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Comments re Replacing Puente Power Plant with Renewable DERs

Attached are comments and analysis regarding replacement of the proposed gas-fired Puente Power Plant with renewable distributed energy resources (DERs) through the Moorpark Sub-Area. Our analysis confirms that strategic deployment of DERs can provide greater reliability and resiliency to communities served within a particular area, while also significantly reducing GHG emissions in compliance with state goals and objectives.

Additional submitted attachment is included below.

December 11, 2017

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Docket No. 15-AFC-01 / Replacing Puente Power Plant with Renewable DERs

Dear Commissioners,

The World Business Academy (the "Academy"), a non-profit organization headquartered in Santa Barbara, California, provides the following comments and analysis in support of developing a system of Distributed Energy Resources (DERs) within the Moorpark Sub-Area as a superior alternative to the originally proposed gas-fired Puente Power Plant at the old Mandalay site.

The Academy formally began investigating various energy infrastructure issues in 1995, followed by publication of a book, *Profiles in Power*, in 1997, and a subsequent dedicated chapter in a subsequent publication, *Freedom From Mid-East Oil,* in 2007. In addition, the Academy has published more than a dozen energy-related articles in various journals, both domestically and abroad, including the American Bar Association journal.

ACADEMY PARTICIPATION IN REGULATORY HEARINGS LEADING TO PUENTE

In 2013-2014, the Academy intervened in the California Public Utility Commission (CPUC) investigation into the rates, operations and practices of the San Onofre Nuclear Generating Station (SONGS).[1] In the past three years, the Academy also actively intervened in CPUC proceedings initiated following the closure of SONGS to approve proposed natural gas peaker plants in the communities of Carlsbad and Oxnard as "flexible resources" to support the anticipated growth of intermittent renewable energy resources. Indeed, in the CPUC proceeding for Carlsbad[2], the Academy and other intervening parties were alarmed to

[1] Docket No. I12-10-013, "Order Instituting Investigation on the Commission's Own Motion into the Rates, Operations, Practices, Services and Facilities of Southern California Edison Company and San Diego Gas and Electric Company Associated with the San Onofre Nuclear Generating Station Units 2 and 3. (Per ALJ Darling's Ruling of 4/19/2013, I.12-10-013, A.13-01-016, A.13-03-005, A.13-03-013, and A.13-03-014 are consolidated. GML)"

[2] CPUC Docket No. A1407009, "Application of San Diego Gas & Electric Company (U902E) for Authority to Partially Fill the Local Capacity Requirement Need Identified in D.14-03-004 and Enter into a Purchase Power Tolling Agreement with Carlsbad Energy Center, LLC."

discover that San Diego Gas and Electric had entered into a bilateral contract with NRG for a 600MW gas peaker plant without first engaging in any competitive bidding or public review. To all intervening parties other than NRG or SDGE, it was clear that institutional stakeholders had given no consideration whatsoever to preferred resources that are at the top of the CPUC's Loading Order. This view was ultimately borne out in the CPUC's reversal of an Administrative Law Judge's initial proposed decision[3] denying SDGE's application with prejudice, and approving a 500MW peaker plant at Carlsbad while reserving a mere 100MW to preferred resources as a concession to opposition.[4] Although the result was a small consolation for opposing parties, the Carlsbad proceeding established a baseline for debate concerning distributed development of preferred resources.

Ironically, delayed construction of the Carlsbad peaker plant may require continued operation of the ancient Encina Power Station until the end of 2018.[5] Contrast that situation with SCE's installation of 70MW of battery storage within six months of authorization following the Aliso Canyon gas blowout in Porter Ranch, California.[6] The comparison is stark: development of DERs where need is greatest is a quicker, more economic and overall superior alternative to building large, centralized fossil fuel plants that rely on transmission lines to provide system reliability.

Likewise, in the LCR proceeding for the Moorpark Sub-Area[7], the Academy strongly opposed the proposal by Southern California Edison (SCE) to (i) refurbish a 40-year-old plant in the densely populated Ellwood neighborhood of Goleta and (ii) install yet another gas-fired peaker plant in the City of Oxnard after decades of particulate emissions exposure from existing baseload plants located in Mandalay and Ormond Beach. In all of its filings and related testimony, the Academy has advocated for the development of a community microgrid system that is 100% reliable and resilient, immune to the inherent vulnerabilities and limitations of our current, antiquated system of centralized fossil-fuel energy generation and transmission.

