

**Written Comments on the
HYDROGEN DRAFT SOLICITATION CONCEPTS
Alternative and Renewable Fuel and Vehicle Technology Program
Subject Area – Hydrogen Refueling Infrastructure Dated July 31 2015
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Per the request by representatives of the California Energy Commission, the following are written comments in response to the Hydrogen Draft Solicitation Concepts document referenced above and discussed during the Workshop of August 13 and 14.

1. Available Funding: After AB118, There was \$40 mil./yr. allocated to Hydrogen Fueling Infrastructure Deployment. That amount was widdled down to under \$15 mil./yr. Then AB 8 came along and added \$20 mil. more to Hydrogen Infrastructure Deployment for the next 10 years until 2024. Which should have been added to the current funding equaling to \$40 mil/yr. back to where the original AB 118 allocated, instead, it was used to replace the Hydrogen Infrastructure from before AB 8 for Hydrogen Infrastructure and reallocated the rest to increase other funded categories, instead of adding to it, which was the intent of the legislation. \$20 mil. is not enough to get enough stations built out in order to meet expected vehicle deployment plans by the OEMs, as well as the last 2 legislations intended.

2. Maximum Award: The maximum award is inadequate in order to get enough stations operating for the Roll-out. Also, the O&M funding increase is welcome, but should be relegated to the off-year funding of station expansions, in order to have more for station deployments. After all, it can't be used until after commissioning anyway.

3. Station Priority and Funding Levels: 100% Renewable Hydrogen should be encouraged in every way and competition for all passing proposals, regardless of the proposal score. That was the purpose of both AB 118, and AB 8, as well as all of the Carbon reduction legislation and regulations over the last 2 decades. So long as the proposal gets a passing score. The first to be funded is the Highest level of Renewable/Sustainable Non-Carbon Hydrogen Fueling Systems. This should have priority over all other aspects so long as they are in assigned areas, or in Established Core Markets, or Expanded Core Markets. Upgrades should be relegated to only an off-year Station Expansion Competition, since that is what most stations will need. That and 700 bar fueling.

4. Single Applicant Cap: You had this same rule last time, and gave nearly 90% to a former sub-contractor who trained most of your proposal evaluators. A cap that should be eliminated only for 100% Renewable/Sustainable Carbon Free Hydrogen applicants. There should be an overriding reason for suspending that cap. For that, an applicant should have; (i) 100% Renewable/Sustainable Non-Carbon fuel generated hydrogen, and (ii) The best locations proposed in that specific assigned location area. Also once a proposal gets a passing score and is eligible to compete in the Station Location Competition, the score for the proposal should have no consideration in that competition, and then the decision should go to the only best location, and the highest renewable/sustainable/lowest carbon contents. If a tie, the tie-breaker could be the proposal score. Only in the case of a numerical tie score for the Station Location Competition.

5. Operational Date and Cap-X Funding: Should re-instate the Renewable Competition w/o any cap on how many you can award. Do it for 100% Renewable/Sustainable Non- Carbon Generated Hydrogen Fueling Systems until all are funded, or you run out of funds. Just the set aside from 607 got you more applicants than all of the previous PONs. Go back to business as usual and they will not come back.

5. Ineligible O&M Costs: #5. Maintenance that adds permanent value to the equipment. There should be an exception for systems that are designed to expand by at least 50% with the addition of a single expensive but necessary component to up size the system to produce at least 50% more capacity. For Renewable/Sustainable Non Carbon Generated Hydrogen only.

Data Collection: Should be voluntary to go past 1 year. Get brownie points for agreeing to do more. Also Retentions should not be longer. In fact, the retentions should be returned within 60 days of commissioning. Not after you get your data. If you don't, then your O&M funds can be withheld until you provide the requested data.

