DOCKETED	
Docket Number:	25-IEPR-01
Project Title:	General Scope
TN #:	261694
Document Title:	Earthjustice Comments - Earthjustice Comments on Scope of Hydrogen Analysis in 2025 Integrated Energy Policy Report
Description:	N/A
Filer:	System
Organization:	Earthjustice
Submitter Role:	Public
Submission Date:	2/11/2025 12:59:02 PM
Docketed Date:	2/11/2025

Comment Received From: Earthjustice
Submitted On: 2/11/2025
Docket Number: 25-IEPR-01

Earthjustice Comments on Scope of Hydrogen Analysis in 2025 Integrated Energy Policy Report

Additional submitted attachment is included below.

EARTHJUSTICE

February 11, 2025
Submitted Electronically

Re: Earthjustice Comments on Scope of Hydrogen Analysis in 2025 Integrated Energy Policy Report

Dear Ms. Nakagawa,

Earthjustice appreciates the opportunity to provide scoping comments as the California Energy Commission ("CEC") begins preparing the 2025 Integrated Energy Policy Report ("IEPR"). These comments discuss best practices for studying the potential role of hydrogen in the transportation, power and industrial sectors and recommend that the IEPR continue focusing on meeting any hydrogen demand from these sectors with renewable electrolytic hydrogen. A careful analysis of the potential uses of hydrogen is essential for policymakers to make informed decisions on allocating scarce resources. The IEPR can help identify decarbonization strategies that can deliver emissions reductions quickly, cost-effectively, and that are consistent with achieving health-based air quality standards.

In each sector, the IEPR should only evaluate the economic potential for hydrogen demand. An analysis of the technical potential for hydrogen would not provide policymakers with useful information because capturing the full technical potential for hydrogen would mean foregoing decarbonization options that are proven, available, and lower-cost than hydrogen. In contrast, scenarios based on the economic potential for hydrogen can help policymakers understand the need for hydrogen infrastructure and investment in feasible, least-cost pathways for achieving State goals. In developing the IEPR, the CEC should not squander its own limited resources analyzing scenarios that are unmoored from economics.

The CEC should also acknowledge that air quality policies will constrain the deployment of any equipment that burns hydrogen. While we appreciate the attention in the 2023 IEPR to efforts to reduce NOx emissions from hydrogen combustion, there is no pathway to achieving zero-emissions in hydrogen turbines and boilers. Consequently, the CEC should not assume this equipment can deploy in the state's most polluted air basins, where "there is no viable pathway to achieve the needed reductions [for achieving health-based air quality standards] without widespread adoption of zero emissions (ZE) technologies across all mobile sectors and stationary sources, large and small."[1]

---

[1] South Coast Air Quality Management District, 2022 Air Quality Management Plan, at ES-5 (Dec. 2022),

Transportation Sector

The 2025 IEPR is an important opportunity to provide an updated assessment of the potential role of hydrogen in the transportation sector that takes advantage of the latest data, which generally indicates a smaller economic role for hydrogen than analysts had predicted just a few years ago. For example, independent analysts at DNV estimated in 2024 that hydrogen would provide just 1% of on-road energy demand by 2050—a dramatic downward revision of its projection in 2023 that hydrogen would provide about 3% of on-road energy by midcentury.[2] The CEC should take care to avoid the mistakes of past modeling efforts, which have often overestimated the potential market for fuel cell vehicles[3] and underestimated the potential for battery electric vehicles.[4]

An analysis of the economic potential for hydrogen in the transportation sector must account for at least three major cost categories in the total cost of ownership of hydrogen vehicles: fueling (including fuel, delivery, and dispensing), vehicle, and maintenance costs. This analysis must also include reasonable assumptions for each of these cost categories for both hydrogen vehicles and battery-electric vehicles, which are the primary alternative technology for complying with California's zero-emission vehicle policies.