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[3] ALJ Yacknin, "DECISION DENYING WITHOUT PREJUDICE SAN DIEGO GAS & ELECTRIC COMPANY'S APPLICATION FOR AUTHORITY TO ENTER INTO PURCHASE POWER TOLLING AGREEMENT WITH CARLSBAD ENERGY CENTER, LLC"

[4] Decision 15-05-051, "Decision Conditionally Approving San Diego Gas & Electric Company's Application for Authority to Enter into Purchase Power Tolling Agreement with Carlsbad Energy Center, LLC," issued May 29, 2015, pp. 36-37. It should also be noted that after many filings requesting a rehearing, the CPUC on November 6, 2015 slightly modified its decision and denied such a rehearing.

[5] "Encina Power Station may stay online through 2018," San Diego Union-Tribune, March 23, 2017.

[6] "Tesla, Greensmith, AES Deploy Aliso Canyon Battery Storage in Record Time," GreenTechMedia, January 31, 2017.

[7] CPUC Docket No. A1411016, "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."

As with the CPUC's LCR proceedings for Carlsbad and Moorpark, the main purpose of the Academy's intervention in this instant proceeding is to help the Energy Commission determine the optimal path towards replacing a peaker plant such as Puente while concurrently realizing California's aggressive clean energy goals, which will require dramatic changes in the way in which energy is generated and utilized. Moving systematically towards this goal, one of the most fundamental technological shifts that a society can and should make as quickly as possible is to replace fossil fuels with DERs that collect, store and manage renewable energy as part of a 100% reliable and resilient network of community microgrids. To ensure full reliability and resiliency, distributed energy systems must be designed to maximize renewable energy output, with a tiered hierarchy of short, medium and long-term energy storage technologies to convert excess renewable energy into reserves for a wide range of uses during varying periods of disruption or low energy production.

THE NEED TO TRANSFORM THE MOORPARK SUB-AREA FROM CENTRALIZED TO DISTRIBUTED ENERGY

For decades, the Ventura County coastline has served as a power generation center for the western end of SCE's service area as represented by the Moorpark Sub-Area. Combined, the Mandalay and Ormond Beach plants provide approximately two gigawatts of power, equivalent to the individual output of the San Onofre and Diablo Canyon nuclear power plants. With their pending closure, and absent any meaningful distributed energy development, the energy polarity of the Moorpark Sub-Area would be reversed, and instead of enjoying proximity to centralized energy generation, ratepayers within the Moorpark Sub-Area would be extremely reliant on receiving grid energy from other utility-scale generation sources located many miles away. This conundrum provides one rationale for building a plant such as Puente, so it can operate to serve local capacity requirements (LCR) when the statewide grid system cannot deliver all the energy needed for the area.

Complicating matters is the peninsular "finger" of the Moorpark Sub-Area that extends up the coastline to Santa Barbara County, where residents rely on delivery of all their energy via a single transmission line that has been repeatedly threatened by wildfires, is being dramatically impacted by the Thomas Fire for a full week as of this writing[8], and is also vulnerable to potentially extended disruptions from mudslides and earthquakes.

1 - The Moorpark Sub-Area, as shown on SCE's DER Interconnection Map (DERiM) website. Note the peninsular "finger," constrained by mountain and service area boundaries, that encompasses coastal Santa Barbara County.

[8] L.A. Times, "Fires threaten power lines serving thousands in Santa Barbara and Ventura," December 10, 2017.

Although there is a secondary sub-transmission line available, it currently provides less than half of the area's peak capacity and even after completion of capacity upgrades would leave a deficiency of at least 100MW that would require extended rolling blackouts over an indefinite time period during a major transmission disruption.

The sad truth is that a traditional "solution" such as Puente provides no guarantee whatsoever of reliability or resiliency for this area, in light of SCE's determination that a failure of the 220 KV transmission lines feeding the Goleta 66 KV distribution system, due to one or more identified natural causes, would deliver a debilitating blow to local communities and the economy. Resiliency and reliability powered by natural "green" energy resources can only be realized through local development of DERs to cover a shortfall resulting from catastrophic disruptions to affected load pockets. If such a solution can be developed for the Goleta/Santa Barbara area, then it should also be accomplished throughout the Moorpark Sub-Area.

