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2023 Draft IEPR Comments

Please find our comments attached

Additional submitted attachment is included below.

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December 7, 2023

Commissioner Patty Monahan
California Energy Commission (CEC)
715 P Street
Sacramento, California 95814

RE: Air Products' Comments Related to the Draft 2023 Integrated Energy Policy Report (Draft IEPR)

Dear Commissioner Monahan:

Thank you for the opportunity to comment on the Draft IEPR. Hydrogen will play a critical role in the clean energy transition – particularly in the transportation, maritime, heavy industry, and certain aspects of the power sector. As noted in the Draft IEPR, significant public and private investment is supporting the development of new hydrogen supply pathways and use cases to decarbonize hard-to-electrify sectors and advance mid-Century carbon neutrality objectives in California and globally. Hydrogen increasingly will also continue to complement other low and zero emission energy sources, adding to energy diversity and resiliency amid the transition to clean energy.

It is important to recognize that California is home to a world-leading private hydrogen market, which has safely and effectively operated for decades under a strong regulatory regime to competitively serve industrial and transportation customers. The state's hydrogen ecosystem includes in-state production capacity, existing hydrogen storage and delivery systems, a growing network of hydrogen refueling stations, including for medium- and heavy-duty fuel cell electric vehicles (FCEVs), and emerging projects in the power, industrial and other sectors. Leveraging and building on these existing functioning markets will allow California to bolster its leadership position in the global clean hydrogen market, while also driving policy and economic changes on the regional, national, and international levels. As such, the state must be mindful of the truly global nature of the hydrogen economy as it develops a clear market framework. By keeping these considerations in mind, California will enable a faster, safe, and more cost-effective expansion of hydrogen and thereby accelerate the pace at which fossil fuels are displaced as we move to decarbonize hard-to-electrify sectors.

We appreciate the exploration of potential electricity demands in a hypothetical, all-electrolytic clean hydrogen future as a bounding exercise, but as the CEC continues its IEPR studies, we encourage developing a broader view of the hydrogen market, including other clean hydrogen supply options and associated emission reduction opportunities and community benefits, including jobs and air quality improvements for frontline communities. We also encourage specific focus on targeted decarbonization strategies for industrial complexes, which can serve as early markets to anchor expansion of clean hydrogen development and be used to drive down long-term costs.

These high-level observations are elaborated upon in the comments below. As the largest hydrogen producer in the state, the United States, and the world, with vast operational expertise as owners and operators of in-state dedicated hydrogen pipelines and storage, Air Products looks forward to continue working closely with the CEC and other agencies through development of this and future IEPR reports, as well as the larger SB 1075 process and the Governor's market development strategy, to ensure rapid development of a growing clean, competitive, reliable, safe, and affordable hydrogen market in California.

Background on Air Products

Air Products is a global company with substantial experience producing, storing, and deploying hydrogen in a safe and environmentally conscious manner. Worldwide and in California, Air Products is the largest hydrogen producer, with over 10,000 metric tons per day of production capacity. Within California, for more than 40 years, Air Products has safely operated hydrogen systems, including 10 hydrogen-production facilities and 30 miles of hydrogen pipelines. Air Products supplies a network of light-duty and heavy-duty hydrogen fueling stations, with an increased focus on developing multi-modal stations capable of fueling all on-road vehicle types, facilitating the transition to zero emissions transportation.

We are a global leader and expert on the production, storage, transport, and use of hydrogen, and have substantial new lower carbon hydrogen investments under development today. In fact, Air Products announced[1] that it will spend $15 billion dollars by 2027 in clean energy investments including both green and blue hydrogen projects, and we have already committed over $11 billion of that amount.

By bringing to bear the financial, technical and execution resources of our existing business, along with others experienced in the hydrogen industry, Air Products is deploying the levels of capital investment needed to scale the production and distribution of hydrogen in California and globally, thereby transforming heavy-duty and off-road transportation, power generation and heavy industry. Importantly, our model also shows that the rapid pace required of the clean energy transition can happen within the context of a private competitive market, which can supply demands of clean hydrogen identified in the Draft IEPR and achieve the lowest cost and highest reliability for the consumer.