To avoid relying on overly optimistic assumptions about fueling costs, the IEPR should analyze a scenario in which the delivered cost per kilogram of hydrogen falls within the range of what has been achieved historically. We appreciate CEC's analysis of multiple price points for delivered hydrogen in the 2023 IEPR. However, we are concerned that the $8/kg and $5/kg scenarios are both unsupported by data on cost trends. Not only are the current costs of

---

http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/final-2022-aqmp/final-2022-aqmp.pdf?sfvrsn=16.

[2] Leigh Collins, DNV slashes forecast for hydrogen use in road transport amid advances in battery-electric trucks, Hydrogen Insight (Oct. 17, 2024), https://www.hydrogeninsight.com/transport/dnv-slashes-forecast-for-hydrogen-use-in-road-transport-amid-advances-in-battery-electric-trucks/2-1-1725398.

[3] For instance, when CARB adopted the first Advanced Clean Cars rule in 2012, it estimated cumulative sales of light-duty FCEVs to reach 56,844 by 2022. In the 2017 midterm review for the rule, CARB estimated that cumulative sales of light-duty FCEVs would reach 35,083 by 2022. CARB, 2017 ZEV Calculator Tool *available at* https://ww2.arb.ca.gov/resources/documents/2017-midterm-review-report. However, just 11,897 light-duty FCEVs were on the road in California at the end of 2022. CEC, Light-Duty Vehicle Population in California, https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/light-duty-vehicle. In its 2022 Advanced Clean Cars II rulemaking, CARB found that California could achieve 100% sales of zero-emission light-duty vehicles with just 2.8% sales of FCEVs. CARB, Final Statement of Reasons for Rulemaking for the Advanced Clean Cars II Regulations, Appendix F at 7 (August 2022).

[4] In 2019, the International Energy Agency's annual Electric Vehicle Outlook estimated EVs would make up 9% of global car sales by 2025. By 2022, they revised that estimate to 15% by 2025. In April 2023, they announced that EV sales shares are set to reach 18% this year. Hannah Ritche, "Electric Cars are the New Solar: People Will Underestimate How Quickly They Will Take Off" (May 7, 2023) https://www.sustainabilitybynumbers.com/p/ev-iea-projections; IEA, "Demand for electric cars is booming, with sales expected to leap 35% this year after a record-breaking 2022" (Apr. 26, 2023) https://www.iea.org/news/demand-for-electric-cars-is-booming-with-sales-expected-to-leap-35-this-year-after-a-record-breaking-2022.

hydrogen fueling far above $8/kg,[5] but hydrogen producers will need to incur additional costs to transition from the current practice of producing hydrogen from fossil fuels to align with California's climate and air quality goals.

A significant portion of the cost of hydrogen fueling is the cost of delivery and the dispensing equipment, which will likely put delivered costs of $8/kg out of reach. A 2020 U.S. Department of Energy analysis that used California data found that delivery and dispensing costs alone ranged from $8.17–9.46/kg for gaseous hydrogen and $8.31–11.35/kg for liquid hydrogen.[6] The pricing for delivery of liquid hydrogen by tube trailer will likely be relevant for the majority of potential hydrogen users in the transportation sector, as California's hydrogen hub envisions this strategy for fueling buses and delivery trucks.[7] Liquifying hydrogen is a costly and energy-intensive process because hydrogen only becomes liquid at extremely cold temperatures (-235 °C); using current technology, liquifying hydrogen consumes more than 30% of its energy content.[8] Further, while the CEC might expect to see some decline in the cost of hydrogen refueling infrastructure as the industry gains additional experience, these kinds of infrastructure projects do not typically yield dramatic cost reductions with economies of scale.

