



Air Resources Board



Linda S. Adams
Acting Secretary for
Environmental Protection

Mary D. Nichols, Chairman
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Edmund G. Brown Jr.
Governor

March 23, 2011

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Mr. James D. Boyd
Commissioner and Vice Chair
California Energy Commission
1516 Ninth Street
Sacramento, California 95814-5512

Dear Mr. Boyd: 

Thank you for the opportunity to comment on the *2011-2012 Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program, Draft Staff Report* (Investment Plan). I commend your staff on the hard work and analysis that went into producing the Investment Plan. The document presents a wealth of valuable information on the state of the science of alternative and renewable fuel and vehicle technologies. The California Energy Commission's (CEC) investments proposed in this Investment Plan coupled with those from the two previous Investment Plans are critical to helping California meet its climate change, air quality, and fuel diversity goals.

I appreciate the close working relationship between the Air Resources Board (ARB) and CEC in developing and implementing our respective Assembly Bill (AB) 118 incentive programs. This collaboration has benefited both programs. CEC investments in vehicle charging and fueling infrastructure complement ARB's incentives for clean vehicle deployment. These investments are important in ensuring a successful California zero-emission vehicle (ZEV) rollout. I thank CEC for your recent action directing \$2 million to ARB to fund ZEVs through our Clean Vehicle Rebate Program. CEC's funding for advanced alternative and renewable fuels supports efforts to achieve the 2020 greenhouse gas emissions reduction goals established in AB 32, the Global Warming Solutions Act of 2006, and puts California on the path to the fundamental transformation of the transportation sector needed to meet the ambitious 2050 climate change goal.

CEC's support for hydrogen infrastructure to date has been invaluable. The \$15.7 million awarded from 2008-2010 AB 118 funding will build 8 new and 3 upgraded fueling stations – an important step in establishing an early hydrogen fueling network in California. The \$10.2 million funding for hydrogen fueling, in the 2010-2011 Investment Plan, which CEC plans to release later this year will add 5 to 7 new stations in communities presently lacking fueling infrastructure.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website: <http://www.arb.ca.gov>.

California Environmental Protection Agency

The investment levels in the previous two Investment Plans were based on sound technical analysis and provide adequate infrastructure support through 2013. However, I am concerned that the proposed level of investment in the draft 2011-2012 Investment Plan falls short of the amount needed to support a successful roll-out of fuel cell vehicles in 2014 and beyond. CEC staff's analysis in the draft Investment Plan finds that these previous investments will provide sufficient coverage to meet fueling demand through 2014. Consequently, CEC staff proposes no new funding for publicly-accessible light-duty hydrogen vehicle fueling stations.

ARB staff analyzed the same vehicle deployment/fueling station capacity data and reaches a different conclusion, finding that 7 additional stations are needed by 2014 to ensure adequate geographic coverage. ARB recommends that the 2011-2012 Investment Plan include \$10 million to co-fund these 7 stations (assuming a continuing decline in station cost). These stations would fill in coverage gaps within existing clusters and add new communities and destination stations.

Our staffs' different conclusions result from different assumptions on the number of stations needed to provide an adequate and convenient fueling network for vehicle owners. In evaluating fueling needs, it is not sufficient to simply match supply and demand regionally as CEC staff appears to have done. It is crucial to have enough stations distributed within a region, so stations are reasonably accessible to vehicle owners. A smaller number of high volume stations will not meet consumers' needs. CEC staff notes the importance station location, not just overall capacity, in its analysis of ethanol and natural gas fueling infrastructure needs, and this concept needs to be incorporated into the hydrogen assessment. The latest CEC/ARB vehicle manufacturer survey was specifically designed to collect the finer resolution data needed to add precision to the infrastructure evaluation process. Stations must be located to match vehicle owners' well documented fueling patterns. People generally refuel their vehicles within a few minutes of home, near work or on convenient thoroughfares between the two. They expect the stations to dispense fuel reliably, without waiting in line. Extra stations are required to provide this reliability which is factored into ARB's analysis. Enclosed is an additional explanation of ARB's analysis and a table showing where the recommended seven additional stations could be built.

Collectively, the 35 station network shown in the enclosed table would provide coverage for the 2014 deployments. Additional capacity will ultimately be needed for the tens of thousands hydrogen fuel cell vehicles expected in later years of the rollout. However, ARB believes that, after the 2011-2012 funding round, there may be enough customer confidence and increased vehicle numbers that market forces may allow for a decreased need for government assisted infrastructure funding.


