

FTA

FEDERAL TRANSIT ADMINISTRATION

Key Topics in Public Transportation Research

Sean Ricketson

Hydrogen and Fuel Cell Technical
Advisory Committee

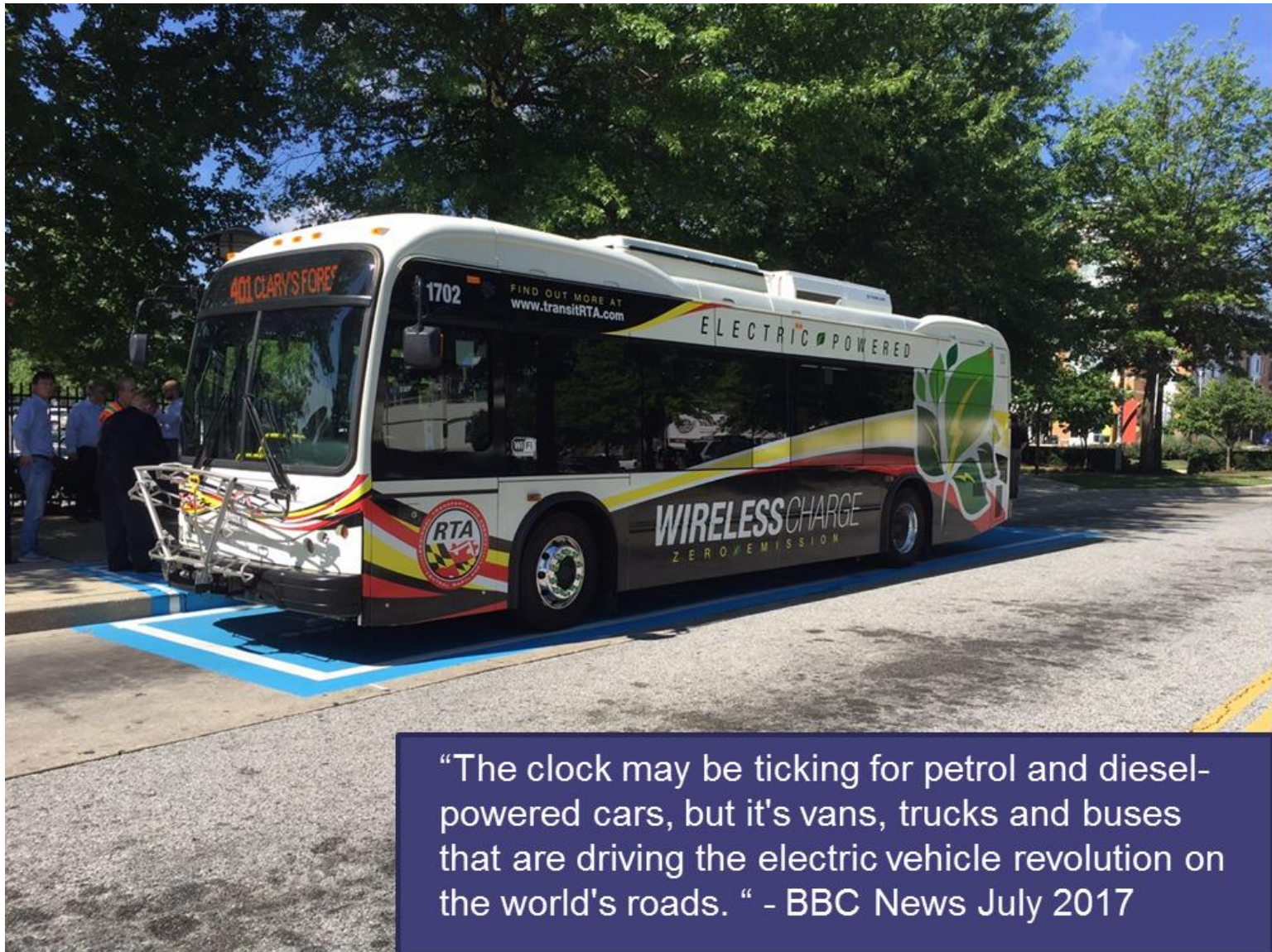
Dec 2018



U.S. Department of Transportation
Federal Transit Administration

Key Topics in Public Transit Research

- This discussion covers selected programs funded by the FTA research office that may be of interest to the Hydrogen and Fuel Cell Technical Advisory Committee



“The clock may be ticking for petrol and diesel-powered cars, but it's vans, trucks and buses that are driving the electric vehicle revolution on the world's roads.” - BBC News July 2017

FTA Research – Overview

Programs
& Projects

Recent
Congressional
Legislation



**FTA
Research
Today**

Agency &
Departmental
Priorities

FTA Research – Overview

- **Programs**
 - National Fuel Cell Bus Program
 - LoNo Program 2013-15
- **Recent Congressional Legislation**
 - Low or No Emission Program 2016-Present
 - LoNo Component Testing
 - Expansion of FTA’s Bus Testing Program
- **Agency and Departmental Goals**
 - Infrastructure
 - Stimulate economic growth and evaluate methods, transit vehicles, service approaches, maintenance strategies, and practices that hold promise to improve lifecycle maintenance as well as systems operations and performance.

