



CENTER FOR TRANSPORTATION AND THE ENVIRONMENT

2021 IMPACT REPORT

JANUARY–DECEMBER 2021





Headquarters

730 Peachtree Street NE, Suite 450
Atlanta, GA 30308
Phone: 678-244-4150
Fax: 404-817-3224

Berkeley

2041 Bancroft Way, Suite 210
Berkeley, CA 94704-1405
Phone: 510-851-0625
Fax: 510-525-2231



Los Angeles

607 Foothill Boulevard, Suite 908
La Cañada Flintridge, CA 91012
Phone: 818-324-0305

St. Paul

550 Vandalia Street, Suite 236
St. Paul, MN 55114
Phone: 404-376-5390

Communication Inquiries

Lauren Justice, Development Director
lauren@cte.tv

Membership Inquiries

Taylor Pitel, Director - Membership & Policy
taylor@cte.tv

www.cte.tv



From the Director's Desk

As I pen this letter and consider where CTE is heading over the next few years, I am reminded of the popular phrase, "being in the right place at the right time." It is certainly pertinent to CTE. We are a 501(c)(3) nonprofit full of engineers and planners who have dedicated their careers to changing the world. We are here, in the right place at the right time, when the world needs changing.

The former Secretary General of the UN, Ban Ki-moon, put it best, "We are the last generation that can take steps to avoid the worst impacts of climate change. Future generations will judge us harshly if we fail to uphold our moral and historical responsibilities."

Preparation and know-how are the keys. With the catastrophic effects of climate change on our collective doorstep, nonprofits are cropping up everywhere to answer the call to action, bringing with them lots of motivation and passion but without the know-how and experience necessary to catalyze change in the most effective way. CTE welcomes the opportunity for partnership and education. We know what works. More importantly we know how to make it work and we are eager to help.

CTE has been actively bringing clean transportation projects to fruition for nearly 30 years. We have managed the development and demonstration of more than 20 prototype battery electric and

fuel cell electric vehicles from the ground up. We have successfully managed and provided technical assistance to more than 90 zero-emission vehicle deployments for transit, school, airport, and municipal operators. We are clearly the industry leaders.

CTE has shaped clean transportation policy in D.C. and Sacramento from day one, bringing not just passion to the table but also, and more importantly, bringing our real-world, hands-on experience. We are engineers first and advocates second. Policymakers and decision-makers seek us out as a trusted advisor in shaping the zero-emission future. Nobody else has done more in this space. Nobody else is more respected in the space. Nobody does it better.

CTE has come a long way since we were formed in 1993. We have grown considerably since I took the reins in 2001, with only four staff members and some inherited debt. But the passion that drives us has not changed. I am proud to lead 64 smart, motivated people who apply their world-class knowledge and expertise every day to achieving our mission of improving the health of our climate and communities by bringing people together to develop and commercialize clean, efficient, and sustainable transportation technologies.

We stand ready to help you be the change you seek.



