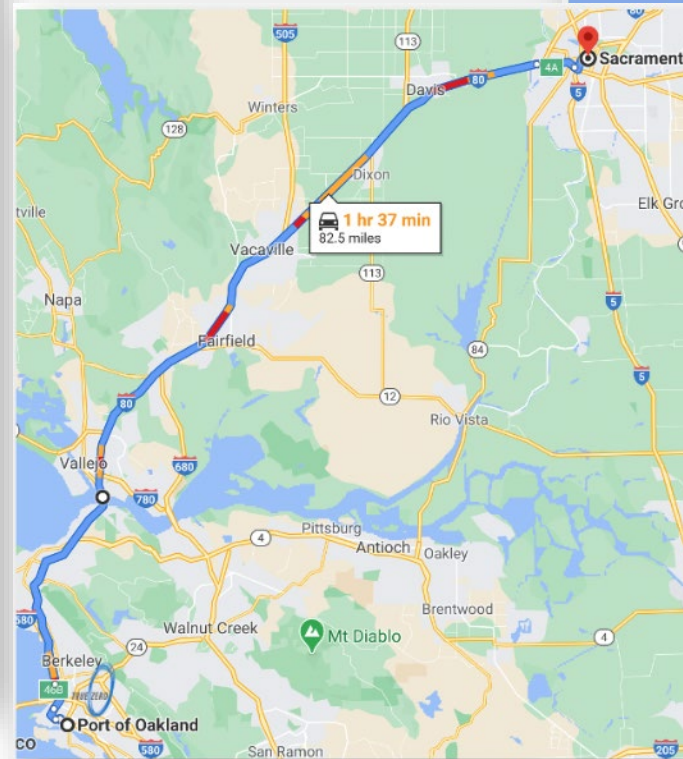
NorCAL ZERO Project Team – 16



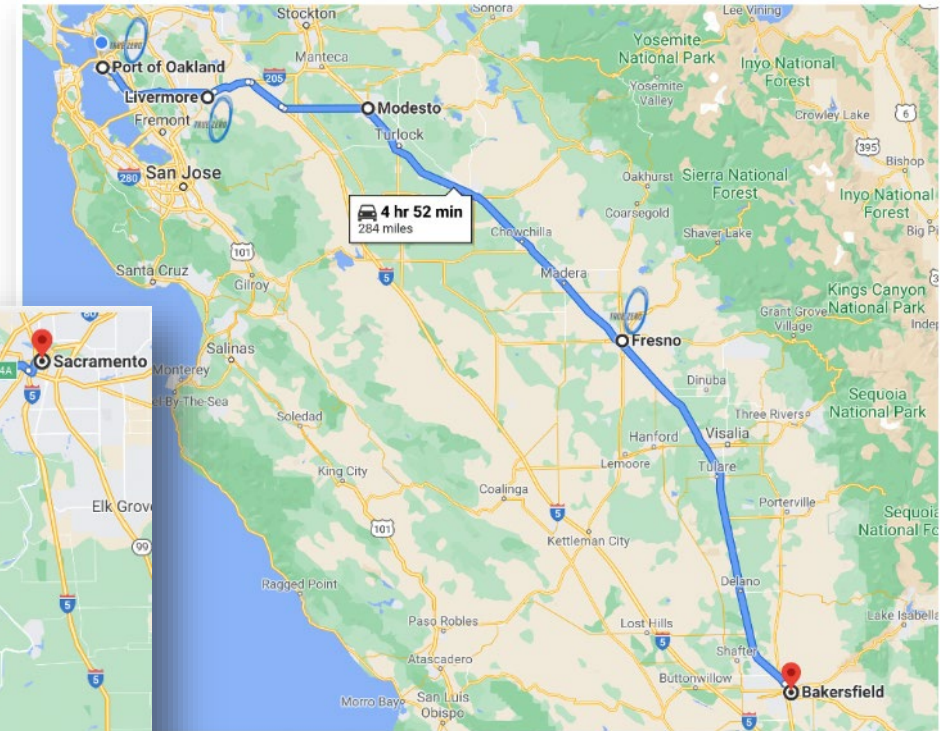
Truck Duty Cycle



Bay Area



Sacramento



Central Valley

NorCAL ZERO Emissions and Petroleum Reductions



Estimated Reductions of GHG, Criteria Pollutant, and Particulate Matter (50k Miles/Yr/Truck)

	Per Truck	Project Entirety
GHG ER	135.34 $\frac{\text{metric tons CO}_2\text{e}}{\text{year}}$	4,060 $\frac{\text{metric tons CO}_2\text{e}}{\text{year}}$
Criteria Pollutant ER	0.073 $\frac{\text{tons WER}}{\text{year}}$	2.19 $\frac{\text{tons WER}}{\text{year}}$

Volume of Petroleum Transportation Fuel(s) Displaced (50k Miles/Yr/Truck)

$$\begin{aligned}
 \text{Fuel Usage}_{\text{baseline}} &= 10,020 \frac{\text{gallons diesel}}{\text{year}} \\
 \text{Petroleum Fuels Displaced Annually} \\
 &= 10,020 \frac{\text{gallons diesel}}{\text{year}} * 30 \text{ fuel cell trucks} \\
 &= 300,600 \frac{\text{gallons diesel}}{\text{year}}
 \end{aligned}$$

Fuel Cell Electric Truck Benefits



Fuel cells are the perfect fit for heavy duty trucks & long driving distances



Refueling Time

Just 8 - 12 min
(20 min US truck target)



Range

Up to 500 miles for US 6x4 tractor

About 250 miles
Swiss 4x2 Cargo

No big impact
by low ambient temperatures



Payload

Similar to Diesel
*Expected weight difference
BE Vs FCE truck +4 ton (+8,800 lbs.)



Hydrogen Sourcing

- 54% Renewable Feedstock and Carbon Intensity of Zero
- Fuel Cells are Agnostic to The Sources of Hydrogen
- Ultimate Goal: 100% Renewable and Carbon Intensity of Zero
- Fuel Cell Trucks will play a key role in distribution of fuel



Swiss Deployment

- 46 Trucks in 2021
- More than 1.5 Million Zero Emission Miles
- Very Low Downtime
- 1,600 units deployed by 2025



Sales Tax Exemption – SB 542

“To meet the ambitious goals set by Governor Newsom in **Executive Order N-79-20** to transition all medium- and heavy-duty trucks in California to zero-emission vehicles in the next 15 to 25 years.”

2035 – 100% Truck Sales will be Zero Emission

2035 – 100% of In-Service Drayage Trucks will be Zero Emission

2045 – 100% of In-Service MD/HD Trucks will be Zero Emission

State Sales Tax Exemption: 3.9375%