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California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

RE: Pacific Gas and Electric Comments on the Draft 2022 Scoping Plan Update

Pacific Gas and Electric Company (PG&E) appreciates this opportunity to comment on the California Air Resources Board's (CARB) Draft 2022 Scoping Plan Update (SPU) released on May 10, 2022. PG&E would like to thank CARB for its efforts in identifying a path for California to reduce greenhouse gas emissions across all sectors of the economy and continuing to engage with the public and relevant stakeholders. PG&E offers the following comments to facilitate CARB's development of a robust and comprehensive final SPU.

PG&E continues to support the State's climate goals, including carbon neutrality no later than 2045. As California's largest energy provider, we embrace our foundational role in transitioning the State to a decarbonized and more climate-resilient economy. We recently unveiled breakthrough commitments to help reduce carbon emissions as part of our comprehensive Climate Strategy Report.[1] This report outlines the company's path to become "climate positive," going beyond net zero emissions to actively removing more greenhouse gases from the environment than it emits, by 2050. Along the way, PG&E plans to reach net zero greenhouse gas emissions by 2040, five years ahead of California's current carbon neutrality target, and has detailed clear milestones it plans to meet by 2030 in reducing emissions, adopting renewable energy, investing in clean transportation infrastructure, and transitioning its natural gas system. Additionally, the company is committed to executing these goals in a cost-effective and feasible manner with minimal impact to customer bills.

Support of CARB's Proposed Scenario (Alternative 3)

We believe CARB's Draft SPU establishes the right framework for carbon neutrality, leading with significant economy-wide emissions reductions and balancing remaining emissions in the target year with an equivalent quantity of carbon removal. This framework is aligned with PG&E's decarbonization strategy and the long-term decarbonization strategy of the United States.[2]

[1] PG&E's Climate Strategy Report, June 2022, available at www.pge.com/climate.
[2] The Long-Term Strategy of the United States, November 2021.

In addition, CARB's Proposed Scenario appropriately incorporates a wide range of decarbonization strategies including clean electricity, energy efficiency, electrification, low-carbon fuels, carbon capture and storage (CCS), and carbon dioxide removal (CDR). We support many pillars of the Proposed Scenario including:

- Strong zero emission vehicle (ZEV) goals.
- Clean electricity goals aligned with the CPUC's latest Integrated Resource Plan (IRP) decision in 2030 and SB 100 in 2045.
- All-electric appliances in new residential and commercial buildings beginning in 2026 and 2029, respectively.
- Inclusion of CCS in industry, and as an eligible technology for the electric sector in meeting SB 100 zero-carbon goals.
- Broad inclusion of CDR approaches to compensate for remaining emissions in 2045.

We also agree with CARB's choice not to select a carbon-neutral-by-2035 scenario as the State's plan. Achieving economy wide carbon neutrality by 2035 is unrealistic and excessively costly based on the deep decarbonization studies we have reviewed, including the SPU's analysis.

While the key pillars of a net-zero economy are clear, the exact mix of strategies, timing, and technologies cannot be foreseen two decades in advance. Implementation needs to be nimble and incorporate new information as it emerges. Further, as the Draft SPU highlights in Table 3-10, there is a wide range of expected abatement costs across sectors and time, with annual values ranging from -$157/ton to $745/ton. While this table is helpful in demonstrating the overall range of abatement costs, CARB should develop a more detailed cost abatement curve for future scoping plans that could be used to better determine the right trade-off between sectoral emission reductions and CDR. It is for these reasons and others that we support market-based, technology-neutral deployment policies that can respond to new information and drive cost-effective implementation. Cost-effective abatement also supports affordability for our customers. We anticipate that the Cap-and-Trade Program will be increasingly important as the State's climate ambition increases to drive cost-effective abatement and support environmental justice and other priority investments. Thus we support initiating a cap-and-trade rulemaking process in 2023 to ensure the program design is aligned with the State's climate ambitions, including extension of the Cap-and-Trade Program post-2030.

Given the importance of CDR to our shared long-term goal of reaching net-zero emissions and beyond, we agree that it is important to deploy a range of approaches this decade, to learn what is working and drive unit-cost declines. With this in mind, we support CARB's proposed CDR target for 2030.

