June 28, 2024

County of Hawai'i FY24-25 Notice to Providers of Professional Services

TA.3 Community Planning (Public Transit Long Range and Strategic Planning)

TA.7 Community Planning (Public Transit Implementation Support)

TA.8 Grant Writer (Public Transit Grants and Federal Compliance Support)

Submitted by:

Center for Transportation and the Environment

COVER LETTER

June 28, 2024

Mr. Victor Kandle
County of Hawai'i
25 Aupuni Street
Hilo, Hawai'i 96720

Dear Mr. Kandle:

The Center for Transportation and the Environment (CTE) is pleased to provide a Statement of Qualification and Expression of Interest for **TA.3 Community Planning (Public Transit Long Range and Strategic Planning)**, **TA.7 Community Planning (Public Transit Zero Emissions Bus Implementation Support)**, and **TA.8 Grant Writer (Public Transit Grants and Federal Compliance Support)** for services required by the County of Hawai'i Mass Transit Agency during the fiscal year 2024-2025. I believe CTE is uniquely qualified to provide the technical expertise and project management services necessary to assist the County of Hawai'i Mass Transit Agency should it require services related to Public Transit Zero Emissions Bus Implementation Support. CTE is experienced in zero-emission bus (ZEB) deployments both for battery electric and fuel cell electric buses, as well as zero-emission bus transition planning projects. In addition, CTE has experience in Hawai'i, leading projects such as the City and County of Honolulu Low-No project, the Hawai'i Department of Transportation Statewide Zero-Emissions Bus Pilot Program, and the County of Hawai'i Zero-Emission Bus Transition Implementation and Master Plan.

Founded in 1993, CTE is a 501(c)(3) nonprofit with the mission to improve the health of our climate and communities by bringing people together to develop and commercialize clean, efficient, and sustainable transportation technologies. CTE collaborates with federal, state, and local governments; fleets; and vehicle technology manufacturers to advance clean, sustainable, innovative transportation and energy technologies.

Thank you for your consideration of CTE's statement of qualifications and expression of interest should you require Public Transit Zero Emissions Bus Implementation Support. If you have any questions, please do not hesitate to contact me (dan@cte.tv or 404-518-2322) or Steve Clermont, Managing Director of Planning and Deployment (steve@cte.tv or 404-606-3498).

Sincerely,

Daniel J. Raudebaugh
Executive Director
730 Peachtree Street NE, Suite 450
Atlanta, GA 30308

1. Firm Details

The name of the firm or person

Center for Transportation and the Environment

Contact information including email address

Primary Contact: Stephen J. Clermont
404-606-3498
steve@cte.tv

Principal place of business and location of all offices

Principal Office: Center for Transportation and the Environment
730 Peachtree Street
Suite 450
Atlanta, GA 30308

Other CTE offices: Berkeley, CA
Denver, CO
St. Paul, MN

2. Age of the Firm and Average Number of Employees

Age of the firm: 31 years
Average number of employees over the last five years: 55*
*This average was calculated using the number of CTE staff present on July 1 of each of the last five calendar years.

3. Education, Training, and Qualifications

CTE's Key Employees have the education, training, qualifications, and experience needed to execute the professional services for the County of Hawai'i Mass Transit Agency associated with TA.7 Community Planning (Public Transit Zero Emissions Bus Implementation Support).

Stephen J. Clermont
Managing Director of Planning and Deployment
B.S. Industrial Management, Georgia Institute of Technology
M.S. Management, Georgia Institute of Technology

Mr. Clermont has more than 30 years of experience in sustainability, advanced and alternative transportation technology, information technology, accounting, and financial management consulting, including information systems management, business process and organizational strategy, as well as enterprise systems software design, development and implementation. Mr. Clermont has successfully managed battery electric bus assessment, procurement and deployment projects at more than a dozen transit agencies across the country.

Daniel J. Raudebaugh
Executive Director
B.S. Mechanical Engineering, Georgia Institute of Technology

As Executive Director for CTE, Mr. Raudebaugh has dedicated the last 30 years to fostering environmental and energy sustainability and creating jobs within US emerging technology sectors. In his role as Executive Director, Mr. Raudebaugh has the opportunity to interact with all of CTE's clients and provides oversight to ensure projects are successfully implemented. Mr. Raudebaugh joined CTE in 1994 and was named Executive Director in 2001.

Erik Bigelow
Managing Director of Engineering Services
B.S. Mechanical Engineering, The University of Texas at Austin

Erik Bigelow is the Director of CTE's Engineering group and provides project and engineering oversight for many of CTE's projects. Mr. Bigelow has worked on zero-emission bus development and deployment projects since starting with CTE in 2009. His experience spans prototype vehicle development and bus deployment, as well as battery electric and hydrogen drive systems, and charging infrastructure planning and analysis. Mr. Bigelow has more than 14 years of direct experience in zero-emission bus analysis and program management with a wide variety of transit agencies in varied sizes and climates. He also provides decision support for charging needs, vehicle selection, route feasibility, and transition planning for fleets with existing and prior projects in over 25 states.

