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CGNP's Reply Brief in CPUC Application A.16-08-006

Attached find a copy of Californians for Green Nuclear Power, Inc.'s (CGNP's) accepted Reply Brief in CPUC Application A.16-08-006 by Pacific Gas and Electric (PG&E) to abandon the safe, efficient, cost-effective and reliable Diablo Canyon Power Plant (DCPP) in 2025. CGNP, as a CPUC Intervenor requests proper notice by the California Energy Commission (CEC) of CGNP's Reply Brief with particular attention directed to the logical conclusion on page 12 of 22 As shown below, this leaves nuclear as the reliable base-load resource. Also as shown below, a troubling aspect about the testimony submitted in this proceeding by PG&E is how it conflicts with other sworn testimony PG&E submitted to the Commission in another recent proceeding. The inescapable conclusion is that one set of the testimony submitted by PG&E is false.... . In summary, CGNP supports the continued safe operation of DCPP far beyond PG&E's proposed abandonment date of 2025. CGNP further requests that any CEC requests for information or clarification be sent to the contact email address shown in the document. CGNP expects substantial revision of the upcoming CEC IEPR to reflect CGNP's fact-based perspectives.

Additional submitted attachment is included below.



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

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6
7 **Application of Pacific Gas and Electric**
8 **Company for Approval of the**
9 **Retirement of Diablo Canyon Power**
10 **Plant, Implementation of the Joint**
11 **Proposal, and Recovery of Associated**
12 **Costs Through Proposed Ratemaking**
13 **Mechanisms**
14 **(U 39 E)**

Application: No. 16-08-006
(Filed: 08/11/2016)

15 **REPLY BRIEF OF**
16 **CALIFORNIANS FOR GREEN NUCLEAR POWER**

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22
23 Gene A. Nelson, Ph.D.
24 Central Coast Government Liaison
25 Californians For Green Nuclear Power, Inc.
26 1375 East Grand Ave, Suite 103 #523
27 Arroyo Grande, CA 93420
28 Tel: (805) 363 - 4697
29 E-mail: liaison@CGNP.org

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1 **I. INTRODUCTION AND SUMMARY OF RECOMMENDATIONS**

2 The science is inescapable. Closing the Diablo Canyon Power Plant (Diablo) will
3 result in 6 to 7 million additional tons of GHG emissions per year, generated by substitute
4 base-load sources ¹. This tragic statistic should be enough to doom this Application. The
5 Aliso Canyon gas leak is barely a year in the history books, a leak that belched into the
6 California sky the GHG emissions equivalent to between 1.4 – 4.5 million cars.² Shockingly,
7 the California Public Utilities Commission is considering an Application by another gas
8 company that would result in the emissions equivalent of at least another million cars
9 annually.³

10 The opportunity to do some good should not be lost on the Commission. Its handling
11 of both its inspection-coordination responsibilities and previous applications by the utility
12 responsible for Aliso Canyon were contributory causes to the severity of that leak.
13 Furthermore, the Commission’s (and other policymakers) expansion of reliance on
14 intermittent, non-diverse sources of new power has made California dependent on natural-
15 gas-fired “peaker” plants, which increase the odds, of course, of another Aliso Canyon. In a

¹ CGNP ex-3, pp. 1-3, line 1.

² Cf. <http://time.com/4180692/california-methane-gas-leak-environment/?xid=homepage> and
<http://www.bbc.com/news/world-us-canada-35258036>

³ "Productive, paid for — and ready to close - The massive La Paloma power plant is in bankruptcy proceedings while the state pushes new construction at ratepayers' expense," June 11, 2017 by Ivan Penn, *The Los Angeles Times*. Note in particular Diablo's importance shown in the graphic, "Most Productive Power Plants." In 2016, Diablo produced **60.2% of the total power produced by all of California's top eight natural-gas-fired power plants.**
<http://www.latimes.com/business/la-fi-la-paloma-capacity-20170609-story.html>

1 state that prides itself on respecting science⁴, and a Commission that has taken steps towards
2 reform, this Application should have been summarily dismissed.

3 Indeed, the Commission is under several statutory mandates to consider what is best
4 for the environment. It must work to reduce GHG emissions. And it must do what is best
5 financially for the ratepayers. Here, Pacific Gas and Electric (PG&E) has not met its burden
6 of proof to show that the proposed closure of Diablo is in the public interest, or that a decision
7 on this application should even be made at this time. The record, applicable law, and
8 Commission policy support CGNP's recommendation that the Commission reject the PG&E
9 application, and authorize resumption of Nuclear Regulatory Commission licensing activities
10 together with other necessary consultations and certifications. Detailed analysis in
11 Californians for Green Nuclear Power, Inc.'s (CGNP)'s opening brief demonstrates that
12 continued operation of Diablo is economical throughout the license-renewal period. It also
13 demonstrates that PG&E will be able to sell "excess" electricity profitably on the wholesale
14 market, even more profitably than its gas plants.

