

Docket No.: R.20-11-003  
Exhibit No.: SC-01  
Witness: Cara Bottorff

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Establish  
Policies, Processes, and Rules to Ensure  
Reliable Electric Service in California in the  
Event of an Extreme Weather Event in 2021.

Rulemaking 20-11-003  
Filed November 19, 2020

**PREPARED OPENING TESTIMONY OF  
CARA BOTTORFF**

**ON BEHALF OF SIERRA CLUB**

**SEPTEMBER 1, 2021**

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## **LIST OF EXHIBITS**

Exhibit A: Resume of Cara Bottorff

Exhibit B: United States Environmental Protection Agency Green Book -- National Dataset of all designated areas (excerpted to include only California counties with a nonattainment designation between 2016-2021)

1 Sierra Club submits the following testimony on the Order Instituting Rulemaking to  
2 Establish Policies, Processes, and Rules to Ensure Reliable Electric Service in California in the  
3 Event of an Extreme Weather Event in 2021, proceeding R.20-11-003. This testimony responds  
4 to the August 10, 2021 Assigned Commissioner’s Scoping Memo and Ruling for Phase 2 and  
5 Administrative Law Judge Stevens’ August 11, 2021 e-mail guidance on proposals, and is timely  
6 served.

7 **TESTIMONY OF CARA BOTTORFF**

8 **I. SUMMARY OF TESTIMONY AND FINDINGS**

9 **Q. What are your main recommendations in this testimony?**

10 **A.** Through this testimony, I recommend that the Commission specifically exclude any new  
11 or incremental gas-fired capacity in its procurement, including incremental capacity from  
12 existing gas units.

13 **INTRODUCTION**

14 **Q. Please state your name, occupation, and business address.**

15 **A.** My name is Cara Bottorff. I am a Senior Electric Sector Analyst at the Sierra Club. My  
16 business address is 50 F Street, NW, Eighth Floor, Washington, DC 20001.

17 **Q. On whose behalf are you testifying?**

18 **A.** I am testifying on behalf of Sierra Club.

19 **Q. Please summarize your professional and educational background.**

20 **A.** I am the senior analyst for Sierra Club’s work on gas within several Sierra Club  
21 campaigns including the Beyond Coal Campaign, which aims to transition the United  
22 States to 100% clean energy, and the California-specific My Generation (“My Gen”) campaign,  
23 which works for an equitable transition to 100% clean energy in California. I  
24 support My Gen’s efforts to retire California’s dirtiest power plants—with a priority for  
25 those in the most impacted communities—and replace them with cost-effective clean  
26 energy resources.

1 I have worked on electric sector and gas development issues for six years, primarily with  
2 a focus on the climate, environmental, and equity impacts of gas generation resources,  
3 pipelines, and associated infrastructure.

4 Prior to joining Sierra Club, I worked at Key Log Economics as a Co-Owner and Policy  
5 Analyst. There, I provided ecological economic analysis on gas pipeline development  
6 impacts for submittal to the Federal Energy Regulatory Commission.

7 I have a master's degree in Public Policy and Leadership from the University of Virginia.  
8 A full resume is attached in Exhibit A.

9 **Q. Are you generally familiar with electric utilities, and related policy and regulatory**  
10 **issues?**

11 **A.** Yes. Through my work at Sierra Club, I am deeply involved in issues related to electric  
12 utilities. I track the characteristics of all planned new gas capacity proposals in the United  
13 States, and I conduct alternatives analyses to demonstrate where clean energy options can  
14 provide the same services as planned gas plants at a lower cost. In addition, I work  
15 closely with other environmental and environmental justice organizations to analyze the  
16 impact of electric sector policies and regulatory frameworks to reduce air pollution and  
17 deploy clean, renewable energy.

18 **Q. Are you generally familiar with electric utilities, and related policy and regulatory**  
19 **issues in California?**

20 **A.** Yes. I am involved in issues related to the electric sector and related policy and  
21 regulatory issues in California through utility and geographic region-specific proceedings  
22 about planned new gas capacity. In these situations, I provide our campaign with  
23 estimated pollution impacts, data regarding surrounding communities, and clean energy  
24 alternatives analyses, among other items. I have also analyzed the existing gas generation  
25 fleet in California, including high polluters' proximity to overburdened communities and  
26 nonattainment areas, among other factors.

27 **Q. What is the purpose of your testimony?**

1   **A.**    In this testimony, I outline the climate, public health, and air quality impacts of gas-fired  
2           power plants generally as well as in the particular context of California. I highlight the  
3           unique risks that increased gas plant emissions pose to disadvantaged communities,  
4           particularly during the COVID-19 pandemic. I also explain the findings and implications  
5           of the most recent report from the Intergovernmental Panel on Climate Change (“IPCC”),  
6           the information we have about gas plants’ poor performance during heat events, and the  
7           public safety danger posed by the Russell City gas plant explosion.

8   **Q.**    **Have you ever testified before this Commission?**

9   **A.**    No.

10   **II.    THE CLIMATE, PUBLIC HEALTH, AND AIR QUALITY IMPACTS OF GAS-**  
11   **FIRED POWER PLANTS**

12        **The State of the Climate**

13   **Q.**    **What is your understanding of the current state of the climate and the projected**  
14        **impacts of climate change?**

15   **A.**    In my view and according to other experts across the scientific community, we are in a  
16        code red situation when it comes to climate. The most recent report from the IPCC  
17        sounds the alarm about the current and future dangers of a changing climate. It warns that  
18        climate change is happening more rapidly than previously predicted. The report says that  
19        “hot extremes” will continue to become more intense and more frequent.<sup>1</sup> The same is  
20        true for drought<sup>2</sup> and extreme flooding.<sup>3</sup> These findings make clear that we are facing the  
21        prospect of immense social disruption and humanitarian disasters at a scale we have not  
22        yet grappled with as a civilization.

23   **Q.**    **What is your understanding of climate change’s impacts on California specifically?**

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<sup>1</sup> IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. [https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC\\_AR6\\_WGI\\_Full\\_Report.pdf](https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf), SPM-19.

<sup>2</sup> *Id.* at SPM-19.

<sup>3</sup> *Id.* at SPM-25.

1 **A.** In my view, California, like most other parts of the globe, is experiencing the effects of  
2 climate change, and those effects will likely become more severe over time. The IPCC  
3 Report states that most of North America has seen greater warming than the global mean,  
4 with warming and extreme heat expected to continue rising.<sup>4</sup> Sea levels will also rise.<sup>5</sup>  
5 Already experiencing deadly wildfires and crippling drought, the Western United States,  
6 including California, will see more of both.<sup>6</sup>

7 **Q. In your view, what implications do these recent climate change findings have for the**  
8 **Commission’s decisions about gas plants in this proceeding?**

9 From the IPCC Report, it is evident that we have only a narrow window of time to avoid  
10 the costly, deadly, and irreversible impacts of climate change. This means that we must  
11 immediately end our dependence on fossil fuels. A recent United Nations Environment  
12 Programme report that focuses on methane strongly states “...without relying on future  
13 massive-scale deployment of unproven carbon removal technologies, expansion of  
14 natural gas infrastructure and usage is incompatible with keeping warming to 1.5° C.”<sup>7</sup>

15  
16 For its part, during this critical window of time, the California Public Utilities  
17 Commission (“Commission”) should not authorize any new or incremental climate-  
18 harming gas and should instead swiftly retire existing gas plants and speed up the State’s  
19 transition to 100% clean, renewable energy.

