UNIVERSITY OF CALIFORNIA Berkeley
Transportation Sustainability
RESEARCH CENTER

Hydrogen Fueling Stations for Fuel Cell Vehicles in California

Organized by IEEE4LIFE

May 21, 2014

Tim Lipman, PhD
telipman@berkeley.edu

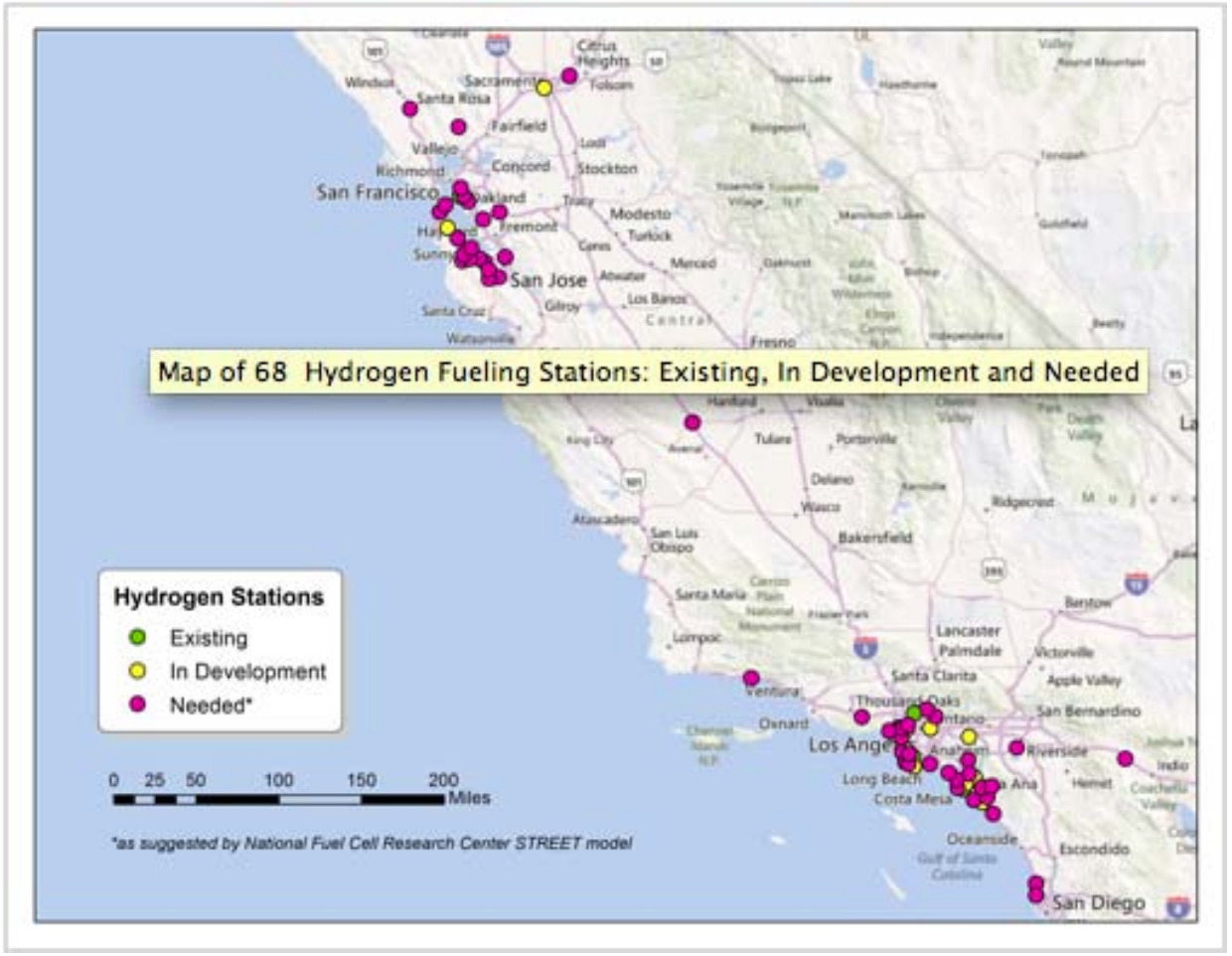
Tour Agenda

- 11:30 - 12:00 Hydrogen station overview and Q&A
- 12:00 - 12:45 Hydrogen station tour
- 12:45 - 1:30 Lunch, FCV rides, and discussion
- 2:00 - 2:20 Hydrogen fueling demo in Emeryville