THE ACADEMY SUPPORTS SOLAR/STORAGE AS THE PATHWAY TO REPLACING PUENTE WITH A RELIABLE AND RESILIENT DISTRIBUTED ENERGY SYSTEM

The Academy unequivocally supports the July 5th analysis of Dr. Doug Karpa at Clean Coalition concerning the ability of DERs, primarily in the form of solar/storage hybrid projects using advanced inverters, to replace Puente in supplying LCR needs for the Moorpark Sub-Area.[9] In particular, the Academy agrees with Dr. Karpa's observation on page 9 that "the Moorpark subarea also hosts enough solar siting opportunity to allow for cost effective deployment of DER capacity vastly in excess of identified reliability and resilience needs."

As shown below, a cursory analysis of various areas within the Moorpark Sub-Area will reveal high concentrations of commercial-industrial properties with large rooftops, parking lots, loading docks and other developed areas capable of hosting significant amounts of solar generation. When combined with appropriately sized storage capacity, these properties will provide a reliable, resilient energy resource that will not only serve site load requirements, but also service the needs of adjacent ratepayers located on the same distribution circuit or serviced by the same substation.

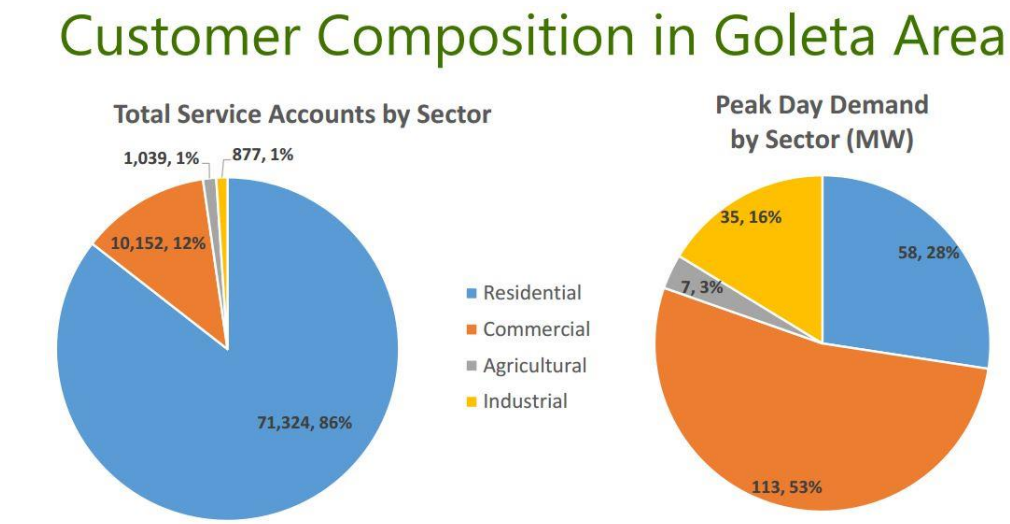
To effectively replace Puente with DERs, an equivalent amount of Puente's capacity will need to be distributed throughout its intended service area in accordance with each location's energy and flexible power needs. This will require an analysis of the distribution systems within the Moorpark Sub-Area and identification of sites capable of servicing their own load and possibly exporting excess energy to adjacent load pockets. As distribution systems become more reliant on intermittent resources, energy storage capacity will need to increase, either on-site or at common interconnection nodes such as substations, where

[9] Karpa, Doug, "Clean Coalition Comments on Scope of CAISO study of DER to meet LCR," filed July 5, 2017 on behalf of Clean Coalition.

development of utility-scale, longer-duration storage medium such as flow batteries and hydrogen electrolysis/fuel cell stations will provide additional system reliability and resiliency during extended disruptions or shortages. Strategic procurement of utility-scale storage resources would also serve to reduce capital costs through economies of scale.

From our review, and those of other stakeholders such as SCE and Clean Coalition, sites having both the largest load profiles and DER capacity lie within the commercial-industrial sector of a given community. By rendering these properties "energy neutral" from a grid perspective, overall system load will be drastically reduced, allowing for more capacity for two-way transfers of energy between distribution substations, circuits of a substation, and segments of a particular distribution circuit.

For example, according to SCE in the graph shown below [10], commercial-industrial properties in the Goleta area consume almost 70%, or 148MW, of all peak day energy demand.

