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California Air Resources Board
1001 I Street
Sacramento, CA 95814

Comments submitted electronically

RE: Comments Related to the August 12th, 2024 15-Day Amendment Package

Dear Chair Randolph and fellow Board Members,

Air Products is pleased to provide comments in support of the California Air Resources Board (CARB) rulemaking for the Low Carbon Fuel Standard (LCFS) and the August 12th 15-day package amendments. We are very appreciative that CARB has recognized the substantial role that hydrogen will play in decarbonizing transportation, but we believe that the proposed 15-day package amendments leave some impediments in place and create new significant impediments to developing the growing market for low-carbon hydrogen. Our comments focus on further refinements that are needed to support the nascent and growing lower-carbon hydrogen market and help realize California's decarbonization goals and help local jurisdictions meet their air quality and public health goals through deployment of zero emission vehicle (ZEV) vehicles to replace diesel-burning vehicles, particularly in heavily traveled goods movement corridors. We respectfully request another 15-day package before the amendments prior to the Board acting on the amendment package at its November 8, 2024, hearing to address the issues identified below.

Air Products is the only U.S.-based global industrial gas company and the largest hydrogen producer globally, nationally, and in California. The company is a trusted hydrogen supplier for numerous markets, including transportation. Within California, Air Products safely operates ten hydrogen production facilities, about 30 miles of hydrogen pipeline and currently supplies and operates a network of light-duty and heavy-duty hydrogen fueling stations, facilitating the transition to zero-emission transportation. Air Products has also been selected to be part of the California ARCHES LLC Hydrogen Hub Project.

We are committed to rapidly scaling and decarbonizing global hydrogen supplies to support decarbonization efforts internationally. On July 25th, 2022, Air Products announced¹ that it will spend or commit at least \$4 billion in additional new capital for the transition to clean energy over the next five years. In the two years preceding this announcement, Air Products had announced approximately \$11 billion in clean energy investments., bringing its total recent commitment to clean energy investments targeting hard-to-abate economic sectors to \$15 billion.

Executive Summary on Key Issues:

1. ***Proposed Change to Reduce the Carbon Intensity Target by 9% in 2025:*** Air Products applauds CARB's bold step and supports the recommendation to reduce the carbon intensity (CI) target in transportation fuels by at least 9% in Q1 2025. We also strongly support CARB's retention of the auto-

¹ Air Products Announces Additional "Third by '30" CO2 Emissions Reduction Goal, Commitment to Net Zero by 2050, and Increase in New Capital for Energy Transition to \$15 Billion

acceleration mechanism included in the amendment package which will enable timely stringency adjustments to maintain strong market signals for the development of lower carbon transportation fuels.

