FUEL CELL ELECTRIC VEHICLE (FCEV) PROGRAM

OVERVIEW

The National Fuel Cell Research Center (NFCRC) has a long, proud relationship with hydrogen fuel cell electric vehicles (FCEV). Since its establishment in 1998, the NFCRC has worked with auto manufacturers, fuel supply companies, and various local, state and federal agencies on fuel cell electric vehicle and fueling infrastructure research and technology. Its history is intertwined with that of the fuel cell vehicle's progress towards commercialization.

Toyota FCHV-Adv fuel cell vehicles at the UC Irvine Hydrogen Station

Through a successful collaboration with Toyota Motor of North America, Inc., the NFCRC maintained a fleet of 17 Advanced Toyota Fuel Cell Hybrid Vehicles (FCHV-Adv) -- one of the largest fuel cell vehicle fleets in the nation—prior to the commercialization of the Toyota Mirai in October 2015. Fleet FCHV-Adv vehicles were sub-leased to companies, agencies and municipalities in Orange County both to gather information through real-world application, and to promote fuel cell vehicle and hydrogen fueling awareness and market acceptance. Today, the NFCRC operates the Mirai to meet the goals of the program

GOALS

- Promote awareness and acceptance of fuel cell vehicles
- Analyze driver behavior and public perceptions
- Evaluate driving/fueling logistics
- Facilitate development of hydrogen fueling infrastructure
- Enable public familiarity/acceptance of the new fueling paradigm

Toyota FCHV-Adv

Toyota Mirai

The FCHV Adv was built on the Toyota Highlander platform, with key features including: Vehicle range of 432 miles; 96 mph top speed ; 90 kW (122 hp) PEM fuel cell stack; 90 kW (122 hp) electric motor; 21 kW nickel-metal-hydride battery pack; 70 MPa (10,000 psi) hydrogen storage tanks; aluminum roof and fenders; and an air conditioning system that utilized carbon dioxide as a refrigerant.

PERSONNEL

Staff: Brendan Shaffer, Jean Grigg
Principal Investigator: Scott Samuelsen

PROGRAM ACCOMPLISHMENTS

- First highway-ready hybrid electric fuel cell vehicle deployment in the nation (Dec. 2, 2002)
- First fuel cell vehicle ever delivered to a paying customer (deployed to Orthodyne Electronics, Inc., Dec. 24, 2002)
- Approximately 150,000 hydrogen powered FCHV-Adv miles driven during calendar year 2012
- Thousands of hydrogen refueling fills at the UCI and the Orange County Sanitation District hydrogen stations (operated by UCI)
- Hundreds of people educated about hydrogen and fuel cell powered automobiles though driving/riding in NFCRC fleet FCHVs, as well as via NFCRC meetings, conferences open houses, and vehicle displays at various community events.
- Invaluable objective customer feedback regarding FCHV attributes and performance provided to Toyota
- Established the locations for the initial hydrogen fueling installations in California, and the number of stations (68) required to enable the market

Delivery of first FCHV to Orthodyne Electronics (12/2002)

RECENT PUBLICATIONS/PAPERS

Brown, T., Stephens-Romero, S., and Scott Samuelsen, G. (2012). Quantitative analysis of a successful public hydrogen station. International Journal of Hydrogen Energy, 37(17), 12731–12740.

Brown, Tim, Schell, Lori, Stephens-Romero, Shane, and Samuelsen, Scott (2013). Economic Analysis of Near-Term California Hydrogen Infrastructure, International Journal of Hydrogen Energy, Vol. 38, pp. 3846–3857.

ADVANCED POWER & ENERGY PROGRAM

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