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*Comment Received From: David Gravereaux
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Dozens of scientists sign letter to California governor urging him to keep Diablo Canyon Power Plant open

Additional submitted attachment is included below.



February 1, 2022
Honorable Gavin Newsom
Governor, State of California
State Capitol, Governor's office
Sacramento, CA 95814

Dear Governor Newsom,

We are some of the leading scientists, entrepreneurs and academics spanning disciplines including climate science, marine biology, air pollution research, energy, planetary science and land conservation. Many of us have dedicated our lives to studying the problems and solutions to energy security and climate change as well as planetary processes in general. With the accelerating threat that climate change poses to life on Earth, we write today to urge that the state reverse the decision to prematurely shut down the Diablo Canyon Nuclear Power Plant, California's single largest source of carbon free electricity.

We commend your genuine commitment to reducing emissions and meeting the growing threat of climate change. Your leadership on this vital issue cannot be overstated. Fidelity to the principles you stand for on climate change, along with the state's mandated emissions goals, however, requires our leaders to acknowledge the hard fact that meeting the state's clean energy goals is incompatible with closing the Diablo Canyon Power Plant. At the very minimum, it's imperative that plans to close the plant be delayed.

California has enacted groundbreaking laws and regulations to shift away from fossil fuels and the emissions they cause. Utilities, like Pacific Gas & Electric (PG&E) must get 100 percent of their electricity from clean sources like wind, solar, geothermal and nuclear power by 2045. Building codes have been enacted that encourage developers to shift away from natural gas in

order to heat homes. The Air Resources Board has also been directed to slash statewide emissions 40 percent below 1990 levels by 2030.

These goals are imperative to meet the threat of climate change, but we will go backwards, not forwards, if the state's largest producer of carbon free energy, Diablo Canyon, is prematurely shuttered.

Senate Bill 1090, authored by Sen. Bill Monning of San Luis Obispo County, amended the Public Utilities Code to mandate that the California Public Utilities Commission replace Diablo Canyon without increasing emissions. This source of clean, zero-emissions power, avoids 7.2 million metric tons of carbon from being added to the atmosphere every year, and the reactors at Diablo Canyon provide approximately 10% of the state's entire electricity portfolio.¹

We are convinced it is impossible to replace the carbon-free electric output of Diablo Canyon at or near the time the plants are scheduled to close.

While California boasts a very high portion of electricity from renewable sources, California will have to boost its total renewable energy production by an enormous 20% in just over two years to replace the clean energy being produced at Diablo Canyon.² With hydroelectric generation in California falling 19% this year as a result of historic droughts (and with that resource likely to remain unpredictable due to climate effects) the prospect of meeting that goal is increasingly dim.³

The joint proposal that was relied upon in deciding to close the plant cautioned that, "the full solution [for Diablo Canyon replacement] will emerge over the 2024-2045 period."⁴ While the California Public Utility Commission

¹ California Energy Commission. (n.d.). *Electric generation capacity and energy*. California Energy Commission. Retrieved September 16, 2021, from <https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/electric-generation-capacity-and-energy>.

² *Id.*

³ *U.S. energy Information administration - eia - independent statistics and analysis*. California's hydroelectric generation affected by historic drought - Today in Energy - U.S. Energy Information Administration (EIA). (n.d.). Retrieved September 10, 2021, from <https://www.eia.gov/todayinenergy/detail.php?id=48616>.

⁴ Joint Proposal of Pacific Gas & Electric Company, Friends of the Earth, Natural Resources Defense Council, Environment California, International Brotherhood of Electrical Workers Local 1245, Coalition of California Utility Employees and Alliance for Nuclear Responsibility to Retire Diablo Canyon Nuclear Power PLant at Expiration of the Current Operating Licenses and Replace it with a Portfolio of GHG Free Resources. Available at: <https://www.pge.com/includes/docs/pdfs/safety/dcpp/JointProposal.pdf>

(CPUC) recently adopted a procurement order that is ambitious, it is unlikely to bring on sufficient resources in time to replace the plant.^{5 6} If indeed renewables could develop at the pace proposed in that order, with Diablo Canyon continuing to operate the result would simply be that the State would achieve its long term decarbonization goals that much sooner.

