INNOVATION DRIVE

For Immediate Release

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FTA Awards $5.67 Million to Demonstrate Economical Hybrid-Electric Fuel Cell Bus

Alexandria, Virginia—October 13, 2006— Innovation Drive is pleased to announce that the Federal Transit Administration (FTA) has selected its integrated product development team to demonstrate an advanced hybrid-electric hydrogen fuel cell bus in Alabama, Connecticut, and South Carolina. The project, valued at $13.1 million, will achieve significant progress toward the FTA's 2015 Goals for the National Fuel Cell Bus Program (NFCBP) over the next four years. Leveraging the federal investment, the team is providing over 50% cost match to complete the program.

Funding for the multimillion dollar NFCBP was made possible through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) which was made public law on August 10, 2005. The U.S. Senate Committee on Banking, Housing and Urban Affairs has jurisdiction over the critical transportation reauthorization and was instrumental in ensuring transportation related program funding would be available through SAFETEA-LU. The committee is chaired by Senator Richard Shelby (R-AL).

In an official announcement, FTA Administrator James Simpson said "By funding this program, Congress has allowed the transit industry to continue its long tradition as an innovator in the areas of alternative fuels and technology. Through this national program, we can consolidate—and accelerate—the process of making hydrogen buses commercially feasible as cleaner, more energy efficient alternatives". The FTA made the announcement October 12th in California.

The team is a diverse group of 16 organizations from private industry, education and the public sector representing seven states. All members of the team are members of the Center for Transportation and the Environment (CTE) of Atlanta, Georgia who will manage the program for FTA. In addition to Innovation Drive, team members include Mobile Energy Solutions, Sabre Engineering, Hydrogenics Corporation, Nilar Corporation, Martin Marietta Composites Division, Birmingham Jefferson County Transit, University of Alabama Birmingham, Southern Clean Fuels, Connecticut DOT, CTTRANSIT, Greater New Haven Clean Cities Coalition, South Carolina Research Authority, University of South Carolina, Central Midlands RTA and the Palmetto State Clean Fuels Coalition.

The technology team, led by Mobile Energy Solutions (MES) of Golden, Colorado, completed the baseline design of a composite bodied, battery-dominant, hybrid-electric hydrogen fuel cell bus utilizing automotive size fuel cells as part of a previous FTA-sponsored program. This technology specific vehicle will be powered exclusively by domestic energy sources; including hydrogen, grid-electricity, and renewable sources, such as wind, to further reduce conventional power source requirements.

Additionally, the demonstration buses, which will be manufactured by Mobile Energy Solutions, will produce no harmful emissions. Conventional transit buses are powered by diesel engines. Diesel emissions contain particulates that are known to cause asthma and other respiratory complications. Furthermore, particulates are believed to cause other problems, including heart disease and cancer. Diesel emissions cost

the public hundred of millions of dollars annually in health care costs. These costs are compounded by other economic drains such as lost work days.

Furthermore, the hydrogen fuel cell power-plant employed in the MES bus does not produce carbon dioxide, a greenhouse gas. In a world increasingly concerned with global warming, zero-emission transit will provide significant reduction opportunities in global greenhouse emissions. Currently, U.S. transportation accounts for approximately 27 percent of U.S. greenhouse gas emissions.

"The MES bus is the first economically viable fuel cell bus. It makes sense for transit operators as it offers affordable lifecycle costs that will be comparable with diesel buses, after the technology is fully commercialized," says Dale Hill, President of MES. "Though the capital investment will still be high, the bus' projected operational costs will be nearly 40 percent lower than diesel powered buses. Over the course of a 12-year operational life, in addition to the elimination of emissions, the MES bus will be cost-effective strictly in terms of economics."

"The MES hybrid-electric fuel cell bus further will appeal to transit operators in that its power sources – electricity and hydrogen – should not experience dramatic price fluctuations. Many transit operators have recently experienced significant operational cost overruns due to price spikes of fossil fuels due to unstable imported energy sources and supply line disruptions from natural events, including Katrina and the Alaskan pipeline. This vehicle's operational costs will be stable, and likely will decrease over time as more efficient hydrogen production technology is realized," says Carla York, CEO of Innovation Drive.