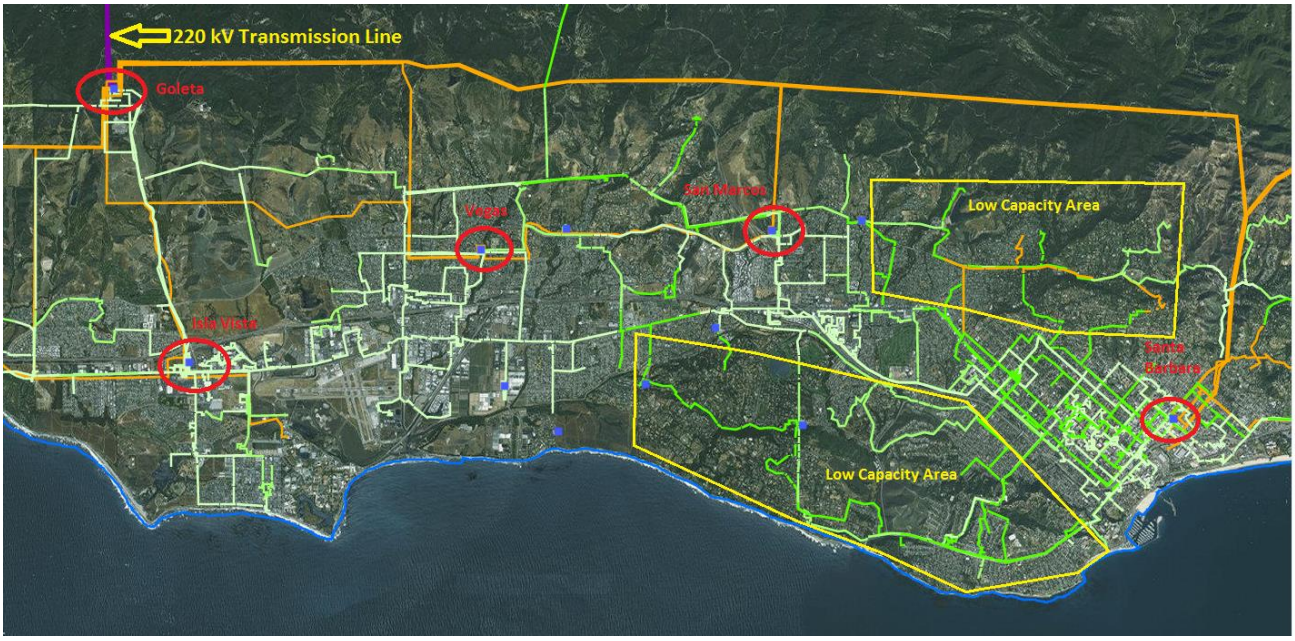


Customer Sector	Total Service Accounts	Peak Day Demand MW
Agricultural	1039	7
Commercial	10,152	113
Industrial	877	35
Residential	71,324	58
Total	**84,767**	**213**

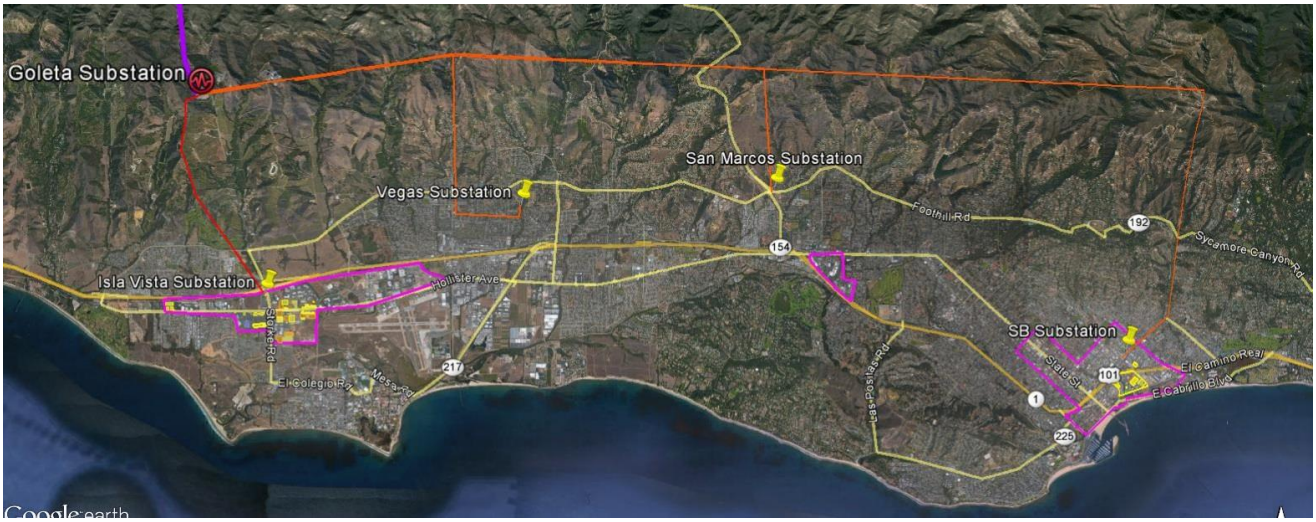
The Academy believes that given inherent similarities in planning and zoning policy among California municipalities, the energy dynamic displayed above for Goleta should be replicable for most, if not all, distribution systems in California, and that maximizing distributed generation and energy storage at commercial-industrial sites will not only eliminate the largest load pockets of a system, but also function as net energy producers for the remainder of the distribution system service area.