While decarbonizing the grid, the State must maintain system reliability, through integration of intermittent renewable resources and by other means. As you know, the need for more energy—at a time when the state is producing less—came to a head in August of 2020, when a heat wave triggered rolling blackouts across the state. Without Diablo Canyon, this situation would have been far worse.

We are less and less able to predict extreme weather events including heat waves, which dictate that California utilities switch off electricity to avoid sparking wildfires. It's these conditions that led to a state of emergency, and consequently, the Department of Water Resources is building five new natural gas plants and has removed the cap on emissions.⁷

This dynamic will be severely exacerbated by the closure of Diablo Canyon, as the only functional alternative to immediately replace its output is natural gas. This will have the same impact as adding more than 1 million gasoline powered cars on our roads and streets per year. If there's any doubt that closing Diablo Canyon *will* result in increased use of natural gas, the administration need look no further than the increased emissions following the recent closure of the San Onofre plant. According to the U.S. Energy Information Administration, “after the retirement of the San Onofre Nuclear Generating Station outside Los Angeles, California, natural gas-fired

⁵ Order Instituting Rulemaking to Continue Electric Integrated Resource Planning and Related Procurement Processes. California Public Utilities Commission, June 24, 2021. Available at: <https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K155/389155856.PDF>

⁶ Order Instituting Rulemaking to Continue Electric Integrated Resource Planning and Related Procurement Processes. California Public Utilities Commission, August 17, 2021. Available at: <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M399/K450/399450008.PDF>

⁷ Chediak, M., & Malik, N. S. (2021, August 19). *California to Build Temporary Gas Plants to Avoid Blackouts*. Bloomberg.com. Retrieved September 10, 2021, from <https://www.bloomberg.com/news/articles/2021-08-19/california-to-build-temporary-gas-plants-to-avoid-blackouts>

generation *increased* to offset lost nuclear generation and, at the time, relatively low hydroelectric generation.”⁸

But even if California could replace Diablo Canyon with renewable energy in the near term, that is not the right goal. Mere replacement is not enough; replacement would merely freeze emissions at their currently dangerous level. The right goal is to reduce carbon emissions as fast as possible, and the right means to do that is to add renewables on top of Diablo Canyon’s carbon free energy, not in place of that energy.

The effects of once-through cooling systems on marine life have been studied extensively, with many known remedies and responses. It is important to note that the state has delayed implementation of OTC rules on other gas-fired power plants and it appears it will continue to do so for years to come.⁹ Far better to run Diablo Canyon than those facilities. In any case, it is suggested that new technologies are being evaluated that can allow Diablo Canyon to operate in conformance with state regulations that protect marine life.

Past concerns over the proximity of Diablo Canyon to the Los Osos, Hosgri, San Andreas and Shoreline faults have been addressed fully by the Nuclear Regulatory Commission (NRC). Seismic studies have found the plant design basis can withstand earthquakes of shaking amplitude ten times larger than that which the faults in question are capable of triggering.

Comparisons between Diablo Canyon and Fukushima Daiichi are therefore alarmist and misguided. What caused the Fukushima accident wasn’t the earthquake, but the fact that the plant was built 33 feet above sea level and had its backup diesel generators on the lower level. The generators were inundated when the tsunami hit and they stopped working, causing the meltdown. For comparison, the Onagawa plant in Japan was sixty kilometers closer to the epicenter of the 2011 Tohoku earthquake and experienced a larger tsunami. However, because the plant was built 48 feet above sea level, it survived the earthquake and tsunami largely intact. Notably, Diablo Canyon

⁸ *U.S. energy Information administration - eia - independent statistics and analysis*. Fort Calhoun becomes fifth U.S. nuclear plant to retire in the past five years - Today in Energy - U.S. Energy Information Administration (EIA). (n.d.). Retrieved September 10, 2021, from <https://www.eia.gov/todayinenergy/detail.php?id=28572>

⁹ <https://www.oregister.com/2020/09/01/aging-power-plants-in-southern-california-wont-close-as-scheduled/>

sits on a bluff 85 feet above sea level and has passed multiple NRC safety inspections. It was recently found to face no significant seismic or tsunami hazards.¹⁰