Wendy Morgan
Director of Grants
M.A. Urban Affairs and Planning, Virginia Tech
B.A. Politics and Sociology from Wake Forest University

Wendy Morgan is Director of Grants at the Center for Transportation and the Environment. Ms. Morgan is experienced in all aspects involved in responding to grant opportunities. She is responsible for organizing and managing the proposal process, which begins with identification of potential funding sources. Ms. Morgan supports assembling project teams to fulfill solicitation requirements. She oversees the process to ensure proposals are complete and responsive to funders' requests as well as manages the schedule for proposal completion and submission. Ms. Morgan has participated in developing successful awards through the Federal Transit Administration's (FTA) Low or No Emission Program while overseeing CTE's grant activities. She has also supported successful awards through FTA's National Fuel Cell Bus Program, Livability, Clean Fuels, and TIGGER programs. Ms. Morgan participated in securing funding from the California Air Resources Board, the California Energy Commission, and the U.S. Department of Energy to support the development, deployment, and/or commercialization of clean transportation alternatives.

Jaimie Levin
Director, West Coast Operations
B.A. Urban Affairs, University of Wisconsin
Masters in City Planning, University of California, Berkeley

Mr. Levin has secured more than $100 million in funding to support the deployment of medium- and heavy-duty fuel cell electric vehicles and hydrogen fueling infrastructure since joining CTE. He prepared another winning proposal for a project he later managed to completion, receiving grants from the California Air Resources Board (CARB) and local Air Districts to deploy 20 next-generation fuel cell electric buses and supporting fueling infrastructure at Orange County Transportation Authority (CA) and AC Transit (CA). Additional projects managed by Mr. Levin include Golden Empire Transit District (CA) and Foothill Transit (CA). Mr. Levin is currently overseeing a fuel cell transit project at Champaign-Urbana Mass Transit District (IL).

Kylie McCord, PE
Director of Planning and Deployment/Senior Engineering Consultant
B.S. Civil Engineering, Georgia Institute of Technology
Master of Business Administration, Georgia State University

Mr. McCord has over 25 years of experience in project management including zero-emission bus deployment and transition planning, construction management, and client service management. Mr. McCord has a State of Hawai'i Professional Engineer license and is currently working as the Senior Project Manager for the Hawai'i Department of Transportation's Hawai'i Statewide Zero Emission Bus Program Project that CTE has managed since 2021. Mr. McCord has served as the Senior Project Manager for ZEB transition planning projects including San Diego Metropolitan Transit System (CA), Spokane Transit Authority (WA), King County Metro (WA), Intercity Transit (WA), and City of Fort Collins (CO). In addition, Mr. McCord serves as a Project Manager and Senior Engineer for multiple zero-emission bus deployment projects including Port Arthur Transit (TX), Greater Bridgeport Transit (CT), Citibus (IA), CityBus (IN), Montgomery County Transit (MD), and Massachusetts Bay Transportation Authority (MA).

Jay Woodbeck
Engineering Service Manager
B.S. Mechanical Engineering, Michigan Technological University
M.S. Energy Systems Engineering, University of Michigan

Mr. Woodbeck leads CTE's team of engineers to provide technical analysis and insight for advanced transportation projects, including battery-electric and hydrogen fuel cell power vehicles. In his previous role at CTE as an Engineering Consultant, he specialized in route analysis to optimize zero-emission fleet miles, working with transit agencies for custom fleet transition plans, and providing utility analysis. He provided technical analysis to weigh using battery-electric, hydrogen fuel cell, or a mixture of both technologies in full fleet transition plans for RTC Southern Nevada (NV) and Corpus Christi Regional Transportation Authority (TX). For agencies looking at battery-electric fleets, he provided feasibility analysis and projected costs of fleet transitions for the AppalCART (NC), and Hoke Area Transit Service (NC). Mr. Woodbeck has led a statewide transition planning data analysis for the Virginia Department of Rail and Public Transportation, developed a charging management optimization tool for Laketran (OH), and contributed to route and charging analysis for Delaware Transit Corp (DE) and Quad Cities MetroLink (IL). His previous experience includes electrified vehicle testing, project management, and EV education at an automotive OEM. Mr. Woodbeck is knowledgeable about AC, DC, and wireless charging operation, standards, infrastructure, and smart grid integration.

Maggie Maddrey
Lead Managing Consultant
B.S. Environmental Science, Berry College

Mrs. Maddrey is responsible for the management of a number of CTE's battery electric bus demonstration and ZEB transition plan projects. In this role, Mrs. Maddrey is responsible for leading all aspects of project management including budgeting and contract management, project planning, client contact, and required project reporting. Project clients include: Santa Cruz Metropolitan District (CA), Delaware Transit Corporation (DE), City of Columbia (MO), Hawai'i Department of Transportation (HI), CyRide (IA), Albuquerque International Sunport (NM), and Central Oregon Public Transit (OR).

Niki Rinaldi El-Abd
Senior Managing Consultant
B.S. Environmental Studies, University of California Santa Barbara
M.S. Sustainable Resource Management, Technical University of Munich

Ms. Rinaldi El-Abd provides organizational and technical support for advanced transportation projects, including battery electric and hydrogen fuel cell powered vehicles as a project manager. She manages zero-emission bus deployment projects, oversees modeling for transition plans and projections for compliance with the California Air Resources Board's Innovative Clean Transit Regulation, and oversees the maintenance of CTE's transition planning resources and modeling materials. Ms. Rinaldi El-Abd coordinated and taught CTE's ZEB 101 course at the 2022 and 2023 Zero Emission Bus Conference, which helped to engage and educate transit agencies about the current state of ZEB technology.

