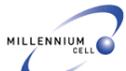




# National Fuel Cell Bus Technology Initiative



## OVERVIEW

The National Fuel Cell Bus Technology Initiative (NFCBTI) is a targeted, multi-year program to develop, deploy and commercialize clean, fuel cell and hydrogen powered drive systems for transit vehicles. WestStart-CALSTART – North America’s leading advanced transportation organization – is leading the campaign to secure federal funding for the NFCBTI. The initiative is aimed at creating a partnership of top private and public partners, including industry leaders in manufacturing and using fuel cell technologies.

The goal of the initiative is to drive down the costs and increase the reliability and durability of fuel cell and hydrogen technologies for transportation by focusing on the best, early platform for fuel cell commercialization in vehicles – the transit bus.

The initiative proposes an aggressive six-year, \$25-million per year effort to address the major challenges and opportunities for fuel cell commercialization, to keep pace with fuel cell development efforts globally, including Europe. The U.S. House has included \$65 million in the six-year reauthorization of the Department of Transportation’s highway programs. Section 3039 calls for a cost shared, competitive grant program with a maximum of four projects in geographically diverse areas of the country being selected. The scope of the initiative covers hydrogen production, energy storage, fuel cell technologies, vehicle systems integration and power electronics technologies.

## BACKGROUND

The transportation sector in the United States continues to rely heavily on fossil fuels that create significant public health and national security problems. Over one-half of the nation’s people live in areas that do not meet the EPA’s air quality standards. Despite over 30 years of various programs, the nation’s dependence on foreign oil has continued to grow. Presently over 60% of the nation’s oil is imported. OPEC nation members control over 70% of the world’s future oil reserves and the trend is toward increasing reliance on

### Industry Supporters (to date)

- AC Transit
- Ballard
- Boeing
- CEO Coalition to Advance Sustainable Technologies
- Cobasys
- Donaldson
- Ebus, Inc.
- EC Systems
- ECD Ovonic
- Enova Systems
- Environmental & Energy Study Institute
- Hydrogenics
- H<sub>2</sub>Gen
- Idatech
- ISE Research
- Millennium Cell
- National Hydrogen Association
- North American Bus Industries (NABI)
- Northeast Advanced Vehicle Consortium
- Pi Technology
- Quantum Technologies
- Solectria Corporation
- Sunline Transit
- Thor Industries
- Tri-Metropolitan Transportation District of Oregon (TriMet)
- U.S. Fuel Cell Council
- UTC Fuel Cells
- WestStart-CALSTART



nations such as Iraq and Iran.

With the proper level of federal assistance, fuel cells can become the long-term solution to the nation's air quality and energy security problems. Fuel cells operate on hydrogen, which can be energy. The only emission from a compressed or liquid hydrogen fuel cell bus is water. Also, emissions from an internal combustion engine fueled by hydrogen are extremely low – indeed sometimes below the level of measurement.

### Status of Technology Today

In the United States there is presently one fuel cell bus operating in revenue service. No new additional fuel cell buses are scheduled to be delivered until 2005 – and then at very high prototype costs per bus. Clearly, fuel cell buses are still in the development process, with significant issues yet to be resolved. For example, cold weather operation, inadequate hydrogen storage, start-up time, durability, training and cost issues all remain impediments to widespread adoption of the technology. In short, the fuel cell and hydrogen bus industry is in the pre-commercialization phase and is in need of additional research, development, and demonstration assistance from the government.

### Major European Program Underway

The European Economic Union (EU) has already initiated a program to deploy 30 fuel cell buses in 10 cities by 2004. This program is supported by a substantial subsidy from the EU. In a recent announcement, the EU said that it would be providing \$2 billion over the next five years for sustainable energy projects. Fuel cells and hydrogen systems will be the primary focus of that investment. If U.S. firms are to remain competitive in this field the federal government must also support them.

The NFCBTI proposes to learn from the Europeans and focus on a small number of transit properties for the deployment and testing of fuel cell buses. The training, infrastructure, and investment needed for a fuel cell bus program is significant. Given the relative maturity of the technology, it would be better to use the European model and focus the demonstrations on a limited number of transit properties. These transit districts in turn would be required to pro-actively share information with all transit operators nationwide. The initiative partners would help facilitate that flow of information.

### Complements Light-Duty Program

The Department of Energy is seeking to commercialize fuel cell passenger cars in a partnership with the auto manufacturers called the Freedom Car program. This program is exclusively focused on the development of fuel cells for light-duty vehicles. The NFCBTI would primarily focus on the development of this technology for buses.

### Why Transit for Fuel Cells?

Despite significant activity focused on fuel cells for light-duty vehicles, transit buses are actually a more promising first platform for the introduction of new technology.

- Buses have fewer packaging and weight constraints than do passenger cars and are a better fit for current fuel cell technology.
- Fueling infrastructure concerns are less critical for transit because fleets are centrally refueled and most have experience with multiple fuels.
- Transit districts have sophisticated maintenance programs and trained mechanics on staff.
- Transit bus purchases are centralized and subsidized.
- Transit vehicles are effective mobile “billboards” and rolling classrooms to assist with fuel cell education.





In the past decade, the transit industry has played a leading role in developing and testing advanced fuels and drive trains. For example, over the last decade, the market share for natural gas transit buses has increased from zero to 25%. Transit districts are ideal proving grounds for new fuels as they operate the buses on fixed routes, have highly trained mechanics, and utilize centralized refueling facilities. The Department of Transportation (DOT) is well suited to manage this program because it finances 80% of all transit bus purchases and is the agency that regulates and manages transit operations on a national basis.

## SUMMARY

The NFCBTI program requests a modest amount of federal investment over the next six years to facilitate the commercialization of fuel cell buses. The larger societal benefits in terms of cleaner air, less global warming, and energy security will provide an enormous return on this investment.

Presently, fuel cell bus technology is in a relatively immature phase and not ready for the marketplace.

In the reauthorization of the transportation bill the supporters of the National Fuel Cell Bus Technology Initiative (NHFCBT) are calling for a sustained six-year program that will enable the fuel cell bus industry to reach the commercialization phase.

### Fuel Cell Bus Initiative Goals

- Work to develop a 6 year, \$25-million per year program to address those challenges
- Focus on reducing technical and cost barriers for fuel cell use, including reliability, life-cycle, weight, volume, start-up time, etc.
- Use transit demonstrations as “rolling classrooms” for fuel cell education

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