To model the economic potential of hydrogen in the transportation sector, vehicle costs are the second cost category where the CEC will need reliable inputs and assumptions. A recent study by the International Council on Clean Transportation ("ICCT") surveyed a body of literature on vehicle price projections and found that battery electric vehicles would maintain a price advantage over hydrogen vehicles for short-haul and rigid class 8 trucks.[9] The study also found that battery electric vehicles will beat diesel trucks on price in these categories by 2040, but hydrogen vehicles would not. The sole vehicle category where hydrogen alternatives beat battery electric vehicles on price by 2040 was long-haul class 8 tractor trucks, and even in that category fuel cell vehicles achieved only a slightly advantageous retail price.[10] David Cebon, the Director of Cambridge's Centre for Sustainable Road Freight, has explained why fuel cell vehicles are more costly to manufacture today than a comparable battery electric vehicle: a fuel cell vehicle has all the components in a battery electric vehicle (with a smaller battery) plus complicated fuel cell, hydrogen tank, and hydrogen delivery equipment.[11] Professor Cebon predicts that the cost advantage of battery electric vehicles will widen as the massive ramp-up of

[5] While the 2023 IEPR indicated that some transit agencies have paid delivered costs of less than $9 per kilogram of hydrogen, it is not clear whether this figure includes the significant costs of constructing and maintaining fuel dispensing infrastructure.
[6] U.S. Department of Energy, *Hydrogen Delivery and Dispensing Cost*, at 2 (Aug. 25, 2022) https://www.hydrogen.energy.gov/pdfs/20007-hydrogen-delivery-dispensing-cost.pdf.
[7] ARCHES Technical Submission to DOE – April 2023, at 13, Figure 3.1, https://archesh2.org/wp-content/uploads/2024/08/ARCHES-Technical-Volume-Redacted.pdf.
[8] U.S. Department of Energy, *Liquid Hydrogen Delivery,* https://www.energy.gov/eere/fuelcells/liquid-hydrogen-delivery (captured Mar. 27, 2023).
[9] Yihao Xie et al, ICCT, Purchase costs of zero-emission trucks in the United States to meet future Phase 3 GHG standards (March 2023) at 16–20, https://theicct.org/wp-content/uploads/2023/03/cost-zero-emission-trucks-us-phase-3-mar23.pdf.
[10] *Id.* at 22 (Fig. 17).
[11] Einride, "The gap will widen", says prof. David Cebon on electric vs hydrogen (March 5, 2023), https://www.einride.tech/insights/prof-david-cebon-on-electric-vs-hydrogen-the-gap-will-widen.

battery manufacturing for the light-duty sector drives learning curves that bring down costs for all battery electric vehicles.[12] To reduce the risk of underestimating the costs of hydrogen vehicles, at a minimum, the CEC should expect the cost curves for fuel cell and battery electric vehicles to mirror the trends in the literature that ICCT surveyed.

Maintenance costs are the final cost category that the CEC should include in any analysis of the economics hydrogen in the transportation sector. While California transit agencies have demonstrated the ability to reduce maintenance costs by transitioning from combustion engines to battery electric buses, a transition to fuel cell electric buses has generally increased maintenance costs.[13] Just as the complexity of fuel cell vehicles makes them more expensive to manufacture than battery electric vehicles, the additional components also make fuel cell vehicles more expensive to maintain.[14] The unique maintenance challenges associated with hydrogen vehicles could dissuade fleet operators from buying a few hydrogen vehicles for edge cases that might be challenging for current battery electric technology.[15]

Many independent experts have found that battery electric vehicles will be the dominant zero-emission technology in the medium- and heavy-duty sector because of their favorable total cost of ownership ("TCO"), which accounts for fuel, vehicle and maintenance costs and is the main driver of fleet purchase decisions. Academics,[16] truck manufacturers,[17] and multiple independent analysts have concluded that battery electric technology is best positioned to decarbonize the vast majority of road-transport—even long-haul trucking.[18] Unrealistically low

---

[12] *Id.*

[13] California Air Resources Board, Literature Review on Transit Bus Maintenance Cost (2020) (summarizing Foothill Transit's maintenance cost savings on page 9, AC Transit's maintenance costs for diesel and fuel cell buses on page 16, and the increased maintenance costs SunLine transit incurred for fuel cell buses relative to CNG buses on page 19), https://ww2.arb.ca.gov/sites/default/files/2020-06/Appendix%20G%20Literature%20Review%20on%20Transit%20Bus%20Maintenance%20Cost.pdf.