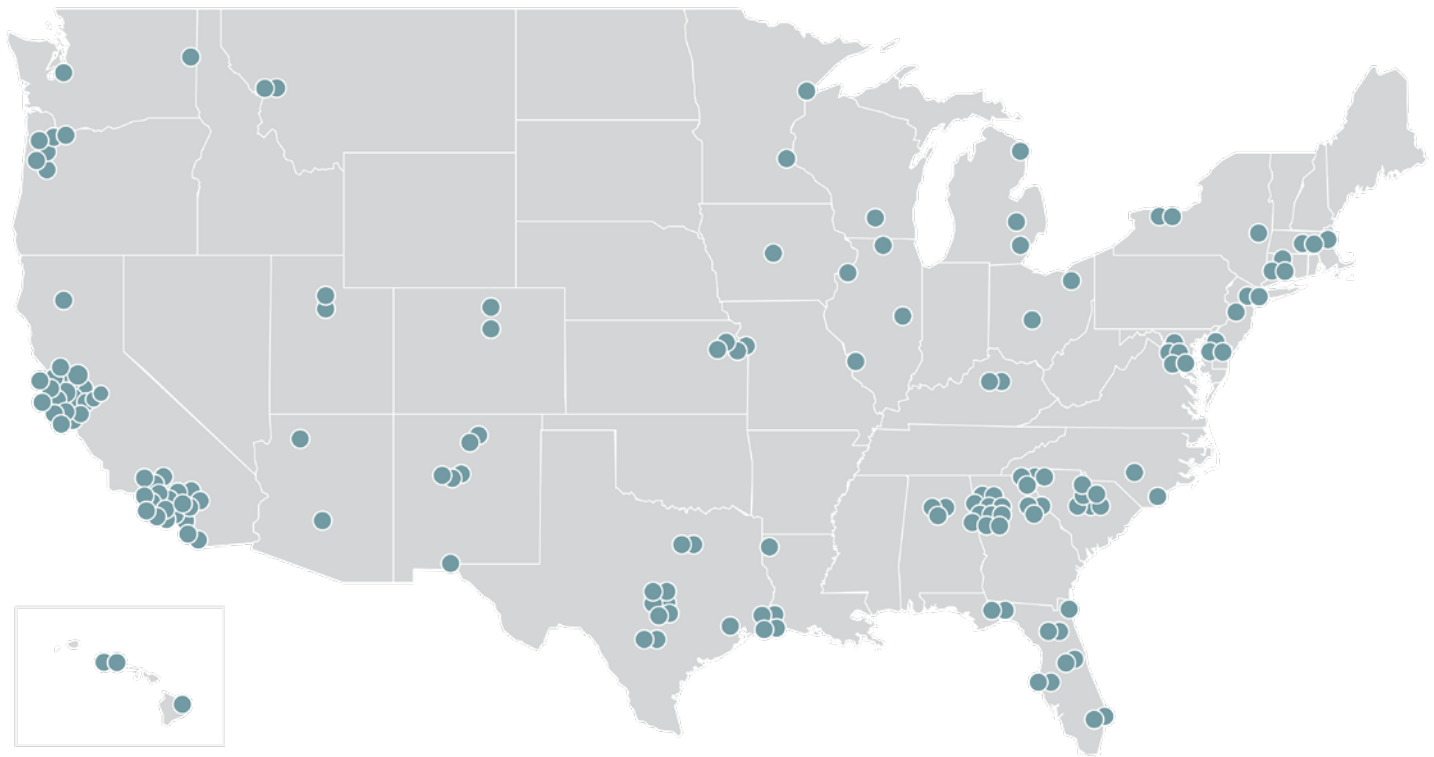
Dan Raudebaugh
Executive Director

A Goal Without a Plan is Just a Wish...

CTE helps cities, schools, and private fleets transform clean transportation goals into reality.

Bus, truck, and other fleet owners are faced with complex options as they transition to zero-emission vehicles. CTE's technical project managers provide fleets with critical consultation and analysis to make informed clean transportation decisions.

CTE has helped 125 fleets make the switch to zero-emission.





“Since our initial deployment of ZEBs, CTE has been a valued partner throughout this incredible journey. From technical studies, bus and infrastructure design, project management, to operations monitoring and workforce development, CTE has global experience and advocacy know how to support the transportation industry’s transition to clean zero-emission technology.”

Salvador Llamas, AC Transit



“UPS is proud to have a non-profit like CTE seek out and advance complex DOE projects that are improving the environment for the communities in which it serves.”

