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Air Liquide Feedback on Draft Solicitation Concepts for Light-Duty Hydrogen Refueling Infrastructure

Additional submitted attachment is included below.

February 22, 2019

California Energy Commission
Docket Unit, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Docket No. 18-HYD-04, Draft Solicitation Concepts for Light-Duty Hydrogen Refueling Infrastructure

Dear CEC Administrators

The State funding of hydrogen refueling stations has been an important element in the growth of the light duty vehicle market and will continue to provide the key driver for market growth and coverage over the next few years. California is undergoing an exciting transition in Hydrogen Mobility and, as we enter a phase of market expansion, it is critically important that we allow for rapid market growth by encouraging large scale adoption of these technologies in order to ensure that the state can meet its climate and transportation goals.

The attached comments are in anticipation of the next California Energy Commission (CEC) grant funding opportunity (GFO) and provide feedback on specific proposals made at the CEC *Draft Solicitation Concepts for Light Duty Vehicle Hydrogen Refueling Infrastructure* held on February 12 of this year. As an active participant in the California hydrogen mobility market, many of our comments have been captured in industry consensus letters submitted separately. We are submitting this document and the comments within as Air Liquide.

The *Solicitation Concepts* are clearly an outcome of substantial efforts made by the CEC staff to address concerns and comments raised in previous workshops and GFO processes. We applaud the staff's efforts and creativity in seeking long-term solutions and in their consideration of industry inputs over the life of this program. Adapting the program to be a multi-year award, prioritizing network solutions rather than single station awards and directing grant funds to awardees who leverage scale and schedule to provide the best $/kg/day network capacities is well aligned with our vision.

In the attachment to this document, we have further recommendations to enable bidders to better meet the needs of the program and its customers by:

1. **Providing all options for renewable hydrogen supply, continuing to enable landfill gas as a feedstock**
2. **Ensuring that awardees will be able to introduce best-in-class solutions that are developed during the course of the program, and**
3. **Allowing for more flexibility in the award structure cost shares and awardee cap limits to insure that the state receives the strongest bids possible.**

Our comments are consistent with the CEC goals, driving toward increased scale with more aggressive schedules while enabling the reduction in costs that are available. The attached recommendations outline our further recommendations along these lines. We appreciate the opportunity to be involved in

the discussions with the CEC and the State of California on these policy priorities and encourage and appreciate further discussion before the formal issuance of the GFO. If there is any additional information or discussion required to advance these topics, please do not hesitate to reach out to us.

Thank you for your consideration,

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Topic I: Renewable Hydrogen Plan (Section 27, p. 25 of *Solicitation Concepts*)

We ask the Energy Commission to continue to consider all reduced carbon pathways to meet the renewable requirements in this program and to remove the limitations on landfill gas as an eligible feedstock in hydrogen production.

The Hydrogen Industry - Committed to providing low cost renewables

A pathway that enables industry to provide the lowest cost, renewable hydrogen to the market is critical to meeting both customer expectations driving vehicle adoption and the state's goals for zero emission vehicle adoption. Success along this renewable pathway requires policy and market landscape that enables this transition, leveraging all mechanisms and resources available. Being overly restrictive of pathways and resources at this critical point in market development may restrict market growth, jeopardize the state's transportation goals and burden the consumer with unnecessarily high fuel prices, impacting the adoption rate while significantly increasing the fuel carbon intensity. Furthermore, such restrictions are not reflective of a balanced policy approach between FCEV and BEVs as the latter are not subject to such limitations.

While we understand and support the state's efforts to continue to drive toward production through electrolysis, this pathway is not competitive today and we believe that a more balanced approach is needed. From an industry perspective, we are committed to the renewable pathways and, through the September 2018 announcement of the Hydrogen Council to deliver 100% decarbonized hydrogen for mobility markets by 2030[1]. To meet these commitments, our industry needs policies that enable our investments in renewables to be balanced with our ability to deliver low-cost fuel to the growing consumer base.

Landfill RNG to H2 - A responsible use of available resources

Landfill gas is a source of biogas, collected from existing landfill sites, upgraded to renewable natural gas (RNG) by removing impurities to meet pipeline natural gas specifications. This RNG is then introduced into a natural gas pipeline for transport to another location for processing. When transferred by pipeline, a process of nominating the renewable content to the user is typically deployed rather than direct supply. The processes of collection, transfer, and production can occur within or outside the State for the California hydrogen market and is already recognized as a renewable pathway by the State in other programs.

