Quail Brush Power Plant is Wrong Approach for San Diego - Local Solar Is the Right Solution

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September 21, 2012

2009 CEC denial of 100 MW Chula Vista Energy Upgrade Project puts rooftop solar on equal footing with peaking natural gas-fired plant

"Photovoltaic arrays mounted on existing flat warehouse roofs or on top of vehicle shelters in parking lots do not consume any acreage. The warehouses and parking lots continue to perform those functions with the PV in place. . . . Mr. Powers (expert for intervenor) provided detailed analysis of the costs of such PV, concluding that there was little or no difference between the cost of energy provided by a project such as the CVEUP (gas turbine peaking plant) compared with the cost of energy provided by PV. . . . PV does provide power at a time when demand is likely to be high—on hot, sunny days. . . . The essential points in Mr. Powers' testimony about the costs and practicality of PV were uncontroverted."

Epilogue: Since 2009, the cost of solar PV has dropped tremendously.

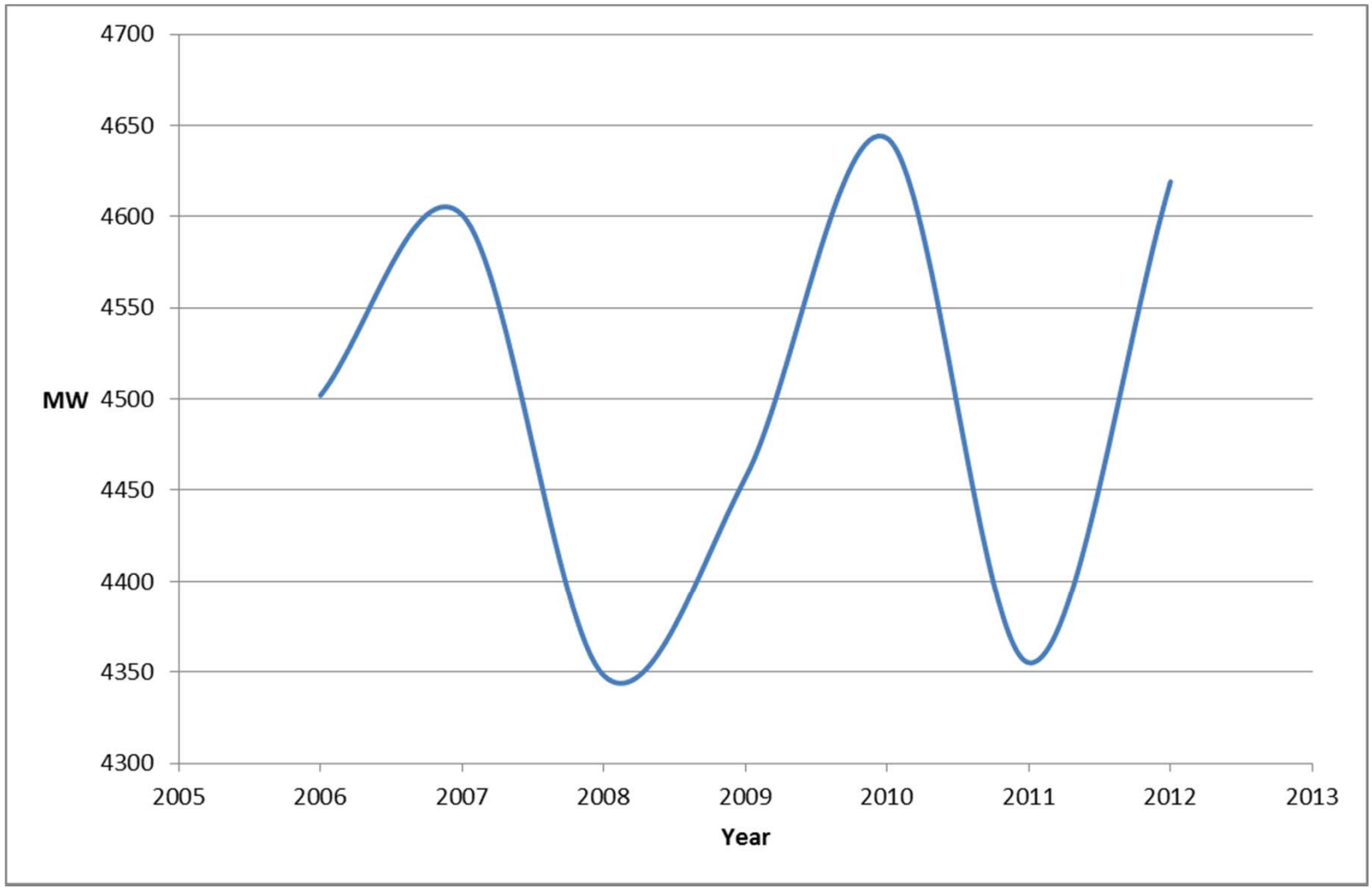
SDG&E must force out-of-business ~ 200 MW of existing peaking natural gas-fired capacity to make room for 100 MW Quail Brush

source peaking turbine usage rate: CEC, *Thermal Efficiency of Gas-fired Generation in California,* August 2011, Table 2, p. 3.

