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Testimony of UTC Power
In Support Of
Raised Bill No. 566
An Act Concerning Fuel Cells

Before the Commerce Committee
March 4, 2008

Good Morning Chairman LeBeau, Chairman Berger and members of the Committee. I am Mike Brown, Vice President, Business Development and General Counsel at UTC Power. UTC Power appreciates the opportunity to convey its strongest support for Raised Bill No. 566, *An Act Concerning Fuel Cells*. The bill directs the Department of Transportation to establish a fuel cell program that would result in transit buses in Connecticut powered by fuel cells, the use of fuel cells at Bradley International Airport, the creation of hydrogen refueling hubs, and creation of a stable funding source.

Connecticut is in a unique position, both on a national and global level. Connecticut is home to both of the world leaders in fuel cell technology for large stationary applications, is home to the world leader in fuel cells for heavy duty vehicle applications and has companies with technology that lead hydrogen applications to transportation, standby power and hydrogen generation. Connecticut has a wealth of talent in the technologies that are necessary to move the world toward a hydrogen-based energy economy and away from an energy economy that is dominated by imported petroleum. In addition, Connecticut, because of its geographic size and location, has the opportunity to quickly assume the global leadership in demonstrating how hydrogen can drive the economy, improve the environmental condition of the state, address climate change concerns and reduce the exposure of its citizens to the harmful effects from combustion of diesel fuel for transportation and other forms of combustion for electrical generation.

Raised Bill 566 is a bold step toward improving the environment of the urban population in Connecticut, stimulating growth in an industry that is indigenous to the state and fostering significant economic development, not only in the future hydrogen economy, but also stimulating an industry that has the ability to improve development in those areas of the state that face a constrained energy infrastructure.

Background on UTC Power's PureMotion® Fuel Cell System for Transit Buses

Before getting to the specifics of the bill's benefits, I'd like to provide the Committee some brief background on UTC Power's experience in fuel cell bus power systems. UTC Power's current PureMotion® 120 fuel cell power system (FCPS) for transit buses represents more than six years of Connecticut-based UTC research and development in partnership with the U.S. Department of Defense through the U.S. Army Tank, Automotive and Armaments Command (TACOM) and the U.S. Department of Transportation.

We have been supplying fuel cell bus power systems since 1998 for programs in Washington, D.C., California, Spain and Italy and more recently in Belgium and Connecticut. Today, we have six of our latest generation buses on the road: four in California, one in Belgium and one here in Hartford, Connecticut. It was almost one year ago, that New England's first zero-emission fuel cell-powered hybrid bus made its debut at the Connecticut Convention Center and entered CT Transit service, Connecticut's state-owned bus system.

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Operation of the bus is funded by the Connecticut Department of Transportation. As of January 2008, the UTC Power bus fleet had accumulated 12,766 hours and 139,781 miles of successful operational service. The success with fuel cell buses to date belongs not just to UTC Power but rather to committed public-private partnerships, including stable funding sources, like that set forth in the Bill. It is these public-private partnerships that jump start the market place and enable the commercialization of early stage products.

Benefits of Fuel Cell Buses

The benefits of fuel cell buses are evident to everyone who takes a ride on one or simply stands on the street when one goes by. When UTC Power brought a fuel cell bus here to the State Capitol a number of years ago, the universal reaction of legislators and others who came by to take a short ride around the block was exactly what we hear from people who ride our fuel cell buses in Spain or Belgium. They ask whether the bus is actually on. When we assure them it is running, they question how that can be the case when they do not hear or smell anything. Fleets of fuel cell powered buses also provide significant opportunity for education of the population on the benefits of hydrogen as a power source and how it can be practically applied to meet the energy needs of the state. In addition to those obvious benefits, I offer the following data to inform your consideration of the bill:

Zero Emissions. Fuel Cell buses have zero emissions - no soot and no smog forming pollutants. Transportation with no NOx, SOx or particulate matter is especially important in densely populated urban centers where concerns about street level emissions, and its health effects, are heightened. Zero emissions also mean no CO2 emissions, which will contribute to Connecticut's climate change goals. The only thing that exits a fuel cell bus tail pipe is water vapor. This means immediate positive impact on street level emissions and the beginning of improvement of the health of those in the vicinity of transit traffic. Studies in both California and in Europe have tied significant health impacts and related costs to the particulate emissions of transit bus fleets.

A point of comparison to illustrate the environmental benefits of one fuel cell-powered bus versus a diesel bus: just one PureMotion® 120 fuel cell power system reduces NOx emissions equivalent to removing 77 cars from the road per year and creates the same CO_2 benefits as would planting 31 acres of forest.

Quiet Operation. Fuel cell buses are incredibly quiet. The inside cabin noise is similar to a luxury sedan. This provides comfort for passengers and increases their inclination to take a bus instead of their own car. Exterior noise is comparable to golf cart, which significantly reduces noise pollution in our Connecticut communities.

Energy Security and Productivity. A fuel cell bus operating on hydrogen reduces dependence on foreign oil and provides a more diverse, secure energy infrastructure. Hydrogen can be produced from a variety of sources and Connecticut has a number of companies, including UTC Power, that have advanced technologies for generating hydrogen through a reformation process or through the process of electrolysis. A fuel cell hybrid bus delivers approximately twice the fuel economy of conventional diesel. The fuel cell bus can go 300 - 350 miles without refueling.

