Appendix B

Public Scoping Documents

Appendix B5

Scoping Comment Letters/Emails

Scoping Comment Letters/Emails

NO.	DATE	FROM
A: Agencies		
A001	11/24/21	Santa Barbara County Energy Minerals Compliance Division
A002	12/2/21	City of Santa Maria
A003	12/1/21	City of Pismo Beach
A004	12/6/21	Santa Barbara County Air Pollution Control District
A005	12/6/21	City of San Luis Obispo
A006	12/6/21	Port San Luis Harbor District
A007	12/6/21	San Luis Obispo County Air Pollution Control District
A008	12/6/21	California Public Utilities Commission
A009	12/6/21	California Department of Transportation
A010	12/6/21	U.S. Fish and Wildlife Service
A011	12/6/21	California Department of Fish and Wildlife
B: Organizations		
B001	10/29/21	Californians for Green Nuclear Energy #1
B002	11/16/21	Californians for Green Nuclear Energy #2
B003	11/29/21	San Luis Obispo Mothers for Peace
B004	12/1/21	Californians for Green Nuclear Power 3
B005	12/1/21	Californians for Green Nuclear Power 4
B006	12/6/21	Santa Lucia Sierra Club and Surfrider Foundation
B007	12/6/21	Californians for Green Nuclear Power 5
B008	12/6/21	Californians for Green Nuclear Power 6
B009	12/6/21	Californians for Green Nuclear Power 7
B010	11/9/21	Avila Valley Advisory Council
C: Tribal Governments		
No comment letters/emails received during scoping		
D: Individuals		
D001	11/1/21	Coleman Miller
D002	11/10/21	Peggy Sharpe
D003	12/6/21	Maia Petrovic
D004	12/6/21	Melinda Forbes

D: Individuals, *continued*		
D005	12/6/21	Sybil Jacobs
D006	12/1/21	Kara Woodruff
D007	12/4/21	L. Jane Swanson
D008	12/4/21	Guy Sharp
D009	12/4/21	Sherri Danoff
D010	12/5/21	Eric Greening
D011	12/5/21	Steven and Zoe Zawalick
D012	12/5/21	Benita Epstein
D013	12/6/21	Sheila Baker
D014	12/6/21	Jill ZamEk
D015	12/6/21	Doug Tait
D016	12/6/21	Melissa Boggs
D017	12/6/21	Sam Blakeslee
D018	12/5/21	Kathi DiPeri

Susan Strachan, Nuclear Power Plant Decommissioning Manager
Planning Department, County of San Luis Obispo, California
976 Osos Street, Room 200
San Luis Obispo, CA 93408
Main Tel: (805) 781-5600 Fax: (805) 781-1242
Email: sstrachan@co.slo.ca.us and diablo@co.slo.ca.us

December 6, 2021

Subject: Collection of Articles Supporting CGNP's Advocacy for the "No Project Alternative" in ED2021-174 / DRC2021-00092

Hello, Ms Strachan:

Here is a Table of Contents for this collection of articles supporting the No Project Alternative for the Diablo Canyon Power Plant (DCPP) cessation of operations and decommissioning project. CGNP continues to observe that per CEQA, this Project as currently documented at the County of San Luis Obispo website is improperly scoped. The project artificially omits the most environmentally harmful step in the process, namely the cessation of operations of the pair of DCPP reactors in 2024 and 2025.

Title	Date	Page
Diablo Canyon Supporters Rally to Keep Diablo Canyon Open	12/4/2021	2
California's Last Nuclear Plant Will Close Soon. Why the Biden Administration wants it open	12/2/2021	11
Keep Diablo Canyon Nuclear Plant Open	12/2/2021	13
California Prepares for More Water Restrictions as Drought Worsens	12/1/2021	15
US energy chief hints California may grant reprieve to its last nuclear plant	11/30/2021	18
The American Nuclear Society Supports Keeping Diablo Canyon Open	11/24/2021	22
California Needs to Keep the Diablo Canyon nuclear plant open to meet climate goals - Chu and Moniz	11/21/2021	27
The Activists Who Embrace Nuclear Power	2/19/2021	31
Shutting Down Nuclear Makes No Sense - Hoff and Zaitz	1/8/2020	41
Closing nuclear plants risks rise in greenhouse gas emissions UCS report warns	11/18/2018	42
Environmental Progress Protest of PG&E A1608006 Cost Claims	9/19/2016	44

These documents are chronologically organized from newest to oldest. Many of the article titles are self-explanatory. Closing DCPP would prevent expansion of its existing desalination plant. Currently, DCPP uses 2 billion gallons of water per day in "once through cooling" to discharge the plant's waste heat into the largest heat sink on the planet, the Pacific Ocean. Research has established that DCPP's operational environmental impacts are negligible because the temperature change between the intake and outfall is only 10 degrees. The increased volume of reject brine with expanded desalination would be difficult to detect at the outfall. The barnacles and mussels that line the intake tunnels grow so vigorously that halfway through the refueling cycle, they must be scraped off while half of the tunnels are temporarily sequentially closed. These filter feeders account for a large fraction of the loss of tiny life forms that are entrained by the plant - comparable to the action of the barnacles and mussels on a few miles of California's rocky coastline. Please note the final document shows how in 2016, PG&E falsely inflated the post-2025 cost of DCPP's generation. The variance that DCPP has been operating under since it began operation in 1984 is consistent with federal 316(b) EPA regulations that take into account the environmental benefits of emission-free nuclear power relative to fossil-fired generation. 316(b) Compliance costs are to avoid being out of proportion to the environmental benefits they provide. CGNP will provide additional documentation supporting the properly-scoped No Project Alternative.

Sincerely, /s/ Gene Nelson, Ph.D. CGNP Legal Assistant
email: government@CGNP.org Phone: (805) 363 - 4697

THE TRIBUNE Newspaper of the Central Coast

Diablo Canyon supporters rally in SLO to keep nuclear power plant open

(This article appeared in the Monday, December 6 2021 print edition of the SLO Tribune on page 5A)

https://www.sanluisobispo.com/news/local/environment/article256324382.html

A “Save Clean Energy” rally held on Saturday, Dec. 4, 2021, in San Luis Obispo called for keeping Diablo Canyon nuclear power plant open.

Group members walked a miniature blimp down Monterey Street. LAURA DICKINSON

More than 100 people gathered in downtown San Luis Obispo on Saturday to voice their support for keeping California’s last remaining nuclear power plant open.

Supporters held a “Save Clean Energy” rally in front of the San Luis Obispo County Government Center on Monterey Street at 11 a.m., shouting their support for keeping Diablo Canyon open.

Speakers included SLO County Supervisor Dawn Ortiz-Legg and Isabelle Boemeke, founder of the Save Clean Energy group.

At one point, participants paraded a miniature blimp down Monterey Street. It was designed to represent the one ton of carbon dioxide.

According to a flyer for the event, the Saturday rally was to express support for keeping open the state's "largest single producer of clean energy."

Stephen Williams of Santa Cruz sported a Diablo Canyon hat. A "Save Clean Energy" rally held on Saturday, Dec. 4, 2021, in San Luis Obispo called for keeping Diablo Canyon nuclear power plant open. Laura Dickinson LDICKINSON@THETRIBUNENEWS.COM

"We cannot afford to take a step backwards in our fight to save the planet," the flyer read. "Join us as we rally to save this essential source of zero-emissions energy." The nuclear power plant is set to shutter in 2025 when the final license for nuclear reactors expires.

The rally was being held in the wake of a new push to keep the plant open. A Stanford and Massachusetts Institute of Technology report released in November claimed keeping Diablo Canyon open for 10 years beyond its expected closure would drastically help the state meet its clean energy goals.

After the report was released, government officials — both local and national — have voiced support for keeping the plant open.

PG&E however, has repeatedly said it does not plan to reverse course on decommissioning the plant.

Isabelle Boemeke, founder of the Save Clean Energy group, spoke at a rally to keep Diablo Canyon nuclear power plant from closing, on Saturday, Dec. 4, 2021, in San Luis Obispo. Laura Dickinson

SLO County Supervisor Dawn Ortiz-Legg spoke at the “Save Clean Energy” rally held on Saturday, Dec. 4, 2021, in San Luis Obispo. It called for keeping Diablo Canyon nuclear power plant open. Laura Dickinson

Isabelle Boemeke is founder of the Save Clean Energy group that held a rally to keep Diablo Canyon from closing, on Saturday, Dec. 4, 2021, in San Luis Obispo. Laura Dickinson

A “Save Clean Energy” rally held on Saturday, Dec. 4, 2021, in San Luis Obispo called for keeping Diablo Canyon nuclear power plant open. Laura Dickinson LDICKINSON@THETRIBUNENEWS.COM

ENVIRONMENT Diablo Canyon is closing soon. Here’s why the Biden administration wants it open DECEMBER 02, 2021 3:26 PM

ENVIRONMENT Study says keeping Diablo Canyon open would help CA meet energy needs — but is it too late? NOVEMBER 11, 2021 1:32 PM

KAYTLYN LESLIE 805-781-7928 Kaytlyn Leslie writes about business and development for The San Luis Obispo Tribune. Hailing from Nipomo, she also covers city governments and happenings in the South County region, including Arroyo Grande, Pismo Beach and Grover Beach. She joined The Tribune in 2013 after graduating from Cal Poly with her journalism degree.

Carolyn Porco Photo Credit: BENJO ARWAS/GETTY IMAGES

Gene Nelson, Ph.D. notes:

I would estimate there were closer to 200 people at the Rally for Clean Energy. I took many photos and videos.

The above article failed to mention the speaker whose speech brought several people, including Isabelle Boemeke, to tears. Her name is **Dr. Carolyn Porco.** Isabelle credits Dr. Porco for sparking her advocacy for nuclear power via her 2015 talk on molten salt reactors. More here: https://www.vice.com/en/article/y3gg3k/tiktok-influencer-isodope-is-stanning-for-nuclear-energy Dr. Porco noted in her December 4, 2021 remarks, "There is no Planet B" - a theme from her March 16, 2020 TED talk https://www.youtube.com/watch?v=dR9uhc_yQjQ

Here's her bio from **http://carolynporco.com/about/biography/**

Carolyn Porco is the leader of the imaging science team on the **Cassini** mission in orbit around Saturn from 2004 to 2017, a veteran imaging scientist of the **Voyager** mission to the outer solar system in the 1980s, and an associate member of the **New Horizons** mission to Pluto and the Kuiper Belt. Carolyn has co-authored over 125 scientific papers on a variety of subjects in astronomy and planetary science and has become a regular public commentator on science, astronomy, planetary exploration, and the intersection of science and religion. Her popular science writings have appeared in such distinguished publications as the London Sunday Times, The New York Times, The Wall Street Journal, the Guardian, Astronomy magazine, the PBS and BBC websites, the Arizona Daily Star, Sky and Telescope, Scientific American, and American Scientist.

Carolyn's research over the past 40 years has ranged across the outer solar system to the interstellar medium. Before Cassini's arrival at Saturn in 2004, her research focused on the planetary rings encircling the giant planets and the interactions between rings and orbiting moons. In particular, she was responsible for the discovery of one of the Neptune ring arcs; for elucidating the behavior of the non-axisymmetric rings and ring edges in the rings of Saturn, Uranus and Neptune; and working with Mark Marley (now at NASA Ames Research Center) in predicting in 1993 that acoustic occultation within the body of Saturn could produce specific wave features in Saturn's rings. This prediction was verified 20 years later using Cassini occultation observations, resulting in the first demonstration that planetary rings could serve as a seismograph and ultimately provide the means to improve knowledge of a planet's internal structure.

Carolyn has also been responsible for leading the Cassini imaging team in a host of seminal discoveries on Jupiter and its ring during Cassini's flyby of that planet in 2000/2001, and on Saturn and its rings and moons since the spacecraft's arrival there in 2004.

For the past decade, Carolyn has turned her attention primarily to the study of **Enceladus**, the small Saturnian moon whose south polar region was found, in images taken by her Cassini team, to be the site of over 100 tall geysers of icy particles erupting from four distinct, deep fractures crossing the region. This and many other Cassini findings point to a long-lived, sub-surface, salty, organics-rich global ocean, thicker beneath the south polar terrain than elsewhere, as the geysers' source, making Enceladus home to the most accessible extraterrestrial habitable zone in the solar system.

Carolyn continues to be active in the presentation of science to the public as the leader of the Cassini Imaging Team. She is the creator/editor of the team's **CICLOPS** website where Cassini images are posted, and she writes the site's homepage "Captain's Log" greetings to the public. Carolyn is a popular public lecturer and **speaks frequently** on the Cassini mission and planetary exploration in general. She has presented at such renowned cross-disciplinary conferences as TED (2009, 2007) and PopTech (2006, 2005). She also **appears frequently** in the media; as of 2016, she is a StarTalk All Stars host. Carolyn is the CEO and President of **Diamond Sky Productions, LLC**.

For the 1997 film Contact, based on the novel by fellow astronomer Carl Sagan, Carolyn served as the **consultant on the main character, Ellie Arroway**. In 2008, she was invited by J.J. Abrams, the director/producer of the 2009 release, Star Trek, to join the film's production crew as a consultant on planetary imagery. Carolyn was responsible for the proposal to honor the late renowned planetary geologist Eugene Shoemaker by sending a portion of his **cremains to the moon** aboard the Lunar Prospector spacecraft. She also conceived of the **epitaph**, engraved on a thin brass foil, which accompanied the ashes to the moon.

Carolyn played instrumental roles in the taking of three iconic photographs of planet Earth from the outer solar system. She participated, along with Carl Sagan, in planning and executing the 1990 "Portrait of the Planets" taken with the Voyager 1 spacecraft, which included the famous **Pale Blue Dot** image of Earth. Later with Cassini, she and her team took one of Cassini's **most beloved images** of Saturn and its rings during the planet's solar eclipse, with Earth visible in the distance.

And she is the creator of **The Day The Earth Smiled**, an event that took place on July 19, 2013, when Cassini once again pointed sunward to image Saturn, its rings and the Earth. This time, however, a **long-distance photo of Earth** was taken with the full advance knowledge of members of the public, who were invited to take part in a day of reflection and celebration of humanity's place in the cosmos. The event was **enjoyed by people all over the globe**.

Carolyn has been the recipient of a number of **awards and honors** for her contributions to science and the public sphere. She is the namesake of Asteroid (7231) Porco, which was named to honor her work in planetary science. In 1999, she was selected by the London Sunday Times as one of 18 scientific leaders of the 21st century, and by Industrial Week as one of "50 Stars to Watch". In 2009, New Statesman named her as one of the "50 People Who Matter Today." In 2010 she was awarded the Carl Sagan Medal, presented by the American Astronomical Society for Excellence in the Communication of Science to the Public. And in 2012, she was named one the 25 most influential people in space by TIME magazine. Since 2015, Carolyn has been a visiting distinguished scholar at the University of California at Berkeley and, since 2017, a fellow of the California Academy of Sciences.

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Cassini Imaging Team Website: **http://ciclops.org/?js=1**

Diamond Sky Productions: **http://diamondskyproductions.com/recent/**

NASA's Cassini: Best Photos of Saturn and its Moons As Spacecraft Prepares for Grand Finale Death Dive BY **STAV ZIV** ON 09/06/17 AT 12:16 PM EDT, NEWSWEEK.