- NRG bought 964 MW Encina Power Plant in Carlsbad and 188 MW of peaking turbines from SDG&E in late 1990s.
- NRG turbines are fully functional and could operate indefinitely.
- Operate about 2 percent of time (< 200 hours per year), very low operating time results in low cumulative air emissions & fuel use.
- Quail Brush could operate up to 43 percent of time (3,800 hours per year), which would result in substantially higher cumulative air emissions and fuel use than the NRG turbines.
- NRG peaking turbines are on leased land owned by SDG&E.
- Lease expires in 2013.
- SDG&E says it will not renew the NRG lease.

SDG&E peak demand has been static over last 7 summers at 4,500 MW +/- 150 MW, while population has grown ~7%

sources: Moodys.com Q2 2006 SD County = 2,941,000; U.S. Census 2011 SD County estimate: 3,140,000; CAISO OASIS



SoCal has plenty of reserves to meet peak demand in summer of 2012, even without San Onofre Nuclear (SONGS)

source: http://www.caiso.com/Documents/Briefing_SummerLoads_ResourcesOperationsPreparednessAssessment-Report-MAR2012.pdf

- State “reserve margin” requirement is 15 to 17 percent.
- Reserve margin means additional power supply available beyond what is needed to meet the typical weather year peak load.
- Forecast 2012 peak reserve margin for SoCal (SCE + SDG&E) with San Onofre is 29 percent.
- This is over 8,000 MW above projected peak load of 27,399 MW.
- Forecast 2012 peak reserve margin for SoCal without San Onofre is 23 percent.
- This is over 6,000 MW above projected peak load of 27,399 MW.

SDG&E 2012 planning reserve margins with San Onofre Nuclear available are high at about 30 percent

sources: Rebuttal testimony of R. Anderson – SDG&E, SDG&E application for PPTA w/Escondido, Pío Pico, Quail Brush, Oct. 21, 2011; CEJA opening brief, SDG&E application for PPTA w/Escondido, Pío Pico, Quail Brush, July 13, 2012, p. 15 (8,000 amp, 230 kV = 3,187 MW) ; CPUC Decision, PG&E application of PG&E for approval of DR programs, pilots, and budgets for 2012-2014, March 20, 2012, p. 19.

- Planning margin reserve capacity = total supply – biggest generator outage (G-1) – biggest transmission line outage (N-1).
- There is 3,061 MW of local generation in SDG&E territory. 2,458 MW is available when largest generator, 603 MW Otay Mesa, is in outage (G-1).
- SDG&E can import up to 3,187 MW along Path 44 (I-5 corridor) when its largest transmission line, the Southwest Powerlink, is not available (N-1).
- Demand response measures reduce 2012 peak demand by 146 MW.
- Total supply available: 2,458 MW + 3,187 MW + 146 MW = 5,791 MW.
- CEC projects 1-in-2 2012 peak demand in SDG&E territory of 4,438 MW.
- Therefore, 2012 SDG&E planning reserve margin at peak demand, in a G-1 + N-1 condition, is 5,791 MW ÷ 4,438 MW = 30 percent.

Loss of SDG&E's 430 MW share of San Onofre Nuclear output reduced 2012 SDG&E planning reserve margin from 30 percent to 29 percent – nearly double the 15 to 17 percent reserve margin requirement

sources: SDGE - http://sdge.com/san-onofre-nuclear-generating-station; CAISO March 22-23, 2012 briefing on SDG&E summer 2012 - http://www.caiso.com/Documents/BriefingSummer2012OperationsPreparedness-Presentation-Mar2012.pdf, p. 3.

- SDG&E share of San Onofre output is 430 MW.
- However, retired Huntington Beach Units 3 & 4 were brought back in service in 2012 in response to the extended unavailability of San Onofre.
- This will add 350 MW of import reserve in SDG&E territory, according to the California Independent System Operator.
- Net imports are reduced only 80 MW, from 3,187 MW to 3,107 MW.
- Total supply available: 2,458 MW + 3,107 MW + 146 MW = 5,711 MW.
- 2012 SDG&E planning reserve margin at peak demand, in a G-1 + N-1 condition w/o San Onofre, is 5,711 MW ÷ 4,438 MW = 29 percent.

