CALIFORNIA ENERGY COMMISSION

California Hydrogen Station Development: Status, Challenges and Lessons Learned

Energy Commission Presentation to Fuel Cell Partnership Executive Board

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ARB-Funded Stations

- $15.7 Million for 8 Eight Stations
- 6 Operational with Modern Equipment
- 2 in Development

- Development time for new stations:
  3.2 to 4.2 years

Energy Commission Hydrogen Station Funding

Total Funding to Date = $43.8 million

17 New Stations = $27 million

~ 7 Station Upgrades = $6.7 million

- No stations permitted or constructed
- $29.9 million in next solicitation will fund about 16 additional stations

AC Transit Fuel Cell Bus Station = $3 million

Ballard Fuel Cell Transit Bus Demo = $2.4 million

CDFA Div of Weights and Measures = $4 million

- Retail Dispensing Fuel Standards

UC Irvine STREET Model = $750,000

Station Funding and Development Status

Fund Source	FY Funding	Amount ($ millions)	No. Stations	Cumulative Stations	Agreement Execution	Operational
ARB-SC	2007-08		9	9	Complete	Complete
CEC	2009-10	15.1	10	19	Complete	Sept 2014
CEC	2011-12	11.9	7	26	Complete	Oct 2014
CEC-SC	2011-12	6.7	7	33	Complete	Dec 2015
CEC	2012-13	9.9	5	38	July 2014	Dec 2015
CEC	2013-14	20	11	49	July 2014	Dec 2015
CEC	2014-15	20	11	60	July 2015	Dec 2016
CEC	2015-16	20	11	71	July 2016	Dec 2017

Energy Commission H2 Station Status

2010 Stations	New Site Needed?	New Site Name	LHI Posted	CEC Approval	MOU w Station Owner		Permit App Filed (estimate)	Installation
Air Products					**Expected**	**Actual**		
West LA	No				Complete		Oct 2013	Jan 2014
Diamond Bar	NA				NA		Oct 2013	Jan 2014
UC Irvine	NA				NA		Nov 2013	Feb 2014
Irvine North	Yes	17241 Irvine Rd, Tustin		Pending	Apr 2013	Pending	Dec 2013	Mar 2014
Santa Monica	Yes	1819 Cloverfield - SM	May 10	June 17	Apr 2013		Jan 2014	Apr 2014
Beverly Hills	Yes	7751 Beverly, LA		Pending	Apr 2013	Pending	Jan 2014	Apr 2014
Hermosa Beach	Yes				Apr 2013	Pending	Feb 2014	May 2014
Hawthorne	Yes				Apr 2013	Pending	Mar 2014	Jun 2014
So Cal Fill Station	NA				NA		Oct 2013	Dec 2013
Linde								
Laguna Nigel	Yes	San Juan Capistrano	Feb 22	June 10		Pending	Pending	Late 2014
West Sacramento	Yes	West Sac – River Rd	Feb 22	June 10		Pending	Pending	Late 2014
2013 Stations		**Site Location**			**MOU w Station Owner**		**Permit**	**Installation**
Air Products								
Woodland Hills		5314 Topanga			Pending			Oct 2014
Mission Viejo		25122 Marguerite Pkwy			Pending			Oct 2014
Linde								
Mountain View		830 Leong			Pending			Oct 2014
Cupertino		21530 Stevens Creek			Pending			Oct 2014
Foster City		390 Foster City Blvd			Pending			Oct 2014
Air Liquide								
Anaheim		3731 E La Palma				Complete	Site drawing	Oct 2014
Hyd Frontier - ITM								
Chino		126000 East End Ave				Complete	Site drawing	Oct 2014