HTTPS://WWW.NEWSWEEK.COM/2017/09/22/NASA-CASSINI-BEST-PHOTOS-SATURN-MOONS-SPACECRAFT-PREPARES-GRAND-FINALE-DEATH-659830.HTML

THE SACRAMENTO BEE

California's last nuclear plant will close soon. Why the Biden administration wants it open

https://www.sacbee.com/news/california/article256286862.html and
https://www.sanluisobispo.com/news/local/environment/article256297532.html
Front page story in the December 5, 2021 *The San Luis Obispo Tribune* print edition.

Steam is released from reactor No. 1 at Diablo Canyon nuclear power plant at Avila Beach in a May 2000 file image. STEVE OSMAN LOS ANGELES TIMES/TNS

It's California's last nuclear plant, destined to be mothballed in four years amid concerns that its closure could leave a gaping hole in the state's power supply.

Now the Biden administration is pushing the idea that PG&E Corp.'s Diablo Canyon power plant should stay open, after all.

U.S. Energy Secretary Jennifer Granholm, in an interview this week with Reuters, said California might want to preserve Diablo Canyon, located on the Pacific coast in San Luis Obispo County, as a source of low-carbon energy in an era of climate change.

"California has been very bullish on zero-carbon emission energy," Granholm said. Keeping the plant open "may be something that they decide to take a look at, given that I think there is a change underfoot about the opinion that people may have about nuclear."

Although PG&E says it still plans to close Diablo Canyon, the energy secretary's comment comes as others are pushing for a reprieve. In November, a high-profile study produced by scientists at Stanford and MIT called for the plant to stay open.

Opponents of Diablo Canyon said they fear a bandwagon effect is emerging to prolong the plant's life. "It's like a freight train coming toward us," said Linda Seeley, of the group San Luis Obispo Mothers for Peace. "They're not looking at the issue of having a 40-year-old nuclear power plant on 13 faults."

Diablo Canyon produces about 9% of the state's electricity supply, and state officials have warned that its planned shutdown in 2025 could undermine the state's efforts to keep the lights on. California already experienced two nights of rolling blackouts in 2020 and narrowly avoided more blackouts during this year's heatwave in July.

"The period after the Diablo Canyon retirement will be a critical point for system reliability," the Independent System Operator, which manages the state's power grid, said in a May 2020 report to the Public Utilities Commission.

Officials with the grid operator and the utilities commission weren't immediately available for comment. And some critics of Diablo Canyon say the state's energy picture isn't as dire as it seemed even a few months ago.

Mark Specht, an energy analyst with the Union of Concerned Scientists in Oakland, said state officials have done a good job of forcing utilities to procure more clean energy as a means of plugging the gap that Diablo Canyon will leave. "I've seen the state make some significant progress...they're taking this issue pretty seriously," he said.

Still, Granholm's comments gave hope to those in the region pushing for Diablo Canyon to stay open. **"We need the reliable power," said Gene Nelson, a leader in a San Luis Obispo County group called Californians for Green Nuclear Power. "We definitely have optimism that sane minds do exist within**

Dawn Ortiz-Legg, a county supervisor whose district includes the area around Diablo Canyon, said she's "encouraged that the conversation is continuing .... If we are serious about climate change, we can't take any conversation off the table."

Nevertheless, PG&E insists it's committed to closing the plant — largely because of economic reasons — and is moving ahead with plans to add more renewable energy such as solar and wind power to its portfolio. "As a regulated utility we're required to follow the energy policies of the state of California. We are committed to California's clean energy future," utility spokeswoman Suzanne Hosn said Thursday. "That is our unwavering position."

The Legislature and the Public Utilities Commission have signed off on PG&E's plan to close Diablo Canyon's two operating units in 2024 and 2025. Granholm said that while the decision is up to California, she might talk to state officials about saving the plant. "Perhaps it's something that they might reconsider," she said. The plant opened in the mid-1980s and has performed reliably. In 2013 questions about plant safety arose when an inspector with the Nuclear Regulatory Commission raised concerns about earthquake faults around the facility.

Three years later, PG&E said it would close the plant but cited financial and operational concerns, not earthquake risks.

"As more solar generation comes on line over time, and when its output is at peak supply (e.g., in the middle of the day), there is less room on the electric system for energy from inflexible and large baseload resources such as Diablo Canyon," the company said in a 2016 report to the utilities commission.
This story was originally published December 2, 2021 12:56 PM.

DALE KASLER 916-321-1066 Dale Kasler covers climate change, the environment, economics and the convoluted world of California water. He also covers major enterprise stories for McClatchy's Western newspapers. He joined The Bee in 1996 from the Des Moines Register and graduated from Northwestern University.

DAILY BREEZE

Keep Diablo Canyon nuclear plant open

This Nov. 3, 2008, file photo shows one of Pacific Gas and Electric's Diablo Canyon Power Plant's nuclear reactors in Avila Beach, Calif.

By **THE EDITORIAL BOARD** | opinion@scng.com |

PUBLISHED: December 2, 2021 at 8:58 a.m. | UPDATED: December 2, 2021 at 10:50 a.m.

https://www.dailybreeze.com/2021/12/02/keep-open-diablo-canyon-nuclear-plant/

California needs reliable, zero-carbon energy to power the state and meet its climate goals, yet the last remaining nuclear power plant in the state, Diablo Canyon, is set to close. Investor-owned utility PG&E made the decision in 2016 to allow the licenses for the plant's two reactors to expire. They will shut down in 2024 and 2025.

Diablo Canyon has been producing about 8% of the electricity used in California. It is a zero-carbon energy source that's steady and reliable when the sun goes down, when the wind doesn't blow and when drought conditions reduce the output of large hydroelectric plants. In July, as a wildfire in Oregon threatened transmission lines on which California relies for imported electricity, the Diablo Canyon nuclear plant was essential to keeping the state's lights on.

When Diablo begins to shut down, what will replace the energy it produces? That's still a work in progress.

The California Public Utilities Commission issued an order to utilities demanding that they buy a massive amount — a total of more than 14,000 megawatts — of renewable energy and battery storage in the coming years. However, that may not be sufficient to prevent electricity shortages in the hot summer months, according to the California Energy Commission and the state's grid operator.

The Biden administration may get involved. On Tuesday, Energy Secretary Jennifer Granholm said she thinks “there is a change underfoot about the opinion that people may have about nuclear” and she said she would be willing to talk with state officials about keeping Diablo open. Also on Tuesday, the Biden administration said it is actively searching for communities that would be willing to do their part to fight climate change by hosting nuclear waste sites. Then “those communities that have nuclear facilities won’t have to worry about that problem,” Granholm said.

We’ll keep checking in to see how that search is coming along, but in the meantime, California has to figure out how to procure enough electricity to meet the needs of the state’s residents and businesses without the perpetual risk of dangerous power outages. In addition to shutting down Diablo Canyon, the state is phasing out **four** electricity-generating plants that run on natural gas. They are all scheduled to be closed by the end of 2023, if not sooner.

In the scramble to procure more renewable energy, there has not been much discussion of the cost to ratepayers. Southern California Edison estimated in 2019 that it could cost up to $250 billion to meet the state’s goal of carbon neutrality by 2045. It would not be surprising if state regulators allowed utilities to recoup those billions of dollars through higher rates or surcharges.

An honest public discussion of the cost and limitations of solar, wind and battery-storage energy would be helpful as the state works through these challenges. Solar and wind energy will always be intermittent, and large-scale batteries that can supply power for longer than four hours are still in development.

Nuclear power has serious challenges, too. The dangerous waste-storage problem has simply not been solved, anywhere in the world. **But if the goal is zero-carbon energy that is reliable and affordable, keeping Diablo Canyon open beyond 2024 and 2025 makes sense.** Ultimately, the future of the nuclear plant is up to its owner, PG&E. However, public officials would be wise to do what they can to extend the life of Diablo Canyon until other renewable energy sources can stand on their own.

THE WALL STREET JOURNAL.

California Prepares for More Water Restrictions as Drought Worsens

The state plans to virtually eliminate the water it supplies to local communities, which are running out of alternatives

Houseboats on California's Lake Oroville in October after storms raised the reservoir more than 16 feet, according to the California Department of Water Resources.
PHOTO: NOAH BERGER/ASSOCIATED PRESS

By Jim Carlton Dec. 1, 2021 5:18 pm ET
https://www.wsj.com/articles/california-prepares-for-more-water-restrictions-as-drought-worsens-11638397099

Californians may face new restrictions, including fines for improperly washing their cars, as the state prepares to virtually eliminate the water it supplies to local communities as it grapples with an unrelenting drought.

The state's Department of Water Resources said Wednesday that for the first time it is preparing to allocate 0% of the water it is contracted to give next year to local districts, which handle what goes into the taps of homes, businesses and farms. That means that unless drought conditions ease, no supplies will be shipped except for critical health and safety needs, such as drinking water and sanitation.

The most the state previously cut back on its water allocations was 5% of what was contracted, which it did twice over the past quarter of a century, including last spring.

“We need to prepare now for a dry winter and severe drought conditions to continue through 2022,” said Department of Water Resources Director Karla Nemeth.

Local agencies will have to rely largely on other sources to try to make up the difference. Many have supplies stored underground as well as in local reservoirs that are fed by rainwater and water, such as runoff from golf courses and wastewater, that has been treated. However, that often isn’t enough to cover all of communities’ water needs for multiple years.

Southern California agencies are generally better stockpiled with their own reserves than those in Northern California because the Los Angeles region went through a crippling drought in the 1990s and took steps to adapt in the aftermath, according to water management authorities.

Several local water agencies, including in the city of San Francisco, don’t use state water at all.

Reservoirs and wells across California are drying up as a two-year drought threatens to extend into a third year. The state’s second-biggest reservoir, Lake Oroville, is at 30% capacity compared with a historic average for this time of year of 60%. The Folsom Lake reservoir has fallen to 37% of capacity from its historic level of 92%, according to state figures.

Those readings would be worse if not for a deluge of precipitation in October when one of the strongest atmospheric rivers in decades slammed into California. Downtown San Francisco recorded 7.04 inches of rain in October, the most in that month since 1889.

A sprinkler was used to water grass in Alhambra, Calif., in September.

PHOTO: FREDERIC J. BROWN/AGENCE FRANCE-PRESSE/GETTY IMAGES

Dryness returned in November, when San Francisco recorded just 1.28 inches, or half its normal amount, as a ridge of high pressure diverted storms to the Pacific Northwest. With forecasts of a La Niña weather pattern that often results in dry winters in California, officials are worried that prolonged drought could wreak more havoc on a state where the agriculture industry is already struggling with reduced water supplies.

“We’re worried about running out next year,” said Gary Kremen, vice chair of the Santa Clara Valley Water District, which supplies water to two million people in Silicon Valley.

On Tuesday, California’s State Water Resources Control Board unveiled draft emergency regulations to make practices such as washing a car without a shut-off nozzle a violation punishable by a fine. The board employed similar bans during California’s last drought, which lasted from 2013 to 2017..

Local water agencies are rolling out their own conservation plans. The Indian Wells Valley Water District, around Palm Springs, and the Marin Municipal Water District north of San Francisco have mandated cutbacks by customers, as have agricultural ones such as the Modesto Irrigation District in central California. Most other agencies so far have asked users to conserve, but water officials say that if necessary restrictions will be ramped up.

Some water providers are in worse shape than others. The Santa Clara district, which gets nearly half from imported state and federal supplies, has little backup water because its local reservoirs have declined to 11% of capacity, according to Mr. Kremen.

“Praying for rain will help,” he said.

Write to Jim Carlton at jim.carlton@wsj.com
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Appeared in the December 2, 2021, print edition as 'More Water Curbs Loom in California.'

REUTERS

COMMODITIES NEWS

NOVEMBER 30, 2021 3:51 PM UPDATED 2 DAYS AGO

U.S. energy chief hints California may grant reprieve to its last nuclear plant

By Timothy Gardner

https://www.reuters.com/article/usa-nuclearpower-granholm-idAFL1N2SL3SS

5 MIN READ

WASHINGTON, Nov 30 (Reuters) - California may reconsider whether to close its last nuclear power plant as public support has grown for the low-carbon energy source, U.S. Energy Secretary Jennifer Granholm told Reuters on Tuesday.

She added she was willing to eventually talk with state officials about keeping the Diablo Canyon plant open.

The Biden administration has expressed support for the nuclear power industry as crucial to its goal of decarbonizing the U.S. electrical grid by 2035.

"California has been very bullish on zero-carbon emission energy," Granholm said in a wide-ranging interview to be broadcast next week at the Reuters Events conference Energy Transition North America 2021 here, where leaders will discuss the move to clean energy.

“It may be something that they decide to take a look at, given that I think there is a change underfoot about the opinion that people may have about nuclear.”

Utility PG&E decided in 2016 to allow the licenses for two Diablo Canyon reactors to expire in 2024 and 2025. That move would close the last nuclear power plant in the country’s most populous state where the public was worried about earthquakes, nuclear waste and use of seawater to cool the plants.

But because nuclear power now accounts for about a fifth of U.S. electricity, reactor shutdowns expand the country’s need for clean energy, making Biden’s goals harder to reach.

Reactors in Connecticut, New York, South Carolina and other states are also in danger of shutting as utilities turn to plants that burn low-cost natural gas to generate electricity.

The Biden administration on Tuesday announced it is seeking feedback from local communities on whether they would host interim sites to store nuclear waste. Such a step could lead to a more permanent and centralized fix for dealing with radioactive waste now stored in casks and pools at 76 reactor sites across 34 states.

Granholm said the Energy Department will talk with communities in the next few months about opportunities for interim sites that can create local jobs.

“If it’s a community that is more favorable toward nuclear power, they might not be averse to taking on the waste problem, so that those communities that have nuclear facilities won’t have to worry about that problem,” Granholm said.

While California is well known for earthquakes, nuclear plants in South Carolina and Missouri face far higher quake risks here than Diablo Canyon does, according to the Union of Concerned Scientists nonprofit group.

A report this month from researchers at Stanford and the Massachusetts Institute of Technology (MIT) said California should extend the life of Diablo Canyon to meet state climate goals.

Granholm said any decision on keeping Diablo open is up to California and did not indicate she had any information that regulators were set to change their position.

“This is clean dispatchable base load power. ... I know the decision has been made already to close it down, perhaps it’s something that they might reconsider,” she said.

And she hinted she would be willing to give her persuasion skills with officials in California, a state plagued with power outages and climate-related wildfires, a try. “Let’s just get through this consent-based siting process first and certainly I’m willing to have those conversations.”

PG&E spokesperson Suzanne Hosn said the plan to shut the plant was approved by the California legislature and state regulators and the company's focus is on safely operating the plant until the end of its licenses.

California Public Utility Commission spokesperson Terrie Prosper said the commission had not received any proposals to extend the life of the reactors, and said certain upgrades would be required for the licenses to be extended. (Reporting by Timothy Gardner; additional reporting by Nichola Groom; Editing by David Gregorio)

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https://www.reuters.com/article/usa-nuclearpower-earthquakes-idINL1N2HD11P

OIL REPORT
OCTOBER 22, 20208:21 AM UPDATED A YEAR AGO

U.S. nuclear plants in S. Carolina, Missouri face the highest quake risks - report

By Timothy Gardner
3 MIN READ

WASHINGTON, Oct 22 (Reuters) - The U.S. nuclear power reactors facing the highest risks of a meltdown from earthquakes are not in tremor-prone California, but states including South Carolina and Missouri, an analysis of government data published on Thursday said.

The chances of an earthquake leading to meltdowns are small, but the results would be grave. A tsunami generated by a 2011 earthquake led to the meltdowns of three reactors at the Fukushima Daiichi nuclear power station in Japan, causing radiation releases and mass evacuations.

