



U.S. Department of Transportation
Federal Transit Administration



AC Transit Fuel Cell Bus Longevity Study

Background

The Federal Transit Administration (FTA) started the National Fuel Cell Bus Program in 2006 to facilitate the advancement of fuel cell technology in buses and push the concept to the market. The program has provided \$65 million in funding to 31 projects in the since the program began, matched with 50–50 cost sharing. The Center for Transportation and the Environment (CTE) managed extended performance testing for Alameda-Contra Costa (AC) Transit's Van Hool fuel cell electric buses (FCEBs) as part of this program as it performed routine service and received regular maintenance.

Objectives

This extended study was conducted to provide data about FCEBs and their operating performance, fleet availability, reliability, fuel economy, infrastructure support and maintenance costs, with the goal of demonstrating their ability to meet or exceed the needs of the transit agency.

Findings

Results of the project showed that FCEB technology is capable of exceptional performance in a transit setting, as the buses continually met or exceeded the needs of AC Transit.

CTE led a team in the extended monitoring of 13 FCEBs at AC Transit in California. The project included performance monitoring of the technology and provided critical operational and maintenance cost data on performance over time, and fuel cell, battery, and drive system durability. Included in this report are project performance and results for extended maintenance and support of fuel cells, traction batteries, and hybrid-drive components of the FCEBs, an overview of the continued maintenance and performance of these buses, and a summary of work completed, involved partners, difficulties encountered, data results, lessons learned, advancements made, and recommendations for future research.

This project involved an extension of maintenance and support that was expected to allow operation of the AC Transit fuel cell bus fleet until December 31, 2016. This goal was far exceeded, as the buses continued to operate well beyond December 31, 2019. In total, 11 of the agency's 13 FCEBs remained in daily service at the time of this report.

Despite the technology still being in a state considered not commercially technology-ready, results indicate that the buses were able to exceed targets set by the Department of Energy and FTA for durability and reliability and demonstrated the potential for fuel cells in the transit industry.

Comparison of AC Transit FCEB Fleet Performance to FTA/DOE Guidelines for Commercialization Readiness

	Units	AC Transit Status	2016 Target	Ultimate Target
Bus lifetime	Yrs/mi	9/232,502 (to date)	12/500,000	12/500,000
Power plant lifetime	Hrs	25,969–32,110	18,000	25,000
Bus availability	%	81% (max)	85	90
Fuel fills	Per day	1 (<10 min)	1 (<10 min)	1 (<10 min)
Bus cost	\$	\$2,500,000	1,000,000	600,000
Power plant cost	\$	8,300\$/kw	450,000	200,000
Hydrogen storage cost	\$	Inclusive	75,000	50,000
Road call frequency (bus/fuel cell system)	Miles between road calls (MBRC)	5,323.67/24,318 (2011–2017)	3,500/15,000	4,000/20,000
Operation time	Hrs per day/ per wk	20/7	20/7	20/7
Range	Miles	220	300	300
Fuel economy	Mi per gallon diesel equivalent (MPGDE)	6.8 (2011–2017)	8	8

Benefits

Results from this project will serve as a source of information to be used by organizations in the industry for future projects.

Project Information

FTA Report No. 0169

This research project was conducted by the Center for Transportation and the Environment (CTE). For more information, contact FTA Project Manager Terrell Williams at (202) 366-0232 or Terrell.Williams@dot.gov. All research reports can be found at <https://www.transit.dot.gov/about/research-innovation>.