

FTA

FEDERAL TRANSIT ADMINISTRATION

NATIONAL FUEL CELL BUS PROGRAM

2005-2018

June 2018



U.S. Department of Transportation
Federal Transit Administration

Overview

- The National Fuel Cell Bus Program
 1. Background
 2. Where we are Today
 3. 9 Active Projects
 4. Questions

Background

- In 2005 Congress created the National Fuel Cell Bus Program
 - Public Law 109-59, signed by President Bush
 - Advance the commercialization of fuel cell buses
 - Authorized 4 years of funding
- Funded for 7 years - 2006-2012 ~ \$13 million per year, ~\$90 million total
- Legislation required grants to “3 geographically diverse non-profit organizations”.
- In 2006 FTA selected 3 non-profits to whom funds were annually allocated through closed competitions

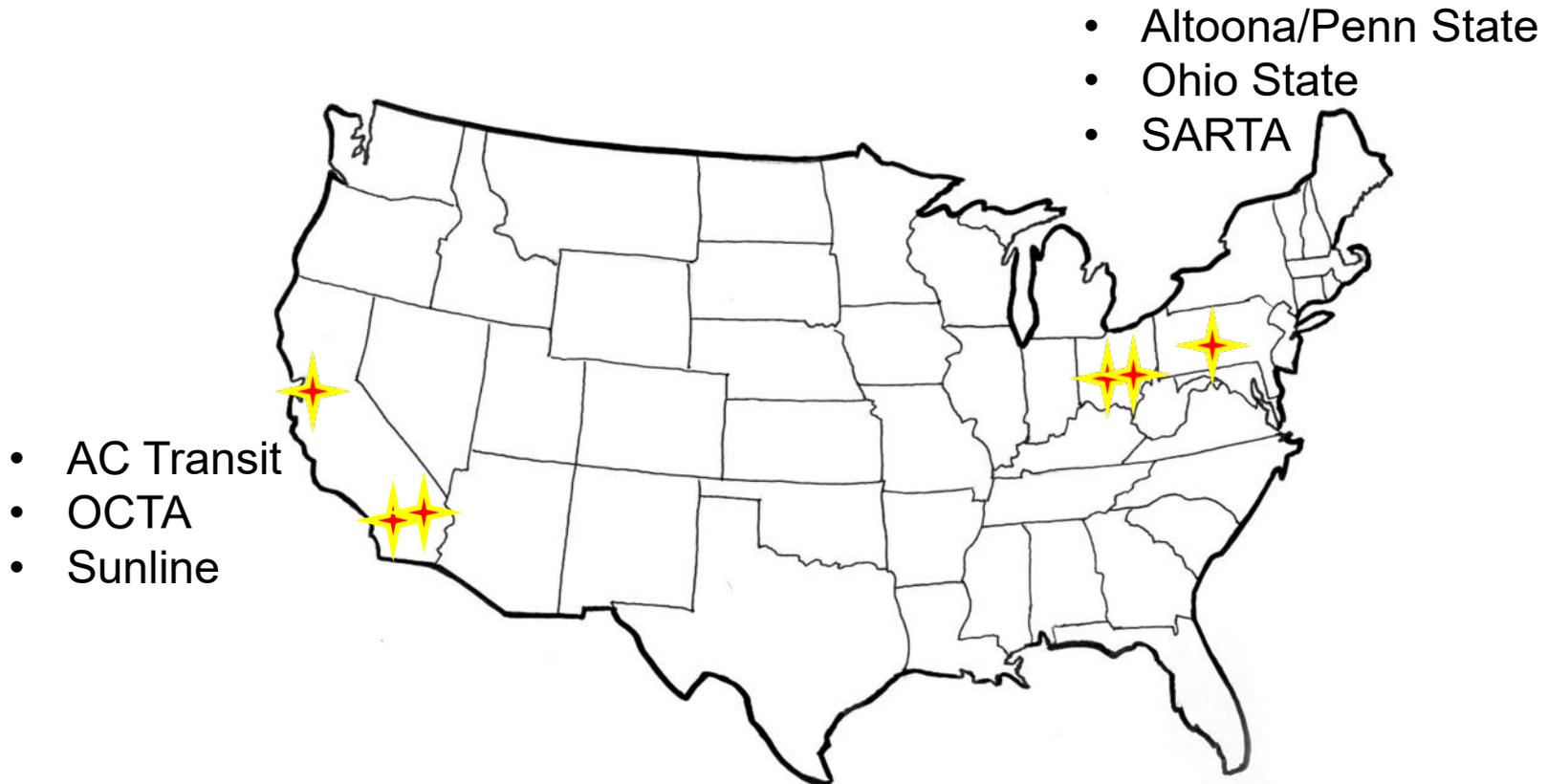
Background cont'd

- Two Key Program Rules
 - Grantees had to be non-profit organizations leading industry consortia
 - A minimum 50% local share funding for all grant agreements