20 **Emissions from Gas Plants and Their Supply Chains**

21 **Q. Please briefly describe the types of emissions that gas plants generate that can**  
22 **impact public health.**

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<sup>4</sup> IPCC, Sixth Assessment Report, Working Group I – The Physical Science Basis, Regional fact sheet – North and Central America  
[https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC\\_AR6\\_WGI\\_Regional\\_Fact\\_Sheet\\_North\\_and\\_Central\\_America.pdf](https://www.ipcc.ch/report/ar6/wg1/downloads/factsheets/IPCC_AR6_WGI_Regional_Fact_Sheet_North_and_Central_America.pdf), p.1.

<sup>5</sup> *Id.* at p.1.

<sup>6</sup> *Id.* at p.3.

<sup>7</sup> United Nations Environment Programme, *Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions*, (May 6, 2021) <https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions>, p. 10.

1    **A.**     Gas-fired power plants, like most combustion-based power plants, generate substances  
2           that are emitted into the surrounding environment. These substances include greenhouse  
3           gases like carbon dioxide as well as criteria pollutants like sulfur dioxide (“SO<sub>2</sub>”),  
4           nitrogen oxides (“NO<sub>x</sub>”), coarse and fine particulate matter (“PM<sub>10</sub>”, “PM<sub>2.5</sub>”), and  
5           other hazardous pollutants like mercury. These emissions all impact public health by both  
6           contributing to the climate crisis and directly harming human health when inhaled.

7    **Q.**     **In your opinion, what are the direct climate-related impacts of gas power plants?**

8    **A.**     From a climate perspective, when including only direct carbon emissions (i.e., the  
9           emissions at the power plant due to the burning of fuel, not including emissions from  
10          extraction, transportation, and storage of fuel), gas plants emit a significant amount of  
11          carbon dioxide. They are roughly half as carbon-intensive as coal-fired plants.

12   **Q.**     **Can you describe the other health impacts from gas plant emissions, outside of the**  
13          **climate impacts?**

14   **A.**     Outside of greenhouse gases, gas plants release a wide range of emissions that are  
15          harmful to human health. Gas plants emit sulfur dioxide, nitrogen oxides, and particulate  
16          matter, each of which can irritate and damage the lungs, with particular risks to children,  
17          the elderly, and people with asthma. Sulfur dioxide damages the lungs, causing wheezing,  
18          shortness of breath, chest tightness, and other problems, as well as increasing the risk of  
19          hospital admissions or emergency room visits.<sup>8</sup> Nitrogen oxides cause inflammation of  
20          airways, reduced lung function, increased asthma attacks, cardiovascular harm, low birth  
21          weight in newborns, and increased risk of premature death.<sup>9</sup> The U.S. Environmental  
22          Protection Agency (“EPA”) suspects that long exposures to elevated nitrogen oxide  
23          concentrations may cause asthma and increased susceptibility to respiratory infections.<sup>10</sup>

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<sup>8</sup> American Lung Association, *Sulfur Dioxide*, <https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/sulfur-dioxide>.

<sup>9</sup> American Lung Association, *Nitrogen Dioxide*, <https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/nitrogen-dioxide>.

<sup>10</sup> U.S. EPA, *Basic Information about NO<sub>2</sub>*, <https://www.epa.gov/no2-pollution/basic-information-about-no2#Effects>.



1 Particulate matter can be coarse (meaning between 2.5 and 10 microns in diameter) or  
2 fine (meaning smaller than 2.5 microns in diameter), and the size determines how far they  
3 can infiltrate the human body.<sup>11</sup> Our bodies might cough or sneeze out coarse particulate  
4 matter, but fine particulate matter can get trapped in the lungs and pass into the  
5 bloodstream.<sup>12</sup> Coarse particulate matter contributes to asthma and chronic bronchitis,  
6 especially in children and the elderly.<sup>13</sup> Because fine particulate matter can penetrate  
7 further into the body, its health impacts are even more severe.

8 **Q. Please explain further how fine particulate matter affects the body.**

9 **A.** Fine particulate matter exposure is very closely connected to decreased lung function,  
10 more frequent asthma symptoms, increased numbers of asthma and heart attacks, more  
11 frequent emergency department visits, additional hospital admissions, and increased  
12 numbers of death.<sup>14</sup> In addition, exposure to high concentrations of fine particulate matter  
13 can elevate the risk of a heart attack within a few hours and up to one day after  
14 exposure.<sup>15</sup> Researchers at Harvard found a clear association between increased risk of a  
15 heart attack in association with high concentrations of fine particulate matter in the  
16 previous 2-hour period, and the risk of a heart attack remained high (increased by 69%)  
17 for the 24 hours following exposure to increased concentrations of fine particulate  
18 matter.<sup>16</sup> Other research supports these connections, including a study that connected the  
19 relationship between daily PM2.5 concentrations and emergency hospital admissions for

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<sup>11</sup> American Lung Association, *Particle Pollution*, <https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/particle-pollution>.

<sup>12</sup> *Id.*

<sup>13</sup> U.S. Energy Information Administration (“EIA”), *Electricity explained: Electricity and the environment*, available at <https://www.eia.gov/energyexplained/electricity/electricity-and-the-environment.php> [hereinafter “EIA: Electricity and the Environment”].

<sup>14</sup> American Lung Association, *Particle Pollution*, <https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/particle-pollution>.

<sup>15</sup> Annette Peters et al., *Increased Particulate Air Pollution and the Triggering of Myocardial Infarction*, Vol. 103:23 *Circulation* 2810-15 (2001), <https://doi.org/10.1161/01.CIR.103.23.2810>.

<sup>16</sup> *Id.*

1 cardiovascular diseases, heart attacks, and congestive heart failure in multiple  
2 communities.<sup>17</sup> Fine particulate matter can also cause emphysema and lung cancer.<sup>18</sup>

3 **Emissions from Gas Extraction, Transportation, and Storage Systems**

4 **Q. Can you describe some of the life-cycle impacts of producing and delivering gas?**

5 **A.** The life-cycle impacts of producing and delivering gas include impacts to the climate and  
6 public health and safety. In terms of impacts to the climate, there are significant direct  
7 and upstream emissions from gas plants. The direct emissions are those at the power  
8 plant due to the burning of fuel. The upstream impacts refer to the emissions that stem  
9 from the process of extracting, processing, and transporting the gas to the power plant  
10 where it will ultimately be burned. At each stage of this upstream process, leaks of  
11 methane, which is the main component of gas and a potent greenhouse gas, can occur and  
12 greatly increase the climate warming emissions associated with the gas plant.<sup>19</sup> On  
13 average, these upstream emissions about double the direct climate impact of a gas plant.<sup>20</sup>  
14 From a public health and safety perspective, the extraction, transportation, and storage of  
15 gas all pose serious risks that include water contamination, air pollution, noise pollution,  
16 light pollution, radionuclide releases, earthquakes, community disruption, fires and  
17 explosions, and air pollution.<sup>21</sup> Water contamination of ground and/or surface water can  
18 occur at gas wells where drilling chemicals (particularly fracking chemicals) can spill or  
19 leach into water sources. Many of these fracking chemicals are toxic; they include  
20 carcinogens (25 percent of fracking chemicals), dermal, ocular, respiratory, and

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<sup>17</sup> Antonella Zanobetti et al., *Fine particulate air pollution and its components in association with cause-specific emergency admissions*, Vol. 8:58 *Environmental Health* (2009).

<sup>18</sup> Sun Young Kyong and Sung Hwan Jeong, *Particulate-Matter Related Respiratory Diseases* (April 2020), *Tuberculosis and Respiratory Diseases*, <https://www.e-trd.org/journal/view.php?doi=10.4046/trd.2019.0025>.