When converted to hydrogen, this represents a best-in-class use of this resource from both an environmental and economic perspective. This usage is consistent with the CalRecycle program goals to "increase recovery of landfill gas for use as a biomass renewable energy source to replace energy from nonrenewable fossil fuel sources."[2] The use of this resource is utilizing existing landfills as a resource and does not require the state to support the development of new sites, not does it prevent the state from requiring new sites to have organics removal or presorting.

[1] hydrogencouncil.com/our-2030-goal
[2] www.calrecycle.ca.gov/climate/landfill

Challenges of a renewable pathway - Meeting the capacity required by the market

Without this feedstock in the renewable portfolio, we are not convinced that there will be sufficient, competitive, renewable hydrogen available to the market from other sources, especially in the near term. In order to meet customer needs from both a supply and cost perspective, we need to consider the supply of renewable hydrogen at scale.

Today, we are rapidly approaching 10,000 light duty vehicles on the market, consuming about 7,000 kg hydrogen per day. The California Fuel Cell Partnership's *Revolution*[3] document projects this to grow to 100,000 vehicles (70,000 kg per day H2) by 2025 and to 1,000,000 vehicles (700,000 kg per day H2) by 2030. If we add to this the potential markets in medium and heavy duty on-road, rail, port, and other offroad fuel cell vehicles, the market requirements can easily reach a few million kg per day of h2 required in the state in the next few years. At only 33% renewable content, this capacity will require a broad portfolio of hydrogen sources and multi-billion dollars of private investment in renewable production. Such investments, at such scale, will only be made within known, demonstrable technology boundaries. Today, the RNG to hydrogen pathway has the best potential to meet these investment targets. As an example, Air Liquide recently announced[4] the investment of $150m in hydrogen production and supply for the California mobility market. This investment is predicated upon our ability to leverage a broad portfolio of renewables, including a large portion of landfill gas, in meeting our renewable obligations. Without clear and long term policies regarding the California hydrogen market and its limitations, such investments are not possible.

While we encourage the further development of renewable hydrogen pathways, many options remain in development and pilot stages, not yet proven at scale. As an example, within the ARFVTP program, GFO-17-602 *Renewable Hydrogen Transportation Fuel Production Facilities and Systems*[5] awarded funding for the development of alternative, renewable hydrogen production from non-landfill RNG and for solar and wind based electrolysis projects but is limited to a few tons per day production in total. These are important first steps in demonstrating and scaling up production, but it would be premature to assume that these can be wholly leveraged to produce renewable hydrogen at the multi-hundred tons per day the market will require in just a few short years.

To the best of our knowledge, a detailed evaluation of the impacts of feedstock restriction on supply chain or fuel costs have not been completed by the state and it would be premature to implement such restrictions without further consideration.

Renewable Requirements - Consistency in California policy

Consistency in policies is a necessity to further encourage investments in the California hydrogen mobility market. With respect to the use of landfill gas as a renewable feedstock we note:

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[3] cafcp.org/sites/default/files/CAFCR.pdf

[4] www.airliquide.com/media/air-liquide-build-first-world-scale-liquid-hydrogen-production-plant-dedicated-supply-hydrogen-energy-markets

[5] www.energy.ca.gov/contracts/GFO-17-602/

- Landfill gas was considered an eligible feedstock in all previous light duty vehicle hydrogen refueling station GFOs including the most recent: *GFO-15-605 Light Duty Vehicle Hydrogen Refueling Infrastructure*[6]
- The Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) does not explicitly preclude its usage as a feedstock as outlined in AB 8 legislation[7] or through either the most recent pass or proposed ARFVTP Investment Plans[8]. We do recognize the intent of the ARFVTP investment plan to not support new landfill projects (Chapter 5, page 66 of the 2018-2019 Investment Plan):

  > *Given these state goals and the corresponding need for organic waste processing infrastructure, future funding opportunities will exclude landfill gas projects from consideration and instead limit biomethane production projects to those that use prelandfill organic waste.*

  We note the important distinction between preclude funding from new landfill projects to excluding the use of landfill gas as a renewable resource.

