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Description:	Gene Nelson, Ph.D. is the author of this 11 January 2018 NECG commentary and requests that it be published on the CEC website under Docket 17-MISC-01 - Offshore Wind. Issues raised include the low statewide capacity factor (CF) of wind. In the half-year period ending on 31 January 2017, the California Independent System Operator's official records show that wind's 6,000 MW capacity factor was only about 20%. The remaining ~80% of the time, fossil-fired generators are utilized to compensate for this intermittency. Furthermore, wind power is subject to random diminutions which require that the fossil-fired backup generators be operated in "back down mode" - or "hot ready mode." The result is that there is negligible emissions reductions relative to 6,000 MW of natural-gas-fired generation. Emissions reductions are a significant claimed benefit for wind generation. Instead, nuclear power such as DCPP should be utilized. Emission-free Nuclear's CF approaches 100% in contrast to wind.
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Diablo Canyon retirement

This is a guest post by Gene A. Nelson, Ph.D., Central Coast Government Liaison with Californians for Green Nuclear Power, Inc. (CGNP.) CGNP is a strong advocate for the continued operation of PG&E's Diablo Canyon Power Plant (DCPP).

DCPP owner PG&E has requested permission from the California Public Utilities Commission (CPUC) to close DCPP in 2024/2025 at the end of the initial 40-year NRC operating license for each unit.

A CPUC decision on this is expected today

Background

On 8 Nov 2017, an Administrative Law Judge (Peter V. Allen) with the California Public Utilities Commission (CPUC) issued a "Proposed Decision" related to Application 16-08-006.[1]

This proposed decision includes the following items (and more):

1. Pacific Gas and Electric Company's proposal to retire Diablo Canyon Unit 1 by 2024 and Unit 2 by 2025 is approved.

2. Pacific Gas and Electric Company's "Tranche 1" proposal to procure 2,000 gigawatt hours of energy efficiency is not approved.

3. Pacific Gas and Electric Company's withdrawn "Tranche 2" and "Tranche 3" replacement procurement proposals are not approved.

4. Replacement procurement will be addressed in the Integrated Resource Planning proceeding or a proceeding designated by the Integrated Resource Planning proceeding.

5. Efforts to avoid an increase in greenhouse gas emissions relating to the retirement of Diablo Canyon, including any replacement procurement, will be addressed in the Integrated Resource Planning proceeding or a proceeding designated by the Integrated Resource Planning proceeding.

6. Pacific Gas and Electric Company should be prepared to present scenarios for Diablo Canyon retirement in the Integrated Resource Planning proceeding that demonstrate no more than a de minimis increase in the GHG emissions of its electric portfolio.

The proposed Decision approves early retirement of Diablo Canyon in 2024/2025, before the implications of this early retirement[2] for the California long-term integrated resource plan or on California greenhouse gas emissions were determined.

Final Oral arguments were held on 28 Nov 2017 at the CPUC headquarters, with comments due on 29 Nov 2017 and reply comments due on 4 Dec 2017.

A 14 December 2017 vote on the Proposed Decision at the CPUC Public Meeting at CPUC headquarters in San Francisco was postponed to 11 January 2018 at the last-minute at the request of at least one of the Commissioners.

There have been some changes to reduce short-term ratepayer obligations. Those changes include that the annual payouts of the "Employee Retention Program" have been reduced from

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1 Application 16-08-006 - 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 (U39E).

2 While the closure in 2024/2025 is consistent with the original NRC operating license, virtually all U.S. nuclear power plants applied for a 20-year license renewal and these applications were approved.

25% of their salary to 15%. The $85 million "Community Impacts Mitigation Program will not be funded by ratepayers.

CGNP

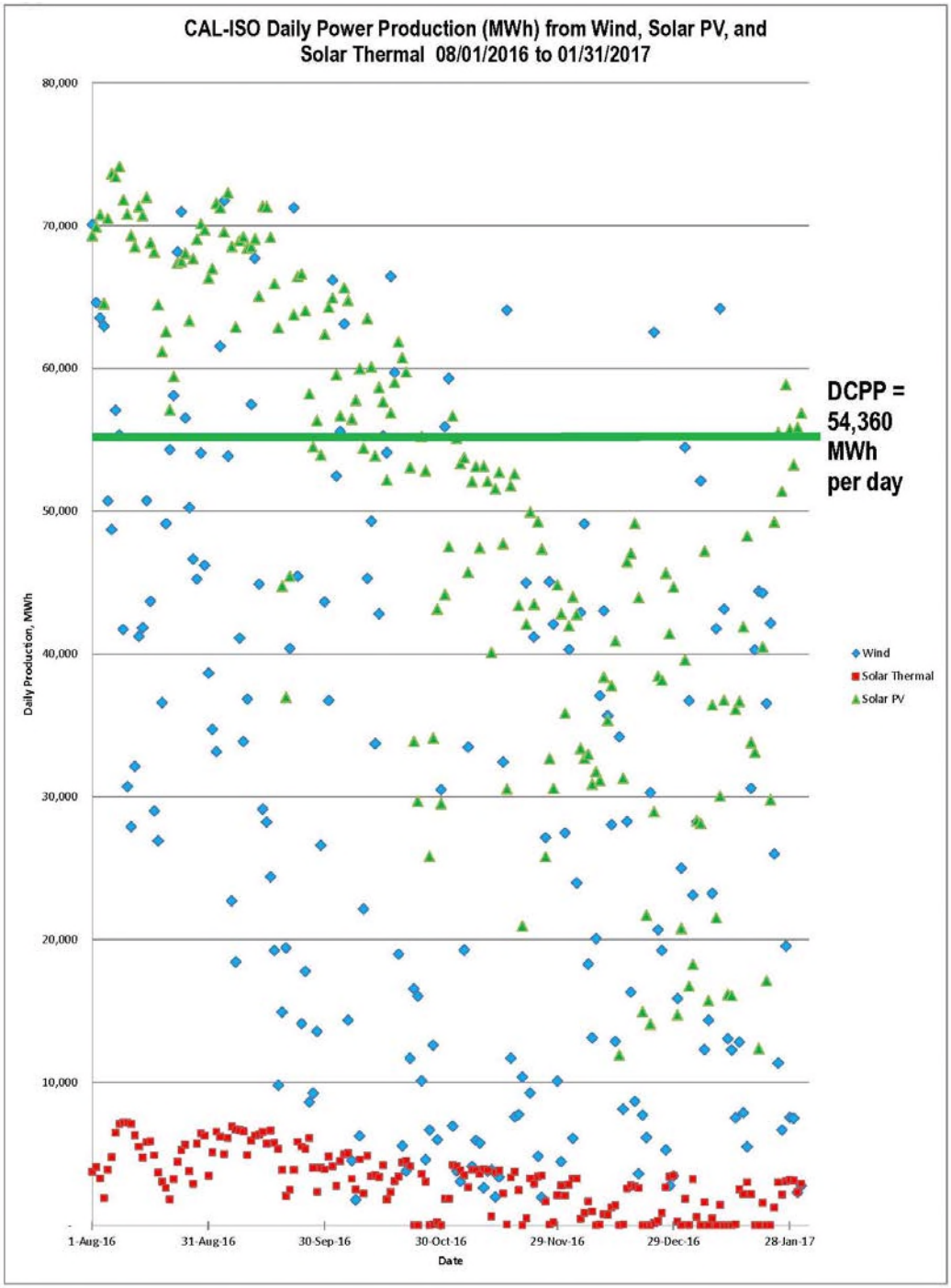
Californians for Green Nuclear Power, Inc. (CGNP) is a nonprofit California educational corporation established in 2013**.** Gene Nelson, Ph.D. serves as their government liaison in a volunteer capacity. His Ph.D. is in a field relevant to commercial nuclear power generation, as are the Ph.D.s of CGNP's three other volunteer technical authors. CGNP is also being advised by some extremely well-qualified environmental attorneys.

CGNP is **the** advocate for keeping DCPP operating beyond 2025.

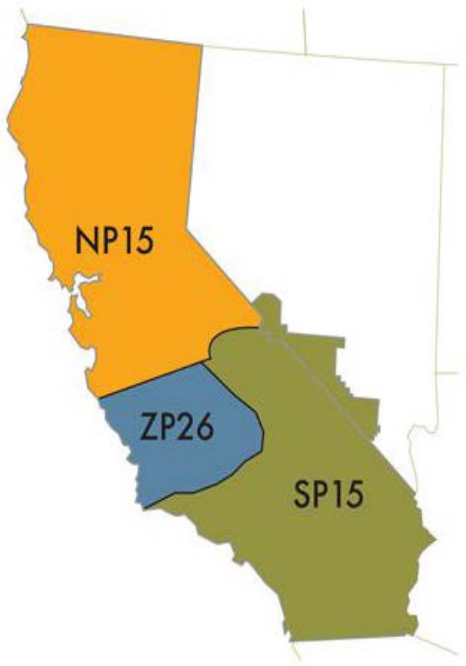
CGNP is the lone adversarial Intervenor (of about 50) in the above Application A.16-08-006. CGNP has researched and authored voluminous, carefully written testimony and vigorously participated during all the oral phases of A16-08-006. CGNP's advocacy on the behalf of the environment and the California ratepayer has already yielded significant beneficial changes in the contours of the Proposed Decision. CGNP has also participated as a nuclear power advocate in some recent FERC Proceedings related to commercial nuclear power.

Core issues

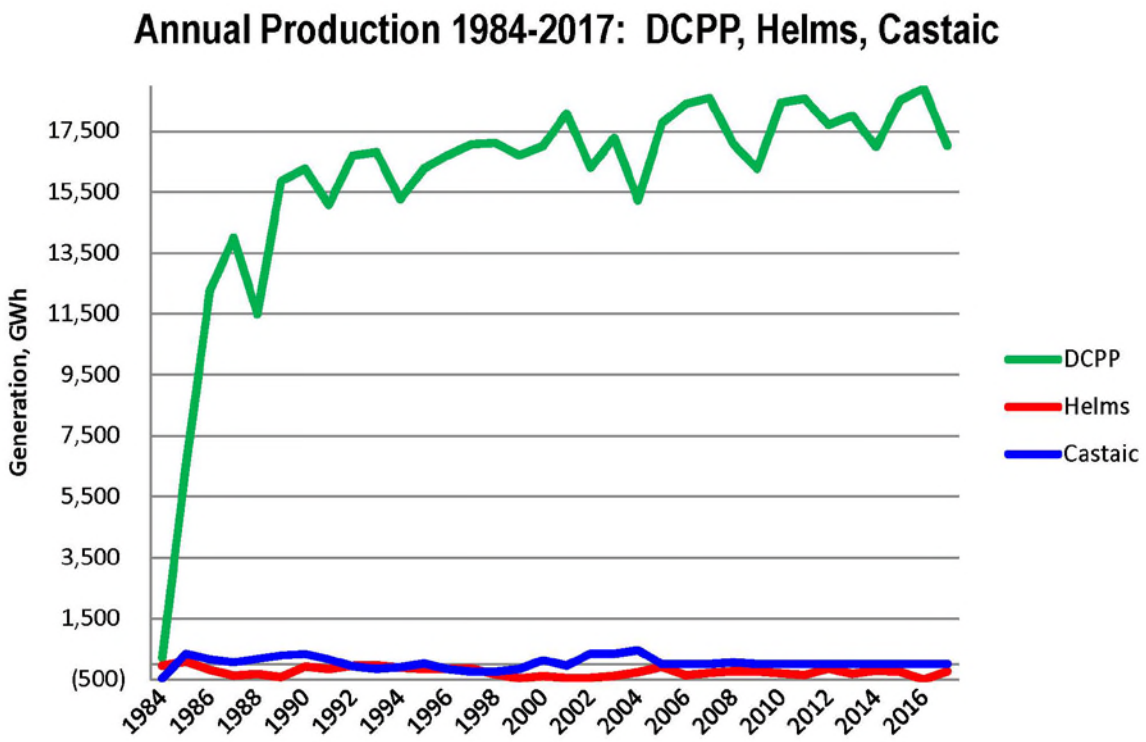
California state policy-makers appear to fail to understand the implications of the 20% statewide capacity factor observed for both California wind and California solar that CGNP obtained by tabulating day-by-day generation by source from the official records of the California Independent System Operator (CAISO) during the half-year period that ended on January 31, 2017. These policy-makers also appear to fail to understand that in comparison, zero-carbon DCPP generated about **108**% of ALL of California's 10,000 MW (nameplate) of solar Photovoltaic power **or** about **180**% of ALL of California's 6,000 MW(nameplate) of wind generation during that half-year interval. Thus, shutting down DCPP will cause significant California environmental harms**.** Here is a scatter-plot from one of CGNP's CPUC A.16-08-006 filings that shows the random day-to-day daily generation of California solar PV, California wind, California solar thermal (Ivanpah – which also burns about a billion cubic feet of natural gas annually) and DCPP. Clearly, significant (and costly) grid interventions are required to deal with the random variations of solar and wind relative to DCPP's steady – and necessary **-** power output. (See scatter-plot on the next page.)


CAL-ISO Daily Power Production (MWh) from Wind, Solar PV, and Solar Thermal 08/01/2016 to 01/31/2017
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
-
Daily Production, MWh
1-Aug-16
31-Aug-16
30-Sep-16
30-Oct-16
29-Nov-16
29-Dec-16
28-Jan-17
Date
DCPP = 54,360 MWh per day
Wind
Solar Thermal
Solar PV

CGNP also learned that grid-scale energy storage is not used in California, perhaps as a consequence of California electricity market design. The two utility-scale California pumped storage facilities (Helms Pumped Storage [Helms] and Castaic pumped storage) show modest annual production, per the U.S. EIA, perhaps because they receive more market compensation for providing voltage and frequency support (which DCPP is apparently excluded from receiving, despite providing considerable voltage and frequency stability to CAISO Sub LAP ZP26 shown on the California map to the left. DCPP's location is near the southwest corner of ZP26.) Helms is located in the Sierra foothills, about 50 miles east of Fresno CA in NP15 (North of Path 15.) CAISO recently began tabulating California battery-based storage daily performance on their website. However, current battery-based energy storage systems are too small by three or four orders of magnitude relative to California's huge energy demands as the world's sixth largest economy, with a growing population nearing 40 million.



While Helms has a nameplate capacity of 1,212 MW (more than half of DCPP's nameplate capacity of 2,240 MW) the graph "Annual Production 1984-2017: DCPP, Helms, Castaic" shows the minuscule annual power production of Helms relative to the nominal 18,000 GWh of DCPP. Intervenor CGNP made a formal data query in A.16-08-006 to Helms owner PG&E regarding the reasons for the modest use of Helms during the course of the above CPUC proceeding. CGNP's data query was rebuffed by PG&E.



Both national and state energy policies have provided incentives for the substitution of huge quantities of **low-quality** non-dispatchable solar and wind generation backed up with thermal generation which adds millions of tons of emissions annually to the environment - initially for the 18 million high-quality emission-free and dispatchable megawatt-hours that San Onofre Nuclear Generating Station (SONGS) was generating annually until January, 2012.

Now, the post-2025 plan is to do the same for DCPP's dispatchable 18 million megawatt-hours of annual production. Recently, DCPP had an annual capacity factor in excess of 100%. DCPP provides safe, reliable, durable, cost-effective and emission-free generation. NECG provided inputs for the 2016 Idaho National Laboratory's nuclear power cost study showing that DCPP's generation cost was about $27.10/MWh, about a tenth of the long-term supply contract that the operators of Ivanpah solar thermal plant have with PG&E for $200.00/MWh.

"Back-Down Mode"

As a consequence of the performance documented above, California Solar and wind are backed with thermal generation to provide power for the approximately 80% of the time that they are not generating power. Much of this thermal generation is operated in "back down mode" (or hot-ready mode) so that the thermal generation is ready to generate power at a moment's notice, since both wind and solar are subject to rapid-onset diminution of output power on a random basis. The result is that despite the large installed capacity of solar and wind in California, there is **almost no emissions reductions** relative to 16,000 MW of pure natural-gas-fired generation**.** Emissions reductions relative to thermal generation are the highly-promoted rationale for employing solar and wind generation.

Perhaps solar and wind generation are valued by operators of thermal generators because of the public believes that there are benefits of capital-intensive solar and wind (that are not supported by the actual performance data shown above.)

Conclusion – Next Steps

In this brief article, summary information regarding the environmental benefits - and ratepayer benefits - of the continued safe operation of DCPP as an example nuclear power plant have been provided. For those readers that wish additional technical details, please contact Gene Nelson at the email address below to obtain links to a number of CGNP's filings in A.16-08-006.

The nuclear power plants in other parts of the country is likely to be experiencing similar pressures. CGNP believes that there are benefits from disseminating information regarding successful citizen advocacy campaigns, such as the initiatives to continue the safe operation of Energy Northwest's Columbia Generating Station. This information exchange would be analogous to how nuclear plant operators exchange information regarding "best operational practices." CGNP gratefully receives such information. CGNP would like to become an information clearinghouse regarding nuclear power advocacy.

In the event that the CPUC chooses to approve A.16-08-006 (i.e., approve retirement of Diablo Canyon in 2024/2025), CGNP intends to challenge that decision on a number of grounds that have already been documented in earlier filings. CGNP will keep NECG readers informed regarding our progress. Any assistance in challenging the CPUC decision will also be gratefully received by CGNP.

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