- 2. *Modify Low-CI Hydrogen Book & Claim Provisions to Maximize Emissions Reductions and Low Carbon Fuel Supply to California:*** We strongly support the inclusion of a technology-neutral, CI-based, book-and-claim approach for hydrogen. However, we continue request that it be applied to all transportation fuels consumed in California, regardless of where the fuels are produced and transported, and consistent with standard treatment of fuels under the LCFS program. This ensures a broader supply of low CI hydrogen to serve the state, increased fueling reliability for new hydrogen stations, greater competition among low CI hydrogen fuel providers, and therefore lower cost to the end consumer. This change will deliver greater reliability and flexibility in what will be a global market for lower-carbon transportation fuels to replace the existing fossil-based transportation fuels market. Note, that more than seventy (70%)² of the fossil-based transportation fuels we use in California are imported to serve the existing transportation market, even though California is home to one of the largest refinery fleets and fuel production. With more than 38 million population and host to several international ports which move more than 70% of the United States goods across the Western United States, replacing legacy transportation fuels will require a broad supply of low carbon fuels and more specifically a nationally and internationally sourced low CI supply of hydrogen to support the transition to zero emission cars, trucks, drayage and cargo handling.
- 3. *Remove New Proposed Requirement for Renewable Hydrogen Only in Mobility Applications:*** We strongly recommend that CARB remove the requirement to require all hydrogen used in mobility applications after 2030 be renewable as electricity and other applicable transportation fuels are not required to meet an equally stringent standard in the same timeframe. The new policy requires all hydrogen, starting in about 6 years to be renewable and if it does not meet the requirements, it will be artificially assigned a CI value for diesel, regardless of the actual CI. This is a substantial new requirement that was not subject to workshop discussion or public vetting. Further, given the proposed transition away from a technology-neutral approach for hydrogen, this proposed change will severely limit the development of a robust hydrogen transportation fuels supply in California at a time when a transition to ZEV transportation solutions, including new vehicle and new fueling stations, is being advanced. The proposal also places hydrogen on unequal footing with electricity as a zero-emission fuel or biogas and other pathways, which enjoy longer transition (e.g., 2045) horizons to meet 100% renewable content requirements. The new policy also moves CARB away from the technology-neutral approach that the LCFS has always taken and undermines the beneficial role that carbon capture and sequestration will play in the national energy transition, forgoes additional carbon emission reductions and air quality improvements that low carbon hydrogen can provide, and presents timing challenges. The hydrogen production and associated industry cannot rapidly pivot from existing supplies to this level of new sources to serve the growing ZEV fueling market.
- 4. *Provide Clarity for Hydrogen Refueling Stations Serving All Vehicle Types:*** We support the proposed changes in the 15-day package for Hydrogen Refueling Infrastructure (HRI) crediting to align light- and medium-duty stations in one category and heavy-duty in another category for generating credits but continue to seek clarity about how stations that serve all three vehicle types will be treated. This clarity is needed as multi-modal stations are the most efficient and flexible infrastructure, with shared equipment, to serve the growing mobility fleet.

• ² Annual Oil Supply Sources To California Refineries

5. ***Low-CI Electricity Book & Claim Provisions:*** Air Products strongly supports CARB's proposal in §95488.8(i)(1) to extend the existing book and claim accounting approach for low-CI electricity to include the process energy associated with other components used to process and distribute hydrogen, like liquefaction and compression. We also appreciate the 15-day amendments treating hydrogen and electricity equitably in terms of the time matching criteria consistently. We believe some important clarifications are still needed in the provisions for the use of low-CI electricity when used to produce hydrogen including striking the newly added qualifier that these provisions only apply to electrolysis as that would unnecessarily limit the extension mentioned above to process energy and the flexibility to provide lower-carbon sources of hydrogen to the mobility market in California.

Detailed Comments:

1. ***Proposed Change to Reduce the Carbon Intensity Target by 9% in 2025:*** Air Products strongly supports CARB's bold step in recommending to reduce the carbon intensity (CI) target in transportation fuels by at least 9% in Q1 2025. We also support CARB's retention of the auto-acceleration mechanism included in the amendment package which will enable timely stringency adjustments to maintain strong market signals for the development of lower carbon transportation fuels. Both changes will bolster the signal to the market that is needed immediately and over the longer-term to ensure that the program spurs clean fuel innovation and provides the emission reductions that California needs from the transportation sector.
2. ***Hydrogen Book-and-Claim Provisions:*** Air Products appreciates CARB's willingness to provide a 'book-and-claim' accounting approach for low-CI hydrogen, and we strongly support the provision's focus on a technology-neutral, CI-focused metric to establish eligibility for low-CI hydrogen. A robust book-and-claim system for hydrogen will support development of new lower-carbon hydrogen production projects, reduce costs, and ensure that the low-carbon attributes of a hydrogen pathway are retained and applied to end-uses where the most environmental benefit can be derived at the lowest cost to the consumer by leveraging existing infrastructure and maximizing supply. This sends the necessary long-term signal to significantly increase investments in the production, storage, and distribution of low-carbon hydrogen fundamental to decarbonizing the transportation sector. CARB's design of such a system will serve as a model to other jurisdictions considering or implementing LCFS programs.

To that end, one key improvement needed is to eliminate the requirement that eligible hydrogen must be supplied to California in a dedicated pipeline as proposed in §95488.8(i)(3)(A). This requirement places an unnecessary constraint on a nascent market and will stifle investments at a time when massive capital outlays are needed to bring low-carbon hydrogen to scale. There are no dedicated interstate hydrogen pipelines to California. As such, this requirement favors only in-state hydrogen pipelines and fails to recognize the value of using hydrogen as an input for renewable fuels produced out of state and imported for use in California, or hydrogen imports for mobility that will be transported in dedicated pipelines outside of California before being transported by truck into the state for the consumer. Just as transportation fuels are imported to California currently, transport flexibility will be needed for hydrogen to ensure a reliable and cost-effective supply as additional infrastructure is built, including potential dedicated pipelines to California.