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While public financial support for infrastructure is key in these early stages of the deployment of hydrogen, ARB believes there is a business case for a sustainable hydrogen fueling market. As the market grows larger, ARB's Clean Fuels Outlet regulation may serve as a backstop to help ensure an adequate hydrogen fueling supply. In fact, that regulation is in the process of being reviewed to determine if it can be used to address hydrogen as a transportation fuel. However, it will not trigger mandated stations in the pre-2015 timeframe because timing is too tight and vehicle volumes are too low. Consequently, continued government partnership and funding in the near-term remains critical.

California has always been a leader in clean transportation and is poised to continue this role with the deployment of hydrogen fueled ZEVs. As you heard in the public testimony at the March 7, 2011 Advisory Committee meeting, significant hydrogen fueling infrastructure investment is also underway in Europe, Japan, China and Korea. This infrastructure deployment worldwide signals the commercial readiness of hydrogen fuel cell vehicles. California must continue its strong support for hydrogen fueling infrastructure or risk having auto manufacturers redirect their California deployment plans to other countries.

I look forward to continuing the close collaboration between CEC and ARB as we implement our respective AB 118 programs. If you have questions or would like to discuss these issues further, please contact me at (916) 322-2892 or have your staff contact Ms. Analisa Bevan, Chief, at (916) 323-8966.

Sincerely,



Tom Cackette
Chief Deputy Executive Officer

Enclosure

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

Ms. Analisa Bevan, Chief
Sustainable Transportation and Technology Branch
Mobile Source Control Division

Enclosure

Air Resources Board's Suggested Changes to the Hydrogen Fuel Demand and Supply Assessment

ARB staff analyzed the same vehicle deployment/fueling station capacity data that CEC staff used in the hydrogen demand and supply assessment presented in Appendix B of the draft 2011-2012 Investment Plan. ARB included several factors in its analysis which leads ARB to conclude that an additional 7 stations will be needed beyond those planned or already funded by CEC in past Investment Plans. These factors include a finer resolution assessment of geographic coverage needed to meet fueling needs, a consideration of the need for station reliability/convenience to meet customers' typical fueling patterns and expectations, and a consideration of the "STREET" (Spatially & Temporally Resolved Energy & Environment Tool) modeling by University of California at Irvine to identify the optimal number of fueling stations to provide an acceptable level of coverage. Each of these factors is described below.

1. Geographic Coverage and Accessibility. Having enough capacity in an area does not equate to having adequate coverage within that same area. They are two separate measurements needing independent analysis. For example, in Appendix B, under the Orange County Region shows that in 2013 there are 800 kilograms (kg) of capacity available to fuel 198 vehicles. Assuming the accepted 1kg/day/vehicle usage, 800 kg capacity would seem to be adequate. A closer examination of the region shows however that coverage is lacking. Infrastructure is located in only 4 out of 23 cities – Irvine, Newport Beach, Laguna Niguel and Fountain Valley. This "capacity" is insufficient for a customer in Anaheim Hills, Fullerton or Yorba Linda, all stated original engine manufacturer (OEM) target communities.

Improvements to the most recent CEC/ARB 2010 OEM Questionnaire add precision to the infrastructure rollout process. First, the new survey divided California into 66 individual counties and/or basins. Then, it further divided some counties into sub counties and into groups of specific cities. This added detail helps the State better focus on which specific communities need stations to support OEM planned vehicle roll-outs. The analysis presented in Appendix B of the 2011-2012 Investment Plan, divides California into only 10 geographic regions which misses this higher resolution data on fueling needs. ARB recommends that Appendix B be modified to present the increased geographic resolution provided by this latest survey. To present a more complete picture of available infrastructure, data on both capacity and geographic coverage should be presented for all areas of OEM interest.

2. Station Reliability/Convenience. Customer fueling patterns are well documented. People refuel their vehicles within a few minutes of home, near work or on convenient thoroughfares between the two. They expect the stations to dispense fuel reliably, without waiting in line. The goal of the State's focused station cluster rollout strategy is to mirror this experience as much as possible. By 2014, stations need to be sited to enable convenient fueling, reliable fueling with back up fueling

should a station be down for maintenance. ARB recommends a station rollout in particularly dense vehicle clusters that maximizes a convenient, reliable and redundant supply of hydrogen to support OEM stated rollout plans ahead of expected vehicle releases.

