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Mr. Mike Tollstrup
California Air Resources Board
Office of Climate Change
1001 I Street
Sacramento, CA 95814

RE: San Diego Gas & Electric Company Comments on the Discussion Draft of the 2013 AB 32 Scoping Plan Update

Dear Mr. Tollstrup,

San Diego Gas and Electric Company (SDG&E) appreciates the opportunity to submit these comments concerning the Discussion Draft of the 2013 AB 32 Scoping Plan Update (Discussion Draft) prepared by the California Air Resources Board staff (ARB). Previously, in comments on the Scoping Plan Update Presentations, SDG&E provided a description of what it has accomplished in reducing GHG emissions in line with the 2008 Scoping Plan. Without reiterating those accomplishments again, SDG&E's efforts are on track and in line with the efforts being implemented throughout the State.

SDG&E continues to have the following two general concerns with regard to the 2013 Draft Scoping Plan:

1. Ensuring a Long-Term Role for Natural Gas
2. Combined Heat and Power (CHP) Issues
 - What are the expected GHG reductions from 4,000 MW of new CHP?
 - There needs to be a specific proposal to estimate the downward adjustment of the GHG target based on ARB documents
 - The Scoping Plan needs to consider the reduced GHG benefit and cost effectiveness based on the current and future electrical system
 - There is an inconsistency with the Zero Net Energy Goal
 - There is an inconsistency with energy recommendations beyond 2020

1. Ensuring a Long-Term Role of Natural Gas

The stated goal for the energy strategy after 2020 is to move current electricity and natural gas systems toward developing a long-term electrification strategy for the energy sector. While the goal to obtain near-zero GHG emissions is laudable, it is not likely to be cost effective and unlikely to influence national and international GHG

reductions. The post-2020 goals should have a more balanced approach to include a long-term place for cost effective natural gas technologies.

2. CHP Issues

SDG&E agrees with this focus of the Discussion Draft but finds the section on Combined Heat and Power (CHP) (pages 29-30) inconsistent with the entire discussion of the Energy sector, both to 2020 and beyond 2020.

As indicated in our previous comments, SDG&E is very concerned with the actual level of GHG reductions associated with the 4,000 MW of CHP estimated in the 2008 Scoping Plan (6.7 MMT). The Scoping Plan Update should provide an update of expected GHG reductions from the 4,000 MW of CHP if that goal is retained. At the Scoping Plan Update workshop, ARB indicated that detailed measure analysis would be included in the 45-day comment draft of the Scoping Plan Update. The CHP measure should be included in that analysis.

Page 30 of the Discussion Draft states: “The ARB is committed to working with the CPUC and CEC to ensure the Scoping Plan goal of 4,000 MW of new CHP is achieved by 2020 and that the Governor’s goal for 6,500 MW of additional installed capacity can be met by 2030.” This statement contradicts the statement in the Zero Net Energy section on page 28 that the “ARB and CEC should analyze **alternatives to the use of natural gas for** heating, cooking, and **industrial processes** such as electrification . . . ” (emphasis added)]. ARB does not need to recommend identifying alternatives when it is promoting a long-lived natural gas technology.

It should also be noted that electricity from the grid now has fewer GHG emissions due to increased renewables in SDG&E’s and other utilities’ portfolios as compared to 2008. This reduces the amount of GHG reduction associated with CHP. The cost of renewables is also declining relative to CHP. Given both factors, natural gas-fired topping cycle CHP systems¹ for GHG reductions will be less cost effective compared to alternative renewable technologies. SDG&E requests that ARB, with the assistance of its economic advisors, reassess the cost effectiveness of its CHP goals in light of these developments post-2008 (33% RPS, declining cost of renewables) and the post-2020 GHG goals for the electric generation sector. This is appropriate because any new CHP will likely have a 25-30 year life and will therefore be operational through 2020 and beyond.

Appended to this letter are five attachments providing more detailed analysis of the CHP issues discussed above. SDG&E looks forward to discussing these comments with ARB staff.