Alison Smyth
Lead Engineering Consultant
B.A. Chemistry, Carleton College
M.S. Oceanography, Texas A&M University

Ms. Smyth has seven years' experience managing advanced transportation technology projects. At CTE, Ms. Smyth provides project management and technical support for battery electric and fuel cell electric medium- and heavy-duty deployment projects. She has worked with a number of different transit clients, including the Champaign-Urbana Mass Transit District (IL), Missoula Urban Transportation District (MT), Los Angeles County Metropolitan Transportation Authority (CA), San Mateo County Transit District (CA), Utah Transit Authority (UT), and Winnipeg Transit (MB, CAN). Ms. Smyth has experience supporting the development of transition plans for battery electric and fuel cell electric fleets and supporting infrastructure. This has included transit fleets (San Mateo County Transit District) and a current evaluation of an airport shuttle bus fleet (Portland International Airport). Ms. Smyth also has experience with the deployment of battery electric and fuel cell electric vehicles. She has led technical analyses evaluating vehicle range under various conditions, infrastructure requirements, and provided project management services for vehicle deployments.

4. LIST OF RECENT PROJECTS AND CLIENT REFERENCES

Smart Deployments		Transition Plans
Atlanta-Region Transit Link Authority	Metropolitan Saint Louis Transit Agency	Chemung County Transit
Augusta Transit	Niagara Frontier Transportation Authority	City of Glendale, CA
Biddeford, Saco, Old Orchard Beach Transit	North Central Regional Transit District	City of Phoenix, AZ
Broome County Transit	North County Transit District	City of Santa Rosa, CA
Capital District Transit Authority	Port Arthur Transit	Community Transit
Central Midlands Regional Transit Authority	Prince George's County, MD	County of Hawai'i Mass Transit Agency
Central Ohio Transit Authority	Rock Island County Metropolitan Mass Transit District	Culver CityBus
Champaign-Urbana Mass Transit District	Rockford Mass Transit District	Delaware Transit Corporation
City of Columbia, MO	Salem Area Mass Transit District	Fulton County Improvement District
City of Corvallis, OR	Santa Cruz Mass Transit District	Georgia Institute of Technology
City of Davenport, IA	Santa Maria Regional Transit	Intercity Transit
City of Fort Collins, CO	Solano County Transit	Lawrence Transit
City of Las Cruces, NM (Roadrunner Transit)	SouthWest Transit	Los Angeles County Metropolitan Transit Authority
City of Lawrence, KS	Spokane Transit Authority	Port of Long Beach
City of Madison, WI (Metro Transit)	State of Connecticut Department of Transportation	Port of Portland
CyRide	Sunline Transit Agency	San Mateo County Transit District
Delaware Transit Corporation	University of Georgia	Santa Clara Valley Transportation Authority
Fayetteville Area System of Transit	University of Michigan	South Carolina Ports Authority
Gold Coast Transit District	Utah Transit Authority	Tri-County Metropolitan Transportation
Greater Bridgeport Transit	Valley Regional Transit	University of California, Santa Cruz
Greater Portland Transit District	Washington Metropolitan Area Transit Authority	Utah Transit Authority
Hawai'i Department of Transportation		Virginia Department of Rail and Public Transportation
Kansas City Area Transportation Authority		
Lafayette Public Transit Corporation		
Link Transit		
Metropolitan Atlanta Rapid Transit Authority		

Additional information about the project references below is included in the attached Descriptive Literature.

Project Name: San Diego Metropolitan Transit System Consulting Services – Zero-Emission Bus Pilot Program	
Agency: San Diego Metropolitan Transit System	*Contact:* Michael Wygant, COO *Ph:* (619) 238-0100 x6400 *Email:* Michael.Wygant@sdmts.com
Project Duration: March 2018 – October 2022 | Pilot November 2022	

Project Name: City and County of Honolulu Zero-Emission Fleet Transition Project	
Agency: City and County of Honolulu Department of Transportation Services	*Contact:* Howard Chee *Ph:* (808) 768-8329 *Email:* hchee@honolulu.gov
Project Duration: February 2020 – March 2023	

Project Name: Champaign-Urbana Mass Transit District Low-No 2017 60’ Fuel Cell Electric Buses and Electrolysis Hydrogen Refueling Station	
Agency: Champaign-Urbana Mass Transit District	*Contact:* Karl Gnadt, Managing Director/CEO *Ph:* (217) 384-8188 *Email:* kgnadt@mtd.org
Project Duration: April 2018 – July 2023	

Project Name: Greater Bridgeport Transit Low-No 2017	
Agency: Greater Bridgeport Transit and Connecticut Department of Transportation	*Contact:* Tom Gorman, Interim CEO *Ph:* (203) 366-7070 x124 *Email:* tgorman@gogbt.com
Project Duration: April 2018 – December 2024	

Project Name: Spokane Transit Authority Zero-Emissions Technologies Fleet Conversion Analysis	
Agency: Spokane Transit Authority	*Contact:* Brandon Rapez-Betty *Ph:* (808) 366-2324 *Email:* brapez-betty@spokanetransit.com
Project Duration: August 2018 – June 2025	

5. DESCRIPTIVE LITERATURE

CTE's qualifications and project descriptions for references are included in this section.