Opportunities to Improve the SPU

While CARB's Proposed Scenario provides a strong foundation for the SPU, we also believe there are some opportunities to potentially strengthen the final plan:

- CARB should develop a carbon-neutral-by-2040 scenario for comparison, which could help address stakeholder concerns about timing by demonstrating where some additional cost-effective decarbonization efforts may or may not be feasible. In identifying ways to possibly reach carbon neutrality five years earlier, PG&E suggests that CARB could model:
    - Increased ambition of its transportation electrification goals including meeting Executive Order N-79-20 for 100% medium-duty/heavy-duty ZEV *operation* wherever feasible by 2045.
    - Exploration of more options for cost-effective reductions in the electric sector, by explicitly testing the trade-off between additional electric sector abatement and carbon removal in the RESOLVE model.
    - Exploring more options for increasing the renewable natural gas supply.
- Include decarbonization of buildings through zonal electrification to achieve both building emission reductions and gas system cost reductions. Absent this inclusion, we are concerned that the gas transition may be unaffordable especially for the most vulnerable Californians.

Opportunities for Future Policy Development

Further, we encourage CARB to provide clearer next steps following adoption of the SPU, including:

- Initiating a cap-and-trade rulemaking in 2023.
- Initiating a rulemaking to consider strengthening the Low Carbon Fuel Standard Program (LCFS)
- Incorporating its CCS protocol developed under the LCFS into cap-and-trade and electric sector decarbonization planning.
- CDR policy development beyond inclusion under LCFS, including clarifying the funding model and how CDR fits into CARB's greenhouse gas (GHG) inventory and tracking progress towards statewide GHG goals.

In addition to the overarching comments above, PG&E offers more specific feedback on various sectors below.

I. Chapter 4: Key Sectors

A. Transportation Sustainability

PG&E continues to support the State's transition to clean transportation which is a critical pillar for achieving the necessary GHG and air pollutant emissions reductions to meet the State targets. PG&E has been an early adopter in electrifying our own fleet with about 1,200 of our more than 14,500 vehicles using battery-electric or hybrid systems. In addition, through its' EV programs PG&E has deployed nearly 5,000 charging ports at over 200 sites throughout our territory. As part of our recent Climate Strategy Report, we also announced more aggressive goals for our fleet conversion targets: 100% light-duty, 50% medium-duty, and 20% heavy-duty vehicles to electric vehicles (EVs) by 2030. These targets reflect the many challenges and barriers that still need to be addressed in the medium-duty and heavy-duty (MD/HD) ZEV

markets. As such, CARB's SPU target for 100% MD/HD ZEV sales by 2040 is an aggressive but feasible goal. However, this could be an area to explore further ambition as part of a new scenario that considers achieving carbon neutrality by 2040 and closer alignment with the Governor's Executive Order N-79-20 for 100% MD/HD ZEV *operation* wherever feasible by 2045. Given the expected useful life of many MD/HD vehicles, achieving this may require 100% ZEV sales prior to 2040.

We also support the SPU's call for further public and private investment in clean vehicle fueling infrastructure which must take place in step with increased sales of ZEVs to support a successful transition. PG&E plays an important role in enabling customer adoption of EVs not only by increasing access to charging infrastructure but also by reducing total cost of ownership through rates and rebate programs and enhancing the education and buying experience through customer education. Today, about one in six of all EVs in the U.S. is in PG&E's service area. This equated to approximately 330,000 EVs connected to PG&E's grid at the end of 2021. Our 2030 goal is to be the global model in our industry by fueling at least 3 million EVs in our service area and to prepare the grid to enable rapid, safe energization and interconnection for all this new EV load.[3]

PG&E also aims to enable 2 million EVs to participate in vehicle-grid integration (VGI) applications, allowing EVs to be a cornerstone for reliability and resilience while also enabling customer access to additional revenue streams that can lower the lifetime cost of EV ownership. We encourage CARB to highlight the value of VGI applications as another key area for further research and development and multi-stakeholder collaboration with targeted efforts towards hard-to-reach customers, (including from low-income and disadvantaged communities) which will help support affordability and ensure that the benefits of the zero-emission transition are accessible to all.