[10] SCE, Goleta Area (GA) RFO Collaboration Workshop presentation, December 13, 2016, p. 26.

As all distribution systems within California share common features and characteristics, successful deployment of DERs to develop distributed energy systems within the Moorpark Sub-Area should be replicable throughout California and the nation. Below are two aerial photos of the Goleta 122/66KV grid-constrained distribution system that lies at the end of the Moorpark Sub-Area's coastal peninsula.



2 - Screenshot of Goleta 122/66KV distribution system from SCE's DERiM website, with identification of distribution substations and low capacity areas currently serviced by 4KV circuits.

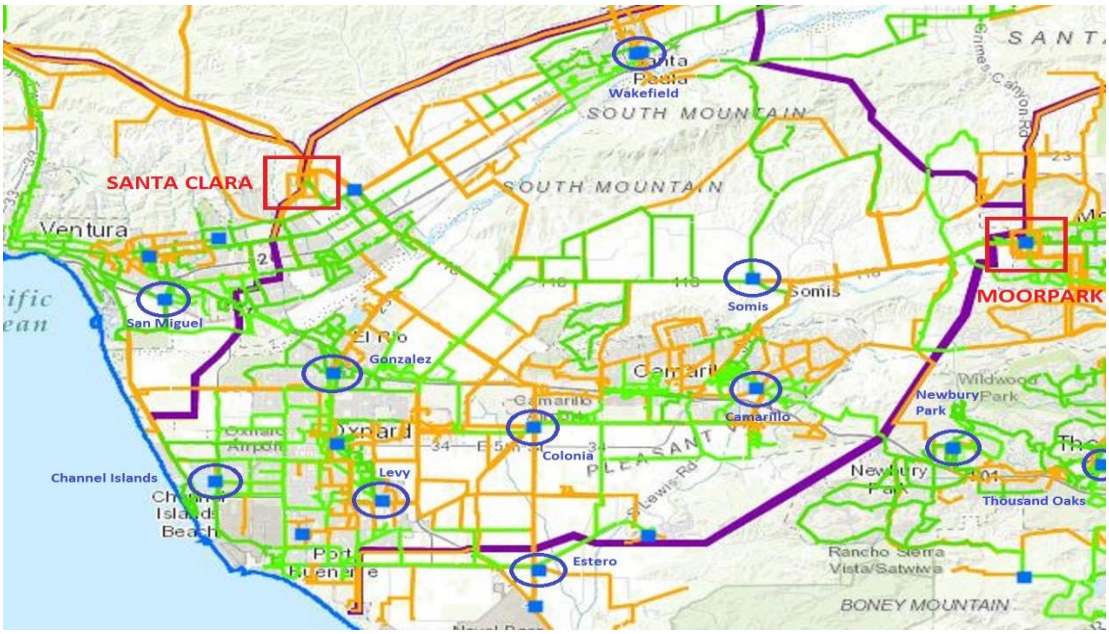


3 - Goleta 122/66KV distribution subsystem, with identification of distribution substations and high capacity commercial-industrial areas outlined in pink. Google Earth file (.kmz) available on request.