Hydrogen Fueling Facility at RFS

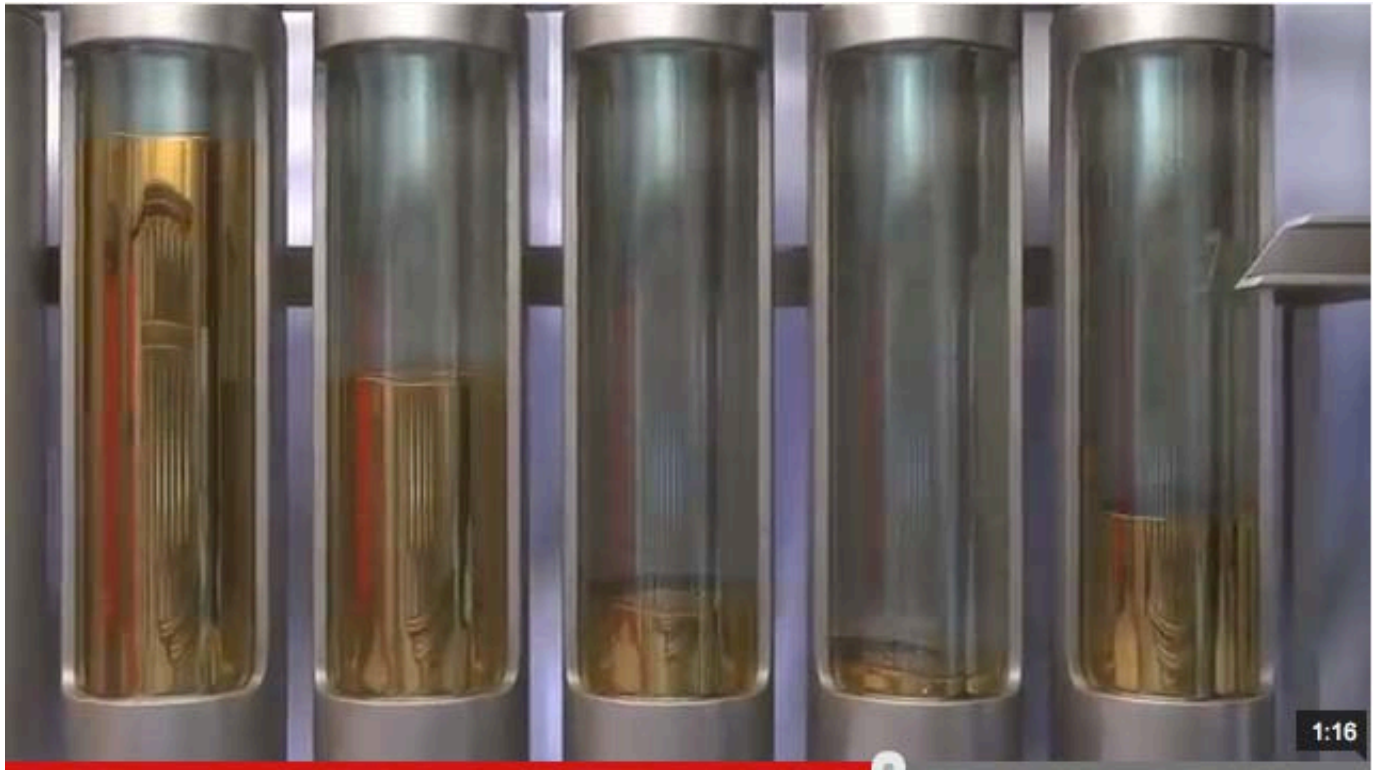
Emeryville Hydrogen Fueling Station

California Hydrogen Station Plan



Hydrogen Station in Emeryville

http://www.youtube.com/watch?feature=player_embedded&v=difhN1Lpnbk



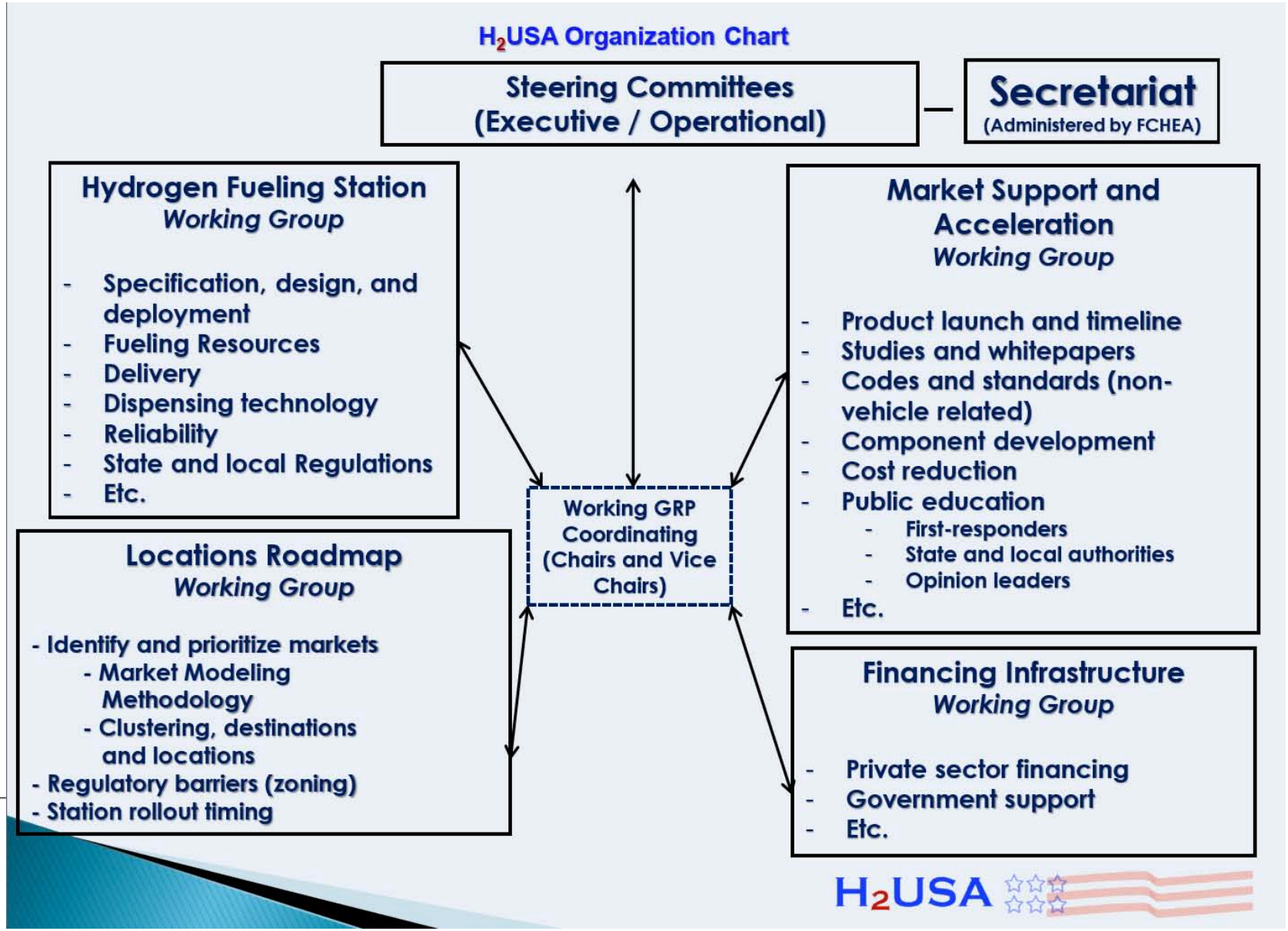
New APCI Inc. Dual-Pressure Dispenser

Dispenser features

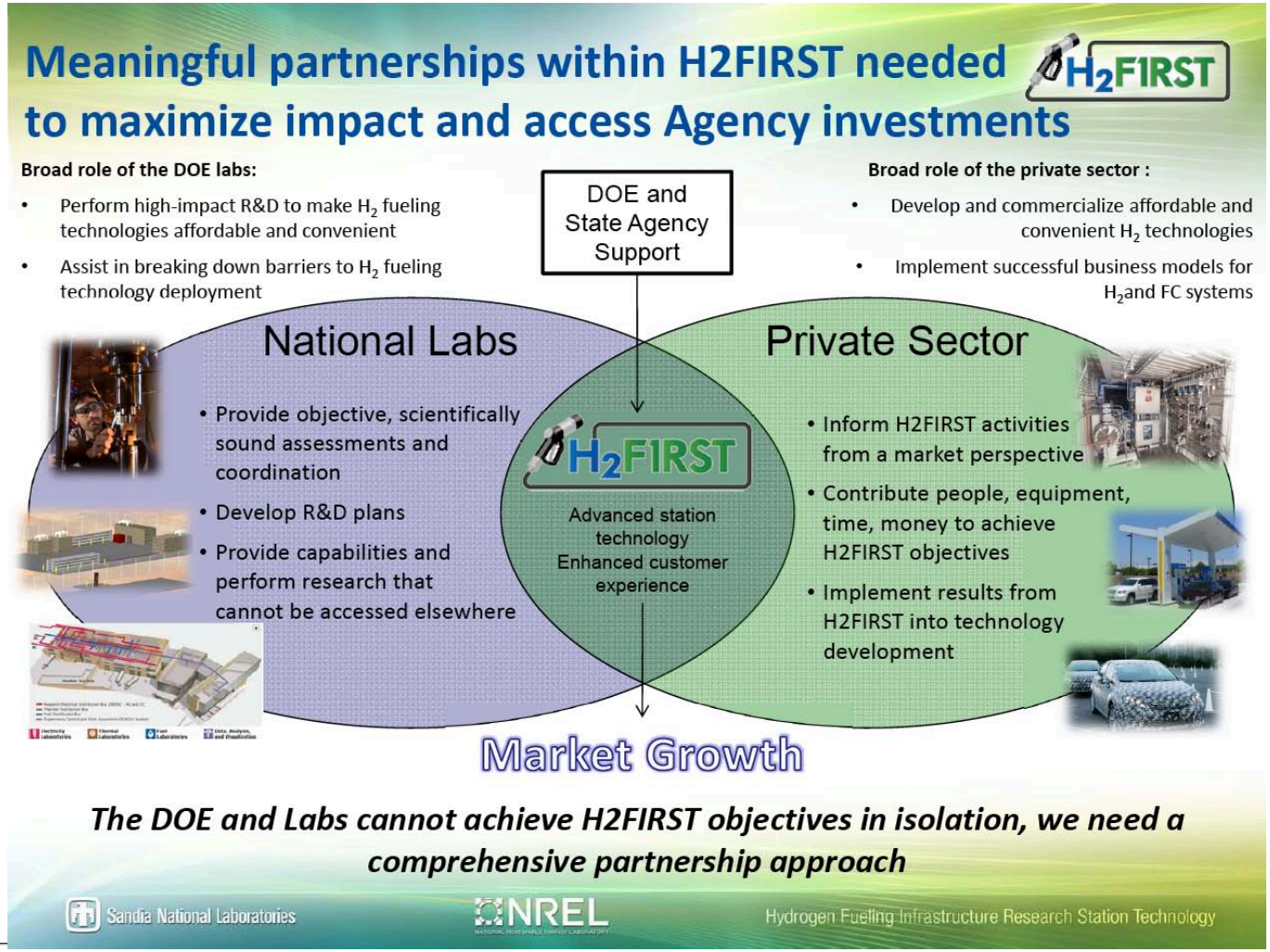
1. Valence with gas detection sensors for immediate leak detection
2. Enclosed and shrouded breakaway connectors
3. Reinforced polycarbonate upper door with ergonomic design to provide simple, customer-friendly user interface
4. Energy-efficient display panel with LED backlighting for clear visibility of display in all lighting conditions; all displays equipped with clear, hard-coated sacrificial lenses for increased durability and extended life
5. Debit payment system and 5.7" color LED display with on-screen training instructions for first-time users
6. Durable EPP/TDS keypad
7. Credit card reader
8. Emergency stop button and operating instructions
9. H70 and H35 unit price displays
10. Unique fueling pressure selection buttons with no moving parts for unmatched durability
11. Lower door assembly
12. RFID (radio frequency identification detector) reader for vehicle identification and communications
13. Universal metal nozzle boot—the industry's most durable
14. Protective jackets over hoses

