

American Fuel Cell Bus Project



Developing and Demonstrating the Next-Generation Fuel Cell Electric Bus Made in America

The Federal Transit Administration's (FTA) National Fuel Cell Bus Program (NFCBP) focuses on developing commercially viable fuel cell bus technologies. CALSTART is one of three non-profit consortia chosen to manage projects competitively selected under the NFCBP. SunLine Transit Agency is leading the American Fuel Cell Bus project to develop and demonstrate a next-generation fuel cell electric bus that meets the FTA's 'Buy America' requirements. SunLine and its development partners, BAE Systems, Ballard Power Systems, and ElDorado National-CA, began operating the bus in transit service in January 2012.

SunLine Transit Agency provides public transit to California's Coachella Valley, an area that encompasses more than 1,100 square miles connecting nine cities in Riverside County. SunLine has more than 10 years experience with alternative fuels for bus operations. In addition to its all-compressed natural gas (CNG) fleet, the agency has demonstrated buses powered by blended hydrogen and CNG, batteries, and fuel cells. As part of FTA's NFCBP, SunLine joined with CALSTART to assemble a team of manufacturers to advance fuel cell bus technology to the next stage of development while addressing the challenge of 'Buy America' compliance.

American Fuel Cell Bus Project Details

The American Fuel Cell Bus development team is led by BAE Systems of Endicott, New York. BAE Systems has been manufacturing hybrid drive propulsion systems for over a decade, with more than 3,500 hybrid buses operating around the world. The primary power source for the bus is a Ballard Power Systems FCvelocity-HD6 fuel cell. Although Ballard Power Systems is based in British Columbia, Canada, recent interest in fuel cell electric buses in the United States has attracted the company to establish U.S. manufacturing capabilities in Lowell, Massachusetts.

The bus glider—built by ElDorado National based in Riverside, California—is based on the 40-foot, low-floor Axess heavy-duty bus model.

With a goal of leveraging improvements and innovations from their collective experience with previous demonstration programs, the team is developing a commercially viable, production capable fuel cell electric bus. The propulsion system is based on BAE Systems HDS 200 series hybrid drive, but instead of a diesel engine, the system is powered by a 150-kW Ballard fuel cell. The fuel cell incorporates the latest advances for durability and efficiency based on field demonstrations of Ballard fuel cell-powered buses around the world. The American Fuel Cell Bus also incorporates a suite of electric accessories powered by BAE Systems' Accessory Power System, which is expected to increase the overall efficiency of the bus. ElDorado has been an active team partner, working closely with BAE Systems and Ballard to integrate the propulsion system and fuel cell into the bus glider.

This project would not have been possible without a high level of commitment by each team member. With a 50 percent cost share requirement, each partner has committed substantial funds and time to this effort. In addition to the partner

contributions, additional funding support was provided by the California Air Resources Board and the South Coast Air Quality Management District in southern California.

Real-World Service

Over the next few years, SunLine plans to operate the bus on all of its routes, including Line 111—one of the more challenging routes in the service area. Line 111, operating primarily on Highway 111, is a 28-mile loop that connects most of the cities in the service area, forming the backbone of SunLine’s system. The route is characterized by high traffic, stop-and-go conditions with very high passenger loads. The majority of the area’s employment density is concentrated along this highway, with numerous hotels and shopping centers, providing the best visibility opportunity for the American Fuel Cell Bus.

American Fuel Cell Bus Facts

Bus glider	El Dorado National, Axess
Length/width/height	40 ft/102 in./140 in.
Curb weight	34,800 lb
Passenger capacity	37 seated or 31 seated with 2 wheelchairs; 19 standees
Hybrid system	BAE Systems, series hybrid propulsion system, HDS 200, 200 kW peak
Fuel cell	Ballard, FCvelocity HD6, 150 kW
Energy storage	A123, Nanophosphate Li-Ion; 200 kW, 11 kWh
Accessories	Electrically driven
Fuel/storage	Gaseous hydrogen, 8 Dynetek tanks, 50 kg at 350 bar

In-Service Evaluation

To evaluate the technology, FTA has enlisted the help of the National Renewable Energy Laboratory (NREL). NREL will collect and analyze data from all of the NFCBP bus demonstrations to ensure consistency. Additionally, NREL will collect and analyze performance and operations data from a selection of CNG buses in similar service at SunLine for a baseline comparison. Consistent data collection and analysis will ensure fair and accurate information and comparisons, document the status and progress of fuel cell buses toward commercialization, and provide information to the transit industry to aid in purchasing decisions. The results will also be fed back into the research and development process to appropriately focus future resources.



More Information

FTA: www.fta.dot.gov

SunLine: www.sunline.org

BAE Systems: www.hybridrive.com

Ballard: www.ballard.com

EIDorado: www.enconline.com/caindex.cfm

CALSTART: www.calstart.org

NREL fuel cell bus publications: www.nrel.gov/hydrogen/proj_fc_bus_eval.html

CALSTART is a non-profit organization that works with public and private partners to accelerate the growth of advanced transportation technologies. CALSTART manages several projects within the National Fuel Cell Bus Program.



FTA’s National Fuel Cell Bus Program (NFCBP) is a cooperative research, development and demonstration program, established in 2006, to advance the commercialization of fuel cell electric buses. The program is part of a broader FTA research effort designed to improve transit efficiency and deliver environmentally sustainable transportation solutions. Conducted in close partnership with industry, the program has secured more than \$75 million in local and private commitments, matching the federal contribution. The teams and projects are competitively selected and managed by three non-profit consortia. The project portfolio includes development and demonstration projects, component projects, and analysis and coordination efforts.