Finally, while we have focused here on Diablo Canyon's capability to support a *faster* and *more reliable* zero carbon transition, a recent analysis by researchers at Stanford University and MIT concluded that keeping the plant online could reduce the cost of that transition by \$2.6 Billion in the short term and up to \$21 Billion over the coming decades. This is the first analysis to look at the economics of Diablo Canyon in the context of the zero-carbon power sector requirement established by law; previous analyses that supported the 2018 shutdown assumed that cheaper gas generation would be available to help provide system reliability, and that is no longer the case.¹¹

It's for these reasons and more that we strongly urge you to delay the closure of the plant until we have a better plan to fully replace it with other clean energy options. The threat of climate change is too real and too pressing to leap before we look. Considering our climate crisis, closing the plant is not only irresponsible, the consequences could be catastrophic. We are in a rush to decarbonize and hopefully save our planet from the worsening effects of climate change. We categorically believe that shutting down Diablo Canyon in 2025 is at odds with this goal. It will increase greenhouse gas emissions, air pollution and make reaching the goal of 100% clean electricity by 2045 much harder and more expensive.

Thank you for your attention to this important issue.

Sincerely,

1. Dr. Steven Chu, Former U.S. Secretary of Energy (Obama Administration), Nobel Laureate (Physics), Professor, Physics and Molecular and Cellular Physiology, Stanford University
2. Richard Rhodes, Science Historian, Pulitzer Prize Laureate

¹⁰ Letter from PG&E to U.S. Nuclear Regulatory Commission, 4/24/18, available at: <https://www.nrc.gov/docs/ML1812/ML18120A201.pdf>

¹¹ Aborn et al, **An Assessment of the Diablo Canyon Nuclear Plant for Zero-Carbon Electricity, Desalination, and Hydrogen Production**, <https://energy.stanford.edu/publications/assessment-diablo-canyon-nuclear-plant-zero-carbon-electricity-desalination-and>

3. Dr. Bruce Damer, Chief Scientist, BIOTA Institute
4. Dr. Kerry A. Emanuel, Professor of Atmospheric Science, MIT
5. Ron Gester, MD, Co-founder & CFO of the Science Council for Global Initiatives; Sierra Club member
6. Dr. James Hansen, Director, Climate Science, Awareness and Solutions, Columbia University Earth Institute
7. Dr. Eric Hittinger, Professor and Interim Department Chair of Public Policy, Rochester Institute of Technology
8. Dr. Jesse Jenkins, Assistant Professor, Department of Mechanical and Aerospace Engineering and the Andlinger Center for Energy and the Environment, Princeton University
9. Dr. Pushker A. Kharecha, Climate Scientist and Deputy Director , Awareness, and Solutions Program, Columbia University Earth Institute
10. Dr. Ross Koningstein, Researcher at Google Climate and Energy Research, PhD in Robotics at Stanford University
11. Dr. Joseph B. Lassiter, III, Heinz Professor of Management Practice in Environmental Management, Retired, Harvard Business School
12. John Mackey, Founder of Animal Compassion Foundation, Board of Directors of Global Animal Partnership, Board of Directors for the Humane Society of the United States, Board Member of Farm Forward, Founder and CEO of Whole Foods
13. Carl Page, President of Anthropocene Institute
14. Yishan Wong, CEO and Founder of Terraformation, Former CEO of Reddit
15. Dr. Dustin Mulvaney, Professor of Environmental Studies at San Jose State University
16. Dr. Richard C. J. Somerville, Distinguished Professor Emeritus, Scripps Institution of Oceanography, University of California, San Diego
17. Dr. David Victor, Professor of Innovation and Public Policy, UC San Diego School of Global Policy and Strategy
18. Dr. George Tynan, Kazuo Iwama Distinguished Professor & Chair of the Mechanical Engineering Department, UC San Diego Jacobs School of Engineering
19. Ramez Naam, Co-Chair Energy and Environment, Singularity University
20. Dr. Zeke Hausfather, Director of Climate and Energy, the Breakthrough Institute
21. Dr. Paulina Jaramillo, Professor of Engineering & Public Policy, Carnegie Mellon University