The U.S. reactor facing the highest risk is Duke Energy Corp's H.B. Robinson near Hartsville, South Carolina, according to the analysis here by the Union of Concerned Scientists.

Robinson faces a one in 7,700 chance annually that a quake would cause a meltdown, said the analysis, based on Duke's estimates submitted to the U.S. Nuclear Regulatory Commission (NRC). **That risk is five times higher than for each of PG&E Corp's two Diablo Canyon reactors, the only ones left in California. Those reactors are scheduled to be shut in 2024 and 2025.**

The three reactors at a Duke plant called Oconee in Seneca, South Carolina, face a one in 17,500 chance of a meltdown annually, according to the analysis.

All Duke nuclear plants are in compliance with NRC requirements for earthquakes, and the company has bolstered structures, systems and components, said Mary Kathryn Green, a company spokeswoman.

Ameren Corp's Callaway reactor in Fulton, Missouri faces a one in 13,800 chance of a meltdown annually, the analysis said. Barry Cox, the site vice president at Callaway, said the plant invests millions of dollars on protections against earthquakes and other natural disasters.

Edwin Lyman, the director of nuclear power safety at the Union of Concerned Scientists, who wrote the analysis, said that the NRC should not approve license renewals for Duke's reactors unless the company does more to guard against risks.

The NRC is satisfied that Duke has made "binding commitments" to install permanent fixes at Robinson and would assess earthquake risks in a license renewal application, said spokesman Scott Burnell. (Reporting by Timothy Gardner; editing by Jonathan Oatis)

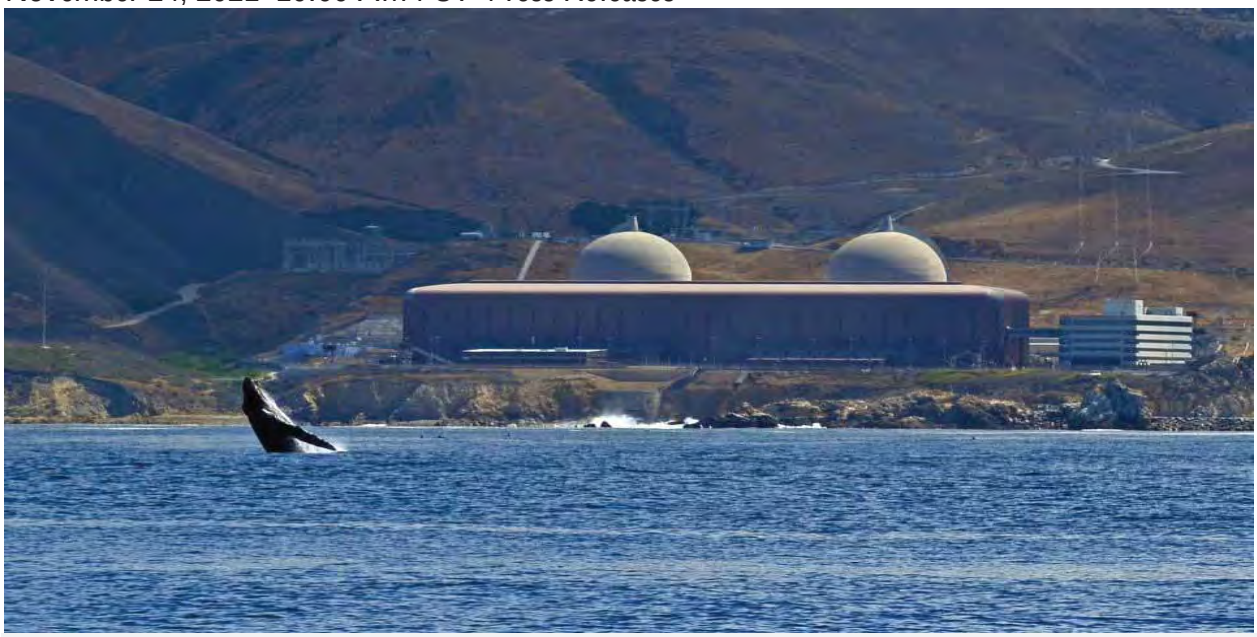
NuclearNewswire

POWER & OPERATIONS

The American Nuclear Society supports keeping Diablo Canyon open

Statement from American Nuclear Society President Steven Nesbit and Executive Director/CEO Craig Piercy

November 24, 2021 10:00 AM PST Press Releases



A whale swims off the coast by Diablo Canyon nuclear power plant. (Image: PG&E)

The American Nuclear Society supports the continued operation of California's Diablo Canyon nuclear power plant. The premature shutdown of Diablo Canyon units 1 and 2, slated respectively in November 2024 and August 2025, will inflict grave harm to California's economy and environment.

Diablo Canyon is a well-performing nuclear power plant that has operated safely for nearly 40 years under the strict oversight of the U.S. Nuclear Regulatory Commission. Diablo Canyon's nuclear generation produces clean electricity without harmful emissions of greenhouse gases and other combustion products. Additionally, Diablo Canyon's energy is available around the clock in all seasons and weather conditions.

Closing California's remaining nuclear power plant will cause more grid instability and rolling blackouts for the state because Diablo Canyon reliably supplies approximately 10 percent of in-state power. Along with further weakening California's fragile power grid,

the premature closure of Diablo Canyon will deprive California of its largest carbon-free energy resource and worsen the state's growing dependency on electricity from out-of-state fossil power plants. The premature loss of Diablo Canyon will result in millions of tons of additional greenhouse gas emissions per year, ruining state and federal plans for decarbonization.

Blackouts are harmful and deadly. During the August 2020 heatwave that strained California's already overloaded power grid, the California Independent System Operator (CAISO) ordered rolling blackouts across the state to cope with a power supply shortage of 4,400 megawatts that left approximately 3.3 million households in the dark and without air conditioning. The blackouts would have been far worse and more extensive without Diablo Canyon's 2,240 megawatts of safe, reliable, fuel-secured, and dispatchable zero-emissions baseload power.

Solar, wind, geothermal, and battery storage will surely be an important part of any decarbonization plan for California, but the state will need every clean energy resource that it has – including Diablo Canyon – to meet its climate goals. A reliable grid requires a strong backbone of always-on and available baseload generation like Diablo Canyon. Intermittent sources alone cannot replace Diablo Canyon's reliable 24/7 production of dispatchable carbon-free electricity for Californians. If the planned closure goes ahead, Diablo Canyon's carbon-free electricity would be replaced by carbon-emitting natural gas- and coal-fired generation.

Without Diablo Canyon, California will be forced to depend on the charity of neighboring regions to make up for shortfalls in power supplies, including meeting demand after sunset when solar resources become unavailable. Given the inevitable potential for conditions limiting the availability of out-of-state energy, including the current drought impacting hydropower sources throughout the western United States, that is not a prudent situation.

According to CAISO, about 25% of California's total electricity needs are currently met by imports. California's vulnerability to blackouts and pipeline disruptions – including those caused by wildfires and earthquakes – demonstrates the necessity in keeping Diablo Canyon's clean baseload power online beyond 2025 for the safety and prosperity of 40 million Californians. In wake of any blackout or extreme event, Diablo Canyon's fuel-secured, reliable, firm, and dispatchable baseload power will surely be needed by Californians.

Years ago, California made a decision to shut down the Diablo Canyon units. However, circumstances have changed. The clean energy imperative is even stronger, and the importance of Diablo Canyon to the reliability of California's current and future supply of carbon-free electricity is undeniable. It is time to revisit outdated decisions made in the last decade in the light of today's facts and prepare for the continued operation of Diablo Canyon. ANS calls upon Gov. Newsom to reconsider the decision and keep Diablo Canyon online.

Tags:
base load california carbon-free diablo canyon grid reliability grid stability nuclear power pg&e rolling blackouts

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Op-Ed: California needs to keep the Diablo Canyon nuclear plant open to meet its climate goals

Even assuming rapid buildout of renewable energy, the continued operation of Diablo Canyon would significantly reduce California's use of natural gas for electricity production from 2025 to 2035.
(Joe Johnston / San Luis Obispo Tribune)

BY STEVEN CHU AND ERNEST MONIZ

NOV. 21, 2021 3:05 AM PT

https://www.latimes.com/opinion/story/2021-11-21/diablo-canyon-nuclear-plant-climate-change-zero-emissions

The Diablo Canyon nuclear power plant is scheduled to close when its federal 40-year license expires in 2025 — marking the end of nuclear power generation in California. This schedule was set in a complex multi-stakeholder process approved by state regulators in 2018, and modifying it would be at least as complex.

However, much has changed in the last few years, underscoring the need to revisit this decision — including rolling blackouts in California in 2020, global awareness of the need for greater ambition in reducing greenhouse gas emissions and a better understanding of the limitations of existing technology within a reliable and resilient system. Reconsidering the future of Diablo Canyon is now urgently needed in advancing the public good.

At the global climate talks in Glasgow, Scotland, the nearly 200 nations attending acknowledged the need for deep reductions in carbon emissions by mid-century. California deserves credit for leading the way in transitioning to a zero-carbon economy. Groundbreaking legislation requires all sources of electricity in the state to be emission-free by 2045. Former Gov. Jerry Brown directed the state to achieve economy-wide climate neutrality by the same date. And Gov. Gavin Newsom signed an executive order last year requiring all new cars sold in the state to be zero-emission, starting in 2035.

The effects of climate change are unmistakable and severe around the world and in California, with record temperatures, drought and wildfires of unprecedented ferocity and destruction. Moving toward deep decarbonization is of paramount importance.

Timing matters. Most of the carbon we emit today stays in the atmosphere and warms the planet for centuries. To avoid the worst effects of climate change, we need to avoid carbon dioxide emissions even as we aim to reach zero emissions by mid-century.

Today, the Diablo Canyon Power Plant accounts for 15% of California's carbon-free electricity production, and 8% of overall electricity output. Natural gas accounts for almost half of California's generation. Without nuclear power, even as deployment of renewable power expands, California will have to increase reliance on gas-fired peaker plants (power plants that run when energy demand peaks) at a time when we need all the clean power we can produce. **Congress and the administration recognized the importance of existing nuclear power by providing incentives to keep nuclear plants running in the bipartisan infrastructure law.**

Researchers at MIT and Stanford University have completed an independently funded joint study to reassess Diablo Canyon's potential value for helping California meet the challenges of climate change by providing clean, safe and reliable electricity. The study also assessed Diablo Canyon's potential for powering water desalination and hydrogen fuel production.

The researchers found that an inclusive strategy that preserves the clean electricity from Diablo Canyon will augment new energy generation from renewables and other sources of clean power. We need to increase renewables at a massive scale, but that will take decades, so any zero-carbon source we retire today will set us back years on the zero-carbon journey.

Carbon-free power is also essential for system reliability and resilience because, beyond the short-term variability, there are weeks and months when wind and solar power are low and storage technologies are of inadequate duration. This is not an either/or situation: California needs both Diablo Canyon and renewables to significantly reduce emissions over the next two decades.

Keeping Diablo Canyon running through 2035 would cut carbon emissions from the electricity sector by 11% annually compared with 2017 levels and **save ratepayers billions of dollars — an estimated $2.6 billion through 2035 and up to $21 billion by 2045**. It also would alleviate the need to develop 90,000 acres of land for renewable energy production just to replace the facility's capacity.

But the potential benefits of preserving Diablo Canyon go beyond generation of more clean electric power.

The MIT-Stanford study found that Diablo Canyon could be repurposed to become a power source for water desalination and for clean hydrogen production, operating as a polygeneration facility. Diablo Canyon's continued operation would thus help address three of the state's largest challenges: energy reliability, persistent drought, and the transition to emission-free transportation and industry — two sectors that are challenging to decarbonize.

A desalination facility at Diablo Canyon could produce up to 80 times the output of the state's largest desalination plant at about half the cost. The researchers also found that, as demand for hydrogen increases, Diablo Canyon could produce it at about half the cost of hydrogen produced by other clean energy sources.

The challenges here in California and globally are bigger than ever and the window of opportunity to mitigate climate change is closing fast. Extending the license of Diablo Canyon buys critical time for the innovation needed to reach net-zero emissions. An important example would be developing cost-effective long-duration electricity storage, an enabler for variable renewables at very large scale.

Revisiting the decision to close Diablo Canyon will involve many stakeholders, including federal regulators needed to permit restart of the license extension process. But that dialogue needs to happen because the stakes are so high.

Reimagining Diablo Canyon's role in California's energy future is an opportunity we cannot afford to ignore.

Steven Chu is a former U.S. secretary of Energy, Nobel laureate in physics and professor of physics and molecular and cellular physiology at Stanford University. Ernest Moniz is a former U.S. secretary of Energy, CEO of the Energy Futures Initiative and professor of physics and engineering systems emeritus at MIT.

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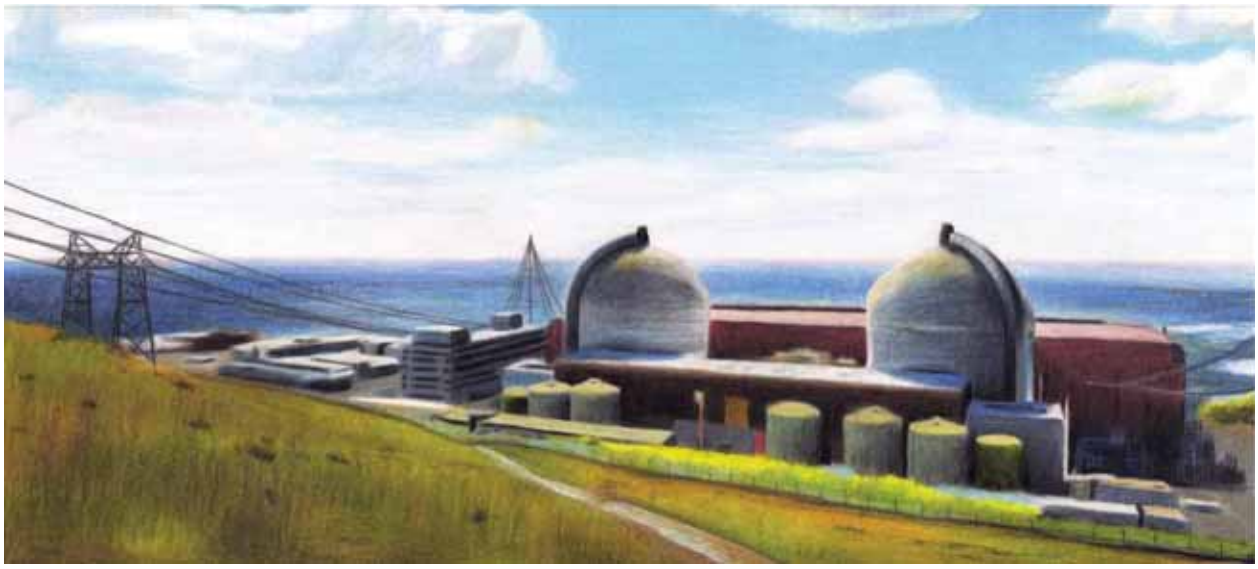
THE NEW YORKER

Annals of Technology

The Activists Who Embrace Nuclear Power

By Rebecca Tuhus-Dubrow

February 19, 2021



In the face of climate change, some environmentalists are fighting not to close power plants but to save them.Illustration by Clément Thoby; Source photograph by David Paul Morris / Bloomberg / Getty

In 2004, Heather Hoff was working at a clothing store and living with her husband in San Luis Obispo, a small, laid-back city in the Central Coast region of California. A few years earlier, she had earned a B.S. in materials engineering from the nearby California Polytechnic State University. But she'd so far found work only in a series of eclectic entry-level positions—shovelling grapes at a winery, assembling rectal thermometers for cows. She was twenty-four years old and eager to start a career.