Zero-Emission Bus Deployment Qualifications

The Center for Transportation and the Environment (CTE) is a 501(c)(3) nonprofit with the mission to improve the health of our climate and communities by bringing people together to develop and commercialize clean, efficient, and sustainable transportation technologies. CTE collaborates with federal, state, and local governments; fleets; and vehicle technology manufacturers to advance clean, sustainable, innovative transportation and energy technologies. Since its founding in 1993, CTE has managed a portfolio of more than $1.4 billion in research, development, demonstration, planning, and deployment projects funded by federal, state, and local organizations including the U.S. Departments of Transportation, Energy, Defense, and Interior, as well as the California Air Resources Board and California Energy Commission.

Experience

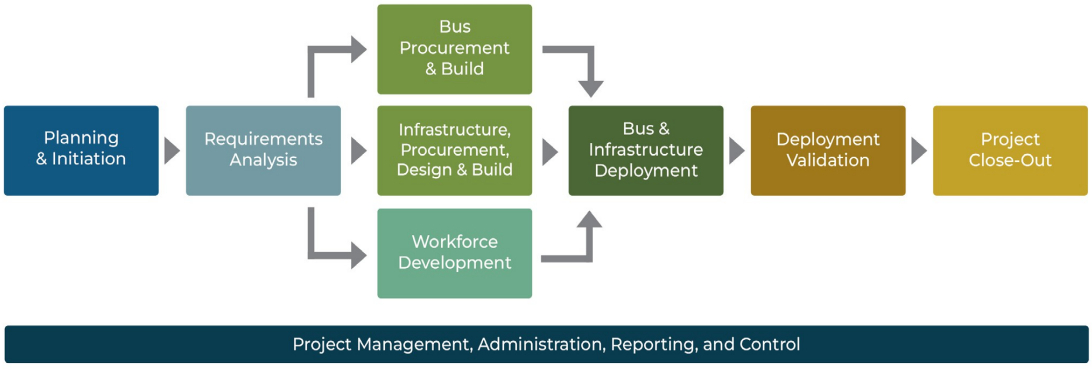
CTE is the national leader in providing technical assistance for zero-emission bus (ZEB) deployments, guiding transit agencies through battery-electric and fuel cell electric bus deployment projects while minimizing project risks. The unique operating characteristics and fueling requirements of these deployments may present challenges for transit agencies that are accustomed to operating conventionally fueled vehicles. Regardless of an agency's familiarity with zero-emission buses, CTE can provide the expertise necessary to help agencies mitigate risks associated with these deployments. CTE understands the technical and administrative challenges associated with the procurement, deployment, and operation of zero-emission vehicles.

For more than a decade, CTE has managed a range of zero-emission bus projects from new bus development and demonstration projects to full fleet deployment and transition planning projects. This portfolio includes projects made possible through the Federal Transit Administration's (FTA) Low or No Emission Vehicle Program, TIGGER Program, Clean Fuels Program, and the National Fuel Cell Bus Program. Through these and other programs, CTE has provided technical and management support or transition planning assistance to more than 100 transit agencies. Transit agencies supported by CTE's Smart Deployment service have either deployed or will soon deploy more than 850 zero-emission buses.

Approach

Smart Deployment Methodology

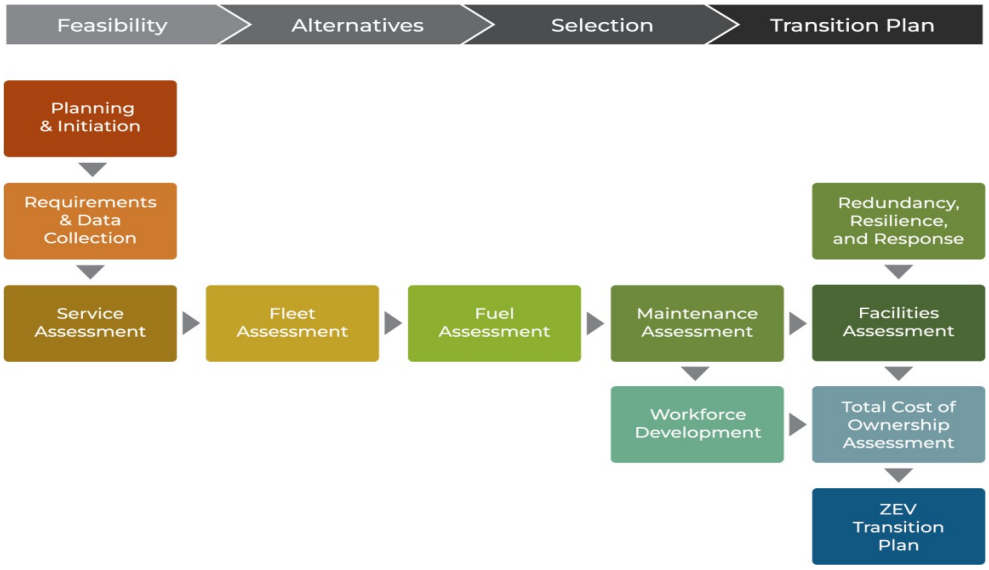
CTE developed a Zero-Emission Bus Smart Deployment Methodology to assist transit agencies in their zero-emission bus deployments. The cornerstone of CTE's approach is to apply our modeling and analysis tools to match transit service requirements with the right ZEB technologies and operational strategies. CTE's approach equips agency staff with a robust understanding of the ZEB market and technology options as well as the impact that these options have on operational strategies and related costs.



