

FCEVs and H₂ in California

Catherine Dunwoody
June 2014





Here come the FCEVs....



**BE PART OF THE
NEXT BIG THING**

Because of your interest in our Fuel Cell Vehicle, we'd like to invite you to an exclusive research event.

Your feedback will help researchers understand what customers expect from alternative fuel vehicles.

Take our survey to find out if you qualify for the in-person event.* If you do qualify and take part, you'll be compensated for your time and participation.

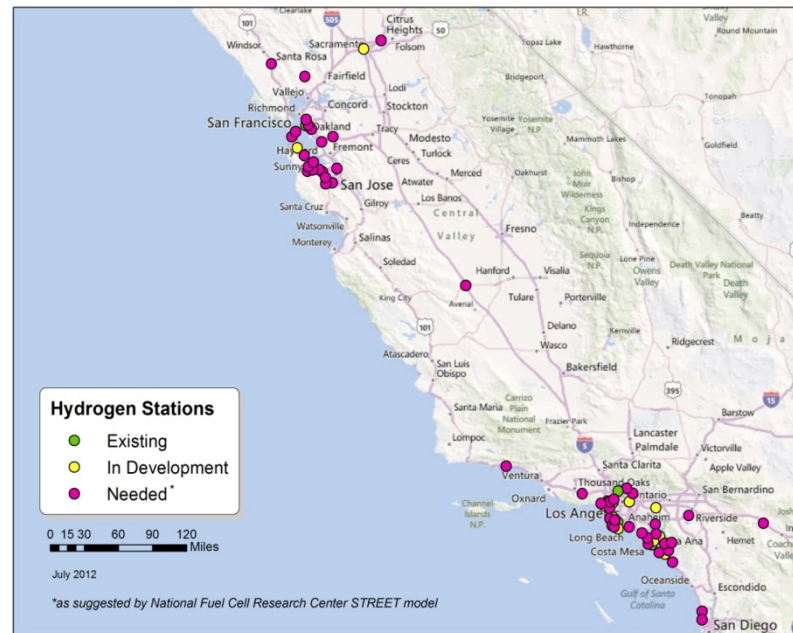
Take survey

Prototype vehicle shown with optional equipment. Production model may vary.

Stations must come first

- 68 stations provide coverage to enable market launch
 - » Supports customer convenient fueling in early markets
 - » Enables travel throughout early market regions and state
- 100 stations to support market growth

Map of 68 Hydrogen Fueling Stations:
Existing, In Development
and Needed



A CALIFORNIA ROAD MAP

Bringing
Hydrogen Fuel Cell Electric Vehicles
to the Golden State

COMMERCIAL LAUNCH OF FCEVS
EXPECTED AROUND 2015

Zero-emissions → 250-400 mile range
Minutes to refuel

Domestically produced hydrogen

THE NETWORK:
CLUSTERS
CONNECTORS
DESTINATIONS

"Consumers need CONFIDENCE in a hydrogen fueling network"

Initial station deployments will focus on geographic clusters in key markets with additional stations connecting these clusters into a regional network.

68 STATIONS
NEEDED TO LAUNCH THE EARLY FCEV MARKET

\$65 MILLION
IN ADDITIONAL FUNDING NEEDED!