Sincerely,

Tamara Rasberry

¹ The most common form of CHP where the system generates electricity first, and the waste heat or exhaust is used in an another process

ATTACHMENT 1 – GHG Reductions from 4,000 MW of new CHP

It is clear that ARB has reduced the 2008 Scoping Plan GHG goal for CHP from 6.7 million metric tons (MMT), but it is somewhat unclear what the new GHG target will be for the CHP measure associated with 4,000 MW of CHP. The Scoping Plan Update should provide an update of expected GHG reductions from the 4,000 MW of CHP if that MW goal is retained. ARB indicated at the Scoping Plan Update workshop that detailed measure analysis would be included in the 45-day comment draft of the Scoping Plan Update, and the CHP measure should be addressed.

The 2008 Scoping Plan GHG reduction figures were based on a 2005 California Energy Commission CHP report and an ARB assumption that the average efficiency of new CHP would be 75 percent. The California Energy Commission updated the prior 2005 analysis with a new report “Combined Heat and Power: 2011-2030 Market Assessment.”² To provide an estimate that could be compared to the Scoping Plan, the report used ARB’s assumptions for avoided emissions, electric line losses, and boiler efficiency. The electric and thermal performance of the combined heat and power systems were taken from multi-sector outputs of the ICF, Inc. CHP Market Model. Calculated on this basis, the avoided annual GHG emissions in 2020 were roughly 3.2 MMT associated with roughly 3,000 MW of new incremental CHP in 2020 in the mid-case and 3.9 MMT and 3,600 MW by 2030, a similar case as used in the 2005 CEC report.³ Using the same metrics that ARB used, except for the efficiency of the CHP units, and without considering the interaction with the Renewables Portfolio Standard (RPS), the CEC report finds closer to 4.2 MMT associated with 4,000 MW of CHP instead of 6.7 MMT.

² Hedman, Bruce, Ken Darrow, Eric Wong, Anne Hampson. ICF International, Inc., Combined Heat and Power: 2011-2030 Market Assessment, California Energy Commission report CEC-200-2012-002, 2012.

³ Hedman, Bruce, Ken Darrow, Eric Wong, Anne Hampson. ICF International, Inc., Combined Heat and Power: 2011-2030 Market Assessment, California Energy Commission report CEC-200-2012-002, 2012, table ES-2 and figure ES-5.

ATTACHMENT 2 - Adjustment of CHP Target Based on ARB Documents

Another approach for the Scoping Plan Update would be to prorate the CHP measure to the same extent as all other energy efficiency measures were reduced in response to the recession and slower economic growth expectations. It is inherently contradictory to reduce all measures except the CHP measure. The Discussion Draft shows 25 MMT associated with the Energy Sector that includes energy efficiency, 33% RPS, the million solar homes program, and CHP. Energy Efficiency, including CHP, was reduced from 26.1 MMT in the 2008 Scoping Plan to 12 MMT as shown in slide 13 of the first Scoping Plan Update workshop presentation. However, there was no breakdown of the change from electricity energy efficiency measures, natural gas energy efficiency measures, and the CHP measure. A simple proportionate reduction from 26.1 MMT to 12 MMT would yield 3.1 MMT of GHG reductions expected from CHP.⁴

A second possible split based on ARB data would be from the Updated Economic Analysis prepared in 2010 that shows in Table 13 of that document that 70% of reductions are from electric and natural gas energy efficiency and 30% are from CHP.⁵ This would reduce the expected CHP emissions reductions from 6.7 MMT to 3.6 MMT if the total reductions expected from energy efficiency are 12 MMT.⁶

Or the split could be based on Appendix F to the Initial Statement of Reasons for the Cap-and-Trade Program (ISOR), Compliance Pathways.⁷ This ARB document shows roughly 27 percent of the GHG savings coming from CHP, implying a 3.2 MMT emissions reduction target related to CHP if total energy efficiency reductions are 12 MMT.⁸

Any of these would be consistent with the changes to other energy sector reductions that have been modified since the 2008 Scoping Plan was originally adopted.

⁴ $6.7/26.3 \times 12 \text{ MMT} = 3.1 \text{ MMT}$.

