**OBJECTIVE AND SIGNIFICANCE:** The objective of this project is to install and operate a hydrogen production and dispensing station on the Island of Hawaii at the Natural Energy Laboratory Hawaii Authority (NELHA) to evaluate the performance and durability of the equipment, and support a fleet of three hydrogen Fuel Cell Electric Buses (FCEB) operated by the County of Hawaii Mass Transit Agency (MTA). The knowledge gained in this project will inform the MTA on transitioning from a diesel bus fleet to a zero emissions FCEB fleet to meet the State of Hawaii’s clean transportation goals.

**BACKGROUND:** Development of hydrogen-based transportation systems requires hydrogen infrastructure to produce, compress, store, deliver, and dispense hydrogen. The NELHA hydrogen station is designed to dispense hydrogen at 350 bar (5,000 psi) to support deployment of heavy-duty FCEBs operated by the MTA Hele-On public bus service. HNEI will also demonstrate centralized hydrogen production and distributed dispensing using its fleet of 3 hydrogen transport trailer (HTT) by delivering hydrogen from NELHA to a dispenser located at the MTA base yard in Hilo. In non-technical areas, HNEI is supporting state policymakers by developing implementation plans and making recommendations for new policies to support the introduction of zero emission transportation systems.

**PROJECT STATUS/RESULTS:** The hydrogen station has been installed and is being commissioned. The station uses an electrolyzer powered by the HELCO grid to produce 65 kg of hydrogen per day. The first HTT has been delivered. The first bus is a 29-passenger ADA-compliant shuttle bus manufactured by Eldorado National and converted to a hydrogen-electric drive train by US Hybrid.

The 40 kW fuel cell system is supplied by hydrogen stored in composite carbon fiber cylinders. The fuel cell power system is integrated with two 11 kWh Lithium-ion battery packs to provide motive power to a 200 kW electric drive system during acceleration. At steady state cruising speed, the fuel cell maintains the battery charge within a range that supports the long-term health of the battery. During deceleration, the electric motor acts as a generator sending power back into the battery (“regeneration braking”). This contributes to overall system energy efficiency and improves bus mileage. The bus stores 20 kg of gaseous hydrogen and has a range of approximately 200 miles depending on the route topography and driver skills. A 10kW export power system has been installed in the bus to enable the bus to provide 110/220VAC electric power for continuous power for up to 30 hours as emergency power for civil defense resilience operations when the grid power is down.

This project has produced the publication below:

**Funding Source:** U.S. Department of Energy; Office of Naval Research (APRISES); State of Hawaii Hydrogen Fund; NELHA; U.S. Hybrid; State of Hawaii Barrel Tax

**Contact:** Mitch Ewan, ewan@hawaii.edu, (808) 956-2337

**Last Updated:** March 2020

![Figure 1. NELHA 65 kg/day Hydrogen Station](image1)

![Figure 2. Hydrogen Transport Trailer](image2)

![Figure 3. 29-Passenger MTA Bus](image3)