California
FUEL CELL PARTNERSHIP
DRIVING FOR THE FUTURE

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March 17, 2011

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 10-ALT-1
1516 Ninth Street
Sacramento, CA 95814-5512

Dear Commissioner Boyd and California Energy Commission staff:

Thank you for the opportunity to provide comments on the "2011-2012 Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program, Draft Staff Report." As you know, the California Fuel Cell Partnership is working together to commercialize hydrogen fuel cell vehicles in California, and the CEC plays an integral role in that process. CaFCP members are pleased with the CEC's November 2010 NOPA for 8 new and 3 expanded/upgraded hydrogen stations in early market communities, and are eager for the second PON for hydrogen stations to be issued in the coming months.

We encourage CEC to include funding for additional light-duty vehicle hydrogen stations in the 2011-2012 investment plan. Based on automaker survey results showing their plans for deploying fuel cell vehicles, CaFCP and automaker analysis projects gaps in hydrogen availability for 11 California market areas by 2014. Hydrogen stations to be funded under the upcoming PON (approximately $10 million from 2010-2011 investment plan) are projected to provide stations for about half of these gap areas. CEC's 2011-2012 investment plan should provide a similar level of funding to fill the remaining gaps to continue to enable vehicle rollout and market preparation.

Please find attached CaFCP's recently published Progress and 2011 Actions report and a short summary of our analysis findings. You may contact Mr. Bill Elrick, CaFCP Technical Program Director, at belrick@cafcp.org if you have questions or need further information.

Sincerely,

Supervisor Josie Gonzales
Chair

Justin Ward
Vice Chair

Analysis of hydrogen station shortfall areas in California
February 24, 2011

- Based on 2010 automaker survey results, 11 areas will have shortfalls in hydrogen fuel availability by 2014 unless additional stations are funded and built (see Table 1). This analysis assumes 4 existing public stations, 9 stations currently in planning/construction and 8 new and 3 upgrade/expanded stations proposed for funding (CEC's November 2010 NOPA) are fully operational by end of 2012.
- Based on CaFCP staff analysis, CEC's draft 2011-12 investment plan analysis does not reveal these gaps for two reasons:
    - CEC appears to have aggregated vehicle placement numbers for individual air quality forecast areas into larger regions. Although CEC had specifically requested a high degree of resolution in the survey results, they apparently didn't utilize this in their analysis.
    - CEC assumes California has 12 publicly accessible hydrogen stations. Automakers consider only 4 existing stations publicly accessible, and of these, 3 have only H35, leaving most customers only able to fill with ½ tank of fuel.
- Of the $13 million allocated in the CEC's FY 2010/11 investment plan, CEC staff has estimated $10 million will be available for a hydrogen station solicitation (lower amount is due to across the board cuts based on reduced AB118 program revenue). This is projected to cover 5-7 new stations and should be directed to build stations in approximately half of the identified 11 shortfall areas.
- To fill remaining gaps, CaFCP staff estimates approximately $10 million for hydrogen is needed in the FY2011/12 investment plan to fund 5-7 additional stations to be operational prior to 2014.