<sup>19</sup> Gunnar Myhre et al., *Anthropogenic and Natural Radiative Forcing*. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (2013), available at [www.climatechange2013.org](http://www.climatechange2013.org).

<sup>20</sup> Based on the 20 year global warming potential of methane of 82.5 from IPCC 6AR WG, Table 7.15, pp.7-125 and a leakage rate of 3 percent from wellhead to power plant. For leakage rate citations see Sierra Club, *Fracked Gas: Nothing “Natural” About It*.

<sup>21</sup> Philip J. Landrigan et al., *The False Promise of Natural Gas*, Vol. 382 *New Eng. Journal of Medicine* 104-107(2020).

1 gastrointestinal toxins (75 percent), chemicals with toxic nervous, immune,  
2 cardiovascular, and renal effects (40 to 50 percent), and endocrine disruptors (30 to 40  
3 percent).<sup>22</sup> Radionuclides can be released from some shale formations that contain  
4 radionuclides such as radon, which can cause cancers (primarily lung cancer).<sup>23</sup>

5 Gas extraction and transportation disproportionately affect low-income communities and  
6 communities of color, exposing them to noise, toxic chemicals, and explosion hazards  
7 and increasing the risk of mental health problems and substance abuse.<sup>24</sup> On average,  
8 over the past 5 years (2015-2020) in the U.S., there was a gas pipeline incident every 5  
9 days that killed someone, sent someone to the hospital, and/or caused a fire and/or  
10 explosion.<sup>25</sup> Gas storage facilities also pose safety risks, as seen from the massive leak at  
11 Aliso Canyon in 2015-2016.

12 **III. GAS-FIRED POWER PLANTS IN CALIFORNIA'S MOST POLLUTED AIR**  
13 **BASINS**

14 **Q. Are these general descriptions of gas plant emissions reflective of gas plant**  
15 **emissions in California?**

16 **A.** Yes, the gas plants in California have the same emissions profile as gas plants elsewhere  
17 in the country. However, gas plant emissions in California are particularly problematic  
18 because the impacted communities already suffer far worse air quality than many other  
19 states.

20 **Q. Do you have any particular concerns regarding California's gas plants?**

21 **A.** Yes. Gas-fired power plants impact the public health of communities wherever they are  
22 located. California is a densely populated state. In Southern California in particular, many  
23 gas-fired power plants are located in densely populated areas, like the Los Angeles

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<sup>22</sup> *Id.*

<sup>23</sup> *Id.*

<sup>24</sup> *Id.*

<sup>25</sup> Based on data from the Pipeline and Hazardous Materials Safety Administration. Pipeline and Hazardous Materials Safety Administration, Distribution, Transmission & Gathering, LNG, and Liquid Accident and Incident Data, U.S. Department of Transportation, available at <https://www.phmsa.dot.gov/data-and-statistics/pipeline/distribution-transmission-gathering-lng-andliquid-accident-and-incident-data>.

1 metropolitan area. This means that California’s gas plants pose a health risk to a  
 2 relatively large population.

3 In addition, many parts of California suffer from persistently poor air quality. Thirty-nine  
 4 of the state’s 58 counties have been in nonattainment for at least one criteria pollutant in  
 5 the past five years.<sup>26</sup> As indicated in Table 1 below, many of California’s air basins are in  
 6 serious, extreme, and/or severe nonattainment for one or more criteria pollutants,  
 7 including El Dorado, Fresno, Inyo, Kern, Kings, Los Angeles, Madera, Merced, Nevada,  
 8 Orange, Placer, Riverside, San Bernardino, San Diego, San Joaquin, Solano, Stanislaus,  
 9 Sutter, Tulare, Ventura, and Yolo counties.<sup>27</sup> For example, in 2019 San Bernardino  
 10 County alone, which is home to over 1.5 million people, has been in nonattainment for  
 11 the following pollutants.

12 **Table 1: 2019 San Bernardino County Nonattainment Classifications**

<b>Criteria Pollutant (standard year)</b>	<b>Area Name</b>	<b>Nonattainment Classification Level (if applicable)</b>
8-Hour Ozone (2008)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA	Severe 15
8-Hour Ozone (2008)	Los Angeles-South Coast Air Basin, CA	Extreme
8-Hour Ozone (2015)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA	Severe 15
8-Hour Ozone (2015)	Los Angeles-South Coast Air Basin, CA	Extreme
PM-10 (1987)	San Bernardino Co, CA	Moderate
PM-10 (1987)	Trona, CA	Moderate
PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA	Moderate
PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA	Serious
PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA	Serious

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<sup>26</sup> See Exhibit B, Excerpts from United States Environmental Protection Agency, *Green Book: Current Nonattainment Counties for All Criteria Pollutants* (data current as of July. 31, 2021), available at <https://www3.epa.gov/airquality/greenbook/ancl.html>.

<sup>27</sup> The order of classification from least serious to most serious is: nonattainment, marginal, moderate, serious, severe, and extreme. “Severe 15” indicates that the area has 15 years to attain the standard.

1 Poor air quality is already a major health hazard. Combined with health risks from  
2 COVID-19, air quality has become even more dangerous. A study by Harvard  
3 University's School of Public Health found that an increase in only 1 µg/m<sup>3</sup> in long-term  
4 exposure to particulate matter was associated with an 8 percent increase in the COVID-  
5 19 death rate.<sup>28</sup> Another analysis found that nearly 80% of the deaths in Italy, Spain,  
6 France, and Germany occurred in the five most polluted regions based on nitrogen  
7 dioxide concentrations.<sup>29</sup> Air pollution must be reduced to protect lives in California's  
8 most vulnerable communities. As the COVID-19 pandemic continues throughout  
9 California, this is not the time to inflict additional pollution and therefore additional  
10 health impacts and risk onto our communities.

11 **Q. Do you have any equity concerns regarding California's gas plants?**

12 **A.** Yes. Approximately 78% of California's gas plants are located within 5 miles of  
13 disadvantaged communities.<sup>30</sup> These gas plants are contributing additional air pollution  
14 to communities that are already overburdened by environmental and health impacts.  
15 California law requires that these communities be prioritized in pollution reduction  
16 efforts. Senate Bill 350 established a requirement to minimize localized air pollutants and  
17 other greenhouse gas emissions, with early priority for disadvantaged communities.<sup>31</sup>  
18 Authorizing additional gas procurement would unlawfully exacerbate these harms.  
19 Upstream impacts of the gas system also harm California's most vulnerable communities.  
20 Recent research shows that California's communities living closest to oil and gas

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<sup>28</sup> See X. Wu et al, Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis, *Science Advances* (2020), available at <https://projects.iq.harvard.edu/covid-pm>; see also <https://www.hsph.harvard.edu/news/hsph-in-the-news/air-pollution-linked-with-higher-covid-19-death-rates/>.

<sup>29</sup> Ogen, Yaron, Assessing nitrogen dioxide (NO<sub>2</sub>) levels as a contributing factor to coronavirus (COVID-19) fatality, *Science Direct* (2020), available at <https://www.sciencedirect.com/science/article/pii/S0048969720321215>.

<sup>30</sup> Brightline Defense, *California Offshore Wind: Winding Up for Economic Growth & Environmental Equity*, (Dec. 2020), pp.12-13, <https://static1.squarespace.com/static/5f434962cbc7a227a863c879/t/5fd959830384a13720d3d61e/1608079766544/Brightline-OffshoreWind-Report-12-6-2020.pdf>.

