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## SoCalGas Comments on Draft 2023 IEPR

*Additional submitted attachment is included below.*

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December 1, 2023

Commissioner Patricia Monahan
California Energy Commission
Docket Unit, MS-4
Docket No. 23-IEPR-01 & 23-IEPR-03
715 P Street
Sacramento, CA 95814-5512

**Subject: Comments on the CEC 2023 Draft Integrated Energy Policy Report**

Dear Commissioner Monahan:

Southern California Gas Company (SoCalGas) appreciates the opportunity to provide comments on the California Energy Commission's (CEC) 2023 Draft Integrated Energy Policy Report (IEPR) released on November 8, 2023. SoCalGas commends the efforts the CEC has undertaken for this year's IEPR. Workshops provided balanced viewpoints and helped develop robust data for the public record.

Our comments are focused on the need for a more integrated holistic approach for assessing the gas and electric energy system. Currently, the Draft 2023 IEPR separately addresses the issues of electric resource development and hydrogen demand. However, these issues are, and are being increasingly, interdependent, as recognized in the California Air Resources Board's (CARB) recently adopted 2022 Scoping Plan. Specifically, the Scoping Plan sets out a pathway to cut greenhouse gas (GHG) emissions by 48 percent below 1990 levels by 2030 and 85 percent below 1990 levels by 2045 with the additional emission reductions coming from carbon removal.[1] The plan includes accelerated electrification of end-uses along with additions of clean fuels like renewable natural gas, hydrogen and sustainable aviation fuel. Similarly, SoCalGas found in its Reliability Study that the electric system will need clean firm dispatchable generation to meet the

[1] See CARB, 2022 Scoping Plan for Achieving Carbon Neutrality, December 2022, , available at https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents and https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

reliability in 2045.[2] Thus, a majority of our comments can be viewed through this lens, as the State's 2045 energy portfolio will require the complementary roles of clean electrons and clean molecules. In addition, the pathway to reach carbon neutrality must simultaneously support utility obligations and responsibilities to provide safe, reliable, and resilient service.

Below, we offer a few global comments on the Draft 2023 IEPR, followed by recommendations on specific sections of the document.

**California Must Plan Appropriately for Energy System Reliability and Resiliency Due to Climate Change Impacts. Exploring Uses for the Resilient Gas System Infrastructure Will Provide Opportunities to Meet Future Energy Requirements.**

SoCalGas recommends that the CEC consider several relatively minor Chapter 1 edits regarding the need to build the clean and decarbonized energy system of the future. CARB's 2022 Scoping Plan Update achieves 2045 carbon neutrality via exponential electrification, along with clean fuels like renewable natural gas (RNG), clean hydrogen, and sustainable aviation fuels (SAF), supported by carbon capture utilization and storage (CCUS). The existing gas infrastructure and rights-of-way (ROWs) could be a critical conduit for delivery of decarbonized molecules.

The opening paragraph of the Draft 2023 IEPR states that, "Achieving [California's climate and pollution] goals hinges on transitioning to zero-carbon, renewable sources of power while rapidly electrifying large segments of the economy. A reliable and resilient electricity system with affordable rates will serve as the keystone for economywide decarbonization."[3]

SoCalGas believes in working together to reach the State's climate goals and understands the urgency needed to effectively address climate change. We are working collaboratively with partners and regulators to find meaningful ways to mitigate climate change impacts and are committed to continuously improving and innovating our business to increase the climate resiliency and safety of the communities we serve. Hardening the electricity system, diversifying energy resources including via clean molecules and relying on the resilient gas system will all be necessary to reliably meet California's GHG goals. The most imperative energy issue facing California in the coming years is building a decarbonized energy system that is also reliable, resilient, and affordable. Clean firm dispatchable power and clean molecules can help with both decarbonization and reliability/resiliency. The Draft 2023 IEPR implies electrification will be the primary means of achieving both decarbonization and energy system resiliency.[4] However, clean firm dispatchable power and clean molecules can help with both decarbonization and reliability/resiliency. Demonstrating that California can continue building a top-five world

[2] The Evolution of Clean Fuels in California Reliability Analysis. See report for more details https://issuu.com/stfrd/docs/cleanfuelsreliabilityreportjuly23?fr=sNDA4OTYwNzQ4NTk

[3] CEC, Draft 2023 Integrated Energy Policy Report, Publication Number: CEC-100-2023-001-CMD, [hereinafter Draft 2023 IEPR], 2023, p. 1, available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=253086.

[4] *Ibid.*.

economy while simultaneously decarbonizing and maintaining reliability and resiliency can serve as a blueprint for other countries and regions.