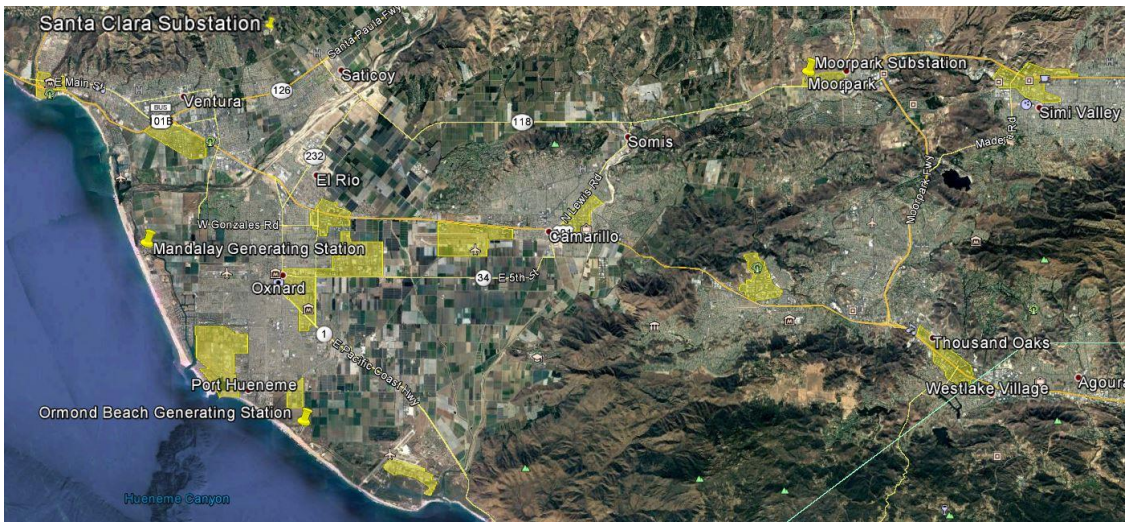
As can be seen in comparing these two images, there are high capacity commercial-industrial areas located within proximity to the four distribution substations. Through

optimizing distributed generation and capacity in these areas, load requirements of the substations can be significantly reduced, thereby reducing overall reliance on grid energy from the transmission lines feeding the Goleta substation that currently serves as the transmission/distribution grid nexus point.

Likewise, the remaining balance of the Moorpark Sub-Area (Ventura, Oxnard, Camarillo, Thousand Oaks, etc.) is similarly situated with high capacity commercial-industrial areas located adjacent to distribution substations:



4 - Screenshot of Santa Clara/Moorpark 122/66KV distribution systems from SCE's DERiM website, with identification of distribution substations.



5 - *Aerial view of Ventura Co. portion of Moorpark Sub-Area, with areas in yellow marking commercial-industrial zones. Areas selected are prospective and not exhaustive. Google Earth file (.kmz) available on request.*

CLEAN COALITION'S IN FRONT OF METER, FEED-IN TARIFF PROPOSAL IS A GOOD FIRST STEP, BUT SHOULD APPLY ONLY TO SITES WITH LOW LOAD AND RESILIENCY REQUIREMENTS

The Academy generally supports Clean Coalition's argument regarding the efficacy of a market-adjusting Feed-in Tariff (FIT) program[11], as it (i) is simpler for developers to respond to and simpler for the utility to evaluate, (ii) uses standardized contracts and prices, cutting out the individualized negotiation process, and (iii) is subject to a single CPUC authorization for the program, rather than a full review of every individual RFO contract. For properties with little to no load or need for resiliency, such a program offers a quick way to develop DERs and generate revenue to offset operating costs and add to the bottom line.

However, a FIT program is by definition "in front of meter" (IFOM), and while offering a good economic opportunity for ratepayers, it does not provide the property owner with direct control over energy generated on site. For enterprises with mission-critical operations, a "behind the meter" (BTM) solution, such as a microgrid, is the only configuration that assures the highest measure of resiliency during a grid disruption.

The Academy also agrees with Clean Coalition's conclusion that the current RFO process is "expensive, slow, and cumbersome," and further adds that if SCE's recently initiated, suspended, then re-initiated RFO for the Goleta area[12] is any guide, the traditional RFO process is extremely ad hoc and does not fit well with the need to strategically plan DER deployment within a distribution system. Under the standard RFO process, a property owner seeking to develop a BTM microgrid offering a range of grid services would be required to complete a multitude of Purchase and Sale Agreements, each with their own set of terms regarding conditions precedent, events of default, interconnection studies, operation/maintenance and payment/delivery obligations, and credit/collateral covenants. The burdens imposed from such a siloed approach forces developers to choose only one or two types of projects, where a more integrated RFO process should allow for submission of one application for the full range of services offered under a microgrid configuration.

