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**2022 IEPR Emerging Topics The Role of Hydrogen June 2022  
Workshop Comments**

Air Products appreciates the opportunity to provide this feedback. Please find our comments attached.

*Additional submitted attachment is included below.*

Air Products and Chemicals, Inc.  
4000 MacArthur Boulevard  
Suite 420, East Tower  
Newport Beach, CA 92660  
T 949.474.1860  
www.airproducts.com



July 12, 2022

Commissioner Siva Gunda, Vice Chair  
California Energy Commission (CEC)  
715 P Street  
Sacramento, California 95814

**RE: Air Products' Comments on 22-IEPR-01 — The Role of Hydrogen in California's Clean Energy Future**

Dear Vice-Chair Gunda:

Thank you for the opportunity to comment on the Role for Hydrogen in California's Clean Energy Future in conjunction with the 2022 IEPR Update. This a very important and timely topic as hydrogen has been identified as playing a key role in decarbonizing multiple sectors in the California Air Resources Board (CARB) draft Scoping Plan.

**Air Products is Investing in a Diversity of Global Scale Clean Hydrogen Solutions**

Air Products is the only major U.S.-based industrial gas company and the world's largest hydrogen producer and supplier for use in numerous markets, including transportation. We are committed to rapidly scaling and decarbonizing global hydrogen supplies in order to support rapid decarbonization efforts in California and internationally. Consider that in just the last two years, Air Products has announced about \$12 billion in clean hydrogen investments, including:

- Part of a joint venture for the world's largest green hydrogen project by far (\$7 billion), requiring more electrolyzer capacity than has been deployed throughout the world to date. This project alone will serve to scale global electrolyzer production capacity and manufacturing, helping to bring down the costs of this important technology.
- An innovative \$1 billion net-zero carbon hydrogen production complex in Alberta, Canada, which achieves net-zero emissions through the combination of advanced hydrogen reforming technology, carbon capture and storage, and hydrogen-fueled electricity generation. Air Products recently won the Best Carbon Management Initiative Award for this project at the 2021 *Chemical Week Sustainability Awards*.

- A \$4.5 billion blue hydrogen clean energy complex in Louisiana, which represents the company's largest investment ever in the U.S. and will sequester more than five million tons of carbon dioxide (CO<sub>2</sub>) per year. This project will capture 95% of the facility's CO<sub>2</sub> emissions and produce blue hydrogen with near-zero carbon emissions.
- A green hydrogen production facility based in Casa Grande, Arizona just outside Phoenix which is expected to be on-stream in 2023 and will produce zero-carbon, liquid hydrogen for the transportation market.
- A \$2 billion major expansion project with World Energy to develop North America's largest sustainable aviation fuel production facility in Paramount, California. The project will expand the site's total fuel capacity to 340 million gallons annually, and among other investments, includes an extension and capacity increase of Air Products' existing hydrogen pipeline network in Southern California. The project is scheduled to be onstream in 2025.

### **California Needs a Diversity of Clean Energy Sources and Technologies, Including for Hydrogen**

Air Products is fully committed to developing world-scale solutions to address climate change. No individual technology will be able to do so on its own, however, and the world – and California – will need multiple solutions to address this critical challenge. That is why Air Products continues to pursue diverse hydrogen production solutions in locations and circumstances where a specific approach, technology and product makes sense.

We agree with the sentiments that Commissioner Monahan shared in the workshop regarding focusing on carbon intensity to define hydrogen instead of colors and the role of imports to bolster hydrogen supply which is estimated to increase 60-fold to meet demand according to CARB's draft scoping plan.<sup>1</sup> We urge the commission to avoid defining or classifying hydrogen based on technologies or geography, and rather make any eligibility or other criteria for hydrogen based on carbon intensity; and preferably in a performance-based standard that recognizes and incentivizes improvement in carbon intensity. We strongly urge you to avoid creating any arbitrary and limiting definitions or exclusions for hydrogen based on production technology, feedstock, or other categorizations that don't necessarily influence emissions outcomes. This would only serve to limit opportunities to reduce emissions in the State.

In California, all forms of hydrogen make sense, as does support for both in-state and out-of-state projects. For example, hydrogen produced today using conventional steam methane reforming technology and natural gas provides over a 30% improvement in

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<sup>1</sup>Slide 4 in presentation to board 6-23-2022 [Draft 2022 Scoping Plan \(ca.gov\)](#)

carbon intensity when compared to conventional transportation fuels<sup>2</sup> and zero criteria and toxic vehicle exhaust emissions – bringing much needed air quality and health benefits to disadvantaged communities. These benefits can be realized now while hydrogen is transitioned to lower carbon over the 2045 carbon neutrality time horizon.

While the state has some world-class renewable energy resources, according to CARB's 2021 draft scoping plan and as presented in CEC's workshop on this topic, the state will need to sustain "record-breaking" clean energy build rates, estimated at 7 GW per year for 22 years<sup>3</sup>, to achieve its decarbonization goals. According to CEC data, the state already relies on imported energy to supply nearly one-third of its electricity, more than 70 percent of its crude oil, and 90 percent of its natural gas. Altogether, more than two-thirds of California's overall energy requirements are met from imported resources.