One of the county's major employers was the Diablo Canyon Power Plant, situated on the coastline outside the city. Jobs there were stable and well-paying. But Diablo Canyon is a nuclear facility—it consists of two reactors, each contained inside a giant concrete dome—and Hoff, like many people, was suspicious of nuclear power. Her mother had been pregnant with her in March, 1979, when the meltdown at a nuclear plant on Three Mile Island, in Pennsylvania, transfixed the nation. Hoff grew up in Arizona, in an unconventional family that lived in a trailer with a composting toilet. She considered herself an environmentalist, and took it for granted that environmentalism and nuclear power were at odds.

Nonetheless, Hoff decided to give Diablo Canyon a try. She was hired as a plant operator. The work took her on daily rounds of the facility, checking equipment performance—oil flows,

temperatures, vibrations—and hunting for signs of malfunction. Still skeptical, she asked constant questions about the safety of the technology. “When four-thirty on Friday came, my co-workers were, like, ‘Shut up, Heather, we want to go home,’ ” she recalled. “When I finally asked enough questions to understand the details, it wasn’t that scary.”

In the course of years, Hoff grew increasingly comfortable at the plant. She switched roles, working in the control room and then as a procedure writer, and got to know the workforce—mostly older, avuncular men. She began to believe that nuclear power was a safe, potent source of clean energy with numerous advantages over other sources. For instance, nuclear reactors generate huge amounts of energy on a small footprint: Diablo Canyon, which accounts for roughly nine per cent of the electricity produced in California, occupies fewer than six hundred acres. It can generate energy at all hours and, unlike solar and wind power, does not depend on particular weather conditions to operate. Hoff was especially struck by the fact that nuclear-power generation does not emit carbon dioxide or the other air pollutants associated with fossil fuels. Eventually, she began to think that fears of nuclear energy were not just misguided but dangerous. Her job no longer seemed to be in tension with her environmentalist views. Instead, it felt like an expression of her deepest values.

In late 2015, Hoff and her colleagues began to hear reports that worried them. P.G. & E., the utility that owns Diablo Canyon, was in the process of applying to renew its operating licenses—which expire in the mid-twenty-twenties—with the federal Nuclear Regulatory Commission. Because its cooling system takes in and spits out about 2.5 billion gallons of ocean water each day, the plant also needs a lease from the California State Lands Commission in order to operate, and P.G. & E. was applying to renew that as well. Environmental groups had come to the commission with long-standing concerns about the effects of the cooling system on marine life and about the plant’s proximity to several geologic faults. The commission, chaired by Gavin Newsom, then the lieutenant governor, had agreed to take those issues into account. At a meeting that December, Newsom said, “I just don’t see that this plant is going to survive beyond ’24-2025.”

Around this time, Hoff discovered a Web site called Save Diablo Canyon. The site had been launched by a man named Michael Shellenberger, who ran an organization called Environmental Progress, in the Bay Area. Shellenberger was a controversial figure, known for his pugilistic defense of nuclear power and his acerbic criticism of mainstream environmentalists. Hoff had seen “Pandora’s Promise,” a 2013 documentary about nuclear power, in which Shellenberger had been featured. She e-mailed him to ask about getting involved, and he offered to give a talk to plant employees. Hoff publicized the event among her colleagues, and baked about two hundred chocolate-chip cookies for the audience.

On the evening of February 16, 2016, a couple hundred people filed into a conference room at a local Courtyard Marriott hotel. Shellenberger told the audience that Diablo Canyon was essential to meeting California’s climate goals, and that it could operate safely for at least another twenty years. He said that it was at risk of being closed for political reasons, and urged the workers to organize to save their plant, for the sake of their jobs and the planet.

Kristin Zaitz, one of Hoff’s co-workers, was also in attendance. A California native and civil engineer, she had worked at Diablo Canyon since 2001, first conducting structural analyses—including some meant to fortify the plant against earthquakes—and then managing projects. Zaitz, too, came from a background that predisposed her to distrust nuclear power—in her case,

an environmentally minded family and a left-leaning social circle. When she first contemplated working at Diablo Canyon, she imagined the rat-infested Springfield Nuclear Power Plant on "The Simpsons," where green liquid oozes out of tanks. Eventually, like Hoff, she changed her thinking. "What we were doing actually aligned with my environmental values," she told me. "That was shocking to me."

Zaitz and Hoff sometimes bumped into each other at state parks, where both volunteered on weekends with their children. After Shellenberger's talk, they lingered, folding up chairs and talking. Before long, they decided to team up. Using the name of Shellenberger's site Save Diablo Canyon, they organized a series of meetings at a local pipe-fitters' union hall. They served pizza for dozens of employees and their family members, who wrote letters to the State Lands Commission and other California officials. Other nuclear plants across the country were also at risk of closing, and soon they decided that their mission was bigger than rescuing their own plant. They wanted to correct what they saw as false impressions about nuclear power—impressions that they had once had themselves—and to try to shift public opinion. They would show that "it's O.K. to be in favor of nuclear," Zaitz said—that, in fact, if you're an environmentalist, "you should be out there rooting for it."

Hoff and Zaitz formed a nonprofit. Like the leaders of many other movements led by women—protests against war, drunk driving, and, of course, nuclear power—they sought to capitalize on their status as mothers. They toyed with a few generic names—Mothers for Climate, Mothers for Sustainability—because they worried that the word "nuclear" would scare some people off. But they ultimately discarded those more innocuous options. "We wanted to be really clear that we think nuclear needs to be part of the solution," Zaitz said. They now run a small activist organization, **Mothers for Nuclear,** https://www.mothersfornuclear.org/ which argues that nuclear power is an indispensable tool in the quest for a decarbonized society.

On December 8, 1953, President Dwight Eisenhower delivered his "Atoms for Peace" speech at the United Nations General Assembly. He described the dangers of atomic weapons, but also declared that "this greatest of destructive forces can be developed into a great boon, for the benefit of all mankind." Eisenhower proposed that governments make contributions from their stockpiles of uranium and fissionable materials to an international atomic-energy agency. One purpose of such an agency, he suggested, would be "to provide abundant electrical energy in the power-starved areas of the world."

The first commercial nuclear power plant in the United States opened four years later, in Beaver County, Pennsylvania. In the following decades, dozens more were constructed. There are currently fifty-six nuclear power plants operating in the U.S. They provide the country with roughly twenty per cent of its electricity supply— more than half of its low-carbon electricity.

The plants were not always presumed to be environmentally unfriendly. At the dawn of the nuclear age, some conservationists, including David Brower, the longtime leader of the Sierra Club, supported nuclear power because it seemed preferable to hydroelectric dams, the construction of which destroyed scenery and wildlife by flooding valleys and other ecosystems. But Brower changed his mind in the late nineteen-sixties and, after a bitter split within the Sierra Club over whether to support the construction of Diablo Canyon, left to found Friends of the Earth, which was vehemently anti-nuclear. As John Wills explains in his 2006 book, "Conservation Fallout," these disputes coincided with broader philosophical shifts. Conservationism—with its focus on the preservation of charismatic scenery for outdoor

adventures—was giving way to the modern environmentalist movement, sparked in part by Rachel Carson's 1962 book, "Silent Spring." Carson's book, which investigated the dangers posed by pesticides, articulated an ecological vision of nature in which everything was connected in a delicate web of life. Nuclear power was associated with radiation, which, like pesticides, could threaten that web.

By 1979, the U.S. had seventy-two commercial reactors. That year proved pivotal in the shaping of public opinion toward nuclear power in America. On March 16th, "The China Syndrome," starring Jane Fonda, Jack Lemmon, and Michael Douglas, was released; the film portrayed corruption and a meltdown at a fictional nuclear plant. Twelve days later, one of the two reactors at the Three Mile Island Nuclear Generating Station in southeastern Pennsylvania partially melted down. Most epidemiological studies would eventually determine that the accident had no detectable health consequences. But at the time there was no way the public could know this, and the incident added momentum to the anti-nuclear movement. By the time of the Chernobyl catastrophe, in Soviet Ukraine, in 1986—widely considered to be the worst nuclear disaster in history—opposition to nuclear power was widespread. Between 1979 and 1988, sixty-seven planned nuclear-power projects were cancelled. In the mid-eighties, the Department of Energy began research into the "integral fast reactor"—an innovative system designed to be safer and more advanced. In 1994, the Clinton Administration shut the project down.

Today, the looming disruptions of climate change have altered the risk calculus around nuclear energy. James Hansen, the NASA scientist credited with first bringing global warming to public attention, in 1988, has long advocated a vast expansion of nuclear power to replace fossil fuels. Even some environmental groups that have reservations about nuclear energy, such as the Natural Resources Defense Council and the Environmental Defense Fund, have recognized that abruptly closing existing reactors would lead to a spike in emissions. But U.S. plants are aging and grappling with a variety of challenges. In recent years, their economic viability has been threatened by cheap, fracked natural gas. Safety regulations introduced after the meltdowns at Japan's Fukushima Daiichi nuclear plant, in 2011, have increased costs, and, in states such as California, legislation prioritizes renewables (the costs of which have also fallen steeply). Since 2013, eleven American reactors have been retired; the lost electricity has largely been replaced through the burning of fossil fuels. At least eight more closures, including Diablo Canyon's, are planned. In a 2018 report, the Union of Concerned Scientists concluded that "**closing the at-risk plants early could result in a cumulative 4 to 6 percent increase in US power sector carbon emissions by 2035.**"

The past decade has seen the rise of a contingent of strongly pro-nuclear environmentalists. In 2007, Shellenberger and his colleague Ted Nordhaus co-founded the Breakthrough Institute, a Bay Area think tank known for its heterodox, "ecomodernist" approach to environmental problems. The organization, which presents itself as more pragmatic than the mainstream environmental movement, supports nuclear power alongside G.M.O.s and agricultural intensification. Other pro-nuclear groups include Third Way, a center-left think tank, and Good Energy Collective, a policy-research organization. (Shellenberger left the Breakthrough Institute, in 2015, and founded Environmental Progress, partly to focus more on efforts to save existing plants.)

The 2011 Fukushima disaster shifted the landscape of opinion, but not in entirely predictable ways. Immediately after Fukushima, anti-nuclear sentiment surged; Japan began to shutter its nuclear plants, as did Germany. And yet, as Carolyn Kormann has written, studies have found

few health risks connected to radiation exposure in Japan in the wake of the accident. (The evacuation itself was associated with more than a thousand deaths, as well as a great deal of economic disruption.) Pro-nuclear advocates now point out that, **after retiring some of their nuclear plants, Japan and Germany have become increasingly reliant on coal**.

Heather Hoff watched news footage of the Fukushima disaster while at Diablo Canyon. What she saw resembled the scenarios she had learned about in training—situations that she had prepared for but never expected to face. "My heart instantly filled with fear," she later wrote, on the Mothers for Nuclear Web site. For a time, her confidence in nuclear power was shaken. But, as more information emerged, she came to believe that the accident was not as cataclysmic as it had initially appeared to be. Eventually, Hoff concluded that the incident was an opportunity to learn how to improve nuclear power, not a reason to give up on it. She and Zaitz visited the site in 2018. They saw black plastic bags of contaminated soil heaped on the roadside, and ate the local fish. Afterward, they both blogged about the experience. Zaitz wrote that she understood the fear provoked by radiation, "with its deep roots in the horrendous human impacts caused by the atomic bomb."

Pro-nuclear environmentalists often tell a conversion story, describing the moment when they began to see nuclear power not as something that could destroy the world but as something that could save it. **They argue that much of what we think we know about nuclear energy is wrong. Instead of being the most dangerous energy source, it is one of the safest, linked with far fewer deaths per terawatt-hour than all fossil fuels**. We perceive nuclear waste as uniquely hazardous, but, while waste from oil, natural gas, and coal is spewed into the atmosphere as greenhouse gases and as other forms of pollution, spent nuclear-fuel rods, which are solid, are contained in concrete casks or cooling pools, where they are monitored and prevented from causing harm. (The question of long-term storage remains fraught.) Most nuclear enthusiasts believe that renewables have a role to play in the energy system of the future. But they are skeptical of the premise that renewables alone can reliably power modern societies. And—in contrast to an environmental movement that has historically advocated the reduction of energy demand—pro-nuclear groups tend to focus more on the value that abundant nuclear energy could have around the world.

Charlyne Smith, a twenty-five-year-old Ph.D. candidate in nuclear engineering at the University of Florida, who shared her story on the Mothers for Nuclear Web site, grew up in rural Jamaica, where she had firsthand experience of "energy poverty." During hurricanes, she told me, no one knew when the electricity would come back; food would spoil in the fridge. Smith learned about nuclear power as an undergraduate and decided to enter the field, with the goal of bringing reactors to the Caribbean. She is not naïve about the risks: she is writing a dissertation on nuclear proliferation. But, she says, "Waste and radiation—those are risks that are minimizable. Proliferation of nuclear material—that risk is minimizable. Versus what you can get out of nuclear energy, weighing the pros and cons. I strongly believe that nuclear energy can solve countless problems."

The pro-nuclear community is small and fractious. There are debates about how large a role renewables should play and about whether to focus on preserving existing plants or developing advanced reactors, which have the potential to shut down automatically in the event of overheating and to run on spent fuel. (These reactors are still in the experimental phase.) There are also differences in rhetoric. At one end of the spectrum is Shellenberger, who seems to see mainstream environmentalists as his main adversaries; his newest book is titled "Apocalypse

Never: Why Environmental Alarmism Hurts Us All." His recent commentary decrying what he calls the climate scare has been widely circulated in right-wing circles and has perplexed some pro-nuclear allies. At the other end is Good Energy Collective, co-founded, recently, by Jessica Lovering, Shellenberger's former colleague at the Breakthrough Institute. Her organization situates itself specifically on the progressive left, and is attempting to ally itself with the broader environmental movement and with activists focussed on social and racial justice. Mothers for Nuclear falls somewhere in between: their tone is less combative than Shellenberger's, but Hoff and Zaitz often seem frustrated with anti-nuclear arguments and, in their social media feeds, point out the downsides of renewables—an emphasis that may turn off some of the people they are trying to persuade. (They believe that nuclear power should do most of the work of decarbonization, supplemented by renewables.)

Nuclear energy scrambles our usual tribal allegiances. In Congress, Democratic Senators Cory Booker and Sheldon Whitehouse have co-sponsored a bill with Republican Senators John Barrasso and Mike Crapo that would invest in advanced nuclear technology and provide support for existing plants that are at risk of closure; a climate platform drafted by John Kerry and Alexandria Ocasio-Cortez included a plan to "create cost-effective pathways" for developing innovative reactors. And yet some environmental organizations, including Greenpeace and Climate Justice Alliance, deplore nuclear energy as unsafe and expensive. Perhaps most telling is the ambivalence that some groups express. Although the Union of Concerned Scientists has warned about the climate impacts of shutting down nuclear facilities, it has historically sounded the alarm about nuclear risk. Ed Lyman, its director of nuclear-power safety, told me that, because "there are so many uncertainties associated with nuclear safety analysis," it's "very hard to make a conclusion about whether it's safe or not." He noted, dispiritingly, that climate change could increase the hazards at nuclear plants, which will have to contend with more extreme weather events.