**SoCalGas recommends the IEPR acknowledge and evaluate the inherent resiliency and affordability attributes of the gas energy system.**

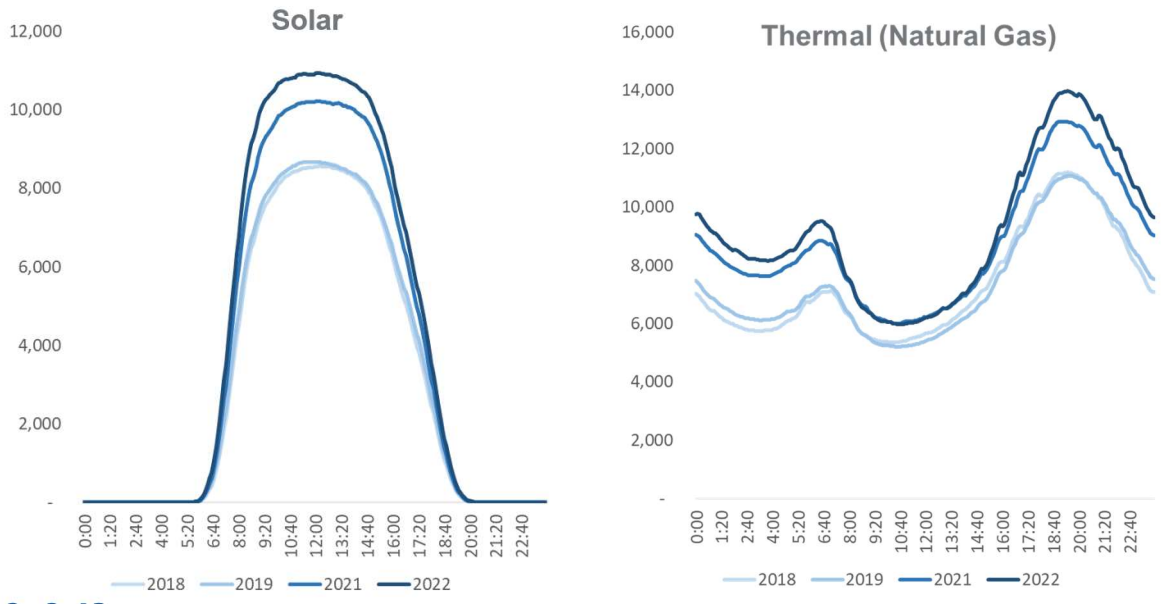
Finding the best use of California's mostly underground gas infrastructure investments to reduce carbon emissions could complement and mitigate the need for costly hardening and undergrounding of existing electric infrastructure. Indeed, a Massachusetts Institute of Technology report described the inherent resilience of the national natural gas transmission and distribution system:

> The natural gas network has few single points of failure that can lead to a system-wide propagating failure. There are a large number of wells, storage is relatively widespread, the transmission system can continue to operate at high pressure even with the failure of half of the compressors, and the distribution network can run unattended and without power. This is in contrast to the electricity grid, which has, by comparison, few generating points, requires oversight to balance load and demand on a tight timescale, and has a transmission and distribution network that is vulnerable to single point, cascading failures.[5]

Gas system infrastructure inherently provides resiliency and reliability to the electric system. Both resiliency and reliability have been important to enable the electric system to "keep the lights on" as increasing amounts of intermittent renewable resources have come online to decarbonize California's electric grid. Figure 1 below represents CAISO electricity supply generated by solar and natural gas, using annual averages of 5-minute increment data. As shown in the figure, 2018 – 2022 hourly natural gas generation has increased simultaneous with increases in solar generation. As the State decarbonizes, natural gas infrastructure has provided support for the buildout of intermittent renewable resources and is needed to balance the grid.

[5] Massachusetts Institute of Technology, Lincoln Laboratory, "Interdependence of the Electricity Generation System and the Natural Gas System and Implications for Energy Security," May 15, 2013, p. 6, available at: https://www.ll.mit.edu/sites/default/files/publication/doc/interdependence-electricity-generation-system-natural-judson-tr-1173.pdf.

**Figure 1: CAISO data on solar and thermal (natural gas) generation**[6]




Existing gas infrastructure and rights-of-way (ROWs) can therefore be important tools that can support stable, decarbonized energy while simultaneously providing resiliency and reliability capabilities that can be called upon when climate events inevitably occur.

**Additional Detailed Recommendations and Comments on the Draft IEPR to Supplement Information and Clarify the Draft IEPR.**

**CHAPTER 1: Plugging In – Speeding Deployment and Connection of Clean Resources to the Grid**

*"The California ISO received nearly 375 interconnection requests in 2021 — well above the historical baseline — which resulted in a one-year pause in accepting new applications. In 2023, nearly 550 interconnection applications were received."*[7]

Figure ES-3: "The Number of Interconnection Applications Are Growing" is very informative. It would also be valuable for stakeholders to include additional data from the CEC and CAISO regarding the total capacity the interconnection requests from 2021 and 2023 represent. Further, it would be helpful to have additional transparency on the total amount of capacity that was approved, completed, and withdrawn. SoCalGas suggests adding another Y-axis on Figure ES-3 to show the total amount of capacity per category that the applications represent.

[6] Compiled from CAISO data at: http://www.caiso.com/TodaysOutlook/Pages/default.aspx.
[7] CEC, Draft 2023 IEPR, p. 4, caption to Figure ES-3, available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=253086.