Source: APCI Inc.

U.S. National H2 Infrastructure Efforts: "H2USA"



U.S. National H2 Infrastructure Efforts: "H2FIRST"



International H2 Infrastructure Efforts

Germany Agrees Action Plan For Hydrogen Refuelling Network

01 OCT 2013

The six partners in the H2 Mobility initiative – Air Liquide, Daimler, Linde, OMV, Shell and Total – have set up upon a specific action plan for the construction of a nationwide hydrogen refuelling network for fuel cell powered electric vehicles. By the year 2023 the current network of 15 hydrogen refuelling stations (HRS) in Germany shall be expanded to about 400, with an initial intention to install 100 HRS over the next 4 years, establishing a demand for fuel cell electric vehicles. An agreement in principle has been signed by representatives of all the partners involved.

Japan & Germany Revving Up for More Hydrogen Fueling Stations

Posted on January 15th, 2013 by Hydro Kevin

Japan and Germany are both once again putting the pedal to the metal in regard to building more hydrogen fueling stations by 2015. This is the rollout date agree to by all of the major automakers for their commercial hydrogen fuel cell cars.

According to Fuel Cell Today (courtesy Nikkei), "The Nikkei reports that JX Nippon Oil & Energy Corp. plans to open 40 hydrogen refuelling stations by 2015, when automakers will launch commercial fuel cell electric vehicles (FCEV). In January 2011, thirteen automakers and energy companies signed up to a target of 100 hydrogen refuelling stations in Japan by 2015.

Hydrogen in Finland ≤ 2020 2/2

Domestic pioneers invest now

Proposal COM(2013)18
→ EU Direktive 4/2014

By 2020 hydrogen stations:
1/300 km + 1/250 000

Commission proposal 01/2013

Parliament draft 07/2013

Parliament desicion 04/2014

Tekes 12

TSRC FCV Research

- 2006-07: Daimler F-Cell “longitudinal” (multi-month) study
- 2007: F-Cell “drive clinics” at RFS (Richmond) and at CAFCP (~200 participants)
- 2008-2010: Sequential HEV/PHEV/FCV study under AB1811 (replicated in N./S. Cal)
- 2010-present: FCHV-adv study (8-9 vehicles)
- 2011-present: Operation of 700-bar station
- 2008-present: Ongoing H2 infrastructure studies

Hydrogen Fuel Dispensed - RFS

- Individual fill data are logged and stored
  - From 6/9/2012 – Present
  - Provides complete fill profile information
- Over 300 successful fills
- Over 1,000 kg of fuel dispensed across all vehicles
- H2 Dispensed:
  - Avg. of 3.39 kg / fill
  - Max fill = 5.3 kg

Hydrogen Metrology Testing

"Lessons Learned" Paper

INTERNATIONAL JOURNAL OF HYDROGEN ENERGY 38 (2013) 15868–15877

Available online at www.sciencedirect.com

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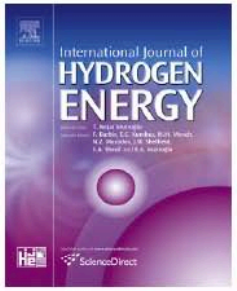

Lessons learned from the installation and operation of Northern California's first 70-MPa hydrogen fueling station

*Timothy Lipman**, *Maggie Witt*, *Matthew Elke*

University of California – Berkeley, Transportation Sustainability Research Center, 2150 Allston Way, Suite 280, Berkeley, CA 94704, USA

Thanks! Questions?

tsrc.berkeley.edu