When Hoff and Zaitz officially launched Mothers for Nuclear, on Earth Day, 2016, they had to figure out how to tell their story and to change minds. The standard images of renewables—gleaming solar panels, elegant wind turbines in green fields—are welcoming, even glamorous. It seemed to Hoff and Zaitz that, **by comparison, the nuclear industry had done a terrible job at public relations.** By emphasizing safety, they thought, the industry had activated fears. Airlines don't advertise by touting their safety records**. It might be better to unapologetically celebrate nuclear energy for its strengths.**

They gave talks at schools and conferences, shared stories on their Web site, posted on social media, and eventually started chapters in other countries. Iida Ruishalme, a Finnish cell biologist who lives in Switzerland and now serves as Mothers for Nuclear's director of European operations, told me that she was drawn to the organization, in part, because of its appeal to emotion. The widespread impression, she said, is that "people who like nuclear are old white dudes who like it because it's technically cool." Mothers for Nuclear offered "this very emotional, very caring point of view," she said. "**The motivation comes from wanting to make it better for our children.**" Ruishalme said that online commenters often tell her that the group is "clearly propaganda, a lobbyist front, not sincere—because it's so preposterous to think that mothers would actually do this." On the organization's Web site, a photo montage of women and children is accompanied by a caption clarifying that they are pictures of real people who support the group—not stock images.

Among opponents, there is a long-standing assumption that anyone who promotes nuclear power must be a shill. The name "Mothers for Nuclear" sounds so much like something dreamed up by industry executives that it can elicit suspicion, even anger, in those who are anti-nuclear. The organization is entirely volunteer-run, with a tiny budget, and has not accepted donations from companies. But Hoff and Zaitz work at a nuclear plant and have been flown to give talks at industry-sponsored events; Mothers for Nuclear has received small donations from others who work in the industry. There is no denying the conflict of interest posed by their employment; even within the pro-nuclear community, their industry ties provoke uneasiness. Nordhaus, the executive director of the Breakthrough Institute, wrote in an e-mail that, although he thinks Hoff and Zaitz are "well-intentioned," nuclear advocacy should be independent of what he called "the legacy industry." (The Breakthrough Institute has a policy against accepting money from energy interests.) Yet, from another angle, their connection to industry may be an asset. "Where they've been successful is coming at it from a personal perspective," Jessica Lovering, the co-founder of Good Energy Collective, told me. Their approach to telling their stories, as outdoorsy, hippie moms, "humanizes the industry," she said.

On a drizzly morning in May, 2019, when such visits were possible, Hoff and Zaitz offered me a tour of their plant. Hoff picked me up from my hotel in San Luis Obispo in her slate-gray electric Ford Focus, adorned with a "Split Don't Emit" bumper sticker. While we waited for Zaitz at a café a few blocks away, Hoff told me about the lavender pendant hanging around her neck. Crafted for her by an artist she knew in Arizona, it was made partly of uranium glass, an old-fashioned material that has a touch of uranium added in for aesthetic purposes. "I wear it as a demonstration—radiation is not necessarily dangerous," she said. Like many nuclear advocates, Hoff believes that the fears provoked by radiation are often unfounded or based on information that is not contextualized. A CT scan of the abdomen involves about ten times as much radiation exposure as the average nuclear worker gets in a year. Some scientists argue that no level of radiation exposure is safe, but others doubt that exposure below a certain threshold causes harm, and note that we are all exposed to natural "background" radiation in daily life. (Uranium glass emits a near-negligible amount**.) Hoff and Zaitz believe that panic about radiation from nuclear energy has, cumulatively, caused more harm than the radiation itself.**

After Zaitz arrived, we set out for Diablo Canyon. I rode up front; Zaitz sat in the back, pumping breast milk for her year-old daughter. The light rain had stopped, but mist still hung in the air. We passed through the town of Avila Beach, driving alongside the ocean. To our left, aquamarine water sparkled. On our right lay gently sloping terrain of grasses, sagebrush, wildflowers, and shrubs. The facility sits amid twelve thousand acres of otherwise unoccupied seaside land. Along the curving road, a sign proclaimed "Safety Is No Accident." In the distance, the two massive containment domes rose above a cluster of shorter structures.

We pulled into the parking lot. In one of the outbuildings, I handed over my passport, then placed my jacket and bag in a plastic bin for an X-ray. I walked through a metal detector, then stood under the arch of a "puffer machine," which blasted me with air, shaking loose particles and analyzing them for traces of explosives. Once I'd been cleared, we walked upstairs to Hoff's office, where the two women exchanged greetings with a few co-workers. We put on safety glasses and hard hats before entering "the bridge," a narrow corridor with large windows that connects the administration building to the turbine hall. Through the windows, we could see the ocean, where water was continually cycling into and out of the plant. A security guard, armed with a handgun and a rifle, and wearing a red backpack, sauntered by.

The turbine hall, a vast space with a soaring, arched ceiling, was dominated by two large generators. Outside, within the two containment domes, uranium atoms were splitting apart in a chain reaction, heating water to more than six hundred degrees Fahrenheit; the steam spun the turbines, which in turn drove the generators. The resulting electricity would bring power to about three million Californians. Warm air rushed noisily around us. Through the din, Hoff explained different parts of the system: the pipes, the springs that supported them, the condenser, which takes wet vapor from the turbine exhaust and turns it back into liquid. Vending machines selling Pepsi and Chex Mix stood against one wall. I wasn't allowed to take photos, but Hoff snapped a few of me and Zaitz. We smiled as if we were at Disneyland.

In June, 2016, not long after the formation of Mothers for Nuclear, P.G. & E. announced that it would not renew its operating licenses: the reactors at Diablo Canyon would cease operations in 2024 and 2025, respectively. The company said that its decision was based largely on economic considerations. Customer demand was declining, in part because of the growing popularity of a system called community-choice aggregation, in which localities can choose their energy sources; often they choose wind or solar farms (though they still need to rely on natural gas at night, when solar is unavailable). The year before, California had passed Senate Bill 350, which requires the state to derive half of its energy from renewable sources by 2030; since P.G. & E. would be legally required to increase its procurement of renewable energy, it could end up with more electricity than it needed if it kept Diablo Canyon online.

The environmental groups that supported P.G. & E.'s plan, including the National Resources Defense Council and Friends of the Earth, see it as a model for gradually transitioning to a grid fed entirely by renewable energy. P.G. & E. has pledged to replace Diablo Canyon with other low-carbon energy sources. And yet energy storage remains a major challenge. Even if P.G. & E. does manage to fill the gap without help from natural gas—a heavy lift—some argue that, **given California's ambitious climate goals, the state should be adding to its total portfolio of low-carbon energy rather than subtracting from it**. Experts differ on the wisdom of the choice. Steven Chu, the Nobel Prize-winning physicist who served as President Barack Obama's Secretary of Energy, told me that he had urged P.G. & E. not to decommission the plant. "It's really the last twenty to thirty per cent of electricity where it's going to be hard to go a hundred per cent renewable," he said. Daniel Kammen, a physicist and a professor of nuclear energy at the University of California, Berkeley, however, was more sanguine. Although he is not opposed to nuclear power, or even to keeping Diablo Canyon open, he said, "We don't need nuclear, and we certainly can get to a zero-carbon future without nuclear. The mixture of other renewables means you don't have to go there."

Hoff and Zaitz are not especially optimistic about the future of Diablo Canyon, but they hope that, between now and the planned closure, P.G. & E. and state officials can be persuaded to reverse course. They seek to recruit ordinary Californians to their cause. After touring the plant, I accompanied them to a radio studio, where they were scheduled to be guests on Dave Congalton Hometown Radio, a popular local talk show. On the air, Hoff explained who they were. "Mothers for Nuclear offers a different voice," she said. "Nuclear power plants are run by lots of men, and women have been more scared of nuclear energy. We're here to offer the motherly side of nuclear—nuclear for the future, for our children, for the planet."

The phone lines lit up. The first couple of calls were favorable. "It's kind of nice to hear a little bit of sanity about nuclear power, for a change," a caller named John said. But then Pete, a listener who said that he had protested the construction of Diablo Canyon back in the early

eighties, brought up nuclear waste. “There’s been numerous efforts to put it here, put it there, put it in barrels, bury it in the sea, bury it in deep caves—this, that, the other thing,” he said. “I don’t think any really good solution has even come up.”

“Pete, where do you put your garbage?” Hoff asked. “Where do you put your plastic waste?”

“That’s not radioactive!”

“It’s still really damaging to the environment,” Hoff said.

“An accident at a nuclear plant is a lot worse than an explosion at an oil plant,” Pete said.

Zaitz jumped in. “The surprising thing, Pete, that we found out is that nuclear is actually the safest way to make reliable electricity when you look at even the consequences of the worst accidents we’ve ever had,” she said. “**Any other energy source ends up, in the long run, killing more people, whether it’s due to air pollution, whether it’s due to industrial accidents. Air pollution kills about eight million people per year**.”

As the conversation continued, Hoff and Zaitz held their own, but it seemed unlikely that many minds would be changed decisively. In trying to plan a carbon-free future, we are faced with imperfect choices and innumerable unknowns. In such situations, we typically go with our guts. Gut feelings are hard to alter. And yet, especially for younger people, nuclear power may not elicit visceral fears. Many people who did not grow up with the threat of a nuclear holocaust now **face a future of climate chaos. Many lie awake at night imagining not meltdowns but lethal heat waves and calving glaciers; they dread life on an inexorably less hospitable planet.**

Since I first met with Hoff and Zaitz, the coronavirus pandemic has upended the world. At Diablo Canyon, the comparatively small fraction of the plant’s workers who need to be on site—security guards, control-room operators, and the like—are now doing so in masks, and with other safety protocols in place; Hoff and Zaitz have been working from home. Meanwhile, last summer, wildfires set the West Coast ablaze. For Hoff and Zaitz, both crises have reinforced their existing beliefs. **Evidence that air pollution exacerbates vulnerability to COVID-19 is yet another reason to move away from fossil fuels**; the importance of **ventilators and other devices at hospitals underscores the need for reliable, around-the-clock electricity**. Last August, when thick smoke blocked the sun in parts of California, solar output in those areas temporarily plummeted.

Rolling blackouts have raised questions about how California’s grid will function after Diablo Canyon is shut down. In May, the office of the California Independent System Operator, which is responsible for maintaining the grid’s reliability, filed comments to the state’s Public Utilities Commission. Its modelling, the office reported, showed that “**incremental resource needs may be much greater than originally anticipated and that the system hits a critical inflection point after Diablo Canyon retires**.” At the same time, the plant’s outsized role is not without drawbacks. The reactors periodically need to be taken offline for maintenance, withdrawing a substantial amount of electricity from the grid.

Our energy system is in flux. There are innovations under way in the renewables sphere—advances in battery storage, demand management, and regional integration—which should help overcome the challenges of intermittency. Nuclear scientists, for their part, are working on smaller, more nimble nuclear reactors. There are complex economic considerations, which are inseparable from policy—for example**, nuclear power would immediately become more competitive if we had a carbon tax**. And there are huge risks no matter what we do.

To be fervently pro-nuclear, in the manner of Hoff and Zaitz, is to see in the peaceful splitting of the atom something almost miraculous. It is to see an energy source that has been steadily providing low-carbon electricity for decades—**doing vastly more good than harm, saving vastly more lives than it has taken—but which has received little credit and instead been maligned**. It is to believe that the most significant problem with nuclear power, by far, is public perception. Like the anti-nuclear world view—and perhaps partly in response to it—the pro-nuclear world view can edge toward dogmatism. Hoff and Zaitz certainly seem readier to tout studies that confirm their views, and reluctant to acknowledge any flaws that nuclear energy may have. Still, even if one does not embrace nuclear power to the same extent, one can recognize its past contributions and **question the wisdom of counting it out in the future**.

One of the last times I spoke with Zaitz, she noted that a lot of people seemed to be feeling discouraged at this moment, overwhelmed by the scale of the challenges ahead. But she counselled against despair. "The hopeful way to go into that is, '**Oh, wow, we actually have technology that can do this**,' " she said. "**And that's nuclear. And so I'd rather stay hopeful**."

More:Nuclear PowerClimate ChangeActivismRenewable EnergyCaliforniaPower Plants

January 8, 2020

Shutting down nuclear makes no sense - Financial Times

Shutting Down Nuclear Power Plants Makes No Sense

https://www.mothersfornuclear.org/news/2020/1/8/lwotjyas5hm5yo4swetaw8rkpya85f

By Heather Hoff and Kristin Zaitz, Mothers for Nuclear

Across Europe, countries are shutting down nuclear power plants. It's happening in the U.S. as well. To us, it doesn't make sense.

Across the U.S., we are closing perfectly good existing nuclear plants because of low natural gas prices and discriminatory policies that, in the name of climate action, support renewables but not carbon-free nuclear energy. When existing nuclear plants close, they are almost always replaced by fossil fuels. Even if we make big gains on adding renewables, the strategy of replacing one clean energy source with another means backwards or no progress on climate. It also means that we pay more: building new clean energy to replace existing clean energy means spending money for little to no actual emissions reductions. This high cost for low progress is also causing polarizing political conversations when it comes to action on climate.

Instead of continuing to rely on the renewables-only bandwagon, we need to focus on building public support for nuclear energy. There is growing public awareness on the importance of using science to inform our decisions as a nation. The science is clear—nuclear is the safest way of generating reliable electricity. Of all of the "clean" energy sources, nuclear occupies the smallest land footprint per unit of energy produced, and we have the technology right now. We cannot continue to delay action on climate until some future solution is produced.

Heather Hoff
heather@mothersfornuclear.org
(928) 812-0682
San Luis Obispo, California
USA
Kristin Zaitz
kristin@mothersfornuclear.org
805-550-2632
San Luis Obispo, California
USA
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Grist

Closing nuclear plants risks rise in greenhouse gas emissions, (UCS) report warns

Environmentalists are divided over nuclear energy, the single largest source of low-carbon electricity.

The Diablo Canyon nuclear power plant outside San Luis Obispo, California. Pacific Gas and Electric

Oliver Milman Published Nov 18, 2018

https://grist.org/article/closing-nuclear-plants-risks-rise-in-greenhouse-gas-emissions-report-warns/

Topic Climate + Climate & Energy

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Looming climate breakdown is opening fresh divisions among environmentalists over nuclear energy, with a major advocacy group calling for struggling nuclear plants to be propped up to avoid losing their low-carbon power.

Nuclear is the single largest source of low-carbon electricity in the U.S. But a third of nuclear plants are unprofitable or scheduled to close, risking a rise in greenhouse gas emissions if they are replaced by coal or natural gas, a major Union of Concerned Scientists (UCS) report has found. https://www.ucsusa.org/sites/default/files/attach/2018/11/Nuclear-Power-Dilemma-full-report.pdf

U.S. emissions could increase by as much as 6 percent if struggling plants are shuttered early, the report warns. This scenario has put pressure on many environmental groups to reevaluate their intrinsic opposition to nuclear energy as a dangerous blight that must be eradicated.

"We are running out of time to make the emissions reductions needed to avoid the worst impacts of the climate crisis," said Steve Clemmer, director of energy research for the UCS climate and energy program. "Losing a low-carbon source of electricity like nuclear power is going to make decarbonization even harder than it already is. Nuclear has risks, it's not a perfect technology, but there have to be trade-offs."

The U.S., like the rest of the world, faces a steep challenge to avoid the worst ravages of heatwaves, drought, extreme weather, and flooding. The IPCC report states emissions must reach net zero by 2050 to avoid the most punishing climate change impacts, whereas the Trump administration is currently dismantling every major policy aimed at lowering emissions in the U.S.