3. STREET Analysis. CEC is funding "The Advanced Power & Energy Program" at the University of California Irvine to further develop and apply information learned from the STREET model. One component of the model helps determine the preferred rollout strategy for an optimal number of hydrogen stations to provide an acceptable level of coverage. The model inputs OEM data, a travel time algorithm, station land use, vehicle travel density and service coverage in its analysis. For example, a STREET analysis of Orange County fueling needs optimized for cost versus benefit indicates that even 19 stations, strategically sited, would provide hydrogen station coverage where average consumer drive time to a station is still nearly twice as long as it takes to reach a gasoline station. In contrast, CEC's plans would provide only 5 stations in Orange County. ARB appreciates CEC's funding of the STREET model and recommends continued consideration of the model's results in funding future hydrogen infrastructure.

The table on the next page shows the location of existing hydrogen fueling stations as well as those new stations that will come online over the next three years based on planned CEC investments as well as the additional stations recommended by ARB. The table also shows the need that each new station is expected to meet in order to further explain the rationale for ARB's recommendations. New stations are identified as adding:

- New coverage within an existing cluster community (C);
- New communities to the fueling network (NC); or
- New destination stations (D).

In 2012, 8 new stations are projected come online and 3 will be expanded as a result of the \$15.7 million in AB 118 funding CEC awarded in 2010. This will increase the fueling network size to 22 stations.

The CEC is planning to release a second AB 118 solicitation for hydrogen fueling stations in Spring 2011. This \$10.2 million solicitation will co-fund 5 to 7 new stations (shown as 6 stations in the table for simplicity). These new stations should come online in 2013, increasing the fueling network to 28 stations as shown in the table.

To meet the projected network need in 2014, ARB estimates that an additional 7 stations are need beyond those noted in the previous two paragraphs. The table shows possible locations for these stations. ARB recommends \$10 million be redirected in the 2011-2012 Investment Plan to co-fund these stations.

ARB staff is available to discuss this analysis in greater detail with CEC staff to help refine the hydrogen fueling infrastructure needs assessment.

Hydrogen Needs Analyses Assuming 08/09 - 09/10, 10/11, and ARB Recommended 11/12 Budget Year Hydrogen Station Funds

Basin/Co.	2012				2013				2014			
	Supply-Demand (kg/day)*	# of new stations from (08/09 - 09/10 FY, \$15.7M)	Need for Station	Total # of stations	Supply-Demand (kg/day)*	# of new stations from (10/11 FY, \$10.2 M)	Need for Station	Total # of stations	Supply-Demand (kg/day)*	# of new stations from (11/12 FY, \$10 M)	Need for Station	Total # of stations
Sacramento/Yolo	218	1	NC	1	215	0		1	402	1	C	2
San Diego	(7)	0		0	207	1	NC/D	1	391	1	C	2
Alameda	50	0		1	260	1	NC	2	233	0		2
San Francisco	(6)	0		0	(6)	0		0	182	1	NC	1
San Mateo	230	0		1	222	0		1	199	0		1
Santa Clara	(13)	0		0	194	1	NC	1	172	0		1
Santa Barbara	(3)	0		0	(4)	0		0	204	1	D/NC	1
1 - Central LA Co.	60	0		1	60	0		1	60	0		1
2 - NW LA Co. Coastal	643	3	C/NC	5	630	0		5	433	0		5
3 - SW LA Co. Coastal	456	2	NC	4	445	0		4	327	0		4
4 - S LA Co. Coastal	0	0		0	0	0		0	200	1	NC	1
6 - W San Fernando Vly	0	0		0	0	0		0	200	1	C/NC	1
7 - E San Fernando Vly	60	0		1	60	0		1	60	0		1
10 - Pomona/Walnut Vly	176	0		1	176	0		1	176	0		1
16 - N Orange Co.	0	0		0	204	1	NC	1	200	0		1
17 - Central Orange Co.	95	0		1	80	0		1	48	0		1
18 - N Orange Co. Coastal	82	0		1	280	1	NC	2	143	0		2
19 - Saddleback Vly	145	1	NC	1	132	0		1	247	1	NC	2
20 - Central Orange Co. Coast	380	1	NC	2	357	0		2	272	0		2
21 - Capistrano Vly	(17)	0		0	179	1	NC	1	53	0		1
23 - Metropolitan Riverside	12	0		1	12	0		1	12	0		1
30 - Coachella Vly	100	0		1	100	0		1	100	0		1
Station Totals:	New:	8	Total:	22	New:	6	Total:	28	New:	7	Total:	35

* Includes capacity from new stations.

Key: Station Needed For:

C = Coverage

D = Destination

NC = New Community