Actual 2012 SDG&E reserve margin on highest demand hour of the year, September 14, 2012, was 24 percent

sources: SDGE - http://sdge.com/san-onofre-nuclear-generating-station; CAISO March 22-23, 2012 briefing on SDG&E summer 2012 - http://www.caiso.com/Documents/BriefingSummer2012OperationsPreparedness-Presentation-Mar2012.pdf, p. 3. CAISO OASIS database, SDG&E demand, Hour Ending (HE) 1700, 4,619 MW: http://oasis.caiso.com/mrtu-oasis/?doframe=true&serverurl=http%3a%2f%2ffrptp09%2eoa%2ecaiso%2ecom%3a8000&volume=OASIS

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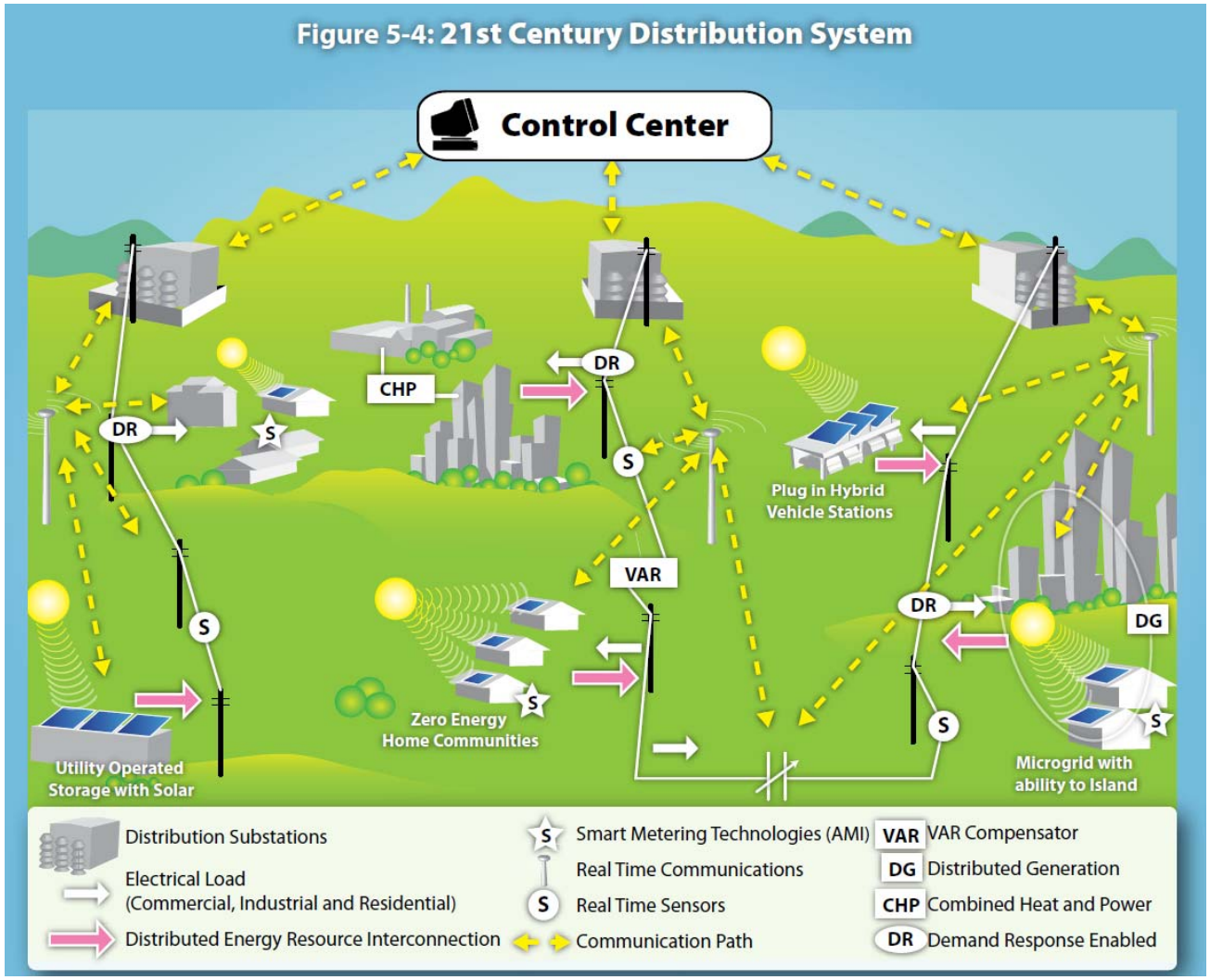
- Net imports are reduced only 80 MW, from 3,187 MW to 3,107 MW.
- Total supply available: 2,458 MW + 3,107 MW + 146 MW = 5,711 MW.
- Peak 1-hour demand in SDG&E in 2012, Sept. 14, 2012 = 4,619 MW
- 2012 SDG&E actual reserve margin at 1-hour peak, in a G-1 + N-1 condition w/o San Onofre, is 5,711 MW ÷ 4,619 MW = 24 percent.

