

Program Overview - Hydrogen Fueling Infrastructure

Clean Fuels Advisory Group
Winter Retreat
February 2, 2011

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Background

- Long-term support of hydrogen infrastructure
- Five Cities Program
- City of Burbank fueling infrastructure
- AQMD hydrogen fueling station
- CEC Infrastructure Awards
- Continued need for station to fill “gap”



Hydrogen Fueling Stations

Current and Planned

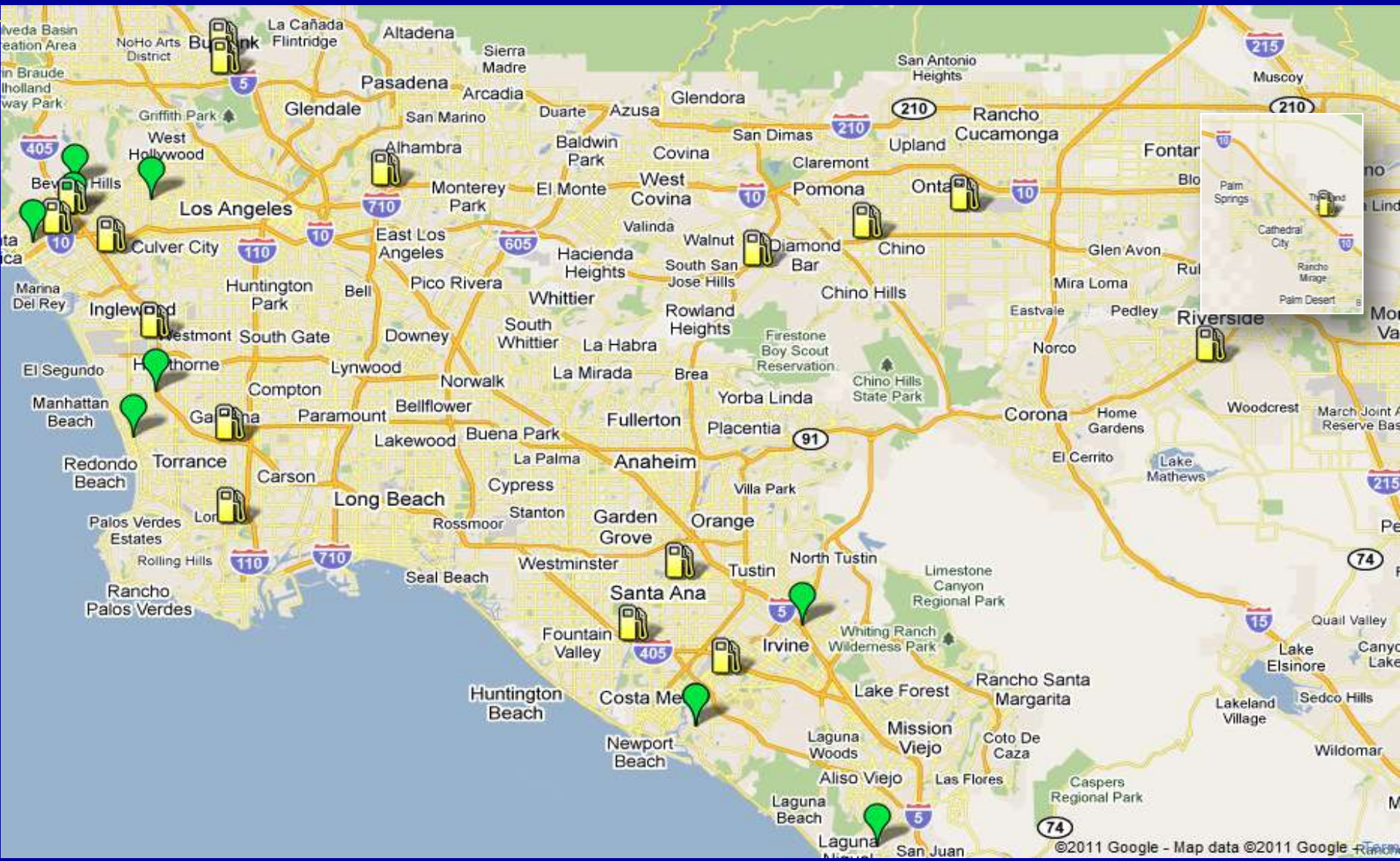
Name	Address	City	Status
GM Burbank	1105 W Riverside Dr	Burbank	Existing
HATCI Chino	12610 E End Ave	Chino	Existing
Shell Culver City	3801 Sepulveda Ave	Culver City	Existing
SCAQMD - Diamond Bar	21865 Copley Drive	Diamond Bar	Existing— *upgrade
UC – Irvine	19172 Jamboree Rd	Irvine	Existing— *upgrade
LAX-east Clean Energy	10400 Aviation Blvd	Los Angeles	Existing
Shell Santa Monica Blvd	11574 Santa Monica Blvd	Los Angeles	Existing
Camp Pendleton	Carmelo Dr & Harbor Dr	Oceanside	Existing
Ontario	1425 Bon View Ave	Ontario	Existing
Riverside	8095 Lincoln Ave	Riverside	Existing
City of Burbank	124 S Lake Ave	Burbank	Existing
Santa Ana	220 S Daisy Street	Santa Ana	Existing
Santa Monica - SCAQMD	2500 Michigan Avenue	Santa Monica	Existing
SunLine	32505 Harry Oliver Trail	Thousand Palms	Existing

