

Hawai'i



Hawaii: The State of Hydrogen

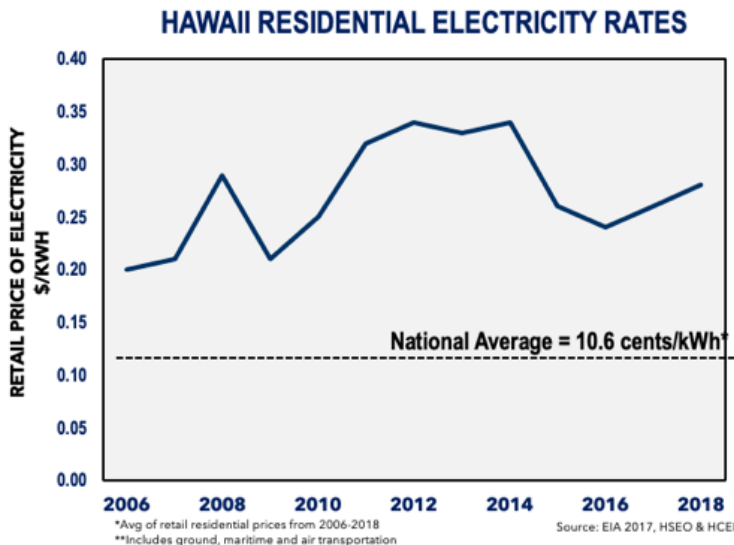
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November 7th, 2019

Hawaii's Unique Energy Landscape



Approximately

\$3.5B on
foreign oil
import in 2017



Almost

70% of
electricity production from
petroleum



About

50%
consumed by
transportation
sector*



More than

2x
national average
electricity
prices



Hawaii's unique geographic location and energy infrastructure and consumption requires energy solutions that are **resilient, secure & cost effective**

Hawaii: The State of Renewable Hydrogen

It's the Law! (HRS 196-10)

Highlights:

- Form strategic partnerships for R&D and Demonstration;
- Conduct Engineering and Economic Evaluations;
- Identify near-term project opportunities;
- Conduct electric grid reliability and security projects;
- Conduct Hydrogen demonstration projects - focus on infrastructure;
- Conduct statewide hydrogen economy public education plan;
- Make Policy recommendations to encourage the adoption of hydrogen-fueled vehicles;
- **Continually fund the hydrogen investment capital special fund.**

2019 Supportive Hawaii State Statutes

Senate Bill 661: Electric Vehicles; Fuel Cell Electric Vehicles

- Grants procurement priority for fuel cell electric vehicles for state and county vehicle purchases;
- **Includes Fuel Cell Electric Vehicles in the definition of "Electric Vehicles"** for purposes of parking fee exemption, high occupancy vehicle lane use, registration, and required parking spaces in places of public accommodation.

House Bill 401: Vehicles; Energy Efficiency; Performance Contracts

- Agencies may contract for the provision of vehicles or associated capital investments in charging or fueling infrastructure and apply vehicle fleet operational and fuel cost savings toward the cost;
- **Amends the definition of "energy performance contract" to include the provision of electric vehicle charging infrastructure for a portion of avoided vehicle maintenance or fuel costs;**
- **Applies to hydrogen vehicles.**

Hawaii's Transportation Services Performance Contracting Legislation

- **Hawaii's newest tool to quickly decarbonize public fleets;**
- **Allows Government agencies to enter into partnerships with private sector;**
- **Enables private company to build infrastructure based on performance contract;**
- **Government agency pays over time;**
- **Private company supplies all transportation equipment, fueling infrastructure, and maintenance;**
- **Private company charges a services fee;**
- **Lease equipment to others when not being used by government ~50%.**

State Procurement Process

- **Develop Procurement Documents;**
- **Develop understanding on fleet procurement process;**
- **Workshops to navigate complex state procurement process;**
- **Identify innovative mechanisms for financing & implementation;**
- **Early 2020 - commence procurement process.**

Funding



- **Increased County of Hawaii GET by 0.5%;**
- **Generates ~\$35 million per year;**
- **Must be used for transportation projects;**
- **Leverages vehicle fleet performance contracts.**