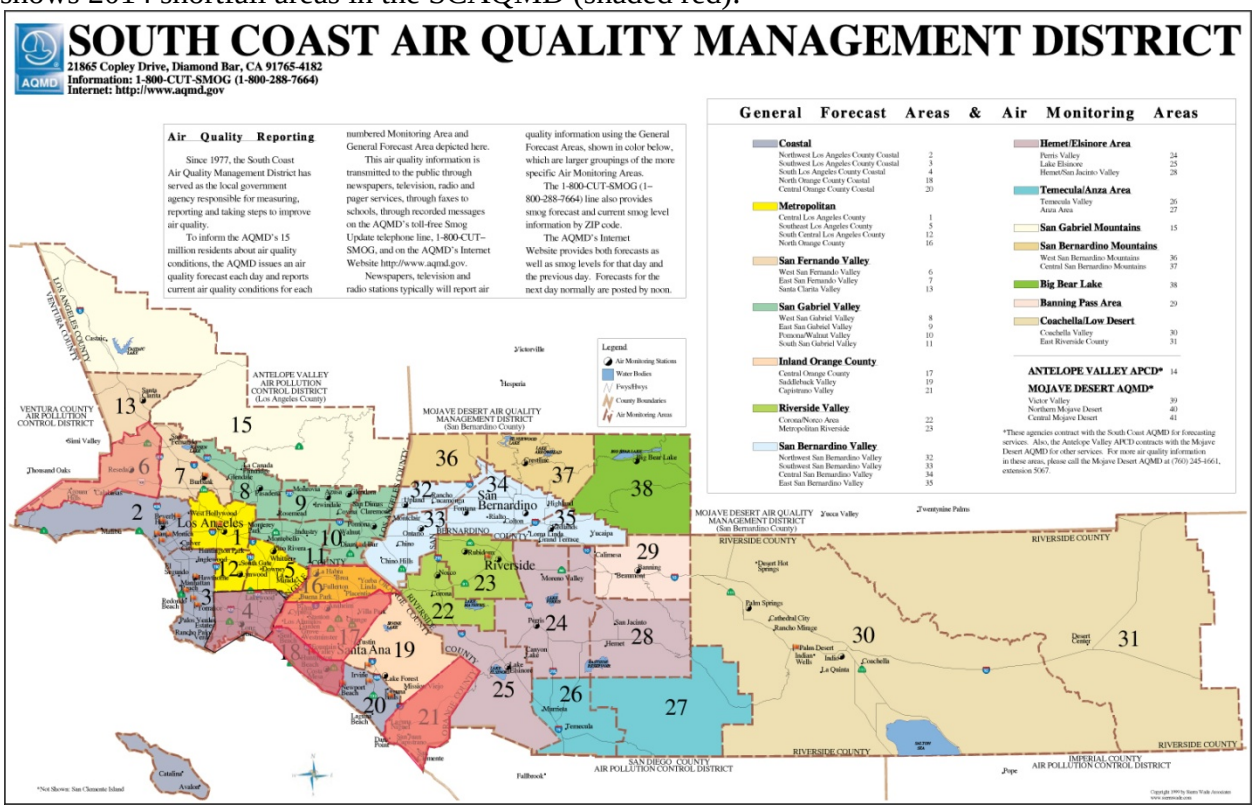
Table 1. Areas where additional hydrogen stations are needed before 2014 (shortfall areas)*

Air Basin	County	Area
South Coast‡ (Los Angeles region)	Los Angeles	South LA County Coastal (region 4)
		West San Fernando Valley (region 6)
	Orange	North Orange County (region 16)
		Central Orange County (region 17)
		Saddleback Valley (region 19)
		Capistrano Valley (region 21)
South Central Coast	Santa Barbara	Santa Barbara
San Diego	San Diego	San Diego
San Francisco Bay Area	San Francisco	San Francisco
	Santa Clara	Santa Clara
Sacramento Valley	Sacramento & Yolo	Sacramento

** Areas having hydrogen supply shortfall by 2014 or sooner, based on projected publicly accessible hydrogen supply (kg/day) compared to automakers' projected vehicle deployments.*

‡Regions within the South Coast air basin refer to the South Coast Air Quality Management District forecast area maps, the location basis used for the 2010 automaker survey.

Based on 2010 automaker survey and currently available, planned and funded stations, this map shows 2014 shortfall areas in the SCAQMD (shaded red):



Current, projected and recommended timeline of stations and funding

	2010	2011	2012	2013	2014
		(end of year status)			
Public stations in operation*	4 (see #)	13	22	27-29	32-36
Stations in development*	9 (see $)	9	5-7	5-7	tbd
Funding available or needed for public stations*	$15.7M	$10M	$10M**	tbd	tbd
New stations funded	8 + 1 (see &)	5-7	5-7	tbd	tbd
Year funded stations open	2012	2013	2014		

* Doesn't include transit-only stations

** suggested allocation for FC passenger vehicle fueling in FY 2011/12 Investment Plan

#: West LA, UC Irvine, Riverside, Thousand Palms

$: Burbank, Torrance pipeline, CSULA, Fountain Valley, Harbor City, Newport Beach, UCLA, SFO, Emeryville

&: 8 new stations under November 2010 NOPA, plus Diamond Bar upgrade/expansion (other upgrade/expansions at UCI and SFO stations already counted)

Progress and 2011 Actions for Bringing Fuel Cell Vehicles to the Early Commercial Market in California

February, 2011

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This document refers to CaFCP's current consensus plan for deploying fuel cell vehicles and hydrogen stations in California. This consensus vision does not necessarily represent the views or commitments of individual CaFCP members.

Building the Early Commercial Market

In the 2009 document *Hydrogen Fuel Cell Vehicle and Station Deployment Plan: A Strategy for Meeting the Challenge Ahead*,[1] CaFCP members identified the specific actions needed to enter a commercial market for fuel cell vehicles and hydrogen fuel through 2017. Based on data and real-world experience, the roadmap called for about 40 new hydrogen stations to prepare for commercial launch. In April 2010, CaFCP released an update that reported progress and next steps toward the action plan goals.[2]

This report is the second update and a precursor to a roadmap coming later this year. This document identifies immediate actions required in 2011 to prepare for coming fuel cell passenger vehicles and transit buses. These actions are the next important steps toward commercialization and user acceptance, and point to future needs and challenges to establish the early commercial market.