<sup>31</sup> Cal. Pub. Util. Code § 454.52(a)(1)(I) (requiring that load-serving entities must "minimize localized air pollutants and other greenhouse gas emissions, with early priority for disadvantaged communities").

1 extraction sites with high densities of wells are predominantly low-income households  
2 with non-white and Latinx demographics. Low-income communities and communities of  
3 color that are most impacted by gas extraction in California are at an elevated risk for  
4 preterm birth<sup>32</sup> and low birth weight.<sup>33</sup>

5 **Q. How does the poor air quality in California relate to incremental pollution from gas**  
6 **plants?**

7 **A.** Of the 104 high ozone days<sup>34</sup> in Los Angeles, Riverside, San Bernardino, and Orange  
8 Counties from June through September 2019, gas power plants in these counties ran on  
9 every one of those days, making the poor air quality worse.<sup>35</sup> These counties experience  
10 high ozone days far too often. These 104 high ozone days represent 85% of the days from  
11 June through September 2019. Additional pollution due to incremental capacity additions  
12 of gas plants would even further worsen the poor air quality during the peak summer  
13 months.

14 California's communities already suffer dangerous air quality, and the Commission  
15 should not consider any measure that would *further* worsen air quality at its worst  
16 possible time of year during the worst pandemic in a century. The public health, air  
17 quality, and environmental costs of gas plants, as well as the extraction and delivery  
18 systems required to support them, outweigh the very limited, short-term benefit that such  
19 procurement would provide. Because of these reasons, I recommend that the Commission  
20 specifically exclude incremental gas procurement from any expedited procurement  
21 authorization.

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<sup>32</sup> David J.X. Gonzalez et al., Oil and gas production and spontaneous preterm birth in the San Joaquin Valley, CA: A case-control study, Vol. 4(4) Environmental Epidemiology (2020), doi:10.1097/EE9.0000000000000099.

<sup>33</sup> Kathy V. Tran, Joan A. Casey, Lara J. Cushing, and Rachel Morello-Frosch 2020 Residential Proximity to Oil and Gas Development and Birth Outcomes in California: A Retrospective Cohort Study of 2006–2015 Births Environmental Health Perspectives 128:6 CID: 067001 <https://doi.org/10.1289/EHP5842>.

<sup>34</sup> “High Ozone Day” includes all days in which any site within the four counties (Los Angeles, Riverside, San Bernardino, and Orange County) reported an 8-hour average ozone above the federal standard (i.e., >0.070 ppm).

<sup>35</sup> Gas plant run times based on <https://ampd.epa.gov/ampd/> data and ozone days based on [EPA](#) data.

1 **IV. ADDITIONAL GAS PROCUREMENT CONFLICTS WITH CALIFORNIA'S**  
2 **ENVIRONMENTAL AND EQUITY GOALS.**

3 **California Climate Law**

4 **Q. In your opinion, would additional authorization for procurement of gas-fired energy**  
5 **capacity comply with California climate law?**

6 **A.** No, because the California legislature and Governor's Office have set a clear pathway to  
7 transition away from fossil fuels. Senate Bill ("SB") 100 requires renewable energy and  
8 zero-carbon resources to supply 100 percent of the state's retail sales by the end of  
9 2045.<sup>36</sup> This built on the state's previous 50% renewable energy standard codified in SB  
10 350. In addition, SB 350 set greenhouse gas reduction goals of reducing economy wide  
11 GHG to 40 percent below 1990 levels by 2030 and to 80 percent below 1990 levels by  
12 2050.<sup>37</sup> It is also worth highlighting that SB 350 also gave the CPUC permission to  
13 approve procurement of resource types that will reduce overall greenhouse gas emissions  
14 from the electricity sector but may not compete favorably in price against other resources  
15 over the time period of the integrated resource plan.<sup>38</sup>

16 In addition to legislation, former Governor Jerry Brown issued Executive Order B-55-18,  
17 which requires California "to achieve carbon neutrality as soon as possible, and no later  
18 than 2045."<sup>39</sup> The Commission has been working towards implementing these targets  
19 through a number of proceedings, including the Integrated Resource Planning (IRP).

20 **Q. Would any gas procurement align with the State's climate policy?**

21 **A.** No, any incremental gas procurement is inconsistent with California's climate laws,  
22 particularly the Commission's own planning to implement SB 350. The Commission

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<sup>36</sup> Cal. Pub. Util. Code § 454.53(a) ("It is the policy of the state that eligible renewable energy resources and zero-carbon resources supply 100 percent of all retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045.").

<sup>37</sup> *Id.* § 454.52(a)(1)(H) (directing the CPUC to set a process for each load-serving entity to file an integrated resource plan that will achieve "the economywide greenhouse gas emissions reductions of 40 percent from 1990 levels by 2030.").

<sup>38</sup> *Id.* § 454.52(a)(2)(A).

<sup>39</sup> Executive Order B-55-18 (Sept. 2018), <https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf>.

1 made a detailed analysis in the IRP proceeding to design a Reference System Plan and a  
2 Preferred System Plan that embodied the CAISO-jurisdictional resources needed to meet  
3 the electric sector’s GHG reduction targets. Neither plan included the need for any new  
4 gas capacity. The Commission itself noted that “in no scenario does the model pick new  
5 natural gas plants to be built in the future.”<sup>40</sup> Thus, any gas procurement would provide  
6 new fossil-fueled resource capacity to a system that has no long-term use for it.

7 **Q. Would short term gas procurement, meaning a contract shorter than 9 years, align**  
8 **with California’s climate policy?**

9 **A.** No, even a short term contract would not align with the state’s climate policy because it  
10 would not be minimizing air pollution as required by SB 350.<sup>41</sup> In addition, any gas  
11 procurement that requires a system upgrade carries a significant risk of becoming a  
12 stranded asset, as the facility may become obsolete before the facility can pay off the cost  
13 of the upgrade. Yet, the contract needs to be as short as possible in order to maintain  
14 incentives for the deployment of the significant renewable energy and energy storage  
15 investments needed in order to meet our climate goals. Renewable alternatives and/or  
16 additional energy storage would not face the same risks because they align with  
17 procurement planned in the IRP proceeding.

18 **Priority for Disadvantaged Communities**

19 **Q. Outside of the general climate impacts from the electric sector, do you consider any**  
20 **other state laws and policy relevant to potential additional gas procurement?**

21 **A.** Yes, SB 350 also established a requirement to minimize localized air pollutants and other  
22 greenhouse gas emissions, with early priority for disadvantaged communities.<sup>42</sup> In other  
23 words, the Commission needs to ensure that resource planning prioritizes air pollution  
24 improvements in disadvantaged communities.

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<sup>40</sup> D.18-02-018, p.39.

<sup>41</sup> Pub. Util. Code 454.52(a)(1)(I).

<sup>42</sup> *Id.* (requiring that load-serving entities must “minimize localized air pollutants and other greenhouse gas emissions, with early priority for disadvantaged communities”).



1 **Q. How does the SB 350 legal requirement relate to incremental gas procurement?**

2 As I explained above, approximately and 78% of the state's gas plants are located within  
3 5 miles of a disadvantaged community.<sup>43</sup> Incremental gas capacity at those plants would  
4 correspond to an increased potential to emit air pollutants and greenhouse gases into  
5 disadvantaged communities and other nearby populations. The Commission cannot both  
6 authorize procurement that leads to additional air pollution in the disadvantaged  
7 communities and comply with the directive to prioritize disadvantaged communities. It  
8 would run directly contrary to SB 350's requirement to offer special protection for  
9 disadvantaged communities where populations already face excessive economic, health,  
10 and environmental burdens.