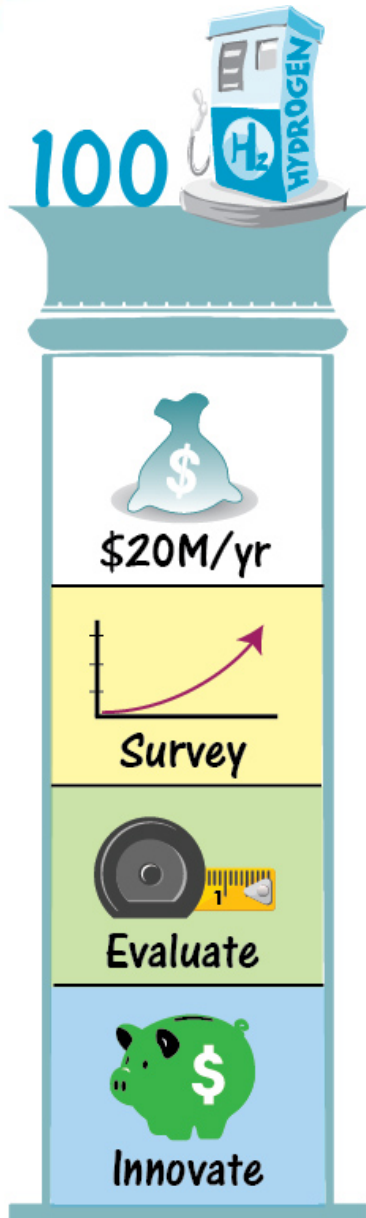
\$10M

Download A California Road Map at
www.cafcp.org/roadmap

The California Fuel Cell Partnership is a collaboration of organizations that work together to promote the commercialization of hydrogen fuel cell electric vehicles.

By working together, we help ensure that vehicles, stations, regulations and people are in step with each other as the technology comes to market.

www.cafcp.org



H₂ station funding



- AB 8 signed into law by Gov. Brown
 - » Extends funding for important air quality and alternative fuel programs
 - » Guarantees \$20M annually through 2023 to achieve 100 hydrogen stations in California
 - » Annual survey, evaluation and reporting
- H₂ funding provision increases certainty that stations will be in place to support early market FCEVs

H₂ station progress



- 9 stations open
- 19 stations in development, construction or commissioning
- 28 stations plus mobile fueler recently proposed for funding
- <http://cafc.org/stationmap>



Hydrogen Infrastructure

Funding to Date = \$90 million

- 45 new stations (\$72.7 million)
- 3 station upgrades (\$6.7 million)
- 4 O&M grants (\$1.2 million)
- 1 mobile fueler (\$0.9 million)

Other funding support

- AC Transit Oakland station (\$3 million)
- CDFA DMS retail dispensing (\$4 million)
- UC Irvine STREET model (\$1.5 million)
- GO-Biz ZEV infrastructure project manager support





H₂ Station Grant Summary

Developer	No. of Stations	Technology and Type	Capacity (kg/day)	100% Renewable H ₂
First Element	17	Delivered H2	180	
	2	Delivered H2	180	Yes
Air Products	10	Delivered H2	180	
Linde	7	Delivered Liquid H2	350	
Air Liquide	1	Delivered H2	180	
	1	Delivered H2	180	Yes
HyGen	3	On-Site Electrolyzer	130	Yes
ITM	2	Electrolyzer + Delivery	100	Yes
Ontario CNG	1	On-Site Electrolyzer	136	
HTEC	1	Electrolyzer + Delivery	135	