This provision imposes a differential restriction if the hydrogen is produced and transported in a pipeline outside of the state, even when this hydrogen or the alternative fuel derived from the hydrogen is consumed in California and should be creditable under the LCFS. For reliability of supply, California should incent the use of low carbon hydrogen to achieve as many emission reductions as possible in multiple fuel value chains and geographies if the finished fuel is consumed in state and creditable under the LCFS.

We request that CARB modify §95488.8(i)(3)(A) as follows:

“Low-CI hydrogen is injected into a dedicated hydrogen pipeline physically connected to California a distribution system or a production facility that provides transportation fuel to California.”

Alternatively, Staff had indicated in one conversation that time limitations on this flexibility may be appropriate. We've proposed an approach similar to what is proposed for biomethane when used to produce hydrogen, below, but are flexible to other approaches:

“Low-CI hydrogen is injected into a dedicated hydrogen pipeline physically connected to a distribution system or a production facility that provides transportation fuel to California. Low-CI hydrogen reported under fuel pathways associated with projects that break ground after December 31, 2032, must demonstrate physical connection to California and flow to California at least 50% of the time by January 1, 2046.”

We also note that the low-CI hydrogen book-and-claim provisions still includes a requirement to report the contracted price of hydrogen to CARB in unredacted invoices in the 15-day package. We support the need for robust tracking of hydrogen volumes to ensure the quantity and environmental attributes of the hydrogen tracked via book-and-claim is verifiable but find no rationale for including hydrogen pricing. In fact, sharing information on the contracted hydrogen price creates the possibility of irreparable harm to both Air Products and its customers. Even in situations where data is published in an aggregated fashion, the limited supply of this hydrogen from a handful of entities would likely lead to competitors deducing this proprietary information and leveraging that information to their advantage in bidding processes. We continue to urge CARB to strike the requirement to report this information in §95488.8(i)(3)(E).

If the requirement for contract price reporting remains, CARB must recognize that there are instances where no price documentation exists for internal company transfers.

To accommodate internal accounting practices, we urge CARB to modify the provision as follows:

(E) To substantiate low-CI hydrogen quantities injected into the pipeline for dispensing in FCVs or as an input to alternative fuel production, the pathway application and subsequent Annual Fuel Pathway Reports must include the following documents linking the environmental attributes of low-CI hydrogen in kg with corresponding quantities of hydrogen in kg withdrawn from the pipeline: if independent 3rd-party custody/title transfer occurs upon injection into a pipeline, to provide unredacted monthly invoices showing the quantities of low-CI hydrogen (in kg) sourced and the contracted price per kg; and the unredacted contract by which the fuel pathway holder obtained the environmental attributes, or if no independent 3rd-party custody/title transfer occurs upon injection into a pipeline then alternative documentation must be provided documenting quantities of hydrogen in kg and the associated environmental attributes.

- 3. Eliminate New Renewable Requirement for Hydrogen Mobility Fuel Post-2030:** We oppose the addition of the requirement in §95482(h) that all hydrogen used in mobility applications be renewable after 2030. This is a substantial new requirement that places hydrogen on unequal footing with electricity as a zero-emission fuel, moves away from the technology-neutral approach that the LCFS has always taken, and forgoes additional emission reductions that low carbon hydrogen can provide. Such a change represents a substantial new and limiting requirement that should not be undertaken in a 15-day amendment package. Additionally, it obviates the important work being done at CARB to

develop a wide-ranging market evaluation of all forms of hydrogen (including non-renewable pathways), as directed by SB1075. Further, by failing to recognize the benefits of projects that couple fossil fuels with carbon capture and sequestration to produce low-CI hydrogen, the proposal is at odds with California's priorities. Perplexingly, the proposal leaves significant GHG reductions on the table while stifling the rapid ramp up in hydrogen production, storage, distribution, and use that is foundational to California reaching its GHG reduction targets.