Over the next 3-5 years, the Team believes its commercialization plan will lower the costs through scaled manufacturing and component cost reductions. Within this timeframe, the acquisition is expected to be comparable with conventional diesel buses. When these goals are reached, the MES bus will be more economic

"Simply put, in 5 years, the MES hybrid-electric fuel cell bus likely will be more cost-effective than diesel buses. However, the national security benefits are very important as well," said Tidal "Ty" W. McCoy, Chairman of Innovation Drive. "These buses will assist our country in decreasing its dependency on imported fossil fuels."

"Over time, we expect this type of technology and its multitude of configurations to be applied to automobiles and other mobility vehicles," continued Mr. McCoy, a former Acting Air Force Secretary and national security expert that still provides consultation to the government. "The results of this demonstration program are truly immense. Creating a sustainable economy is clearly a major initiative of our national leaders. Though this program may be an incremental step toward energy independence, it is clearly an important one, given the endorsement of the FTA and the participation of the National Renewable Energy Laboratory (NREL)."

The consortium, managed by the Center for Transportation and the Environment (CTE) of Atlanta Georgia, will build, test, deliver and demonstrate a true zero-mission transit bus in three regions of the country to collect performance data in varying climates and terrains. The data will be used to better understand fuel cell performance in the cold, northern winters compared with hot, humid southeastern summers. Additionally, the demonstrations will analyze how contrasting terrains – flat and hilly - affect bus performance.

The consortium's primary technology companies have exceptional experience in alternative fuel technology and transit experience. These team members include: Mobile Energy Solutions (MES), Sabre Engineering, Hydrogenics Corporation, Nilar Batteries, and Martin Marietta Composites. The engineering team is the same that designed Denver's 16th Street Mall buses, the largest alternative fuel transit bus fleet in North America, now in its seventh year of successful revenue service.

"The hybrid-electric fuel cell design approach has generated significant interest from many transit operators around the world," said Dale Hill, President and Chief Engineer of Mobile Energy Solutions. "It is the most cost-effective, reliable, and low-maintenance zero-emission transit bus of which we are aware. California transit agencies are required by law to transition to zero-emission operations and several agencies indicate that this is the only pragmatic solution for their needs."

Data collection, recording, and validation will be performed by the NREL, University of Alabama-Birmingham, University of South Carolina and the Greater New Haven Clean Cities Coalition. This project represents the first time NREL will be involved with data collection and verification during testing and demonstration of a new vehicle.

The buses will be operated by Birmingham-Jefferson County Transit Authority, CTTRANSIT, the University of South Carolina and Central Midlands Regional Transit Authority. The operators offer routes in contrasting climates and terrains.

Innovation Drive will serve as a Team Leader, coordinating and monitoring day-to-day activities for the project. It will be responsible for collecting information for government reporting as well as marketing and communicating milestone accomplishments and program successes to the industry working with CTE.

This fuel cell bus demonstration will demonstrate the viability of the hybrid-electric technology in real-world revenue service. However, it also will provide baseline operational cost data to transit operators on which transit agency planners may use to plan budgets. Reliable cost information will enable these transit planners to rationalize large scale investment and adoption of zero-emission technology as the country and world begins to transition to a carbon-constrained economy.

Finally, the demonstration will also attempt to foster public acceptance of advanced transit technology as a clean, reliable, and affordable option. As the buses are demonstrated in Alabama, Connecticut, and South Carolina, other states will be confident in introducing these buses to their cities and municipalities. In time, awareness and confidence will be increased, allowing for further advances to be more fully embraced by private consumers.

