BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Application of Southern California Edison Company (U338E) for Approval of the Results of Its 2013 Local Capacity Requirements Request for Offers for the Moorpark Sub-Area.	Application 14-11-016 (Filed November 26, 2014)

CLEAN COALITION SUPPLMENTARY SUMMARY OF ENGINEERING STUDY OF MEETING GOLETA 29.6 MW RELIABILITY, SHORT CIRCUIT DUTY, AND HEALTH IMPACT ABATEMENT WITH DISTRIBUTED PHOTOVOTAIC AND STORAGE SYSTEMS

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SUMMARY

The Clean Coalition submits this analysis of a 35 MW PV solar and 164 MWh energy storage project to meet 29.6 MW peaker need identified by CAISO, as a supplement to the Clean Coalition's engineering analysis submitted to the CPUC on August 8, 2017 demonstrating that PV solar and storage can meet the requirements of the Ellwood Peaker Project far more cost effectively. The Clean Coalition's original submission demonstrated that a PV solar and storage can meet all requirements of the unnecessarily larger 54 MW nameplate capacity of the Ellwood Peaker Plant.

The costs to ratepayers of a PV solar and storage approach would be considerably lower than of a refurbishment of the Ellwood peaker, especially after accounting for the costs of natural gas, operations and maintenance (O&M), and the cost reductions of PV solar and storage from the Federal Investment Tax Credit (ITC). Not only is the PV solar and storage approach more cost-effective, but the PV solar and storage approach would provide substantial additional functionality and community benefits.

- A combination of solar and storage is fully capable of meeting the generation provided by the Ellwood Peaker Project during peak hours.
- An aggregation of 35 MW of solar and 35 MW of storage power capacity and 165 MWh of storage energy capacity would be sufficient to meet the smaller 29.6 MW reliability need identified by CAISO[1]
- The per kWh ratepayer price for PV solar and storage energy would be sharply lower than for Ellwood, even though the installed costs may exceed those of the Ellwood peaker refurbishment, since PV solar and storage would avoid additional costs of natural gas fuel and peaker O&M; and benefit from the federal ITC.
- PV solar and storage facilities would provide more energy and other grid services in the highly constrained Goleta load pocket than Ellwood could provide under its 380-hour annual operating limit.

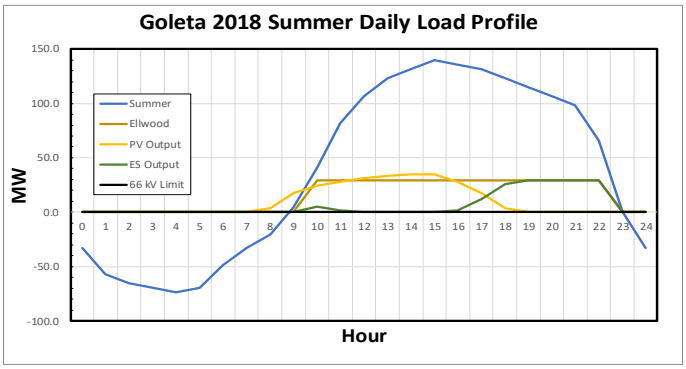
[1] ALJ DeAngelis' Proposed DECISION IN PHASE 2 ON RESULTS OF SOUTHERN CALIFORNIA EDISON COMPANY LOCAL CAPACITY REQUIREMENTS REQUEST FOR OFFERS FOR MOORPARK SUB-AREA PURSUANT TO DECISION 13-02-015, April 7, 2017.

I. The actual reliability need of 29.6 MW could be cost-effectively met with an aggregation of 35 MW of solar and 35 MW / 165 MWh of storage.

An aggregation of 35 MW of PV solar and 35 MW/ 165 MWh of storage can meet the 29.6 MW peaker need identified by CAISO. This capacity would likely cost ratepayers less than 10 cents per kWh bundled.

According to the Clean Coalition's PV solar and storage modeling, a 35 MW of solar and 35 MW / 165 MWh system would meet the CAISO-identified 29.6 MW reliability need associated with Ellwood during the 13 hours of peak.

Figure 1: Load Profile for PV solar and storage replacement for 29.6MW of Ellwood generation



PV solar and storage projects of this size are clearly feasible and cost effective as they are being deployed nationwide at competitive prices. The Clean Coalition's August 8th filing referenced multiple PV solar and storage examples, including the AES 28 MW of solar and 20 MW / 100 MWh PV solar and storage project on Kaua'i, and the recently announced 100 MW solar and 120 MWh storage for Tucson Electric Power. PV solar and storage represents an feasible and increasingly cost-competitive approach to meeting peak load capacity requirements.

Furthermore, distributed PV solar and storage can facilitate community resilience and environmental benefit as well. Not only would a PV solar and storage avoid the air pollution impacts on nearby communities and schools, but a distributed network is far more robust to impacts to the system than a single location generator ever could be.

The Clean Coalition is currently staging a Community Microgrid in the Ellwood load pocket that would provide a significant fraction of these resources. Thus, with a range of projects already in the pipeline, the PV solar and storage approach would likely be relatively straightforward to develop in a timely manner.