15 Diablo is a proven, safe, reliable, cost-effective source of GHG-free electricity, which
16 will continue to be needed as an important source of base-load generation for the California
17 Independent System Operator (CAISO). PG&E has not specifically articulated new, reliable
18 GHG-free sources that can replace Diablo's output and firm-generating capacity, and
19 therefore the record is undeveloped on this issue. Moreover, continued operation of Diablo is
20 cheaper than each of the new GHG-free sources suggested as a replacement.

21 These simple facts require the Commission to reject this Application.
22

⁴ "Fighting Trump on Climate, California Becomes a Global Force" May 25, 2017, Page A1 *The New York Times*
<https://www.nytimes.com/2017/05/23/us/california-engages-world-and-fights-washington-on-climate-change.html>

1 **II. ARGUMENT**

2 **A. PG&E Has Still Not Met Its Burden of Proof.**

3 In its Opening Brief⁵, PG&E acknowledged that it has the burden of affirmatively
4 establishing the reasonableness of all aspects of its application, and that it must demonstrate
5 all costs to be recovered are “just and reasonable,” and that the retirement of Diablo and its
6 replacement by GHG-free resources are both “just and reasonable” and “necessary to promote
7 the safety, health, comfort, and convenience” of customers, PG&E employees, and the
8 public⁶. PG&E continues, stating “the standard of proof the applicant must meet is that of a
9 preponderance of the evidence” and the “Evidence Code Section 190 defines “proof” as the
10 establishment by evidence of “a requisite degree of belief.” PG&E’s dwelling on the barest
11 formulation of the standard is telling. But as shown by CGNP’s exhaustive testimony –
12 prepared and submitted by truly independent experts, with decades of experience in their
13 fields – PG&E can’t even meet this preponderance-of-the-evidence standard. California
14 prides itself in following science. The Commission should let the science govern its decision
15 here.

16 As just one example, PG&E states in its opening brief, that “By 2030, Diablo’s
17 baseload generating profile does not fit the hourly demand profile associated with PG&E’s
18 bundled customers.”⁷ PG&E persists in this argument without offering any evidence to rebut
19 the data submitted by CGNP that Diablo has the potential to operate in a more flexible mode.
20 As shown in its testimony, CGNP fully understands the need for NRC licensing and possible
21 plant modifications in order to permit flexible operation, and PG&E acknowledges that it has
22 done technical work examining the issues. But since PG&E has withheld this information and

⁵ PG&E Opening Brief, p. 9

⁶ Cal. Pub. Util. Code § 451.

⁷ PG&E Opening Brief, p. 16

1 has not used any work product to support its claims restricting operation to base-load, the
2 Commission can only make the inference that said work product actually supports the claims
3 of flexible operation without exorbitant plant changes and protracted licensing risk. CGNP
4 supports the continuation of NRC licensing efforts, to quantify the effects to the plant and
5 their costs, rather than the reliance on PG&E’s apparent business decision to close Diablo.

6 Furthermore, PG&E agrees that the Diablo license-renewal application would have
7 passed the NRC’s safety assessment. CGNP has offered testimony that the uncertainties
8 regarding required state approvals are being exaggerated by the Applicant. PG&E further
9 states its decision not to relicense Diablo was based on its assessment of the need for the
10 plant, not cost, and while PG&E evaluated potential costs of operating Diablo beyond 2025,
11 concerns about cost-effectiveness were not the primary drivers in PG&E’s decision making
12 process.⁸ However, in its cost analysis, it continues to use the arbitrarily inflated once-
13 through-cooling mitigation cost of \$3.5 billion to make continued operation look as
14 unattractive as possible. CGNP, in its testimony and opening brief presented hard data
15 showing cost estimates should be significantly lower than PG&E’s.⁹

16 It should be noted that Mr. Freeman of Friends of the Earth stated, “PG&E has
17 proposed a lower cost alternative to operating Diablo beyond 2024-25. To suggest that this
18 Commission should reject the lower cost alternative, one that is pollution free, would violate
19 the Commission’s just and reasonable standard and be a disservice to consumers.”¹⁰ This
20 logic should also apply if, in fact, continued operation of Diablo *is* determined to be the lower
21 cost alternative when all of the necessary engineering and licensing activities are completed.
22 It is also not credible to forecast any costs for alternatives to Diablo when the technologies,

⁸ PG&E Opening Brief, p. 20

⁹ Ex, CGNP-1 at p. 93, et. seq.,(Marinak) and CGNP Opening Brief pp.18-34

¹⁰ FOE Opening Brief, p. 4

1 their lifetimes and reliabilities and therefore costs are unknown. While PG&E may de-
2 emphasize costs in their decision, future costs are important to ratepayers and the Commission
3 decision.