Transition Planning Methodology

CTE leveraged its experience in helping transit agencies through their zero-emission bus deployment programs to develop a Zero-Emission Bus Transition Planning Methodology for transit agencies. This methodology supports transit agencies planning for compliance with stakeholder zero-emission goals. These plans consider bus and service requirements, fleet procurement timelines, infrastructure assessments, resiliency, bus and facilities capital costs, operating and maintenance cost impacts, and emission benefits.

CTE's standard Zero-Emission Bus Transition Planning Methodology encompasses ten key phases: Planning & Initiation; Requirements & Data Collection; Service Assessment; Fleet Assessment; Fuel Assessment; Maintenance Assessment; Facilities Assessment; Redundancy, Resilience, and Response; Total Cost of Ownership Assessment; and finally, the creation of the ZEB Transition Plan itself.



Smart Deployment Services

CTE has created a suite of services based on our Zero-Emission Bus Smart Deployment Methodology that are specifically designed to help agencies understand ZEB technologies and how to successfully deploy them. Based on our success with previous deployment projects, CTE offers several project and technical consulting service packages designed to fit a variety of client requirements. Each service package consists of a combination of tasks from the full list of services in CTE's Zero-Emission Bus Smart Deployment Methodology:

- Deployment Planning
- Bus, Route, & Fuel Modeling
- Bus & Fueling Specification Advisory
- Procurement Support & Technical Evaluation
- Performance Validation
- Benefits Assessment & Deployment Validation
- Project Management and/or Technical Advisory

Transition Planning Services

CTE provides transit agencies with a comprehensive and robust roadmap for converting their fleets to zero-emission buses. This plan meets and exceeds FTA's requirements for Low-No applications. CTE supports transit agencies' planning for compliance with stakeholder zero-emission goals. CTE's comprehensive ZEB Transition Planning methodology includes a Feasibility Assessment, Alternatives Analysis, Alternative Selection, and ZEB Transition Plan. The resulting product is a plan for phased implementation of ZEBs and supporting infrastructure that is based on the agency's service and operations requirements. The analysis includes assessments of the fleet vehicles, refueling requirements, facilities, maintenance needs, emissions reductions, and overall resilience. The analysis effort will also include a comparison of the total cost of ownership of various technology transition scenarios. In addition to these analyses, the plan meets FTA's requirements by including an assessment of the agency's workforce and the impact of transitioning to zero-emission technologies, funding availability, the impact of policies and legislation on the transition, and considers the partnerships required to support the transition to zero emission. This effort culminates in the creation of the ZEB Transition Plan, a comprehensive report guiding the agency's implementation of a zero-emission bus fleet.

Grant Writing Services

CTE has an established process for tracking public funding opportunities and is knowledgeable of programs through which transit agencies are eligible to receive funding to support its transition to ZEB, both at the federal and state levels. CTE can develop a matrix of potential public funding sources for rebates, incentives, grants, and other opportunities. The matrix includes eligibility requirements, funding amounts and availability, and application timelines.

CTE's most notable success with grant writing is for FTA's Low or No Emission Vehicle Program. As an eligible project partner on Low-No grant applications, CTE has a strong track record of helping transit agencies develop winning Low-No grant applications. Our success rate is unmatched in the industry and is a direct result of our knowledge of the ZEB market, experience with ZEB deployments, and our ability to organize and manage the entire grant application process. Since the program's inception, CTE has partnered with nearly 150 transit agencies, supporting them with not only grant writing assistance, but often being named as a project partner to provide project management and/or technical assistance in support of their deployments.

Workforce Development

Transitioning to a zero-emission bus fleet brings opportunities and challenges for transit agencies and their entire workforce. CTE's Zero-Emission Bus 101 course (ZEB 101) provides a technology background, key considerations, lessons learned, and a realistic look at operating capabilities for transit agencies. Each course is tailored to meet an agency where they are in the ZEB transition—from preparing for the first ZEB procurement to the unique challenges of operating a 100% ZEB fleet. ZEB 101 is structured to introduce management, operations, and maintenance staff to zero-emission bus technologies and the basics of deploying battery and fuel cell electric buses. With this framework, agencies can identify key interfaces between departments to ensure the entire organization can work together effectively in planning for and implementing a zero-emission fleet. ZEB 101 also trains participants on the technical aspects of ZEBs, preparing them to ask the right questions of bus manufacturers and infrastructure providers prior to investing in a particular technology solution.