PG&E also suggests that CARB consider the impacts of increased stringency in the LCFS program both pre- and post-2030 as another lever that could potentially accelerate the ability to achieve carbon neutrality earlier than 2045.

B. Clean Electricity Grid

The projected electric load and resource build-out proposed in the SPU appear to be consistent and in the range of what we have projected at PG&E. We are supportive of the key strategies outlined for achieving success in continuing to build and decarbonize the electric sector including the continued use of the Renewables Portfolio Standard (RPS) Program, SB 100 (De Leon, Chapter 312 Statues of 2018), SB 350 (De Leon and Leno, Chapter 547, Statues of 2015), and the CPUC's IRP. The SPU's Figure 4-5 illustrates that the Proposed Scenario expects electricity resources needed by 2045 to near 200 GW. To enable this dramatic growth, PG&E's vision is to make the electric grid smarter, more dynamic, and more flexible— incorporating new energy technologies and giving our customers increased flexibility, choice, and value. We recognize the need to reimagine the grid to meet varying and evolving needs—from accelerating

[3] Climate Strategy Report 2022, 14.

renewable energy integration and decarbonization to adapting our system to mitigate growing wildfire and other physical climate risks.[4]

We observe that electric sector emissions in 2045 in the Proposed Scenario are approximately one third of total statewide emissions by virtue of reductions in all sectors by that time, which is significantly higher than the current level of around 15%. This would leave significant emissions remaining in the electric sector that would need to be balanced by carbon removal. As the electric sector is the only sector modeled using an optimization model, we encourage CARB and their technical consultants to explicitly test the trade-off between additional electric sector abatement and carbon removal. Specifically, we suggest incorporating the cost of carbon removal into the electric sector optimization starting in the carbon neutrality target year and going forward such that the optimization model can choose between adding additional zero carbon electricity to reduce emissions versus paying for carbon removal. While it makes sense to model SB 100 as one of the policy constraints (as CARB already does), adding the carbon neutrality policy constraint to the electric sector modeling is appropriate in the SPU and could help identify if additional electric sector emissions reductions would be more cost-effective than carbon removal.

At PG&E, we have committed to achieving a net zero energy system in 2040 and will get there by reducing our Scope 1 & 2 emissions by 50% from 2015 (emissions reductions: 51% electric and 46% natural gas operations) and reducing our Scope 3 emissions by 25% from 2015 (emission reductions: 40% electricity & 20% natural gas supply). We envision this net zero energy system to consist of a combination of maturing technologies and updated infrastructure to enable a diverse supply of cleaner fuels. To make the transition, we expect a diverse mix of resources to be available--from broad electrification to cleaner fuels such as renewable natural gas and hydrogen, to nature-based solutions and carbon capture, storage, and utilization. Over the next two decades, innovations in technology and markets will inform the most beneficial balance of these resources to meet the evolving needs of our customers. Fundamentally, we believe it's a matter of "how much" of each resource will be deployed versus "if" we will use a diversity of resources. How much will be driven by factors such as customer acceptance, technology maturity, and cost.[5] Because these factors are impossible to predict, PG&E firmly believes implementation needs to be nimble and incorporate new information as it emerges.

C. Sustainable Manufacturing and Buildings

PG&E applauds CARB staff for their broad view of building decarbonization. As staff states in Appendix D, the inability to provide comprehensive (i.e. whole-building or zonally based) decarbonization solutions to customers presents a key challenge in long-term gas rate affordability. Staff writes, "As more households move away from using natural gas, those remaining on the natural gas system are likely to pay an increasingly larger share of systemwide costs, which could further widen the affordability gap between households that are able to decarbonize early and those that are not."[6] From an equity and affordability standpoint, PG&E

[4] Climate Strategy Report 2022, 8.
[5] Climate Strategy Report 2022, 7.
[6] Appendix D, 19.

urges CARB and other state agencies to prioritize comprehensive building decarbonization opportunities that achieve both building emission reductions and gas system cost reductions.