Vehicle technology has moved from R&D toward commercialization and, therefore, actions have evolved to focus on consumer confidence, acceptance and usability. This requires:

- Successfully opening and operating the stations announced, funded and under construction. To customers, a station in planning or under construction does not exist. It's vital that awarded stations move quickly from announcement to retail operation so automakers can deploy vehicles in planned timeframes.
- Establishing early clusters of stations to enable vehicle deployments. To be successful, clusters need multiple fueling stations to meet customer needs and provide station redundancy. Hydrogen supply must also exceed customer demand by considering peak usage in addition to average daily usage. Early clusters will ultimately expand geographically and quantitatively to accommodate greater FCV deployments within the decade.
- Meeting current technical requirements and preparing for codes and standards now under development. All stations, regardless of funding parties or equipment providers, must meet applicable J2601 requirements, provide fuel at H35 and H70, deliver sufficient daily and peak supply, and adhere to developing hydrogen fuel quality standards.
- Meeting customer expectations for retail fueling. Stations and refueling protocols must be safe and open to all automaker vehicles, be retail oriented and provide a customer experience similar to today's conventional fuel stations (e.g. 24/7 operating hours, no use agreements or classroom training requirements, and conventional payment methods).
- Meeting retailers' business expectations for dispensing fuel. Owners and operators of retail hydrogen stations must be able to sell hydrogen as a retail fuel, understand applicable regulations and requirements for dispensing hydrogen and be able to integrate hydrogen with normal business operations, including a path to profitability. Owners must be able to see when they can recover operating and maintenance costs, and make a return on capital investment competitive with other investment opportunities.

[1] CaFCP 2009 Action Plan www.cafcp.org/sites/files/Action%20Plan%20FINAL.pdf
[2] CaFCP 2010 Progress and Next Steps report www.cafcp.org/sites/files/FINALProgressReport.pdf

2011 Coordinated Stakeholder Actions

The following are priority actions for 2011:

- Fill the gaps in areas where hydrogen supply will fall short of demand based on automakers' projected vehicle deployments to early customers.
  - ✓ Direct available 2011 hydrogen station funding to support new stations in shortfall areas listed in Table B.
  - ✓ Identify additional funding, to be available in 2012 and beyond, to support a growing network of fueling stations necessary to fuel vehicles in 2015 and beyond, as shown in Figure A.
  - ✓ Find ways to fund ongoing operation and maintain early retail-like demonstration stations, as these will continue to be vital in the early years of commercialization
- Synchronize and augment regulations, including the Clean Fuels Outlet, Zero Emission Vehicle Regulation, Zero Emission Bus Regulation and renewable hydrogen, to better support successful deployment of FCVs.
- Complete many of the codes and standards that enable retail sales of hydrogen as fuel.
- Use information from industry and academia to identify new funding models to transition away from year-to-year government co-funding.
- Target education and training in the early market communities that are receiving their first hydrogen stations this year.

2010 Snapshot

At the end of 2010, California had four publically accessible hydrogen stations that customers from each automaker can use, two of which already have more demand for fuel than they can supply. A new station in Torrance was being commissioned as this document was written. Four more stations are expected to open in Southern California in early-2011 and one in San Francisco near the end of 2011. (See Appendix 1 for a list of current and planned stations.)

Several of these demonstration stations are first of their kind, building upon the experience from earlier stations and becoming a proving ground for new technology and ideas. The Torrance station is the first to take fuel from an active underground hydrogen pipeline. The Harbor City station is the first to have high-pressure delivered gas, minimizing on-site compression. Fountain Valley will be the first to make 100% renewable hydrogen from wastewater digester gas. Jointly, the new stations will provide more fueling options for existing fuel cell vehicle customers and transit buses, and enable automakers to place more new vehicles with retail customers and into fleet operation.

In 2010, a collaboration of five San Francisco Bay Area transit agencies began operating a fleet of 12 new fuel cell buses. The buses have the latest improvements and upgrades learned from prior demonstrations including a fully integrated hybrid fuel cell/battery electrical system with an advanced lithium-ion energy storage system. The buses have more passenger capacity and carry 40kg of hydrogen, yet weigh 5,000 pounds less than the previous generation of fuel cell bus and cost about 35% less.