Industry Involvement

CTE is an active participant in industry-led initiatives, representing the organization's diverse relationships with industry stakeholders:

- American Public Transportation Association's (APTA) Zero Emission Bus Standard Bus Procurement Guidelines Development Committee
- CTE staff authored two reports for the Transportation Research Board's Transit Cooperative Research Program (TCRP): *Electric Battery Buses – State of Practice* and *Guidebook for Deploying Zero-Emission Transit Buses.* CTE is also in the process of authoring a third TCRP report, titled *Resilience and Emergency Response Planning for Zero-Emission Fleets*

- CTE staff authored two white papers and a guidebook for the National Center for Applied Transit Technology (N-CATT): *Building Successful Partnerships between Rural Transit Systems Deploying Zero-Emission Vehicles and their Electric Utilities*, *Hydrogen as a Transportation Fuel in Rural Communities*, and *Guide to Green Energy Adoption for Transit Agencies*
- CTE staff are drafting a guidebook titled *Zero-Emission Bus Transition Planning Guidebook* for the National Transit Institute (NTI), which is expected to be released by July 2024

CTE is also leading the ZEB industry with a number of outreach initiatives designed to educate stakeholders, support collaboration, and advance the state of the technology to best serve the needs of transit agencies across the country:

- **Zero Emission Bus Resource Alliance (ZEBRA)**
  CTE provides administrative management, technical assistance, and industry consultation to ZEBRA, an association of transit agencies from the US and Canada seeking to engage with each other and learn about ZEBs from agency experience.
- **International Zero Emission Bus Conference**
  CTE hosts and organizes the event each year, gathering industry leaders from around the world
- **FTA's Transit Vehicle Innovation Deployment Centers (TVIDC)**
  In coordination with FTA's Office of Research, Demonstration, and Innovation, CTE leads multiple research efforts designed to facilitate the transit industry's transition to zero-emission buses
- **California Transit Training Consortium (CTTC)**
  CTE coordinates and manages the activities of the CTTC board and respective committees to execute CTTC's Strategic Plan to develop and deliver transit training programs to agencies in California.

San Diego Metropolitan Transit System Consulting Services – Zero-Emission Bus Pilot Program

San Diego Metropolitan Transit System

Contact

Michael Wygant
COO

Transit Services
1255 Imperial Ave., Ste. 1000
San Diego, CA 92101
(619) 238-0100 x6400
Michael.Wygant@sdmts.com

Key Personnel

Steve Clermont
Senior Project Manager

Kylie McCord
Project Manager

Contract Duration	Project Value	CTE Project Value
Mar. 2018 – Oct. 2022 Nov. 2022 (Pilot)	$553,728	$435,148

Project Description

The Center for Transportation and the Environment (CTE) led the San Diego Metropolitan Transit System (MTS) Zero-Emission Bus (ZEB) Pilot Program, which included a ZEB feasibility assessment, a ZEB transition plan, and a ZEB pilot. For the feasibility assessment, CTE analyzed routes and service requirements to determine how ZEBs may be best used in MTS service. The feasibility assessment also included analysis of MTS facilities to determine how they could accommodate charging infrastructure and/or hydrogen fueling infrastructure.

CTE analyzed routes and service requirements to determine how ZEBs may be best used in MTS service as part of the feasibility assessment. CTE utilized its ZEB Transition Planning Methodology to guide creation of MTS's ZEB transition plan. Key activities CTE led to develop the transition plan included conducting a ZEB market analysis, data collection, assessing energy requirements through modeling and simulation, defining necessary facility upgrades, and developing a transition timeline and cost/benefit model. CTE employed its ZEB smart deployment methodology to support MTS's efforts to deploy six battery electric zero-emission buses as part of the agency's pilot program.

CTE worked with MTS to finalize recommendations, support community outreach, and complete an implementation strategy. The final study and associated recommendations were approved by the MTS Board of Directors in September 2020 and by the California Air Resources Board (CARB) in December 2020.

The ZEB transition plan defined a series of ZEB and infrastructure projects to transition to a 100% zero-emission fleet and provided estimates of capital costs, operating and maintenance costs, and a fleet emissions profile over the transition timeline. Finally, CTE developed a pilot project scope and work plan, and worked with MTS to conduct a two-year evaluation of pilot operations after deployment. Results from the pilot study were compiled in a final report submitted to MTS in November 2022.

City and County of Honolulu Zero-Emission Fleet Transition Project

City and County of Honolulu Department of Transportation Services (DTS) and Oahu Transit Services (OTS)

Contact	Key Personnel
Howard Chee City & County of Honolulu Frank F. Fasi Municipal Building 650 South Kind Street, 3rd Floor, Honolulu, Hawaii 96813 hchee@honolulu.gov	Steve Clermont *Senior Project Manager* Emily Price *Project Manager* Matt Boothe *Engineering Consultant* Chase Stell *Managing Associate*

Contract Duration	Project Value	CTE Project Value
Feb. 2020 – Mar. 2023	$14,500,000	$513,344

Project Description

The Center for Transportation and the Environment (CTE) partnered with the City and County of Honolulu Department of Transportation Services (DTS) and Oahu Transit Services (OTS) for a successful award under the 2017 Federal Transit Administration (FTA) Low or No Emissions Program (Low-No). CTE managed the project and provided technical assistance as OTS deployed three GILLIG 40’ battery electric buses (BEBs).

