Samantha Pate
Director
Strategic Planning
SDG&E
8330 Century Park Ct.
San Diego, CA 92123

September 3, 2021

Rajinder Sahota
Deputy Executive Officer
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: San Diego Gas & Electric Company Comments on the August 17, 2021, 2022 Scoping Plan Update - Scenario Concepts Technical Workshop

Dear Ms. Sahota,

San Diego Gas & Electric Company (SDG&E) appreciates the opportunity to submit comments regarding the August 17, 2021, 2022 Scoping Plan Update - Scenario Concepts Technical Workshop. We also appreciate the thorough presentations that informed the public and the Environmental Justice Advisory Committee (EJAC) of the multiple models that will be used to create the 2022 Scoping Plan. It is important that the models, their assumptions, inputs and limitations be understood by the public. This transparency is paramount.

SDG&E is committed to enabling and accelerating the transition to carbon neutrality on behalf of our customers and the communities we serve. In March 2021, we made a climate pledge to reach net zero greenhouse gas (GHG) emissions by 2045, which includes SDG&E's direct emissions as well as those from our customers' consumption of energy.[1] We are proud of our role in helping reach the AB 32 goals four years before the 2020 target.

California's goals to decarbonize call for a transformation of the way energy is generated, delivered, and consumed. The Scoping Plan modeling will need to utilize **realistic and feasible** scenarios that take into account California's expected/projected energy transformations. SDG&E is pleased that the California Air Resources Board (CARB) is soliciting feedback from California stakeholders in its efforts to determine which scenarios should be considered for Scoping Plan modeling and analysis. CARB should continue to ensure that the Scoping Plan modeling process is transparent and allows sufficient time for stakeholder review and the evaluation and incorporation of stakeholder feedback.

[1] Scope 1, 2, and 3 emissions are included in the net zero pledge.

SDG&E recommends that CARB select multiple scenarios for their modeling and analysis. In particular, SDG&E emphasizes that selected scenarios should represent realistic and feasible paths to decarbonization. We have limited time to perform the necessary analysis to reach our decarbonization targets. In an ideal world with an abundance of time and resources, it would be possible to run all permutations of potential scenario options, however we do not have this time, thus SDG&E recommends that CARB focus on scenarios that are feasible. We believe that scenarios that are unattainable or unsustainable should not be entertained as they would detract much needed time and resources from feasible scenarios and if selected as final Scoping Plan scenarios could cause California to fail in reaching its carbon neutrality targets. SDG&E believes the main lens from which to measure the feasibility of scenario options is by prioritizing **reliability, flexibility /technology inclusivity, and cost minimization**.

Also, we understand that the modeling process is iterative and as such the appropriateness and adequacy of each selected scenario won't be understood fully until model runs are complete. Even if scenarios are selected for their expected benefits to **reliability, flexibility /technology inclusivity, and cost minimization,** the outcomes of those scenarios will only be known after receiving modeling results. To maintain continual transparency, CARB should build the Scoping Plan schedule to allow an additional round of stakeholder scenario feedback after the preliminary run. In response to verbal comments, CARB staff indicated that the initial run of selected scenarios will occur later this year. SDG&E recommends that CARB plan a workshop to allow stakeholders to view scenarios and their modeling results together. The workshop schedule should allow sufficient time to incorporate stakeholder feedback into subsequent scenario selection and model runs that will inform the Spring 2022 Draft Scoping Plan.

In addition to transparency, SDG&E would like to see more inter-agency collaboration especially as it relates to the timing and interaction of various agency deliverables such as the Scoping Plan, Integrated Resource Planning (IRP), SB 100 Report and Transmission Planning Process (TPP). SDG&E has previously recommended more frequent analysis of the SB 100 Report to capture the changing landscape of emerging decarbonization technologies, incremental executive orders and statute, and updated cost curves. SDG&E still recommends more frequent analysis but amends its original request to recommend that the SB 100, Scoping Plan and IRP processes synchronize their cycles such that each produces their final outcome in consecutive years. For example, finalize the Scoping Plan in 2022, the IRP's next Preferred System Plan cycle in 2023, and the SB 100 report in 2024, and then repeat in 2025 with the Scoping Plan. In this way, each process can inform the next process in the series. Similarly, new directives, technology changes and updates to cost curves can be incorporated annually by whichever proceeding is active in that year.