Where we are Today

- **All funding obligated**
- **9+ remaining active projects**
 - 1. FC Bus Testing Protocols & Procedures
 - 2. New Flyer 60' FC Bus
 - 3. Two FC Buses in Ohio
 - 4. Battery Dominant FC Bus
 - 5. UAB FC Bus in Ohio
 - 6. FC Bus in Orange County, CA
 - 7. AC Transit FC Bus Fleet Support
 - 8. Hydrogen Infrastructure & Modelling at Ohio State
 - 9. Outreach
 - Plus support to National Renewable Energy Laboratory (NREL) for evaluations

Program Activity Summer 2018



Two non-profits remain active: CalStart & CTE

1. Fuel Cell Bus Testing

- CalStart, BAE Systems, ElDorado National-California, Ballard Power Systems, the Bus Research and Testing Center and the Thomas D. Larson Pennsylvania State University Transportation Institute
- Developing protocols and procedures so transit FC buses can be tested according to Federal requirements

2. New Flyer 60'



Photo: California Fuel Cell Partnership

2. New Flyer 60'

- New Flyer 60' Articulated FC bus with Ballard Fuel Cell and Siemens power management.
- Altoona test then run at AC Transit for 2 years.
 - Altoona testing complete April 2018,
 - ~15,000 miles
 - Delivery to AC Transit Fall 2018

3. Two Ohio FC Buses



3. Two Ohio FC Buses

- 2 EIDorado National-California buses:
 - Bus #1 - HD6 Ballard Fuel Cell, BAE systems power management
 - Bus #2 - HD6 Ballard Fuel Cell, Siemens Power Management
- Originally planned for demos in Chicago and Cleveland, both buses will be operated in Canton OH, by Stark Area Regional Transit (STARK) with one also demo'd at Ohio State University

4. Battery Dominant FC Bus



4. Battery Dominant FC Bus

- EIDorado National-California Bus
- 80kW US Hybrid Fuel Cell
- BAE HybriDrive propulsion system
- Commercial off-the-shelf 50 kW-hr Li-Ion battery
- In service at Sunline since Feb 2018
 - 2,000+ miles by end of March

5. UAB FC Bus in Ohio



5. UAB FC Bus in Ohio



5. UAB FC Bus in Ohio

- EVAmerica Bus with Ballard HD-6 FC
- Embedded Power Control (EPC) completed the project and provided power management and systems integration
- Demo'd at the University of Alabama Birmingham in 2015-2016
- Now at SARTA as part of outreach and training

6. FC Bus in Orange County



6. FC Bus in Orange County

- Originally a demo in Ithaca, NY
- EIDorado National-California Bus with Ballard HD-6 and BAE Systems power management
- In operation at Orange County Transportation Authority (OCTA) since 2016, fueled off-site at UC Irvine
- OCTA subsequently awarded State funds for an additional 10 fuel cell buses and hydrogen fueling

7. AC Transit FC Bus Fleet Support



Photo: Fuel Cells 2000

7. AC Transit FC Bus Fleet Support

- Alameda-Contra Costa Transit District
 - East (San Francisco) Bay Transit Service
- Supports continuing operations of AC Transit's fleet of 13 FC buses
- Funds extension of key system and component warranties to ensure the fleet continues to operate at an improving rate of performance, including increased availability.

8. Ohio State Hydrogen Fueling & Bus Modelling



8. Ohio State Hydrogen Fueling & Bus Modelling

- Originally part of the demo of a fuel cell bus based on the DesignLine electric bus
- Hydrogen fueling at Ohio State University
 - The project has enabled the FC demo bus at Ohio State
- Modelling of electric bus operations to optimize fleet deployment

9. Outreach

- Fuel Cell Bus Conferences
- Communications and media support
- Supporting activities by organizations supporting FC Bus Deployments
 - Midwest Hydrogen Center of Excellence
 - Zero Emission Bus Resource Alliance