[14] Michael Barnard, Hydrogen Fleets are Much More Expensive to Maintain Than Battery & Even Diesel, CleanTechnica (Jan. 27, 2024), https://cleantechnica.com/2024/01/26/hydrogen-fleets-are-much-more-expensive-to-maintain-than-battery-even-diesel/.

[15] For instance, in its recent general rate case before the California Public Utilities Commission, SoCalGas requested $816,000 for a labor training program to address the complexities of hydrogen vehicle maintenance, including (1) The hydrogen gas cylinders have a much larger pressure rating and are significantly heavier than gas powered vehicles, which require special lifting devices to remove and install; (2) Hydrogen gas is colorless and odorless. The vehicles are equipped with several sensors that detect hydrogen gas. These require testing and calibration at regular intervals, which also require special tools; (3) To "open" the hydrogen system for service, the garage needs to be equipped with hydrogen detection sensors, a hydrogen evacuation system, and a system to drain the hydrogen gas out of the cylinders before opening; (4) The hydrogen fuel cell produces high voltage (300+ volts) to power an electric motor and a high-voltage battery pack. Handling the high voltage components requires additional special tools, and Personal Protective Equipment to help prevent injury or death. Response to Data Request CEJA-SEU-008, Q.7. The Commission denied recovery of these costs. CPUC Decision 24-12-074 at 578.

[16] Patrick Plötz, *Hydrogen technology is unlikely to play a major role in sustainable road transport*, 5 Nature Elecs. 8 (Jan. 2022), https://www.nature.com/articles/s41928-021-00706-6.

[17] Matthias Grundler and Andreas Kammel, *Why the future of trucks is electric*, TRATON (Apr. 13, 2021), https://traton.com/en/newsroom/current-topics/furture-transport-electric-truck.html.

[18] Amol Phadke et al., *Why Regional and Long-Haul Trucks are Primed for Electrification Now*, Berkeley Lab (Mar. 2021), https://etapublications.lbl.gov/sites/default/files/updated_5_final_ehdv_report_033121.pdf; Transport &

estimates for the TCO of hydrogen vehicles could stall the transition to zero-emission vehicles, if fleet owners wait in vain for steep price declines in hydrogen options instead of buying lower-cost battery electric vehicles.

For locomotives, any analysis of the potential for hydrogen would be incomplete without considering the opportunities for decarbonization with catenary electrification. As the federal Action Plan for Rail Energy and Emissions Innovation explains, "[c]atenary is a **globally adopted, off-the-shelf, safe, efficient, reliable** zero-emission technology for line-haul, industrial, intercity passenger, and commuter rail applications."[19] The Action Plan identifies a tremendous cost-savings opportunity from transitioning to catenary: "The most recent nationwide cost-benefit analysis of freight rail electrification was published in 1983, which found that **electrifying a core 29,000-mile subset of the freight rail network would save $5.2 billion per year**, adjusted for 2024 U.S. dollars (USD)."[20] It is essential to consider both full and discontinuous catenary (catenary + battery), as recent studies have found that intermittent catenary is the most cost-effective approach to decarbonizing the non-electrified portions of rail networks in Norway and the United Kingdom and the German national rail company is already constructing an intermittent catenary system.[21] In Germany, a hydrogen rail system would have been three times more expensive than discontinuous catenary.[22] Rail operators in Germany and Austria have abandoned experiments with hydrogen technology because electric alternatives could decarbonize their equipment at lower cost.[23] After careful analysis, the CEC may determine that there is zero economic potential for hydrogen locomotives in California.

