

National Fuel Cell Bus Technology Development Program



William Chernicoff
Research and Innovative
Technology Administration

Christina Gikakis
Federal Transit Administration

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Federal Transit Administration (FTA) Overview



- ◆ **Provides financial and technical assistance to the local public transit systems** to plan, construct, and operate public transportation in the U.S.
- ◆ Systems includes buses, subways, light rail, commuter rail, streetcars, and passenger ferry boats
- ◆ **Current programs authorized in SAFETEA-LU** (Aug. 2005)
- ◆ **FY 2006 budget over \$8.5 billion**, includes
 - \$6.9 billion for Formula and Bus Grants
 - \$1.5 billion for Capital Investment Grants
 - **\$54 million for National Research Program**, includes many Congressionally-directed efforts

Transit Interest in Clean, Energy Efficient Vehicle Technologies



◆ Need to Meet Emissions Standards

◆ Reduce Operating Cost

- Fuel efficiency – fuel is second largest operating cost
- Current full size transit buses achieve only 2 to 4 mpg
- Reduce maintenance costs
- Improve performance

◆ Consumer Acceptance/Public Relations

- Smoke and odor free
- Clean and quiet
- Being “green”

Transit Bus as Vehicle for New Technologies



◆ Fleet Operations

- Centrally fueled and maintained
- Professional operators, mechanics, and fuelers
- Urban stop-and-go duty cycle; fixed route & schedule
- Less rigorous start-up & roll-out requirements

◆ Size and Weight of Vehicle

◆ Federal Support for Capital Purchases

- Federal funding support
- Programs to assist introduction of new technologies

◆ High Visibility/High Impact

- Operate in densely populated areas
- Broader public exposure and acceptance

Transit: Long History of Clean Vehicle Technologies Deployments



◆ Alternative Fuels

- Alcohols – methanol, ethanol
- Natural Gas – CNG, LNG
- Propane



◆ Diesel Engine Technologies

- Particulate traps, Engine design

◆ Electric Drive Technologies

- Electric buses- niche applications
- Hybrid buses - emerging commercially



◆ Fuel Cell -RD&D



Key Lessons Learned

- ◆ Transit Market Too Small
 - 2,000 to 4,000 new transit buses per year compared to 100,000s of trucks
 - Technologies with only transit applications will always have a significant cost premium
- ◆ Using Transit Buses to Lead Emissions Standards Not Successful
- ◆ Federal Assistance Hastens Commercial Market
 - Cost differential of initial capital purchase critical

Transit Interested in Clean, Energy Efficient Technologies Continues



- ◆ Local and community pressure to reduce emissions, below standards
- ◆ Fuel efficiency important to transit - operating costs not eligible for FTA financial assistance (except in limited circumstances)
- ◆ Congressional interest -- earmarks in both FTA research and capital budgets

Fuel cell buses can meet transit bus needs but, significant barriers remain to their commercialization

Barriers to Fuel Cell Bus Commercialization



- ◆ **Initial Vehicle Cost Premium**
- ◆ **Improve Performance**
 - Increase durability /Increase reliability /Fuel efficiency
- ◆ **Energy Storage**
 - Efficiency / Cost / Weight and volume
- ◆ **Transit Bus Systems Integration**
- ◆ **Fueling Infrastructure**
 - Cost /Availability
- ◆ **Maintenance Training Programs**
- ◆ **Synthesis of Valid Information**
- ◆ **Federal Requirements for Bus Purchases**
 - 12 year life, bus testing requirements

National Fuel Cell Bus Technology Development Program (NFCBP)



- ◆ *Newly authorized in SAFETEA-LU*
- ◆ \$49 Million over fiscal years 2006 to 2009
- ◆ Facilitate Development of Commercially Viable Fuel Cell Buses
- ◆ Teams and Projects Competitively Selected
- ◆ 50% Non-Federal Cost Share Required



NFCBP Program Goals

- ◆ Facilitate development of commercially viable fuel cell buses
- ◆ Significantly improve transit bus fuel efficiency and reduce petroleum consumption
- ◆ Reduce transit bus emissions
- ◆ Establish a globally competitive U.S. industry for fuel cell bus technologies
- ◆ Increase public acceptance of fuel cell vehicles

