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Comments on Diablo Canyon Cost Comparison

Additional submitted attachment is included below.

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Comments on the Draft Senate Bill 846 Diablo Canyon Power Plant Extension Cost Comparison

Introduction

Thank you for the opportunity to comment on the Draft Senate Bill 846 Diablo Canyon Power Plant Extension Cost Comparison. The CEC Draft Senate Bill 846 Diablo Canyon Power Plant Extension Cost Comparison (CEC Report) contains several flaws which hopefully can be corrected in the final report. The CEC Report first overestimates the annual production from Diablo Canyon which overstates its value and sets an unrealistic goal line for any like kind replacement. The CEC Report underestimates the cost to operate the plant based on dated May testimony from PG&E. The CEC report wastes considerable time evaluating Like for Like analysis meaning the replacement power must supply the equivalent annual production of the DCPP which is not required by CPUC decisions for Diablo Canyon retirement.[1] The cost report eliminates a cost comparison of almost all generating technologies that are feasible because somehow they compete with the current procurement actives that are being conducted to meet CPUC procurement orders. The rest of generating technologies were eliminated from consideration as being to time consuming or infeasible.

Diablo Canyon is not a GHG Free Resource

According to the CEC report the, "Diablo Canyon Power Plant (DCPP) consists of two nuclear reactors (Units 1 and 2) that produce a total of about 18,000 gigawatt-hours (GWh) of electricity annually, or 2.2 gigawatts (GW) of net peak capacity."[2] The Energy Information Agency provides annual generation for Diablo Canyon. In 2019 the DCPP generated 16,165,384 MWh, 2020 DCPP generated

[1] Conclusion of Law number 14 from D. 21-06-035 provides the amount and type of resources required to be procured to enable the retirement of Diablo Canyon. As the decision states, *"To ensure no ambiguity about the emissions profile of replacement capacity for Diablo Canyon, the Commission should require that a minimum of 2,500 MW of incremental NQC be from zero-emitting generation, generation paired with storage, or demand response resources, that are available every day between 5 p.m. and 10 p.m. daily (the beginning of hour ending 1800 and the end of hour ending 2200), and can deliver 5 MWh of energy during each of those periods for every MW of incremental capacity used to comply with the requirements of this order."*

[2] Draft Senate Bill 846 Diablo Canyon Power Plant Extension Cost Comparison Page 8 of 42

16,258,698 MWh, in 2021 DCPP generated 16,477,366 MWh, and in 2022 in generated 17,593,254 MWh.[3]

The CEC report states that DCPP provides, *"17 percent of California's zero-carbon electricity."* The CEC report is mistaken as Diablo canyon is not a zero-carbon producer. The NRC Staff Guidance for Greenhouse Gas and Climate Change Impacts for New Reactor Environmental Impact Statements which is included in the 21-ESR-01 docket[4] details the primary GHG emissions from the nuclear fuel processing cycle. NRC guidance estimates that the fuel mining, processing and handling generates 10,100,000 MT CO2(eq) for the uranium fuel cycle over a 40 year period for a 1,000 MW light water reactor.[5] Diablo Canyons two 1,000 MW reactors could result in a potential 20,200,000 MT CO2 (eq) over 40 years or 505,000 MT CO2 (eq) per year. Comparing Diablo Canyon to zero emitting resources is an inaccurate comparison and taints the resource evaluation.

CPUC Procurement Requirements are Being met.

The CEC Report implies that load serving entities are not meeting the procurement targets ordered by the CPUC. The CEC cost report states that, "*recent supply chain constraints in the market for solar, wind and energy storage resources and development delays (e.g., interconnection and permitting) have resulted in risks to new resources coming online as planned and overall system reliability upon the retirement of DCPP." The* Joint Reliability Planning Assessment - Third Quarterly Report[6] which the CEC co-authored demonstrates that procurement of renewable resources is on track to meet all current CPUC procurement requirements. Table 1 of the "The Third Quarterly Report" shows that 4,504 MW of NQC has been procured as of May 26, 2023.