*There is a CPUC Long-Term Gas System Planning Rulemaking to Address Affordability Aspects of the Energy System Transition*

The Draft 2023 IEPR addresses the potential impacts of increased building electrification on residential customer bills, citing the CPUC rate-reform rulemaking aimed at a flat billing rate and the addition of a fixed, flat-rate charge, in its discussion of managing rate impacts during electrification of the grid.[8] However, the Draft 2023 IEPR does not acknowledge that there is a parallel rulemaking at the CPUC in Order Instituting Rulemaking (OIR) (R.20-01-007) to address future rate impacts on remaining gas customers who must bear the total gas system cost as gas usage declines as a result of fuel switching. Future rate impacts are especially pertinent to low-income customers who already spend a higher percentage of their income on utility bills.[9] Thus, we recommend the 2023 IEPR highlight the ongoing CPUC rulemaking regarding the mitigation of future rate impacts for customers remaining on the gas system.

Earlier this year, the CPUC issued a scoping ruling in R.20-01-007 establishing next steps, and a forthcoming Phase 3 Scoping Memo will be issued by March 31, 2024 with questions related to outstanding issues from the 2022 Scoping Memo, including those pertaining to cost control and cost allocation.[10] It is expected that the CPUC will consider in this venue such equity and social justice considerations that will underly the gas system transition. Therefore, it is important the CEC consider rate and bill impacts for all customers.

*"Conduct a comprehensive assessment of the number of jobs and type of labor needed to achieve economywide decarbonization by 2045 and use the findings to guide investments in education, training, and workforce development programs including for power systems engineers, electricians, and line workers to rapidly grow the available workforce and prioritize funding for community colleges, trade schools and within tribes, low-income, and disadvantaged communities. The California Workforce Development Board (CWDB) and the CEC could be involved in implementation."*[11]

The assessment of number of jobs and type of labor needed to achieve economywide decarbonization by 2045 should also consider jobs that pertain to clean fuel infrastructure, such as the future clean hydrogen hubs and dedicated pipeline systems like Angeles Link. As the gas and electric grids continue to become increasingly interdependent, the existing gas system and clean fuels network will play a role in helping the State reach carbon neutrality by 2045. These systems will also continue to play a critical role in providing the means to maintain high-pay and long-term

[8] *Id.*, p. 44-45.
[9] ACEEE report, How High are Household Energy Burdens, September 2020. "Nationally, 67% (25.8 million) of low-income households (≤ 200% of the federal poverty level [FPL]) face a high energy burden and 60% (15.4 million) of low-income households with a high energy burden face a severe energy burden." See report for more details, https://www.aceee.org/sites/default/files/pdfs/u2006.pdf.
[10] CPUC Rulemaking 20-01-007 Assigned Commissioner's Phase 2 Scoping Memo and Ruling, available at: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M515/K973/515973880.PDF.
[11] CEC, Draft 2023 IEPR, p. 43, available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=253086.

jobs. Thus, the proposed assessment should consider jobs that will support clean fuels infrastructure such as infrastructure maintenance and operations; construction of new infrastructure, such as hydrogen pipelines; and other positions that will likely require the same skill sets needed and employed today by gas IOUs' workforce. As a result, experienced workers have the potential to transition to jobs supporting clean fuels infrastructure without an extensive amount of training, thereby mitigating workforce displacement.

*Public Awareness Campaigns Are Beneficial to All Clean Energy Infrastructure Projects*

*"Given the scale of new renewable resources, transmission, and distribution infrastructure needed over the coming decades, it will be increasingly vital to expand public engagement and awareness campaigns beyond, and in complement to, established permitting processes. To achieve public support, providing opportunities to be heard is key and people value being consulted early and frequently throughout planning, design, and implementation processes. While public engagement does not inherently result in consensus or agreement about construction of any specific project, a lack of engagement may increase opposition and delay progress on clean resource and infrastructure deployment."*[12]

SoCalGas commends the CEC for recognizing the importance of public engagement and awareness campaigns for new renewable resources, transmission, and distribution infrastructure to enhance public understanding of projects, address public concerns, and reduce potential project delays. We recommend this approach be taken for forthcoming clean fuels infrastructure projects for the power generation, transportation, and industrial sectors. Public engagement and awareness will be especially important as new energy infrastructure is needed to achieve the state's decarbonization goals. For example, dedicated hydrogen pipelines used to deliver clean hydrogen to power plants and other hard to electrify sectors could potentially require new pipeline infrastructure, space for electrolyzers, hydrogen storage, and renewable generation. On the transportation front, hydrogen infrastructure operators will require additional intrastate pipelines and related infrastructure to transport hydrogen between potential production facilities, storage facilities, and end users. Enhanced public engagement and awareness may also inform the public of opportunities to utilize the gas utilities' existing rights-of-way for new infrastructure whenever feasible, which may help manage hydrogen pipeline costs and accelerate hydrogen infrastructure investment. Moreover, using existing ROWs may help mitigate public concerns insofar as energy delivery infrastructure is already in place.