⁵ Staff Report to the Air Resources Board, "Updated Economic Analysis of California's Climate Change Scoping Plan, March 24, 2010, Table 13, page 37. Energy Efficiency other than CHP accounted for 12 MMT and CHP 5 MMT (all the study found available per footnote 25). $5/(5+12) = 5/17 = 30\%$

⁶ $30\% \times 12 \text{ MMT} = 3.6 \text{ MMT}$

⁷ Staff Report on Initial Statement of Reasons Proposed Regulation to Implement the California Cap-and-Trade Program, Part I Volume I, October 28, 2010, Appendix F, Tables F-7 and F-10.

⁸ Calculation – CHP 4.6 MMT; Electric EE – 9.7 MMT; Gas EE – 2.6 MMT. $4.6 \text{ MMT} / 16.9 \text{ MMT} = 27\%$.
 $27\% \times 12 \text{ MMT} = 3.2 \text{ MMT}$

ATTACHMENT 3 – Inconsistency with the Zero Net Energy Goal

Page 28 of the Discussion Draft states: “ARB is committed to building on upon the recent policies and goals adopted by the CPUC and CEC and supporting the development of a statewide program requiring all new residential and commercial construction to operate with zero net energy use.” The policy goal expects that half of all retrofits will also be zero net energy. The statement that “The ARB is committed to working with the CPUC and CEC to ensure the Scoping Plan goal of 4,000 MW of new CHP is achieved by 2020 and that the Governor’s goal for 6,500 MW of additional installed capacity can be met by 2030” is inconsistent with the zero net energy goal. CHP is not a near zero technology, and a significant amount of the CHP is in the commercial building sector.

Based on the CEC report “Combined Heat and Power: 2011-2030 Market Assessment,” fully one-third to one-half of the new CHP is to expected to come from commercial and residential installations.⁹

⁹ Hedman, Bruce, Ken Darrow, Eric Wong, Anne Hampson. ICF International, Inc., Combined Heat and Power: 2011-2030 Market Assessment, California Energy Commission report CEC-200-2012-002, 2012, Table 56, page 119. Assumes CHP used for air conditioning is primarily in the commercial sector.

ATTACHMENT 4 – CHP Has Reduced GHG Benefit and is Less Cost Effective

In the 2008 Scoping Plan, GHG reductions from CHP were calculated based on natural gas being 80 percent efficient in typical thermal applications and electric generation having a 8300 btu/kWh heat rate (41 percent efficient). But natural gas efficiencies for the separate production of heat and power are much better than that used by ARB in the 2008 Scoping Plan. ARB has used 85 percent efficiency of natural gas boilers in the cap-and-trade regulation in 2010, and the CEC appliances database currently shows over 200 natural gas boiler models with efficiencies exceeding 90 percent.¹⁰ Similarly, gas-fired base load electric generation has improved efficiency tremendously over the last several decades, moving from heat rates of 10 - 12,000 btu/kWh (25-35 percent efficient) for simple cycle combustion to 7000 btu/kWh (48 percent efficient) for modern combined cycle gas turbines.

While the CEC has determined that topping cycle CHP with efficiency greater than 62 percent provides GHG reductions based on the 2008 Scoping Plan benchmarks, current new gas technologies are substantially better than the ARB benchmarks. As a result, new CHP has a substantially lower GHG benefit compared to the separate production of electricity and thermal energy using gas technologies.

Another factor lowering the GHG benefit of CHP is the RPS. As SDG&E's portfolio is increasingly made up of renewable energy, the level of SDG&E's portfolio emissions intensity (GHG per kWh) decreases.¹¹ The CEC report on CHP states:

Analyzing greenhouse gas emissions in the context of all the other statewide reduction programs moving forward concurrently, particularly the RPS renewable percentage generation targets, results in a declining contribution to greenhouse gas emissions reductions over time. The reason for this reduction is that on-site CHP reduces utility demand for electricity. This demand reduction, in turn, reduces the amount of renewable energy capacity needed for utilities to meet their percentage targets. Therefore, with the RPS in place, the avoided utility emissions are only 67 percent of avoided emissions of the marginal fossil fuel electric system.¹²

In other words, the long-term marginal emissions are only two-thirds of efficient natural gas generation once the RPS is reached, so that new CHP will provide little or no long-term GHG reduction compared to separate production of electricity from SDG&E's portfolio after 2017 and efficient natural gas thermal applications.