Fuel Cell Bus Program

- In 2005 Congress created FTA's National Fuel Cell Bus Program, signed by President Bush, to advance the commercialization of fuel cell buses
- Funded for 7 years - 2006-2012 ~ \$13 million per year, ~\$90 million total



Fuel Cell Bus Program 2018

- **All funding obligated**
- **8+ remaining active projects, most will close in 2019, but buses may continue in operation**
 - 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. Outreach
 - Plus support to National Renewable Energy Laboratory (NREL) for evaluations

Fuel Cell Bus Program 2018

Current program activity is
Mostly in Ohio and California

- Altoona/Penn State
- Ohio State
- SARTA



- AC Transit
- OCTA
- Sunline

NREL Evaluations

- FTA, with support from DoE, funds bus evaluations by the National Renewable Energy Lab
- NREL provides evaluations of real-world technology bus performance
- NREL gathers data on a variety of metrics of both new technology buses and conventional technology as baseline
 - Maintenance costs
 - Operating costs
 - Reliability (Miles Between Roadcalls)
- Consistency over time and across projects ensures data confidence and comparability

Current/Planned NREL Transit Bus Evaluations

NREL Zero Emission Bus Evaluations																
Demonstration	State	City	Bus Length	# Buses	2018				2019				2020			
					1	2	3	4	1	2	3	4	1	2	3	4
ZEBA Demonstration	CA	Oakland	40	13	AC Transit											
American Fuel Cell Bus (AFCB)	CA	Thousand Palms	40	1	SunLine											
	CA	Orange County	40	1	OCTA											
	OH	Canton, Cleveland	40	2	SARTA/GCRTA/OSU											
	CA	Irvine	40	1	UCI											
AFCB (TIGGER)	CA	Thousand Palms	40	3	SunLine											
Battery Dominant AFCB	CA	Thousand Palms	40	1					SunLine							
AFCB (Low-No)	CA	Thousand Palms	40	5		SunLine										
	OH	Canton	40	5		SARTA										
New Flyer FCEB (AQIP)	CA	Thousand Palms	40	5					SunLine							
Advanced Generation FCEB	CA	Oakland	60	1					AC Transit							
On-route Charge BEB (TIGGER)	CA	West Covina	35	12	Foothill Transit											
Plug-in Charge BEB (Low-No)	CA	Concord	29	4	County Connection											
Plug-in Charge BEB (TIGGER)	CA	Long Beach	40	10		Long Beach Transit										
Plug-in Charge BEB (Low-No)	MN	Duluth	40	6			Duluth Transit									

Color coded by Technology:		Fuel cell dominant electric
		Battery dominant fuel cell electric
		Fast-charge battery electric
		Plug-in battery electric

<https://www.nrel.gov/hydrogen/fuel-cell-bus-evaluation.html>

LoNo 2013-2015

- Low or No Emission Vehicle Deployment Program
 - Funded from the FTA Research Budget (Section 5312) for the purchase of clean transit vehicles
 - 17 Projects, \$77.5M, 111 buses, mostly battery-electrics
 - Includes 13 Fuel Cell Buses at SARTA & Sunline
 - The performance of the SARTA buses is being evaluated by NREL

Low-No 2016 to Present

- Low or No Emission Vehicle Deployment Program
 - Funded from FTA’s Bus Capital Program (Section 5339) until 2020
 - So far, three years, 2016-18:
 - 123 projects, \$195M
 - Including 2 fuel cell buses pending delivery, one at SARTA, and one at Champaign-Urbana
 - <https://www.transit.dot.gov/funding/grants/lowno>

LoNo CAP

- Low and No Emission Component Assessment Program (LoNo-CAP)
- Up to \$3M/year, total
- Auburn University and Ohio State
- FTA pays 50% of the cost for the testing of bus components including batteries, fuel cells, power management
 - Tests maintainability, reliability, performance, structural integrity, efficiency, and noise
- Voluntary, no passing or failing scores

Bus Testing

- FTA's Bus Testing Program (Altoona Testing) tests new transit bus models for:
 - safety
 - structural integrity and durability
 - reliability
 - performance (including brakes)
 - maintainability
 - noise
 - fuel economy and
 - emissions

Bus Testing cont'd

- To be eligible for purchase a transit bus using FTA funds, buses must receive a passing score
- Until the FAST Act, bus testing occurred at Penn State only (Altoona Testing)
- Now, testing is being expanded to include Ohio State and Auburn Universities but will on focus on LoNo vehicles
- This presents a challenge to ensure all three facilities are identical in capability and procedures

Bus Testing & LoNo-CAP

- As a result of the need to coordinate three centers, as well as the ongoing work under LoNo-CAP, FTA has the opportunity to support innovative research effort going forward focused on facilitating bus and component testing and research.

Thanks!

Sean Ricketson, Senior Engineer
Office of Infrastructure and Asset Innovation
Federal Transit Administration
USDOT