May 2014

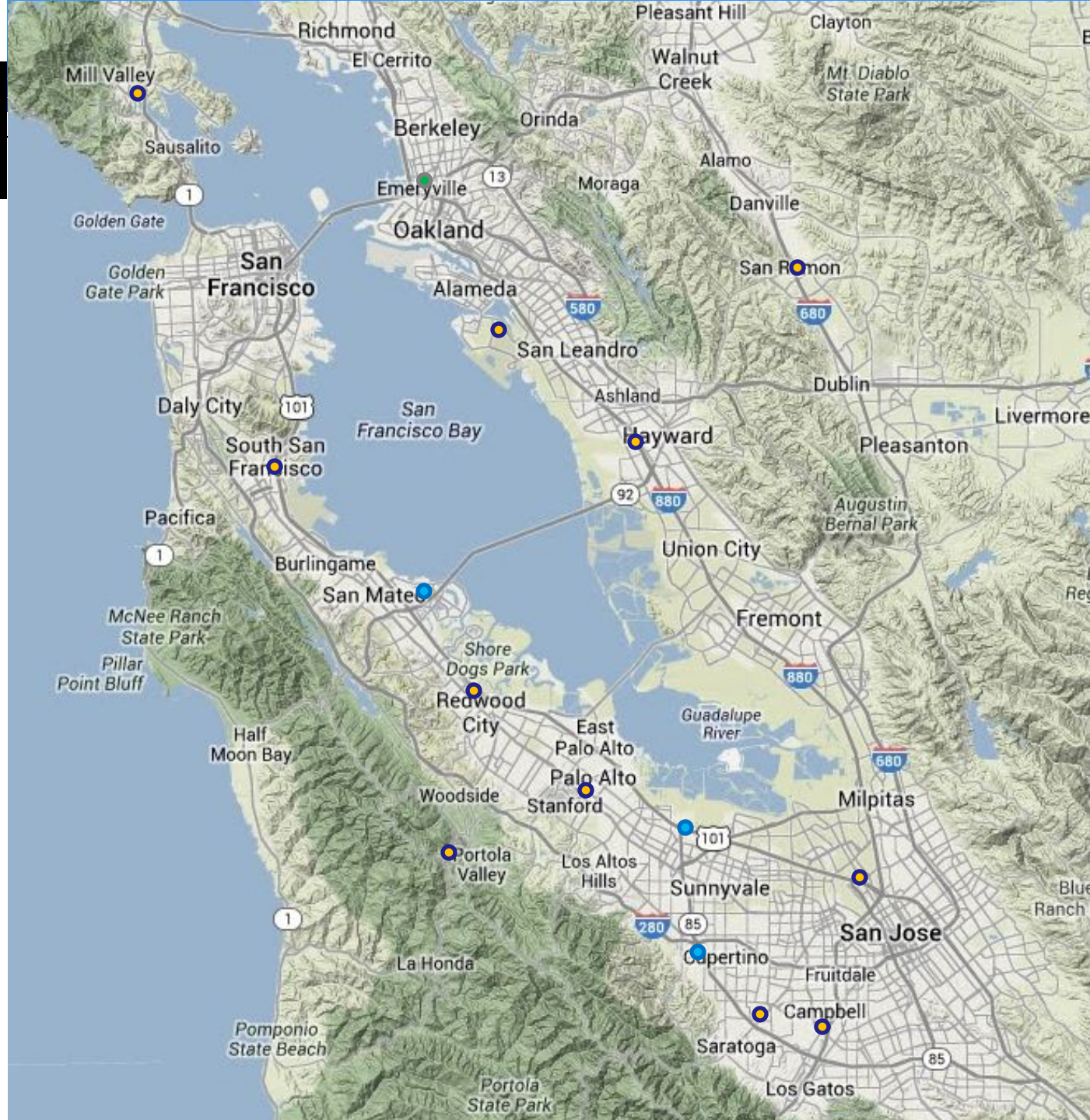
Northern CA Hydrogen Stations

 **Open**
Emeryville - AC Transit

 **In Development**
Cupertino
Foster City
Mountain View
*West Sacramento

 **Announced**
Campbell
Hayward
Mill Valley
Oakland
Palo Alto
Redwood City
*Rohnert Park
San Jose
San Ramon
Saratoga
South San Francisco
*Truckee
Woodside

**Not shown on map*



Southern CA Hydrogen Stations

Open

- Burbank
- Fountain Valley - OCSD
- Irvine - UC Irvine
- Los Angeles - Harbor City
- Los Angeles - West LA 1
- Newport Beach - Shell
- *Thousand Palms - SunLine Transit
- Torrance - Shell