¹⁰ Initial Statement of Reasons Supporting the Cap-and-Trade Regulation, Appendix J, page J-53 for the 85% figure. CEC Appliances Database, Heating Products, Boilers, subset of natural gas boilers.

¹¹ This statement does not apply to renewable CHP or to bottoming cycle CHP.

¹² Hedman, Bruce, Ken Darrow, Eric Wong, Anne Hampson. ICF International, Inc., Combined Heat and Power: 2011-2030 Market Assessment, California Energy Commission report CEC-200-2012-002, 2012, page 123.

As a derivative of the reduced GHG benefit, the cost effectiveness of natural gas-fired topping cycle CHP as a GHG reduction measure only is impacted.¹³ The cost effectiveness analysis contained in the Compliance Pathways Analysis, Appendix F to the Cap-and-Trade regulation, showed GHG reductions cost \$111 to \$170 per metric ton of CO₂e reduction based on the 2008 benchmarks for separate production of electricity and thermal energy. If the RPS and new gas technologies change the GHG benefit compared to the separate production of electricity and thermal energy, then cost effectiveness is impacted.

The Discussion Draft indicates at page 64: “The ongoing analysis of regulatory measures will also inform the long-term scope of the AB 32 portfolio. Assessing the costs and environmental benefit of each regulatory measure over time can lead to program modification and the improved interaction of regulatory measures as California moves toward long-term climate goals.” With guidance from ARB’s economic advisors, ARB should reassess the cost effectiveness of the CHP measure given the interaction with the RPS to provide for CHP program modification.

¹³ Cost effectiveness is not impacted for renewable CHP and bottoming cycle CHP. Further, CHP that can provide other grid benefits such as local capacity may still be cost effective for other reasons.

ATTACHMENT 5 – Inconsistency with Energy Recommendations Beyond 2020

Beginning at page 83, the Discussion Draft lays out the long-term strategy in the energy sector to “[d]evelop a near zero emission strategy to reduce greenhouse gas emissions in the energy sector, reduce energy costs, and maintain the reliability of the electrical grid.” Since most CHP has marginal GHG reductions or no reductions compared to the separate production of electricity and thermal energy, it is not a near zero emissions strategy.

Further, on page 84, it indicates the plan should “evaluate and recommend the most appropriate combination of clean energy technologies, which include clean **flexible** gas units . . . to maximize decarbonization of the State’s centralized power generating system at the lowest cost.” [Emphasis added] The long term goal is to minimize the use of gas fired generation while maintaining reliability. Flexible natural gas electric generation is required to enable the electric grid to remain reliability with a substantial increase in renewable generation. Flexible gas-fired resources can mitigate the impact of intermittency of variable generation renewables (solar and wind) that fluctuates minute-by-minute and second-by-second due to cloud cover and wind speed variations. Flexible gas-fired resources can also accommodate the impact of solar which increases in the day, but drops to zero production at night. Since customers loads do not change in the same ratio as solar production, flexible gas resources can ramp up to replace the solar energy as the sun sets. Both the California Independent System Operator (CAISO) and the CPUC are preparing for this system impact in defining products such as “flexible capacity” to be acquired to meet the challenges presented by the State’s policies to promote renewable energy.

CHP generation is not a substitute for flexible gas-fired conventional generation and its promotion in the Discussion Draft is inconsistent with the energy recommendations for beyond 2020 given most contracts for CHP will not be in place until near 2020 and the technology has a life of 25-30 years. CHP generation is not flexible capacity, but instead poses added problems for the grid operator since CHP sales of energy to the grid are “must-take.” There is no ability of the CAISO to use CHP to manage the reliability of the grid.