Initial results indicate significant fuel and emissions savings

In 2014, Foothill Transit in West Covina, California, fully electrified one of the bus routes in its 327-square-mile service area. Today, the transit agency is investigating the feasibility of electrifying additional routes with help from the National Renewable Energy Laboratory (NREL).

Foothill Transit’s 100% alternative fuel fleet includes 15 electric buses and 315 compressed natural gas (CNG) buses. NREL is evaluating the in-service performance of the electric buses compared to CNG buses operating on similar routes. Launched in 2015 with support from the California Air Resources Board and the Advanced Vehicle Testing Activity within the U.S. Department of Energy’s Vehicle Technologies Office, the study aims to improve understanding of the overall use and effectiveness of fast-charge electric buses and associated charging infrastructure in transit operation.

The on-road portion of the evaluation involves collecting and analyzing vehicle performance data gathered via onboard logging devices. NREL is using the data to evaluate vehicle and component performance—with a focus on energy efficiency, battery and electric motor power profiles, reliability, and maintenance costs—and to conduct detailed drive cycle analyses. Based on the field data, NREL will develop a validated vehicle model using the Future Automotive Systems Technology Simulator, or FASTSim, to help the transit agency identify other routes in its service area that are suitable for electrification. NREL will also analyze the infrastructure requirements and grid-side impacts of the transit agency’s two 500 kW charging stations.

Initial results indicate that the electric buses offer significant fuel savings compared to the CNG buses. The average energy efficiency of the electric buses equates to approximately 17.5 miles per diesel gallon equivalent (DGE) while the average fuel economy of the CNG buses equates to about 4.5 miles per DGE.

In addition to the on-road portion of the evaluation, NREL plans to conduct chassis dynamometer testing of the vehicles to determine the fuel economy and emissions impact of the electric bus technology in a controlled setting.

Manufactured by Proterra, the 35-foot EcoRide transit buses in this study are made of lightweight composite materials and are powered with 88 kWh Lithium-titanate battery packs.

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