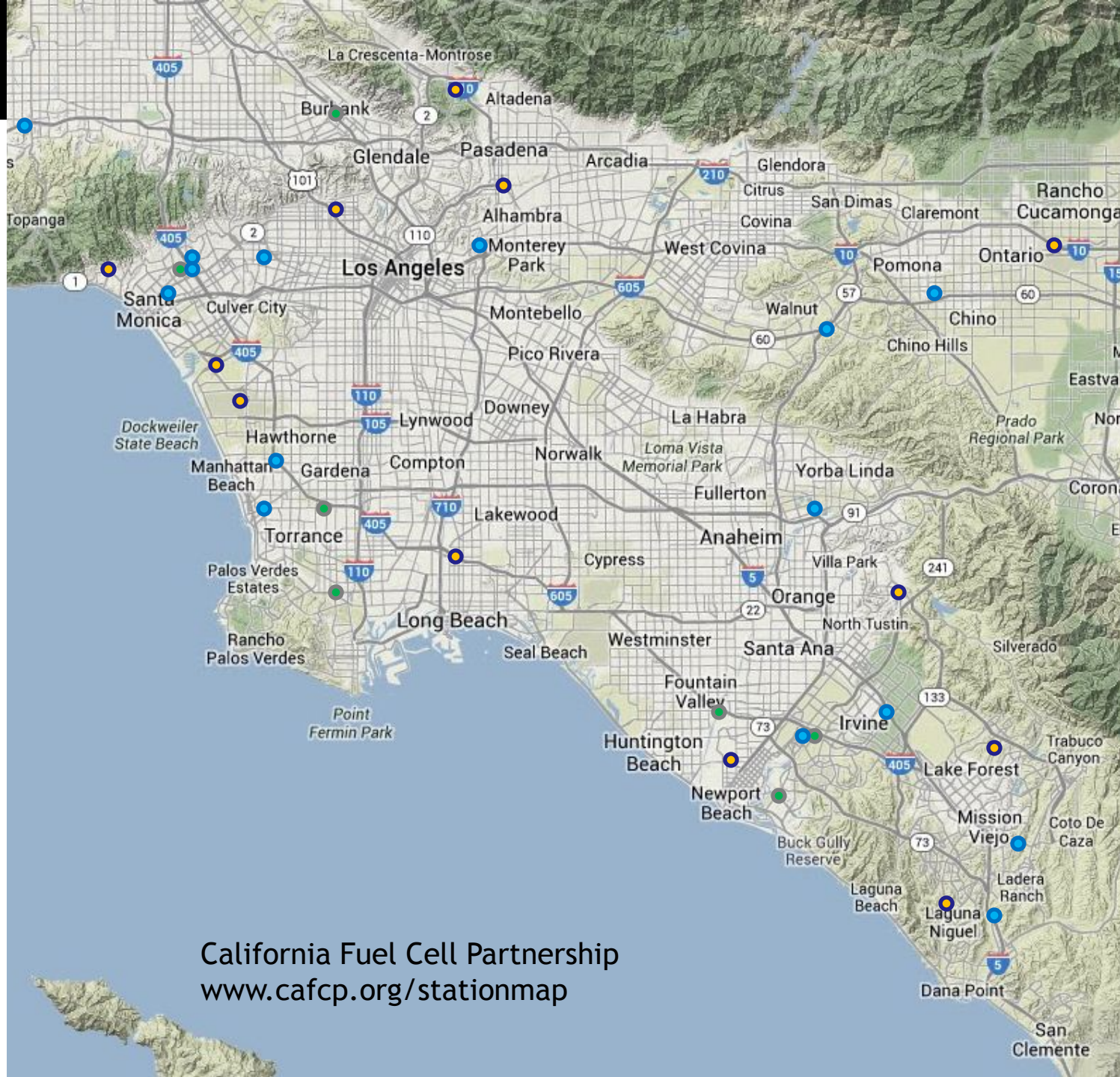
In Development

- Anaheim
- Chino (upgrade)
- Diamond Bar (upgrade)
- Irvine - UC Irvine (upgrade)
- Irvine - Walnut Ave.
- Lawndale
- Los Angeles - Cal State LA
- Los Angeles - West LA 2
- Los Angeles - Westwood
- Los Angeles - Woodland Hills
- Los Angeles - Beverly Blvd.
- Mission Viejo
- Redondo Beach
- San Juan Capistrano
- Santa Monica 1

Announced

- *Coalinga
- Costa Mesa
- La Canada Flintridge
- Laguna Niguel
- Lake Forest
- Long Beach
- Los Angeles - LAX
- Los Angeles - 9
- Los Angeles - 10
- Ontario
- Orange
- Pacific Palisades
- *Riverside
- *San Diego
- *Santa Barbara
- South Pasadena