4 **B. Shuttering Diablo Will Hurt the Environment, and PG&E's Claims to the**
5 **Contrary Are Not Credible.**

6 CGNP has shown that retiring Diablo will significantly increase GHG emissions.¹¹
7 PG&E claims it and the Joint Parties are committed to avoiding this potential outcome by
8 using Tranche #1 and the IRP to replace Diablo with GHG-free resources.¹² This statement
9 lacks support, as the record shows no credible assurance that there will be 18,000 GWh/year
10 of reliable cost-effective supplies of GHG-free resources at the time of the proposed Diablo
11 closure or any time thereafter. To compensate for the loss of Diablo production would require
12 an oversupply of solar and wind generating resources plus storage capacity to accommodate
13 any potential shortfall from the intermittent generation of the renewables. CGNP has
14 established that it is highly likely that significant shortfalls will occur and that they will
15 require the burning of natural gas.¹³

16 ORA recommends that the Commission deny PG&E's request for customer funding of
17 \$1.3 billion for its Tranche 1 Energy Efficiency procurement proposal because PG&E fails to
18 demonstrate that its requested Tranche 1 procurement, which is an increase of more than 50%
19 of the currently-identified energy efficiency potential, would be cost effective.¹⁴ PG&E notes
20 that ORA and CLECA indicated in their testimonies that they did not believe the 2,000 gross

¹¹ Ex. CGNP-1 at pp. 18-19

¹² PG&E Opening Brief, p. 20

¹³ CGNP-1 pp 130-137

¹⁴ ORA Opening Brief, p. 10

1 GWh goal in Tranche #1 was achievable.¹⁵ PG&E also notes that several parties have
2 proposed consolidating the Tranche #1 proposal with other ongoing Commission proceedings,
3 such as the IRP or the Business Plan proceeding.¹⁶ Shell Energy North America recommends
4 that the Commission should reject PG&E's proposal for "early action" energy efficiency
5 procurement to replace a portion of the Diablo energy output and direct PG&E to address
6 electric resource planning and procurement needs for its bundled sales customers (including
7 any and all "replacement" for Diablo energy and capacity) through the IRP proceeding
8 (R.16-02-007).¹⁷ In withdrawing its request for Tranches #2 and #3, PG&E agrees to address
9 replacement resources in an IRP¹⁸ proceeding. Why shouldn't both the Diablo shutdown and
10 the EE also be considered as part of the IRP proceeding? CGNP opposes the approval by the
11 Commission of Tranche 1, and supports the deferral of any decision on Diablo operation or
12 potential closure to the IRP or a new proceeding that provides careful consideration of the
13 increased costs and adverse environmental consequences that are likely outcomes of a
14 decision to abandon Diablo.

15 It is illogical to decide to close Diablo without reasonable assurance that the lost
16 capacity would be replaced by GHG-free resources. Because some parties have testified that
17 PG&E claims regarding replacement power are unachievable, it would be imprudent to base
18 any shutdown decision on the limited information presently available. The possibility that the
19 other parties are correct and PG&E is wrong appears in the public record. The Commission
20 runs the risk of looking foolish or vitiated if, just a few years from now, the predictions of
21 parties like CGNP come true.

¹⁵ PG&E Opening Brief, p. 32

¹⁶ PG&E Opening Brief, p. 32

¹⁷ Shell Energy North America Opening Brief, p. 2

¹⁸ PG&E Opening Brief, p. 35

1 After vigorously rebutting claims of plant aging and vessel embrittlement by CEERT
2 and SLO Mothers for Peace seeking an *early* shutdown of Diablo, PG&E states “Finally,
3 given California’s overarching policy priority for achieving GHG-emissions reductions, it
4 makes no sense to prematurely shut-down Diablo in 2019, well before it can be replaced with
5 GHG-free resources.”¹⁹ This holds equally true for many years beyond 2024-25, until GHG-
6 free resources (especially storage) are assured. If PG&E makes the case that Diablo should be
7 operated until license expiry, why should it not operate until it is clear that it is *not* needed?
8 Diablo's safe and efficient operation since 1984 establishes that a delay of four or five years
9 will harm no one, and that this delay would provide time to obtain better much information on
10 future Diablo operational modes and costs, alternative sources of electricity, while minimizing
11 near-term costs to ratepayers through avoidance of most of the costs requested in this
12 application.