11 **Q. Has the Commission addressed this issue before?**

12 **A.** Yes, the Commission has already set precedent requiring that any load-serving entity that  
13 proposes a new gas plant must make additional showings that a lower-emitting or zero-  
14 emitting resource could not meet the identified resource need, noting:

15 both because of the clear nexus between natural gas generation and  
16 emissions in disadvantaged communities within the electric sector and  
17 because a portfolio that includes new gas plant procurement would be  
18 inconsistent with the portfolio we are adopting in this decision..., we will  
19 require that any LSE proposing to develop new natural gas resources or re-  
20 contract with existing natural gas resources in their IRP for a term of five  
21 years or more, regardless of whether it is located in a disadvantaged  
22 community, make a showing as to why another lower-emitting or preferably  
23 zero-emitting resource could not reasonably meet the need identified.<sup>44</sup>

24 **Q. Would authorization to procure additional gas capacity comply with state law  
25 regarding early priority for disadvantaged communities?**

26 **A.** No, additional gas procurement of gas plants would have direct and obvious impacts on  
27 disadvantaged communities simply because the bulk of California's gas plants are located

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<sup>43</sup> Brightline Defense, *California Offshore Wind: Winding Up for Economic Growth & Environmental Equity*, (Dec. 2020), pp. 12-13.  
<https://static1.squarespace.com/static/5f434962cbc7a227a863c879/t/5fd959830384a13720d3d61e/1608079766544/Brightline-OffshoreWind-Report-12-6-2020.pdf>.

<sup>44</sup> D.18-02-018, p. 70.

1 there. New capacity contracts would lock in additional years of operation into place for  
2 gas plants, including plants that might otherwise be displaced by clean energy resources.  
3 Any new contract for gas capacity reduces the value that could otherwise be captured by  
4 a demand-side resource, new renewable resource, or energy storage facility serving the  
5 same area.

6 **Q. Would a requirement that incremental gas capacity be located in a non-**  
7 **disadvantaged community resolve this problem?**

8 **A.** No, not entirely. Many gas plants in densely populated areas of the state sit in a census  
9 tract that is near, but not specifically inside, a disadvantaged community. Additional  
10 capacity to pollute at these plants could still impact disadvantaged communities by  
11 exacerbating the environmental and health burdens of those census tracts.

12 **Q. You stated that the Commission must ensure that resource planning prioritizes air**  
13 **pollution improvements in disadvantaged communities; has the Commission**  
14 **fulfilled this mandate?**

15 **A.** The Commission has conducted some initial analyses on the air quality impacts to  
16 disadvantaged communities, but more is needed in order to ensure that pollution is indeed  
17 minimized in these overburdened communities. The Commission should further develop  
18 its analysis with more fine-grained, updated data and analysis.

19 **Q. Are other agencies examining the air quality impacts of fossil-fueled generation?**

20 It is my understanding that the California Energy Commission's ("CEC") SB 100  
21 planning will include analysis of air quality in the future, but to my knowledge the CEC  
22 has not yet conducted this important analysis.

23 **V. GAS PLANT FORCED OUTAGES DURING EXTREME WEATHER EVENTS**

24 **Q. In your opinion, are gas plants a reliable grid resource during extreme weather**  
25 **events?**

26 **A.** No. Recent data from the California Independent System Operator ("CAISO") on forced  
27 outages show that gas plants have not reliably performed during extreme heat events

1 when demand is high. For example, the Preliminary Root Cause Analysis of the Mid-  
2 August 2020 Heat Storm found that the gas fleet experienced 1,400 to 2,000 MW of  
3 forced outages during peak demand.<sup>45</sup> The Final Root Cause Analysis confirms this  
4 finding and also appears to suggest over 2,000 MW of forced outages occurred during  
5 certain hours.<sup>46</sup>

6 This summer, CAISO reported that during the June 17 and 18, 2021 heat events, the grid  
7 lost about 2,200 MW of gas capacity.<sup>47</sup> What is more, it appears that the forced outage  
8 rate of gas plants has been increasing in recent years.

9 The gas fleet's poor performance shows that increasing gas plant capacity does not  
10 necessarily increase grid reliability. It therefore makes no sense for California to continue  
11 to rely on gas in the name of reliability.

#### 12 **IV. SAFETY RISKS OF GAS PLANTS**

##### 13 **Q. Do you have other concerns about increasing the state's reliance on gas?**

14 **A.** Yes. An additional concern is that gas plants—even newer plants using more modern gas  
15 turbine and emissions control technologies—can pose a threat to public safety. For  
16 example, the Russell City gas plant, constructed in 2013 and touted by its owners as “the  
17 best damn plant in the fleet,”<sup>48</sup> recently experienced an explosion that catapulted large  
18 hunks of metal hundreds of feet into the air. According to the City of Hayward, where the  
19 plant is located, one piece of metal weighing 15 pounds crashed through the roof of an

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<sup>45</sup> CAISO, CPUC, and CEC, Preliminary Root Cause Analysis of the Mid-August 2020 Heat Storm, p. 8 (the gas fleet experienced 1,400 to 2,000 MW of forced outages during the outages);

<sup>46</sup> See CAISO, CPUC, and CEC, Final Root Cause Analysis, Figure 4.4, Figures B.8-B.19 (showing almost 3,000 MW of forced outages at natural gas plants at various hours of the day during August 14 and 15).

<sup>47</sup> CAISO, 2021 Summer Readiness – July Update, EPR Joint Agency Workshop on Summer 2021 Electric and Natural Gas Reliability (July 8, 2021), <https://efiling.energy.ca.gov/getdocument.aspx?tn=238737>, Slide 3; see also <https://www.politico.com/states/california/story/2021/06/30/old-clunkers-california-power-plants-break-down-during-heat-wave-1387507>.

<sup>48</sup> Mark Specht, *I Toured “the Best Damn Plant in the Fleet.” Two Years Later It Exploded.* (Aug. 12, 2021) <https://blog.ucsusa.org/mark-specht/i-toured-the-best-damn-plant-in-the-fleet-two-years-later-it-exploded/>.

1 unoccupied trailer at the City's Housing Navigation Center, which provides transitional  
2 shelter for people experiencing homelessness.<sup>49</sup> Another piece, weighing 51 pounds,  
3 landed on the City's Water Pollution Control Facility.<sup>50</sup> A dangerous fire at the gas plant  
4 ensued.

5 **Q. What, in your view, should we learn from the Russell City gas plant explosion?**

6 In my opinion, although no one was harmed, the incident underscores the risks associated  
7 with our state's reliance on gas plants. The plant's explosion could have caused grave  
8 harm. What is more, the plant was taken offline for weeks after the explosion providing  
9 no power for the grid. California should stop turning to polluting and risky gas plants as  
10 the solution to the state's reliability needs.

11 **Q. Does this conclude your testimony?**

12 **A.** Yes.

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<sup>49</sup> City of Hayward, Russell City Energy Center, <https://www.hayward-ca.gov/your-government/departments/city-managers-office/russell-city-energy-center>.

<sup>50</sup> *Id.*

1 **VERIFICATION**

2 I, Cara Bottorff, am an employee of the Sierra Club. I am authorized to make this  
3 verification on the organization's behalf. The statements in the foregoing document are true to  
4 my own knowledge, except for those matters that are stated on information and belief, and as to  
5 those matters, I believe them to be true.