It should also be noted that the Energy Commission, CPUC and CAISO have spent the past year exploring the commercialization of microgrids and have jointly issued a draft Roadmap for Commercialization of Microgrids in California[13], and as part of that roadmap, an effort will be made to identify and standardize microgrid use cases that could be implemented as part of an integrated RFO process. In these circumstances, a microgrid developer would submit only one application that covers all DERs and grid services offered

[11] Karpa, Doug, "Feed-in Tariffs can meet Moorpark reliability need faster than an RFO," filed October 19, 2017 on behalf of Clean Coalition.

[12] Southern California Edison (SCE) Goleta Area Request for Offers ("GA RFO").

[13] California Energy Commission, "California Microgrid Roadmap." See Also, "Draft - Roadmap for Commercializing Microgrids in California," submitted September 29, 2017.

by that particular microgrid configuration. The Academy is participating in this process, and it is our hope that this process will yield a concrete microgrid deployment strategy within the coming year.

MICROGRIDS SHOULD BE DEVELOPED FOR INSTITUTIONAL SITES TO MAXIMIZE SYSTEM RESILIENCY UTILIZING LONG-DURATION STORAGE TECHNOLOGIES

Even considering the hurdles presented by the current RFO process, there are large, institutional sites, such as universities, military installations, medical and governmental complexes, that should be considered now for development, possibly as special projects under the aegis of the CEC/CPUC/CAISO triumvirate.

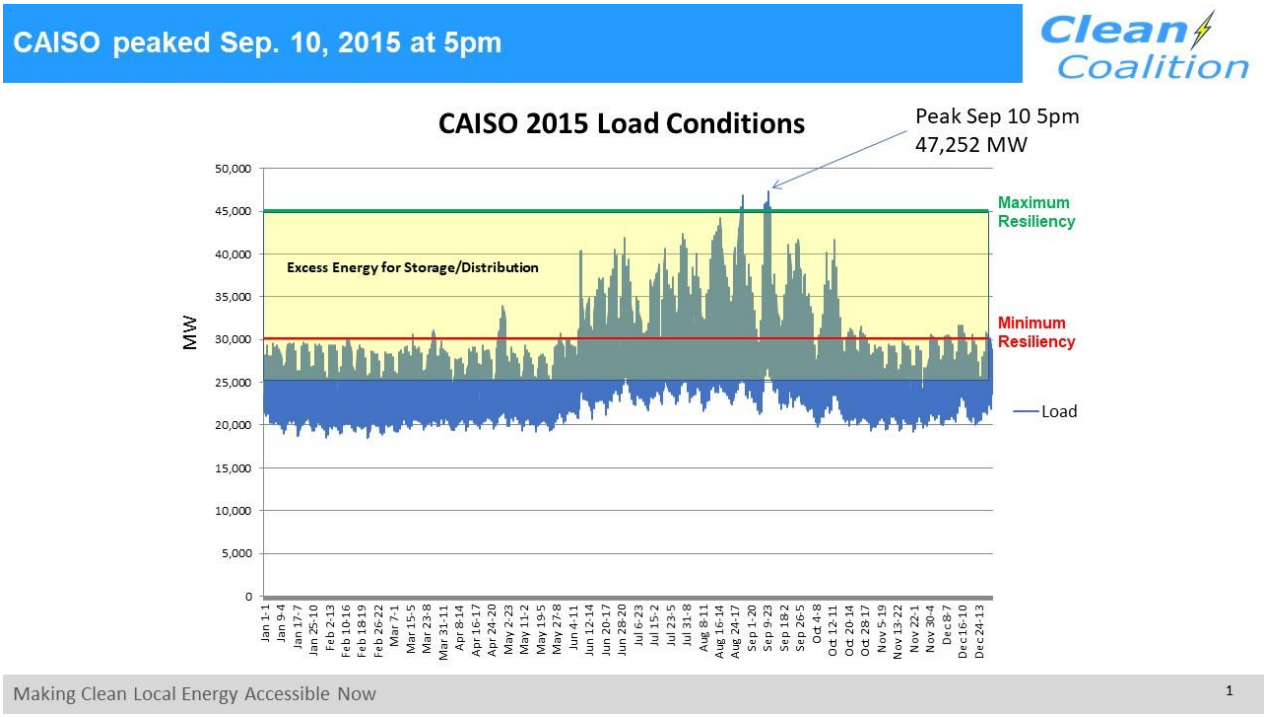
One such site located in the Moorpark Sub-Area is the Port Hueneme complex which consists of both commercial and military components. It should be noted that Port Hueneme is a primary destination for export automobiles from Pacific Rim countries to Central Coast dealerships and contains acres of concrete parking lots that can house megawatts of energy generation and storage for on-site and grid use.