While California was awarded a renewable hydrogen hub under the Infrastructure Investment and Jobs Act, Congress specified that the collection of hydrogen hubs funded pursuant to the Infrastructure Investment and Jobs Act (IIJA) "can be developed into a national clean hydrogen network to facilitate a clean hydrogen economy." It is important to support consistent standards within California that can contribute to national and even international decarbonization efforts, and to avoid isolating California's hydrogen market from others. It is also important to recognize that the federal definition of clean hydrogen is, in fact, technology neutral and based on a carbon intensity standard consistent with the long-standing design of the LCFS.

CARB and other state officials have previously supported hydrogen with CCS in various forums, including in the Scoping Plan, which states, "In addition, CCS can support hydrogen production until such time as there is sufficient renewable power for electrolysis and an abundant water source." (2022 Scoping Plan, pg. 86). Additionally, the Scoping Plan relies heavily on CCS in refining to achieve accelerated greenhouse gas reductions in 2030 and beyond. CCS at refineries would likely include CCS at hydrogen production facilities, as well, and that hydrogen should not be excluded from the mobility market as flexible low-carbon hydrogen sources will be needed to assure reliable and cost-effective supply.

The increasingly stringent CI standards in the LCFS will help transition the hydrogen market to renewable hydrogen over time without a near-term mandated overlay. It will take time for the full transition to renewable hydrogen to occur, but other low carbon technologies will reduce emissions sooner, utilize existing infrastructure and drive innovation for fossil-base technologies. Setting a near-term target like 2030 will have an immediate chilling effect on this technology development because there is no longer a time horizon for credit generation and return on investment needed to support the transition to a renewable hydrogen market that meets California's rapidly increasing demand. As such, we strongly urge that you strike the newly added provision §95482(h) in its entirety.

- 4. *Promote Multi-Modal Station Hydrogen Refueling Infrastructure (HRI) Credits:*** We support the proposed changes in the 15-day package for Hydrogen Refueling Infrastructure (HRI) crediting to align light- and medium-duty (LMD) stations in one category and heavy-duty (HD) in another category for generating credits, but we continue to seek clarity about how stations that serve all three vehicle types are treated.

Air Products believes that multi-modal stations, which include fueling for both LMD and HD vehicles, utilizing shared compression, storage and dispensing equipment, will play an important role in California's hydrogen fueling network, provided that the correct policy signals are in place. Clarity is still needed in the regulation or in guidance as to how the provisions in the separate LMD and HD sections apply and complement one another so as to recognize and encourage efficiencies associated with multi-modal stations. We note that the proposed amendments do not explicitly define multi-use or multimodal stations or include a section with specific provisions for HRI crediting at these stations. As such, Air Products seeks clarity on some issues in this regard.

- Provision §95486.3(a)(1)(C)5 regarding ineligible hydrogen refueling stations indicates that any LMD station that is co-located with a private HD station is ineligible for credit generation. This implies that a LMD station co-located with a public HD station is, in

fact, eligible. Please confirm.

- In provisions §95486.3(a)(3)(A)2 and §95486.4(a)(3)(A)2, HRI crediting for an individual applicant is limited to no more than 1% of the prior quarter's deficits and 2.5% in aggregate for all participants. These percentages are indicated separately for LMD and HD HRI crediting. We interpret that these are in fact additive in the case of multi-modal stations and that the individual limit in the combined station case is 2% and 5.0% in aggregate, respectively. Please confirm.
- In provisions §95486.3(a)(2)(F), we appreciate the increased HRI credit cap of 2000 kg/day for LMD stations while maintaining the 6000 kg/day cap for HD stations. We interpret the separate credit caps for LMD and HD stations to be additive in the case of a multi-modal station. For example, if station is public and serves both LMD and HD customers, at the 50% discount factor, the credit cap would be 4000 kg/day (1000 kg/day from LMD plus 3000 kg/day HD). Please confirm.
- A market scenario involving a public LMD-HRI station co-located with a HD-HRI station will likely be designed with common or shared hydrogen supply, compression, and other equipment. The regulation should include provisions to accommodate credit generation within the capital expenditure limitations for stations with shared equipment. We propose the following language be added to the regulation:

"§ 95486.4(a)(4)(J) "For co-located LMD and HD station, the cumulative value of HRI credits generated for a co-located station must be less than the difference between 1.5 times the allowable LMD and HD initial capital expenditure, or off-site facilities, reported pursuant to section §95486.4(a)(6)(C)1 and the sum of total LMD and HD grant revenue or external funding before the co-located station is both approved and operational, pursuant to section §95486.4(a)(6)(C)5. and 6 in the prior quarter.