*The IEPR Report Will Benefit from Inclusion of Comprehensive Information on Clean Fuels and Infrastructure*

SoCalGas recommends the following enhancements to the Draft 2023 IEPR language to acknowledge and incorporate the decarbonization potential offered by clean fuels. Proposed additions are underlined, as follows:

[12] *Id.*, p. 53.

- "State agencies, gas utilities, electric utilities, local governments, and the private sector are advancing decarbonization efforts such as development of low-carbon fuels (including clean and renewable hydrogen and renewable natural gas), electrification, and renewable energy." (pp. 11-12)
- "The path to a clean energy future requires an array of solutions including electrification and clean fuels such as renewable natural gas and clean hydrogen and balancing the often-competing needs for a reliable, affordable, and clean energy system." (p. 12)
- "California is moving to a future powered by clean energy and electricity." (p. 13)
- "Moving forward, the electric grid will serve as the backbone for enabling the decarbonization of much of the on-road transportation and building sectors and even some industrial activities." (p.13)
- "Clean energy resources include grid-scale renewable and clean hydrogen generation and short-term and seasonal storage, as well as distributed energy resources (DERs) and microgrids like rooftop solar and customer-level storage, as well as non-combustion use of hydrogen in smaller fuel cells,[13] linear generators, and flexible loads like electric vehicle (EV) chargers and heat pumps." (p. 13)
- "Explore opportunities to deploy temporary or permanent power solutions such as mobile batteries, linear generators and fuel cells — prioritizing zero-emission technologies — that reduce the maximum distribution system capacity needed for the project, allowing more clean resources to connect to distribution systems while permanent infrastructure is constructed." (p. 44)
- "The CPUC is coordinating with gas and electric IOUs to best position California to receive federal funding made available through the 2021 Infrastructure Investment and Jobs Act, among other opportunities. Resolution E-5254 establishes a tracking mechanism for IOUs to regularly report on planning, seeking, and implementing awards from federal funding that align with the state's climate, reliability, and resilience goals.[14] (p. 46)
- "Identify opportunities to maximize usage and expansion of transmission capacity within existing rights-of-way and evaluate the viability of technologies like advanced conductors, high-voltage direct current transmission, ~~and~~ grid-enhancing technologies as solutions in transmission planning and investment, and review gas transmission and distribution rights-of-way for opportunities to accelerate hydrogen and other clean fuel infrastructure investment." (p. 56)
- "Mainspring Energy developed a linear generator — a technology that directly converts motion along a straight line into electricity using chemical energy. These technologies could provide backup generation that is much cleaner than diesel generators. The potential downside is that, at least initially, they would operate on fossil gas, relying on the gas

[13] The 2021 IEPR stated, "Non-combustion use of hydrogen in smaller fuel cells, as distributed resources and in microgrids, could also support the grid and displace diesel use in backup generators, reducing criteria pollutants and GHG emissions." Volume III Decarbonizing the State's Gas System, March 2022, p.71, available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=242233.

[14] Resolution E-5254: Adopts Procedural Mechanisms for Review and Approval of Electric and Gas Investor-Owned Utility Cost Recovery Requests for Infrastructure Investment and Jobs Act1 and Other Federal Grant Programs, available at: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M506/K016/506016078.PDF.

system that the state is working to transition away from. However, linear generators can also run on renewable natural gas and clean hydrogen when these fuel sources are readily available. These technologies could play a role in bridging near-term grid reliability concerns while the state continues to build out the resiliency of the grid." (p. A-23)

In addition, under "Problem 4" recommendations on p. 7, we recommend adding the following third recommendation on a new line after the word "baselines.":

> "(3) Relative to clean fuels, establish a process for gas IOUs to provide feedback to the CPUC on Clean Fuel progress and share proposals that can help reduce barriers of market entry (such as with various permitting and funding opportunities) which may expedite facility development and ultimately reduce costs."

## CHAPTER 2: Potential Growth of Clean and Renewable Hydrogen

### *Expanding the Scope of Hydrogen Analysis*

In the introduction to the hydrogen chapter on p. 57, the Draft 2023 IEPR cites a state legislative mandate: "*Senate Bill (SB) 1075 (Skinner, Chapter 363, Statutes of 2022) calls for the CEC to "study and model potential growth for hydrogen in decarbonizing the electricity and transportation sectors. ...*" The statute requires the CEC to report on its findings in the 2023 IEPR and the 2025 IEPR. However, the hydrogen chapter of the Draft 2023 IEPR unnecessarily limits its focus solely to what it terms "clean and renewable" hydrogen, which "refers to hydrogen produced only from water and renewable electricity or renewable biogenic feedstocks such as agricultural residues and woody biomass," and omits other types of potential low-carbon hydrogen production.[15]

It is in the public interest to align clean hydrogen definitions with those used by the federal government so that California is prepared to apply for and receive federal incentives relying on such definitions. SoCalGas commends the CEC for its use in its SB 643 analysis of U.S. DOE's proposed definition of clean hydrogen which is a target of 4.0 kilograms of carbon dioxide equivalent (kg of CO2e) produced per kilogram of hydrogen that is directly produced, or 4.0 kg CO2e/kg H2. CEC staff noted during the SB 643 workshop that this definition of clean hydrogen is inclusive of multiple pathways of production beyond electrolysis. The State of California's ARCHES framework also relies on this federal definition.[16] This is a technology- and production pathway-neutral definition, focused instead on well-to-gate carbon intensity.