[3] https://www.eia.gov/electricity/data/browser/#/plant/6099?freq=A&start=2001&end=2022&ctype=columnchart&ltype=pin&columnchart=ELEC.PLANT.GEN.6099-ALL-ALL.A&linechart=ELEC.PLANT.GEN.6099-ALL-ALL.A&pin=&maptype=0

[4] TN 251597 Included as Attachment 1 to this submission. Attachment 1: Staff Guidance for Greenhouse Gas and Climate Change Impacts for New Reactor Environmental Impact Statements COL/ESP-ISG-026

[5] Attachment 1: Staff Guidance for Greenhouse Gas and Climate Change Impacts for New Reactor Environmental Impact Statements COL/ESP-ISG-026 Page 9 of 18

[6] TN 251991 Joint Reliability Planning Assessment - Third Quarterly Report

Table 1: Cumulative Resource Additions, January 2020 Through May 26, 2023

Technology Type	Nameplate Capacity (MW)	Estimated Sept. Net Qualifying Capacity (NQC) MW	Number of Projects
Storage	4,097	3,621	56
Solar	3,652	301	56
Hybrid (Storage/Solar)	998	456	16
Wind	700	94	19
Geothermal	41	31	1
Biogas, Biomass, Hydro	34	1	8 (2,2,4)
Subtotal SB 100 Resources, In-California Independent System Operator	9,522	4,504	156
Natural Gas, incl. Alamitos & Huntington Beach	1,477	1,474	12
Total Resources, In-California Independent System Operator	10,999	5,978	168
New Imports, Pseudo-Tie[1] or Dynamically Scheduled	1,689	727	13
Total Resources, Including Imports	12,688	6,689	181

Source: CPUC staff[2]

[7]

The Third Quarterly Report also states that, "As of the end of May 2023, more than 40 additional resources were approaching the final stages of completion in the California ISO's New Resource Implementation (NRI) process, representing more than 2,000 MW in nameplate capacity. Many of these resources are expected to reach commercial operation throughout the summer." With an additional 2,000 MW of resources added to 4,504 MW already procured it demonstrates that procurement orders are being met. D. 19-11-016 required 3,060 MW of new zero carbon resources by August 1, 2023.[8] Procurement under D. 19-11-016 reached 3,803 MW exceeding procurement requirements by 503 MW according to the CPUC's Summary of Compliance with Integrated Resource Planning (IRP) Order D.19-11-016 and Progress Toward Mid Term Reliability (MTR) D.21-06-035 Procurement document.[9]

The Mid Term Reliability Decision D.21-06-035 required that 2,000 MW of clean energy be provided in 2023. With the projected 2,000 MW of new capacity coming online by the end of summer

[7] TN 251991 Joint Reliability Planning Assessment - Third Quarterly Report Table 1 Page 14 of 18.
[8] D. 19-11-016 allowed for 240 MW of natural gas generation.
[9] Summary of Compliance with Integrated Resource Planning (IRP) Order D.19-11-016 and Progress Toward Mid Term Reliability (MTR) D.21-06-035 Procurement Page 19 of 35 https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/d1911016andd21.pdf

2023 combined with the 4,504 MW already procured the procurement targets ordered by D. 21-06-035 and D. 19-11-016 will be met. The narrative that project delays are preventing compliance with CPUC leads to the CEC to eliminating all feasible renewable energy projects such as wind, solar, and geothermal because they potentially compete with existing CPUC procurement activities.

Resource Eligibility Criteria

The CEC utilized three eligibility characteristics to identify resources which could be procured to replace Diablo Canyon. According to the CEC the eligibility criteria were developed to identify resources to replace DCPP's generating capacity and energy production in alignment with legislative requirements and DCPP characteristics.

The first CEC criteria is that the resources must be *" Zero-carbon: Resources that produce no carbon emissions, similar to DCPP operations and consistent with the greenhouse gas (GHG) emission reduction goals."* As explained above Diablo Canyon is not a zero-carbon resource. The fuel processing requirements for Diablo Canyon result in up to 505,000 MT CO2 (eq) per year.[10] While the procurement orders are clear that zero carbon resources must be procured the cost comparison must recognize that DCPP is not a zero-carbon resource under any scenario.