With the additional time has to refine modeling on the economic potential for hydrogen in the transportation sector, it is not appropriate for the 2025 IEPR to include scenarios based on assumptions that the California Air Resource Board ("CARB") hard-coded into the 2022 Scoping Plan update. CARB did not analyze whether it would be economic to use hydrogen in the transportation sector at the levels it assumed in the Scoping Plan. Thus, even if one assumes that the Scoping Plan scenario reflects the technical potential for hydrogen in the transportation sector, it does not illuminate its economic potential. Since the publication of the Scoping Plan, CARB's assumptions regarding the role of hydrogen in the transportation sector have been contradicted both by experience on the ground[24] and economic modeling like the ICCT report

---

Environment, *Why the future of long-haul trucking is electric* (June 18, 2021), https://www.transportenvironment.org/discover/why-the-future-of-long-haul-trucking-is-electric/.

[19] U.S. Department of Energy, Department of Transportation, Environmental Protection Agency, Department of Housing and Urban Development (Dec. 2024) at 32 (emphasis in original).

[20] *Id.* (emphasis in original).

[21] *Id.* at 30.

[22] *Id.* at 45.

[23] *Id.*

[24] For instance, the Scoping Plan scenario assumes 425 Heavy Duty Vehicles in the population stock and 372 Hydrogen Fuel Cell Heavy Duty Vehicles in the population stock in 2023. CARB, PATHWAYS data, https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-PATHWAYS-data-E3.xlsx. By the end of 2023, the Energy Almanac shows a heavy-duty vehicle population of 753 electric trucks and 30 hydrogen trucks. CEC, Medium- and Heavy-Duty Zero-Emission Vehicles in California, https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/medium (selecting data for trucks in weight classes 7 and 8).

discussed above. Evaluating a scenario based on the Scoping Plan could inadvertently confuse policymakers and the public, who may incorrectly infer that the scenario reflects a viable or likely pathway for achieving State goals. However, it is highly improbable that fleets will choose unnecessarily expensive compliance pathways for California's zero-emission vehicle rules. Under Senate Bill 1075, the CEC has a unique statutory mandate to model the potential growth for hydrogen in decarbonizing the transportation sector, which it cannot serve by importing assumptions that lack economic justification from the Scoping Plan.

Finally, the IEPR should provide important context for helping the public and policymakers understand the CEC's projections for the projected demand (in MT) of hydrogen from various kinds of equipment. Specifically, the IEPR should indicate what percentage of the vehicle fleet or new vehicle sales relies on hydrogen in each scenario. The IEPR should also state the assumptions in each scenario regarding the comparative costs of purchasing, fueling, and maintaining hydrogen and battery-electric vehicles.

Electrical Sector

The IEPR's projections for the potential use of hydrogen in the electric sector should be consistent with economics and achievement of California's air quality and environmental justice policies. We appreciate that the 2023 IEPR acknowledges that no hydrogen is used on the electric grid in the Scoping Plan's economic dispatch modeling. In the 2025 IEPR, it would be helpful to clarify that these modeling results do not fail to provide an estimate of the amount of hydrogen that might be used in the electric sector. Rather, the modeling shows that most economical route for achieving power sector goals might require zero hydrogen for grid power.

Earthjustice also appreciates the 2023 IEPR considering alternatives to the Scoping Plan's inclusion of fossil gas on the power grid in 2045. However, the assumption that hydrogen could displace all fossil gas in the Scoping Plan Scenario ignores the likelihood that other resources would help meet the power grid's needs more economically than hydrogen. For a more informative exercise, the CEC could run a scenario in the Scoping Plan's electricity sector modeling that excludes fossil gas as a resource in 2045 to see how much hydrogen might economically dispatch in the absence of fossil gas. The CEC may also be able to take advantage of modeling from the current SB 100 process. While there may be multiple reasonable approaches to modeling the potential for hydrogen in the electric sector, the IEPR's hydrogen demand estimates will only be useful to policymakers if they reflect hydrogen's economic potential.