The buses will use two stations, both using new ideas and technology. The station in Emeryville is a solar electrolysis station with two dispensers: one inside the fence for buses and one outside the fence for passenger vehicles. The transit-only station in Oakland will be the first to use a

biogas-fed stationary fuel cell system to fully power an electrolyzer and all other electrically driven equipment at the station with renewable energy.

Two additional California fuel cell bus demonstrations are underway: one with SunLine Transit in Thousand Palms and the other with the City of Burbank. San Francisco MTA is also demonstrating the use of a hydrogen fuel cell auxiliary power unit in a hybrid diesel/electric transit bus. At a one-day workshop[3] in Washington DC hosted by the U.S. Department of Energy, technical experts from industry, end users, academia, DOE national laboratories, and other government agencies concluded that the fuel cell vehicle technology is close to commercial readiness.

Fuel Cell Vehicles on the Road

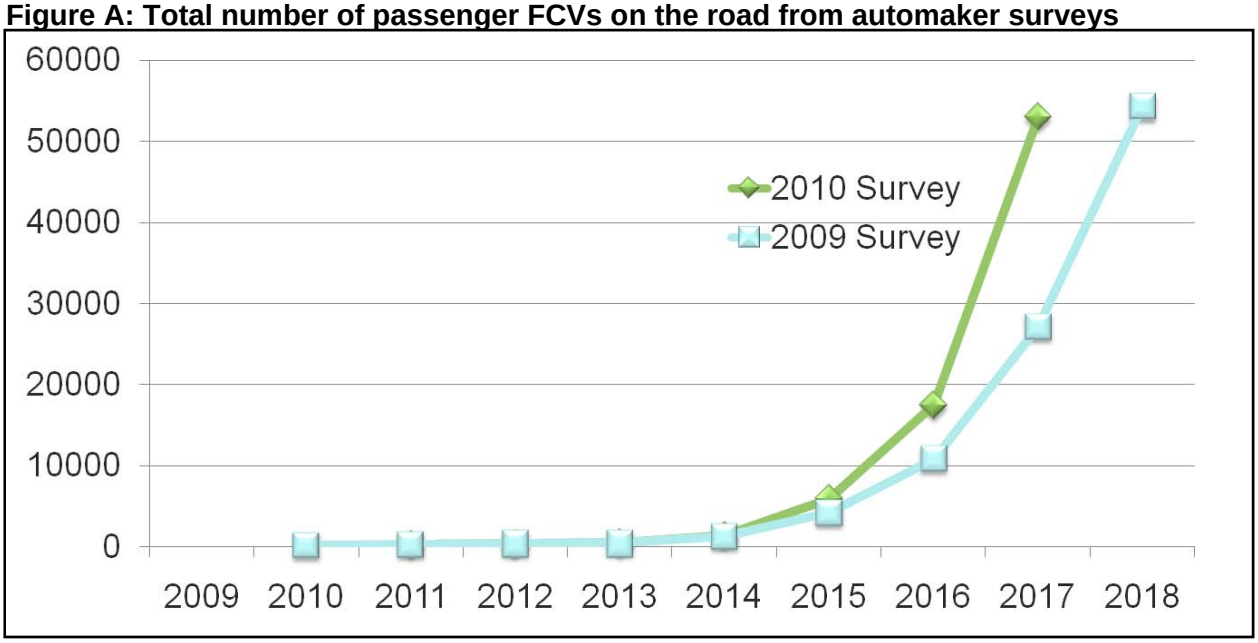
Fuel cell passenger vehicles

CaFCP conducts annual surveys of its automaker members to gain an accurate projection of planned vehicle deployments in the coming years. The December 2010 results show trends similar to previous surveys, confirming automaker plans for hundreds, thousands and then tens of thousands of fuel cell vehicles. Table A presents the 2010 CaFCP automaker survey results while Figure A presents a summary of CaFCP's 2010 automaker survey results for passenger FCVs compared to the 2009 survey. Result show that automakers now expect FCVs to reach tens of thousands slightly earlier than they did in 2009.

Table A: 2010 CaFCP survey of automaker passenger fuel cell vehicles

	Hundreds	Thousands	Tens of thousands
	Through 2013	2014	2015-2017
Total Passenger Vehicles*	430	1,400	53,000

Figure A: Total number of passenger FCVs on the road from automaker surveys



[3] Joint Fuel Cell Bus Workshop Summary Report, http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/buswksp10_summary.pdf

Fuel cell buses

The California Air Resources Board is currently monitoring all California fuel cell bus demonstrations by measuring bus performance characteristics such as reliability, availability, durability and cost as they compare to conventional buses in transit service today. As fuel cell buses reach commercial readiness, CARB is prepared to propose regulatory actions to require large transit agencies to purchase a small percentage of all new bus acquisitions as zero emission buses. When this purchase requirement is implemented, the 10 largest California transit agencies will begin deployment, further expanding the need for hydrogen infrastructure, including high-volume stations, in the most densely populated regions of the state.