Ryan Bankerd, UPS

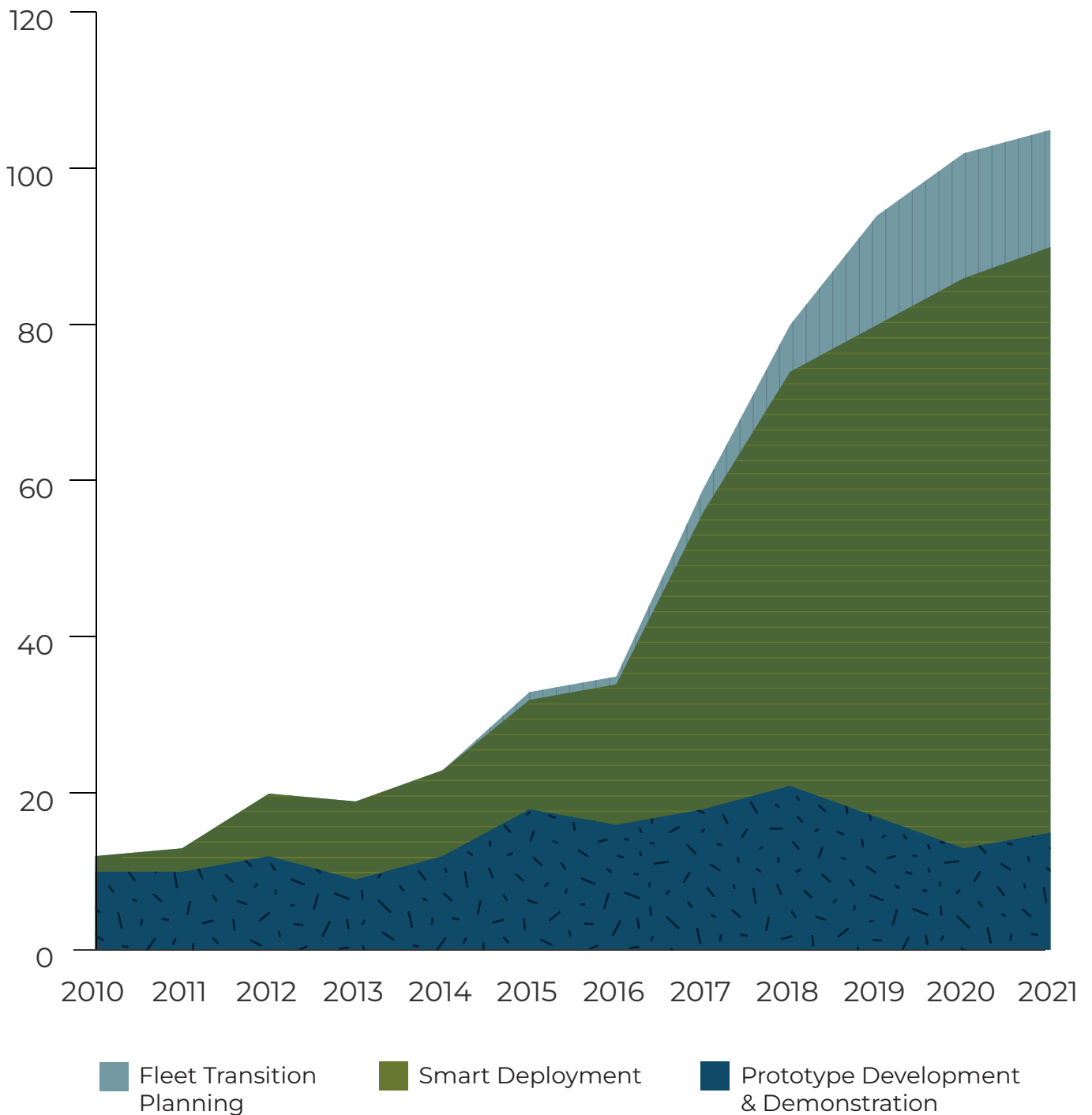


“CTE has been an important partner as we look to the future of zero-emission BEB’s. They have applied our specific regional characteristic like climate, topography, route distance, and passenger loads, to industry cost and performance data to help STA develop an informed fleet electrification plan.”

E. Susan Meyer, Spokane Transit Authority (STA)

100+ Active projects in 2021

Active Projects by Program Area



Nimble Engineering & Vast Experience

CTE's three technical program areas take zero-emission technology from conception to commercialization. Our suite of services are designed to meet the clean transportation sector's needs from the suppliers through to the bus and truck fleet owners.

Fleet Transition Planning

We provide fleet owners and operators with a roadmap to make a full transition to zero emission.



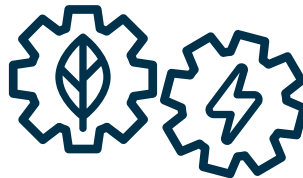
Smart Deployment

We provide fleet owners and operators with the answers they need to put electric vehicles into service.



Prototype Development & Demonstration

We provide technology suppliers with vision and support to bring new zero-emission products to market.



Our Strategic Approach

Since 2008, CTE has set the standard for fleet support services that guide transit agencies' zero-emission bus decisions.

We are now applying the methods we honed with transit's pioneers to the next tier of fleet electrification.



AUTOMATION

In 2020, CTE initiated the USA's first full size automated bus demonstration in partnership with Connecticut DOT. Currently, all buses have completed final assembly at New Flyer's facilities, and are preparing to ship to Robotic Research for further ADS integration and testing. On-road demonstration at the CTfastrak is expected to begin in the first half of 2023.



FREIGHT

In April 2021, CTE successfully completed the design, build, and demonstration work associated with the ZECT II Fuel Cell Drayage Truck project sponsored by South Coast Air Quality Management District. The team achieved the primary goal of the project, which was to make significant strides developing zero-emission technologies for heavy-duty Class 8 trucks that would accelerate the improvement of air quality in southern California transportation corridor.