Hydrogen Fueling Stations

Current and Planned

Name	Address	City	Status
Toyota	19001 S Western Avenue	Torrance	Existing
Orange County San Dist	10844 Ellis Avenue	Fountain Valley	Previously awarded
Shell Oil	1600 Jamboree Road	Newport Beach	Previously awarded
Shell Torrance Pipeline	190th Street & Western Ave	Torrance	Previously awarded
Mobil Oil – Mebtahi	25800 Western Ave	Harbor City	Previously awarded
UCLA	1100 Veteran Ave	Los Angeles	Previously awarded
CSULA	5151 University Drive	Los Angeles	Previously awarded
Laguna Niguel Station	30072 Crown Valley Parkway	Laguna Niguel	Planned
Honda Home Energy	1900 Harpers Way	Torrance	Existing
Santa Monica	1402 Santa Monica Blvd,	Santa Monica	Planned
Beverly Hills	1004 S La Cienega Blvd,	Los Angeles	Planned
West LA	11261 Santa Monica Blvd,	Los Angeles	Planned
Hermosa Beach	1131 Pacific Coast Hwy,	Hermosa Beach	Planned
Irvine North	4162 Trabuco Rd,	Irvine	Planned
Hawthorne	5230 Rosecrans Ave,	Hawthorne	Planned