13 **C. Shuttering Diablo Will Result in Unreasonable Charges to Ratepayers,**
14 **and the Commission Should Be Wary of Strange Bedfellows Claiming Otherwise.**

15 For decades, PG&E has battled the efforts of many of the Joint Proposal parties, who
16 sought first to prevent the construction of Diablo and later to hinder its operation. In 2016,
17 these traditional foes joined forces to close Diablo at the end of its current license period.
18 There is no certainty regarding the true reasons for the positions of all parties, but claims of
19 reduction in GHG emissions coupled to the shutdown have certainly not been proven. There is
20 certainty that the shutdown of Diablo if accompanied by Commission approval of the
21 requested Employee Retention and Community Impacts Mitigation Programs (CIMP) will
22 cause increased rates to consumers of PG&E electricity. CGNP has established that both the
23 Employee Retention Program and the CIMP represent unreasonable charges to ratepayers, and

¹⁹ PG&E Opening Brief, p. 22

1 they should be denied by the Commission. CGNP has presented testimony and a brief in
2 support of its position that those programs should not be funded by the ratepayers.²⁰ If PG&E
3 feels that they are needed, then their costs should be borne by the PG&E stockholders,
4 because closure of Diablo is a wholly voluntary action on the part of PG&E. Additionally,
5 CGNP has provided testimony that the Employee Retention Program is likely not to be
6 needed to maintain Diablo's operating staff.²¹

7 ORA recommended that customers not be required to fund Tier 1 payments. ORA
8 states "If PG&E chooses to provide these payments then PG&E shareholders should fund
9 them...ORA recommends no customer funding of employee bonuses for the first four years of
10 the (proposed) nine-year period."²² ORA also states that since PG&E provided no facts to
11 support its conclusion regarding the need for the retention program, or the assumptions that
12 underlie it, its arguments are speculative at best and should be given no weight.²³ This is
13 wholly in accord with the CGNP testimony and brief as cited above.

14 CUE, while attempting to justify the Employee Retention Program, states "We
15 represent 476 employees at Diablo. Of them, 410 (86%) have now signed retention
16 agreements. We believe that fewer than 10 members of our bargaining unit have separated
17 from PG&E since June, meaning an annual turnover of less than 4%."²⁴ CGNP has
18 previously testified that the 86% only means that workers will accept free money until such
19 times as they may quit. There is no downside to their signing up, and the 86% is no indication
20 that the workers support the shutdown of Diablo. One-on-one discussions with employees
21 indicate that they do not support the shutdown, and Business Manager Dalzell signed the

²⁰ Ex. CGNP-1 at pp. 85-87 and Ex. CGNP-2 at pp. 39-40 and CGNP Opening Brief, pp. 14-17

²¹ CGNP Opening Brief, p. 14

²² ORA Opening Brief, p. 25

²³ ORA Opening Brief, p. 26

²⁴ CUE Opening Brief, p. 13

1 agreement without the knowledge or approval of his workers.²⁵ Additionally, the cited 4%
2 turnover in the year since the announcement of the Joint Proposal provides *prima facie*
3 evidence that there is no precipitous loss of personnel from Diablo.

4 It is also interesting to note that CUE is the first of the Joint Proposal parties to openly
5 state what should be apparent to all, that “The closure of Diablo will create a depression in the
6 surrounding community.”²⁶ The annual loss to the economy of approximately \$1 billion in
7 direct and indirect payrolls²⁷ will have severe and possibly permanent effects. One should
8 question why this issue has not received more prominence, and why the local jurisdictions
9 have not protested the potential closure more vigorously.

10 CGNP has provided un rebutted testimony and argument showing why the Commission
11 should not approve the CIMP request.²⁸ ORA also objects to the CIMP request and states
12 “ORA reviewed PG&E’s proposal and does not support customer funding of the proxy
13 payments. The payments would effectively be a substitute for PG&E’s property taxes. If
14 Diablo’s rate base is declining based the actual depreciation schedule, it is unreasonable to
15 require PG&E’s customers to fund additional payments above the calculated property taxes
16 that are based upon the actual cost of service to operate Diablo.”²⁹ Furthermore, the absence
17 of a connection between the Applicant's determination of the plant's depreciation schedule
18 driven by its business desires and an engineering-based assessment of the plant's useful
19 lifetime is established by CGNP's written testimony, workpapers, and brief.³⁰

20

²⁵ Evidentiary Hearing Transcript, page 1325, lines 6-22.

²⁶ CUE Opening Brief, p. 2

²⁷ PG&E-5 Prepared Testimony, Chapter 8 Atch A, p.4, second paragraph.

²⁸ Ex. CGNP-2 at p. 41 and CGNP Opening Brief, pp. 17-18.

²⁹ ORA Opening Brief, p. 29

³⁰ CGNP Opening Brief pp. 124-129.

1 **D. Diablo Is a Critical Base-Load Resource, and PG&E Has Not Identified**
2 **Alternatives.**

3 Diablo is a proven reliable, cost-effective source of GHG-free electricity.³¹ It will
4 continue to be needed as an important source of base-load generation for CAISO. Base-load
5 plants form the stable foundation of an electrical grid. Base-load sources – such as nuclear,
6 natural gas and coal – are essential to maintaining the grid’s stable, reliable and economical
7 operation. When asked, “Are you aware of any large electric grid, anywhere in the world that
8 operates without a substantial continual supply of electricity from base-load sources?” PG&E
9 witness Frazier-Hampton, who performed their needs analysis, was unable to identify such a
10 grid anywhere.³² CGNP (and doubtlessly the Commission) supports eschewing coal and
11 natural gas. As shown below, this leaves nuclear as *the* reliable base-load resource. Also as
12 shown below, a troubling aspect about the testimony submitted in this proceeding by PG&E is
13 how it conflicts with other sworn testimony PG&E submitted to the Commission in another
14 recent proceeding. The inescapable conclusion is that one set of the testimony submitted by
15 PG&E is false.