6. Minimum Station Daily Fueling Capacity Requirements

During 2014 and now in 2015, and since the first PONs were released, our company has used the Minimum Technical Requirements identified in PON 13-607 (and other PONs before), as the performance criteria of the hydrogen fueling stations we are in the process of establishing under contract with the CEC. These performance criteria therefore represent a baseline in technical performance that we have used to establish our system design and the major component selection and correspondingly our teammates for our hydrogen fueling system. The DRAFT CEC Solicitation establishes new performance criteria that greatly expand beyond the performance criteria established in PON 13-607. To satisfy these expanded criteria, our team would be forced to substantially re-designing our system and potentially select new components from different vendors. This approach is counter-productive to establishing repeatable hydrogen fueling system designs with established costs that can be replicated for new installations in the future. We therefore suggest that the performance criteria stated in PON 13-607 be used as the basis for Minimum Technical Requirements for all Pilot hydrogen refueling infrastructure deployment solicitations now and into the future.

To encourage development of systems with greater hydrogen production capacity or greater dispensing capability, we suggest that the CEC establish these expanded performance criteria for a separate off year PON for systems expansions only. Over the PON process for this solicitation, solicitations have been released on average every 2 years (2010, 2012, 20014). Rather than changing the minimum System Requirements, we suggest that every other year issue a PON specifically for expanding existing stations (on-site generation only), rather than changing the minimum System Capacity thereby encouraging system expansion designs in the minimum systems deployed. Provide extra credit to those that follow that path in their systems design.

This approach would enable competitors to propose systems that achieve these goals without penalizing competitors that are trying to establish baseline hydrogen refueling systems for multiple replications in the future to help drive down costs and promote wider scale adoption. The pitfall of establishing expanded performance criteria in the category of Minimum System Requirements precludes competitors from proposing their established system designs that satisfied the past PON criteria, and also slow the deployment of starter systems that can be expanded as demand increases. Even if the demand rises beyond a starter system capacity, and even if there were no additional funding for expansions, it would be in the interest of the stations to increase capacity to increase profits, and many will be expanding themselves. But to get us all there, to be able to compete on a level playing field, providing an Expansion PON every other year will achieve what you are trying to achieve, greater capacity, as well as the ability to increase significantly the station income to be self sufficient and to be able to expand on their own.

Recommendations:

- 1) Increase funding to at least \$30 mil., but \$40 mil. /yr. would meet goals to station deployments needed to meet OEM projections, or OEM deployments will be significantly reduced.
- 2) Use the Minimum System Performance requirements from PON 13-607 as the Minimum System Requirements in all future CEC hydrogen infrastructure solicitations. While requiring that all systems deployed be expandable. If you are going to make the proposed Minimum System Capacity, you are going to need to significantly increase the amount of Funding to achieve.
- 3) Establishing extra credit for larger systems will only put all applicants under pressure to do as well, or be beat out by all the competition, ergo - will be come by default the min. Tech. Req.,. Suggest another competition to fund expansions, like one every 2 years (an off year), while the other stations are building out from the last PON, another PON will be held to handle expansions from the previous PON, which would incentivize all to build their systems to be easily expandable.
- 4) Eliminate the 700 bar fueling from the minimum technical requirements, and make it extra credit, or limit it to deployment at Freeway exits on either connector stations or at critical strategic locations on the way out of town as a last chance to fuel. At least until enough stations are establish and can abandon the 700 bar requirement altogether and keep the cost/kg competitive with gasoline costs on a cost/mi.basis. Another option would be to allow both to flourish simultaneously; Choose 700 bar stations in the priority areas that have the room for it, and allow stations that are right for funding because of location, but do not have the room for 700 bar, to dispense only 350 bar until a more advanced, smaller footprint, more efficient 700 bar system could be used to upgrade to 700 bar dispensing.

7. Hydrogen Quality Requirements,

The third paragraph states; “a method of continuously monitoring the gas stream to ensure that hydrogen quality meets the SAE J2719 standards at the output.” This requirement goes way beyond the sampling approach requirements identified in PON 13-607. Recommend that the sampling approach requirements identified in PON 13-607 be established as the Minimum Technical Requirements and that in-line gas stream analysis could be included in a new category called Expanded Performance Capabilities as extra credit. Otherwise the next PON and all others thereafter, will need to increase the amount to be awarded overall as well as per station, if the CEC is going to require.