Hydrogen Fueling Stations Current and Planned



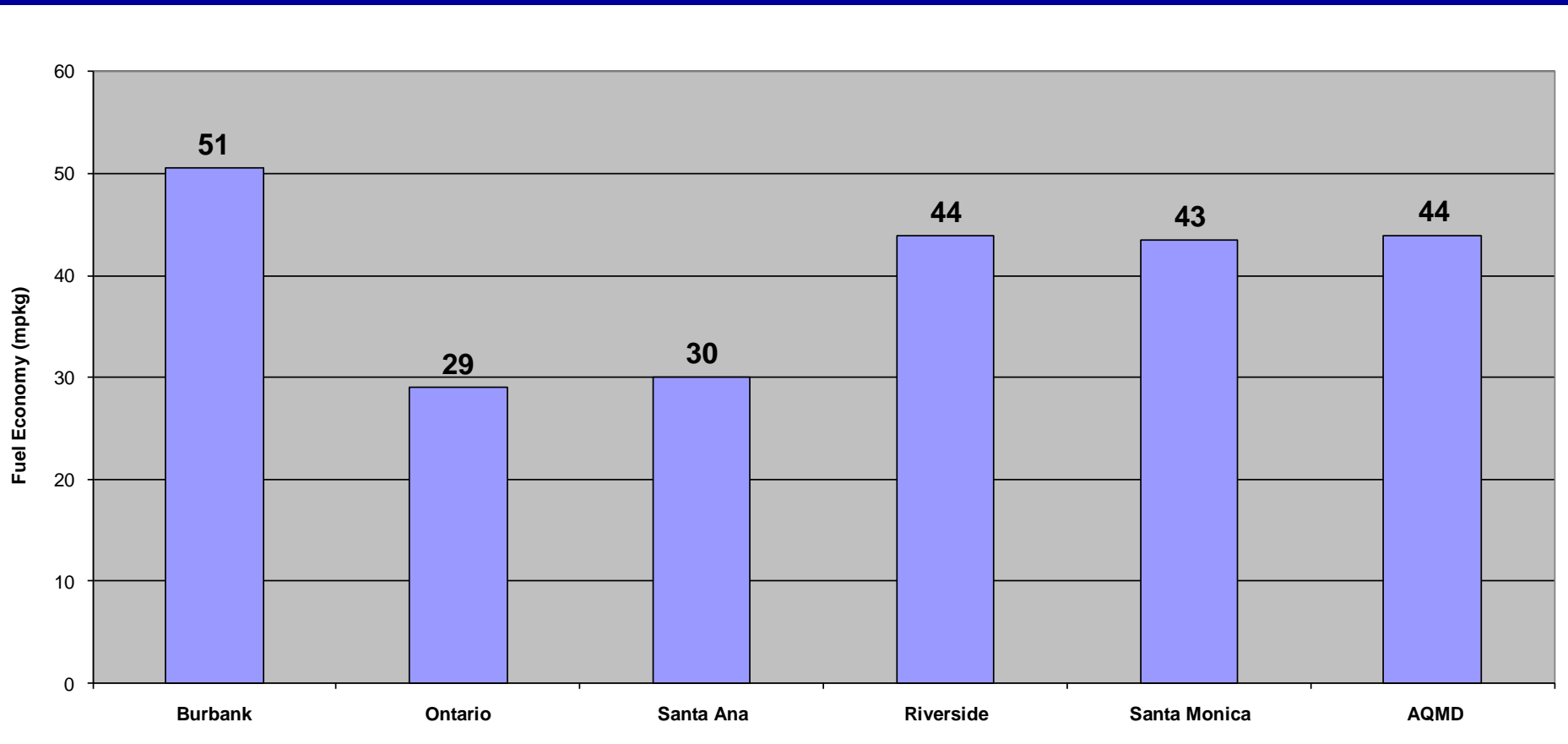
Performance of H₂ Vehicles



- H₂ ICE Vehicles Display Similar Fuel Economy as Older Generation FCVs (45 mpkg)
- Fuel Economy for H₂ Vehicles Consistent Over Time (2005-2008)
- Some Differences in Fuel Economy Due to Inability of H₂ Stations to Accurately Measure H₂ Dispensed