The second CEC criteria is that the resource, "*Does not compete with Integrated Resource Plan (IRP) procurements: Resource types incremental to, and not identified in planned procurements to prevent increased costs in the market for resources already being procured by load serving entities."* [11] These resources are essentially a complete list of the only commercially proven and feasible resources avaible and include solar, wind, geothermal, hydro, pumped storage, and CAES. Once these resources are eliminated there are no other resources that could be implemented by 2025 according to the report.

The third requirement the CEC uses is the, "*Grid value: Resources that can provide the grid with consistent energy production throughout the day and reliable power during net peak periods."* This is an arbitrary requirement. CPUC procurement orders are clear daily energy is not the issue but peak capacity is what the CPUC decided was needed to replace Diablo Canyon. Conclusion of Law number 14 from D. 21-06-035 provides the amount and type of resources required to be procured to enable the retirement of Diablo Canyon. As the decision states, *"To ensure no ambiguity about the emissions profile of replacement capacity for Diablo Canyon, the Commission should require that a minimum of 2,500 MW of incremental NQC be from zero-emitting generation, generation paired with storage, or demand response resources, that are available every day between 5 p.m. and 10 p.m. daily."* It is not necessary for Diablo Cayon replacement to generate the daily energy that the DCPP provides. The CEC recognizes the requirement as the report states, "*While planning for the replacement for DCPP has been ongoing since 2016, CPUC ordered load serving entities (LSEs) in 2021 to procure at least 2,500 MW of zero-emitting resources to replace DCPP by June 1, 2025*.[12]

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[10] Attachment 1: Staff Guidance for Greenhouse Gas and Climate Change Impacts for New Reactor Environmental Impact Statements COL/ESP-ISG-026 Page 9 of 18

[11] Draft Senate Bill 846 Diablo Canyon Power Plant Extension Cost Comparison Page 8 of 43

[12] Draft Senate Bill 846 Diablo Canyon Power Plant Extension Cost Comparison Page 8 of 43

Diablo Canyon Costs are Severely Understated.

The CEC also understates the costs of retaining Diablo Canyon. The CEC uses PG&E's dated May 19, 2023 testimony on the costs of operating Diablo Canyon. Utilizing these numbers, the CEC concludes that Diablo Canyon operational costs will be, *"$736 million in 2023, $744 million in 2024, and $893 million in 2025."* PG&E submitted revised operating cost estimates in August of $971,985,000 in 2024, $1,426,078,00 in 2025 and $1,320,454,000 in 2026.[13] These costs PG&E reported in August above do not include money PG&E would receive through the SB 846 loan. By the CEC estimates PG&E would recover $42 million in 2022, $381 million in 2023, $408 million in 2024, $210 million in 2025, and $58 million in 2026 for costs associated with extending the operation of DCPP.[14] The CEC has woefully underestimated the costs to continue operating Diablo Canyon which negatively impacts their analysis. As The CEC Cost Report states that, *"The data found in PG&E's testimony, presented in this chapter, is used as a baseline to compare DCPP extension costs and the cost of a mix of alternate resources in Chapter 4."* Presented below is Table 1-4 containing PG&E's more accurate operating cost estimates submitted in their revised August reply testimony.

TABLE 1-4
COMPARING PG&E AND TURN COST ESTIMATES
(THOUSANDS OF DOLLARS)

Line No	Scope	2024	2025	2026	2027	2028	2029	2030
1	Forecasted Operational Costs (May 19)	$744,446	$893,139	$765,144	$751,996	$885,818	$773,478	$422,644
2	Other DCPP Costs (Table 1-3)	222,596	505,286	515,494	460,377	462,229	454,596	176,232
3	Additional Costs (Table 1-1 & A12)	~~2,360~~ 4,943	~~5,356~~ 27,654	~~5,574~~ 39,816	~~5,788~~ 41,229	~~5,832~~ 42,513	~~5,776~~ 40,516	~~2,850~~ 19,160
4	Total	$~~969,401~~ 971,985	$1,~~403,781~~ 426,078	$1,~~286,212~~ 320,454	$1,~~218,161~~ 253,601	$1,~~353,879~~ 390,560	$1,~~233,850~~ 268,590	$~~601,726~~ 618,036
5	TURN's Estimate (Table 13)	$1,635,024	$2,150,450	$1,618,396	$1,569,071	$1,703,220	$1,667,591	$910,519
6	TURN's Overstatement	$~~665,623~~ 663,039	$~~746,669~~ 724,372	$~~332,184~~ 297,942	$~~350,910~~ 315,470	$~~349,341~~ 312,660	$~~433,741~~ 399,001	$~~308,793~~ 292,483