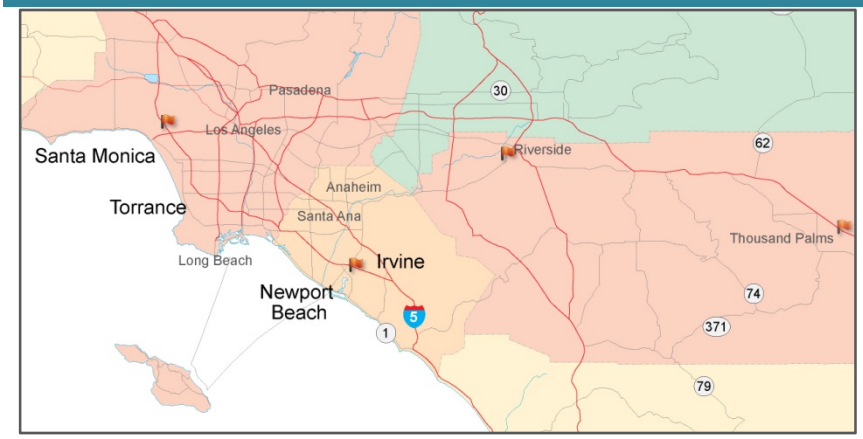
Hydrogen stations

Four publicly accessible hydrogen stations were open in California at the end of 2010. Eight more stations were in development in 2010 and in November 2010 the California Energy Commission proposed funding for eight new and three upgraded/expanded stations. Proposed funding is expected to be awarded in early 2011, with stations to begin operation in 2012.

The maps on the following page (Figure B) show a progression of public hydrogen stations in Southern California from those open at the end of 2010 to those projected to be open by the end of 2012. Figure C shows the stations expected in Northern California by the end of 2012.

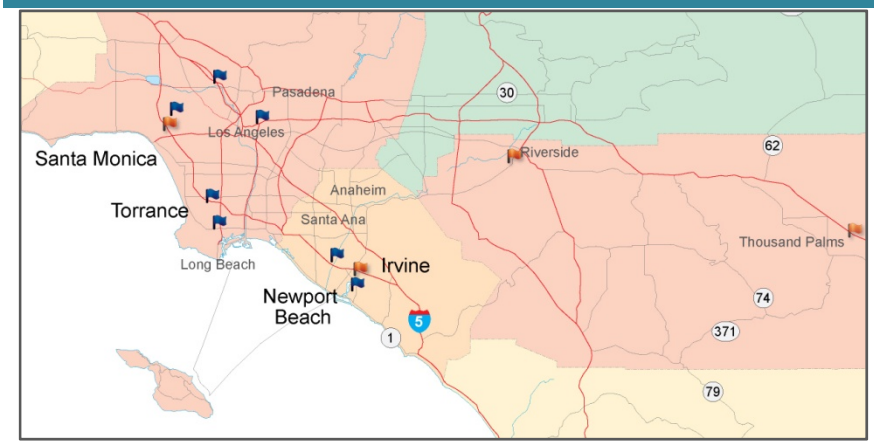
Figure B: Progression of hydrogen stations in Southern California

Stations open to the public in 2010



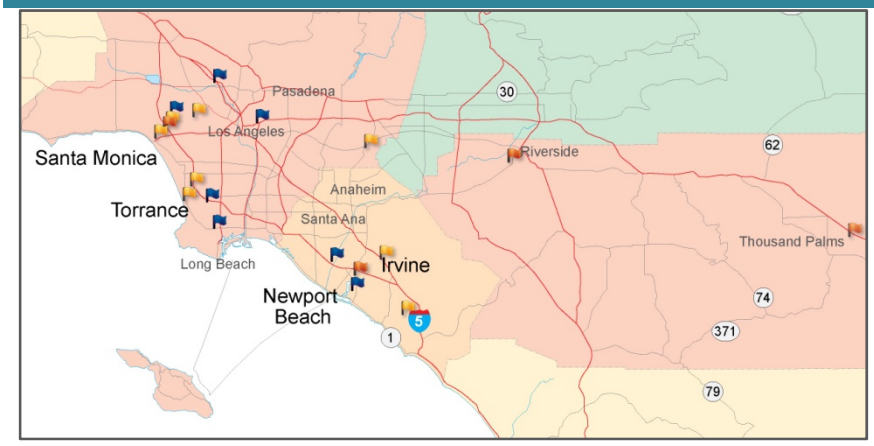
West Los Angeles
Riverside
Irvine
Thousand Palms