- The California Low Carbon Fuel Standard (LCFS) program[9], which was recently amended to include capacity HRI credits for hydrogen stations includes landfill gas for consideration as a viable, renewable hydrogen pathway with a Carbon Intensity comparable to electrolysis and other renewably sourced hydrogen.
- The use of landfill RNG as a feedstock is consistent with the CalRecycle program with respect to the responsible use of resources.[10]

[6] www.energy.ca.gov/contracts/GFO-15-605/
[7] leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB8
[8] www.energy.ca.gov/altfuels/2017-ALT-01/
[9] www.arb.ca.gov/fuels/lcfs/lcfs.htm
[10] www.calrecycle.ca.gov/climate/landfill

Topic II: Awarding Tranches and Batches of Stations over Multi Years (Section 2. p. 5 and other sections of *Solicitation Concepts*)

Ensuring that awardees will be able to introduce best-in-class solutions that are developed during the course of the program

Batch Evolutions - A key to enabling best-in-class economics and technologies over the course of a multi-year tranche award.

We are supporters of the proposed batch and tranche methodology that is outlined in the *Solicitation Concepts* as it allows the state to place a higher value on networks of stations and enables the developers to leverage larger, multi-year awards into their planning. It is our opinion that the state will get the best return on its investment in hydrogen infrastructure by incentivizing the as proposed $/kg/day in the evaluation criteria.

As outlined in the *Concepts*, developers are required to submit detailed plans for the first year batch of stations in a tranche and then, for subsequent batches, less information is required with regards to location, siting, and some other details. As outlined, it is not clear how or if developers will be able to improve their station offerings from batch to batch over the years of award.

We believe it is important for developers to be able to provide improved solutions as they are developed, proven, and readied for market from year to year. Technology developments, market developments, economic developments are all likely to occur in the course of a multi year award and we encourage the state to be flexible in their selection criteria, such that these improvements can be incorporated and, ultimately, passed through to the consumers.

Using the $/kg/day metric to maximize the capacity of installed stations for given state funding will be a good metric to ensure efficient station development, provided the developer can further refine designs and business models within the fixed award amount. An award that allows for such evolutions will enable the best solutions for the market and the state.

In particular, we anticipate that development in the areas of compression, gaseous and liquid storage, liquefaction, refrigeration, and pumping are all likely areas for new technologies to develop over the course of this program. Having the flexibility to meet the customer's and state's expectations for robust and reliable stations which supply the lowest cost fuel to the consumer is critical for the station owner.

Topic III: Eligible Costs, Matched Funding, and Single Applicant Caps (Sections 4 - 6, pages 6 - 7 of *Solicitation Concepts*)

Promote flexibility in the award structure cost shares and awardee limits to insure that the state receives the strongest bids possible

Flexibility - A key to enabling robust proposals for station Batches and Tranches

By making awards to networks of stations over a multi-year period, station developers should have sufficient certainty to leverage the economies of scale within their proposals. As such, the state should expect that for similar award amounts, better station capacity and coverage should result. In this spirit, we request that consider adding flexibility to the funding restrictions as laid out in Sections 3-6 of the *Solicitation Concepts*.

Section 4: Eligible Costs and Section 5: Matched Funding Requirements - It is our understanding that the intent of these sections is twofold; to streamline the reporting process, and for the state to maximize the network dispensing capacity with their investments. In general, we agree with these as goals of the program but we are concerned that by limiting the eligible expenses to 50% of equipment costs only, developers will be significantly constrained.

Success of this program requires proposals from developers for tranches that are robust and sufficiently large to insure station build out to beyond 100 stations. Such stations need to be reliable, well located, well managed, and able to meet the needs of the next generation of ZEV owners in the state. Our concern is that, by reducing the state match from 85% of project costs to 50% of equipment costs, developers will propose much smaller batches and tranches than they would otherwise.

Section 6: Single Applicant Cap - In addition to the reduced state cost share on projects, we are concerned that the single applicant cap of 33% within each year of the program will also significantly limit the state's ability to get the best, largest network of stations. While we recognize the need for the state to make prudent decisions and have multiple suppliers, we believe these goals can be met with less restrictive single applicant caps.