16 Diablo’s capacity is 2.2 GW. Data from CAISO shows that throughout 2017 CAISO’s
17 minimum, workday demand is 8 or 9 times higher.³³ Even on weekends, minimum CAISO
18 Net Load amounts to about 9 GW (over four Diablos). Thus, the minimum baseload demand
19 for CAISO far exceeds the output of Diablo.

20 PG&E claims that CAISO will experience a reduced need for base-load sources in the
21 future.³⁴ But its claim has not been demonstrated through the IRP process. More intermittent

³¹ CGNP Opening Brief, pp. 20, line 3.

³² Transcript, PG&E, Frazier-Hampton, pp. 946, line 6.

³³ CGNP Prepared Testimony, p. 60, including the graphic

³⁴ Transcript, PG&E, Malnight, pp. 302, line 24.

1 Renewable Portfolio Standard sources will be added to the grid suggesting increased need for
2 flexible capacity. But overall electricity demand continues to increase with population, along
3 with new demands such as created by electric vehicles, suggesting increased demand for base-
4 load capacity as well. In fact the actual daily minimum demand for power in the CAISO
5 system far exceeds predictions for 2017 made by CAISO just a few years ago.³⁵

6 This base-load analysis cannot be divorced from the environmental one. Even if one
7 assumes that CAISO will experience some reduction in the need for base-load capacity,
8 closing zero-GHG emitting Diablo first, among all of CAISO's base-load sources is
9 indefensible. Under PG&E's proposal, CAISO would continue to obtain base-load electricity
10 from coal and natural-gas plants. Closing Diablo would result in at least 6 to 7 million tons
11 more GHG emissions per year generated by CAISO base-load sources³⁶ compared to that
12 case of continued operation. This would violate the Public Utilities Code which requires
13 "[t]he portfolio shall rely upon zero carbon-emitting resources to the maximum extent
14 reasonable and be designed to achieve any state wide greenhouse gas emissions limit." *See*
15 *Cal. Pub. Util. Code* § 454.51(a).

16 PG&E's amended testimony requests a directive be issued that GHG-free
17 replacements be used to replace Diablo, to be determined in a future proceeding. Yet PG&E
18 has not demonstrated specific new reliable GHG-free sources that could replace Diablo's
19 output and firm generating capacity.³⁷ As other parties have noted, unless the Commission
20 were to require that newly constructed GHG-free sources be used to replace Diablo output,
21 then the ultimate result would be increased reliance on GHG-emitting sources arising

³⁵ CGNP Rebuttal Testimony, pp. 14, line 5.

³⁶ CGNP ex-3, pp. 1-3, line 1.

³⁷ Transcript, PG&E, Frazier-Hampton, pp. 940, line 20.

1 elsewhere.³⁸ And the net effect would be equivalent to replacing Diablo output with fossil
2 fuels.

3 In its testimony, PG&E suggested that part of Diablo's output be replaced by wind and
4 solar sources, in Tranches 2 and 3. As CGNP, science, and experience has shown, solar and
5 wind farms do not increase the capacity of the grid in any meaningful way, because they can
6 never be counted on to produce energy at a particular time when it is needed. Thus, adding
7 *any* number of new solar or wind sources does not allow one to retire a *single* power plant
8 from the grid. PG&E confirmed this reality in testimony a few years ago, reporting results of
9 its study that considered in detail the full range of possible replacement sources for Diablo.³⁹

10 Regarding wind turbines PG&E asserted⁴⁰

11 Because the power output can only be intermittently generated during the day or
12 during certain seasons, depending on the location, wind turbines are unsuitable for
13 baseload applications (sic) and, therefore, wind generation cannot be considered an
14 adequate replacement of Diablo generation.
15

16 During cross examination in this proceeding, PG&E witnesses Strauss and Frazier-Hampton
17 stated that replacing Diablo with PV could actually increase the problem of over-generation.⁴¹

18 Hydroelectric power has also been suggested as a possible replacement. But the
19 development of new large hydroelectric sources is limited due to severe environmental
20 concerns and lack of available sites.⁴² No new large hydroelectric dams could be expected to
21 be completed by 2024. For these reasons PG&E concluded, in affirmed 2010 testimony, that

³⁸ GPI opening brief, pp. 14, discussion of additionality.