II. Ratepayer costs would be sharply lower with PV solar and storage.

The Clean Coalition estimates that a PV solar and storage approach would have a total installed cost of less than $90 million, and the price of delivered energy will be far lower than what the Ellwood peaker can deliver. First, comparable projects have delivered energy costs below 11 cents per kWh. Second, installed component costs indicate an installed cost of approximately $90 million dollars in 2018.

Comparable projects have delivered energy at a ratepayer cost of under 11 cents per kWh. As mentioned above, the AES 28 MW of solar and 20 MW / 100 MWh PV solar and storage project on Kaua'i is delivering power at bundled price of 11 cents per kW, which is cheaper than what the average American currently pay for electricity (U.S. residential electricity prices averaged 12.5 cents/kWh in October 2016). This Kauai example will also provide for 11% of the total electricity consumption throughout the Island of Kauai starting in 2018. The recently announced 100 MW solar and 120 MWh storage for Tucson Electric Power will provide power at a bundled Power Purchase Agreement (PPA) rate of less than 4.5 cents per kWh.

The Clean Coalition grounds these estimates in our experience staging PV solar and storage project to meet energy needs cost effectively. For example, the Clean Coalition helped set the stage for this Kauai project by conducting the dispatch analysis that maximized economic value while minimizing the need for the Kauai utility to burn fossil fuels. We have also facilitated cost-competitive solar and storage projects in San Francisco.

An analysis of installed component costs also indicates that a PV solar and storage approach would be cost-competitive. Installed costs depend on the prices of components, which vary between projects and have been falling sharply. As of 2016, installed costs of solar range from about $1.40 per Watt for ground-based to about $2 per Watt for large commercial rooftops, according to the latest National Renewable Energy Lab Benchmarks[2]

[2] R. Fu, *et al.* "U.S. Solar Photovoltaic System Cost Benchmark: Q1, 2016, NREL, Report NREL/TP-6A20-66532, September 2016, *available at https://www.nrel.gov/docs/fy16osti/66532.pdf?utm_source=NREL%20Report%20Shows%20U%2ES%2E%20Solar%20Photovoltaic%20Costs%20Continuing%20to%20Fall%20in%202016&utm_medium=email&utm_content=nrel&utm_campaign=NewsRelease*

(both of which are sharply lower than the highly unrealistic $2.70 per watt recently used by CAISO in its recent Puente Power Plant study). Since solar installed costs have been falling by around 10% a year, the actual installed costs for a project in Goleta would almost certainly be approximately 20% lower than these 2016 estimates.

Two reliable studies of energy storage suggest similar affordable energy storage costs. The 2016 costs for energy storage in these studies have also been declining sharply at approximately 11% a year. First, a study of battery storage by the National Renewable Energy Laboratories (NREL)has identified examples in California and Tennessee with installed costs of approximately $300 per kWh, while the most recent Lazard's analysis places the low cost at $285 per kWh and median price at $399 per kWh. (These are also sharply lower than CAISO's out of date Puente-substitute estimates of $500 per kWh).[3] At those component prices, the installed of battery storage for the PV solar and storage approach in Goleta, including balance of systems and soft costs, would likely be around $400 per kWh. The total installed cost of the 165 MWh of storage would be about $65 million. Hence, the total installed cost today of the PV solar and storage approach to fully replace Ellwood, and do much more, is estimated at under $120 million based on 2016 costs. Accounting for the cost trends over the last several years, this cost would be less than $90 million by end-2017.

Furthermore, the delivered ratepayer costs are more favorable for PV solar and storage, because PV solar and storage benefits from the ITC and other price reductions, while delivered costs of energy from natural gas must include not only the installed costs, but also fuel, operations and maintenances, and can only recover costs over a limited period. For comparison, the Ellwood Peaker Plant can only operate 380 hours per year would therefore likely cost to ratepayers more than $30 cents per kWh typical of natural gas peakers, three times higher than what is estimated for the PV solar and storage approach based on the Kauai and Tucson Electric Power PV solar and storage pricing.

[3] DiOrio, *et al. "*Economic Analysis case studies of battery energy storage with SAM" NREL Report NREL/TP-6A20-64987. November 2015, *available at https://www.nrel.gov/docs/fy16osti/64987.pdf.* See also, Lazard's Levellized Cost of Storage, v. 2.0, December 2016, available at https://www.lazard.com/media/438042/lazard-levelized-cost-of-storage-v20.pdf

III. Cheaper and more effective PV solar and storage approach demonstrates that the Ellwood Peaker Plant is not a just and reasonable approach to meeting any needs in Goleta.

Ultimately, the current prices of solar and storage means that natural gas plants are not only polluting sources, but they are also increasingly no longer cost competitive for peaker applications. In fact, PV solar and storage options can meet the identified reliability needs without incurring health impacts and deaths that the Ellwood contract would entail. These needs could also be dramatically reduced with additional demand response, energy efficiency, and other DER. The Commission aspires to incorporate social costs and environmental justice into its decision making and is required to give priority to preferred resources. Rejection of the Ellwood contract and directing the procurement of preferred resources would foster all these goals.

Respectfully submitted,

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