The U.S. has an aging fleet of nearly 100 reactors at 60 nuclear plants, with many nearing the ends of their expected lifetimes. Five plants have shut down since 2013, with a further five set to shutter over the next eight years.

In total, a third of U.S. nuclear power plants are set to close down or are unprofitable largely due to a major shift to cheaper natural gas. As nuclear provides more than half of the United States' low-carbon energy, this situation "raises serious concerns about our ability to achieve the deep cuts in carbon emissions needed to limit the worst impacts of climate change," the UCS report states.

Replacements for nuclear will vary across the country. The huge Diablo Canyon plant in California, for example, will probably spawn a surge in renewable energy when it shuts in 2025. But in other states, such as Ohio and Pennsylvania, weak clean energy policies and the abundance of natural gas mean the closure of nuclear plants will probably raise emissions.

"Renewables can fill a lot of the gap but it's a timing issue," Clemmer said. "Over a long timeframe, we can ramp up renewables and phase out coal, gas, and nuclear generation, but we don't have that time. We have to cut half of all emissions by 2030, according to the IPCC. We can't physically ramp up renewables fast enough."

Anti-nuclear campaigning has been a foundational shibboleth for groups such as Greenpeace, which has pointed to disasters such as Chernobyl in 1986 and Fukushima in 2011 as evidence that the sector should be shut down.

While the UCS have never been militant opponents of nuclear power, Clemmer said "we are getting a bit more vocal" about the benefits of keeping plants open as the scale of the climate crisis has become clearer.

Many opponents remain implacable, however.

"Nuclear reactors are a bad bet for a climate strategy," said Gregory Jaczko, who was chair of the U.S. Nuclear Regulatory Commission during the Obama administration. "The Union of Concerned Scientist models don't reflect the reality of the United States electricity market. Renewables are getting cheaper faster than expected and are in some cases the least expensive source of electricity."

Jaczko said new nuclear is a "financial boondoggle," with investments better placed in solar or wind. "Employing nuclear for climate change is like Dorothy seeking the Wizard of Oz to get home," he added. "It's an expensive enticing mirage."

Clemmer said he agreed that new nuclear plants are enormously expensive, but **said there was a case for the U.S. government to invest around $814 million a year to keep existing unprofitable plants online, given the cleaner energy they provide. "Environmental groups may come round to this, but I'm just not sure," he said.**

https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M166/K941/166941516.PDF
Archived 12 06 21 by CGNP
See also, "PG&E Submitted False Cost Data in Diablo Canyon Case, New EP Investigation Finds" by Michael Shellenberger, September 19, 2016
Environmental Progress
https://environmentalprogress.org/big-news/2016/9/19/protest-pge-proposal

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BEFORE THE PUBLIC
UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Application of Pacific Gas and Electric Company for Approval of the Retirement of Diablo Canyon Power Plant, Implementation of the Joint Proposal, And Recovery of Associated Costs Through Proposed Ratemaking Mechanisms
(U 39 E)

Application 16-08-006
(Filed August 11, 2016)

ENVIRONMENTAL PROGRESS'S PROTEST OF PACIFIC GAS AND ELECTRIC COMPANY'S APPLICATION FOR APPROVAL OF THE RETIREMENT OF DIABLO CANYON POWER PLANT, IMPLEMENTATION OF THE JOINT PROPOSAL, AND RECOVERY OF ASSOCIATED COSTS THROUGH PROPOSED RATEMAKING MECHANISMS

Attorney Frank Jablonski
PROGRESSIVE LAW GROUP, LLC
354 W. Main Street
Madison, WI 53703
Direct: (608) 258-8511
Facsimile: (608) 442-9494
Email: frankj@progressivelaw.com

Attorney for: ENVIRONMENTAL PROGRESS

Filed and served September 15, 2016.

PROTEST OF ENVIRONMENTAL PROGRESS

Pursuant to Rules 1.4(a)(2) and 2.6 of the Commission's Rules of Practice and Procedure, Environmental Progress ("EP") files this protest to the above-captioned application filed by Pacific Gas & Electric Company ("PG&E"). EP strongly opposes the Joint Proposal which is the subject of this application, and strongly opposes PG&E's decision to retire the Diablo Canyon Power Plant ("DCPP"). Notwithstanding this protest, EP in a separate motion asks CPUC to suspend all hearings on DCPP in light of the on-going federal and state criminal investigation of CPUC, the withholding of emails involving CPUC President Michael Picker, and the intention by the California legislation to implement reforms or abolish the CPUC.

A. Introduction and Summary

EP is incorporated and organized under the laws of the State of California. EP's principal place of business is in Berkeley, California. EP's President is Michael Shellenberger, a PG&E customer, and many of EP's supporters are residential customers of PG&E.

EP's purpose is to help achieve the dream of universal prosperity and environmental protection for all human beings. EP works with climate scientists, conservationists, citizens, students and environmentalists to educate the public about the need for all sources of clean energy for California energy consumers.

EP's participation in CPUC proceedings is motivated by a desire for cleaner and cheaper electricity that can not only meet current needs but also rapidly replace petroleum used for transportation, and accelerate the creation and diffusion of cleaner and cheaper fuels and technologies globally to achieve its mission.

EP opposes all of the positions on the specific authorities being requested by PG&E in its application because they would violate CPUC's mandate to protect California ratepayers from market manipulation, price increases and pollution.

CPUC must be responsive to the demands of the Governor, the Legislature and civil society. All of these institutions, including CPUC, are on the record supporting California's stated policy objective of reducing greenhouse gas emissions 40 percent levels below 1990 level by 2030, a policy EP also strongly supports.

PG&E should be denied its request to increase electricity rates as future rate increases. Accelerating decarbonization requires radically *accelerated* deployment of near zero-carbon power sources, not their loss or mere replacement. If PG&E should still go forward with DCPP's closure, then any future rate increases should go to adding new power, not paying for the replacement of a power plant that does not need to be closed.

B. Discussion.

1. Achieving California's 2030 climate objective will require that the state reduce carbon emissions at a rate 7 times faster than it did from 2000 to 2014 — a period that saw the worst economic downturn since the Great Depression.

According to California Air Resources Board, total greenhouse covered by state laws ("included emissions") in 1990 were 431 million megatons of carbon dioxide equivalent (MMTCO2), of which 40 percent is 172 MMTCO2. Achieving that will require California reduce emissions by 259 MMTCO2 between 2017 and 2030, or 20 MMTCO2 per year. By contrast, California only reduced its emissions 1.7 MMTCO2 per year between 2000 and 2014.[1]

431	MT CO2	1990 Emissions
172.4	MT CO2	40% of 1990 levels
258.6	MT CO2	by 2030, by law
441.5	MT Co2	2014 Emissions
12.19	MT CO2 drop per year	2015-2030 rate
465.91	MT CO2	2000 Emissions
1.74	MT CO2 drop per year	2000-2014 rate

2. California has been going backwards on emissions since 2011.

Where emissions declined 24 million tons between 2000 and 2010, they have been flat since 2011. Where emissions from California's electricity sector declined 12 million tons between 2000 and 2010, they actually *rose* 10.45 million tons between 2011 and 2014, the most recent year data is available. The loss of one of

[1] California Air Resources Board (CARB), "2016 Edition California Greenhouse Gas C1:P3 for 2000-2014 — by Sector and Activity," 2016

the state's two nuclear plants, San Onofre Nuclear Generating Station, known as SONGS, in 2012, which was replaced largely by power from natural gas, is responsible for 55 percent of the emissions increase.

3. California's population will rise and energy consumption could thus rise significantly between today and 2030.

In California, over 90 percent of the emissions counted by California Air Resources Board are from electricity or transportation. Transportation alone is 37 percent of California's emissions.[2]

Electricity demand is likely to rise with a growing population. The number of Californians is set to rise from 39 million today to 44 million in 2030, a 13 percent increase. [3]

4. More Energy Efficiency Is Likely to Raise Electricity Rates Without Lowering Overall Electricity Demand

California's per capita electricity consumption has been relatively flat since 1975, hovering around 6,900 kwh per person, with no pattern of increase or decline during this period.[4] Also during this time, California has had in place aggressive efficiency measures.

PG&E offers no assurance that any of the efficiency measures it would procure would be additional or additive to what is already happening. California already offers generous subsidies for retrofitting homes and for households to purchase more efficient appliances. While there are legitimate and interesting debates over whether even more efficiency programs, investments, mandates,

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[2] CARB 2016
[3] California Department of Finance, "Projections: Population" 2016, http://www.dof.ca.gov/Forecasting/Demographics/projections/
[4] CARB, "Per Capita Electricity Sales, 1975 – 2014," http://energyalmanac.ca.gov/electricity/per_capita_electricity_sales.html

subsidies and measures would reduce electricity consumption, what matters here is that there is a very good possibility that California's electricity demand will rise 13 percent rather than rise, as PG&E claims in its Application, simply due to an increasing population.

The efficiency measures could significantly increase rates without reducing consumption or pollution. There is a large body of evidence that additional energy efficiency measures will raise rates, and here we cite just two.

The first comes from a workshop that CPUC co-hosted with the California Energy Commission (CEC) to discuss how to replace the power lost after the closure of SONGs on July 15, 2013.[5] At that meeting, the heads of the CEC, the California Air Resources Board (CARB), CPUC's then-President Peevey and parties to PG&E's joint proposal all acknowledge that they would replace SONGS with natural gas and not avoid replacing the power through demand reductions resulting from energy efficiency.

CPUC President Peevey was told by Southern California Edison that more energy efficiency would make electricity rates rise, not decline. This is from the transcript:

> PRESIDENT PEEVEY: Just a quick question on the energy efficiency. If I'm reading this chart correctly, it's a pretty -- if I read this chart correctly, it's a pretty sizeable increase in rates due to energy efficiency….
>
> MR. HOWARD [Southern California Edison]: We believe you'll see that in the customer bills, but we also have it levelized. So as you invest in energy efficiency you're not going to see direct rate decreases. You will see rates potentially go up as you see less users, as you use more energy efficiency (emphasis added).

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[5] California Energy Commission and California Public Utilities Commission, "Joint Workshop on Electricity Infrastructure Issues Resulting from SONGS Closure," July 5, 2013. http://www.energy.ca.gov/2013_energypolicy/documents/2013-07-15_workshop/2013-07-15_Transcript.pdf

What Edison's Howard is arguing is that even if efficiency works in reducing energy consumption, it will reduce Edison's customer base — just as PG&E is proposing to reduce its customer base — and rates will either remain the same or rise.

The second point of evidence comes from a rigorous study by three University of California – Berkeley and University of Chicago economists that found home weatherization costs twice as much as electricity is saved.[6]

Conventional wisdom suggests that energy efficiency (EE) policies are beneficial because they induce investments that pay for themselves and lead to emissions reductions. However, this belief is primarily based on projections from engineering models. This paper reports on the results of an experimental evaluation of the nation's largest residential EE program conducted on a sample of more than 30,000 households. The findings suggest that the **upfront investment costs are about twice the actual energy savings.** Further, the model-projected savings are roughly 2.5 times the actual savings. While this might be attributed to the "rebound" effect – when demand for energy end uses increases as a result of greater efficiency – the paper fails to find evidence of significantly higher indoor temperatures at weatherized homes. Even when accounting for the broader societal benefits of energy efficiency investments, the costs still substantially outweigh the benefits; the average rate of return is approximately -9.5% annually.

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[6] Meredith Fowlie, Michael Greenstone, and Catherine Wolfram, "Do Energy Efficiency Investments Deliver? Evidence from the Weatherization Assistance Program," June 2015, http://econresearch.uchicago.edu/sites/econresearch.uchicago.edu/files/paper_draft_06_15_clean.pdf

5. Achieving California climate goals requires significantly replacing petroleum in transportation.

Replacing a significant share of petroleum used in transportation with near-zero emissions energy, whether electricity, hydrogen or some other fuel.

California will need to increase electric vehicle (EV) on the road from today's 160,000 to 5 million cars by 2030, according to California Governor Jerry Brown and California Air Resources Board Chair Mary Nichols.[7] There are 34 million registered vehicles in California with 24 million of them cars.[8] In 2015 there were 62,166 EVs among the two million cars sold in California.[9]

Much more detailed analyses should be done, but a shorthand example suffices for this Motion. To fuel 5 million electric cars with the same electricity usage as Nissan Leafs[10], **California will need almost the exact amount of electricity annually (17,500 GWh) that would be generated by a near-zero carbon power plant the size of Diablo Canyon**.[11] And to generate enough power for 24 million cars, California would require the equivalent of 5 power plants the size of Diablo Canyon.

6. Closing Diablo Canyon will not alleviate curtailment of renewable power.

PG&E's Testimony asserts that keeping Diablo Canyon open will increase the curtailment of RPS-eligible renewables because it cannot easily ramp down during

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[7] Chris Megerian, "California Falling Short in Push for More Clean Vehicles," LA Times, December 8, 2015. http://www.latimes.com/politics/la-me-pol-sac-climate-vehicle-emissions-20151208-story.html

[8] DMV, December 2015. https://www.dmv.ca.gov/portal/wcm/connect/5aa16cd3-39a5-402f-9453-0d353706cc9a/official.pdf?MOD=AJPERES

[9] Charles Fleming, "Honda Leads California New Car Sales for 2015," *LA Times*, February 17, 2016. http://www.latimes.com/business/autos/la-fi-hy-california-car-sales-20160217-story.html

[10] The Nissan Leaf needs 30 kWh of electricity to travel 100 miles, or .3 kWh per miles. Department of Energy, 2016. http://www.fueleconomy.gov/feg/Find.do?action=sbs&id=37066

[11] 5,000,000 Nissan Leafs at 0.3kWh per mile, multiplied by 12,000 miles (California average)

periods of over-generation. (These episodes mainly occur on sunny days when surges of solar power threaten to overwhelm the California grid.)

But PG&E's own estimates indicate that closing Diablo Canyon would alleviate just 850 GWh per year of renewables curtailment (**PG&E Testimony, p. 3-8**). This is a trivial amount, about 1 percent of the 84,000 GWh of RPS-eligible RE that CAISO forecasts for 2024.[12] Alleviating the curtailment of those 850 GWh of low-carbon renewable electricity through Diablo's closure would entail the loss of Diablo's 17,660 GWh of low-carbon electricity.

PG&E argues that "The CAISO needs resources with ramping flexibility and the ability to start and stop multiple times per day based on real-time grid conditions" (**PG&E Testimony, p. 2-20**)—in other words, natural gas plants with all their carbon emissions.

But the expedient of shutting Diablo will bring little reprieve from the curtailment crunch. That's because renewables curtailment isn't caused by nuclear power, it's caused by other renewables—especially solar panels that overgenerate on sunny days. CAISO studies suggest that by 2024, with a 40 percent RPS penetration, the marginal curtailment rate of additional increments of solar generation will be 28 to34 percent;[13] that marginal curtailment rate will increase rapidly as solar penetrations grow.

Rather than easing curtailment, closing Diablo to make way for more solar makes curtailment problems worse.

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[12] CAISO, "Report of the No Renewable Curtailment Sensitivity Case Studies;" https://www.caiso.com/Documents/May8_2015_DeterministicStudies_nocurtailment_ExistingTrajectory_40percentRPS_R13-12-010.pdf

[13] CAISO, "2015-2016 Transmission Plan" pp. 254-56, http://www.caiso.com/Documents/Board-Approved2015-2016TransmissionPlan.pdf

7. DCPP will be replaced mostly by fossil fuels either within PG&E's "bundled load," its service territory, California, or the United States.