Stations to be added in 2011



Newport Beach
Harbor City
Los Angeles
Burbank
Fountain Valley
Torrance
Westwood

Stations to be added in 2012



West Los Angeles
Irvine (2)
Beverly Hills
Diamond Bar
Santa Monica
Hawthorne
Hermosa Beach
Laguna Niguel

Proposed for funding in 2010

Figure C: Northern California hydrogen stations

2010 Progress and 2011 Recommended Actions

In 2010, CaFCP members made progress with each of the five points in the Progress and Next Steps report. Most of the actions are specific steps to bringing clusters of demonstration retail-ready hydrogen stations into operation in the early market areas.

Fund showcase stations

Progress: In the 2010 progress report, automakers and transit agencies identified seven specific communities that needed new stations before 2012, and four existing stations that needed upgraded, expanded or extended operation. Automakers identified these locations as best suited to provide "primary" stations to their first customers. The goal is to maximize station utilization, make the best use of limited funding, and provide adequate fuel and convenience for customers.

In November, the California Energy Commission released its Notice of Proposed Awards that identifies the Transportation Committee's support for co-funding 11 new, expanded or upgraded stations.[4] The solicitation included specific points to ensure public access, longevity and faster station planning and construction.

In addition, South Coast Air Quality Management District and the California Air Resources Board funded continued operation of the Burbank station.

[4] Alternative and Renewable Fuel and Vehicle Technology Program Grant Solicitation PON-09-608 Hydrogen Fuel Infrastructure http://www.energy.ca.gov/contracts/PON-09-608_Revised_NOPA.pdf

2011 Action: Fill the gaps in areas where hydrogen supply will fall short of demand based on automakers' projected vehicle deployments to early customers.

- Direct available 2011 hydrogen station funding to support new stations in the shortfall areas listed in Table B.
- Identify additional funding, to be available in 2012 and beyond, to support a growing network of fueling stations necessary to fuel vehicles in 2015 and beyond, as shown in Figure A.
- Find ways to fund ongoing operation and maintenance of early retail-like demonstration stations, as these will continue to be vital in the early years of commercialization

Customers need confidence they will be able to fuel their new vehicles where they want to go, and at times that are convenient for their schedules. It is important that hydrogen stations have adequate supply on a daily and peak basis to supply the growing vehicle fleet. Fulfilling customer needs with sufficient locations will initially result in more hydrogen than needed, but location is a key to customer adoption that will start the early commercial market.

Through the survey and ongoing planning meetings, the automakers jointly identified areas where they project a shortfall in fuel supply by 2014, based on vehicle placement plans. Stations in these areas (listed in Table B) will fill these gaps. Areas within the South Coast air basin refer to South Coast AQMD's forecast map.

Table B: Areas where additional hydrogen stations are needed before 2014*

Air Basin	County	Area
South Coast‡ (Los Angeles region)	Los Angeles	South LA County Coastal (region 4)
		West San Fernando Valley (region 6)
	Orange	North Orange County (region 16)
		Central Orange County (region 17)
		Saddleback Valley (region 19)
		Capistrano Valley (region 21)
South Central Coast	Santa Barbara	Santa Barbara
San Diego	San Diego	San Diego
San Francisco Bay Area	San Francisco	San Francisco
	Santa Clara	Santa Clara
Sacramento Valley	Sacramento & Yolo	Sacramento

** Areas having hydrogen supply shortfall by 2014 or sooner, based on projected publicly accessible hydrogen supply (kg/day) compared to automakers' projected vehicle deployments.*

‡Regions within the South Coast air basin refer to the South Coast Air Quality Management District forecast area maps, the location basis used for the 2010 automaker survey.

In addition to location, new stations must also consider retail customer fueling habits. Most people fuel their vehicles in the few hours before and after work.[5] Therefore, stations must be designed to provide 75-80% of their capacity in a three-hour window. For example, a station that has 50 customers a day will typically see 20 of the customers between 6:00am and 9:00am, 25 customers between 5:00pm and 8:00pm, and the other five throughout the day. Therefore, that station's design must consider both daily and peak fueling capacity.

As FCVs approach the early commercial market, clusters of stations need to grow into an urban network and ultimately a system. Meeting this challenge requires continued operation of existing public stations as well as adding new stations. Stations must prove reliability in retail-like use so automakers can be confident their new customers will have access to sufficient fuel supply and locations.