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END NOTES

1. ACHIEVING 2015 FTA GOALS

The demonstration of the MES-designed hybrid-electric fuel cell transit bus will be highly valuable to the NFCBP's 2015 goals. The purpose-built bus can facilitate significant strides in achieving the following stated goals:

(1) Achieve a fuel cell bus vehicle cost of no greater than 5 times that of a commercial transit bus
(2) Achieve a 4–6 year or 20,000–30,000 hours of durability for the fuel cell propulsion system
(3) Achieve a doubling of the fuel efficiency compared to a commercial transit bus to enhance energy security.
(4) Achieve fuel cell bus performance equal to, or better than, equivalent commercial transit bus (acceleration, gradeability, range, braking distance, etc.).
(5) Exceed the 2010 heavy-duty bus emissions standards.
(6) Foster economic competitiveness in fuel cell bus technologies.
(7) Increase public acceptance for fuel cell bus technologies

After the manufacture of the first prototype, the bus price will be under $1 million, just three times that of current commercial diesel transit buses. (1) Two primary factors will drive the cost-reduction of the MES bus compared with competitive fuel cell buses, which currently cost $2-3 million.

First, the MES team employs a battery-dominant hybrid-electric power train. Roughly one-third of the power requirements are supplied through stored electricity in specially packaged "Super Batteries." The remaining power is supplied by two automotive type fuel cells. This simple shift in the design approach reduces the power demanded of the fuel cells, well recognized as the most costly components in the bus. Obviously, minimizing the size of the fuel cell(s) will eliminate substantial cost.

The vehicle is designed for easy integration of newer technologies that are more efficient and affordable. As an example, Hydrogenics, the fuel cell manufacturer, will continue its research to improve the "balance of plant" of its fuel cell.

A proposed strategy to develop a Parallel Variable Output Fuel Cell configuration may increase life by an additional 50%, depending on the operating cycle. Two 16kW fuel cells, each capable of providing the power to operate the vehicle under normal conditions, will provide power during extreme power demand (such as a very hot afternoon or at high speeds). However, extreme current draw is sporadic. Therefore, alternating the workload between each fuel cell avoids prolonged combined usage of the cells, thus extending overall life. This configuration may realize collective operating efficiently in excess of 7,000-8,000 hours.

Coupling cost reduction with increased life expectancy will effectively approach the NFCBP goal of 20,000-30,000 hour stack life in terms of cost-benefit. Although the 20,000 hour life may not be reached as soon as desired, the reduction in stack replacement costs for smaller fuel cells will be cost-effective in terms of overall lifecycle costs. A reasonable estimation is the MES bus will require no more than three stack exchanges to meet the NFCBP goal, while a large fuel cell stack that managed to achieve 20,000 hours life prior to replacement is anticipated at a higher cost than the three replacements to the MES bus. (2)

Equally important is the fact that the MES bus will be purpose-built, as opposed to an expensive retrofit derived from a heavy steel chassis bus. Building the vehicle from "scratch" permits efficient line production and quality assurance programs (as certified by ISO 9001) will reduce labor cost and errors during the manufacturing process, ultimately saving mitigation costs throughout the lifecycle of the vehicle.

MES estimates that its vehicle will realize more than 10 miles per kilogram of hydrogen (gas gallon equivalent), effectively tripling the mileage per gallon of currently available commercial buses. The comparison is slightly skewed in that the MES bus also is powered by grid-energy stored in its batteries. Therefore, a more accurate measure must use a power-cost comparison. MES estimates that its bus will cost $0.42 per mile to operate. Commercial diesel vehicles cost $0.69 per mile; using diesel prices of $2.25/gallon (a generous assumption given today's volatile fuel prices). Fuel cost will continue to diverge in favor of the MES bus as fossil prices continue to escalate and engine emission control becomes more expensive. Additionally, hydrogen production will become less expensive as production scale increases, technologies improve, and renewable sources are linked to the hydrogen generators, likely doubling the MES bus efficiency. (3) Finally, the additional revenue provided by the Proximity Advertising system will further defray costs associated with vehicle operation.

Designed to perform as well as a commercial diesel bus, the MES bus will perform better in many categories. The bus body length is 35 feet, 5 feet shorter than conventional transit industry chassis while seating the same number of passengers. This makes the bus more maneuverable and permits the navigation of smaller streets and avenues, ostensibly increasing service coverage without reducing capacity.

Constructed from a hybrid composite material, vehicle weight is reduced up to 12,000 lbs compared to 40 foot diesel buses and 14,000 lbs when compared to current fuel cell buses. Reduced weight translates into reduced energy consumption, which in turn reduces 'on-board' energy storage requirements for a 300+ mile range. Despite the lighter materials, the structural integrity of the composite bus is improved over a steel chassis as proven by side impact tests conducted by both NABI and Northrop and further validated by Altoona testing of the NABI Compobus.

