

Fast-fill hydrogen fueling station enabling zero emission transportation

June 5 2015, by Mitch Ewan



Electric vehicles fuel up with hydrogen at Marine Corps Base Hawaii. Credit: Mitch Ewan, HNEI

The Hawai'i Natural Energy Institute (HNEI) has commissioned a "Fast-Fill" high-pressure hydrogen fueling station at the Marine Corps Base Hawai'i (MCBH), Kaneohe Bay. This state-of-the-art station was developed to support a fleet of General Motors Equinox Fuel Cell Electric Vehicles (FCEV) leased by the Office of Naval Research for use by Marine Corps and Navy personnel on O'ahu. Operational since November 2014, this station was recently certified for unattended operation, allowing drivers to self-fill their cars just as they would do at any gasoline fueling station. Unattended operation will serve as a model for the installation of private stations throughout the state.

Said General Motors' Hawai'i Site Leader Chris Colquitt, "We have been really impressed with the fill speed and control algorithms of the hydrogen station at MCBH. It is exciting to experience consistent 4-minute 700 bar fills. I am confident the Department of Defense (DoD) drivers of the FCEVs will be delighted as well. The algorithms to control flow have done a really good job of ensuring tank temperature thresholds are maintained without stopping fills before completion. On top of all that, the station and site aesthetic came out really well."

Added HNEI Director Richard Rocheleau, "We are excited that the MCBH hydrogen station is now servicing Fast Fills by the drivers without an attendant – a first in Hawai'i. We are also pleased that General Motors is satisfied with the performance of the station. We hope that our research efforts will help accelerate the deployment of hydrogen stations throughout Hawai'i as it contributes to the DoD's energy goals."

The fuel cells in these vehicles work by using hydrogen to create electricity that is then used to power an electric motor. The only emission is water. Successful hydrogen fueling operations here will help identify zero emission sustainable transportation solutions. The development of [fuel cell](#) and hydrogen technology has been part of the U.S. Department of Energy (US DOE) portfolio since 1986. UH Mānoa and HNEI have been part of that program since its inception.

A major challenge for hydrogen production and dispensing stations is the cost of hydrogen at the nozzle. In this project, HNEI is conducting research to assess the technical performance and economic value of an electrolyzer-based [hydrogen production](#) system in a 350/700 bar Fast-Fill (under 5 minutes) fueling station. The technical analysis will include component efficiencies under various operating scenarios and the long-term durability of major components. The economic analysis will determine the daily operating cost of the station and the overall cost

benefits of producing hydrogen. The dual fill pressure capability will allow this station to service both light duty vehicles that have largely been designed to use high pressure (700 bar) hydrogen storage and larger fleet vehicles such as buses which usually are designed for lower pressure (350 bar).

The MCBH Fast-Fill [hydrogen](#) station is part of the Hawai'i Hydrogen Power Park project established by HNEI to support the US DOE's Technology Validation Program. The initial funding from the US DOE Fuel Cell Technology Office was used to procure the electrolyzer and a low-pressure fueling capability. Additional funding was received from the Office of Naval Research to expand the capability to include the 700 bar Fast Fill to support the Equinox FCEV demonstration at MCBH on O'ahu. The State of Hawai'i also provided funding that was used for project management and the installation of equipment.



Drivers can now self-fill vehicles with hydrogen at MCBH. Credit: Mitch Ewan, HNEI

Provided by University of Hawaii at Manoa

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