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**Docket 19-TRANS-01 Low Carbon Fuel Production Program - Air Liquide
comments**

Additional submitted attachment is included below.



March 12, 2019

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

Re: Docket No. 19-TRAN-01, Low Carbon Fuel Production Program

Dear CEC Administrators

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 State funding of hydrogen refueling stations has been an important element in the growth of the light duty vehicle market and the proposed Low Carbon Fuel Production Program will build on this success to help provide the key driver for market growth and coverage over the next few years.

The attached comments are in response to the *Low Carbon Fuel Production Program Draft Guidelines* and the summary workshop held on March 5 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 *Draft Guidelines* will help support new and expanded renewable and ultra-low-carbon transportation fuel production and help the California meets its renewable transportation goals. The projects and technologies will help expand transportation fuel production plants in the state, to increase production capacity, and reduce GHG emissions associated with low-carbon fuel production. In the attachment to this document, we have recommendations to enable bidders to better meet the needs of the program and its customers. **We ask that all options for renewable hydrogen supply be eligible by continuing to enable landfill gas as a feedstock**

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,

David P. Edwards, PhD

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Eligible Renewable Hydrogen Feedstocks

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 will restrict market growth, jeopardize the state's transportation goals and burden the consumer with unnecessarily high fuel prices impacting the adoption rate.

While we understand and support the state's efforts to continue to drive toward production through electrolysis, we believe that a 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 2030¹. 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 can then be used directly at the collection site to produce H2 or it can be 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.

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.

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

¹ hydrogencouncil.com/our-2030-goal

² www.calrecycle.ca.gov/climate/landfill

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. 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 provides the single most viable technology for this investment. As an example, Air Liquide recently announced⁴ 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 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:

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 legislation⁷ or through either the most recent pass or proposed ARFVTP Investment Plans⁸. 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) program⁹, 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.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