CTE provided technical support and project management services to DTS in support of the zero-emission bus project. CTE managed the entire deployment including coordinating regular meetings and information sharing, tracking project tasks, risks, budget, and timeline, and preparing quarterly reporting required by FTA.

DTS also partnered with the Department of Design and Construction (DDC) and Hawaiian Electric Company (HECO) to construct the charging infrastructure. The charging infrastructure is installed in the Ready Line area of the Kalihi depot and includes nine 150 kW chargers with 25 remote dispensers.

DTS received delivery of the GILLIG BEBs in the last quarter of 2021. In the beginning of 2022, the ready line charging station came online and in March 2022, DTS put the buses into revenue service.

After the buses were deployed, CTE collected, analyzed, and reported on Key Performance Indicators (KPIs). These KPIs helped DTS and OTS track and understand the performance of the BEBs for 12 months following deployment.

Champaign-Urbana Mass Transit District Low-No 2017 60’ Fuel Cell Electric Buses and Electrolysis Hydrogen Refueling Station

Champaign-Urbana Mass Transit District (MTD)

Contact	Key Personnel
Karl Gnadt *Managing Director* 1101 E. University Ave., Urbana, IL 61802 (217) 384-8188 kgnadt@mtd.org	Jaimie Levin *Senior Project Manager* Alison Smyth *Lead Engineering Consultant* Yeshasvi Mahadev *Engineering Associate* Shannon Russell *Managing Associate*

Contract Duration	Project Value	CTE Project Value
Apr. 2018 – Jul. 2023	$14,264,800	$552,625

Project Description

The Center for Transportation and the Environment (CTE) partnered with Champaign-Urbana Mass Transit District (MTD) for a successful award under the 2017 Federal Transit Administration’s (FTA) Low or No Emission Vehicle Program (Low-No). CTE worked with MTD to deploy two 60’ fuel cell electric buses (FCEBs), retrofit the maintenance facility to accommodate hydrogen-powered vehicles, and construct a fueling station that includes a 1 MW electrolyzer for on-site production. These buses are the first commercial articulated FCEBs in the United States.

At the start of the project, CTE worked with MTD to establish a project management plan that summarized tasks and deliverables for the project’s full timeline, including vehicle procurement and station construction. CTE provided project management support throughout the deployment.

From a technical support standpoint, CTE assisted MTD with developing a contract for the buses, including the vehicle specifications. CTE also drafted the Request for Proposals for the fueling station and participated in the evaluation process for the proposals, which resulted in MTD selecting Trillium to design and build the hydrogen fueling station. Trillium will also perform operations and maintenance services for MTD for three years after station acceptance. During manufacturing, CTE and Transworld Associates LLC oversaw quality control inspections for the vehicles.

Both FCEBs have been delivered to MTD, the maintenance facility upgrade is complete, the fueling station is accepted, and the buses have been placed into revenue service. CTE provided eight months of Key Performance Indicator data reporting services and data training and resources to MTD staff.

MTD implemented a solar array at their station that went online in October 2022, reducing the agency’s emissions and cost to produce hydrogen.

Greater Bridgeport Transit Low-No 2017

Greater Bridgeport Transit (GBT) and Connecticut Department of Transportation (CTDOT)

Contact	Key Personnel	
Tom Gorman *Interim CEO* Greater Bridgeport Transit One Cross St. Bridgeport, CT 06610 (203) 366-7070 x124 tgorman@gogbt.com	Kylie McCord *Senior Project Manager* Anna Staddon *Managing Associate*	
Contract Duration	**Project Value**	**CTE Project Value**
Apr. 2018 – Dec. 2024	$1,450,000	$475,000

Project Description

The Center for Transportation and the Environment (CTE) has partnered with Greater Bridgeport Transit (GBT) and the Connecticut Department of Transportation (CTDOT) for a successful award under the Federal Transit Administration (FTA) Low or No Emission Program (Low-No). CTE is providing project management and technical assistance as GBT deploys five 40' Proterra battery electric buses (BEBs). Technical assistance for the project includes bus and route modeling for several different vehicle configurations and routes (including evaluating the need for auxiliary heat), support during technical specification development for vehicles and chargers, coordination with GBT's engineering consultant regarding electrical and charging system design and safety review, completion of Buy America audits, and periodic quality inspections during bus fabrication. CTE has also supported GBT in multiple community and legislative outreach activities throughout the project.

The project was split into two separate phases due to delays associated with completion of Altoona testing for the Proterra 40' 660 kWh ZX-5 bus. GBT elected to purchase two 40' Proterra Catalyst E2 440 kWh buses and installed two depot chargers to gain insight into impacts on training, maintenance, and operations, prior to deploying the three longer range 660 kWh vehicles during the second phase. The first two vehicles entered revenue service in January 2021. CTE helped GBT monitor the in-service buses by providing bi-weekly reports of performance and quarterly Key Performance Indicator (KPI) reports. However, as of July 2022, revenue service and CTE's reporting services have been paused to allow for the investigation of a Connecticut Transit (CT Transit) bus fire to conclude. CTE prepared an interim final report reflecting activities completed during the first phase of the project and preparing for Phase II.