Traffic Congestion Mitigation. Connecticut's traffic congestion problems are significant, and in some areas, acute and growing. This problem imposes costs. The Texas

Transportation Institute estimated that congestion costs the American economy $78 billion in 2005, as measured by wasted fuel and workers' lost hours. It also imposes personal costs: it causes the average peak period traveler to spend an extra 38 hours of travel time and consume an additional 26 gallons of fuel annually. Moving people out of cars and onto fuel cell buses will help alleviate traffic congestion and do so in a way that contributes to the state's climate change solutions and air quality goals. Reducing the number of personal auto commuters cuts environmental impact once, putting them on fuel cell powered buses more than doubles the benefit. Part of the transit activity that must be addressed is how to make commuting on fuel cell buses the preferred transit method for many of the state's residents. With their clean operation and quiet interiors, fuel cell buses provide an inviting platform for other enhancements that may entice ridership, including amenities that might make a bus trip a productive journey instead of unproductive commute time.

These tangible and diverse benefits leave no question why the Federal Transit Administration's expressed desire to have fuel cell buses represent a significant percentage of new U.S. transit bus purchases by the year 2015. We urge your favorable consideration of Bill 5681's call for transit buses powered by fuel cells to make Connecticut a global leader in achieving these benefits for its citizens and its economy.

Hydrogen Refueling Hubs in Connecticut

Establishing hydrogen refueling hubs in Connecticut is an essential part of fully implementing the promise of hydrogen fuel cells for transportation, diversifying our energy mix and reducing dependence on foreign sources of oil. The small geographic size of Connecticut makes it entirely feasible for fuel cell-powered buses to operate throughout the state (and also into the urban centers of Springfield, MA, New York and Boston) with just a few strategically located refueling facilities. In addition, with these strategically located refueling facilities, transportation options begin to open up for bus-ways linking strategic locations within Connecticut. Such services would substantially reduce the carbon footprint of commuting buses and other traffic as ridership increases. The Hartford fuel cell bus operates on a renewable source of hydrogen. The hydrogen used on the current Connecticut fuel cell bus is produced through electrolysis with hydropower in upstate New York and then trucked to Connecticut. The carbon footprint of the CT Transit bus is limited to the tanker truck bringing the hydrogen to Connecticut from upstate New York - the only fossil fuel used in the operation of the bus.

Hydrogen refueling hubs are necessary to the widespread use of fuel cell powered transit envisioned in the bill. For that reason, this provision is important and merits support.

Transitioning to the use of fuel cells at Bradley International Airport

The bill's goal of transitioning to the use of fuel cells at Bradley International Airport demonstrates not only leadership, but also serves to make Bradley an attraction or destination. Airports have significant sources of air pollution including: aircraft; vehicles such as automobiles, shuttles and, public transportation for people and goods; and, ground support equipment such as aircraft towing, baggage handling, maintenance repair, refueling and food service. Airports also use portable fossil fuel powered generators and grid power to provide electricity for the fixed operations at the airport including terminals, air traffic control equipment and ground power for aircraft. All of this combines to make the environmental footprint of an airport a fairly significant issue.

Green airports have received a fair amount of discussion nationally and globally and one of the drawbacks generally is the size of the airport. Large airports would require a significant investment and a long period of time to realize a meaningful environmental impact. Bradley, as a smaller international airport, could actually become a "green" airport with a smaller investment and over a shorter period of time. Airports are ideal settings for technologies that use hydrogen as the fuel source for transportation vehicles. Vehicles typically stay within the immediate proximity of the airport and go to a central location for maintenance, fueling and storage. This provides the opportunity to create a hydrogen infrastructure with economies of scale. For stationary power application to support terminal, aircraft and airport operations, fuel cells can provide a clean alternative to the grid and, given fuel cells' ability to operate independent of grid power, they are also well suited to ensure continuous airport operations without the need for independent generators. Fuel cells can also operate to provide heating and cooling to the facilities at the airport significantly increasing the amount of available energy utilized versus what is currently available from the grid. Stationary fuel cells produced by UTC Power are also competitive with the grid in terms of cost per kilowatt hour, making the investment a sound decision.

In addition to reducing airport emissions and its carbon footprint, fuel cells are particularly well suited to a variety of airport applications:

- *Continuous Clean Power.* Fuel cells can be used to power terminals and co-located facilities like hotels, to provide continuous power despite grid conditions. When used in combined heat and power mode, fuel cells can also provide cooling in peak summer months and heating during the winter, reducing the strain on the grid. The ability of fuel cells to operate continuously would also eliminate the need for diesel back up generators. Fuel cells could also allow the airport the option of going off grid, reducing demand for grid power and the accompanying carbon footprint.

- *Buses.* Fuel cell buses can shuttle passengers to airport terminals, parking, rental car centers and hotels.

- *Ground Support Equipment.* Fuel cells can be used in light, medium and heavy-duty ground support for baggage handling, maintenance, fuel delivery and food service.

- *Aircraft tugs.* Fuel cells can power aircraft tugs to move planes to runway and back and allow shutting off of main engines.

- *Aircraft ground operations.* Fuel cells can also provide aircraft power while the aircraft are parked at the gates reducing the need for the use of on-board APU's, eliminating their use of jet fuel, and eliminating the need for diesel powered ground carts.

We appreciate the opportunity to communicate our strong support for the bill. We urge your favorable consideration and welcome any inquiries about fuel cell technology at any time.