6 Further, I certify that I oversaw the preparation of Exhibit B to this testimony and that it  
7 is true and correct.

8 I declare under penalty of perjury that the foregoing is true and correct.  
9 Executed on September 1, 2021, in Charlottesville, VA.

10  
11 /s/Cara Bottorff

12  
13  
14 Cara Bottorff  
15 (202) 675-6698  
16 [Cara.bottorff@sierraclub.org](mailto:Cara.bottorff@sierraclub.org)  
17

**EXHIBIT A**

Exhibit to the Prepared Opening Testimony of Cara Bottorff

On Behalf of Sierra Club

# Cara Bottorff

1450 Stoney Creek Drive | Charlottesville, VA 22902 | 302-584-4358 | cara.bottorff@sierraclub.org

## EDUCATION

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**The University of Virginia, Frank Batten School of Leadership and Public Policy**, Charlottesville, VA **May 2017**  
*Master of Public Policy*: Environmental Policy and Economics

**The University of Virginia, College of Arts and Sciences**, Charlottesville, VA **May 2015**  
*Bachelor of Arts*; Major: Foreign Affairs; Minors: Economics and Global Sustainability

## RELEVANT EXPERIENCE

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**Sierra Club**, Washington DC/Charlottesville, VA

*Senior Electric Sector Analyst*

**June 2021-Present**

- Lead analyst on gas related issues and campaigns at the Sierra Club.
- Provide timely and strategic analysis to support Sierra Club campaigns to track, report on, and expand on gas plant, gas pipeline, LNG export, well closure, and building electrification progress as well as potential new campaign directions.
- Develop, track and analyze results of key performance indicators (KPIs) for stopping new gas plants and building electrification.
- Collaborate with partners and funders to create data, analysis, and materials needed for these campaigns across organizations.
- Contextualize data and analysis for use by communications, organizing, legal, and external partners.
- Incorporate environmental justice data (EPA's EJScreen and CalEnvirScreen) into gas plant analysis.

*Electric Sector Analyst*

**June 2017-June 2021**

- Created and maintained a comprehensive national database to track new planned gas plants and pipelines.
- Developed KPIs for the Beyond Coal Campaign's work to stop new planned gas plants.
- Co-authored report on utility progress toward a clean energy transition ([The Dirty Truth about Utility Climate Pledges](#)).
- Researched and developed a methodology for estimates of lifecycle greenhouse gas emissions of gas infrastructure.

**Key-Log Economics Consulting LLC**, Charlottesville, VA

*Co-Owner and Policy Analyst*

**April 2015-May 2017**

- Co-wrote four reports for clients on various environmental economic issues including gas development.
- Managed three interns and 120+ volunteer reviewers; oversaw tasks and handled high volume communications.
- Addressed client needs through close communication; presented findings to clients; led training workshop.
- Conducted literature reviews of academic and grey literature; compiled best practices.
- Analyzed extensive data sets in excel; synthesized findings for final reports.
- Developed, initiated, and managed an integrated system for crowd-sourced review of public input into federal environmental reviews.
- Planned financial and organizational transition of the company from Single Member to a Multiple Member LLC.
- Prepared and presented testimony on scoping period comment analysis at public hearing regarding the Federal Energy Regulatory Committee hosted by Delaware Riverkeeper Network and others at the National Press Club in Washington DC.

*Independent Researcher*

**May 2014-July 2014**

- Researched and wrote a case study report demonstrating the breadth of payment for ecosystem services programs in the United States; conducted program evaluation to identify process improvement opportunities for these programs.

**Policy Analysis Report for Deloitte Consulting**, Charlottesville, VA

**January 2016-May 2016**

*Independent Policy Analyst*

- Collaborated with other Master of Public Policy candidates to research and write a report on water scarcity in California.
- Analyzed the costs and benefits of demand side management alternatives to reduce water consumed; proposed and ranked viable policy options based on detailed criteria.

**Virginia Energy Efficiency Council**, Charlottesville, VA

**July 2014-September 2014**

*Research Intern*

- Completed a comparative analysis of energy efficiency programs in Virginia, Maryland, and North Carolina.
- Identified performance gaps and available opportunities for Virginia.

**Albemarle County Office of Planning Research Project**, Charlottesville, VA

**January 2014-May 2014**

*Independent Researcher*

- Collaborated on a student-led project to identify a county-wide plan for recreation and open space; considered both current conditions and future possibilities; plan for consideration for addition to Albemarle County's Comprehensive Plan.

## SKILLS

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Microsoft Office (Word, Excel, Powerpoint), Tableau, Analysis, Research, Literature Review, Report Writing, Public Speaking, ArcGIS, QGIS, STATA

**EXHIBIT B**

Exhibit to the Prepared Opening Testimony of Cara Bottorff

On Behalf of Sierra Club



countyname	pollutant	area_name	yr2016	yr2017	yr2018	yr2019	yr2020	yr2021	class	population
Alameda County	8-Hour Ozone (2008)	San Francisco Bay Area, CA	16	17	18	19	20	21	Marginal	1510271
Alameda County	8-Hour Ozone (2015)	San Francisco Bay Area, CA			18	19	20	21	Marginal	1510271
Alameda County	PM-2.5 (2006)	San Francisco Bay Area, CA	16	17	18	19	20	21	Moderate	1510271
Amador County	8-Hour Ozone (2015)	Amador County, CA			18	19	20	21	Marginal	38091
Butte County	8-Hour Ozone (2008)	Chico (Butte County), CA	16	17	18	19	20	21	Marginal	220000
Butte County	8-Hour Ozone (2015)	Butte County, CA			18	19	20	21	Marginal	220000
Butte County	PM-2.5 (2006)	Chico, CA	16	17					Moderate	217626
Calaveras County	8-Hour Ozone (2008)	Calaveras County, CA	16	17	18	19	20	21	Marginal	45578
Calaveras County	8-Hour Ozone (2015)	Calaveras County, CA			18	19	20	21	Marginal	45578
Contra Costa County	8-Hour Ozone (2008)	San Francisco Bay Area, CA	16	17	18	19	20	21	Marginal	1049025
Contra Costa County	8-Hour Ozone (2015)	San Francisco Bay Area, CA			18	19	20	21	Marginal	1049025
Contra Costa County	PM-2.5 (2006)	San Francisco Bay Area, CA	16	17	18	19	20	21	Moderate	1049025
El Dorado County	8-Hour Ozone (2008)	Sacramento Metro, CA	16	17	18	19	20	21	Severe 15	150517
El Dorado County	8-Hour Ozone (2015)	Sacramento Metro, CA			18	19	20	21	Moderate	150297
El Dorado County	PM-2.5 (2006)	Sacramento, CA	16	17	18	19	20	21	Moderate	144214
Fresno County	8-Hour Ozone (2008)	San Joaquin Valley, CA	16	17	18	19	20	21	Extreme	930450
Fresno County	8-Hour Ozone (2015)	San Joaquin Valley, CA			18	19	20	21	Extreme	930450
Fresno County	PM-10 (1987)	San Joaquin Valley Air Basin, CA							Serious	930450
Fresno County	PM-2.5 (1997)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	930450
Fresno County	PM-2.5 (2006)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	930450

