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Rajinder Sahota
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**RE: San Diego Gas & Electric Company and Southern California Gas Company
Comments on the August 2, 2021, 2022 Scoping Plan Update - Engineered
Carbon Removal Technical Workshop**

Dear Ms. Sahota,

San Diego Gas & Electric Company (SDG&E) and Southern California Gas Company (SoCalGas) appreciate the opportunity to submit joint comments regarding the August 2, 2021, 2022 Scoping Plan Update - Engineered Carbon Removal (ECR) Technical Workshop. We applaud CARB Staff's efforts to bring together industry experts as well as members from the Assembly Bill (AB) 32 Environmental Justice Advisory Committee (EJAC) to discuss recent market trends, potential applications, environmental factors, and community considerations for engineered carbon removal.

SDG&E and SoCalGas are committed to enabling and accelerating the transition to carbon neutrality on behalf of our customers and the communities we serve. We are proud of the role our utilities played in helping reach the AB 32 goals four years before the 2020 target. We agree that the state should identify least regret actions that invest capital for research, development, and deployment of clean technology and avoid stranded assets. Additionally, we are pleased to see the 2022 Scoping Plan Update process has robust stakeholder engagement. SDG&E and SoCalGas encourage CARB to continue this transparent and collaborative effort throughout the Scoping Plan Update process. In particular, CARB should ensure that the Scoping Plan scenario modeling process be transparent and be shared with stakeholders early enough in the process that stakeholders can review and provide feedback to CARB, which can then be evaluated and incorporated.

SDG&E and SoCalGas are technology neutral and technology inclusive. Accordingly, we support a portfolio approach to developing a greenhouse gas (GHG) reduction strategy. Carbon capture, utilization and storage (CCUS), a specific type of ECR solution, is a necessary component of an inclusive carbon reduction portfolio.

Our comments focus on the following:

1. A portfolio of carbon management solutions, including ECR solutions, is essential to achieve California's 2045 carbon neutrality goals.
2. ECR solutions support electric reliability and provide flexibility to all sectors of our economy, including the electric grid.
3. Deployment of ECR solutions will require increased policy support.

1. A portfolio of carbon management solutions, including ECR solutions, is essential to achieve California's 2045 carbon neutrality goals.

Most decarbonization pathways evaluated globally include a portfolio of: various renewable resources, fuel switching, end-use efficiency measures, biomass supply, ECR solutions, and adoption of hydrogen and synthetic gas. To fully determine the effectiveness of any portfolio, SDG&E and SoCalGas recommend the use of a cost per ton metric as part of the analysis for all technologies.

Studies have shown that decarbonizing 60% of California's electric portfolio is possible using only renewables. However, due to the excessive over-build of solar and wind resources and the large amount of land that would be needed, achieving renewables penetration beyond 60% will require other solutions to maintain grid reliability and serve California's expected load requirement.¹ Flexible technologies like geothermal, hydrogen fuel cells, ECR solutions, and other clean-firm power resources will be needed to address these concerns. As such, ECR solutions are not an alternative to decarbonization, but rather a complementary technology that accelerates energy decarbonization. The Intergovernmental Panel on Climate Change's Sixth Assessment Report indicates with high confidence that anthropogenic CO₂ removal has the potential to remove CO₂ from the atmosphere and durably store it in reservoirs.² Without solutions like ECR, California's decarbonization goals may not be practically achievable. Thus, CARB should include ECR solutions as a potential resource type to enable the electric sector to fully decarbonize in a cost-efficient manner.

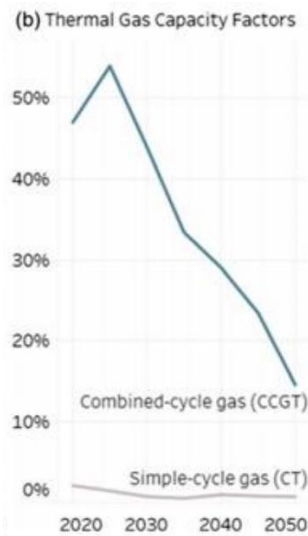
¹ See "California needs clean firm power, and so does the rest of the world: Three detailed models of the future of California's power system all show that California needs carbon-free electricity sources that don't depend on the weather" at <https://www.edf.org/sites/default/files/documents/SB100%20clean%20firm%20power%20report%20plus%20SI.pdf>

² Working Group I contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, The Physical Science Basis, Summary for Policymaker at https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

2. ECR solutions support electric reliability and provide flexibility to all sectors of our economy, including the electric grid.