22. Dr. Carolyn Porco, Planetary Scientist, Visiting Scholar University of California, Berkeley, Fellow of the California Academy of Sciences
23. Creon Levit, Chief Technologist and Director of R&D at Planet Labs. Foresight Institute Senior Fellow
24. Dr. Prof. M. Granger Morgan, Hamerslag University Professor of Engineering Carnegie Mellon University
25. Dr. Jeremiah Johnson, Associate Professor, Department of Civil, Construction, and Environmental Engineering, North Carolina State University
26. Dr. Michael Craig, Assistant Professor of Energy Systems, School for Environment and Sustainability, University of Michigan.
27. Dr Christopher T M Clack, Chief Executive Officer, Vibrant Clean Energy, LLC, Boulder Colorado
28. Dr. Jason McDaniel, Associate Professor of Political Science, San Francisco State University
29. Christine Peterson, Co-Founder and former president of Foresight Institute. Adviser of Machine Intelligence Research Institute, Global Healthspan Policy Institute, National Space Society, and the Voice & Exit conference.
30. Dr. Sudip Mukhopadhyay, co-inventor of [1234yf](#), the world's first low Global Warming Potential automobile refrigerant
31. Jaan Tallinn, co-founder of the Cambridge Centre for the Study of Existential Risk ([cser.org](#)) and Future of Life Institute ([futureoflife.org](#)). Board of Sponsors of the Bulletin of the Atomic Scientists ([thebulletin.org](#)), and has served on the [High-Level Expert Group on AI](#) at the European Commission, as well as on the Estonian President's Academic Advisory Board. Founding Engineer of Skype.
32. Dr. Adam Brandt, Associate Professor, Energy Resources Engineering, Stanford University
33. Dr. Rodney C. Ewing, Department of Geological Sciences, School of Earth, Energy & Environmental Sciences, Stanford University
34. Dr. Pamela Matson, Professor, Department of Earth System Science, Stanford University
35. Dr. Kathy Barker, Clinical Assistant Professor, Department of Health Systems and Population Health, University of Washington
36. Dr. Parth Vaishnav, Assistant Professor of Sustainable Systems, School for Environment and Sustainability, University of Michigan
37. Dr. Morgan E O'Neill, Assistant Professor, Earth System Science, Stanford University

38. Dr. Jacopo Buongiorno, Professor, Nuclear Science and Engineering, Massachusetts Institute of Technology (MIT)
39. Dr. John E. Fernandez, Professor and Director of the Environmental Solutions Initiative, Massachusetts Institute of Technology (MIT)
40. Dr. Menachem Elimelech, Founder of Yale Environmental Engineering Program, Professor of Chemical and Environmental Engineering at Yale, Member of National Academy of Engineering
41. Dr. Ronald. B. Smith, Professor Emeritus of Earth and Planetary Science, Yale University
42. Dr. Anna Dyson, Director, Yale Center for Ecosystems + Architecture, Hines Professor of Sustainable Architecture, Yale Schools of Architecture, Yale School of the Environment
43. Brendan McCord, former HQE/SGE at the Department of Defense, Author of the Department of Defense Artificial Intelligence Strategy, founder of the Joint Artificial Intelligence Center
44. Dr. Julie Zimmerman, Senior Associate Yale Dean of Academic Affairs, Professor of Yale Green Engineering, Assistant Director for Research at Center for Green Chemistry and Green Engineering
45. Dr. Robert O. Mendelsohn, Yale American environmental economist, Edwin Weyerhaeuser Davis Professor of the School of Forestry and Environmental Studies at Yale University, Professor of Economics in Economics Department at Yale University and Professor in the School of Management at Yale University
46. Dr. Arun Majumdar, Professor of Mechanical Engineering and Senior Fellow at Stanford University and at The Hoover Institution.
47. Dr. Ronald Amundson, Professor of UC Berkeley Department of Environmental Science, Policy & Management
48. Dr. Claudia Carr, Associate Professor, UC Berkeley Environmental Science, Policy & Management Department
49. Dr. Robert C. Armstrong, Professor of Chemical Engineering, MIT; Director, MIT Energy Initiative.
50. Dr. Alan Hastings, Distinguished Professor Emeritus, Department of Environmental Science and Policy, U.C. Davis
51. Dr. Daniel Sperling, Director, Institute of Transportation Studies, Distinguished Blue Planet Prize Professor of Civil Engineering and Environmental Science & Policy, University of California, Davis
52. Dr. Michael Springborn, Associate Professor, Department of Environmental Science and Policy, U.C. Davis