This goal could be accomplished through the expansion of appliance-based regulations to *all* gas appliances in a building or by using zonal electrification as a tool to electrify whole communities and allow the retirement gas infrastructure assets. While cooktops, dryers, or decorative fireplaces do not produce considerable NOx emissions when compared to furnaces or water heaters, they also use less natural gas. Their continued use, alongside an overall decline in gas system throughput, will not facilitate reducing maintenance costs associated with the existing natural gas system. Decommissioning the natural gas system in tandem with decreasing throughput is the only way to keep gas prices affordable for all customers.

California must remain focused on keeping rates affordable through this transition to a carbon neutral economy. For these reasons, PG&E supports Staff's recommendation for "incentive programs [that] could include incentives for strategic pruning of the gas system (i.e., outreach programs to electrify all of the homes or businesses in a particular location that would allow for the gas lines serving that neighborhood to be capped and retired.)"[7] In our recent *Climate Strategy Report*, PG&E has made a commitment to "evaluate gas capital projects for electrification as an alternative to the planned gas projects and pursue electrification for the projects evaluated as feasible and cost-effective."[8] To reach scale for strategic gas pruning/zonal electrification programs, PG&E stresses the need for the following key items:

- A process to reconsider CA's Public Utilities Code Section 451: a utility's obligation to serve.
- The ability for a gas utility to treat behind-the-meter appliances as regulatory assets (i.e. be able to capitalize the costs of those appliances), such that electrification projects are on an equal financial footing with gas capital projects.
- A large scale up of non-gas customer funding to support zonal electrification efforts such that we do not further compound long-term gas rate impacts.

PG&E would like to stress that most utility interventions are subject to cost-effectiveness tests that can make it challenging for PG&E to directly support electrification of cooking, laundry, or fireplace end uses or fund ancillary building decarbonization needs, such as panel upgrades or wiring. Due to this, a statewide effort for whole-building or zonal electrification would be more effective than an effort by PG&E alone.

To meet our climate goals quickly and cost-effectively, a combination of holistic appliance regulations, whole building retrofits, and zonal electrification strategies will likely be needed. As summarized by Staff, "to achieve the most cost-effective range of benefits for the building occupants, building decarbonization investments could be coupled with other health and habitability improvements (a "whole-building" approach)."[9] In February, PG&E filed our 2024-2031 Energy Efficiency Business Plan, which includes a commitment to achieve 35.4 million

[7] Appendix D, 26.
[8] PG&E Climate Strategy Report, 10.
[9] Appendix D, 11.

metric tons (MMT) of cumulative lifecycle carbon dioxide (CO_2) emission reductions through a portfolio that advances decarbonization and building electrification strategies. The portfolio also includes a proposal to remove financial support for natural gas equipment, except where there is no viable electric alternative.

In addition to zonal or whole home electrification strategies, external funding for the decommissioning of the natural gas system would ensure rates do not become overly burdensome for the customers that must remain on it. As E3 states, "Given the magnitude of gas system cost recovery challenges, there may be good reason to commit funds from elsewhere in the economy to reduce the cost stresses on the gas system and related customers."[10] Attempting to decarbonize California's buildings without a thoughtful and organized transition will cause an untenable increase in natural gas costs to consumers. CARB should call for additional work on the use of external funds to safeguard customer rates and ensure rate equity for all Californians as a critical action item after adoption of the final SPU.

In Appendix F, staff notes "because some rural and tribal areas within California are not connected to the state's electric grid—nor natural gas infrastructure—but rely instead on propane and wood burning, they need special consideration to ensure they still benefit from building decarbonization policies and programs."[11] PG&E shares this concern for non-regulated fuels. In particular, most utility incentive programs are unable to target these unregulated uses, which leaves these communities ineligible for such cost-effective opportunities to decarbonize. To help address this issue, PG&E launched a pilot program in 2020 as part of the CPUC's OIR to electrify small, disadvantaged communities in the San Joaquin Valley who relied on propane and wood-fueled appliances. [12]