In addition to SDG&E's comments herein, SDG&E supports the comments made in the Joint POU letter on the Scenarios Concept Workshop.

Our comments focus on the following:

1. Scenario selection should prioritize reliability, flexibility/technology inclusivity, and cost minimization.
2. Carbon Free Electricity Grid – CARB Questions

3. Carbon Free Electricity Grid – Scenario Options
4. Scenario Options for Carbon Neutrality Timeframe, Role of Engineered Carbon Removal, and Vehicle Fleet Electrification

1. Scenario selection should prioritize reliability, flexibility /technology inclusivity, and cost minimization

Electric System reliability and resiliency are foundational and must be considered as a critical component of scenario development

The August 2020 reliability events highlight the importance of adequate resource and transmission planning. To preserve reliability and resiliency, we must ensure an adequate and flexible energy supply consisting of a mix of technologies, energy that is routed to load centers by transmission, and clean fuel as we continue to shape the paths to achieve California's 100% renewable and zero-carbon electricity goals. Reliability cannot be compromised.

Many strategies currently under consideration for decarbonizing transportation, buildings, and industry significantly increase electric demand and rely on a clean and reliable electric system to achieve the desired outcomes. Thus, economy-wide scenario selection and modeling also needs to ensure the resulting electric portfolios can reliably produce and deliver clean energy 24x7 for all days and all seasons of the year.

Performing supply-side modeling for carbon neutrality scenarios to ensure electric system reliability is critical and necessary, and it is important to understand that this work has not yet been completed. The SB 100 final report found that SB 100 is directionally achievable but did not model reliability. Thus, all Scoping Plan scenarios, including those that leverage SB 100 scenarios to inform needs for the electric sector, need to undergo Loss of Load Expectation (LOLE) reliability assessments with a planning target of 0.1 days/year, or 1 day in 10 years, to ensure they are achievable at a reasonable cost. Additionally, it is important to note that the preliminary work completed by E3 in October 2020 used to inform the 2022 Scoping Plan update results is significantly higher electric consumption in 2045 than contemplated in the core SB 100 analysis.[2]

SDG&E believes that Scoping Plan reliability modeling must utilize a LOLE study. LOLE studies are the industry-accepted approach traditionally used by resource planners to establish system resource need – put simply, it is the "gold standard" of reliability planning. LOLE studies focus on the peak hour of the days that have significant Loss of Load Probability (LOLP). LOLP changes over time, which means that new LOLE studies must be conducted periodically in order to ensure the validity of the planning data and decarbonization assumptions.

[2] E3's *Achieving Carbon Neutrality in CA*, October 2020 (Figures 19 and 20 for the Balanced Scenario). *Inputs and Assumptions CEC SB 100 Joint Agency Report*, June 2020 (Table 11 for High Electrification).

Incorporating LOLE studies and including clean firm and dispatchable resources along with adequate transmission and distribution to deliver clean energy to homes and businesses are necessary steps to creating reliable scenarios and ensuring that California's decarbonization goals are achievable. Further, any scenarios resulting in an unreliable electricity grid should be immediately discarded.