CTE and GBT worked together with Wendel, GBT's engineering consultant, and United Illuminating, the local electrical utility, to complete planning for the installation of the remaining chargers to support deployment of the three Proterra 660 kWh ZX-5 vehicles. GBT received the three Proterra buses and is currently completing driver training and planning for installation of the new chargers. CTE will continue to provide the full scope of services to GBT during the second phase of the project. Additionally, CTDOT and CT Transit technical staff have participated in all-team activities (e.g., goal setting, model result review, etc.) in an effort to further their knowledge of BEB deployments and to translate this into future efforts by CTDOT and CT Transit.

Spokane Transit Authority Zero-Emissions Technologies Fleet Conversion Analysis

Spokane Transit Authority

Contact	Key Personnel
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Contract Duration	**CTE Project Value**
Aug. 2018 – Jun. 2025	$582,086

Project Description

The Center for Transportation and the Environment (CTE) has completed multiple projects to support the Spokane Transit Authority's (STA) Zero-Emission Bus (ZEB) Program since 2018. CTE was initially selected to lead a team to prepare STA's Analysis of Alternatives for Fleet Conversion to Zero-Emission Technologies. CTE applied its standard transition planning methodology to this analysis and identified lifecycle costs, performance issues, risks, and recommended timeline for the deployment of ZEBs throughout STA's entire fleet. While the analysis encompassed STA's entire fixed-route service, considering a transition over an extended period of time, part of the analysis specifically focused on two high performance transit (HPT) lines (City Line and Monroe-Regal Line) in consideration of near-term ZEB adoption. The analysis considered financial and operational impacts of commercially available battery electric transit bus (BEB) technologies. Hydrogen fuel cell electric buses (FCEB) were not included in the original evaluation at the request of STA. The results of this analysis were presented to STA's Board of Directors to better inform decision making on the transition to a ZEB fleet, including in the areas of policy, procurement, and technology.

CTE collected data and simulated battery electric bus operations on STA routes to determine and analyze operating efficiencies under various loading conditions for multiple route types. CTE then applied this analysis to STA's current and proposed blocking schedules to estimate total daily energy requirements across the fleet. This effort also included bus, route, and charge modeling for the HPT lines. Using the outputs from the modeling and simulation efforts, CTE drafted requirements for buses and charging infrastructure. Bus requirements focused on energy storage required to meet STA service, while charging requirements identified charge rates, daily demand, and daily energy requirements for the HPT routes and the entire fleet.

CTE worked with project partner WSP to develop conceptual charging layouts and rough-order-magnitude infrastructure costs for the ZEB transition. Using this data, CTE created a transition plan for the replacement of STA's current fleet to zero-emission and identified the number of standard diesel transit buses that could be replaced by ZEBs based on particular vehicle capability in the context of the transition timeline. The ZEB Transition Plan included a lifecycle cost analysis for the baseline (diesel) and BEB scenarios over the timeline. CTE also developed a charge model to evaluate different charging scenarios, including the use of high-capacity DC fast charging (450 kilowatt) at the depot and on-route,

to determine the total load by time of day for overnight and daytime charging of battery electric buses based on total daily energy requirements to provide STA transit services. CTE evaluated the estimated electricity costs for different charging options based on the current utility rate structure and a proposed electric vehicle rate structure that was developed by Avista, the local electric utility.

CTE subsequently supported STA in developing a request for procurement (RFP) for BEB charging infrastructure. Transition planning outcomes helped inform the specifications required for the infrastructure as well as the conceptual design presented in the RFP. CTE was responsible for developing the technical specifications of the RFP and also participated on the evaluation team tasked with reviewing RFP responses.

Following installation of the charging infrastructure, CTE worked closely with STA as it expanded its BEB fleet, launching the much-anticipated City Line Bus Rapid Transit (BRT) service on July 15, 2023. Currently, CTE is providing service validation and key performance indicator (KPI) reporting for the City Line and Monroe-Regal Line to evaluate bus performance during operations. Validation services were originally scheduled to begin in early 2022, but did not begin until July 2023. This delay was due to construction postponements associated with the BRT infrastructure for the City Line. In addition, STA contracted CTE to update the original ZEB Transition Plan as they are expected to have 40 BEBs in service by early 2024. CTE prepared charging analysis to evaluate the potential to charge all 40 buses at the Boone Northwest Garage with the charging infrastructure currently in place as well as infrastructure that was planned to be installed by early 2024. Updates to the on-route charging analysis for the City Line were completed in order to evaluate multiple different operating schedules proposed by STA. Further evaluation of the potential to incorporate hydrogen FCEBs into the fleet was also completed as part of the revised ZEB Transition Plan. The final ZEB Transition Plan was accepted by STA leadership on June 13, 2024 and is expected to be approved by the STA Board of Directors on June 20, 2024.

In May 2024, CTE facilitated a ZEB workshop with the STA Board of Directors. Further work in 2024 will include support and guidance to STA to evaluate hydrogen fueling strategies and potentially develop an initial hydrogen FCEB deployment project.