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[13] **PACIFIC GAS AND ELECTRIC COMPANY REBUTTAL TESTIMONY ON RULEMAKING TO IMPLEMENT SENATE BILL 846 CONCERNING POTENTIAL EXTENSION OF DIABLO CANYON POWER PLANT OPERATIONS AUGUST 25, 2023 REVISED TESTIMONY** Page 18 of 93 file:///C:/Users/sarve/Downloads/R2301007-PGE-Various-DiabloCanyonPowerPlantOperationsExtensionOIR-RebuttalTestimony-Revised-20230825%20(3).pdf

[14] Draft Senate Bill 846 Diablo Canyon Power Plant Extension Cost Comparison Page 9 of 43

[15] **PACIFIC GAS AND ELECTRIC COMPANY REBUTTAL TESTIMONY ON RULEMAKING TO IMPLEMENT SENATE BILL 846 CONCERNING POTENTIAL EXTENSION OF DIABLO CANYON POWER PLANT OPERATIONS AUGUST 25, 2023 REVISED TESTIMONY** Page 18 of 93 file:///C:/Users/sarve/Downloads/R2301007-PGE-Various-DiabloCanyonPowerPlantOperationsExtensionOIR-RebuttalTestimony-Revised-20230825%20(3).pdf

The CEC Analysis Requiring Like for Like Generation is Misplaced.

The CEC Report concludes on page 2 that, "*The analysis shows that there are no supply resources that can be brought online before the planned 2025 retirement of DCPP to meet the like-for-like energy generation of 18,000 GWh per year.*" First of all, Diablo Canyn does not average 18,000 GWh a year as demonstrated from the Energy Information Agency data presented above. More importantly CPUC procurement orders do not require like for like energy generation to replace Diablo Canyon. The CPUC has been very clear. As stated above Conclusion of Law number 14 from D. 21-06-035 provides that, "*the Commission should require that a minimum of 2,500 MW of incremental NQC be from zero-emitting generation, generation paired with storage, or demand response resources.*"

CEC Report Concludes that Demand Response Programs are More Cost Effective Than Diablo Canyon.

The CEC Report concludes that the only possible resource that could replace Diablo Canyon is demand response programs. According to the CEC report 750 MW of demnd response resources could be procured at, *"an upfront capital cost between $230 million and $330 million plus recurring annual incentive costs of about $50 million–$65 million per year."* Over a five year period this could cost at a maximum 655 million which is less than half the cost of one year of operations for the Diablo Canyon Plant.

There is evidence that the potential for demand response programs and tools to shave peak demand is much larger than the CEC report projects. During the September 2022 heat wave unplanned and unpaid demand response from single emergency text from CAISO reduced demand by 2,600 MW in minutes. As reported in Scientific American *"Within minutes of the message going out, usage suddenly plunged. A predicted 51,145 MW plummeted to 48,769 MW, immediately reducing the strain and keeping the lights on across California for the night. Governor Newsom, speaking to the press in Beverly Hills when the texts went out, said that 27 million texts had gone out and within minutes 2,600 MW of power usage in California suddenly went away. He also confirmed that rotating blackouts were only minutes away at that point."*[16] Demand response tools could be procured to offset Diablo Canyon's contribution to meeting peak demand, lower GHG emissions, and be more cost effective.

Conclusion

The CEC Report eliminates all replacement technologies due to feasibility, timing or apparent conflict with other CPUC procurement projects. The CEC report does recognize that demand response is a far more cost-effective method for meeting the peak demand. The CEC report then eliminates demand response because the authors of the report believe 2,000 MW of demand response programs are not feasible by 2025. The reaction to CAISO emergency text on September 6, 2022 demonstrates that demand response alone could replace Diablo Canyons output during peak demand extremes at a much lower cost than continuing to operate Diablo Canyon.

[16] https://californiaglobe.com/fr/state-praises-residents-for-reduced-energy-use-following-emergency-text-message-tuesday/