Guiding Principles to Expand California's Leading Hydrogen Market

California is home to one of the nation's largest, well-established competitive hydrogen markets. Much of the hydrogen deployed in California and across the Unites States serves heavy industry and transportation already. California leads the global hydrogen economy with policies and programs that support economy-wide hydrogen applications and creates demand and incentives for new production and hydrogen deployment in traditional (industry) and non-traditional (zero emission vehicle (ZEV), maritime, power) economic sectors. The CEC's work on hydrogen through the Draft IEPR and other efforts, the Governor's directive to develop the Hydrogen Market Development Strategy, the Senate Bill 1075 (Skinner) process and future work on SB 100, SB 423 and SB 643 implementation, coupled with the federal Inflation Reduction Act and recent U.S. DOE hydrogen hub award, creates more momentum than ever to expand California's robust hydrogen economy.

[1] Air Products, Air Products Announces Additional "Third by '30" CO_2 Emissions Reduction Goal, Commitment to Net Zero by 2050, and Increase in New Capital for Energy Transition to $15 Billion (July 25, 2022)

As California writes the next chapter for its established hydrogen economy, guiding principles that shaped other clean energy programs, like the electricity Renewable Portfolio Standard (RPS) and the Low Carbon Fuel Standard (LCFS), can serve as template for policy frameworks. In response to the September IEPR hydrogen workshop, we provided detailed comments on these guiding principles and policy frameworks to support expansion of California's hydrogen market.[2] In summary, CEC and other state agencies should work to develop a hydrogen market that aligns with the following principles:

- Preserve and expand **competitive markets** to accelerate project development, innovation, cost reductions, wide-scale emissions reductions, and long-term success.
- Set clear market rules that create **certainty**:
    - Avoid new rules or market regulations that dramatically shift or disrupt existing, functional hydrogen markets.
    - Create new **long-term visible market rules** to enable private sector investments in hydrogen production and delivery infrastructure, including demand side offtake rules that match investment life cycles (15-20 years).
    - **Align** any new hydrogen market rules with established **climate policies** like the 2022 Scoping Plan Update.
- Recognize that California's energy system extends beyond its borders and **leverage regional collaboration** to drive down costs and increase hydrogen supply, reliability, and availability.
- Prioritize support for new lower carbon hydrogen production facilities with **verifiable emission reductions**. For electrolytic hydrogen, this would include robust time-matching, deliverability, and additionality requirements.
- Use energy **diversity, resiliency, and energy independence** as metrics, while avoiding over-reliance on one energy source, like electricity.
- Provide a **technology-agnostic** approach for incentives and market rules for lowering the carbon intensity of hydrogen that ensures a level-playing field for zero-emission technologies.
- Use **carbon intensity metrics** to measure lifecycle emissions from lower carbon hydrogen.
- Recognize the role that **hydrogen derivatives** will play and give them consideration when setting policy.
- Prioritize **front-line communities** and design programs that deliver meaningful environmental and economic benefits for these communities.
- **Don't pick winners and losers,** and allow for innovation and accommodation of new, lower carbon hydrogen technologies as they develop.
- Support continued **workforce training** and enable skilled job growth.

Leveraging California's historic, successful, and robust hydrogen systems will add to the toolbox of clean energy resources to enable the state to meet its environmental and equity goals. Leveraging the experience and momentum from existing, proven hydrogen solution providers will enable the state to act with speed and efficiency to delivery on its energy transition goals.

