

California State Senate

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OVERSIGHT HEARING

Proposal to Extend Operations of the Diablo Canyon Nuclear Power Plant

Background

“More than any other single power generation source, nuclear power is the object of extreme loyalty as well as utmost disdain.” – Peter Asmus, *Energy in California* (University of California Press: 2009)

Diablo Canyon Nuclear Power Plant. Pacific Gas & Electric’s (PG&E’s) Diablo Canyon Power Plant (DCPP) is California’s only remaining operating nuclear power plant. DCPP consists of two units; Unit 1 is a 1,073 megawatt (MW) Pressurized Water Reactor (PWR) which began commercial operation in May 1985, while Unit 2 is a 1,087 MW PWR, which began commercial operation in March 1986. According to California Energy Commission (CEC) website, the plant produces approximately 8.5 percent of California’s in-state electric generation, roughly 18,000 giga watthours (GWh). The DCPP is licensed by the federal Nuclear Regulatory Commission (NRC) to operate it November 2, 2024 (unit 1) and August 26, 2025 (unit 2). In addition to NRC licensing, the power plant is subject to lease requirements from the State Lands Commission, due to the location of the plant on state tideland, and additional state permitting. DCPP reportedly took 18 years and over \$5.5 billion to construct, well over the initial \$400 million estimates. In part, these costs overruns related to the need to address seismic improvements after nearby fault lines were discovered. Most of these costs were passed on to electric ratepayers.

Nuclear energy. Nuclear energy is produced by splitting large nuclei atoms, in this case uranium (small pellets in the case of DCPP) to release generous amounts of

energy in the form of heat (a process known as fission). In a pressurized water reactor, such as DCP, the heat is used to produce steam to drive turbine electrical power generators. The reactor is contained inside a containment shell made of extremely heavy concrete and steel. The reactor core contains the uranium fuel, which is formed into cylindrical pellets (about half an inch in diameter and an inch long) that are sealed in fuel tubes. The tubes are arranged in groups to make a fuel assembly which form the reactor core. The heat is controlled with the use of control rods which when pulled out and inserted change the availability of neutrons affecting changes to the amount of heat. In the PWR system, the heat is removed from the reactor by water flowing in a closed pressurized loop. The heat is transferred to a second water loop that is kept at a low pressure that allows the water to boil and create steam that is used to turn the turbines. In the case of DCP, the facilities once-through-cooling system (OTC) draws water from the Pacific Ocean to condense steam that is then used to drive the turbine systems.

California's experience with nuclear energy. In 1976, California placed a moratorium, under the Warren-Alquist Act (§§25524.1 – 25524.2), on the construction and licensing of new nuclear fission reactors until the federal government implements a solution to radioactive waste disposal. Spent fuel is typically held in temporary storage at reactor sites until a permanent long-term waste disposal solution becomes available. Though there have been longstanding attempts to establish permanent storage sites, most notably at Yucca Mountain in Nevada, none have been created by the federal government. Today, California currently has three commercial nuclear power facilities in various stages of decommissioning, including San Onofre Nuclear Generating Station (SONGS) in Southern California, which had to be abruptly decommissioned, as well as, Rancho Seco and Humboldt Bay Power Plant (both in Northern California). Under NRC licenses, once a nuclear plant ceases reactor operations it must be decommissioned, a process defined in federal regulations. In preparation for a plant's eventual decommissioning, nuclear plant owners are required to maintain trust funds while the plants are in operation to ensure sufficient funds are available to manage the spent nuclear fuel and safely retire the facility.

DCP and local community. The DCP sits on approximately 900 acres adjacent to the Pacific Ocean between Avila Beach and Montaña de Oro State Park in San Luis Obispo County. The plant employs roughly 1,500 employees who help operate the facility. DCP itself generates millions in property tax revenue, which

mainly benefits local schools.¹ A study, commissioned by PG&E, of the economic benefits of DCPD concluded that operation of DCPD in 2011 contributed, directly and indirectly, over \$900 million to the local economy, including many of the regions high-paying, year-round jobs.² The DCPD is a major contributor to the economy of San Luis Obispo County and northern Santa Barbara County as both a source of tax revenue and employer.