Flexibility and Technology Inclusivity

SDG&E values flexibility and is technology neutral and technology inclusive. In general, Options A presented at the workshop were overly restrictive and the antithesis of flexibility. We support an inclusive and flexible portfolio approach to developing a GHG reduction strategy. SDG&E agrees with the SB 100 final report general conclusions that SB 100 is achievable pending a reliability assessment and that the electric portfolio benefits from technological and geographical diversity. Three independent studies also found that decarbonizing California's electric portfolio is possible, and that diversity is not only favorable, but necessary.[3] The studies concluded that decarbonizing California beyond 60%, is not possible using exclusively renewables. Achieving renewable/clean energy penetration beyond 60% will require other solutions to maintain grid reliability and serve California's expected load requirement. Due to the necessity for diversity of clean energy resources, SDG&E urges CARB to create scenarios that are inclusive of flexible technologies such as geothermal, hydrogen fuel cells, green hydrogen combustion, methane pyrolysis, energy from diverted organic waste and wastewater, engineered carbon removal (ECR) solutions, and other clean firm/dispatchable resources and clean fuel technologies as they will be needed to complement renewables and collectively decarbonize the electric portfolio. Scenarios should thus be technology diverse and inclusive.

SDG&E reminds CARB of the importance of their work to future development of emerging technologies. Investors, legislators, and the industry are watching. Prescriptive and technology exclusive signals could hamper market development, regulatory support, and investment for otherwise viable technologies. On the other hand, a technology inclusive Scoping Plan would invigorate development of clean energy technologies. California is at the forefront of decarbonization, and the entire globe will benefit or suffer from the selected scenarios and eligible technologies provided by the Scoping Plan.

Cost minimization needs to be a fundamental consideration of Scoping Plan modeling

Evidence of severe and systemic economic disparities, heightened by the recent pandemic, confirms that we must minimize costs, especially for customers least able to afford decarbonization. A precursor to incorporating cost minimization into modeling is to include all costs into the modeling effort. This includes capacity costs of dispatchable electric generators (DEG) which are expected to seldomly run but will still accrue costs as "stand-by" units. Similarly, modeling will need to include projected stranded costs resulting from fuel switching.

[3] 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 .

This consideration becomes even more crucial as low-income communities are expected to hold a disproportionate burden of stranded costs, resulting in inequitable outcomes. Including fuel switching costs will give CARB a realistic projection of true costs that will be faced by Californians and in particular by low-income communities.

2. Carbon Free Electricity Grid – CARB Questions

The workshop presentation included multiple questions and an initial set of options for the Carbon Free Electricity Grid scenarios. SDG&E offers the following answers and feedback on this important and critical portion of the Scoping Plan.

- **Any role for biomass to generate electricity?**

  SDG&E is **technology neutral** and believes all net-zero, near-zero or negative carbon solutions should be viable options. Thus, biomass and especially pyrolysis of biomass should be one of many solutions employed and permitted by the state. As the Lawrence Livermore National Laboratory's *Getting to Neutral* study finds, "g[G]asifying biomass to make hydrogen fuel and CO2 has the largest promise for CO2 removal at the lowest cost.[4]"

- **Any role for combustion of renewable natural gas (RNG) or renewable hydrogen to replace fossil gas for reliability?**

  Three separate studies found that California will need clean firm power to achieve a net-zero carbon economy[5]. RNG and/or renewable hydrogen combustion should be included as viable solutions since they can complement intermittent renewable energy by providing **reliability** support to the grid in the form of ramping capability and long duration storage.

  California utilities are already making progress on advancing clean combustion. Los Angeles Department of Water and Power (LADWP) is already beginning the process of converting their Intermountain Power Plant to running on renewable hydrogen, slated to be fully operational by 2045. LADWP's Los Angeles 100% Renewable Energy Study (LA100) further recommends building "new, state-of-the-art combustion turbines at current thermal generating station sites fueled by renewable-electricity-derived fuels (such as hydrogen)." Replacing or converting current gas fired DEGs to generators run on renewable hydrogen makes them clean energy resources. SDG&E has recently begun a renewable hydrogen blending pilot project at the Palomar Energy Center which is expected to be operational in 2022. Power plants combusting fuels with renewable hydrogen blends below 100% hydrogen can further utilize ECR solutions to accomplish near-zero GHG emission levels. Plants switching to RNG can deliver negative GHG emission levels. Adding ECR solutions to RNG combustion can deliver even further negative emissions. Thus, renewable hydrogen and RNG combustion can simultaneously provide reliable

[4] https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf
[5] 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

service, support intermittent resources, and provide clean energy to California. As such, we encourage the inclusion of combustion of RNG and combustion of renewable hydrogen to enable a reliable grid and achieve decarbonization goals.