Due to the nature of electric drive vehicles, the MES bus accelerates exceptionally well. The regenerative braking system extends the life of brakes by slowing the vehicle through charging resistance. Rapid stops are enhanced greatly by the reduced vehicle weight and four-wheel disc brakes. (4) Since the vehicle is battery-dominant fuel cell, it is a true zero-emission bus. There are no toxic emissions or greenhouse gases released to the environment, only water vapor and heat, easily surpassing the requirements of Heavy Duty Bus Emissions Standards for 2010. (5)

The Viper Drive controller is a fully integrated redundant power management system, optimizing electrical consumption of the vehicle subcomponents while prioritizing the total systems electrical requirement through peak reductions during various phases of the bus duty cycle. The system mitigates grounding issues, radio frequency interference (RFI) and electromagnetic interference (EMI), and is the first to use the WAGO non-screw wiring terminal with self locking wiring harness.

Based on the resounding success of and lessons learned from the alternative fueled, hybrid-electric, Denver 16th St. Mall shuttles designed and built by the MES Team, the IPT believes that it will achieve all of the goals set forth in its design. If so, market forces will accelerate competition within fuel cell bus technology, or competing companies will wilt as the market will no longer accept costly, inefficient, retrofitted vehicles with multi-million dollar lifecycle costs. Simply put, the most affordable product will also be the best performing, most energy efficient and reliable fuel cell bus on the market. In 3-5 years, improvements in manufacture and component cost reduction will assist MES in the realization of a fuel cell bus that is price-competitive with any other commercial bus. (6)

The demonstration of these fuel cell buses will verify data related to the viability and reliability of the hybrid-electric fuel cell technology being presented to the industry and public. The technology's overall lack of environmental impact, especially as renewable sources such as wind and solar are used to charge battery systems and produce hydrogen, will fulfill our nation's desire to move to a non polluting, domestic fuel source. All of the power consumed by the MES transit bus will be produced domestically.

To ensure public awareness, the vehicle itself has the capability to educate the public through content provided on its on-board video screens. (7)

According to the American Public Transit Association (APTA), there are approximately 77,000 transit buses operating in the United States. If only half of these vehicles were replaced with hybrid-electric fuel cell buses over the next decade, the US could reduce fossil fuel consumption by 570 million gallons per year. This technology will likely be transferred to automobiles over the coming decades, further reducing dependence on imported energy.

2. PRINCIPAL OF OPERATION

The MES bus employs a battery-dominant, hybrid-electric hydrogen fuel cell power plant system. Batteries provide a portion of the power (±80 miles) required to operate the transit bus as well as serving as a storage medium for the energy generated by the fuel cell and the regenerative braking.

The remaining power is primarily provided through a chemical reaction in the fuel cell. Hydrogen reacts with oxygen from atmospheric air to create electricity captured by a PEM (polymer electrolyte membrane or proton exchange membrane) in the cell stack. The only by-products in the process are water and heat.

The regenerative braking system also recharges the battery system in the same manner as many hybrid-electric systems do today. When the bus operator removes his foot from the accelerator, the motor electronically changes to a generator for the purpose of capturing the available regenerative energy. The electricity generated is fed directly back to the batteries, where the charge is stored until needed.

The MES system is unique in that it can rapidly store large amounts of electricity without generating heat due to the advanced battery management system. This also enables the NiMH batteries to accept rapid recharging, which increases the ability to capture regenerative braking energy from the 10% of most battery technologies to the 30 – 40% range, greatly enhancing the range of the bus exclusively from battery power.

The result is a vehicle with a range in excess of 300 miles, depending on operating conditions and environment.

3. PROJECT TEAM

The Technology Team has over 200 person-years of transit experience. The Technology Team was assembled to ensure best-in-class service for a premium product.