Previous funding to community for DCPD closure risks. Resolution-3535 is a CPUC Resolution adopted in 1998, which also addressed Diablo Canyon. In this case, the County of San Luis Obispo and the San Luis Coastal Unified School District sought protection against the risk that Diablo Canyon-related property taxes would decrease precipitously in response to electric market restructuring, namely the restructuring adopted in AB 1890 (Brulte, 1996) and jeopardize the ability of the County to provide basic public and educational services. At the time, the California Public Utilities Commission (CPUC) expressed a reluctance to require ratepayers to pay for the cost of local government services that are typically paid for by taxpayers, no matter how beneficial those services may be. The CPUC stated that authorization from the Legislature would be necessary for any such action, since the CPUC did not have authorization to use ratepayer funds for non-utility-related activities. Subsequently the Legislature passed into law Chapter 382, Statutes of 1997, a budget bill which authorized \$10 million from ratepayers to fund a community mitigation fund to benefit the county and school district.

Joint Proposal announced. On June 28, 2016, the State Lands Commission voted to approve a lease extension for the DCPD to 2025. A week prior to the vote, PG&E announced a Joint Proposal with labor and environmental organizations that would result in the closure of the plant by 2025 and “increase investment in energy efficiency, renewables and storage beyond current state mandates.” The original parties of the Joint Proposal included the International Brotherhood of Electrical Workers (IBEW) Local 1245, Coalition of California Utility Employees (CCUE), Friends of the Earth, Natural Resources Defense Council (NRDC), Environment California, and Alliance for Nuclear Responsibility.

CPUC Application 16-08-006. In August 2016, PG&E filed an application with the CPUC submitting the Joint Proposal to review and request for approval of the replacement power provisions, the employee retention program and other elements.

¹ San Luis Obispo County Comprehensive Annual Financial Report for Fiscal Year 2013-14. (<http://www.slocounty.ca.gov/Assets/AC/Digital/Financial/CAFR/2013-14CAFR.pdf>)

² *Economic Benefits of Diablo Canyon Power Plant: and economic impact study.* June 2013.

The application sought over one billion dollars in ratepayer funds to pay for the costs associated with the proposal. In November 2016, PG&E agreed to expand the Joint Proposal and secured the support of the County of San Luis Obispo, the Coalition of Cities (Arroyo Grande, Atascadero, Morro Bay, Paso Robles, Pismo Beach and San Luis Obispo) and the San Luis Coastal Unified School District. The expanded proposal included \$85 million in support for the San Luis Obispo County community, compared to the \$50 million in the original proposal.

The key elements of the Joint Proposal are as follows:

- PG&E will retire the DCPD at the expiration of its NRC license in 2025.
- Parties support the orderly replacement of Diablo Canyon with greenhouse gas (GHG)-free resources. The proposal included three tranches of GHG-free resources to partially replace the output of Diablo Canyon, the last two which were subsequently abandoned by PG&E:
 - 2,000 gross GWh of energy efficiency at \$1.3 billion
 - 2,000 GWh of GHG-free energy, including energy efficiency and Renewable Portfolio Standard (RPS) eligible energy resources
 - A voluntary 55 percent RPS commitment.
- PG&E would cease efforts to renew its operating license with the NRC.
- PG&E commits to several employee unions to establish an employee retention program funded by \$363.4 in ratepayer funds:
 - \$352.1 million in ratepayer funds to provide incentives to retain the plant's approximately 1,500 employees during the remaining operating years of the plant by providing a 25 percent annual bonus for each employee for the remaining years of the operation of the plant.
 - \$11.3 million in ratepayer funds for a retraining and development program to facilitate redeployment of a portion of plant personnel to the decommissioning project or other positions within the company.
 - The application also noted severance payments for employees that would be addressed in a separate proceeding specific to the decommissioning of the plant.
- PG&E agreed to establish a Community Impacts Mitigation Program (CIMP) funded with \$85 million from ratepayers for payments to San Luis Obispo County and San Luis County Unified School District to mitigate the economic impact of the plant's retirement due to future loss of tax revenue once the plant had ceased operations. The CIMP consists of:

- \$75 million Essential Services Mitigation Fund created to offset the potential negative impacts to essential services provided to the community.
 - Distributed to the County in nine equal installments (\$8.333 million per year for nine years) through 2025.
 - The County distributes to local agencies (in total 71 agencies) whose budgets are impacted by the decrease in unitary tax funding from the power plant.
 - School District receives \$36.8 million, including \$10 million to an educational foundation designated by the School District.
- PG&E would create an Economic Development Fund to “ease the local economic impacts of the plant’s closure.”
 - Each member of the Coalition of Cities would receive a portion of \$5.76 million.
 - The County receives \$3.84 million, and shares \$192,000 with the City of Grover Beach “which means that all cities in the County will receive benefits from the settlement.”
 - The remaining \$400,000 would be allocated for regional economic development activities.
- A third part of the agreement between PG&E and the County addresses the continuation of funding for offsite community and local emergency preparedness and planning efforts until all spent fuels are in dry cask storage and the two nuclear reactors are fully decommissioned. The agreement also reiterates PG&E’s pledge to limit its actions related to real estate and land holdings.

CPUC Decision. In the fall of 2017, the CPUC voted to approve the retirement of the DCP, including approval for some of the elements of the Joint Proposal. Specifically, the CPUC approved \$222.6 million in rate recovery for costs associated with the employee retention (\$211.3 million) and retraining (\$11.3 million). The CPUC also approved \$18.6 million for license renewal activities. However, the CPUC denied elements of the Joint Proposal, including:

- *Procurement of GHG-free resources.* In response to the requests for replacement energy, the CPUC stated that replacement procurement issues would be better addressed in the Integrated Resources Planning (IRP) proceeding. The CPUC noted it is not clear what greenhouse gas-free procurement (if any) may be needed to offset the retirement of DCP. They specifically cited the changing electricity market, the growth of Community Choice Aggregators (CCAs), and the time between the decision and the

closure of the plant as factors that merit a thorough review in the IRP process, instead of directing specific procurement requirements outside the IRP. However, the CPUC stated its intent to “avoid any increase in GHG emissions resulting from the closure of Diablo Canyon.” The CPUC did not suggest legislative authorization was necessary for this action, only that it was better suited to address in the IRP proceeding.

- *Funding for the school district, county and cities.* The CPUC also denied the \$85 million for the CIMP, stating that the use of ratepayer funds for those activities is not legally allowable and would require legislative authorization. In denying the CIMP, the CPUC stated that it could not legally authorize the use of ratepayer funds for non-utility-related activities, such as funding schools. Instead, the CPUC stated that the parties could request authorization from the legislature to use ratepayer funds for these purposes or, alternatively, PG&E shareholders could also fund these efforts. The CPUC decision also commented on lack of fairness for a significant portion of the CIMP distribution, especially the \$10 million to the school district. The CPUC decision stated that the “amount and allocation of payments appear to have more to do with PG&E’s litigation needs than the economic needs of the community.” The decision further noted that a clearer picture of the economic impacts on the community should be available upon completion of the economic assessment required by SB 968 (Monning, Chapter 674, Statutes of 2016).
- The CPUC also denied the full request for employee retention and training. The CPUC approved the employee retention program at an annual payment level of 15 percent bonus for each employee, instead of the requested 25 percent. The CPUC decision stated the consideration of benchmark data, the presence of significant and pre-funded severance pay, and the unique nature of the nuclear industry, as factors for approving a reduced employee retention program from what was requested in the application. Importantly, the CPUC did not suggest authorization from the legislature was needed. Instead, the CPUC ruled for employee bonuses they believed the record of the proceeding supported.