Fresno County	PM-2.5 (2012) 8-Hour Ozone	San Joaquin Valley, CA	16	17	18	19	20	21	Moderate	930450
Imperial County	(2008) 8-Hour Ozone	Imperial County, CA	16	17	18	19	20	21	Moderate	174528
Imperial County	(2015)	Imperial County, CA			18	19	20	21	Marginal	174528
Imperial County	PM-10 (1987)	Imperial Valley, CA	16	17	18	19			Serious	146905
Imperial County	PM-2.5 (2006)	Imperial Co, CA	16	17	18	19	20	21	Moderate	154061
Imperial County	PM-2.5 (2012)	Imperial County, CA	16	17	18	19	20	21	Moderate	154061
Inyo County	PM-10 (1987)	Coso Junction, CA							Moderate	7333
Inyo County	PM-10 (1987) 8-Hour Ozone	Owens Valley, CA	16	17	18	19	20	21	Serious	7333
Kern County	(2008) 8-Hour Ozone	Kern Co (Eastern Kern), CA	16	17	18	19	20	21	Severe 15	95176
Kern County	(2008) 8-Hour Ozone	San Joaquin Valley, CA	16	17	18	19	20	21	Extreme	710337
Kern County	(2015) 8-Hour Ozone	Kern County (Eastern Kern), CA			18	19	20	21	Moderate	95066
Kern County	(2015)	San Joaquin Valley, CA			18	19	20	21	Extreme	709869
Kern County	PM-2.5 (2006)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	710137
Kern County	PM-2.5 (2012) 8-Hour Ozone	San Joaquin Valley, CA	16	17	18	19	20	21	Moderate	710137
Kings County	(2008) 8-Hour Ozone	San Joaquin Valley, CA	16	17	18	19	20	21	Extreme	152982
Kings County	(2015)	San Joaquin Valley, CA			18	19	20	21	Extreme	152982
Kings County	PM-2.5 (1997)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	152982
Kings County	PM-2.5 (2006)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	152982
Kings County	PM-2.5 (2012)	San Joaquin Valley, CA	16	17	18	19	20	21	Moderate	152982
Los Angeles County	8-Hour Ozone (2008)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA	16	17	18	19	20	21	Severe 15	378742
Los Angeles County	8-Hour Ozone (2008)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Extreme	9442967
Los Angeles County	8-Hour Ozone (2015)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA			18	19	20	21	Severe 15	377429

Los Angeles County	8-Hour Ozone (2015)	Los Angeles-South Coast Air Basin, CA			18	19	20	21	Extreme	9428411
Los Angeles County	Lead (2008)	Los Angeles County-South Coast Air Basin, CA	16	17	18	19	20	21		9436927
Los Angeles County	PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Serious	9438565
Los Angeles County	PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Serious	9438565
Madera County	8-Hour Ozone (2008)	San Joaquin Valley, CA	16	17	18	19	20	21	Extreme	150865
Madera County	8-Hour Ozone (2015)	San Joaquin Valley, CA			18	19	20	21	Extreme	150865
Madera County	PM-2.5 (2006)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	150865
Madera County	PM-2.5 (2012)	San Joaquin Valley, CA	16	17	18	19	20	21	Moderate	150865
Marin County	8-Hour Ozone (2008)	San Francisco Bay Area, CA	16	17	18	19	20	21	Marginal	252409
Marin County	8-Hour Ozone (2015)	San Francisco Bay Area, CA			18	19	20	21	Marginal	252409
Marin County	PM-2.5 (2006)	San Francisco Bay Area, CA	16	17	18	19	20	21	Moderate	252409
Mariposa County	8-Hour Ozone (2008)	Mariposa County, CA	16	17	18	19	20	21	Moderate	18251
Mariposa County	8-Hour Ozone (2015)	Mariposa County, CA			18	19	20	21	Marginal	18251
Merced County	8-Hour Ozone (2008)	San Joaquin Valley, CA	16	17	18	19	20	21	Extreme	255793
Merced County	8-Hour Ozone (2015)	San Joaquin Valley, CA			18	19	20	21	Extreme	255793
Merced County	PM-2.5 (1997)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	255793
Merced County	PM-2.5 (2006)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	255793
Merced County	PM-2.5 (2012)	San Joaquin Valley, CA	16	17	18	19	20	21	Moderate	255793
Napa County	8-Hour Ozone (2008)	San Francisco Bay Area, CA	16	17	18	19	20	21	Marginal	136484
Napa County	8-Hour Ozone (2015)	San Francisco Bay Area, CA			18	19	20	21	Marginal	136484
Napa County	PM-2.5 (2006)	San Francisco Bay Area, CA	16	17	18	19	20	21	Moderate	136484

Nevada County	8-Hour Ozone (2008)	Nevada Co. (Western part), CA	16	17	18	19	20	21	Serious	82107
Nevada County	8-Hour Ozone (2015)	Nevada County (Western part), CA			18	19	20	21	Moderate	82042
Orange County	8-Hour Ozone (2008)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Extreme	3010232
Orange County	8-Hour Ozone (2015)	Los Angeles-South Coast Air Basin, CA			18	19	20	21	Extreme	3010232
Orange County	PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Moderate	3010232
Orange County	PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Serious	3010232
Orange County	PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Serious	3010232
Placer County	8-Hour Ozone (2008)	Sacramento Metro, CA	16	17	18	19	20	21	Severe 15	338093
Placer County	8-Hour Ozone (2015)	Sacramento Metro, CA			18	19	20	21	Moderate	337840
Placer County	PM-2.5 (2006)	Sacramento, CA	16	17	18	19	20	21	Moderate	314319
Plumas County	PM-2.5 (2012)	Plumas County, CA	16	17	18	19	20	21	Moderate	5843
Riverside County	8-Hour Ozone (2008)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Extreme	1739657
Riverside County	8-Hour Ozone (2008)	Morongo Band of Mission Indians Pechanga Band of Luiseno	16	17	18	19	20	21	Serious	913
Riverside County	8-Hour Ozone (2008)	Mission Indians of the Pechanga Reservation	16	17	18	19	20	21	Moderate	2730
Riverside County	8-Hour Ozone (2008)	Riverside Co, (Coachella Valley), CA	16	17	18	19	20	21	Severe 15	425806
Riverside County	8-Hour Ozone (2015)	Los Angeles-South Coast Air Basin, CA			18	19	20	21	Extreme	1737528
Riverside County	8-Hour Ozone (2015)	Morongo Band of Mission Indians, Pechanga Band of Luiseno			18	19	20	21	Serious	932
Riverside County	8-Hour Ozone (2015)	Mission Indians of the Pechanga Reservation, CA			18	19	20	21	Marginal	639

Riverside County	8-Hour Ozone (2015)	Riverside County (Coachella Valley), CA			18	19	20	21	Severe 15	425029
Riverside County	PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Moderate	1740912
Riverside County	PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Serious	1740819
Riverside County	PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Serious	1740819
Sacramento County	8-Hour Ozone (2008)	Sacramento Metro, CA	16	17	18	19	20	21	Severe 15	1418788
Sacramento County	8-Hour Ozone (2015)	Sacramento Metro, CA			18	19	20	21	Moderate	1418788
Sacramento County	PM-2.5 (2006)	Sacramento, CA	16	17	18	19	20	21	Moderate	1418788
San Bernardino County	8-Hour Ozone (2008)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA	16	17	18	19	20	21	Severe 15	489638
San Bernardino County	8-Hour Ozone (2008)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Extreme	1526629
San Bernardino County	8-Hour Ozone (2015)	Los Angeles-San Bernardino Counties (West Mojave Desert), CA			18	19	20	21	Severe 15	489531
San Bernardino County	8-Hour Ozone (2015)	Los Angeles-South Coast Air Basin, CA			18	19	20	21	Extreme	1526600
San Bernardino County	Carbon Monoxide (1971)	Los Angeles-South Coast Air Basin, CA							Serious	1583687
San Bernardino County	Nitrogen Dioxide (1971)	Los Angeles-South Coast Air Basin, CA							Primary	1583687
San Bernardino County	PM-10 (1987)	Los Angeles South Coast Air Basin, CA							Serious	1583687
San Bernardino County	PM-10 (1987)	San Bernardino Co, CA	16	17	18	19	20	21	Moderate	237418
San Bernardino County	PM-10 (1987)	Trona, CA	16	17	18	19	20	21	Moderate	4167
San Bernardino County	PM-2.5 (1997)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Moderate	1526626
San Bernardino County	PM-2.5 (2006)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Serious	1526626