It is widely accepted that in order to reach SB 100's goals of serving retail sales with renewables and zero-carbon resources by 2045, SB 32's goals of GHG emissions 40% below 1990 levels by 2030, and carbon neutrality by 2045, carbon emissions from stand-alone gas-fired generation will need to be reduced. It is also widely accepted that dispatchable electric generators (DEG) will need to be retained to ensure reliability and security against future grid outages.³ One study published by AGU Advances estimates that the United States' gas power plants' capacity factor (meaning how often the gas plants are run) will drop from around 50% to below 15% by 2050, as shown in the graph below (*AGU Advances' US Gas Power Plant Capacity Factors*).⁴ The reduced run time of gas-fired power plants will reduce both carbon emissions and air pollution from those plants. However, since these plants will still occasionally run to meet reliability needs, ECR solutions could be utilized to decarbonize their output and provide clean energy.

AGU Advances' US Gas Power Plant Capacity Factors⁵



SDG&E and SoCalGas note that not all retained power plants will utilize natural gas as their primary or only fuel source. For example, Los Angeles Department of Water and Power's (LADWP) Los Angeles 100% Renewable Energy Study (LA100) recommends building "new, state-of-the-art combustion turbines at current thermal generating station sites fueled by

³ 2021 SB 100 Joint Agency Report; https://www.energy.ca.gov/sb100#anchor_report and California Public Utilities Commission, Decision D.21-06-035, *Decision Requiring Procurement to Address Mid-Term Reliability (2023-2026)*, 30 June 2021.

⁴ Williams, J. H., Jones, R. A., Haley, B., Kwok, G., Hargreaves, J., Farbes, J., & Torn, M. S. (2021). Carbon-neutral pathways for the United States. AGU Advances, 2, e2020AV000284. <https://doi.org/10.1029/2020AV000284>

⁵ *Id.*

renewable-electricity-derived fuels (such as hydrogen).⁶ Thus, some current gas fired DEGs will be replaced by or converted to generators run on renewable hydrogen, making them clean energy resources. SDG&E has also started a renewable hydrogen blending pilot at the Palomar Energy Center which is expected to be operational in 2022. Power plants combusting fuels with renewable hydrogen blends can utilize ECR solutions to accomplish near-zero GHG emission levels. Plants switching to renewable natural gas could be coupled with ECR solutions to deliver negative GHG emission levels, allowing these resources to simultaneously provide reliable service, support intermittent resources, and provide clean energy to California. As such, we encourage the inclusion of ECR solutions as they would enable the grid to maintain reliability and to do so while achieving decarbonization goals.

3. Deployment of ECR solutions will require increased policy support.

As indicated by Roger Aines of Lawrence Livermore National Labs at the workshop and in the *Getting to Neutral* study, reaching carbon neutrality will not be possible without some form of ECR solutions.⁷ ECR solutions will also help decarbonize other sectors such as aviation, agriculture, maritime, food processing, cement, steel, and many other industries. The positive impact of this flexibility cannot be underestimated. Not only can ECR solutions be used as a bridge for all sectors to reach decarbonization, but the broad application and thus broad interest will provide many more opportunities to assist in reducing the cost-economics of ECR solutions as compared to technologies only suited for specific sectors. Broadly speaking, ECR solutions are an “a la carte” option that can be applied to decarbonize any facility within any sector. The flexibility offered by ECR solutions provide a valuable tool for California to decarbonize even its most difficult sectors. However, ECR solutions lack the policy, incentive, and regulatory support necessary to provide a clear signal on long-term incentive dynamics, to encourage investment, and to set affordable pathways to integrate ECR solutions. CARB can help in this effort by signaling the importance of ECR solutions via the 2022 Scoping Plan.

Conclusion

ECR solutions can play an important role in California’s journey to decarbonization. As mentioned above, Lawrence Livermore National Labs warns that without ECR California will be unable to reach carbon neutrality. Further, ECR solutions offer the flexibility to help decarbonize all sectors of our economy, but current policies are not enough to drive ECR solutions at scale. CARB’s proposed inclusion of ECR solutions within its 2022 Scoping Plan will provide viable decarbonization tools for the electric industry and for hard-to-decarbonize sectors. Doing so will allow the electric sector, hard-to-decarbonize sectors, and California to reach neutrality and it will send a much-needed signal that could help spur development and cost reduction of ECR solutions. SDG&E and SoCalGas strongly believe that these considerations will help lead to a Scoping Plan that can help California achieve its 2030 goals and ultimately carbon neutrality by 2045.

⁶ LA100: The Los Angeles 100% Renewable Energy Study Executive Summary: <https://www.nrel.gov/docs/fy21osti/79444-ES.pdf>

⁷ https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf

California Air Resources Board
August 16, 2021

Sincerely,

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