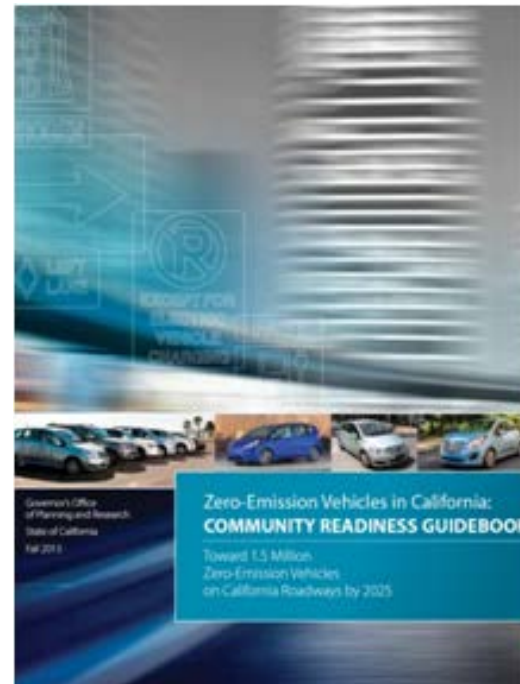
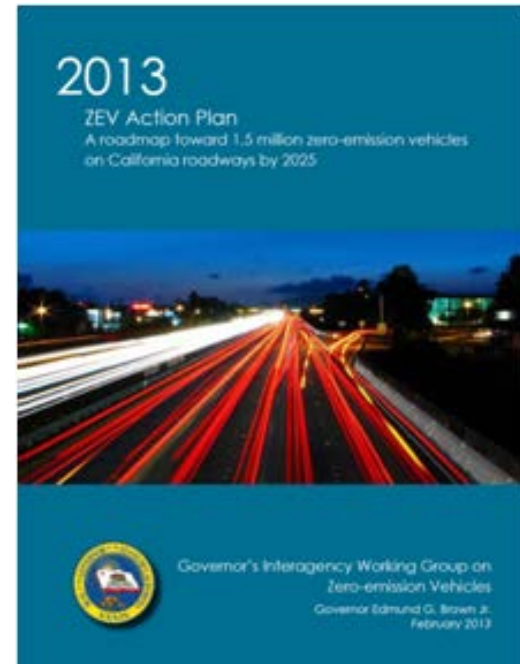
*Not shown on map



California Fuel Cell Partnership
www.cafcp.org/stationmap

State agency actions

- California ZEV Action Plan
- ZEV Infrastructure project manager in GO-Biz
- Hydrogen policy group
 - » Governor's Office, ARB, CEC, GO-Biz
- Interagency H₂ station workgroup
- H₂ Station “Green Team”
- H2USA member
- 8-State ZEV Action Plan



Selling hydrogen as fuel

- Field testing to determine practical meter accuracy
- Adopt additional accuracy classes that sunset over time
- Enable legal commercial sale of H₂ by the kg
 - » Temporary use permit
 - » Certificate of approval



CaFCP support



Fuels Institute

Tomorrow's Vehicles

What will we drive in 2023?

No Longer a Pipe Dream

if the right factors are met, hydrogen fuel cell vehicles could be a viable option for consumers and retailers.

BY JOHN EICHBERGER

FEATURED ARTICLES



Beginning the Commercialization of Hydrogen Fuel Cell Electric Vehicles

By Joe Gagliano, California Fuel Cell Partnership You may have recently seen a spike in media stories regarding hydrogen fuel cell electric vehicles (FCEV). Toyota announced its next-generation fuel-cell vehicle at the November 2013 Tokyo Auto Show and in the US at the 2014 Consumer Electronics Show this past January. Honda and Hyundai introduced their ...



California FUEL CELL PARTNERSHIP
DRIVING FOR THE FUTURE

California Fuel Cell Partnership
4.9 ★★★★★ (8 ratings)
2,520 likes · 98 talking about this · 50 were here

Non-Profit Organization
CaFCP is a collaboration of industry, government and academia working together to bring hydrogen-powered fuel cell passenger vehicles and transit buses to the commercial market.