NFCBP Objectives and Technical Targets



- ◆ Pathway to Commercialization
- ◆ Durability – 4 to 6 years and 20,000 to 30,000 hours
- ◆ Bus Cost – less than 5 times diesel bus
- ◆ Reliability – more than 90% availability
- ◆ Fuel Efficiency – 2 times comparable transit bus
- ◆ Emissions – Exceed 2010 EPA Standards
- ◆ Vehicle Performance – comparable transit bus
- ◆ Enhance Public Acceptance

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Legislation Establishes Key Elements



- ◆ **Secretary required to conduct National solicitation and select on competitive basis**
- ◆ Selection criteria outlined in legislation
 - Further fuel cell technology for transit bus operations,
 - Finance plan and cost share
 - Advance different fuel cell technologies
 - Priority consideration to organizations with experience managing advanced trans tech projects; H2 and fuel cell
- ◆ Section 5309 conditions apply (bus capital requirements)
- ◆ Individual projects conducted through (up to three) geographically-diverse, non-profit organizations
- ◆ 50% Non-Federal cost share required

NFCBP Implementation Strategy



- ◆ Seeks best and most innovative ideas from industry on how to best achieve program objectives
- ◆ Complements other U.S. Government, state and regional efforts
- ◆ Proposals in two-step approach – White Papers then Full Proposals
- ◆ Evaluation team includes experts from across Government
- ◆ Projects selections for full four years from initial program solicitation



NFCBP Program Implementation

- ◆ FTA released program announcement in April 2006
- ◆ FTA received 65 white papers from 10 organizations
- ◆ FTA selected 28 white papers from 4 organizations to submit full proposals
- ◆ Evaluation team
 - DOT's Research and Innovative Technology Admin., Federal Motor Carrier Safety Admin., FTA; the Dept of Energy, the Nat'l Renewable Energy Lab, U.S. Office of Science and Technology Policy
- ◆ 14 projects from 3 organizations ultimately selected
 - WestStart-CALSTART
 - Center for Transportation and the Environment
 - Northeast Advanced Vehicle Consortium
- ◆ Additional selections limited by program funding

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Press Event Announcing Selections



- ◆ FTA Administrator Announced Project Selections
October 12, 2006 in SunLine Transit in California

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

SunLine Transit General Manager C. Mikel Oglesby (left),
Congresswoman Mary Bono and FTA Administrator James Simpson.

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Overview of Project Selections



Balanced portfolio of project selected to best advance fuel cell bus commercialization

◆ Diversity of partners across teams

- Four fuel cell manufacturers -UTC, Ballard, Hydrogenics, Nuvera
- Multiple drive system integrators - includes ISE Corp, BAE Systems and GE Global research
- Multiple bus manufacturers
- Fuel suppliers
- Transit agencies

◆ Demonstration sites across U.S. in various climates

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Overview of Project Selections



◆ Full spectrum of technical approaches

- Multiple drive technologies/ configurations
- Fuel cell stack size/ utilization
- Multiple energy storage technologies - batteries, Li ion, ultracaps

◆ Both large and small project efforts, with varying risk levels

◆ Includes outreach and coordination efforts

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Current Status



- ◆ Project selections announced for \$45M of \$49M authorized
- ◆ Negotiations with three consortia commencing
- ◆ Projects will be awarded to consortia through Cooperative Agreements
- ◆ FY 2006 funding available now
- ◆ FY 2007 funds not yet available, DOT currently under continuing resolution
- ◆ FY 2007 to FY 2009 funds contingent upon future appropriations

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Other Program Elements



- ◆ Data collection requirement based on NREL data protocol
- ◆ Regular program review meetings to share findings/ results across projects
- ◆ Program will integrate and coordinate with existing FTA and DOT research efforts through FTA's bus technologies development roadmap (under development) and DOT's hydrogen taskforce
- ◆ FTA intends to coordinate program efforts with DOE's FreedomCAR and Hydrogen fuel initiatives



For More Information Contact

- ◆ Christina Gikakis
DOT/Federal Transit Administration
Office of Research, Demonstration and Innovation
Program Manager, NFCBP
202-366-2637
christina.gikakis@dot.gov