8. Minimum Station Daily Fueling Capacity Requirements

The minimum daily fueling capacity from PON 13-607 of 100 kg/day should be the Minimum Technical Requirement. Capacity beyond 100 kg/day should be included in a new section of the solicitation titled Expanded Performance Capabilities. [See #6.2 under Recommendations above.](#)

9. Minimum Peak Fueling Capacity Requirements

The minimum daily fueling capacity from PON 13-607 of three consecutive fills of 7 kg each within one hour should be the Minimum Technical Requirement. If the automobile manufacturers have determined that 5 kg tanks will predominate in the market initially, then require peak fueling to by 4 consecutive fills of 5 kg each within one hour. This requirement is close to the PON 13-607 requirement of 21 kg of hydrogen dispensed in one hour.

Something no one seems to want to discuss is the problem with expanding 700 bar fueling. If you are going to expand the system generation, and gong to expand the 700 bar fueling capacity as well, I can now say with hands on knowledge that, at least for on-site generation, 700 bar expansion will be impossible. May even be impossible for delivered hydrogen as well. Sandia analysis is that only

about 20% of the stations can take hydrogen fueling stations, based on the majority of the stations being funded, which are almost all Fossil Fuel generated delivered hydrogen. If we stuck with 350 bar, that would not be a problem for either on-site and delivered hydrogen. For on-site generated hydrogen (electrolysis/renewably generated), the footprint is nearly doubled by the 700 bar systems. With our planned expansion system of 400kg/day system, more than tripling electrolyzer capacity, will take up no more space than what we are deploying now at 130kg/d. Not the same with the 700 bar. The chiller which is now 10'x10', will need to expand to 30' x 30'. Even if your minimum requirements go up to 250 kg/d, that will increase the footprint to at least 20'x20'. Making it impossible to put a system in at over 80% of the stations you want fueling at. You will either need to make 700 bar optional, or keep the current capacity at its current level until new technology is developed to make 700 bar less expensive, lower footprint, and more durable so that the downtimes of the stations (mostly 700 bar problems) are rectified. Making the 350 bar the dependable economical back up to the 700 bar. Otherwise get rid of the 700 bar requirement. Make it optional, and give extra credit for innovative more efficient approaches, especially for on-site generation - specifically 100% Renewable/Sustainable Carbon-Free Hydrogen Fueling. Which I am sure you agree is the goal here. As indicated above, another option would be to selectively pick 700 bar stations in the priority areas that have the room for it, and allow stations that are right for funding because of location, but do not have the room for 700 bar, to dispense only 350 bar until a more advanced, smaller footprint, more efficient 700 bar system bused to upgrade to 700 bar.

9. Hydrogen Refueling Station Upgrades: Upgrades or System Expansions should be done in off year PONs, or every other year, and should not be in eligible if done after 2010. That is something that should be encouraged to apply as it will help to keep stations up and running and meeting market demand.

10. Evaluation Process, Scoring Criteria and Points:

Sustainability of the hydrogen, or at what rates will the source of its generation run out of its feed stock or power source/fuel. 100% Sustainable is the goal of all of this. The funding is all about sustainability. If it uses carbon it is not sustainable because we and our environment (at least not for us) are not sustainable if we continue to use it. All of this funding is to reduce the carbon footprint as well as other criteria pollutants. The goal is zero carbon and criteria pollution. The only way to do that is to eliminate it at its source. Take it out of the equation. Not hide it or sequester it. That only sweeps it under the rug. Then you are 100% Renewable/Sustainable, and Carbon Free. That is the way you reduce carbon footprint worldwide. That should be the Priority in all of this. It is as important, if not more important, that any other criteria, and should be rewarded with the highest of points.

Points awarded for "Sustainability" should be equal to or greater than "Market Viability". Especially because it is not Market Viable if it is not the highest level of Sustainable. 100% Sustainable/Renewable should be awarded at least 50 points.

11. Distance between Planned and existing stations.

Then last several PONs were atrocious at this. The way they measured 6 minutes distance away was to calculate by the most direct route at the full speed limit in the area. That method was so inaccurate, that Google and Bing did a better job based on traffic, and time of day. That is the way it should be done, and you won't have to pay \$1.5 mil for it either. Google Searches are free.

Location and Capacity (50 points). Capacity Analysis is not scientific. It is very subjective and cannot be verified by any real data because the data does not exist. This has never been done before and there is no way to even guess at what capacity will be needed. That is why you start out with a smaller system standardized for all locations, and then expand as market demands at the local system's rate of needed expansion.