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2022 IEPR Update Scoping Order

Attached, please find Air Products' comments regarding the scoping order

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

March 18, 2022

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

RE: Air Products' Comments on 22–IEPR–01 — 2022 Scoping Order

Dear Vice Chair Gunda:

Thank you for the opportunity to comment on the Draft Scoping Order for the 2022 Integrated Energy Policy Report (IEPR) Update. Air Products supports the three proposed major topics, including (1) Establishing a Framework to Center Equity and Environmental Justice Throughout CEC Efforts; (2) Creating a California Planning Library; and (3) Addressing Emerging Topics, including the Role for Hydrogen in California's Clean Energy Future.

Our comments here primarily focus on item (3), although we wish to express our support for the draft proposal to establish an Equity and Environmental Justice Framework and our appreciation for the CEC's analytical tools and data products – along with our strong support for creating a planning library that may help to make those tools and the broad depth of the CEC's analytical activities and expertise even more readily available.

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 more than $12 billion in clean hydrogen investments, including:

- 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_2) per year. This project will capture 95% of the facility's CO_2 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.

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 solutions such as green hydrogen and blue hydrogen in locations and circumstances where a specific approach, technology and product makes sense.

In California, blue and green hydrogen both make sense, as does support for both in-state and out-of-state projects. 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.

While the state has some world-class renewable energy resources, according to the 2021 Joint Agency SB 100 Report, the state will need to sustain "record-breaking" clean energy build rates for 25 years, just to achieve its SB 100 goals. The California Public Utilities Commission has identified a need for new out-of-state renewable energy resources in its recent Integrated Planning Report and the California Independent System Operator is planning for transmission to accommodate the additional required gigawatts of renewable energy imports into the State.

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.

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. While it appears some have convinced themselves of this as a matter of conventional wisdom, they are really no more difficult to decarbonize than other sectors, at least conceptually. We know how to decarbonize industry and heavy-duty and off-road transportation, and the technologies to do so – hydrogen and its derivatives, as well as carbon capture and sequestration (CCS) and gasification – are largely available today.

We can flip this conventional wisdom if we plan to decarbonize those sectors and enable the solutions to do so. In addition to some world-class renewable energy resources, California also has world-class geology to support CCS, which should be brought to bear in the State's fight against climate change, as well as a critical need to manage and utilize waste biomass from the forests and other organic waste streams, which hydrogen-related efforts can support.

We hope the 2022 IEPR Update, as well as the recently opened and related order instituting an informational proceeding on decarbonizing the gas system, will provide forums to more fully evaluate and enable these solutions, and therefore support an accelerated and deeper decarbonization of California's economy.

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 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 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.

Most of all, 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. A comparison and evaluation of decarbonization strategies, including for hydrogen, should be clearly based on lifecycle carbon intensity.

More Cross-Sectoral Analyses Needed than Just Electricity and Electrolysis

As you evaluate hydrogen strategies and technologies, we urge you to consider a wide array of cross-sectoral impacts. Too often, discussions of hydrogen as a cross-sectoral issue have limited focus on electrolysis as an asset for the electricity grid. Electrolysis is certainly a promising technology but should not be the exclusive focus.

Indeed, other promising cross-sectoral assessments may look at the opportunity for blue hydrogen to pair with CCS at industrial facilities, including cement plants, and for biomass gasification (especially if it's paired with CCS and potentially co-located with other industrial decarbonization efforts) to support State priorities related to organic waste, forest management, and avoided agricultural burning in the Central Valley.

As illustrated in the Lawrence Livermore National Laboratory Report, *Getting to Neutral,* the cross-sectoral opportunities for waste biomass and hydrogen are vast. The report finds that deploying biomass gasification with CCS to manage existing organic waste streams and developing offtake markets at scale to utilize the resulting hydrogen, can quickly and cost-effectively lead to emissions benefits that would be greater than taking every passenger vehicle off California's roads. Based on this analysis, no other integrated climate strategy may offer such emissions benefits.

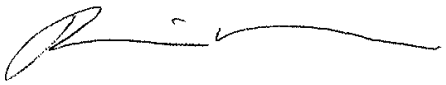
This is not to say that the 2022 IEPR Update evaluation should focus on biomass gasification or CCS, just that it shouldn't exclude those technologies. And it certainly shouldn't limit its focus to just a subset of the full range of promising hydrogen production, transportation or storage technologies, or off-take markets and applications.

We hope you will use the 2022 IEPR Update to start a broad discussion, focused on greenhouse gas emissions outcomes, to help bring to the public forefront the wide array

of emerging, hydrogen-related technologies and strategies to help California quickly and cost effectively achieve its climate and energy goals.

Thank you again for the opportunity to comment on 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.

Respectfully,



Miles Heller
Director, Greenhouse Gas Government Policy