SB 1090 (Monning, Chapter 561, Statutes of 2018). The proponents of the Joint Proposal argue that the DCP has benefitted all PG&E ratepayers and that the risks associated with the plant have been borne by San Luis County residents who will continue to live with the risks posed by the plant, even once the plant is

decommissioned. SB 1090 directs the CPUC to require the use of ratepayer funds for activities, or portion of activities, the CPUC had previously denied, including: an additional 10 percent augmentation to the already-approved 15 percent annual employee retention bonuses (for a total of 25 percent annual retention bonuses), and the requirement that replacement power be GHG-free, as well as, approving funds for the CIMP. The CPUC has since adopted decisions to implement these actions.

Extreme heat leads to August 2020 rotating outages. For the first time in 20 years, California experienced rotating electricity outages when the electric grid operator, the California Independent System Operator (CAISO), forced electricity outages in order to balance electricity supply and demand on Friday, August 14 and Saturday, August 15, 2020. The outages occurred in the midst of an extreme heat wave affecting much of the western United States. The August 14th rotating outages caught many by surprise and resulted in the loss of power during the evening hours to nearly 500,000 customers within the CAISO footprint for a duration of 15 minutes to nearly two and a half hours, depending on the utility service territory. The August 15th rotating outages affected fewer customers for a shorter duration, specifically 321,000 customers experienced rotating outages ranging between eight minutes to one and a half hours, depending on the utility service territory. These events occurred at a time when temperatures were soaring and Californians were relying on electricity to both operate air conditioning in order to keep cool and to maintain connectivity, as many were working or staying home in order to reduce the risk of infections from the COVID-19 pandemic.

Root causes identified. Governor Newsom, working with the CPUC, CEC, and CAISO took emergency actions in order to prevent additional rotating outages that week, as the Western United States heatwave continued to challenge electricity grid operations. However, the threat of the loss of power and the need for all-hands on-deck emergency actions raised concerns about the State's ability to prepare the electric grid for future extreme heat events. In the aftermath, Governor Newsom requested the CAISO, CPUC, and CEC, report on the root causes of the events leading to the August outages. The CAISO, CPUC, and CEC released a *Preliminary Root Cause Analysis* report on October 6, 2020, and continued their analysis to confirm and supplement findings, releasing a *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave* report on January 13, 2021.

The report identified three major causal factors contributing to the August outages:

1. The climate-change-induced extreme heat wave across the western United States resulted in demand for electricity exceeding existing electricity resource adequacy (RA) and planning targets.

Taking into account 35 years of weather data, the extreme heat wave experienced in August was a 1-in-30 year weather event in California. In addition, this climate change induced extreme heat wave extended across the western United States. The resulting demand for electricity exceeded the existing electricity resource planning targets and resources in neighboring areas were also strained.

2. In transitioning to a reliable, clean, and affordable resource mix, resource planning targets have not kept pace to ensure sufficient resources that can be relied upon to meet demand in the early evening hours. This made balancing demand and supply more challenging during the extreme heat wave.

The rotating outages both occurred after the period of gross peak demand, during the “net demand peak,” which is the peak of demand net of solar and wind generation resources. With today’s new resource mix, behind-the-meter and front-of-meter (utility-scale) solar generation declines in the late afternoon at a faster rate than demand decreases. This is because air conditioning and other load previously being served by solar comes back on the bulk electric system. These changes in the resource mix and the timing of the net peak have increased the challenge of maintaining system reliability, and this challenge is amplified during an extreme heat wave.

3. Some practices in the day-ahead energy market, operated by the CAISO, exacerbated the supply challenges under highly stressed conditions.

A subset of energy market practices contributed to the inability to obtain or prioritize energy to serve CAISO load in the day-ahead market that could have otherwise relieved the strained conditions on the CAISO grid on August 14 and 15. The practices which obscured the tight physical supply conditions included under-scheduling of demand in the day-ahead market by load serving entities or their scheduling coordinators, and convergence bidding, a form of financial energy trading used to converge day-ahead and real-time pricing. In addition, the CAISO implemented a market enhancement in prior years. In combination with real-time scheduling

priority rules, this enhancement inadvertently caused the CAISO's day-ahead Residual Unit Commitment process to fail to detect and respond to the obscuring effects of underscheduling and convergence bidding during August's stressed operating conditions. Although the CAISO is now actively developing solutions to these market design issues, most of the day-ahead supply challenges encountered were addressed in the real-time market as a result of additional cleared market imports, energy imbalance market transfers and other emergency purchases.