MCBH Hydrogen Station



MCBH Hydrogen Fueling Station Fueling GM Equinox FCEV

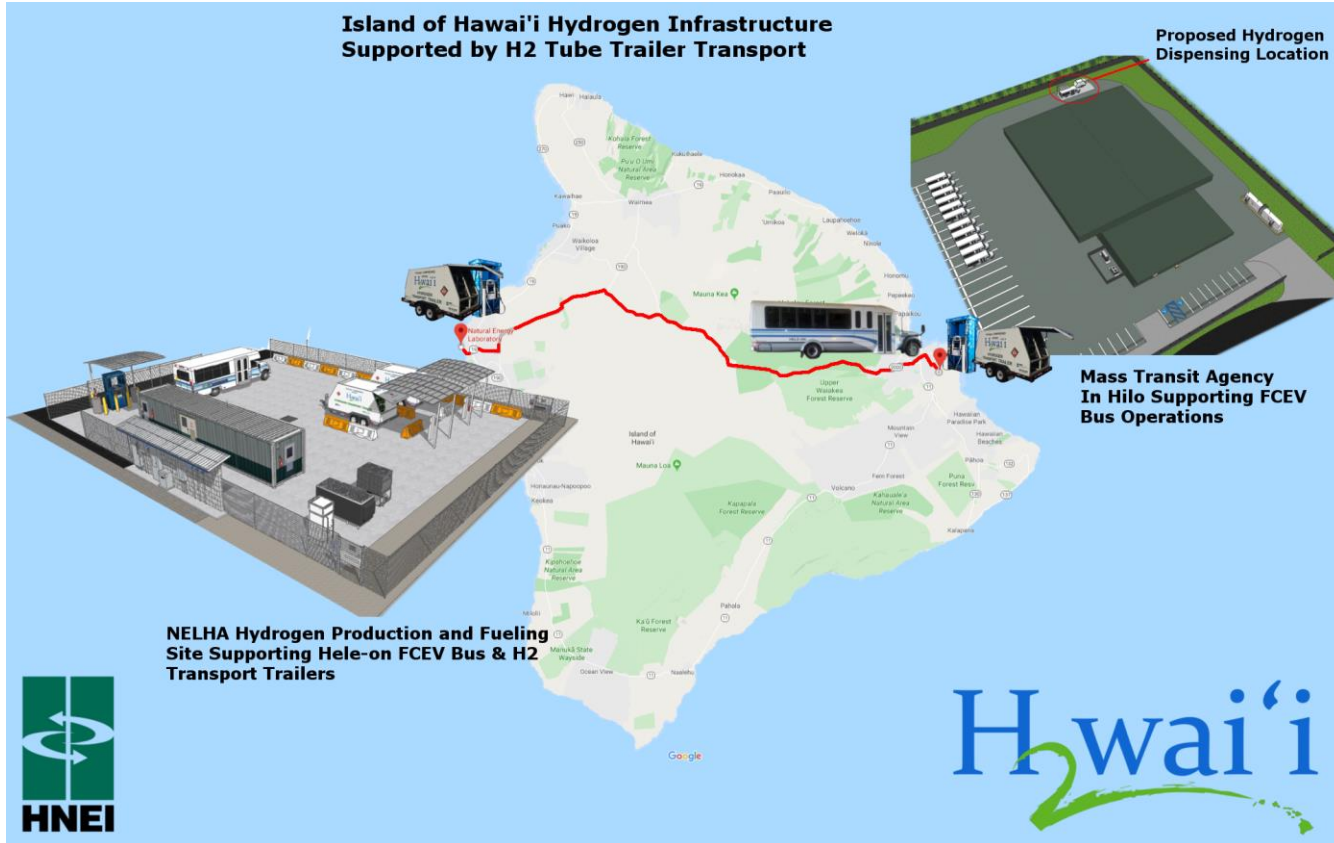


Toyota: First Public Fueling Station in Hawaii



Governor Ige Filling Mirai

Central Production – Distributed Dispensing “Drag & Drop”



NELHA Hydrogen “Hub”



Site Layout



NELHA Hydrogen “Hub”



Fuel Cell Electric Buses for the Big Island



County of Hawaii Bus (1)
29 Pass, 200 miles



County of Hawaii Bus (2)
19 Pass. 100 miles

- Fuel Cell Electric Shuttle Buses demonstrate to the general public the advantages of fuel cell buses and electric drive.
 - Quiet ride;
 - No diesel fumes;
 - Potential for lower O&M costs;
 - **An experience for thousands of people.**

10kW Export Power Unit – New Value Proposition



- ✓ **Powers critical loads in a civil defense emergency;**
- ✓ **Helps justify additional cost of FCEB;**
- ✓ **Can deliver 10kW for 32 hours;**
- ✓ **AC Output: 110/220 VAC 60 Hz;**
- ✓ **Stand alone operation;**
- ✓ **Refill hydrogen tank in 15 minutes for another 30 hours;**
- ✓ **Civil Defense loves this feature.**

Hydrogen Transport Trailers (“HTT”)

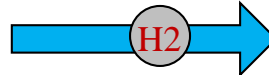


High Tensile
Steel Frame

Incorporates Air
Operated Valves



Fueling Post
with Boost
Compressor



Smart Dispenser
Controls HTT

- Hydrogen Transport Trailer carries 105 kg @ 450 bar;
- Demonstrates distributed dispensing using cascade fill to 350 bar using a “Smart” dispenser;
- Utilizes Pressure Consolidation Method developed by Powertech to reduce hydrogen fueling cost

Aloha



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