Five Cities Program

Average Fuel Economy by City for H₂ ICE Vehicles

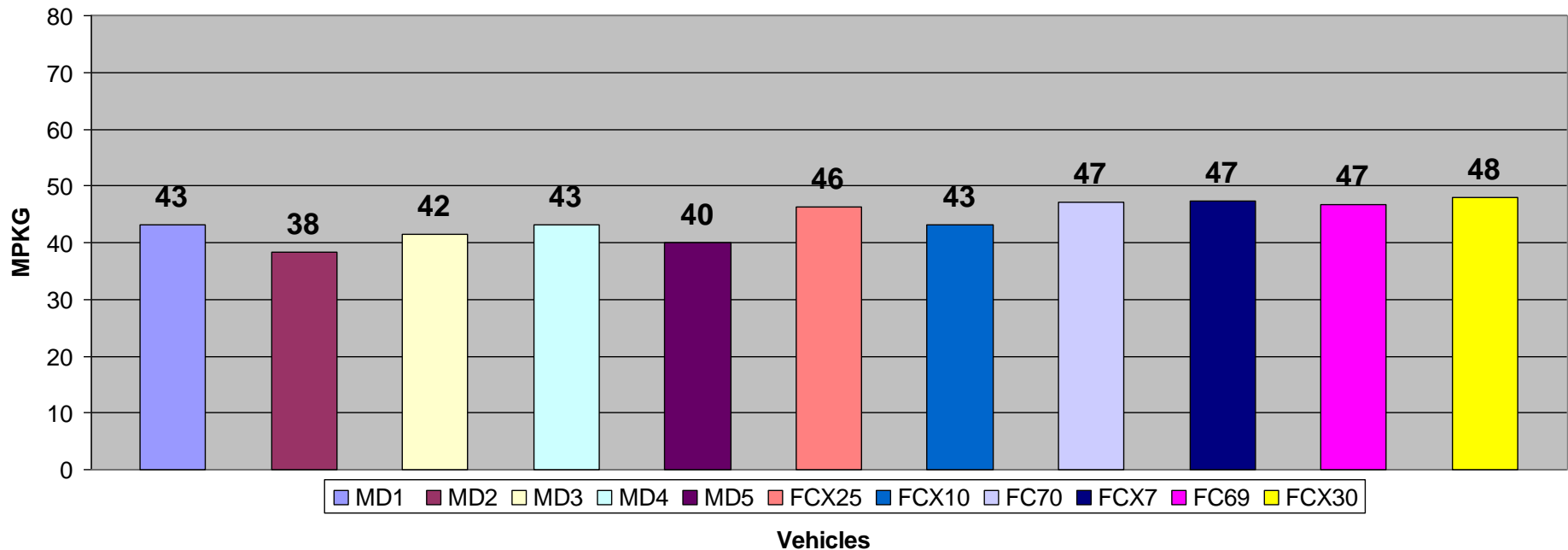


Mobile Refuelers (Ontario, Santa Ana) Not as Reliable in Measuring Hydrogen Dispensed

Five Cities Program

Average Fuel Economy by City for FCVs

Fuel Economy for H₂ ICE Comparable to Older Generation Fuel Cell Vehicles



Five Cities Program

Infrastructure Improvements

- Upgrading Station Software to Collect Vehicle ID and Odometer Readings to Link Amount of H₂ Dispensed with Mileage at Same Point in Time
- Modify Software to Lower Cost of Operation—Produce H₂ During Off Peak Hours
- Establish DSL Network Connection to Laptop Collecting Station Data

Five Cities Program

Next Steps

- Need automated data logging system for vehicles
- Consider expanding vehicle range
- Station software fix to reduce electricity use



Vehicle Data Logging System

Continue Operation of Burbank Hydrogen Station

- Burbank hydrogen fueling station originally part of AQMD Five Cities Program
 - Electrolyzer output of 12 kg/day
- DOE/BP built new 350/700 bar hydrogen fueling station
 - APCI – H2Gen steam methane reformer (SMR)
 - Provided for system maintenance and data management
 - Contract expired on September 15, 2009

City of Burbank

- RFP was released and subsequent contract awarded to Hydrogen Frontier for continued operation and fuel deliveries for Burbank hydrogen fueling station
 - Maintain safety monitoring
 - Continue monthly maintenance
 - Continue station operation on behalf of Burbank
 - Provide for emergency fueling during station outages
 - Provide continued fuel deliveries for Burbank HICE vehicle fleet and planned hydrogen fueled hybrid bus Provide detailed reporting for all fueling events
 - Meet SB 1505 requirements with renewable biogas credits

City of Burbank Funding Sources

Agency	Amount
DOE	\$ 360,000
CARB	\$ 300,000
AQMD	<u>\$ 200,000</u>
Total	\$ 860,000

- Other Potential Funding from OEMs
 - Pay to Play concept

CEC Infrastructure Awards

UC Irvine	19172 Jamboree Boulevard, Irvine	\$1,470,308
Santa Monica	1402 Santa Monica Blvd. Santa Monica	\$1,534,633
Beverly Hills	1004 S la Cienega Boulevard, Los Angeles	\$1,302,275
West Los Angeles	11261 Santa Monica Boulevard, Los Angeles	\$1,297,902
Hermosa Beach	1131 Pacific Coast Highway, Hermosa Beach	\$1,512,506
Irvine North	4162 Trabuco Road, Irvine	\$1,423,965
AQMD	21865 E. Copley Drive, Diamond Bar	\$1,491,386
Hawthorne	5230 Rosecrans Avenue, Hawthorne	\$1,198,758
Laguna Niguel	30072 Crown Valley Parkway, Laguna Niguel	\$2,049,134