I**nnovation Drive, Inc.** provides integrated solutions through operational and management support. The company's mission is to commercialize new technologies and processes that improve performance, efficiency, environmental impacts and economic prosperity, and reduced dependence on imported energy. ID personnel have been involved in the procurement, manufacture and deployment of over 150 alternative fuel, advanced technology transit vehicles. Current activities include the continued support of development, demonstration and commercial implementations of energy production through wind and water turbines, hydrogen production using electrolysis, new transit technologies to improve operations, and several Homeland Security technologies. For more information, visit www.innovationdrive.net.

Mobile Energy Solutions, LLC (MES), headquartered in Colorado, is a leading edge entrepreneurial company that consistently works "outside the box" in the emerging industry of high technology, ultra low emission, commercial, hybrid-electric, battery-powered and fuel cell vehicles. Founded in 2004, the principals designed, engineered and manufactured the 36 EcoMark I, 45' CNG-fueled hybrid-electric shuttle buses for the Denver 16th St. Mall which, in over six years of successful revenue service have transported 125,000,000 passengers at a daily rate of 65,000.

Principals of MES also have been involved in the design and manufacture of the Northrop/LACMTA ATTB Bus as well as the Americanization of the Irisbus Civis. For information, please visit www.mobileenergysolutions.com.

Sabre Engineering provides advanced control solutions to varying industries including transportation, industrial and government sectors. Sabre products and services provide reliable and cost effective methods to control and integrate processes and machines.
Founded in 1992, Sabre has worked throughout the US, Europe and Asia with Fortune 500 companies such as Agilent Technologies and Johnson Controls. Sabre systems have ranged from hybrid electrical vehicle controllers to clean room supervisory controls. Utilizing the latest in programmable logic controllers, human machine interfaces, and custom microprocessor-based systems, Sabre designs have increased both productivity and operational efficiencies, providing a quick return on capital for clients.
Sabre has an extensive background in robotics, automation and vehicle systems. Sabre custom designs often bring to market new, enabling technologies that have been patented in the US and abroad. Visit the company website www.sabre-engineering.com for further information.

Hydrogenics Corporation is a clean power generation company engaged in the commercialization of hydrogen and fuel cell technology and test stations for fuel cells. With an unrivalled experience in fuel cell test systems and relationships with key industry partners, Hydrogenics is creating innovative clean energy solutions for transportation, stationary and portable power applications. Hydrogenics, based in Mississauga, Ontario, Canada, has operations in British Columbia, Canada, Japan, the United States, and Germany. For more information, please visit www.hydrogenics.com.

Nilar Corporation was founded in 2000 to provide a new way to package energy. The company has sales and marketing offices in Stockholm, Sweden, and the main production and R&D facilities in Denver, Colorado. The Nilar team of engineers is highly experienced in industrial and military battery development, having previously developed the Optima, gel cell battery. Their current product is a bi-polar battery that incorporates a remarkable simplification in design and production technique, while removing common failure modes. Today, Nilar has production lines capable of manufacturing standard NiMH 24V 10Ah and 12V 10Ah battery modules, as well as custom configurations for high volume applications. For more information, please visit www.nilar.com.

Martin Marietta Composites manufactures structural composite products used in transportation, construction and military applications. When high strength, low weight and durability are important - composites deliver the solution. Specialty products for truck bodies and rail car components have been developed. Martin Marietta's composite truck bodies utilize TRANSONITE® walls and floors to deliver durability and corrosion resistance. The composite rail car technology helps build lighter weight cars with increased thermal efficiency. TRANSONITE has also been used to develop composite matting and protective panels for military and commercial applications. Martin Marietta Composites work with composites began in 1996 with the DuraSpan® bridge deck system. Read about the company at www.martinmarietta.com.

Birmingham Jefferson County Transit Authority (BJCTA) is the largest operator of public transportation services in the state of Alabama. Currently operating a mixed fleet of diesel and CNG transit vehicles, BJCTA is interested in not only providing safe and reliable transit services, but also to moving their fleet to low or zero emissions. BJCTA currently operates 109 vehicles in revenue service and has a qualified staff of personnel interested in demonstrating and learning about new technologies that can assist the agency in reducing mobile source emissions in the Birmingham metropolitan area. For more information, please visit www.bjcta.org.