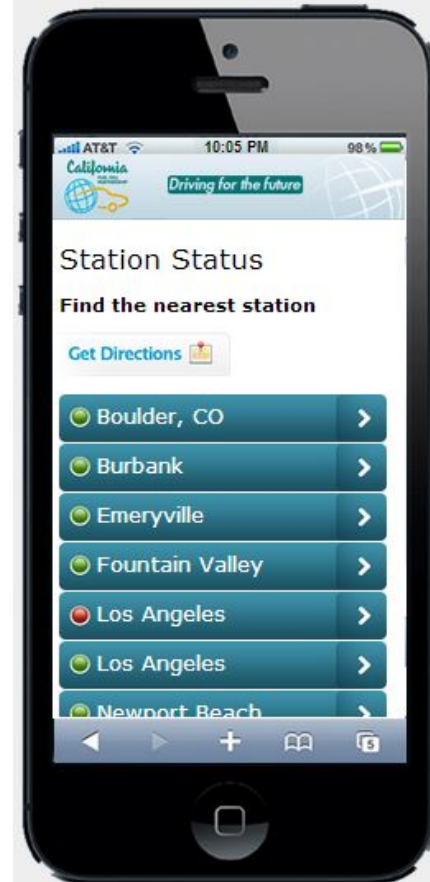
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Photos

Events

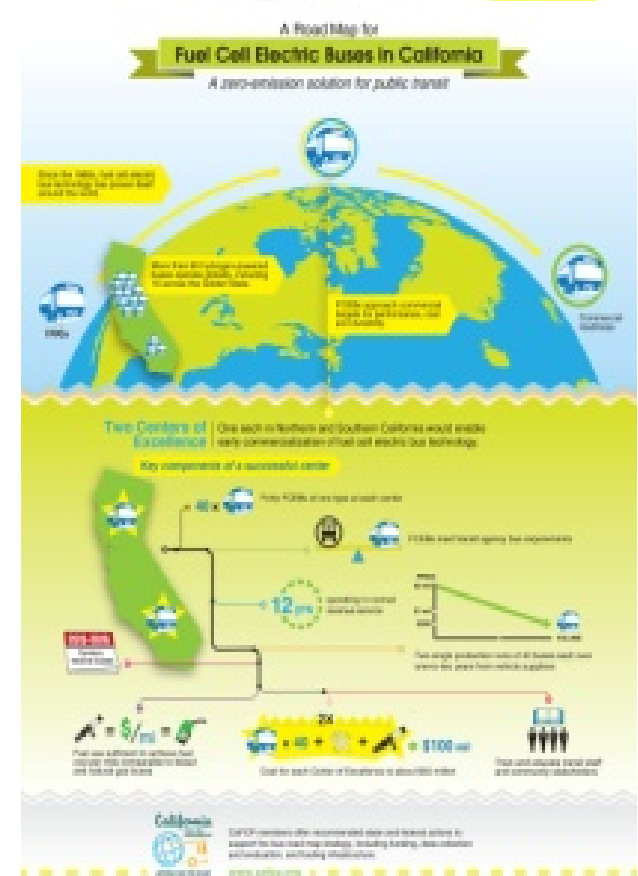
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June 2014 Fuel Marketer News

Fuel cell buses and trucks

- 16 fuel cell buses
- >1.5M miles in service
- >2.5M passengers carried
- FCEB roadmap
 - 40 bus fleets
 - 12-year operation
 - <\$1M per bus
- MD/HD roadmap
 - In process



CaFCP members



Air Liquide
Air Products
Alameda-Contra Costa Transit District
(*AC Transit*)
Automotive Fuel Cell Cooperation
BAE Systems
Ballard Power Systems
California Air Resources Board
California Department of Food and
Agriculture
California Energy Commission
California State University-Los Angeles
The Center for Energy Efficiency and
Renewable Technologies (*CEERT*)
Chrysler
Daimler
Energy Independence Now
General Motors
Honda
Hydrogenics

Hyundai
ITM Power
Institute of Transportation Studies, UC Davis
Linde North America, Inc.
National Fuel Cell Research Center, UC Irvine
National Renewable Energy Laboratory (*NREL*)
Nissan
Powertech Labs
Proton OnSite
Sandia National Laboratories
South Coast Air Quality Management District
Southern California Gas Company
SunLine Transit Agency
Toyota
U.S. Department of Energy
U.S. Environmental Protection Agency
University of California, Berkeley
US Hybrid
Volkswagen