A Complete Analysis of Hydrogen Demand Is Important for the Guiding Clean Hydrogen Market Development

[2] https://efiling.energy.ca.gov/GetDocument.aspx?tn=252517&DocumentContentId=87593

The Draft IEPR provides an analytical background that will inform programs and market rules, with significant impacts to the future of the state's hydrogen market and at key agencies like the CPUC and CARB. We appreciate the scenarios presented in the Draft IEPR, including a focus on decarbonizing the power sector with hydrogen, but encourage a broader analysis in the Final IEPR and future IEPR reports which includes the following:

- We encourage the CEC to explore a wide array of applications and use cases for hydrogen in the transportation sector. In addition to evaluating hydrogen for on-road use, we encourage exploration of hydrogen in shipping, aviation, rail, maritime and other off-road applications. We support exploration of hydrogen use in rail applications, including in the modified AATE3 scenario, and encourage CEC to also include other transportation sectors, including maritime and aviation, in that scenario, as well.
    - With respect to the heavy-duty sector, we encourage the Commission to conduct a wider analysis which would reflect both accelerated and expanded use of hydrogen in heavy-duty and off-road sectors. Given range and weight limitations of heavy-duty battery electric vehicles, increasing electricity costs, and challenges with developing and energizing large new electric vehicle charging stations, especially for high-powered charging for heavy-duty vehicles – it is possible that hydrogen infrastructure and fuel cell vehicles could "leap-frog" electric vehicles, especially for medium and heavy-duty ZEVs.

- In addition to exploring the current use, and increased use compared to the Scoping Plan or other scenarios, of hydrogen directly as a transportation fuel, the IEPR should include consideration of the of clean hydrogen derivatives in transportation, such as ammonia. These fuels will serve as key demand drivers for clean hydrogen in the transportation sector and will likely serve as preferred fuels over electricity or hydrogen directly in many transportation segments.

- We support scenarios that look at a growing role for hydrogen in power sector, including a scenario that replaces remaining gas generation in the Scoping Plan with hydrogen. However, the Scoping Plan does not decarbonize gas plants (through the addition of carbon capture) until the year 2045. We encourage the Final IEPR to evaluate more rapid scenarios for decarbonizing the power sector through the use of clean hydrogen, including scenarios that would transition to hydrogen in the power sector in-line with timelines set forth in the proposed federal rules for decarbonizing power plants, as well as the U.S. Nationally Determined Contribution pursuant to the Paris Climate Agreement, which calls for achieving zero carbon in the power sector by 2035.

- Finally, in addition to SB 1075's requirements to evaluate demand in the transportation and electricity sectors, we encourage the CEC to evaluate demand for clean hydrogen in the industrial and other sectors, as well. Just as clean hydrogen can be deployed to decarbonize gas power plants, it can also decarbonize cement, glass, and steel manufacturing as well as other industrial operations.

CEC Should Take a Technology-Neutral Approach to Hydrogen

The Draft IEPR focuses solely on a single technology – renewable electrolysis – to estimate potential new electricity demands associated with growing use of clean hydrogen. While estimating new electricity demands from hydrogen is an important and appropriate task of the IEPR, we encourage the Final IEPR to include a full and fair evaluation of the complete array of

hydrogen technologies throughout the supply chain. Current hydrogen supplies can be deployed to support California's comprehensive energy goals, including supporting fuel cell electric vehicles in the transportation sector and providing feedstock replacement for additional decarbonization. Deploying carbon capture on fossil-based projects can deliver similar – and potentially better – emissions outcomes than green hydrogen pathways. Biomass, biogas, and other clean hydrogen production pathways deserve complete evaluation, as well. Indeed, SB 1075 calls on CEC to evaluate all hydrogen production and demand, not just renewable hydrogen or electrolysis, directing that "the commission shall study and model potential growth for hydrogen and its role in decarbonizing the electrical and transportation sectors of the economy."

We urge you to take a technology-neutral and performance-based approach in your evaluation of hydrogen and include additional pathways in the 2023 IEPR, rather than waiting until 2025. We strongly urge avoiding creating arbitrary or limiting definitions or exclusions for hydrogen based on production technology, feedstock, or other categorizations that don't necessarily influence emissions outcomes or air quality improvements. 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 based on carbon intensity. Such a technology-neutral approach also aligns with federal incentives including the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA) – neither of which dictate a specific production technology.