Every kilowatt-hour of renewable electricity that's used to replace low-carbon nuclear power is a kilowatt-hour that's not available to displace fossil fuels from the grid. Because of that lost decarbonization opportunity, Diablo's lost power should properly be regarded as being *entirely* replaced by fossil fuels, for as long as there are fossil fuels on the grid. By that truer measure, Diablo's closure will result in an extra 144 million tons of carbon dioxide emissions than would occur if the plant were to renew its license and operate until 2045.

One of the architect of the Joint Proposal himself acknowledged at the workshop that SONGS would need to be replaced by natural gas not efficiency. V. John White, whose renewable energy, natural gas and energy efficiency industry association, Center on Energy Efficiency and Renewable Energy Technologies (CEERT) was hired by Friends of the Earth to create the framework for the Joint Proposal, acknowledged that efficiency and demand response would not be anywhere near enough to replace SONGS. White said the choice was between electricity imported from out-of-state or new natural gas electricity production in state. "We really have choices to make between are we going to import electricity or are we going to import gas and burn it."

The strongest advocate of building more natural gas plants to replace SONGS was Alliance for Nuclear Responsibility. Its lawyer, former California Energy Commissioner John Geesman, urged CEC and CPUC to expedite natural gas burning:

> Now, I am a big advocate of transparency and all of that stuff, but those of us that trace our political genealogy back through the Grey Davis Administration know that first and foremost you keep the damn lights on…. I think if you can find gas-generation capacity, you ought to take advantage of that opportunity…. And I think that those are the marching orders you're under. It certainly should be….

PG&E's Application and Testimony prey on widespread confusion about three different things:

1. California's electrical grid;
2. PG&E's *service* territory: all consumers who receive electricity through PG&E's power lines, including those customers who buy power from alternative retailers known as "Community Choice Aggregators" (CCAs);
3. PG&E's "bundled load": those customers in PG&E's service territory who purchase their electricity from PG&E, not from a CCA.

PG&E justifies its proposal to close DCPP and raise electricity rates on the basis of the needs of its *customer base* while ignoring the impact on PG&E's *service base* and on California's *whole electrical grid*.

In its Testimony, PG&E argues that the electricity usage it supplies will decline for three reasons:

- Lower demand due to greater energy efficiency;
- Lower demand due to more "distributed generation" such as rooftop solar.
- Migration of its customers to CCAs.

However, this accounting focuses on just one part of California: PG&E's shrinking bundled load, not its larger service area or California. And while the focus here is California, CPUC should reject any proposal that would result in higher emissions in other states from natural gas electricity generation exported to California. Currently, California imports about one-third of its power. If California is truly committed to climate goals, then simply exporting its pollution to other states cuts against the effort to reduce emissions in the US as a whole.

8. More natural gas electricity generation would very likely increase deaths from pollution and pipeline explosions.

On September 9, 2010, a Pacific Gas & Electric (PG&E) natural gas pipeline running underneath the city of San Bruno, California, exploded, killing eight people and destroying 38 homes. Six years later, a federal jury found PG&E, California's largest electric utility, guilty of violating safety regulations and deliberately misleading investigators. PG&E's lawyer argued to the jury that "Nobody at PG&E is a criminal."[14]

But even without criminal or unethical conduct, natural gas is far more dangerous than uranium, the fuel used by DCPP. In a large review of the evidence compiled for the British medical journal *Lancet*, scientists found that nuclear power is the safest way to make reliable power. Natural gas accidents kill a full order of magnitude more members of the public than nuclear accidents. The same study found that pollution from natural gas kills 54 times more and injures 136 times more people than from nuclear.[15]

Using standard public health accounting, closing DCPP would result in 831 to 5,637 premature deaths. Using the same calculations, Diablo Canyon has prevented up to 14,421 deaths since it began producing electricity. That's because using nuclear energy instead of coal and natural gas saves lives. In a study for the journal *Environmental Science and Technology,* climate scientist James Hansen and Pushker Kharecha in 2013 calculated that nuclear energy has prevented 1.8 million deaths since 1971.[16]

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[14] Sudhin Thanawala, "California Utility Guilty of Obstructing Investigators," *AP*, August 10, 2016.
[15] Anil Markandya and Paul Wilkinson, "Electricity and Health," *Lancet*, September 15, 2007
[16] Kharecha and Hansen, "Prevented Mortality and Greenhouse Gas Emissions from Historical and Projected Nuclear Power," Environmental Science and Technology, 2013

9. PG&E's Application rests on its false claim that DCPP will require cooling towers or some other very expensive OTC requirement.

PG&E forecasts in its Prepared Testimony that in 2025 Diablo's revenue requirements will be $1.661 billion, rising to $1.743 billion in 2030, on a total output of 16,300 GWh per year. Neither PG&E's Application nor its Testimony breakdown or explicitly justify 60 percent inflation in DCPP's costs.

In its Application, PG&E rests the $1.6 billion in revenue requirements on assumption that "the cost to operate Diablo Canyon may significantly increase due to [once-through-cooling regulatory requirement]." It adds:

Future operating costs are uncertain due to a variety of regulatory and other factors and could increase as the facility ages. Compliance with California's environmental protection regulations and other state and federal requirements may increase costs beyond 2025. These include, for example, any environmental mitigation or compliance measures required by California resource agencies, retrofits to comply with the State Water Resources Control Board's ("SWRCB") Once-Through Cooling ("OTC") regulation.

PG&E offers account of OTC is misleading in several ways:

PG&E's Proposal and Testimony ignore the fact that framework for an OTC mitigation settlement was already negotiated and focused on land conservation and artificial reef.

In 2000, the Central Coast Regional Water Quality Board created the framework for an OTC settlement with PG&E. Michael Thomas from Board oversaw the process, and hired Peter Raimundi from UC-Santa Cruz who worked with PG&E consultant John Steinbeck of Tenera Consultants. In January 2016, all three men were interviewed by Michael Shellenberger and the transcripts of the interviews are attached as an appendix.

The Regional Water Board — not the *State* Water Board, as PG&E claims — decides on OTC compliance. Explained Michael Thomas of the Central Coast

Regional Water Quality Board: "Both boards have a role, **but the Regional Water is who decides whether to adopt cooling towers**." Indeed, as we'll note below, the State has deferred to Raimondi, Thomas and Steinbeck.

The artificial reef was proposed at one-time cost of $15 - $50 million. According to Raimondi's presentation to the State Water Board, and based on research with Steinbeck and Thomas, "An artificial reef of sufficient size and with appropriate design and placement could compensate for the majority of impacts associated with entrainment at DCPP….The estimated cost for the construction of an artificial reef ranged from 15 million to 50 million dollars."[17]

Rainmodi (2016):

> "We proposed compensatory mitigation through habitat creation. Most species affected were ones associated with rocky subtidal reefs. So we proposed they build artificial reefs. There was precedent in southern California where for SONGS a compensatory reef was built and is still operating…. **The cost of the construction of the San Onofre artificial reef was $30 to $35 million, and that's close to the estimate from Diablo."**
>
> The negotiated settlement focused on land conservation. Said Thomas, "We came up with a package that comprised several million in projects and the setting aside about 2,000 acres of land north of the power plant in a conservation easement."

The cost of land conservation was estimated at $4.3 million per year. According to Thomas:

> For Diablo, if you go through the calculations, OTC compliance comes out to $4.3 million per year, for 2.5B gallons a day. PG&E can pay the $4 million per year. The State Water Board preference is that that the money goes toward supporting and implementing the marine protected areas. So if you establish marine protected areas, it would help make up for losses by the power plant

[17] Peter Raimondi, "The Science of Mitigation: Based on work done with Michael Thomas, Greg Cailliet and John Steinbeck and many others," 2008. Submitted to the State Water Quality Board.

> When we did it with PG&E it was several million plus the land. **They could pay $4.3 million a year, or they could propose something else.** What they propose is pretty wide open. They could say they've already taken mitigation measures that should be taken into account. There's only one case where a power company has done that, and it was approved. I would expect PG&E to document everything they have done that they could consider beneficial to environment and make that as compelling as possible.
>
> All the parties rejected cooling towers, including the Water Board. Said Thomas, "I don't think they are feasible or optimal. There have been multiple studies for towers that aren't feasible. We hired our own consultants separate from PG&E and they came to same conclusion."

Said PG&E's consultant Steinbeck:

> "PG&E may make the decision to shut Diablo Canyon down but under existing state regulation they can continue to operate without building cooling towers. PG&E just needs the Board to make decision that we're going to do this or that and then come up with a proposal and then they're going to move forward with that. I don't understand why PG&E is so concerned."

a. PG&E falsely claims that DCPP's compliance with OTC would require a longer outage.

PG&E in its Testimony writes:

> As part of its OTC mitigation compliance, it is assumed that DCPP would transition from the historical maintenance schedule to an annual two-month spring outage schedule with refueling occurring every other year. This two-month outage schedule in the spring would also help to mitigate over-generation events. Based on this two-month annual outage schedule, post-2025 generation from Diablo Canyon is projected to decline from historical levels to 16,300 GWh.

But "longer outage" was never included in mitigation framework proposed to the Regional Water Quality Board. PG&E cites no evidence for this claim and instead cites a dead web link: "Error: 404 – The page you requested could not be found." on the State Water Resource Control Agency web site.

b. PG&E Exaggerates OTC Compliance by at least $600 million annually.

The Highest estimate named for mitigation was $50 million *total* for an artificial reef. The parties (State and PG&E) were not far from each other in total cost. Said Raimondi:

> "I can't remember exact figures but the ballpark was a $20 - $30 million difference between the two mitigation proposals. Ours was something like $35 million and theirs was like $5 million."

PG&E's estimates for Diablo's revenue requirements and unit costs per megawatt-hour are way out of line with estimates made by other experts, with Diablo cost data itself and with other PG&E estimates.

Other estimates of Diablo's revenue requirements in the coming decade are much lower than PG&E's Testimony figures. A recent study by V. John White and Associates for Friends of the Earth estimated that Diablo's revenue requirement in 2025 would be between $1.003 billion and $1.069 billion, far lower than PG&E's $1.661 billion.[18] A 2015 estimate submitted to the CPUC by John Geesman, an attorney for the Alliance for Nuclear Responsibility, put the 2019 revenue requirement of the plant at $1.02 billion.[19] A 2013 report funded by PG&E also estimated that Diablo's revenue in 2027 would be about $1 billion. All these

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[18] V. John White and Associates, "A Cost Effective and Reliable Zero Carbon Replacement Strategy for Diablo Canyon Power Plant;" p. 37. http://lowcarbongrid2030.org/wp-content/uploads/2016/PDFs/160627_Diablo-Final-Report.pdf

[19] Public Utilities Commission of the State of California, "Prepared Direct Testimony of John L. Geesman on Behalf of The Alliance for Nuclear Responsibility in Application No. 15-09-001 Pacific Gas and Electric Company Test Year 2017 General Rate Case," p. 16. http://a4nr.org/wp-content/uploads/2016/03/A1509001-A4NR-Geesman-Ratemaking.pdf

estimate converge on a probable Diablo revenue requirement of about $1 billion in the 2025 to 2030 period, about $700 million lower than PG&E's forecast. **(PG&E Testimony, p. 8-AtchA-51)**

Current cost figures for Diablo Canyon support these estimates. PG&E data on Diablo submitted in its General Rate Case showed total operating and capital expenses of $627 million for the plant in 2015,[20] about $36 per MWh, which accords well with industry averages. Adding an 11.8 percent return on the plant's $1.805 billion net value (**PG&E Testimony, p. 10-5)** would give a total revenue requirement of $840 million in 2015, for a unit cost of $48 per MWh. To reach PG&E's Testimony cost figures, Diablo's revenue requirement and unit costs would have to double over the next 10 years. This forecast is drastically out of line with the estimates cited above that indicate a revenue requirement in 2025 of about $1 billion, or $57 per MWh.

Since PG&E's case for closing Diablo Canyon relies on these erroneous and unfounded cost estimates, the closure proposal should be rejected by the CPUC.

10. Even with its inflated future costs, DCPP would still be cheaper than replacing it with other low-carbon power sources.

PG&E's inflated cost forecasts show that in 2025 Diablo's revenue requirements would be $1.661 billion, rising to $1.743 billion in 2030, on a total output of 16,300 GWh per year. (**PG&E Testimony, Table 2-6**) That puts the average unit cost of the power at $102 per megawatt-hour (MWh) in 2025, rising to $107 per MWh in 2030. PG&E's estimate of the cost of renewable resources to replace Diablo is $103 per MWh in 2025, rising to $113 per MWh in 2030 (**PG&E Testimony, pp. 3-9 to 3-10**).

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[20] Public Utilities Commission of the State of California, "Pacific Gas and Electric Company 2017 General Rate Case Exhibit (PG&E-1) Summary of PG&E's 2017 General Rate Case Supplemental Workpapers Supporting Chapter 1." pp. B5-1 to B5-6.

Thus, PG&E's numbers still show Diablo with a slight cost advantage over RE sources, and give no support to a financial case for closing Diablo.

PG&E's estimates of the cost of renewable energy ("RE") resources are too low. PGE assumes a RE resource mix to replace Diablo of 80 percent wind and 20 percent utility-scale solar. This is very different from California's actual RE mix, which has a much higher proportion of higher-cost solar in relation to lower-cost wind. In 2015 the utility-scale intermittent energy mix in California was 45 percent wind to 55 percent solar,[21] vastly different from the 80:20 wind to solar mix PG&E assumes, and solar power is growing much faster than wind power. The skewed resource mix that PG&E assumes underestimates the likely costs of RE power and ignores the greater likelihood of curtailment in a mix with a higher proportion of solar.

PG&E's estimated RE costs also factored in the federal and state subsidies RE will receive. Without the subsidies, the RE costs would be substantially higher. Federal subsidies are due to sunset by 2025, making subsidy assumptions uncertain.

Once outlandish and unfounded assumptions about OTC mitigation and cooling towers are replaced with realistic cost estimates, continued operation of Diablo is seen to be much cheaper than replacing it with renewable sources, with a cost in the neighborhood of $57 per MWh range in the post-2025 period. That is about half the cost of PG&E's estimate of the cost of replacing it with renewables and energy efficiency. It's also about the same as the price PG&E estimates that Diablo's surplus power would sell for on wholesale markets. PG&E's bundled customers would therefore pay the same low average cost as other wholesale customers would pay, a cost below what they would pay for low-carbon replacement resources

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[21] U. S. Energy Information Administration, Electricity Data Browser, http://www.eia.gov/electricity/data/browser/#/topic/0?agg=2,0,1&fuel=vtvv&geo=000000000004&sec=g&linechart=ELEC.GEN.ALL-CA-99.A&columnchart=ELEC.GEN.ALL-CA-99.A&map=ELEC.GEN.ALL-CA-99.A&freq=A&ctype=linechart&ltype=pin&rtype=s&pin=&rse=0&maptype=0

according to PG&E's estimates. Relicensing of the plant and operating it until 2045 is thus the most economical option both for its bundled customers and for other consumers in the PG&E service territory and the larger CAISO grid. Allowing the closure to proceed would mean needless rate increases for PG&E's bundled customers and other California ratepayers.