Additional hydrogen stations will need to be funded and built before 2015 to prepare for commercial launch of vehicles, and stations will need to be added and expanded each year to fuel the rapidly growing vehicle fleet. In the next few years, as more customers drive fuel cell vehicles, automakers will better understand how fueling location impacts early adoption. Automakers will prioritize new station locations as they understand customer market needs.

Synchronize and augment regulations and policies

Progress: Federal, state and regional government regulatory agencies took early action to synchronize vehicle regulations that emphasize zero emissions with fuel regulations that aim to lower carbon content through biofuels. Agencies will continue to look at ways to synchronize the regulations and policies.

2011 Actions: The California Air Resources Board will consider revisions to several regulations, including the Clean Fuels Outlet, Zero Emission Vehicle Regulation and Zero Emission Bus Regulation in 2011. CaFCP and its members will continue to work with U.S. Environmental Protection Agency to include fuel cell vehicles in the new EPA vehicle labels. In addition, California and the Department of Energy will continue research and evaluation of ways to make hydrogen from renewable resources, including biogas and biomass, in a more cost effective manner.

Complete codes and standards for retail sales of hydrogen

Progress: Several of the first standards for hydrogen quality have been adopted by standards setting organizations. The National Institute of Standards and Technology accepted the standards for hydrogen signage and dispenser marking. California Division of Measurement Standards, with support from NIST and the U.S. National Working Group and funding from CEC, expects to finalize hydrogen metrology standards by early 2012. In addition, the California Energy Commission executed a contract with the California Department of Food and Agriculture to establish a hydrogen dispenser type approval and hydrogen fuel quality standards.

2011 Actions: CDFA to develop a one-year timeline for completing the rest of the codes and standards that includes:

- Perform tolerance testing at existing stations

[5] *Driving demand: What can gasoline refueling patterns tell us about planning an alternative fuel network?*, M. Nicholas, UC Davis Institute of Transportation Studies, September 2010

- Determine best practices for testing and evaluating hydrogen gas-measuring devices
- Create a standard for type and field evaluation based on the most efficient, cost-effective, and precise method
- Develop an examination procedure outline for compliance testing and examination for weights and measures officials

Support business model development by the private sector

Progress: CaFCP initiated a series of meetings with people in the traditional and alternative fuel businesses to learn how hydrogen can become a future profit center. CaFCP has also been evaluating existing business reports to understand how best to analyze and present the business case for selling hydrogen as a retail fuel. The International Partnership for Hydrogen and Fuel Cells in the Economy, in conjunction with the National Renewable Energy Laboratory and the California Fuel Cell Partnership, held workshops to identify early market fuel infrastructure options.

2011 Actions: In early 2011, CaFCP and SIGMA, a membership organization of independent retail fuel marketers, began a joint workgroup to better understand the potential business case of hydrogen dispensers in retail fuel stations. CaFCP will also complete a report that uses UC Davis and UC Irvine costs analyses. NREL will hold an additional workshop with station equipment providers to better identify component cost targets and needs for R&D. With this information, CaFCP aims to identify new funding models to transition away from year-to-year government co-funding.

Support early market communities

Progress: Through outreach, education and training, CaFCP helps speed the permitting and construction process of hydrogen stations in the first communities. CaFCP members and staff met with many state and local elected officials in the early market areas to help them understand the benefits of bringing fuel cell vehicles into their communities. CaFCP also conducted first responder training, permitting workshops and business breakfasts in the Los Angeles and Orange County areas.

2011 Actions: Target education and training in the early market communities that are receiving their first hydrogen demonstration stations this year. The goal is to provide information and hands-on experience to officials and residents to ensure that the planning and permitting processes move quickly and smoothly.

Progress must continue if California is to retain leadership in fuel cell vehicle commercialization, bringing environmental and economic benefits, including a potential 25,000 new jobs that DOE estimates the industry could create.[6]

[6] *Department of Energy. Effects of a Transition to a Hydrogen Economy on Employment in the United States Report to Congress*. July 2008, www.hydrogen.energy.gov/pdfs/epact1820_employment_study.pdf

Conclusion

Hydrogen fuel cell vehicles offer zero-emission vehicle attributes with range, refueling time and performance comparable to current conventional vehicles while using domestic energy sources. FCVs are one of the few vehicle technologies that can meet the demands of a diverse consumer market while significantly reducing greenhouse gas emissions and local air pollutants and diversifying our energy sources. Hydrogen is a domestically produced low-carbon fuel and has demonstrated the ability to be a zero-carbon fuel when produced from renewable resources.

Commercializing fuel cell vehicles is a dynamic and challenging process. Actions and priorities will change as deployment proceeds, requiring refinements and adjustments as progress is made. This report presents the second such refinement by identifying immediate steps required in 2011 to bring FCVs to the commercial market as part of the portfolio of solutions.