San Bernardino County	PM-2.5 (2012)	Los Angeles-South Coast Air Basin, CA	16	17	18	19	20	21	Serious	1526626
San Diego County	8-Hour Ozone (2008)	Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation	16	17	18	19	20	21	Moderate	114
San Diego County	8-Hour Ozone (2008)	San Diego County, CA	16	17	18	19	20	21	Severe 15	3095199
San Diego County	8-Hour Ozone (2015)	Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, CA			18	19	20	21	Marginal	13
San Diego County	8-Hour Ozone (2015)	San Diego County, CA			18	19	20	21	Severe 15	3077287
San Diego County	Carbon Monoxide (1971)	San Diego, CA							Moderate ≤ 12.7ppm	2909194
San Francisco County	8-Hour Ozone (2008)	San Francisco Bay Area, CA	16	17	18	19	20	21	Marginal	805235
San Francisco County	8-Hour Ozone (2015)	San Francisco Bay Area, CA			18	19	20	21	Marginal	805235
San Francisco County	Carbon Monoxide (1971)	San Francisco-Oakland-San Jose, CA							Moderate ≤ 12.7ppm	805235
San Francisco County	PM-2.5 (2006)	San Francisco Bay Area, CA	16	17	18	19	20	21	Moderate	805235
San Joaquin County	8-Hour Ozone (2008)	San Joaquin Valley, CA	16	17	18	19	20	21	Extreme	685306
San Joaquin County	8-Hour Ozone (2015)	San Joaquin Valley, CA			18	19	20	21	Extreme	685306
San Joaquin County	Carbon Monoxide (1971)	Stockton, CA							Moderate ≤ 12.7ppm	373545
San Joaquin County	PM-10 (1987)	San Joaquin Valley Air Basin, CA							Serious	685306
San Joaquin County	PM-2.5 (1997)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	685306
San Joaquin County	PM-2.5 (2006)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	685306
San Joaquin County	PM-2.5 (2012)	San Joaquin Valley, CA	16	17	18	19	20	21	Moderate	685306

San Luis Obispo County	8-Hour Ozone (2008)	San Luis Obispo (Eastern San Luis Obispo), CA	16	17	18	19	20	21	Marginal	1649
San Luis Obispo County	8-Hour Ozone (2015)	San Luis Obispo (Eastern part), CA			18	19	20	21	Marginal	1290
San Mateo County	8-Hour Ozone (2008)	San Francisco Bay Area, CA	16	17	18	19	20	21	Marginal	718451
San Mateo County	8-Hour Ozone (2015)	San Francisco Bay Area, CA			18	19	20	21	Marginal	718451
San Mateo County	PM-2.5 (2006)	San Francisco Bay Area, CA	16	17	18	19	20	21	Moderate	718451
Santa Clara County	8-Hour Ozone (2008)	San Francisco Bay Area, CA	16	17	18	19	20	21	Marginal	1781642
Santa Clara County	8-Hour Ozone (2015)	San Francisco Bay Area, CA			18	19	20	21	Marginal	1781642
Santa Clara County	PM-2.5 (2006)	San Francisco Bay Area, CA	16	17	18	19	20	21	Moderate	1781642
Solano County	8-Hour Ozone (2008)	Sacramento Metro, CA	16	17	18	19	20	21	Severe 15	129377
Solano County	8-Hour Ozone (2008)	San Francisco Bay Area, CA	16	17	18	19	20	21	Marginal	285082
Solano County	8-Hour Ozone (2015)	Sacramento Metro, CA			18	19	20	21	Moderate	129291
Solano County	8-Hour Ozone (2015)	San Francisco Bay Area, CA			18	19	20	21	Marginal	284053
Solano County	PM-2.5 (2006)	Sacramento, CA	16	17	18	19	20	21	Moderate	129588
Solano County	PM-2.5 (2006)	San Francisco Bay Area, CA	16	17	18	19	20	21	Moderate	284288
Sonoma County	8-Hour Ozone (2008)	San Francisco Bay Area, CA	16	17	18	19	20	21	Marginal	434421
Sonoma County	8-Hour Ozone (2015)	San Francisco Bay Area, CA			18	19	20	21	Marginal	431795
Sonoma County	PM-2.5 (2006)	San Francisco Bay Area, CA	16	17	18	19	20	21	Moderate	433262
Stanislaus County	8-Hour Ozone (2008)	San Joaquin Valley, CA	16	17	18	19	20	21	Extreme	514453
Stanislaus County	8-Hour Ozone (2015)	San Joaquin Valley, CA			18	19	20	21	Extreme	514453
Stanislaus County	PM-2.5 (1997)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	514453
Stanislaus County	PM-2.5 (2006)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	514453
Stanislaus County	PM-2.5 (2012)	San Joaquin Valley, CA	16	17	18	19	20	21	Moderate	514453

Sutter County	8-Hour Ozone (2008)	Sacramento Metro, CA	16	17	18	19	20	21	Severe 15	3433
Sutter County	8-Hour Ozone (2015)	Sacramento Metro, CA			18	19	20	21	Moderate	3383
Sutter County	8-Hour Ozone (2015)	Sutter Buttes, CA			18	19	20	21	Marginal	3
Sutter County	PM-2.5 (2006)	Yuba City-Marysville, CA							Moderate	94737
Tehama County	8-Hour Ozone (2008)	Tuscan Buttes, CA	16	17	18	19	20	21	Marginal	0
Tehama County	8-Hour Ozone (2015)	Tuscan Buttes, CA			18	19	20	21	Marginal (Rural Transport)	0
Tulare County	8-Hour Ozone (2008)	San Joaquin Valley, CA	16	17	18	19	20	21	Extreme	442179
Tulare County	8-Hour Ozone (2015)	San Joaquin Valley, CA			18	19	20	21	Extreme	442179
Tulare County	PM-2.5 (1997)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	442179
Tulare County	PM-2.5 (2006)	San Joaquin Valley, CA	16	17	18	19	20	21	Serious	442179
Tulare County	PM-2.5 (2012)	San Joaquin Valley, CA	16	17	18	19	20	21	Moderate	442179
Tuolumne County	8-Hour Ozone (2015)	Tuolumne County, CA			18	19	20	21	Marginal	55365
Ventura County	8-Hour Ozone (2008)	Ventura County, CA	16	17	18	19	20	21	Serious	823262
Ventura County	8-Hour Ozone (2015)	Ventura County, CA			18	19	20	21	Serious	820808
Yolo County	8-Hour Ozone (2008)	Sacramento Metro, CA	16	17	18	19	20	21	Severe 15	200849
Yolo County	8-Hour Ozone (2015)	Sacramento Metro, CA			18	19	20	21	Moderate	200849
Yolo County	PM-2.5 (2006)	Sacramento, CA	16	17	18	19	20	21	Moderate	199151
Yuba County	PM-2.5 (2006)	Yuba City-Marysville, CA							Moderate	70218