# GE Demonstrates “Electric Bus of the Future”

NISKAYUNA, N.Y. -- (BUSINESS WIRE) -- The hybrid systems research team at GE Global Research, the company’s central technology development arm, announced a significant breakthrough that could help accelerate the electrification of bus fleets, delivery trucks and other larger, heavy-duty vehicle fleets.

The GE team successfully demonstrated a dual battery system on a zero tailpipe emissions hybrid transit bus that pairs a high-energy density sodium battery with a high-power lithium battery.

While significant advances in battery technology have been made, further reductions in the size and cost of batteries will be needed to enable the widespread adoption of electric vehicles. GE researchers believe a dual system with high power and energy storage capacity could achieve the optimal electric driving range and acceleration requirements at a more practical size scale and cost for larger vehicles.

The research is being done as part of a $13 million research project GE is engaged in with the Federal Transit Administration (FTA) and Northeast Advanced Vehicle Consortium, funded under the National Fuel Cell Bus Program.

“Public transit and delivery service providers recognize the importance and benefits of transitioning to an electric fleet, but are looking for cost-effective solutions to make that possible,” said Lembit Salasoo, senior electrical engineer and Principal Investigator on the hybrid bus project at GE Global Research. “With the cost of the battery remaining a principal hurdle, a dual battery system could bring these costs down and help accelerate the electric revolution for bus and delivery truck fleets representing hundreds of thousands of vehicles.”

“We’re entering a decade of unprecedented activity and developments in electrified transportation,” Salasoo added. “With heavier vehicle platforms, both energy storage and power are a premium to deliver optimal vehicle performance, but the exact needs can vary based on a vehicle’s size and drive cycle. The beauty of our dual battery system is that it can be scaled to deliver just the right combination of power and storage.”

Many of the 843,000 buses registered in the U.S. (including most of the 63,000 transit buses and 480,000 school buses) travel less than 100 miles per day. Enabling more of these buses to transition to an all-electric, zero emissions platform would dramatically reduce CO2 emissions and petroleum fuel consumption.

Most types of batteries today come with a trade-off between power and energy storage. For example, lithium batteries, provide a lot of power for acceleration, but are not optimized to store energy for driving range. Sodium batteries are on the opposite side of the spectrum. They store large amounts of energy, but are less optimized for power. GE’s dual battery combines the best attributes of both

chemistries into a single system.

In the hybrid transit bus demonstration, the lithium battery focused on the high power acceleration and braking, while the sodium battery provided an even electric power flow to extend the bus range. Each type of battery does what it does best.

In addition to optimizing performance, a dual system can reduce the cost of a battery by up to 20% compared to a single battery system for vehicle applications like transit buses and delivery trucks that require significant power and energy storage capacity. The key cost advantage of a dual system is that it provides flexibility to integrate less expensive battery chemistries without having to increase the size of the battery to address a vehicle’s power and energy storage needs. A single battery system would require a more costly scale up in the size of the battery to achieve the same result.

The development of a dual battery system and partnership with the FTA is a key part of GE’s growing hybrid and electric technology portfolio. GE is actively exploring partnership opportunities across the electric vehicle value chain through its Licensing business to commercialize its dual battery technology.