Automakers' plans for commercializing fuel cell vehicles remain strong and consistent with previous years' projections, even as some OEMs begin to roll out other advanced technologies. Many automakers have stated that fuel cell vehicles are the ultimate solution and vital to meeting consumer expectations for zero emission vehicles.[7] By 2017, more than 50,000 fuel cell vehicles are expected to be on California roads. The FTA recently awarded $16.6 million in grants to help speed commercialization of fuel cell buses.[8]

Building clusters of stations in early market communities is the right strategy to provide benefits of customer convenience, reduced operational costs and ease of transferring experience from one location to another. UC Irvine's STREET model shows that eight hydrogen stations clustered in the Irvine area can match the level of service that the existing 34 retail gasoline stations provide.[9] While initially the stations will be able to provide more hydrogen than customers demand, as the number of vehicles increases from hundreds to thousands the stations will be ready to meet the increased demand.

Current station deployment can work for hundreds of FCVs, but there needs to be a fundamental increment in infrastructure development and sustainability in the longer term to allow automakers to go from thousands to tens of thousands of FCVs. Uncertainty about stakeholders' ability to overcome this hurdle remains high and is the main challenge in the years to come. Funding mechanisms, retail sales of hydrogen, cost-effective renewable hydrogen and synchronizing government regulations around low-carbon fuels and zero-emission vehicles are as necessary for commercialization as reducing costs and improving durability.

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[7] *Toyota Advances Hydrogen Fuel Cell Plans Amid Industry's Battery-Car Push*, Bloomberg, January 12, 2011 http://www.bloomberg.com/news/2011-01-13/toyota-advances-hydrogen-plans-amid-industry-s-battery-car-push.html
Mercedes-Benz Brings the Latest Fuel Cell Fleet to the USA, Daimler press release, November 18, 2010 http://www.daimler.com/dccom/0-5-633234-1-1348590-1-0-0-0-0-0-9293-7145-0-0-0-0-0-0-0.html
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GM Fuel-Cell System Edges Closer to Reality, Edmunds Inside Line, March 2010 http://www.insideline.com/chevrolet/equinox/gm-fuel-cell-system-edges-closer-to-reality.html

[8] http://www.fta.dot.gov/news/news_events_12231.html

[9] *Systematic planning to optimize investments in hydrogen, infrastructure deployment,* Shane D. Stephens-Romero, et al., International Journal of Hydrogen Energy 2010

Other technologies benefit from the progress of automotive fuel cells. Fuel Cells 2000's report *The Business Case for Fuel Cells*[10] profiles 38 nationally recognized companies, including Coca-Cola, Staples, Wal-Mart, Whole Foods, Hilton Hotels and Sysco that have ordered, installed or deployed more than 1,000 fuel cell forklifts, 15 MW of power from stationary fuel cells and 600 fuel cell units at telecom sites.

California is a world leader in fuel cell vehicle demonstration and hydrogen infrastructure development, which has created jobs and new businesses in the ever-growing green technology sector. The state is positioned to continue its leadership by successfully initiating the commercial launch of hydrogen fuel cell vehicles as a part of the transition to electrification of the fleet.

[10] *The Business Cars for Fuel Cells* www.fuelcells.org/BusinessCaseforFuelCells.pdf

Appendix A

Open and Planned Hydrogen Stations in California

Status		Station	LDV Capacity kg/day	Pressure (H35/H70)
Open		Irvine #1	25	35/70
		Thousand Palms	60	35
		Riverside	12	35
		West Los Angeles #1	30	35
Planned		Burbank	60	35/70
		Los Angeles	60	35/70
		Emeryville	60	35/70
		Fountain Valley	100	35/70
		Harbor City	100	35/70
		Newport Beach	100	35/70
		Torrance	50	35/70
		Westwood	140	35/70
		Oakland (transit only)	0	35
		Santa Monica	100	35/70
		Beverly Hills	100	35/70
		West Los Angeles #2	100	35/70
		Hermosa Beach	100	35/70
		Irvine #2	100	35/70
		Hawthorne	100	35/70
		San Francisco	120	35/70
		Laguna Niguel	100	35/70
		West Sacramento	100	35/70
		Diamond Bar	100	35/70

* Irvine #1 is currently open (25kg/day) with planned upgrade in 2012 (100kg/day)

** Thousand Palms is shared bus and light-duty vehicle station, total capacity 160 kg/day (100kg for buses, 60kg for light duty)

*** Emeryville is a transit and light-duty vehicle co-located station, 60 kg/day capacity represents light duty