³⁹ CGNP ex-4, pp. 7.2-5 – 7.2-6

⁴⁰ CGNP ex-4, pp. 7.2-5.

⁴¹ Transcript, PG&E, Strauss, pp. 563, line 23; PG&E, Frazier-Hampton, pp. 939, line 24.

⁴² A. 10-01-022, PG&E Prepared Testimony, Volume III, pp. 7.2-7.

1 “hydroelectric power is not a reasonable alternative to renewal of operating licenses for
2 Diablo.”⁴³

3 Geothermal is unlikely to be available on the scale required to replace Diablo, a
4 conclusion shared in PG&E previous testimony.⁴⁴ Biomass is not competitive on a scale
5 required to replace Diablo, as PG&E previously concluded.⁴⁵

6 Thus, as demonstrated by its own previous testimony, PG&E has not identified new
7 reliable GHG-free sources that could be expected to replace Diablo by 2024. In fact PG&E’s
8 2010 comprehensive study of possible replacement sources concluded with this strong
9 admonishment:⁴⁶

10 Based on these evaluations, PG&E determined that the only viable alternative
11 generation technology to replace Diablo power is natural gas-fired generation.
12

13 It also warned⁴⁷

14 PG&E is undertaking every effort to meet the state’s long term, low-carbon
15 energy requirements. The ability to meet these requirements in the time frame
16 required and at a reasonable cost to PG&E’s customers will be severely
17 handicapped without renewal of Diablo’s operating licenses.
18

19 PG&E’s 2010 study also analyzed in detail the costs of 18 potential alternative replacements
20 for Diablo output, including the comprehensive set of GHG-free sources listed above.⁴⁸

21 PG&E concluded that continued operation of Diablo throughout the license renewal period
22 was cheaper by a substantial margin in every case.⁴⁹

⁴³ A. 10-01-022, PG&E Prepared Testimony, Volume III, pp. 7.2-7.

⁴⁴ A. 10-01-022, PG&E Prepared Testimony, Volume III, pp. 7.2-8.

⁴⁵ A. 10-01-022, PG&E Prepared Testimony, Volume III, pp. 7.2-8.

⁴⁶ CGNP ex-4, pp. 7.2-2.

⁴⁷ CGNP ex-3, pp. 1-3, line 10.

⁴⁸ A. 10-01-022, PG&E Prepared Testimony, Volume I, pp. 4-18, et seq.

⁴⁹ CGNP ex-3, pp. 1-6, line 8.

1 PG&E witnesses briefly mentioned storage as a potential solution to the problem of
2 intermittency of most GHG-free sources.⁵⁰ But its proposal presents no realistic plan to
3 construct the unprecedented storage systems required. It fails to account for the enormous
4 associated costs, which CGNP estimates at over \$73.6 billion for the case of PV replacement
5 including storage.⁵¹ The ability to obtain all the permits required to build multiple new
6 Helms-scale pumped hydro storage projects appears highly doubtful, and the prospects of
7 completing their construction by 2024 even worse. Without enough storage capacity,
8 balancing the inherently unpredictable output of wind and solar requires building dispatchable
9 gas or coal plants, a conclusion reached not only by PG&E,⁵² but also demonstrated in
10 refereed journal articles. One example cited by CGNP, a highly relevant, recent study by the
11 Max Planck Institute and the Royal Institute of Technology, published in the *European*
12 *Physical Journal Plus*, found that if Sweden's nuclear plants were replaced with wind power
13 it would make the electrical grid unreliable. It concluded conventional natural gas and coal
14 power plants would be needed to compensate for the unreliability. That would double CO2
15 emissions.⁵³

16 CGNP has also shown that when the outputs of these fossil-fueled sources are ramped
17 up and down in the manner required to compensate for the erratic, whimsical output of wind
18 turbines, there is a sizable increase in their emissions of greenhouse gasses and air pollution.
19 This effect has been documented in numerous scientific studies, including a study that
20 examined more than 300,000 hourly records of utilities in four regions of the country.⁵⁴ These

⁵⁰ PG&E Prepared Testimony, pp. 1-2, line 30; Transcript, PG&E, Frazier-Hampton, pp. 940, line 16.

⁵¹ CGNP Prepared Testimony, pp. 118, et. seq.

⁵² CGNP ex-3, pp. 4-4, section 3.

⁵³ CGNP Prepared Testimony, pp. 66, line 19.

⁵⁴ CGNP Prepared Testimony, pp. 113, line 13, including references mentioned.

1 increased emissions cancel out at least a substantial fraction of the claimed reduction in GHG
2 emissions associated with the wind turbines. Thus the overall result would be a large net
3 increase in greenhouse gas emissions compared to the zero-GHG emissions achieved with
4 continued operation of Diablo.⁵⁵ These increases in emissions will move California farther
5 away from the legislated mandates for reduced GHG emissions.

6 PG&E testimony implies that the grid would be able to handle any amount of random
7 fluctuations in output caused by any amount of unreliable solar- and wind-generated sources.
8 Real-world experience indicates otherwise. For example, Germany's wind and solar power
9 systems have provided too much power at unpredictable times, which damaged the power
10 grid and made the system vulnerable to blackouts. Grid operators paid companies \$548
11 million to shutter turbines to fix the problem. Germany will remove 6,000 megawatts of wind
12 capacity by 2019 to restore the stability of its grid.⁵⁶ South Australia continues to experience
13 serious problems with blackouts caused by wind power (or its absence).⁵⁷ This includes a
14 complete crash of the South Australian grid which the state's utility blamed on violent
15 fluctuations in output from a wind farm. The blackout is estimated to have cost businesses
16 AUD\$367 million.⁵⁸

17 All of this underscores the necessity of maintaining Diablo as California's largest
18 reliable, economical, zero-GHG emitting energy source. It establishes CGNP's conclusion
19 that closing Diablo would cause GHG emissions to increase by many millions of tons
20 annually, compared to its continued operation through the extended license period.

21 The bottom line is this: surely the Commission is aware that the Legislature is likely to

⁵⁵ CGNP Prepared Testimony, pp. 113, line 20.

⁵⁶ CGNP Prepared Testimony, pp. 37, line 12.

⁵⁷ CGNP Prepared Testimony, pp. 37, line 20.

⁵⁸ CGNP Prepared Testimony, pp. 37, line 25.

1 require an even greater reliance on “100% GHG-free” power sources in the coming years. Yet
2 shuttering Diablo will only increase reliance on natural gas. And from a technical and legal
3 standpoint, the Commission can not approve this application with so many outstanding issues,
4 which PG&E unilaterally succeeded in bifurcating in separate proceedings. This Application
5 must stand on the record, and the record shows that PG&E’s arguments should be rejected.

6 **E. PG&E’s Estimates of Future Operating Costs for Diablo Are Not Credible.**

7 CGNP presented detailed analysis of future operating costs for Diablo that corrected
8 PG&E’s analysis by properly accounted for essential facts. First PG&E claims in the
9 Application that future operating costs for Diablo will escalate dramatically, contradicting its
10 own cost analysis from 2010. This is primarily due to an assumed 25% probability that
11 cooling towers would be required, with estimated costs of up to \$13.3 billion.⁵⁹ Since there is
12 zero probability that PG&E would actually pay costs to install cooling towers, they must be
13 excluded from calculations of costs that would actually be paid. This principal problem with
14 PG&E’s cost estimate was solved using estimates for once-through cooling mitigation costs
15 for the specific practical options that were discussed as part of the mitigation framework.⁶⁰
16 CGNP noted testimony of PG&E witnesses indicating that O&M costs are presently
17 increasing at a lower rate than predicted in the model in the application.⁶¹ CGNP
18 demonstrated that PG&E’s 2010 model for O&M costs is a much better fit to data and is
19 defensible with respect to industry trends. The expertise of CGNP witnesses regarding the
20 engineering and economics of nuclear plants makes them especially well qualified to judge
21 the credibility of specific claims regarding costs. Resolving PG&E’s cost estimate

⁵⁹ CGNP opening brief, pp. 21, line 3.

⁶⁰ CGNP opening brief, pp. 21, line 12. See also historical details of Diablo's OTC mitigation found in the first four paragraphs on page 43 of PG&E's Form 10-K filing for the U.S. Securities and Exchange Commission for the year ending December 31, 2016.

⁶¹ CGNP opening brief, pp. 22, line 26.

1 demonstrated continued operation is economical.⁶² Detailed analysis presented by CGNP
2 showed that Diablo will be able to sell electricity profitably on the wholesale market,⁶³ more
3 so than PG&E’s gas plants.

4 Several other parties have embraced cost models that greatly overestimate Diablo
5 future operating costs too. TURN, CEERT and FOE have all embraced a common model as
6 the basis of cost estimates in their testimony or rebuttal testimony.⁶⁴ It is “A Cost Effective
7 and Reliable Zero Carbon Replacement Strategy for Diablo Power Plant “ – “the FOE
8 Report.” The report’s conclusions regarding Diablo violate essential engineering facts
9 regarding the expected service lives of major plant components. Those claims, including ones
10 made in the opening brief by FOE,⁶⁵ have been thoroughly rebutted in CGNP Prepared
11 Rebuttal Testimony⁶⁶ and CGNP’s opening brief.⁶⁷ CGNP’s rebuttal also considers many
12 factors that have the potential to increase substantially the already high cost of electricity
13 obtained from solar or wind projects.⁶⁸