53. Dr. Frances C. Moore, Assistant Professor, Department of Environmental Science and Policy, University of California Davis
54. Dr. Susan Harrison, Professor, Dept. of Environmental Science and Policy, U. C. Davis
55. Dr. James N. Sanchirico, Professor, Environmental Science and Policy, University of California, Davis
56. Peter Schwartz, Futurist
57. Dr. Donald R. Blake, Distinguished Professor at University of California, Irvine, Department of Chemistry and an Elected Fellow of the American Association for the Advancement of Science and American Geophysical Union
58. Dr. William J. Cooper, Professor Emeritus, Department of Environmental Engineering, University of California, Irvine
59. Dr. Steven J. Davis, Professor, Department of Earth System Science, University of California, Irvine
60. Dr. Linda Cohen, Professor Emerita of Economics and Law, University of California, Irvine
61. Dr. Efi Foufoula-Georgiou, Distinguished Professor of Civil and Environmental Engineering, University of California, Irvine
62. Dr. Michael K. Stenstrom, P.E., BCEE, Distinguished Professor, Dept of Civil and Environmental Engineering, University of Calif Los Angeles
63. Dr. Laurent Pilon,, Mechanical and Aerospace Engineering, Institute for the Environment and Sustainability, University of California, Los Angeles
64. Dr. Suzanne E. Paulson, Chair, Department of Atmospheric and Oceanic Sciences, Prof., UCLA Institute of the Environment and Sustainability, Director, Center for Clean Air, University of California at Los Angeles
65. Dr. Jasper A. Vrugt, Department of Civil and Environmental Engineering, Associate Professor, University of California, Irvine
66. Dr. Michael L. Ross, Professor, Political Science Department and the Institute of the Environment and Sustainability, University of California, Los Angeles
67. Dr. Shaily Mahendra., Professor and Samueli Fellow, Department of Civil and Environmental Engineering and Institute for the Environment and Sustainability, University of California, Los Angeles
68. Dr. Soroosh Sorooshian, University of California, Irvine, Distinguished Professor and Director, Institute of the Environment and Sustainability, Center for Hydrometeorology and Remote Sensing

69. Dr. Alex Hall, Professor, Atmospheric and Oceanic Sciences, UCLA Institute of the Environment and Sustainability, American Geophysical Union Atmospheric Sciences Ascent Awardee, NSF CAREER awardee, Lamont Fellow, NASA Earth System Science Fellow, NSF Graduate Fellow
70. Dr. Gregory Okin, Professor and Chair, Department of Geography, Professor, Institute of Environment and Sustainability, University of California, Los Angeles
71. Dr. Edward A. Parson, Dan and Rae Emmett Professor of Environmental Law, Faculty Director, Emmett Institute on Climate Change and the Environment Leader, AI Pulse Project, UCLA School of Law
72. Dr. Karen A. McKinnon, Assistant Professor, Institute of the Environment and Sustainability and Department of Statistics, University of California, Los Angeles
73. Dr. Katharine Ricke, Assistant Professor at University of California, San Diego, joint appointment with the Scripps Institution of Oceanography, Assistant Professor, Climate Sciences, Atmospheric Science & Physical Oceanography
74. Dr. Benjamin Grinstein, Distinguished Professor of Physics, University of California, San Diego
75. Dr. Charles F. Driscoll, Emeritus Professor of Physics, University of California, San Diego
76. Dr. Jane L. Teranes, Senior Teaching Professor, Scripps Institution of Oceanography and Faculty Director, Environmental Systems Program, UC San Diego
77. Dr. Jennifer A. Burney, Marshall Saunders Chancellor's Endowed Chair, Global Climate Policy and Research, School of Global Policy and Strategy, University of California, San Diego
78. Dr. Thomas O'Neil, Distinguished Professor of Physics, Emeritus, University of California, San Diego
79. Dr. Ken Caldeira, Senior Scientist, Department of Global Ecology, Carnegie Institution for Science