Any modeling exercise should include constraints that reflect California's air quality and environmental justice policies. As discussed above, many Californians live in air basins that cannot attain health-based air quality standards without "widespread adoption of zero emissions (ZE) technologies across all mobile sectors and stationary sources, large and small."[25] The

---

[25] South Coast Air Quality Management District, 2022 Air Quality Management Plan, at ES-5.

.

CEC's modeling should exclude hydrogen combustion turbines from operating in non-attainment areas because these turbines cannot achieve zero-emissions. Scoping Plan data on gas combustion does not provide a reasonable upper bound for the sector's potential hydrogen demand because the Scoping Plan does not consider air quality mandates.

Similarly, assuming hydrogen combustion will replace all methane combustion would be inconsistent with California's transmission planning and energy justice policies. In SB 887, the Legislature declared that it is a problem that "there are load pockets where there is insufficient transmission capacity to import the renewable energy resources and zero-carbon resources that are available" and established transmission planning mandates to fix this problem.[26] Improved transmission will substantially reduce the need to rely on polluting resources in California's constrained load pockets. The Scoping Plan does not consider these policies.

While there may be zero energy from hydrogen turbines on an economically dispatched electric grid, hydrogen fuel cells may play a role in meeting California's electricity needs. The 2023 IEPR was right to observe that "future analyses should consider electricity generation from fuel cells as an alternative to combustion."[27] To date, the hydrogen industry has driven much of the focus on the power sector toward hydrogen combustion in turbines because these end uses provide large scale demand. But a narrow focus on scaling volume or extending the life of existing turbines risks ignoring unique advantages of stationary fuel cells. Fuel cells offer a promising path to displace highly polluting diesel back up generations in the event of outages or helping alleviate stress on the grid during peak demand.[28] In Calistoga, 8 MW of hydrogen fuel cell stationary power will supplement lithium-ion batteries in a microgrid to replace diesel generators and supply the city's electricity needs for at least 48 hours during outages.[29] Megawatt-scale fuel cells can hasten electrification of the transportation sector by enabling high-power charging in remote locations or areas where lengthy grid-upgrades may still be required.[30] These power generation technologies could be deployed throughout California because they are zero-emission. As the technologies scale, prices are likely to decline faster for mass produced products like fuel cells and electrolyzers than for complex and customized systems like power plant retrofits.[31] Information on the potential for zero-emission long-duration energy storage

[26] Cal. Public Utilities Code § 454.57(b)(3), -(d)–(f) (codifying SB 887 (2022)).
[27] 2023 IEPR at 82.
[28] *See, e.g.*, Honda, "Honda's Zero Emission Stationary Fuel Cell Provides Back Up Power to a Data Center" (Mar. 6, 2023) https://global.honda/en/newsroom/news/2023/c230306eng.html; Plug, "Zero-Emission High Power Fuel Cell for Larger Applications" https://www.plugpower.com/fuel-cell-power/gensure-backup-power/gensure-mw-scale-power/.
[29] Kathy Hitchens, "Plug Power to Provide Hydrogen Fuel Cell for Calistoga Microgrid" (June 12, 2023) https://www.microgridknowledge.com/generation-fuels/article/33006510/plug-power-to-provide-hydrogen-fuel-cell-for-calistoga-microgrid.
[30] *See* Nora Manthey, "Plug Power Presents Stationary Fuel Cell System to Charge BEVs" (May 3, 2023) https://www.electrive.com/2023/05/03/plug-power-presents-stationary-fuel-cell-system-to-charge-bevs/#:~:text=Plug%20Power%20is%20looking%20to,provides%2060%20MWh%20on%20site.
[31] *See* Abhishek Malhotra and Tobias S. Schmidt, Accelerating Low-Carbon Innovation, Vol. 4 Joule 2259 (Nov. 2020), https://www.sciencedirect.com/science/article/pii/S2542435120304402.

options—including hydrogen technologies—will be critical for California policymakers. We appreciate that the 2023 IEPR recognized the need for further examination of fuel cells.