California will very likely have to continue relying on imported energy to meet its clean energy goals for electricity and other sectors – even in a clean energy future. The CEC's, and State's approach to hydrogen should not prevent opportunities to import clean hydrogen into the State, which will likely be required to meet California's climate and clean energy goals quickly and cost effectively.

### **CEC Should Take a Technology-Neutral Approach to Hydrogen and Other Emerging Topics**

We are confident that a full and fair evaluation of the complete array of hydrogen technologies throughout the entire supply chain will lead to the conclusion that we can more deeply and quickly decarbonize many sectors of California's economy than we currently assume. An incomplete evaluation, however, including one that only looks at limited solutions, such as electrolysis or pipeline transport of hydrogen, is more likely to lead to suboptimal outcomes, higher costs, and longer timeframes for achieving California's climate goals.

We urge you to take a technology-neutral and performance-based approach in your evaluation of hydrogen, including an evaluation of:

- Current hydrogen supplies and how they can be deployed to support California's energy and climate goals and how they can also be further decarbonized themselves.
- End use applications for hydrogen and its derivatives, including methanol, ammonia, and synthetic fuels such as renewable methane or sustainable aviation fuel.
- An array of clean hydrogen solutions and technologies, based on carbon intensity, including blue hydrogen (utilizing CCS), green hydrogen from

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<sup>2</sup> Union of Concerned Scientist "How Clean Are Hydrogen Fuel Cell Electric Vehicles" Fact Sheet (September 2014)

<sup>3</sup> Rajinder Sahota, draft Scoping Plan hearing 6-24-2022

both electrolysis and biomass gasification, and negative carbon solutions by pairing biomass gasification with CCS.

- Barriers, and recommendations to overcome them, to maximize private sector investment in the whole of the clean hydrogen supply chain to accelerate deep decarbonization in all relevant sectors and achieve California's energy and climate goals.

### **Hard to Electrify Sectors Don't Have to be "Hard-to-Abate"**

Many sectors that will require clean hydrogen to decarbonize are often referred to as "hard-to-abate" sectors. However, hydrogen and its derivatives provide the means to decarbonize these "hard-to-abate" sectors including industry, power generation, medium and heavy-duty transportation, along with off-road applications.

We noted that in the presentation by Bloomberg NEF, they do not see a strong role for hydrogen in the medium and heavy-duty transportation sector. Air Product's strongly disagrees. We are supportive of deploying zero emission vehicle technologies – and we see a role for both battery-electric and hydrogen fuel cell electric technologies. Hydrogen fuel cells offer clear advantages for long-haul trucks in terms of range, speed of refueling, and payload when compared to their battery-electric counterparts. Moreover, larger fleets will benefit from the central refueling experience that hydrogen provides without substantive electric system upgrades (including outside the facility fence) that might be required to accommodate simultaneous charging of vehicles. In fact, Air Products and Cummins Inc. have jointly announced the signing of a memorandum of understanding (MOU) to work together to accelerate the integration of hydrogen fuel cell trucks in the Americas, Europe and Asia. Cummins will provide hydrogen fuel cell electric powertrains integrated into selected OEM partners' heavy-duty trucks for Air Products, as Air Products begins the process of converting its global fleet of distribution vehicles to hydrogen fuel cell vehicles.

Another benefit of hydrogen fuel cell vehicles, especially long-haul heavy-duty trucks, is that they will need significantly less land area for refueling than their battery-electric counterparts. This is due to the high-throughput and considerably faster fueling times of hydrogen vehicles when compared with the space requirements needed for simultaneous overnight battery-electric charging operations to ensure maximum operational vehicle range of heavy-duty commercial vehicles.

### **Summary**

During the workshop following the 3<sup>rd</sup> panel discussion, you asked a question about what would advance the conversation/opportunity for hydrogen. In response, we offer the following:

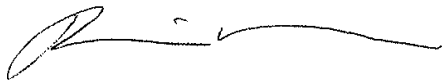
- Promote technology neutral, carbon intensity-based performance-based regulatory policies that can take advantage of the emission benefits that

hydrogen provides now and incent the transition to lower carbon hydrogen production methods over time.

- Support large-scale production opportunities by working with other agencies to strengthen programs like the LCFS, or develop similar programs in other sectors, to facilitate low carbon fuel demand and that recognize the value that hydrogen provides.
- Ensure that funding programs recognize the value of both battery-electric and hydrogen fuel cells technologies equitably.
- Incent hydrogen refueling infrastructure that is built at scale and operated reliably at a high-level of performance. Prioritize high capacity, high availability stations in addition to targeting specific numbers of stations.
- Remove permitting/CEQA roadblocks where possible to advance production and infrastructure opportunities. This should include expanding public outreach and education efforts with local jurisdictional authorities, so they are familiar with the benefits and safe-handling of hydrogen.

Thank you again for the opportunity to comment on the Role of Hydrogen in Californian's Clean Energy Future as part of the Draft 2022 IEPR Update Scoping Order. We look forward to further explore these topics with you and share our decades of hydrogen expertise and perspective throughout the 2022 IEPR Update process. Please feel free to contact me by phone (916-860-9378) or email [hellermt@airproducts.com](mailto:hellermt@airproducts.com).

Respectfully,

A handwritten signature in black ink, appearing to read 'Miles Heller', with a long horizontal flourish extending to the right.

Miles Heller  
Director, Greenhouse Gas Government Policy