The cost issue is central to the case for closing Diablo Canyon. PG&E has no duty to close the plant simply because some of its power is surplus to its bundled load when it can sell the surplus to the larger grid. Nor does it have a duty to close the plant in order to prevent a trivial degree of curtailment of renewable generation when that curtailment is actually caused by chaotic overproduction from renewable generators themselves. It does have a fiduciary duty to minimize costs for its customers. A realistic cost forecast for the plant would show that continuing to operate it will fulfill that obligation—and PG&E's case for closing Diablo Canyon would collapse

CONCLUSION

An independent CPUC committed to its mission — defending the public interest — should recognize its duties go well beyond those of PG&E. It would consider the impact of closure on the success of California's emissions-reduction initiatives. It would consider the balance of impacts on the state's air quality, land uses and environment. It would consider the impact on all the state's rate-payers in the PG&E service territory and on the larger grid, not just the rate-payers in PG&E's bundled customer base.

An independent CPUC would carefully weigh these considerations and find that keeping Diablo open accords best with the interests of Californians and the qualities of efficiency and sustainability that the state wants in its energy supply.

Therefore, EP opposes the Joint Proposal.

Respectfully submitted September 15, 2016.

s/ Frank Jablonski
Attorney Frank Jablonski
PROGRESSIVE LAW GROUP, LLC
354 W. Main Street
Madison, WI 53703
Direct: (608) 258-8511
Facsimile: (608) 442-9494
Email: frankj@progressivelaw.com

Attorney for:

ENVIRONMENTAL PROGRESS

APPENDIX

- Interview with Michael Thomas, Assistant Executive Officer, Central Coast Regional Water Quality Control Board, interviewed January 12, 2016
- Interview of Pete Raimondi, expert consultant to regional water board. Professor at UC-Santa Cruz ecology and evolutionary biology, interviewed January 8, 2016
- Interview with John Steinbeck, Tenera Consultants, January 8, 2016

Michael Thomas, Assistant Executive Officer, Central Coast Regional Water Quality Control Board; Interviewed by Michael Shellenberger; 3:45 pm January 12, 2016.

Who are you what is your role here?

I am the Assistant Executive Officer and the head of our enforcement unit. Almost all of the enforcement actions go through me. I was the lead staff person in 2000 and worked with Pete Raimondi, and hired him to assist us. And I worked with PG&E's consultant John Steinbeck. Pete's a great guy and a great scientist, John is also really good.

Where is the whole process at?

Back then we did all the environmental studies and there were two issues. What gets sucked in — entrainment — and the discharge of water 22 degrees above background levels.

In Regional Water Board staff's opinion, there were only significant environmental impacts from entrainment, and for PG&E to renew its permit, we said they had to address them.

So we came up with proposal for regional board to settle all of those impacts. We came up with a package that comprised several million in projects and the setting aside about 2,000 acres of land north of the power plant in a conservation easement.

The Board in 2000 and again in 2003 did not accept the settlement, and at the same time EPA decided that they were going to revise their Clean Water Act 3060b regulations that govern intake, entrainment and impingement. The EPA set out to advise and that put us on hold. EPA finally revised and adopted the the new regulations. But then the State Water board in Sacramento decided to adopt their own policy, and that took several years.

So now we're back to renewing a discharge permit for Diablo and we have to look at all those issues again. We have to look at the work we did previously, and the work we did since, and come up with a proposal for settling all the issues.

When will the process be finished?

We want to bring a proposal to the board in January 2017 to revise the permit

What will you do between now and then?

We have to revise the draft, update the draft, and work with the State Water Board because the state has some authority over the mitigation of impacts from OTC policy.

How did feds change rules and how did state change theirs?

I think the Feds basically affirmed their rule — which was very controversial — that the power companies have to do everything to minimize impacts, including imposing closed cycle cooling where it's feasible to do so

California State decided similarly. There are categories for different plants and nuclear has its own category. Nuclear has extra time for studies and analyses for minimizing impacts and deciding whether it's feasible.

Are cooling towers feasible?

I don't think they are feasible or optimal. There have been multiple studies for towers that aren't feasible. We hired our own consultants separate from PG&E and they came to same conclusion. We did a lot of work but the State Water Board put together their own review panel and looked at all these issues again after we did.

Will the Regional Board or State Board decide?

Both boards have a role, but the Regional Water is who decides whether to adopt cooling towers. On entrainment and impingement we will work with State Water Board executive director Tom Howard.

What is the main issue?

Entrainment is a significant issue because the volume of water is 2.5 billion gallons per day. We estimated larvae and our position was it is a potentially significant impact and so some level of mitigation is needed. How do you quantify that? It's extremely difficult because you're dealing with larvae — how do you put a price on that? And how do you mitigate for it? Do you do off-shore reefs, wetlands? And how much? They did that at San Onofre and it's very controversial as to what to do about it and how much to do about it. You have scientists on both sides. Some say you should do a substantial amount of it and others say it's relatively insignificant.

Have you found any change to fish populations over time?

No we haven't. The problem is that fish populations go up and down dramatically and there's so much data you can't determine cause and effect like from a power plant.

So we just assume that there is an impact and err on the conservative side.

What are the factors?

There are many factors including seasonal warming, El Nino, warming from the blob, climate change, and just the general warming of the ocean — plus fishing. We have fishing pressure all along the central coast, and now we have marine protected areas. There's one to the north of Diablo canyon, so you have all of these things acting on the fish population.

Is the pretense that science? Or do other things come in to play?

Both. A State panel recommended to the state board that power plants pay a fee. The looked at the data and converted entrainment losses into habitat. They asked how much habitat would it take to create the loss by power plant. You do that conversion and you ask how much is that worse. And they simplified and now we can look at volume of water by power plant and we can convert to acres and dollars.

How much money would it likely cost if PG&E paid by volume of water?

For Diablo, if you go through the calculations, OTC comes out to $4.3 million per year, for 2.5B gallons a day. PG&E can pay the $4 million per year. The State Water Board preference is that that the money goes toward supporting and implementing the marine protected areas. So if you establish marine protected areas, it would help make up for lossesloses by the power plant.

Could Water Board staff make such a proposal for mitigation?

Yes. I anticipate we'll be talking to PG&E about exactly that. Asking them what they propose. Policy allows PG&E to propose option. They can say we have already done x, y, and z environmental projects and we want that to be accepted as mitigation. There's a power plant that just did that a few months ago.

Is it even likely you'd come back with something as small as $4 million a year?

Well, if it operates 10 years, that's $40 million. If it operates 20 years, that's $80 million.

Is that your ballpark estimate?

I don't know. When we did it with PG&E it was several million plus the land. Now we have to bring into context today's State Water Board policy to minimize entrainment and impingement to level of cool water or something else. They could pay $4.3 million a year, or they could propose something else. What they propose is pretty wide open.

They could say they've already taken mitigation measures that should be taken into account. There's only one case where a power company has done that, and it was approved.

I would expect PG&E to document everything they have done that they could consider beneficial to environment and make that as compelling as possible.

Why is everyone asking whether plant can survive?

Good question. The other thing is the re-licensing with the Public Utilities Commission and the Coastal Commission. They need to get a renewal for extending their license.

Couldn't the Regional Water board still decide to make PG&E build towers?

Our staff's opinion is based on the review of the evidence which is that cooling towers are not feasible. There are organizations that disagree with us and they will be present and involved and will

argue that we should not permit. But I want to clarify that board makes its own decisions.

When will the board vote?

Depends. If it's not controversial, they may decide in one meeting. But controversial topics might take several meetings, and board meetings are several times each year. We could be dealing with it for the first part of next year.

Interview of Pete Raimondi, Professor at UC-SC ecology and evolutionary biology; Interviewed by Michael Shellenberger at 1:30 pm on January 8, 2016.

Can you help me understand who are you and your role here?

I work for the State of California, the California Coastal Commission, the California Energy Commission, and the Regional Water Board for assessments of power plants, desalination plants, and for designing mitigation.

The State Regional Water Quality Control Board is the regional group that administers the State Water Board's [National Environmental Policy Act's] NEPA determinations, 316a and 316b. The first, 316a is thermal effects, and 316b is intake effects. I typically do intake effects.

The State convened two technical working groups in the 1990s on thermal and entrainment. Both came up with results.

I'll only tell you about intake. We were charged with working with consultants hired by PG&E to come up with independent assessments. The State people would address questions of interest to intake impacts under 316b.

We had agreement with PG&E that we would have oversight of assessment. [PG&E's consultant] Tenera did a great study. There was no difference of opinion over the design or the results or the math. But there was a difference over whether there was an impact and, if so, its magnitude, and how much it should be. [PG&E

and Tenera] proposed a mitigation package that I thought was not enough to compensate for the losses found in study.

But before anything happened, PG&E declared bankruptcy. So it stalled because PG&E declared bankruptcy. So that stopped progressing.

What was the mitigation PG&E proposed?

They proposed a whole bunch of things for mitigation. We came up with a counter package for intake. They proposed a package for thermal and intake. We proposed a suitable mitigation for intake.

We proposed to use information collected to come up with a loss to the biology. The mitigation intent was to provide those resources, to have "complete compensation," as we call it. The key word is "compensatory" mitigation.

In this situation we proposed compensatory mitigation through habitat creation. Most species affected were ones associated with rocky subtidal reefs. So we proposed they build artificial reefs. There was precedent in southern California for SONGS where a compensatory reef was built and is still operating.

How much would your package have cost?

I can't remember exact figures but the ballpark was a $20 - $30 million difference between the two mitigation proposals. Ours was something like $35 million and theirs was like $5 million.

Is building an artificial reef much more than dumping rocks on a sandy beach?

It's a little harder than that. You have to have a particular sand, otherwise the whole reef will sink. The cost of the construction of the San Onofre artificial reef was $30 to $35 million, and that's close to the estimate from Diablo.

Isn't 30 million a bargain mitigation for once-through cooling?

I agree. When [utility] staff analysts look at it next to net operating profits, it's typically not noticeable on the ledger. It's a fraction of all the other costs going on. At the time PG&E was suffering for reasons that didn't have to do with mitigation and ultimately filed for bankruptcy. At the time they made the reasonable claim they couldn't afford. But the idea was that something would happen, and it didn't.

Why?

I don't know. The State just dropped. Coming out of that period we went through high growth in the State and there were brownouts and everyone was worried about the plants going off line. A huge amount of the electricity was in the two nukes [San Onofre and Diablo Canyon] at the time and they worried about brown-outs.

John Steinbeck, Tenera, Interviewed by Michael Shellenberger; 3:21 pm January 8, 2016

You worked for PG&E to evaluate how to handle its once-through cooling. How long have you been working on this?

I've been out there for 30 years. I wrote the report that me and [UC-Santa Cruz professor and Water Board Consultant] Pete [Raimundi] were coauthor on that became the guidelines. All of these intake assessments have to use our approach. Pete and I are friends but we're on opposite sides. But we have a lot of respect for each other.

Is it true the State Water Board is likely to require PG&E build cooling towers at Diablo Canyon?

There's a large misconception of what the State did with [the Federal Clean Water Act's] once-through cooling [OTC] requirement. I keep seeing wrong stuff in print. The State did not make OTC illegal or stop the use of OTC. Plants can still use OTC, they just have to initiate some kind of useful measures, operational or technological, to reduce the effects of OTC. [Natural gas power plant] Moss Landing has an agreement with state on

how they're going to do that. The other carve-out was nuclear plants. The State recognized that they couldn't go in and jeopardize nuclear safety. So, the State was going to require Diablo to do a lot of work, but I am assuming they're going to do mitigation since it doesn't make sense to try to retrofit the plant.

Why then is PG&E saying it might shut Diablo down?

PG&E may make the decision to shut Diablo Canyon down but under existing state regulation they can continue to operate without building cooling towers. PG&E just needs the Board to make decision that we're going to do this or that and then come up with a proposal and then they're going to move forward with that. I don't understand why PG&E is so concerned.

How much could mitigation cost PG&E?

Mitigation may cost them $200 million. That's what [closed nuclear plant] San Onofre shelled out to the Coastal Commission [to build an artificial reef]. Maybe it goes up to $300 million. Whatever it is, it will be a lot less than billions.

How then did the conversation ever even get to $6 billion cooling towers?

[California Environmental Quality Act] CEQA required the study as part of the regulations. CEQA required PG&E to look at all options to reduce the effects of OTC that was reasonable and cost effective and didn't threaten safety. But CEQA never required PG&E to get rid of OTC, just to look at the options from a realistic standpoint, select an option, and get it approved.

San Luis Obispo County Board of Supervisors
1055 Monterey Street, Suite D430
San Luis Obispo, CA 93408
boardofsups@co.slo.ca.us, <diablo@co.slo.ca.us>,

November 16, 2021 11:01 GMT

Subject: CGNP's Comments for Item 34, Public Comment Period - BOS Meeting of 11/16/21

Please refer to CGNP's attached comments. Dr. Nelson will excerpt from them during today's Public Comment period.

This filing will also form a portion of CGNP's Scoping Comments regarding the proposed project to cease Diablo Canyon Power Plant operations and decommission the plant. CGNP will complete its scoping comments due by 5:00 p.m., December 6, 2021

Sincerely,

/s/ Gene Nelson, Ph.D. CGNP Legal Assistant
Californians for Green Nuclear Power, Inc. (CGNP)
1375 East Grand Ave Ste 103 #523
Arroyo Grande, CA 93420-2421
(805) 363 - 4697 cell
Government@CGNP.org email
http://CGNP.org website

Attachment: CGNP to SLO County Board of Supervisors 11 16 21.pdf (6 pages)

County of San Luis Obispo Planning & Building,
Room 300, Attention: Susan Strachan
976 Osos Street
San Luis Obispo, CA 93408

Subject: CGNP's Public Comments in DRC2021-00092 - 12 01 21

December 1, 2021: 14:52 GMT

Hello Ms. Strachan:

Attached find CGNP's Public Comments in DRC2021-00092 dated December 1, 2021. This document forms a portion of CGNP's Comments regarding the Project's Draft Environmental Impact Statement. CGNP continues to raise

objections that the Draft EIS will likely be improperly scoped in contravention to relevant California statutes.

CGNP will further amend these Comments in advance of the 5:00 PM PST deadline on Monday, December 6, 2021.

Please confirm receipt of today's Comments.

Sincerely,

/s/ Gene Nelson, Ph.D. CGNP Legal Assistant
Californians for Green Nuclear Power, Inc. (CGNP)
1375 East Grand Ave Ste 103 #523
Arroyo Grande, CA 93420-2421
(805) 363 - 4697 cell
Government@CGNP.org email
http://CGNP.org website

Attachment: CGNP Comments to SLO County 12 01 21.pdf (35 Pages)

Susan Strachan, Nuclear Power Plant Decommissioning Manager
Planning Department, County of San Luis Obispo, California
976 Osos Street, Room 200
San Luis Obispo, CA 93408
Main Tel: (805) 781-5600 Fax: (805) 781-1242
Email: sstrachan@co.slo.ca.us and **diablo@co.slo.ca.us**

Subject: CGNP's Comments Supporting the No Project Alternative for Diablo Canyon Power Plant

December 6, 2021 4:29 PST

Hello, Susan: Please include CGNP's attached file in the record of

ED2021-174 / DRC2021-00092

CGNP would appreciate a confirmation of this email's timely receipt.

Sincerely,

/s/ Gene Nelson, Ph.D. CGNP Legal Assistant
Californians for Green Nuclear Power, Inc. (CGNP)
1375 East Grand Ave Ste 103 #523
Arroyo Grande, CA 93420-2421
(805) 363 - 4697 cell
Government@CGNP.org email
http://CGNP.org website

Attachment: CGNP Materials for SLO County - 12 06 21.pdf (72 pages)

(The cover sheet for the 72-page attachment follows.)