Industrial Sector

If the 2025 IEPR explores the potential demand for hydrogen in the industrial sector, it should also recognize that economic competition from other heating technologies and the imperative to transition to zero-emission industrial processes will severely curtail the demand for hydrogen. The U.S. Department of Energy's Industrial Decarbonization Roadmap explains the promising role of electric technologies in decarbonizing industrial heating needs: "Electrified technologies (including induction, radiative heating, and advanced heat pumps) are particularly viable in the lower end of the medium-temperature range, but electrification is also feasible in the higher-temperature ranges (e.g., iron and steel or cement kiln advances)."[32] Other independent analysts have found that hydrogen is poorly suited for decarbonizing industrial process heat after surveying competing technologies.[33] The 2023 IEPR did not discuss alternatives to hydrogen for high-temperature heat. The 2025 IEPR is an important opportunity to compare hydrogen against the full range of industrial decarbonization technologies to assess which are best positioned to meet the process heat needs of California's major industries. For areas that do not meet state or federal air quality standards, this assessment should only consider zero-emissions technologies, such as electric heat sources and high-temperature fuel cells.

The 2025 IEPR should only study industrial decarbonization scenarios that align with California's long-term climate goals. The 2023 IEPR stated that industrial heating equipment can often accommodate blends of hydrogen and fossil gas of up to 20–23% hydrogen, with adjustments and verification.[34] However, burning a blend of fossil gas and 23% carbon-free hydrogen would only abate about 10% of the carbon emissions from this equipment. A strategy that leaves 90% of an industrial facility's emissions unabated is incompatible with California's policy of achieving net-zero greenhouse gas emissions as soon as possible, and no later than 2045.[35] Therefore, the 2025 IEPR should not consider hydrogen blending, or any other strategy that lacks a feasible pathway for complete decarbonization.

Hydrogen Production Pathways

The 2025 IEPR should only consider zero-emissions hydrogen production pathways. Running an electrolyzer on 100% new or otherwise-curtailed renewable electricity is a zero-emissions production pathway for which the technology is available today. In contrast, producing hydrogen from biomass through gasification or pyrolysis emits health-harming air pollution. For instance, both technologies emit particulate matter of less than 2.5 microns, which

---

[32] U.S. Department of Energy, Industrial Decarbonization Roadmap, at 17 (2022).
[33] Dan Esposito, Energy Innovation, Hydrogen Policy's Narrow Path, at 23–24 (Aug. 27, 2024), https://energyinnovation.org/wp-content/uploads/Hydrogen-Policys-Narrow-Path-Delusions-and-Solutions-2.pdf.
[34] 2023 IEPR at 91.
[35] Cal. Health & Safety Code § 38562.2(c)(1) (codifying Assembly Bill 1279).

can penetrate deep into the human respiratory system.[36] Consequently, producing hydrogen from biomass would undermine California's efforts to address its air quality crisis. Moreover, electrolysis is the dominant strategy being pursued around the globe for producing renewable hydrogen.[37] As a result, there is more data on electrolytic hydrogen that can support credible modeling of hydrogen's economic potential as a decarbonization tool.

Conclusion

Thank you for the opportunity to comment on the CEC's analysis of hydrogen's potential role as a decarbonization tool in the forthcoming IEPR.

Sincerely,

Sara Gersen
Earthjustice

---

[36] 5 Zhiyi Yao, Particulate Emissions From the gasification and pyrolysis of biomass: Concentration, size distributions, respiratory deposition-based control measure evaluation, Environ. Pollution (Nov. 2018) https://doi.org/10.1016/j.envpol.2018.07.126.

[37] Installed capacity for water electrolyzers could reach 5 GW by the end of 2024. International Energy Agency, Global Hydrogen Review 2024, at 59 (Oct. 2024), https://iea.blob.core.windows.net/assets/89c1e382-dc59-46ca-aa47-9f7d41531ab5/GlobalHydrogenReview2024.pdf.