[15] While SB 1075 referenced "green" hydrogen, it did not define the term, and there is ongoing global debate over the appropriate definition.

[16] According to ARCHES, "The federal Infrastructure Investment and Jobs Act (IIJA), the law that established the clean regional hydrogen hubs program of which ARCHES aims to be a part, defined "clean" hydrogen as hydrogen "produced with a carbon intensity equal to or less than 2 kilograms (kg) of carbon dioxide-equivalent (CO2e) produced at the site of production per kilogram of hydrogen produced," which may be "made from renewable

Clear and consistent hydrogen definitions will help establish guidelines in funding opportunities, procurement, and modeling efforts which will help set boundaries and drive the market forward. Such definitions should be crafted to align with the ability of California power generators to use hydrogen sourced from out of state and delivered via pipeline to their facility. SoCalGas believes that definitions should focus on well-to-gate carbon intensity, rather than production pathways, as decarbonization is the ultimate goal. Therefore, any adopted definition should allow hydrogen that meets allowable carbon intensity standards to participate in California's power sector. In order to do so, definitions should remain technology- and production pathway-neutral. Further, alignment of clean fuel and carbon management terminology and rules, needs to run in parallel with other state planning efforts such as SB 100, SB 905, the CPUC Integrated Resource Planning (IRP), and the CARB SB 1075 proceeding.

*Analyze the Potential for Gas Infrastructure to Serve the Transportation Sector*

In addition to serving electric generation, ports, and the industrial sector, pipelines also may be the preferred method for delivering hydrogen for the transportation sector, particularly when dealing with larger volumes. SoCalGas is currently studying the potential demand for hydrogen in the transportation sector as part of the Phase One feasibility studies for Angeles Link (D.22-12-055). The study's preliminary findings are similar to the adopted scenario in CARB's 2022 Scoping Plan, which shows there will be significant demand for clean hydrogen in the transportation and mobility sector.[17] This demand can be supported by common carrier, dedicated hydrogen pipelines, which can deliver clean hydrogen directly to major medium-duty and heavy duty (MD/HD) hydrogen refueling stations (~3,000 kg/day). Smaller MD/HD hydrogen refueling stations with lower daily capacity (~1,000 kg/day) that are in close proximity to hydrogen hubs can receive a clean hydrogen supply through tube trailers and cryogenic liquid-carrying trucks as a last mile delivery method, which is in line with the SB 643 report's assertion that trucking is the cost-effective option to distribute hydrogen at smaller volumes and shorter distances.[18]

*Estimates for Hydrogen Demand are Needed and Can Be Developed*

On p. 57, the Draft 2023 IEPR states, "While electrification is poised to play a significant role in decarbonizing California's economy, the 2022 Scoping Plan Update finds that clean and renewable hydrogen is needed to replace fossil fuels in applications like ocean-going, rail, and air transport as well as in the industrial sector." The language suggests that there will be some significant and

energy resources." Following the law's passage, the DOE solicited feedback from stakeholders, and subsequently the Inflation Reduction Act, which among other provisions established 10 years of production tax credits for clean hydrogen on a lifecycle carbon intensity basis, revised the definition of clean hydrogen to 0-4 kg CO2e per kg of hydrogen on a lifecycle basis, with incentives going up as carbon intensity goes down." ARCHES, Frequently Asked Questions, accessed 11/27/2023, available at: https://archesh2.org/frequently-asked-questions/.

[17] CARB, 2022 Scoping Plan for Achieving Carbon Neutrality, *supra*.

[18] CEC, 2023 Staff Report on Senate Bill 643: Clean Hydrogen Fuel Production and Refueling Infrastructure to Support Medium- and Heavy-Duty Fuel Cell Electric Vehicles and Off-Road Applications, Publication Number: CEC-600-2023-053, available at: https://www.energy.ca.gov/sites/default/files/2023-09/CEC-600-2023-053_0.pdf.

potentially forecastable demand for hydrogen. Yet at p. 91, it notes that, "Electricity needed for in-state production of hydrogen is not included due to the high uncertainty around the future of hydrogen." This inconsistency should be addressed in the final IEPR to account for expected new hydrogen production.

*Technical Adjustment to Description of Electrolysis*

On p. 61, the 2023 Draft 2023 IEPR states "*Electrolysis uses renewable electricity to split water with oxygen as a by-product.*" Insofar as the electrolytic reaction is agnostic as to fuel source, we suggest deleting the word "renewable."

