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August 20, 2021

Rajinder Sahota, Deputy Executive Officer for  
Climate Change & Research  
California Air Resources Board 1001 I Street  
Sacramento, CA 95814

Comments submitted electronically via [Comment Submittal Form \(ca.gov\)](https://www.ca.gov/carbon-reduction-plan/comment-submittal-form)

**RE: Comments Related to the 2022 AB-32 Scoping Plan Update August 2, 2021**  
**Engineered Carbon Removal Technical Workshop**

Dear Ms. Sahota,

Air Products is pleased to provide comments in support of CARB's 2022 update of the AB 32 Scoping Plan. We understand the significance and the challenges of this update based on the longer planning horizon coupled with significant carbon reduction goals. We support CARB's climate goals and believe that Air Products can help California with the energy transition needed to meet these challenges.

Air Products is the only US based global industrial gas company, in operation for over 80 years with operations in more than 50 countries around the globe. The company's core industrial gases business provides atmospheric and process gases and related equipment to manufacturing markets, including refining and petrochemical, metals, electronics, food and beverage and healthcare. Approximately 19,000 employees globally work to make Air Products the world's safest and best performing industrial gases company, providing sustainable offerings and excellent service to all customers.

Worldwide, Air Products is the largest hydrogen producer with over 8,000 metric tons per day of production capacity and over 1,800 miles of industrial gas pipelines. Within California, the company safely operates 9 hydrogen production facilities, 35 miles of hydrogen pipeline and currently supplies a fleet of hydrogen fueling stations, facilitating the transition to carbon-free transportation. In fact, Air Products supplies ~80% of the hydrogen currently used in the California mobility market.

**Hydrogen is a Key Element of the Energy Transition**

Recognized by experts around the world, hydrogen is the most viable energy source that can decarbonize a significant portion of the economy; especially the hard-to-abate emissions sectors such as heavy-duty transportation, shipping, aviation, chemicals, cement, power and metals (steel, aluminum, and iron) production.

Each method of hydrogen production has a distinct role to play in various geographies – depending on the availability of natural resources including renewable power, land, and sequestration pore space – but all methods can fundamentally provide a significant reduction in greenhouse gas emissions. Regardless of the hydrogen “color”, transitioning to hydrogen as fuel source can have an immediate

impact on reducing greenhouse gas emissions when compared to other fuel sources. Implementation of policy supporting a rapid transition to hydrogen use and performance-based policies on a sectoral basis are the most effective ways of decarbonizing hard-to-abate sectors and quickly developing the quantities of hydrogen production required to displace higher carbon intensity fuels both in the industrial and transportation sectors.

### **Our Experience with Carbon Capture**

In 2013, Air Products in collaboration with the Department of Energy, deployed carbon capture at scale by retrofitting two world-scale hydrogen facilities in Port Arthur, TX. This investment captures approximately 1 million metric tons of CO<sub>2</sub> annually, with the carbon intensity of hydrogen reduced by almost half and resulting in a 13% decarbonization of Air Products' Gulf Coast hydrogen network providing benefits to more than 60 customers.

Air Products also recently announced a \$1 billion investment in Edmonton, Alberta, in conjunction with the Government of Canada to create a net-zero hydrogen energy complex, deploying an innovative design and advanced technology supporting the development of a low carbon industrial energy hub. The project, scheduled to be on-stream in 2024, will leverage locally sourced natural gas to be processed into hydrogen using an autothermal reformer. This technology allows for over 95% of CO<sub>2</sub> emissions to be readily captured and permanently sequestered, resulting in nearly carbon-free hydrogen. In addition to supplying our Alberta pipeline network and associated customers, a portion of the net-zero hydrogen will be used to generate power for the entire facility operations and for export to the electric grid. Lastly, a portion of the net-zero hydrogen will also be liquefied for the merchant industrial and transpiration fuels market. This innovative design can be replicated in jurisdictions with the policy, geology and interest in developing low-carbon hydrogen hubs.

### **Hydrogen Production Utilizing CCS is a Necessary Strategy for Attaining State Climate Goals**

Producing hydrogen with CCS will play a very important role in attaining the carbon reduction goals of the state. Its contribution to these reductions should be included in the Scoping Plan update. While the carbon intensity of conventionally produced hydrogen is already lower than petroleum-based fuels, it can be significantly further reduced with CCS – as Air Products is demonstrating through our projects mentioned above. Negative carbon emissions can be achieved by coupling CCS with hydrogen produced by biomass or biogas – including using gasification. CARB has indicated that negative carbon emissions reductions can play a key role in achieving their deep decarbonization goals.

Hydrogen production utilizing CCS also allows for the build-out of the substantial increase in renewable power supply and the transmission capacity to deliver it where it is needed. The ability to simultaneously decarbonize the current power sector, increase power demand for further electrification, and add the incremental renewable generation capacity to support hydrogen production via electrolysis will constrain achieving all three objectives. In contrast, hydrogen production with CCS supply can satisfy the near-term requirements while hydrogen demand and renewable energy supply can grow in parallel. Deployment of hydrogen produced using CCS

concurrently with development of renewable hydrogen opportunities will accelerate carbon reductions in multiple sectors sooner than if either technology were exclusively favored.

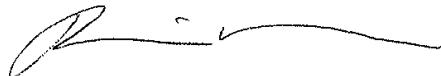
It's important to note that CCS can contribute to overall greenhouse gas reductions AND air pollution reductions. CCS has been clearly demonstrated and supported by globally respected scientific research over many years. Indeed, California's Lawrence Livermore National Lab has been a strong proponent of CCS and demonstrates that support at workshops based on their report *Getting to Neutral*.<sup>1</sup> Strategies to capture CCS will also deliver additional criteria air pollutant reductions, which may vary based on technology and application, but are directionally consistent and deserve further analysis.

We need to reduce emissions from all sectors as quickly as possible, and both hydrogen and CCS are critical strategies for the state to deploy to achieve its goals and especially to decarbonize the industrial sector. Contrary to some suggestions at the workshop – this is not a zero-sum game. The State's support for CCS will not slow down or interfere with its clearly established goals to transition to 100 percent clean energy, 100 percent zero emission vehicles, or beginning to electrify buildings. It will only deliver additional emissions reductions, from the industrial and power sectors, and much more quickly – providing greater, more near-term air quality and climate benefits.

The Scoping Plan update is the right vehicle for recognizing the role that CCS can play and identifying the necessary supporting policies that should be advanced or enhanced to enable its reduction contribution. The existing CCS protocol related to the LCFS is a very important component, and Air Products has identified ways to improve its implementation. The Scoping Plan update creates an opportunity to strengthen supporting policies for CCS and Air Products stands ready to work with CARB and other state agencies to achieve the carbon reductions that this technology promises.

Air Products appreciates the opportunity to provide this feedback and we would like to meet with CARB to discuss the opportunities we see for hydrogen and CCS in the context of the scoping plan development and to meet the state's climate goals. Please feel free to contact me by phone (916-860-9378) or email [hellermt@airproducts.com](mailto:hellermt@airproducts.com).

Respectfully,



Miles Heller  
Director, Greenhouse Gas Government Policy

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<sup>1</sup> [https://www-gs.llnl.gov/content/assets/docs/energy/Getting\\_to\\_Neutral.pdf](https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf)