SUBMITTED ELECTRONICALLY
via ShermanPermits@calpine.com

November 17, 2025

Calpine Mid-Atlantic Generation, LLC
6 Hillman Drive, Suite 201
Chadds Ford, PA 19317

Re: Calpine Sherman Avenue Energy Center, Proposed Title V Operating Permit Renewal (BOP230001), Environmental Justice Impact Statement (EJ Project ID: 33496494)

To whom it may concern,

Clean Energy Group (CEG) is pleased to provide these comments regarding the Environmental Justice Impact Statement (EJIS) submitted as part of an application for Title V Operating Permit Renewal by Calpine New Jersey Generation, LLC ("Calpine") for the Sherman Avenue Energy Center in Vineland, New Jersey. These comments reflect the position of CEG, a national nonprofit dedicated to accelerating a just and equitable transition to clean, affordable energy for all. They do not necessarily reflect the views of CEG's partner organizations or funders.

These comments are informed by CEG's work through the Phase Out Peakers Initiative, a first of its kind project focused on accelerating the retirement of fossil-fuel peaker plants and their replacement with energy storage, renewable generation, and other non-emissions alternatives. This work has included partnering with entities such as the New York Power Authority (NYPA) to successfully advocate for the retirement of NYPA's peaker plants and their replacement with battery storage.

Based on CEG's analysis of the Sherman Ave plant's operations and site, we believe, contrary to Calpine's statements in the EJIS, that battery storage is technically and financially feasible at the site. Calpine should pursue hybridization with battery storage to reduce emissions at the site and fulfill its obligations under New Jersey's EJ Rules (N.J.A.C. 7: 1C).

Technical Feasibility

Based on CEG's analysis of Sherman Ave's run-time from 2020 to July 2025, using data from the US Environmental Protection Agency's (EPA) Clean Air Markets Program Database (CAMPD), the plant's gross load output per hour does not typically exceed 90 megawatts

(MW), and is often significantly less.[1] On average, the plant operated for events under a duration of four hours 41.6 percent of the time, for events between four and 12 hours 51.6 percent of the time, and for events greater than 12 hours 6.8 percent of the time, as can be seen in Table 1 below:

Table 1: Number and Percentage of Operating Events by Duration, 2020-2025

Year	</= 4 hours	4- 12 hours	>12 hours
2025 (through July)	6 (30%)	11 (55%)	3 (15%)
2024	28 (46%)	31 (51%)	2 (3%)
2023	20 (32%)	34 (54%)	9 (14%)
2022	21 (42%)	24 (48%)	5 (10%)
2021	20 (48%)	22 (52%)	0
2020	17 (40%)	23 (53%)	3 (7%)
Average Number and Percentage of Events (excluding 2025)	21.2 (41.60%)	26.8 (51.60%)	3.8 (6.80%)

Based on this analysis, there are a variety of hybridization options using batteries at the site which would cost-effectively and dramatically reduce emissions while still meeting all events in which the plant would be called upon. For example, a 90 MW/720 megawatt-hour (MWh) battery storage installation would cover 82 percent of events, using 8-hour lithium-ion batteries. A 12-hour installation at Sherman Ave would be able to meet over 90 percent of events. In both scenarios, the existing combustion unit would only need to come on for infrequent longer duration events.

While there may be some space constraints limiting battery development within the original 5.52-acre footprint of the site, it should be noted that the site is on a 55-acre parcel. Calpine already owns and operates a 680 MW installation of four-hour duration batteries, for a total of 2720 MWh, on a 43-acre site in California. Analysis conducted on the feasibility of large-scale battery storage development in high-density areas in New York City found that four-hour duration storage projects can have a density of 23 to 30 MW per

[1] US EPA. "Sherman Ave Custom Data." Clean Air Markets Program Data (CAMPD). Accessed November 7, 2025. https://campd.epa.gov.

acre, or up to 40 MW under certain conditions.[2] Furthermore, while Calpine stated in the EJIS that battery storage hybridization would be infeasible at the site due to requiring a new interconnection study from PJM, if the batteries are designed to utilize the facility's existing interconnection service while preserving the same total rated capacity at the point of interconnection, the batteries can be interconnected under PJM's Surplus Interconnection Service, which would qualify for expedited review by PJM outside the interconnection queue.[3]

Emissions Reductions

Hybridization with battery storage is the most cost-effective way to significantly reduce emissions at the plant, particularly nitrogen oxides (NO_x). As seen in Table 2 below, based on the plant's last five years of generation and emissions data, the installation of a 90 MW/1080 MWh battery storage system would reduce NO_x and carbon dioxide (CO_2) emissions by 73 percent, and sulfur dioxide (SO_2) emissions by 74 percent. A system using eight-hour batteries would reduce NO_x and CO_2 emissions by 55 percent, and SO_2 emissions by 56 percent.

[2] Stratagen Consulting on behalf of the PEAK Coalition. *The Fossil Fuel End Game: A Frontline Vision to Retire New York City's Peaker Plants by 2030*. The PEAK Coalition, 2021. https://www.cleanegroup.org/wp-content/uploads/Fossil-Fuel-End-Game.pdf.

[3] Warren, Wendy, Craig Glazer, and Christopher Holt. "PJM Interconnection LLC, Docket No. ER25-____-000 Proposed Tariff Amendments for Surplus Interconnection Service." December 20, 2024. https://www.pjm.com/pjmfiles/directory/etariff/FercDockets/8561/20241220-er25-778-000.pdf.

Table 2: Emissions reductions achieved with four-, eight-, and 12-hour battery systems

	90 MW/360 MWh battery			90 MW/720 MWh battery			90 MW/1080 MWh battery		
	SO2 (lbs)	CO2 (short tons)	NOx (lbs)	SO2 (lbs)	CO2 (short tons)	NOx (lbs)	SO2 (lbs)	CO2 (short tons)	NOx (lbs)
2024	40	3,982	4,939	113	11,208	13,726	151	15,036	18,538
2023	20	2,041	2,756	89	9,099	11,277	159	16,391	20,015
2022	31	3,167	3,921	99	9,946	12,054	109	10,912	13,197
2021	22	2,199	2,729	75	7,434	8,982	102	10,107	12,155
2020	18	1,798	2,196	74	7,317	8,823	91	9,040	10,925
Average Reduction (Percent)	**16%**	**16%**	**17%**	**56%**	**55%**	**55%**	**74%**	**73%**	**73%**

Even four-hour batteries would address 41.6 percent of the times the plant is called upon. These shorter duration events are some of the most polluting from a local emissions standpoint, as emissions are typically unabated during plant start-up and shut down. By reducing the need for the plant to come on for these shorter duration events, a system using four-hour batteries would reduce CO_2 and SO_2 emissions by 16 percent and NO_x

emissions by 17 percent. These emissions reductions are particularly pertinent given that, based on Calpine's own survey of community stressors, the Vineland community currently experiences significant adverse stress from ground-level ozone, even with the use of existing emissions abatement systems.

Cost-Effectiveness

Based on the National Renewable Energy Laboratory's (NREL) most recent Advanced Technology Baseline (ATB) data, a typical four-hour utility scale installation would cost approximately $1,551/kW, while an eight-hour installation would cost approximately $2,799/kW. While data for 12-hour battery costs is less widely available, a reasonable cost estimate for such a system would be approximately $4,031/kW.[4] These costs are not unreasonable, particularly given the significant beneficial impact on local air pollution emissions that even a four-hour battery storage installation would have.

Special Conditions

While hybridization with battery storage has the potential to cost-effectively reduce emissions at the plant, several additional requirements would need to be in place to ensure these reductions are achieved. The site would need to be configured so that the batteries are called upon first, and the combustion unit only turned on for events longer than the battery system's available duration. This configuration would also take advantage of the quick response grid services batteries, which have no ramp time and are already synced to the grid, can provide that a gas turbine cannot. The batteries can also charge during periods of high renewable energy production, helping to minimize curtailment of those resources and reducing any potential embodied emissions from grid charging of the batteries.

CEG strongly recommends that Calpine amend its EJIS to reflect the technical and financial feasibility of battery storage hybridization at the Sherman Ave plant. Installing, at minimum, a 90 MW/720 MWh battery storage system would cover 82 percent of events in which the plant is called upon and would reduce NO_x and CO_2 emissions by 55 percent, and SO_2 emissions by 56 percent. Installing such a system should be imposed as an Environmental Justice Special Condition for the renewal of the Sherman Ave plant's Title V permit.

[4] National Renewable Energy Laboratory. "2024 Annual Technology Baseline." Annual Technology Baseline, July 23, 2024. https://atb.nrel.gov/electricity/2024/data.

We would be happy to meet to further discuss our comments or answer any questions.

Respectfully submitted,

Abbe Ramanan
Project Director
Clean Energy Group