SCHOOL BUS

In 2021, CTE completed the development of an electric school bus feasibility study and implementation roadmap for Albuquerque Public Schools (APS). This project includes an assessment of APS' school bus fleet to determine appropriate, electric bus solutions along with a supporting charging infrastructure strategy.



CLEAN ENERGY

CTE is working with Champaign-Urbana Mass Transit District to deploy two 60' fuel cell electric buses (FCEB), retrofit the maintenance facility to accommodate hydrogen-powered vehicles, and construct a fueling station that includes a 1 MW electrolyzer alongside a solar array for on-site hydrogen production. These buses are the first commercial articulated FCEBs in the United States.



AIRPORTS

CTE partnered with Sunport to support the airport's procurement of 13 battery-electric buses (BEB) along with depot and on-route charging equipment that will serve Sunport's rental car shuttle route. The program will consist of annual procurements that started in 2021 and will continue over the next several years, with two to three buses being procured each year.



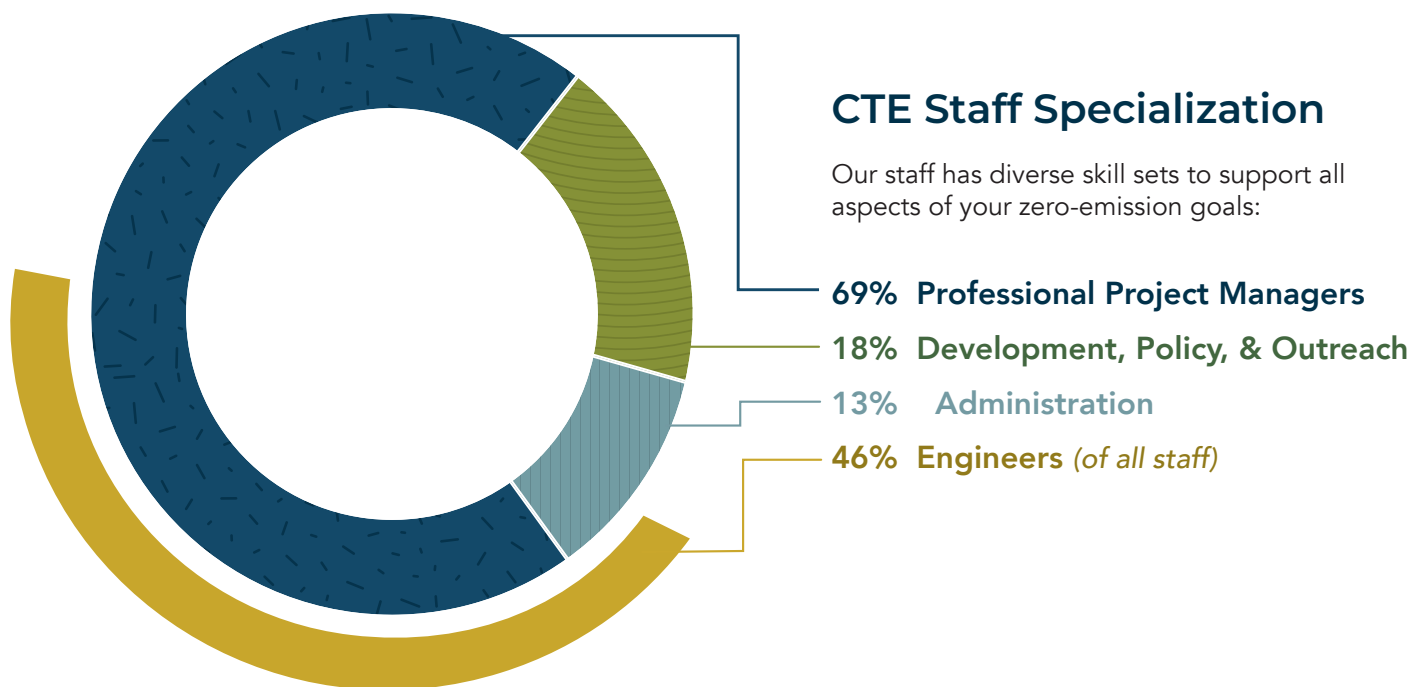
MUNICIPAL

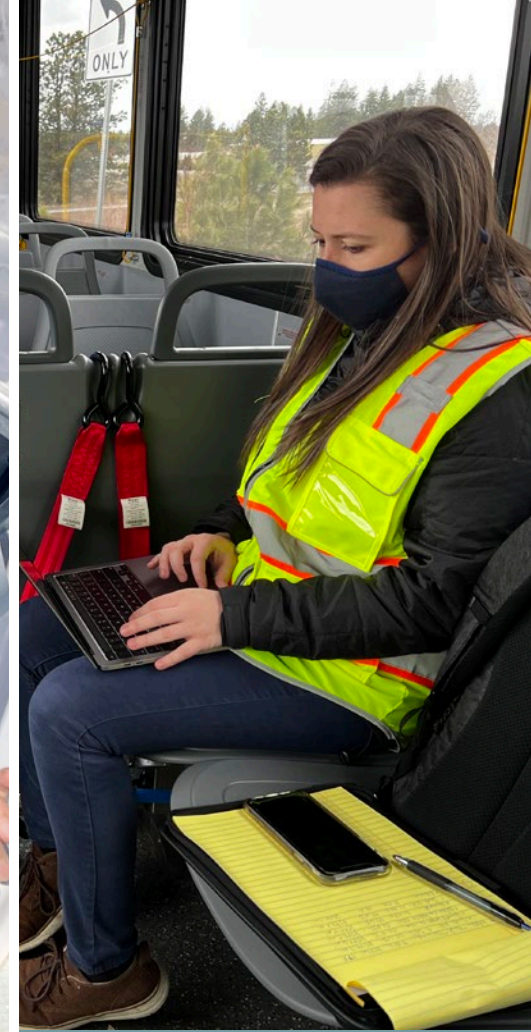
In 2021, CTE began supporting the City of Glendale's non-bus fleet transition plan. CTE is assessing Glendale's zero-emission options for utility vehicles, street sweepers, and shuttles among other vehicle types. CTE's assessment includes recommendations for charging infrastructure optimization and vehicle replacement timing.



Engineers First & Advocates Second