3. Carbon Free Electricity Grid – Scenario Options

Four potential option scenarios representing CARB staff's initial thinking were presented at the workshop. SDG&E prefers a new fifth option, Option E detailed below. Additionally, SDG&E recommends rejecting as infeasible Options A-C, would appreciate a better definition for Option D and offer the following specific feedback on these scenarios and the Option E scenario for consideration.

- **Option A – No combustion; Total load coverage; Carbon neutrality by 2035**
  Option A violates the pillar of technology inclusivity. And as a reliability assessment was not conducted on the SB 100 No Combustion scenario, this scenario cannot claim to be reliable. Further, multiple studies question whether there is sufficient land to accommodate the large amounts of solar and wind facilities needed to support a No Combustion scenario[6]. Due to its technology exclusivity, lack of reliability assessment and potential to require more land than what is available, this option should be considered infeasible and should be excluded from consideration.

  See Carbon Neutrality section below for Option A's timeline acceleration.

- **Option B – All available technologies; Accelerate carbon neutrality to 2035**
  Option B appears to embody the pillar of technology inclusivity, however "all available technologies" was left undefined. SDG&E encourages CARB to explicitly include emerging technologies that may or may not have been included as SB 100 candidate resources such as combustion of renewable hydrogen and ECR solutions. It is critical to include all potential solutions. Without full technology inclusivity, this option may not be affordable and may not be viable due to land use constraints.
  See Carbon Neutrality section below for Option B's timeline acceleration.

- **Option C - All available technologies; Total load coverage; Carbon neutrality by 2045**
  Same comment as Option B regarding "all available technologies." Regarding extending load coverage to include transmission losses, SDG&E believes the only way to achieve "Total Load Coverage" is by including near-zero emission technologies such as combustion of renewable hydrogen and ECRs as eligible technologies. Without this flexibility, SDG&E believes that a total load coverage scenario is infeasible.

- **Option D - All available technologies; Carbon neutrality by 2045**
  Option D provides the most flexibility in terms of target and technology types. However, SDG&E is concerned with the undefined term of "all available technologies." We encourage CARB to define "all available technologies" to explicitly include existing and emerging zero and near-zero carbon technologies that may or may

[6] Ibid.

not have been included as SB 100 candidate resources such as combustion of renewable hydrogen and ECR solutions.

- **Option E Proposal - All existing and emerging zero or near-zero carbon technologies; Total load coverage; Carbon neutrality by 2045**
  Option E would allow all existing and potential clean energy technologies including but not limited to: solar, wind, geothermal, hydrogen fuel cells, biomass pyrolysis, combustion of RNG and renewable hydrogen, ECR with natural gas combustion or RNG. This proposed scenario's total load coverage, (beyond SB 100 retail sales and inclusive of transmission losses), is contingent on allowing all technologies. Without technology inclusivity, SDG&E does not believe total load coverage is possible. Option E aligns with SDG&E's sustainability commitments and eminent pilot projects and SDG&E's 3 pillars of reliability, technology inclusivity and cost minimization.

4. Scenario Carbon Neutrality Timeframe, Role of Engineered Carbon Removal, and Vehicle Fleet Electrification

- **Carbon Neutrality Timeframe**
  SDG&E recognizes the urgent and critical need to decarbonize California and is proud to partner with the state in pursuing these ambitious goals. Nevertheless, GHG emissions have yet to show year over year declines on a trajectory that would meet the existing 2030 target defined in SB 32, despite the significant progress made by the electric sector over the past two decades[7], further highlighting the need for collective action across all sectors of the California economy.