Lastly, PG&E is in support of CARB's proposal to "strengthen California's building standards to support zero-emission new construction."[13] PG&E's innovative WatterSaver program and the upcoming California Energy-Smart Homes Program will also incentivize low-carbon solutions in the building sector. These building electrification programs are complemented by a robust series of PG&E-led EV, demand response, and resiliency efforts, as well as statewide programs like BUILD and TECH, further enabling our clean energy future. In the California Public Utilities Commission Building Decarb proceeding (R.19-01-011), PG&E recently supported the elimination of gas line extension allowances, discounts, and refunds for all residential customers and for non-residential customers where there was not a financial or environmental benefit to customers.

i. Low Carbon Fuels

The Draft SPU emphasizes the need to keep all options on the table, and PG&E agrees with this approach given the long planning horizon for this Scoping Plan and the sheer scale of the technological, financial, and behavioral transformation necessary to achieve a carbon neutral

[10] The Challenge of Retail Gas in California's Low-Carbon Future, 64
[11] Appendix F, 19.
[12] Breaking Down Barriers and Improving Access: PG&E Pilot Generates More Affordable Energy Options and Support for Disadvantaged Communities in the Central Valley, May 3, 2021.
[13] 172

economy. As such, PG&E supports the Proposed Scenario's inclusion of blending renewable natural gas (RNG) and hydrogen into natural gas pipelines as a key strategy to reduce the usage of fossil energy. PG&E is actively working to transition our natural gas system to transport and deliver cleaner fuels such as RNG and hydrogen to help decarbonize our operations and the energy used by our customers.

PG&E has committed to increasing the percentage of RNG supplied to our core gas customers to 15% by 2030[14], which will also enable PG&E to meet new requirements for California utilities. To help enable this goal, PG&E is working to safely increase the supply of RNG through pilot RNG interconnection projects and ongoing research and development (R&D). Our R&D roadmap covers the full value chain of RNG, to support the development of technologies that can create RNG and to resolve any knowledge gaps about blending in the gas system. PG&E has also committed $25 million through 2030 to research sustainable uses for woody biomass, including conversion of woody biomass (such as trees at risk for wildfire and damaged by bark beetle infestation) into a source of RNG. PG&E supports the expansion and exploration of a wide variety of RNG feedstocks, including biomethane converted from dairy biogas. Allowing for the capture and use of biogas from dairies will also be needed to meet the State's SB 1383 methane target.

In addition to our efforts on RNG, PG&E has announced the nation's most comprehensive end-to-end hydrogen study and is developing a demonstration facility, the Hydrogen to Infinity demonstration project[15], to gain hands on experience in blending hydrogen in the transmission system. The Preferred Scenario's target of blending 7% renewable hydrogen (~20% by volume) will need to be tested to ensure such levels can be safely integrated into the gas system. PG&E and its partners (Northern California Power Agency, Siemens Energy, City of Lodi, GHD Inc, and UC Riverside) in the Hydrogen to Infinity demonstration project will be able to test such levels in the project's standalone system to inform a future hydrogen injection standard. This important safety research will take time however, so hydrogen to help decarbonize the natural gas system is on a longer time horizon. RNG is already interchangeable with the gas system and can help decarbonize in the short-term. Together, RNG and hydrogen are critical low carbon fuels that must be part of the State's toolbox, especially for industries that cannot electrify.

Conclusion

PG&E supports CARB's Proposed Scenario as a flexible and technology-inclusive pathway to reach carbon neutrality by 2045 through significant economy-wide emission reductions and carbon removal to address remaining emissions. While trying to achieve carbon neutrality by 2035 is unrealistic and would create negative impacts on California's economy and

[14] This 2030 goal represents a minimum volume of approximately 27 billion cubic feet per year.
[15] "PG&E Launches the Nation's Most Comprehensive Study on Hydrogen's Feasibility within Gas Pipelines," May 2, 2022. Available at: PG&E Launches the Nation's Most Comprehensive Study on Hydrogen's Feasibility Within Gas Pipelines | PG&E (pge.com)

job market, it may be worthwhile for CARB to test a carbon-neutrality-by-2040 scenario that slightly increases ambition in key areas. PG&E looks forward to continuing to work with the state agencies, stakeholders and our customers to achieve a sustainable future, and we are proud to outline specific steps we plan to take in our Climate Strategy Report.