In addition, it may be worth noting that other chemicals can be produced as a result of electrolytic reactions that produce hydrogen, and other electrolytic processes can be used to produce hydrogen. For example, electrochemical–thermally activated chemical (E-TAC) decouples hydrogen and oxygen in a two-step non-electrochemical process without the use of a membrane.[19] Other examples might include processes where instead of oxygen, another commodity chemical is produced that could further valorize the hydrogen.

*Safety of Hydrogen Delivery*

We appreciate the CEC noting that 1,600 miles of hydrogen pipelines in the United States have been operating safely.[20] To encompass other types of hydrogen delivery, we recommend that the CEC consider the relative safety and risk characteristics of transport mechanisms such as between pipeline transport and on-road delivery of gaseous fuels.

*Avoiding NOx Emissions*

The Draft 2023 IEPR at p. 64 correctly points out the negative health consequences associated with nitrogen oxide (NOx) emissions. It is important to minimize emissions of NOx and other criteria pollutant emissions from hydrogen energy systems. We suggest adding language to p. 64 that recommends aftertreatment technologies to minimize criteria air pollutant emissions, particularly for plants within or near communities.

*Revise Description of the Angeles Link Project*

SoCalGas recommends updating the description of the Angeles Link project on p. 65 of the Draft 2023 IEPR to read as follows:

[19] *Nature*, "Decoupled hydrogen and oxygen evolution by a two-step electrochemical–chemical cycle for efficient overall water splitting," September 13, 2019, available at: https://www.nature.com/articles/s41560-019-0462-7.
[20] CEC, Draft 2023 IEPR, p. 63.

"Southern California Gas Co. (SoCalGas) has proposed the Angeles Link project. The Angeles Link system is intended to be dedicated to public use and is anticipated to consist of one or more high-pressure, open-access, common carrier trunk transmission pipelines, distribution pipelines, and appurtenances, including compressor stations. The system will transport clean renewable hydrogen, likely from multiple local and longer term regional clean hydrogen production sources to various delivery points in the Los Angeles Basin (including the concentrated commercial and industrial area in and around the Ports of Los Angeles and Long Beach), and in the broader Southern and Central California region (Project area). The system may also include pipeline delivery of clean renewable hydrogen from third-party storage facilities. The Angeles Link pipeline system may potentially be developed in stages to meet demand needs."

*Acknowledge Benefits of Hydrogen Open Access Infrastructure*

We strongly encourage the CEC to emphasize the importance of open access pipelines for the transport and storage of hydrogen. As highlighted by the Department of Energy in "Pathways to Commercial Liftoff: Clean Hydrogen," open access is a key trigger for enabling "low-cost hydrogen energy storage for long duration and for resilience events," which is essential for the development of a robust hydrogen market in California. Expounding on open-access, common carrier infrastructure could include showing how it: 1) increases access through integrating multiple producers and end-users; 2) enables price transparency to increase confidence amongst end-users, reducing the need for bespoke contract negotiations between producers and end-users; and 3) provides market participants access to scalable infrastructure that could be developed alongside market growth to meet changing requirements.

*Clarify Analysis of Demand for Hydrogen Storage*

On p. 66, the Draft 2023 IEPR cites consulting firm E3's estimates of the potential market size for hydrogen storage in California. The range of 1.5 GW to 10 GW mirrors E3's 2021 estimates that E3 noted were designed to estimate the amount of "long-duration hydrogen storage that could be produced from curtailed electricity," and the focus of the analysis was on usage in power generation.[21] If these figures are based on the same data, the analysis of the potential for hydrogen storage should be expanded beyond simply curtailed power to consider other sources, such as non-grid-collocated hydrogen produced from renewable energy, as well as to consider other end uses such as in the mobility sector. Alternatively, in the immediate term, the text should clarify that the storage analysis is of limited scope for curtailed electricity only.

[21] E3, "Hydrogen Opportunities in a Low-Carbon Future: An Assessment Of Long-Term Market Potential in the Western United States", June 2020, available at: https://www.ethree.com/wp-content/uploads/2021/11/E3_MHPS_Hydrogen-in-the-West-Report_Final_June2020.pdf.

*Clarify Electrolyzer Table Assumptions*

Table 2 on p. 69 of the Draft 2023 IEPR could be made clearer by addressing other operating costs associated with electrolyzers beyond electricity and water usage.

"*The large volumes of hydrogen considered in these scenarios would require a hydrogen pipeline or sequential deliveries via truck, which may not be a feasible option for power plants. Further, there are additional costs, energy requirements, and leakage risks associated with compression or liquefaction of the hydrogen when delivered in tankers. Delivery via pipelines is better suited for moving large volumes of hydrogen and some dedicated hydrogen pipelines have been proposed by regulated utilities or are already in operation by private entities.*"[22]

SoCalGas appreciates the attention paid to tailoring methods of transporting hydrogen to different end use applications. Diverse approaches to producing, transporting, and utilizing energy produce a robust and resilient energy system.