Our staff's first priority is making zero-emission vehicles work in the real world. Our decades of first-hand experience informs the shape of our programs and principles.





64

Staff members
(full-, part-, and contract)

28

Years for CTE's longest
tenured employee

20%

Of all zero-emission transit
bus deployments in the
US managed by CTE

13

Years (average) CTE's
leadership team has
been with the company



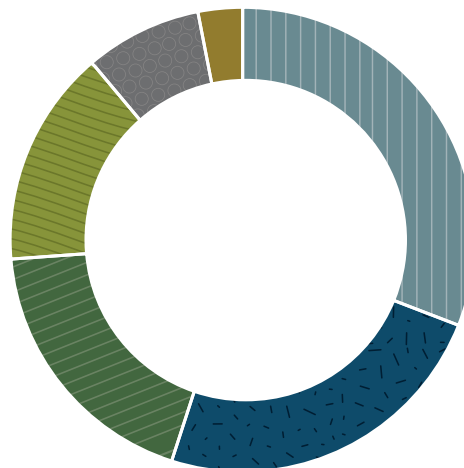
2021 Events & Outreach

CTE’s conferences and working groups are informed by our 100+ active projects. We connect event participants with timely first-hand knowledge that helps them make informed zero-emission decisions in their communities.



2021 INTERNATIONAL ZERO EMISSION BUS CONFERENCE

The 2021 Zero Emission Bus Conference (ZEB Con) took place September 15-17 in Denver, Colorado attracting more than 450 attendees. This event is the largest of its kind convening 60+ speakers in 15 sessions focused squarely on the practicalities of electrifying our nation’s bus fleets.



Attendees by Market

- 31% Operator
- 24% Professional Services
- 19% Vehicle Suppliers
- 15% Infrastructure
- 8% Association
- 3% Other



“I have attended multiple types of transit conferences for the last 4+ years, and if any transit agency is beginning to look at a pathway to a zero-emission fleet, I would highly recommend attending ZEB Con. I find ZEB Con to have the most up-to-date information, experiences, and best practices of implementing a public transit zero-emission fleet, in which any type of fleet manager can gain some insight on this technology.”

Kyle Whatley, ZEV and Sustainability Manager, San Diego MTS



Transit Agencies Leading the Transition to ZEBs

What is ZEBRA?