Additionally, while we agree on the value of hydrogen pipelines to serve large, primarily industrial, end users, we disagree with implications in the Draft IEPR (e.g., pg. 63) that pipelines are necessarily preferable. Developing new, dedicated hydrogen pipeline infrastructure requires matching identified demand with dedicated clean hydrogen supplies, which requires significant planning, expertise, and capital investment. Relying on pipeline infrastructure to serve smaller, near-term and growing loads – such as multi-modal hydrogen refueling stations – may be impractical and slow development of the hydrogen market. Air Products believes transporting hydrogen as a liquid via truck, for example, will be critical to supporting emerging and growing hydrogen end use applications.

The IEPR Should Include Additional Analyses Related to Clean Hydrogen Market Growth

In addition to evaluating a complete set of hydrogen demands and timelines in the transportation, power, industrial and other sectors, as well as a wide array of beneficial hydrogen production strategies, we encourage the CEC to include a broader array of analyses related to hydrogen in the Final IEPR. In particular:

- **Evaluate ports as an anchor for the growing hydrogen industry.** Some of the most severe air quality impacts accrue in communities in and around port complexes, which often host heavy industry, aviation, maritime and power production. As the CEC looks across the transportation sector to expand hydrogen, ports should be kept top of mind. Port greening has co-benefits with the potential to expand hydrogen infrastructure and deployment to neighboring industries. Delivery of hydrogen in these regions will have a high impact and result in immediate, dramatic air quality improvements. Targeting ports and industrial sites near them will also create hundreds of new skilled jobs in locations where jobs may be lost due to reductions at refineries and other industries.

- **Consider workforce benefits.** As we look toward expanding California-based hydrogen production, handling, delivery and fueling infrastructure, there are opportunities to grow the green economy and increase the availability of skilled jobs in California's already vibrant hydrogen industry. Just as wind, solar, and refinery developers worked with

partners to train a new class of skilled workers and expand the state's green economy, the hydrogen expansion into heavy industry and heavy transportation will create a concomitant workforce training program and workforce deployment for generations. Our state's energy blueprint should prioritize this along with community environmental benefits.

- **Evaluate global markets as part of California's hydrogen growth strategy.** California's energy policies historically have recognized the impact that our economy and our policies have on regional, national, and international energy supplies – and vice versa. Policies like Cap-and-Trade, the Low Carbon Fuel Standard, and Renewable Portfolio Standard were all designed with a recognition of impacts beyond our borders. According to CEC data, California imports 75% of its crude oil, more than 90% of its natural gas, and over two-thirds of all energy, including electricity. Replacing these fossil fuels and energy sources will require an all-of-the above strategy, including expanding in-state resources and supporting regional, national, and international hydrogen and hydrogen derivative supply chains. We encourage the CEC to recognize hydrogen's role in the global energy economy, the impact of the state's efforts on the global supply of hydrogen and to analyze and recommend market incentives to ensure that there is a robust, reliable supply of hydrogen in place to supplant the use of diesel, crude, oil, and natural gas in key sectors. This will enable a cost-effective expansion of hydrogen and position California competitively in the global hydrogen economy.

- **Provide a broad view of hydrogen derivatives.** In addition to existing private hydrogen pipeline and production, the U.S. and California already have extensive infrastructure in place for hydrogen derivatives, such as ammonia. California is home to one of the only port-side ammonia import terminals in the West Coast, which currently serves the agricultural industry. Furthermore, ammonia production and deployment sites are being planned in Northern Los Angeles County. Clean ammonia can serve as feedstock for expanded hydrogen deployment in the transportation and power sectors.