6 As can be seen from the above aerial, siting solar PV on just a portion of open concrete lots at Port Hueneme could generate between 50-100MW of energy.

Depending upon the overall load profile of the facility, it is more than likely that Port Hueneme could export significant amounts of electricity to surrounding grid circuits serving adjacent communities. Furthermore, given the mission critical status of ports and

military bases, excess generated energy can be routed to a suite of storage technologies covering durations ranging in scope from hours (li-ion/flow batteries) to days and possibly weeks (via hydrogen reserves) to compensate for seasonal low production periods.

Below is a graph outlining CAISO's annual peak load profile for 2015.[14] Although this graph addresses peak load conditions for CAISO's entire service area, for discussion purposes it is generally representative of most site annual load conditions on a seasonal basis.



7 Courtesy of Clean Coalition (minimum/maximum lines and excess energy zone added for discussion purposes).

Assuming a site has potential generation capacity in excess of all peak conditions, at what level should an owner target site generation in order to utilize as much site generation to maximize site resiliency? Under a nominal resiliency scenario, generation would be set at or around the 30,000MW line, which would cover peak loads for approximately two-thirds of the year, and require grid support during the remaining four months. However, if a site such as Port Hueneme can host generation far in excess of load requirements, and mission critical operations require a high degree of site resiliency, then distributed generation would be targeted at or above the 40,000MW line.

[14] Clean Coalition, "Transmission Access Charges (TAC) Webinar - California's transmission costs are exorbitant and growing fast, but the fix is easy," March 30, 2017, p. 16 (min.-max. lines added for discussion purposes).

Under this latter scenario, all excess energy generated from October through June would be (i) first stored for short-term load shifting to cover the diurnal cycle, (ii) then converted into a long-term storage medium such as electrolyzed hydrogen and then injected back into the microgrid via fuel cells to compensate for seasonal extended periods of low generation or during extended transmission outages, or (iii) exported to adjacent ratepayers for increased grid reliability, and/or (iv) sold at a profit as a transportation fuel to emerging fleets of hydrogen cars, buses and trucks that will be needed to power long-distance transport and deliveries. Additional value can also be realized if a vehicle-to-grid program is incorporated and the owner transitions site equipment and vehicle fleets to operate using site-generated electricity.

CONCLUSION

While the foregoing analysis makes clear that there is more than sufficient potential for DERs to meet LCR needs, it is important that local governments, ratepayers and stakeholders reach a consensus on how, where and when DERs should be developed over time. Focus should not be limited only on what can be accomplished now, but also contemplate on new regulatory policy objectives that will eliminate impediments and streamline/accelerate future development.

From this perspective, Clean Coalition's proposal for a market-adjusting Feed-In Tariff program is an excellent first step to quickly deploy a significant quantity of DERs using a proven deployment tool, provided that participants are aware of the site control limitations inherent in such a program. To enhance adoption, perhaps such an FIT program could include an opt-out provision so property owners wishing to ultimately reconfigure to a microgrid can transition once streamlined regulatory approval protocols and value metrics are developed for the wide range of grid services available within a microgrid design.

Otherwise, opportunities to develop large, key institutional microgrids that will provide grid resiliency should be identified and acted upon with the assistance of utilities and regulatory agencies. Such projects will need to be developed in phases, and cannot wait for simplified and streamlined processes to come.

In any case, the design, development, deployment and operation of a distributed energy system such as one that will replace the Puente Power Plant must be strategic, and concentrate first on those sites that have the highest load signatures and/or offer the greatest potential capacity for distributed generation and storage. Our analysis reveals that in most cases, these two elements are coterminous and are located at commercial-industrial properties located within common municipal zoning criteria. DER development at circuits serving these areas would also limit grid modernization costs, and allow other portions of the distribution grid to receive excess energy from these locations.

The unique location and resiliency needs of the Moorpark Sub-Area cry out for a distributed energy solution. Transformation of this area will be proof positive that the entire state can operate independently on a distributed energy grid utilizing 100% renewal energy. By designing a distribution system to maximize generation and storage utilization, a fully reliable and resilient, 100% renewable energy solution can be achieved.

Respectfully Submitted,

Robert Perry
Director of Energy Research
World Business Academy