Actions identified to mitigate against widespread outages. Exactly one year ago, this committee received a presentation on the actions being taken by the CAISO, CPUC, and CEC identified in the Report to better prepare the electric grid, including, among others:

- CPUC directing the electric investor-owned utilities (IOUs) to seek additional supply-side capacity and additional demand-side resources, especially during the net peak period (i.e. the hours past the gross peak when solar production is very low or zero).
- CAISO performing analysis supporting an increase to the CPUC's Resource Adequacy program procurement targets which at the time of the outages had required 15 percent in reserves for all load-serving entities (the targets have since been increased).
- CAISO making market rule and practice changes by June 2021 that will ensure the CAISO's market mechanisms accurately reflect the actual balance of supply and demand during stressed operating conditions.
- CPUC tracking progress on generation and battery storage projects that are currently under construction in California to ensure there are no CPUC-related regulatory barriers that would prevent them from being completed.
- CEC conducting probabilistic studies that evaluate the loss of load expectation on the California system to determine the amount of capacity needed to meet the desired service reliability targets.

CPUC historic procurement order. On June 24, 2021, the CPUC, in ongoing efforts to ensure electricity reliability in the state and meet clean energy goals, approved a historic decision ordering utilities to procure 11,500 megawatts (MW) of new electricity resources to come online between the years 2023 and 2026, with all of the resources procured coming from preferred resources, such as distributed energy resources (including energy efficiency and demand response), renewables, and zero-emitting sources. The CPUC procurement order represents the largest

capacity procurement ordered at a single time by the CPUC, and is the largest requiring only clean resources.

Governor proposes to extend operations of the DCP. In late April of this year, Governor Newsom commented on the possibility of extending operations of the DCP, as well as, natural gas plants that like DCP are subject to retirement due to State Water Board regulations regarding once-through-cooling facilities that impacts ocean water and marine life. Since then, there have been a number of news reports and a Joint Agency Workshop as recent as two weeks ago to discuss the need, option, and hurdles to extending operation of DCP. The Newsom Administration has noted the opportunity to secure federal funding from the U.S. Department of Energy's implementation of the Infrastructure Investment and Jobs Act, specifically a pending September 6th application deadline for currently operating nuclear facilities. Today's hearing is an opportunity for Senators to hear from the Governor's Office in a public setting about the Governor's proposal to extend operations of the DCP, as well as, the opportunity to hear from a variety of stakeholders, including many who were parties to the Joint Settlement agreement to decommission the plant. The hearing will begin with a presentation from the Governor's Office regarding their proposal. Following the Governor's Office presentation, the committee will hear from stakeholders have been asked to share their priority considerations for any such proposal. Specifically, the committee will hear from the owner and operator of the facility, PG&E, and representatives from the workforce, local government, environmental organizations, ratepayer organizations, and, finally, the public.

Among the considerations the committee, members of the Legislature, and public may consider:

- Is the extension of the operation of the DCP sufficiently explained and adequately justified from an energy reliability necessity?
- What are the safety considerations of an extension (including seismic, emergency, etc.)? Are they fully accounted for in the costs projections and expected future operations?
- What is required of the opportunity for federal funding? Is a full proposal to extend the operations necessary at this time? How realistic is the funding opportunity? To what extent do federal funds reduce costs to ratepayers and taxpayers?

- What permitting and licensing action is needed from the various federal and state regulatory agencies to authorize an extension?
- What are the total costs for the extension, including any that have been borne for decommissioning?
- How will costs be allocated to ratepayers, taxpayers, and shareholders? Is the allocation just and reasonable?
- Which ratepayers will shoulder these costs and how will they be allocated? There are bundled service customers served directly by PG&E, unbundled customers served by CCAs and direct access providers, and ratepayers outside PG&E territory (served by other utilities within the balancing authority footprint and within the state).