Include Recommendations Related to Expanding Clean Hydrogen Markets in the Final IEPR

One of the most important aspects of the annual IEPR report is the recommendations provided on emerging and timely energy topics. We appreciate the Draft IEPR including recommendations for future R&D, notably including out-of-state resources in future modeling scenarios. However, we encourage CEC to include additional recommendations for rapidly expanding clean hydrogen as a climate and energy solution in California in the Final IEPR. These recommendations should include at least the following:

- The state should target port complexes and neighboring industries, as well as goods movement generally, for near-term growth in hydrogen demands. This will focus hydrogen systems solutions on heavily impacted front-line communities that experience some of the worst air quality due to goods movement in and near port complexes and allow early economies of scale to bring down costs and increase deployment of clean hydrogen as an energy solution.

- Deploying medium- and heavy-duty FCEVs and multi-modal, reliable hydrogen fueling stations to support them, should be a priority. While light-duty FCEV markets continue to grow, the expanded adoption of FCEVs in medium- and heavy-duty vehicle segments can

help support the buildout of hydrogen refueling network and ultimately support the State's ZEV goals.

- The state should prioritize infrastructure and ZEV purchase incentives accordingly, and deploy them in a manner that maximizes emission reductions in the frontline communities that surround the ports, goods movement corridors and other heavy industry, as these communities are disproportionately impacted by criteria air pollutants emitted by those economic sectors.

- As the CEC looks to invest its limited Clean Transportation Program dollars, the agency should ensure that all zero-emission technologies are competing on a **level playing field for funding**. Given the urgent need to reduce emissions in the transportation sector across the board, it is critical that the state adopt an "all of the above" approach with respect to incentivizing zero-emission technologies. We recommend that the CEC give equal amounts of funding to battery electric vehicle (BEV) charging infrastructure and fuel cell electric vehicle (FCEV) fueling infrastructure.

- CEC should consider public hydrogen fueling station funding reforms. Changes to CEC's ZEV infrastructure funding programs will maximize the state's investments by directing funding toward hydrogen fueling stations that are built with the future in mind. These should include:
    - Prioritize investing in multi-modal stations that can serve several vehicle types, such as light-duty and heavy-duty vehicles, at a single site. The ability to serve multiple markets with a single station increases efficiencies for the station operator, reduces delivery costs for hydrogen supply, increases station reliability and provides convenience for customers driving all types of vehicle classes.
    - Invest in stations with more capacity. Larger stations with more on-site hydrogen storage capacity are more practical for enabling CA's transition to meet its ZEV targets. In contrast, the model of building out numerous smaller stations causes supply chain-related costs to increase significantly, as each station will need its own logistical plan to get fuel delivered, obtain spare parts, and be generally maintained, thus reducing station reliability.
    - Make reliability a priority. Station reliability problems, in the form of supply shortages and station equipment malfunctions, have hurt consumer confidence in hydrogen for mobility. Larger multi-modal stations enable station developers to address this issue because they can economically incorporate a more resilient design.
    - Add claw-back mechanisms be added to the programs so that the State can recoup funds from station projects that do not perform reliably. Such a safeguard will ensure that taxpayer investments are protected and help increase consumer confidence in station reliability.
    - Incorporate an examination of the financial strength and execution capabilities of an applicant company as part of the solicitation evaluation and scoring processes.
    - Revise eligibility requirements for pre-purchased equipment. Project participants are currently only able to receive funding for the purchase of equipment after they are selected as an awardee. This precludes the common strategy of purchasing equipment in bulk ahead in anticipation of the buildout of multiple stations and results in longer project timelines, lost savings, and inhibition of scaling across the industry.

- The State should develop a safe, competitive, and affordable hydrogen industry that provides for increased private sector investment in verifiable emissions reductions.

- The State should avoid creating a vertically integrated, CPUC-regulated hydrogen utility, which would disrupt and destabilize California's leading and growing hydrogen market. Allowing California's regulated natural gas utilities to suddenly enter into the existing, functional, competitive hydrogen market, and use current ratepayer funds to enable the utility to unfairly compete against the private sector, will not serve to catalyze an expanded hydrogen market. Instead, it will undermine long-term cost-effectiveness and send negative market signals to the private sector.