*Additional Analysis Needed*

SoCalGas appreciates that, at p. 73, the Draft 2023 IEPR points to the need for additional analysis in several important areas, including alternative production and conversion pathways (including biogenic sources and fuel cells), system efficiencies and the addition of new renewables, colocation, storage, emissions, leakage, and equity considerations. The findings from those analyses could help inform planning and strategy that is being devised now, so sooner is better. We hope that these areas will be addressed in the 2025 IEPR process if not before.

*Add Additional Information Regarding Hydrogen Price Spikes*

The Draft 2023 IEPR cites the recent spike in the price of hydrogen dispensed at light-duty fueling stations, where it reached $36 per kilogram. SoCalGas appreciates the attention to the recent price volatility but is concerned showing only one data point does not reflect the whole market. It is also in the public interest for the 2023 IEPR to explore what factors effect hydrogen retail prices. S&P Global Commodity Insights recently compiled data regarding hydrogen retail prices and found the cost of hydrogen remained consistently at or near $16 per kilogram through 2022 (see Figure 2). This recent price volatility is worth noting for the CEC to explore retail price volatility issues and mitigation strategies. Insofar as transportation of hydrogen is an important component of the cost of hydrogen, scaling up delivery infrastructure will help build a robust market, which in turn could help alleviate price pressures.

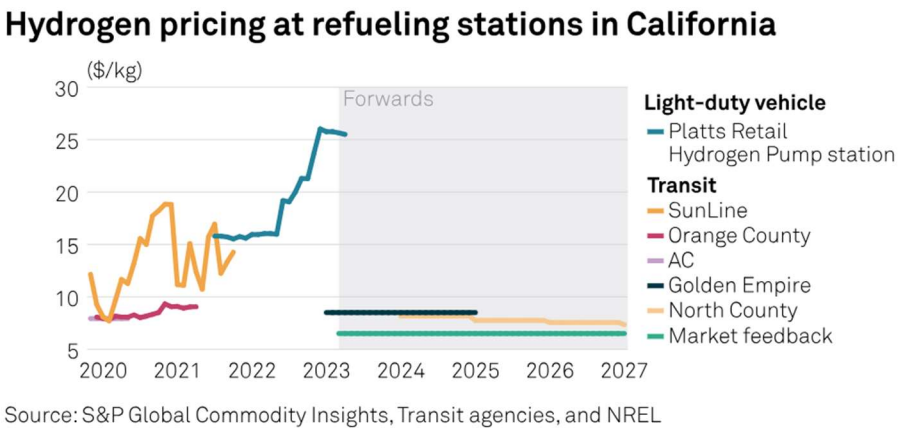
Furthermore, it is important to consider that the $36 per kilogram price is for light-duty refueling stations; it is not clear how this information correlates to the prices at medium- and heavy-duty hydrogen refueling locations. It would be beneficial for the public to understand how transit

[22] CEC, Draft 2023 IEPR, p. 72.

authorities are working to lock in lower prices for retail hydrogen. Currently, transit authorities are looking to contract for hydrogen prices less than $10 per kilogram for future fleets that will arrive in 2024.

Additionally, during the November 15 CEC IEPR Commissioner Workshop on Load Modifier Scenario Results, CEC staff indicated that the Additional Achievable Transportation Electrification (AATE) 3 scenario is very sensitive to hydrogen fuel price while reflecting recent price trends. Therefore, there is a risk that the recent price spike may have an outsized impact on overall planning.

**Figure 2: Hydrogen Pricing at Refueling Stations in California**[23]




Source: S&P Global Commodity Insights, Transit agencies, and NREL

SoCalGas commends the CEC for its work on solutions to decarbonize the transportation sector. As noted, light-duty hydrogen refueling has not been without refueling challenges. To present a more complete view, it is also worth noting that, while battery electric vehicles are promising options, EV charging likewise presents access and availability challenges, particularly for the large portion of Californians without easy access to a home EV charging unit. For example, media reported on a recent J.D. Power survey of EV owners reporting that "about 21% of their attempts to charge in public end in failure due to broken chargers or faulty payment systems."[24] The public

[23] S&P Global Commodity Insights, "California transit agencies establishing road map for hydrogen fuel cell use in buses," June 14, 2023, available at: https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/061423-california-transit-agencies-establishing-road-map-for-hydrogen-fuel-cell-use-in-buses.

[24] Tucker, Sean, "The big problem with chargers that's challenging electric car owners," *MarketWatch*, October 23, 2023, available at: https://www.marketwatch.com/story/the-big-problem-with-chargers-thats-challenging-electric-car-owners-dcd64635.

frequently airs frustration with EV charging infrastructure bottlenecks and problems with charger network interfaces.[25] [26] [27]

Slides presented during a CEC Electric Vehicle Charging Infrastructure Reliability Workshop in 2022 cited several indicators of consumer frustration with the charging experience: a CARB consumer survey finding that 40 percent of California respondents had contacted customer service about broken kiosks or plugs or system shutoffs; a Plug In America survey finding that 34 percent of DC fast charging customers considered broken chargers a "moderate concern;" and a U.C. Berkeley study of open-system public charging stations in the Bay Area finding one quarter of plugs tested to be unreliable or have design failure.[28] Members of the public expressed reliability concerns during that workshop as well as during an October 2023 workshop on proposed regulations.[29] While the Draft 2023 IEPR points to light-duty hydrogen fueling challenges that need attention, it is worth remembering that public EV charging is also not yet seamless.