Critical Issues Assessment

2010 Stations	Agreement Execution Issues	Site Control: Site Change	Site Constraints	Permit – Local Agency Issues	OEM Deployment Issues	Equipment Commercial-ization
Air Products						
West LA	X			X	X	
Diamond Bar	X				X	
UC Irvine	X				X	
Irvine North	X	X			X	
Santa Monica	X	X	X		X	
Beverly Hills	X	X	X		X	
Hermosa Beach	X	X			X	
Hawthorne	X	X			X	
So Cal Fill Station	X					
Linde						
SF Airport				Canceled		
Laguna Nigel	X	X		X		X
West Sacramento	X	X	X	X		X
2013 Stations						
Air Products						
Woodland Hills						
Mission Viejo						
Linde						
Mountain View						
Cupertino						
Foster City						
Air Liquide						
Anaheim						
Hyd Frontier - ITM						
Chino						

Agreement Execution Issues

- Linde and Air Products needed 12 months to execute 2010 Agreements

Lessons Learned and New Actions

- Both companies now familiar with Energy Commission standard conditions
- 2012 Agreements executed in 2 to 12 weeks
- Current draft PON has 120 day deadline from Business Meeting approval to execution

Site Control and Lease Negotiations

- 7 of 8 private sites from 2010 NOPA need to be changed
  - Owners did not agree to modifications approved by manager
  - Station sold and new owners did not approve of H2

Lessons Learned and New Actions

- Energy Commission now requires documentation of station owner commitment to H2
- Station developers more experienced at due diligence on ownership

Physical Site Constraints

- Air Products' Beverly Hills and Santa Monica sites did not have sufficient physical space
- Linde's Laguna Nigel site was at base of slope. Vent stack impinged on upslope property.

Lessons Learned and New Actions

- Energy Commission now requires documentation and photos of site suitability
- Station developers more experienced at due diligence on site assessment

Permit & Local Agency Issues

- San Francisco Airport Commission refused to authorize station due to liability concerns.
  - Station and funding lost.
- City of Laguna Nigel hostile to H2 stations in residential neighborhood. Beverly Hills and Mission Viejo may have similar reticence.
- City of West Sacramento long term zoning for new Linde site at Ramos facility may not be compatible with H2 station over 15 to 20 years.

Local Agency: Lessons Learned

- Governor's Office support: OPR, Go-Biz and new Ombudsman
- ZEV Action Plan H2 action items for local government outreach
- FCP has staff in Southern and Northern California conducting local agency outreach.
- FCP first responder training experts and H2 letter from State Fire Marshall
- ARB has local government outreach plan
- South Coast has knowledgeable staff willing to work with local governments
- Energy Commission staff have worked with local government and Linde in SF Bay Area
- Energy Commission expanding Regional Readiness Planning solicitation to include H2
- OEMs offering to work with station developers on local government issues

OEM Deployment Timeline

- Uncertainty on dates and volumes of initial FCV deployments creates financial uncertainty for early year cash flow at new H2 stations
- Toyota, Honda and Daimler maintaining 2015 schedule, but GM, Nissan and Daimler pushing back initial launch to 2017
- ARB reduced estimate of 2015-17 deployment downward from 50,000 cars to 20,000 cars in Energy Commission's draft 2013 IEPR

OEM Schedules: Lessons Learned

- Hydrogen Network Investment Plan research and development funded by FCP: Market Assurance Grant concepts
- Potential negotiations on Take or Pay contracts or other forms of OEM support for early market stations
- More bilateral discussions and information sharing between OEMs and station developers
- Energy Commission offering higher capital support (70%) and 10% bonus for fast track construction
- Energy Commission offering O&M funding:
  - Up to $200,000 over 3 years in 2012 PON
  - Up to $300,000 over 3 years for all operable stations meeting modern performance standards in current draft 2013 PON.
- AB 8 requirements for annual OEM surveys and joint ARB-Energy Commission assessments

Equipment Commercialization

- Linde valve incident at AC Transit
- Linde durability issues during testing for US standards

Lessons Learned and New Actions

- AC Transit: Important test of emergency equipment and local first responder communications and response
- Increased due diligence on equipment design and testing