- The State should prioritize dedicated hydrogen storage and delivery infrastructure to ensure safety and environmental integrity. We urge caution related to blending hydrogen into natural gas pipelines or using pure hydrogen in any legacy infrastructure. This is particularly important for "high percentage" blends that remain undefined in the draft IEPR. As identified by the University of California, Riverside report to the CPUC,[3] limitations to blending exist in terms of pipeline materials, component materials and function (i.e., meters) and impacts on end user equipment and appliances (different flame patterns, flame temperature with associated NOx increases, heat transfer requirements, etc.).

- The State should prioritize new clean projects with verifiable greenhouse gas emission reductions. The recommendations should be linked to existing state and federal climate and air quality policies and advance durable accounting and tracking environmental attributes that ensure real, verifiable emission reductions.

- The State should support a globally integrated clean hydrogen market that maintains California's strong track record of designing emission-based compliance protocols for all energy consumed in the state to ensure verifiable emission reductions, like the Cap-and-Trade application for electricity imports, LCFS rules for clean fuel imports, and RPS rules for imported electricity.

- The State should advance policies that support the rapid growth of clean hydrogen as a decarbonization solution, including:
    - Maintain a technology-neutral approach to the market and make any eligibility or other criteria for hydrogen based on carbon intensity.
    - Maintain incentives to accelerate the fleet transition from diesel to zero-emission FCEVs.
    - Provide dedicated incentives for investments in hydrogen infrastructure and ZEVs in and around port complexes.
    - Provide incentives for heavy industry to move away from fossil energy for high heat applications.
    - Provide incentives for new, lower carbon hydrogen production that provides verifiable emissions reductions.
    - Provide incentives for power plant owners to convert from natural gas to hydrogen in line with state and federal clean energy policies.
    - Mandate that hydrogen power plants meet or exceed natural gas power plant NOx emission standards.

[3] CPUC Issues Independent Study on Injecting Hydrogen Into Natural Gas Systems (ca.gov)

- Highlight the role for hydrogen in the power sector, including in the forthcoming SB 423 evaluation of firm zero carbon resources and 2025 SB 100 Joint Agency Report. Also guide the CPUC Integrated Resource Planning (IRP) and procurement strategies to enable private sector investment in hydrogen solutions:
  - Including clean resource adequacy procurement,
  - Strategic reserve investments in hydrogen,
  - Directives to load-serving entities to procure hydrogen baseload capacity,
  - Procurement directives for hydrogen as long-term storage solutions (e.g. PG&E's third-party partnership to develop a hydrogen fuel cell project to improve grid resiliency at substations as approved by Commission Resolution E-5261),[4] and
  - Consideration of distributed generation and grid resiliency in the IRP and procurement orders for electric LSEs that include hydrogen fueled equipment.
- Updated CEC RPS guidebook to include renewable hydrogen use in turbines, as well as fuel cells.

Additional Technical Comments on the Draft IEPR

In addition to broader themes and items identified above, Air Products wishes to share various technical comments related to the Draft IEPR:

- pg. 64-65: Discusses private and utility projects related to conversion of power plants to hydrogen or associated demonstration projects. We note that the CPUC has yet to determine its role and the role of utilities in the hydrogen value chain.
- pg. 66 – Includes the statement - "The state is also funding public and private hydrogen stations for MDHD through the EnergIIZE (Energy Infrastructure Incentives for Zero-Emission) Commercial Vehicles grant program. As of September 2023, the program had provided funding for *32 hydrogen-dispensing nozzles*." The phrase in italics is not clear. Please clarify whether this mean "32 dispensers", "32 hydrogen stations" or "32 fueling positions".
- pg. 68 – To estimate the input requirements for electrolytic hydrogen production, staff identified the largest commercially available proton exchange membrane electrolyzer. PEM has limited scaling capability in comparison to alkaline electrolysis. The majority of commercial electrolyzer systems are based around three main technology groups: liquid alkaline, proton exchange membrane, and solid oxide. Each of these technologies is experiencing a rapid improvement in performance and a reduction in installed cost, and each appears to be well suited to specific applications.[5] Alkaline and solid-oxide electrolysis should be considered in the IEPR evaluation.
- pg. 68 – States today's cost of PEM electrolyzer is generally greater than $1,100 per kW with some estimates reaching $350 per kW by 2030. For reference, 2020 US Hydrogen Roadmap indicative cost for PEM system was $1100-$1500 excluding installation cost, buildings, civil works, water purification system, high purity dryer and thermal control unit.[6] There has been a significant amount of inflation and material cost increases for PEM

[4] Resolution E-5261, adopted on April 27, 2023, approved PG&E's plan to develop a Clean Substation Microgrid Pilot Project in partnership with Energy Vault, as presented in PG&E Advice Letter 6808-E.
[5] U.S. Department of Energy Earthshots – Technology Strategy Assessment, Findings from Storage Innovations 2030 Bidirectional Hydrogen Storage, July 2023. Page 2.
[6] Road Map To A US Hydrogen Economy – Reducing emissions and driving growth across the nation. Page 56. US Hydrogen Road Map – Fuel Cell & Hydrogen Energy Association (fchea.org)

electrolyzers since US Roadmap study, so IEPR cost per kW looks to be optimistic and perhaps not inclusive of the total installed costs.

- pg.69 – The Draft IEPR assumes that clean and renewable hydrogen produced via electrolysis will require development of new renewable generation to provide the electricity for electrolyzers. We support the notion that electrolysis should be powered by *additional* renewable energy.
- pg.74 – Hydrogen demands in the new AATE 3 forecast scenario are less than 33% of the 2022 Scoping Plan. We believe this scenario underestimates the role for hydrogen in the transportation sector.
- pg.76 – Addresses price parity of hydrogen to diesel along with current and future cost. We recommend that CEC develop a similar cost comparison for Class VIII FCEVs and battery electric trucks.
- pg. 82 – Recommend CEC assign Technical Readiness Levels (TRLs) to RD&D programs so guidance related to the identified gasps and market readiness can be factored into the IEPR forecast.

Conclusion

California is a global leader in the green economy with renewable and low carbon energy markets that drive state, national and international policies. The CEC IEPR process, which produces a comprehensive and effective energy framework, is critical to developing an affordable, safe, reliable hydrogen system that deliveries climate and air quality benefits, energy diversity, prioritizes and protects frontline communities and grows our workforce. State programs can provide important market signals for hydrogen that enable expansion of our robust green economy and continued support for private sector investments.

California is moving toward the next phase of economy-wide decarbonization for hard-to-abate sectors, which now includes expanding hydrogen to a wider, non-traditional end-user base. Air Products urges you to consider in your analysis and final recommendation the principles of a competitive market and appropriate state incentives to support new hydrogen production and demand in this context. Competitive markets with technology-neutral and performance-based (carbon intensity) metrics will facilitate immediate meaningful environmental benefits, drive costs down, and will deliver real projects with verifiable emission reductions, quickly, safely, and reliably.

As the state's largest hydrogen producer and systems operators, the only U.S.-based global hydrogen provider, and an international leader in low carbon hydrogen deployment, we look forward to working with the CEC and Joint Agencies to finalize the 2023 IEPR and effectively implement SB 1075, the Scoping Plan, ARCHES, and the Governor's Hydrogen Market Development Strategy.

Thank you again for the opportunity to comment. If you have any questions, please feel free to contact me or Miles Heller (hellermt@airproducts.com).

Respectfully,

Eric Guter
Vice President
H2fM and Clean Hydrogen