The **University of Alabama at Birmingham** (UAB) investigative team has considerable relevant experience. Dr. F. H. Fouad is a Chair and Professor of the Dept. of Civil Engineering and also Associate Director of the University Transportation Center for Alabama. Assisting Dr. Fouad are members of the UAB faculty with experience in vehicle simulation, testing, infrastructure development, energy storage, and transit planning. These faculty members include Dr. Wilbur Hitchcock, Dr. Robert Peters, Dr. Virginia Sisiopiku, Mr. Andrew Sullivan, and Dr. Jay Goldman.

Southern Clean Fuels (SCF) is dedicated to increasing the use of clean, non-polluting fuels in the geo graphic areas surrounding Birmingham and throughout the South. By focusing on strategic alliances and mutual supplier/client benefit, SCF is quickly building a solid base of success in the Birmingham area with increased use of clean fuels.

CTTRANSIT is the Connecticut Department of Transportation (CDOT)-owned bus service. CTTRANSIT will maintain the vehicle during the demonstration period and work with the Greater New Haven Clean Cities Coalition in the collection and reporting of field data about the project. CTTRANSIT provides public transit local and express bus services in the greater Hartford, New Haven, and Stamford Connecticut metro areas. CTTRANSIT operates regular services throughout the state operating services 7 days a week operating nearly 100 routes. Nearly 27 million passengers a year use CTTRANSIT to reach their destination. CTTRANSIT operates 400 buses and has a long history of innovative and collaborative bus emissions test projects. For more, visit www.cttransit.com.

The **Greater New Haven Clean Cities Coalition** (GNHCCC), a non–profit chapter of the Transportation Energy Partnership, started in 1995 as part of the US DOE Clean Cities Program. The Clean Cities Program advances the nation's energy security through assisting local decisions to adopt technology and practices that contribute to the reduction of petroleum consumption. Clean Cities carries out this mission through a nation wide network of more than 89 coalitions, which develop public/private partnerships to promote alternative fuels/vehicles, fuel blends and economy, hybrid vehicles, and idle reduction. Projects include electric trolleys thorough hydrogen hybrid-electric buses. In addition the coalition has developed natural gas, electric and bio-fuels deployment programs. GNHCCC is recognized as the primary POC for AFV information and carries on a variety of outreach programs that reduce petroleum use and mobile source emissions. For more information, visit www.nhcleancities.org.

The **South Carolina Research Authority** (SCRA) is a $75 million per year global leader in applied research and technology transfer services. SCRA is a publicly chartered, but privately funded, not-for-profit corporation that creates and manages consortia on behalf of government, industry, corporate and academic clients and partners to solve specific applied research and commercialization problems. In the fall of 2005 SCRA expanded its business and joined a state-wide effort to facilitate the discovery, development and deployment of critical segments of the hydrogen economy for the betterment of South Carolina. See www.scra.org.

The **University of South Carolina** has a fleet of shuttle busses that transport students along six separate routes in the hilly (slopes up to 25%) downtown campus in Columbia South Carolina. The Vehicle Management Department has its own crews of bus drivers and maintenance personnel. The University has been proactive in its efforts to utilize and demonstrate alternative energy sources. Some of its shuttle buses currently run on biodiesel, CNG and ethanol. A 5-kw fuel cell provides power to one of the buildings in a student residence complex. The Department of Chemical Engineering is home to the NSF Industry/University Cooperative Research Center for Fuel Cells. Visit www.sc.edu for more information.

Central Midlands Regional Transit Authority was established in 2002, and is committed to providing safe, dependable and accessible public transit service to the heart of the Midlands. Since 2002, the CMRTA has provided transportation for more than 2 million passengers, expanded route services and introduced 43 new ADA accessible buses that offer a safer and more comfortable mode of transportation. The CMRTA currently operates seven CNG buses. The remaining vehicles operated by the CMRTA use new technology-clean diesel.

The **Palmetto State Clean Fuels Coalition** seeks to improve the quality of life of state residents by decreasing air pollution and the economic instability associated with dependence on foreign fuels, by increasing the alternative fuel vehicle marketplace and the supporting infrastructure. For more information, visit www.environ.sc.edu/clean.html.