- 1. The estimated value of HRI credits, for the purpose of this determination, shall be calculated using the number of HRI credits generated for the HD-HRI station in the quarter plus the number of HRI credits generated for the LMD-HRI station for the quarter and the average LCFS credit price for the quarter published on the LCFS website.*
- 2. The estimated cumulative value calculated under this provision will be made available only to the respective reporting entity in LRT-CBT and will not be published on the LCFS website.*
- 3. This will not affect the reporting entity's ability to generate non-HRI credits for the hydrogen dispensed at the station."*

We also appreciate CARB clarifying that on-site hydrogen generation is not included in the Capital calculation in §95486.3(a)(6)(B)(1). We request that a similar provision be included in the HD-HRI crediting provision in §95486.4.

- 4. Low-CI Electricity Book & Claim Provisions:** Air Products continues to support CARB's proposal in §95488.8(i)(1) to extend the existing book and claim accounting approach for low-CI electricity to include the process energy associated with other components used to process and distribute hydrogen, like liquefaction and compression. We also appreciate the 15-day amendments treating hydrogen and electricity equitably in terms of the time matching criteria consistent with our prior comments.

We do note the addition of the qualifier 'electrolytic' in §95488.8(i)(1)(C) when referencing the use of low-CI electricity book & claim for hydrogen. This will unnecessarily limit the ability to use low-CI electricity attributes for key components of the hydrogen fuel value chain. Liquefaction is a key processing step that will enable efficient delivery of hydrogen to the growing transportation market but requires a substantial electrical load. Shared liquefaction facilities capable of providing low and

renewable carbon hydrogen to fueling stations will be needed and these facilities may process qualifying hydrogen other than electrolytic. To maximize the potential to lower hydrogen fuel CI and incentivize new renewable electricity resources, it is important that these shared facilities be able to access low-CI electricity attributes regardless of the hydrogen that they process. We request that this provision remain as it was in the 45-day package and applicable to all types of hydrogen.

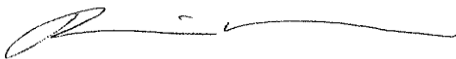
We continue to seek confirmation, consistent with the current regulation and staff discussions that low-CI electricity book & claim can be employed both in-state and out-of-state. We also note that CARB did not propose to limit the low-CI electricity book & claim provisions to California in the Initial Statement of Reasons which would significantly reduce reliable and cost-effective supply of low carbon hydrogen to the state of California. While the California Public Utilities Code is referenced in the regionality requirement provision §95488.8(i)(1)(C)(1), we understand that the initial clause of this provision “The low-CI electricity must be supplied to the grid within the local balancing authority where the electricity is consumed” is intended to apply to hydrogen production and associated renewable power both inside and outside of the state of California. Please add the parenthetical “(or local balancing authority for hydrogen produced outside of California)” similar to what is provided in §95488.8(i)(1)(A) in the current regulation.

As we noted in our comments on the 45-day package and consistent with discussions with CARB staff, the new Tier 1 Simplified Hydrogen Calculator needs to reflect the ability to book & claim low-CI electricity to process energy consistent with what is reflected in the rule language.

§95488.10 (a)(4) should acknowledge that low-CI electricity can also be used for process energy for hydrogen used as a transportation fuel – and not just for the “hydrogen production via electrolysis” – consistent with §95488.8(i)(1). This change ensures consistency in the regulation.

Air Products appreciates the opportunity to provide this feedback on the August 12th 15-day package and we would be happy to meet with CARB to discuss any of these topics further. Please feel free to contact me at hellermt@airproducts.com.

Respectfully,



Miles Heller
Director, Greenhouse Gas, Hydrogen, and Utility Regulatory Policy