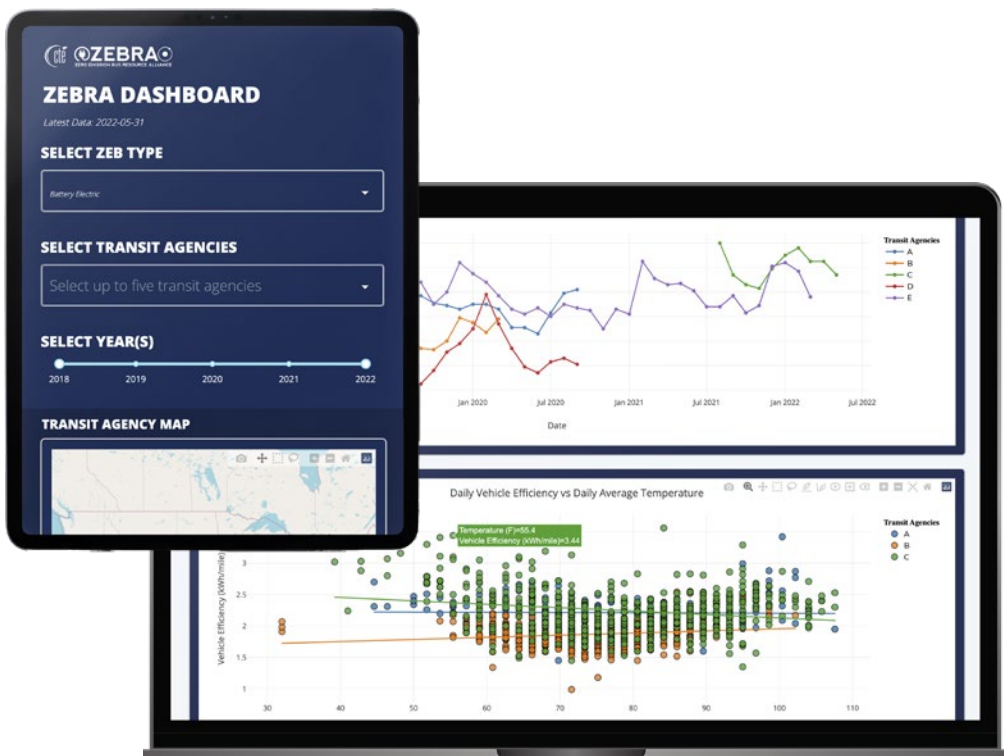
The Zero Emission Bus Resource Alliance (ZEBRA) is a professional association for transit agencies to share lessons learned about zero-emission buses (ZEBs). Since 2017, CTE has been providing leadership and technical expertise to guide the group.

In 2021 ZEBRA represented the collective voice of over 45 transit agencies:

- 310+ ZEBs in service
- 290+ ZEBs on order/in procurement
- 27 ZEB Transition Plans
- 16 battery-electric bus-only fleets
- 3 hydrogen refueling stations
- 4 upcoming hydrogen refueling stations
- 2 mixed battery-electric/fuel cell electric fleets
- 1 fuel cell electric bus-only fleet

In addition to regular member meetings and technical trainings, CTE provides ZEBRA with the ZEB performance dashboard. This tool is the only one of its kind in the US, and allows for interactive comparisons of operational ZEB data from more than 15 transit agencies.

For more information, visit www.ZEBRAgrp.org or email info@zebragr.org.

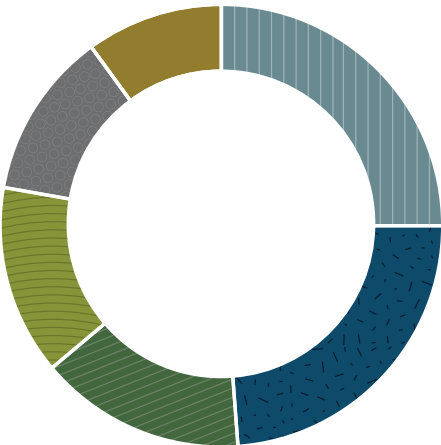




Membership

Our Membership program consists of **100+ companies and organizations** who believe in CTE's mission. Members represent the entire zero-emission ecosystem from clean fuels to design services. They are core to our project success and provide the foundation of CTE's operational funds.

CTE connects our members with tools and resources to advance their zero-emission goals. Primary membership benefits include grant opportunities, advocacy alignment, and networking events. In 2021, CTE shared **105 funding announcements** worth over **\$3.86 billion** with our members.



Members by Sector

- 25% Infrastructure
- 24% Professional Services
- 15% OEM
- 14% Operator
- 12% Vehicle Supply Chain
- 10% Association

A Special Thank You to Our 2021 Leadership Circle Members



Finance