14 TURN’s opening brief claims that costs of new photovoltaic sources will be lower
15 than the levelized cost of electricity, citing specific contracts at lower prices. But a contract
16 cannot be taken as proof of the revenue required to provide a service. Contracts which lose
17 money are signed every day. The solar energy industry in particular has an appalling record
18 of bankruptcies. Such contracts are *not* reflective of the actual costs to provide the services
19 described. Additional revenue streams are required. Large taxpayer-funded subsidies form a

⁶² CGNP opening brief, pp. 24, line 17.
⁶³ CGNP opening brief, pp. 19, line 3.
⁶⁴ TURN Prepared Testimony of William Perea Marcus, Volume 1, pp. 1;, CEERT Prepared Testimony, pp. 18;, FOE Rebuttal Testimony, pp. 5, line 16
⁶⁵ FOE Opening Brief, pp. 4, et seq.
⁶⁶ CGNP Rebuttal Testimony, pp. 43, line 7, et. seq.
⁶⁷ CGNP Opening Brief, pp. 32, line 10, et. seq.
⁶⁸ CGNP Rebuttal Testimony, pp. 46, line 2, et seq.

1 substantial part of the required revenue stream. But these subsidies are to be largely
2 eliminated over the next few years.⁶⁹ Also the contracts cited don't specify that the PV-
3 generated electricity will only be available for use during a few hours each day, centered
4 around noon. Nor do they require the consumer to reduce usage suddenly when clouds drift
5 over the PV panels. Thus the contracts ignore the costs required to provide backup for the PV
6 sources, which are imposed upon other ratepayers across the grid.⁷⁰ TURN's estimate also
7 ignores the costs of lost fuel efficiency due to ramping and cycling the dispatchable sources or
8 the higher maintenance costs associated with those more demanding operating dynamics. It
9 doesn't include costs of transmission lines to remote sites where over well over 100 square
10 miles of solar PV generation would have to be sited. It also doesn't include the short life spans
11 of PV systems compared to conventional generators, including Diablo. All of these factors
12 will raise the relative costs of electricity from solar sources.

13 Previous analysis by CGNP provided a realistic accounting of overall costs of new
14 wind and solar sources, including imposed costs, and showed that continued operation of
15 Diablo is much cheaper.⁷¹ The cost analysis for new wind and solar sources had as its basis a
16 comprehensive study performed by the Institute for Energy Research (IER). CGNP offered
17 two additional expert witnesses involved in producing the study. Travis Fisher's
18 qualifications include work as an economist for the Federal Energy Regulatory Commission
19 for seven years, focusing on wholesale electricity markets and rates. Tom Stacy's
20 qualifications include ten years of experience analyzing electricity economics, and five years
21 serving on the ASME Energy Policy Committee as a member at large.

22 Finally, several parties have misleadingly claimed that pending California energy

⁶⁹ CGNP Prepared Testimony, pp. 102, line 10, et. seq.

⁷⁰ CGNP Prepared Testimony, pp. 97, line 23. et. seq.

⁷¹ CGNP Opening Brief, pp. 35, line 17, et. seq.

1 legislation known as SB 100, California Renewables Portfolio Standard Program: emissions
2 of greenhouse gases authored by Senator Kevin DeLeon, excludes Diablo's nuclear power.
3 No such exclusion exists in the plain language of the bill that passed the Senate and is
4 currently awaiting consideration by the Assembly.

5 **III. CONCLUSION**

6 PG&E has failed to meet its standard of proof. When considering both the costs to
7 ratepayers and the detriment to the economy, it is clear the proposed closure and rate increases
8 requested by PG&E are not in the public interest. The information provided by PG&E in this
9 proceeding is inadequate to warrant an affirmative decision by the Commission. CGNP
10 recommends complete rejection of PG&E Application A.16-08-006 as not in the public
11 interest, and authorization of the completion and ratepayer recovery of the costs of all
12 necessary relicensing activities. CGNP believes that if any further consideration of Diablo's
13 future operation is necessary, that it be performed within the IRP or a future, more
14 comprehensive Proceeding. Furthermore, as does Party CEERT ⁷², CGNP respectfully
15 requests that our final oral argument be scheduled concurrent with our Rebuttal Brief before
16 the Commission in Application A.16-08-006.

17 Lastly, on May 23, 2017, PG&E, A4NR, TURN, ORA, Mothers for Peace, FOE,
18 NRDC, Environment California, IBEW Local 1245, and CUE filed a settlement agreement
19 related to license renewal and cancelled project costs. CGNP urges the commission to reject
20 this self-serving settlement as not being in the public interest and instead authorize the full
21 reimbursement of all past and future license renewal costs to firmly establish the plant capital
22 costs and regulatory costs of future Diablo operation.

23

⁷² CEERT Opening Brief, p. 38

1 /s/ Gene A. Nelson, Ph.D. 16 June 2017

2 Central Coast Government Liaison
3 Californians For Green Nuclear Power, Inc.
4 1375 East Grand Ave, Suite 103 #523
5 Arroyo Grande, CA 93420