*Refer to Directed CPUC Filing re Hydrogen Blending Projects*

SoCalGas, SDG&E, PG&E, and Southwest Gas (the Joint IOUs) are planning to file an amended application in Q1 2024 to propose live hydrogen blending demonstration projects from 0.1% hydrogen by volume up to 20% hydrogen by volume under various conditions, as directed by CPUC decision D.22-12-057. The projects will consist of blending up to 5% in an open portion of the gas distribution system and blending 5-20% in closed distribution and transmission systems, respectively. The demonstrations will gather necessary data to support a statewide hydrogen blending standard compatible with the varied gas system infrastructure and end-user equipment and applications. The proposed projects build off prior research and will provide proof of concept for the safe use of blended hydrogen in the gas system as part of California's decarbonizing efforts.

## CHAPTER 3: California Energy Demand Forecast

*CEC can consider using additional weight classes from the EMFAC model for IEPR Additional Achievable Transportation Electrification (AATE) Scenario 3 for medium and heavy-duty trucks*

[25] Stern, Joanna, *The Wall Street Journal*, "I Visited Over 120 EV Chargers: Three Reasons Why So Many Were Broken," November 15, 2023, available at: https://www.wsj.com/tech/i-visited-over-120-ev-chargers-three-reasons-why-so-many-were-broken-7a5d3e45.
[26] Hiller, Jennifer, *The Wall Street Journal*, "Even Transportation Secretary Pete Buttigieg Can't Find a Reliable EV Charger," September 13, 2023, available at .
[27] Gomes, Nathan, "EVs struggle with reliability due to charging, battery issues - Consumer Reports survey" *Reuters*, November 29, 2023, available at: https://www.reuters.com/business/autos-transportation/evs-struggle-with-reliability-due-charging-battery-issues-consumer-reports-2023-11-29/.
[28] CEC, Electric Vehicle Charging Infrastructure Reliability Workshop, March 11, 2022, presentation available at: https://www.energy.ca.gov/event/workshop/2022-03/electric-vehicle-charging-infrastructure-reliability-workshop.
[29] CEC, Workshop on Proposed Regulations for EV Charger Inventory, Utilization, and Reliability Reporting, October 9, 2023, 22-EVI-04, available at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=22-EVI-04.

During the November 15 CEC IEPR Commissioner Workshop on Load Modifier Scenario Results, the CEC noted the use of only two weight classes, Class 6 and 8, to model hydrogen demand for fuel cell electric vehicles (FCEV) and the potential number of these vehicles to be in use in 2040. The CEC noted that its modeling parameters were limited and CEC staff are open to receiving feedback on other potential weight classes to be included. During the September 8 IEPR Workshop on Potential Growth of Hydrogen, the CEC presented its preliminary SB 1075 hydrogen scenarios for medium- and heavy-duty trucks using CARB's Emission Factor (EMFAC) model.[30] Notably, the data presented by the CEC in the CARB Scoping Plan Scenario assumed hydrogen-fueled fuel cell electric truck counts to be approximately 325,000 in 2039[31] whereas the CEC IEPR 2023 AATE Scenario 3 estimated the count to be approximately 65,000 in 2040,[32] which is a five-fold difference. SoCalGas suggests the CEC expand modeling to include additional weight classes as the CEC continues to develop hydrogen transportation forecasts. Furthermore, we suggest the CEC align the IEPR 2023 AATE Scenario 3 Scenario assumptions with those of the CARB Scoping Plan Scenario in terms of vehicle classifications that are included.

**Conclusion**

SoCalGas commends CEC for its hard work to prepare this year's IEPR and for its openness to constructive input. Our comments seek to add to the IEPR process by focusing on integrated resource planning and highlighting ways in which clean fuels support decarbonization goals while maintaining critical energy reliability and resilience. We are proud to be a partner in California's climate efforts and look forward to all the work ahead.

Thank you for your consideration of our comments.

Respectfully,

*/s/ Kevin Barker*

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[30] CARB EMission FACtor (EMFAC) model, available at: https://arb.ca.gov/emfac/.
[31] See CEC, "IEPR Commissioner Workshop on the Potential Growth of Hydrogen," SB 1075 Preliminary Hydrogen Scenarios for Medium and Heavy-Duty Trucks presentation, September 8, 2023, slide 5, available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=252209&DocumentContentId=87215.
[32] CEC, "Transportation Energy Demand Forecast Results" IEPR Commissioner Workshop presentation, November 15, 2023, slide 16, available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=253094&DocumentContentId=88298.