

DEMONSTRATION OF FUEL CELL ELECTRIC BUS OPERATION IN HAWAII VOLCANOES NATIONAL PARK

Scott Higgins¹, Kevin Davies¹, Godwin Severa¹, Keith Bethune¹, Jean St-Pierre²

¹University of Hawaii, ²Hawaii Natural Energy Institute

The Hawaii Natural Energy Institute (HNEI), the Hawaii Center for Advanced Transportation Technologies (HCATT), and the National Park Service (NPS) are in preparation to demonstrate the operation of Fuel Cell Electric Buses (FCEB) in the harsh environmental conditions at Hawaii Volcanoes National Park (HAVO) on the Island of Hawaii. Due to the volcanic eruptions of Kilauea and the prevailing trade winds, HAVO intermittently registers up to 5 ppm sulfur dioxide (SO₂) in the atmosphere, with lower concentrations of other air contaminants along the routes proposed for the buses. It is well-known that fuel cell stacks experience irreversible power loss when exposed to sulfur-based air contaminants at these concentrations. HNEI has developed and installed a novel Environmental Sensor System (ESS) which is integrated with a high performance air filtration media to prevent stack poisoning. The novel ESS is installed onto the FCEB and will deliver real-time air contaminant concentrations in the environment from which air is drawn for the cathode fuel. The ESS will also record atmospheric temperature, pressure and relative humidity. The measurements taken with the ESS will be used to predict air filter lifetimes based on knowledge gained through laboratory air filtration experiments at the Hawaii Sustainable Energy Research Facility. The ESS will also be used to protect the stack from poisoning by automatically turning off the fuel cell when the air contamination is detected after the air filter at the entrance of the cathode. The FCEB will be operated and maintained by the NPS and will be used to provide transportation around the Park for HAVO visitors. All data relating to FCEB performance will be transmitted on a regular basis and analyzed by HNEI. The overall methodology followed, operational protocols developed and preliminary performance data for this project will be presented.