  As such, SDG&E recommends CARB evaluate the feasibility and implications associated with achieving current emissions reductions and carbon neutrality goals prior to pursuing even more aggressive targets in this Scoping Plan development effort. While the intentions of accelerating these timelines are in good faith, the outcomes may well be unattainable in a practical sense.

  Should CARB consider exploring an accelerated timeline to carbon neutrality, SDG&E recommends that this decision be informed by modeling and analysis to address the implications of this decision. Specifically, there are significant questions regarding reliability and cost in pursuit of fast-tracked targets:

  1. Electric system reliability and supporting infrastructure build-out must be assured for decarbonization goals to be achieved.

  2. The cost of decarbonization in an accelerated timeline would be condensed into a shorter time frame, leading to affordability challenges, and an increased risk of inequitable outcomes.

[7] CARB 2000-2019 GHG Inventory (2021 Edition)

SDG&E would like to reiterate its support for aggressive and attainable decarbonization goals; however, the feasibility of achieving existing targets, including the prioritization of reliability, cost minimization, and equity, should be the primary evaluation utilized to inform the overall approach to this scoping plan.

- **Role of Engineered Carbon Removal**
  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 CO_2 removal has the potential to remove CO_2 from the atmosphere and durably store it in reservoirs.[8] Without solutions like ECR, California's decarbonization goals may not be achievable. Thus, CARB should include ECR solutions for use with fuel combustion and in industrial processes to enable the electric sector and other sectors to fully decarbonize.

  As indicated by Roger Aines of Lawrence Livermore National Laboratory at the ECR workshop and in the *Getting to Neutral* study, reaching carbon neutrality will not be possible without some form of ECR solutions.[9] 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 provides a valuable tool for California to decarbonize even its most difficult sectors.

- **Vehicle Fleet Electrification**
  SDG&E affirms its support for the State's transportation electrification goals and aims to be a strategic partner in the buildout of electric vehicle ("EV") charging infrastructure in our service territory. Through its Power Your Drive program, Priority Review Programs, and Power Your Drive for Fleets program, SDG&E has helped enable transportation electrification in the San Diego region by installing over 3,000 EV charging stations in workplaces, multi-unit dwellings, ride and drives, and industry sites. Transportation electrification is a feasible and cost-effective approach to achieving economy-wide carbon neutrality, with minimal impacts to households and jobs. EVs and EV charging infrastructure are established technologies that are currently available for passenger vehicle drivers in California. And as EV battery technology continues to improve, so will vehicle efficiency and range.

[8] 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
[9] https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf

The Vehicle Fleet Electrification scenarios CARB chooses to model, and ultimately the scenario CARB chooses to include in the 2022 Scoping Plan, will have an impact on electricity demand and load flexibility outcomes. As such, SDG&E would urge that CARB meaningfully consider these impacts and how they intersect with the Carbon-Free Electricity Grid scenarios.

Conclusion

Reliability, flexibility/technology inclusivity, and cost minimization are paramount to the success of California's decarbonization efforts and must be incorporated as the filters that CARB will utilize to select the set of Scoping Plan scenarios that E3, UC Irvine and Rhodium will ultimately model and analyze. Using these pillars to gauge the feasibility of potential scenarios is critical to avoid unrealistic or unachievable scenarios. Further, we encourage CARB to conduct more frequent Scoping Plan updates and to align future Scoping Plans with IRP and SB 100 deliverables. Finally, transparency of analysis and modeling is critical to the success and acceptance of the Scoping Plan work. We urge that CARB add another round of scenario review after test runs have concluded. SDG&E strongly believes that these considerations will help lead to a Scoping Plan that can help California achieve its 2030 goals and ultimately carbon neutrality by 2045.

Sincerely,

/s/ Samantha Pate

Samantha Pate
Director
Strategic Planning
SDG&E