California's state energy vision is local, local, local

source: CEC, *2007 Integrated Energy Policy Report,* December 2009, p. 155.



What is the state's plan? Joint Utility *Long-Term Energy Efficiency Strategic Plan* (2008, 2011 update)

source: http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/.

- Energy efficiency & demand response

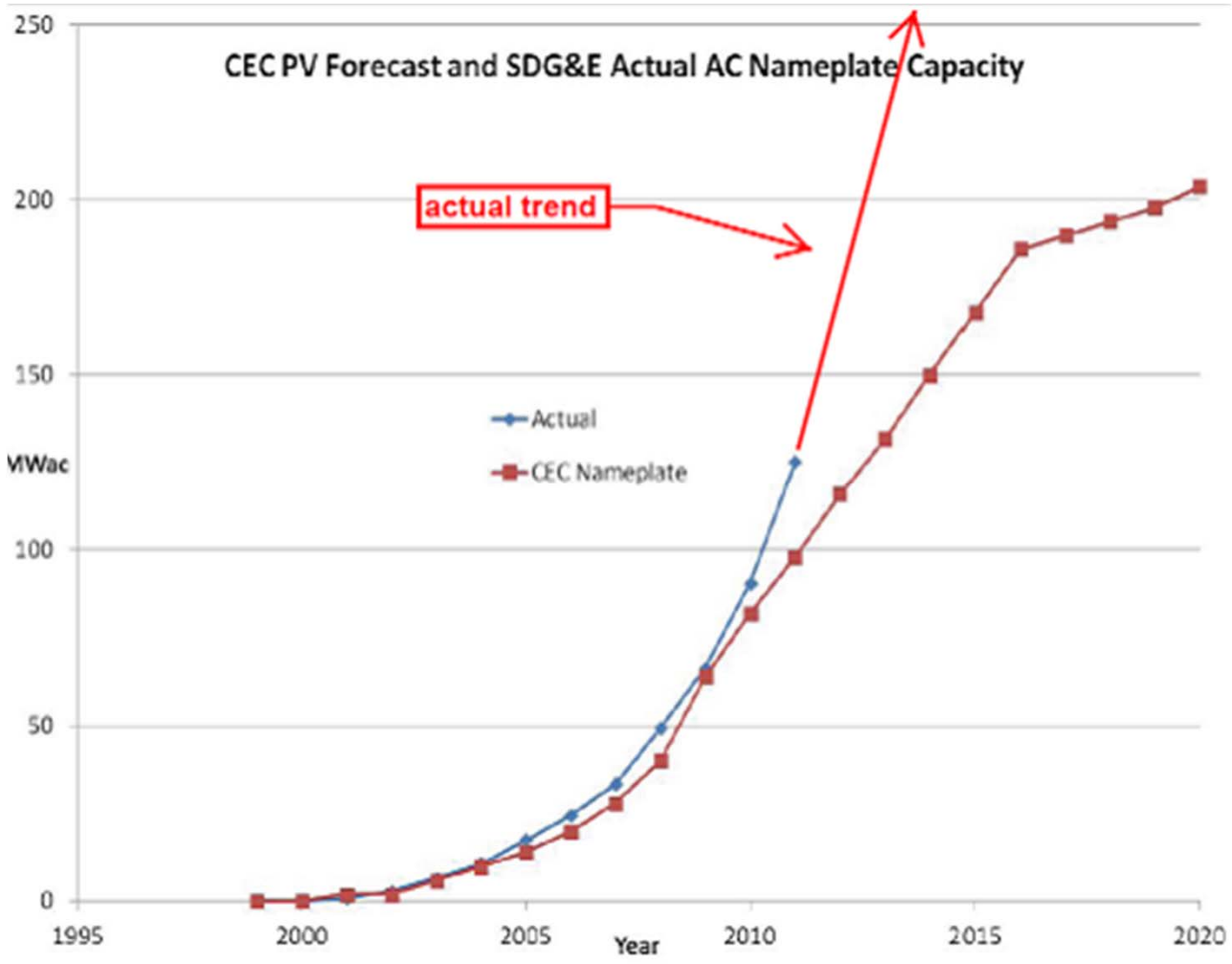
  ("net zero energy" buildings: energy efficiency + rooftop PV)
- All new residential homes net zero by 2020
- All new commercial buildings net zero by 2030
- 25% of existing residential ~ net zero by 2020
- 50% of existing commercial net zero by 2030
- 30 – 40% reduction in existing building electricity demand via energy efficiency measures
- Reduce air conditioning loads by 50% by 2020

Gov. Brown's Clean Energy Jobs Plan – local focus

source: http://www.jerrybrown.org/Clean_Energy;

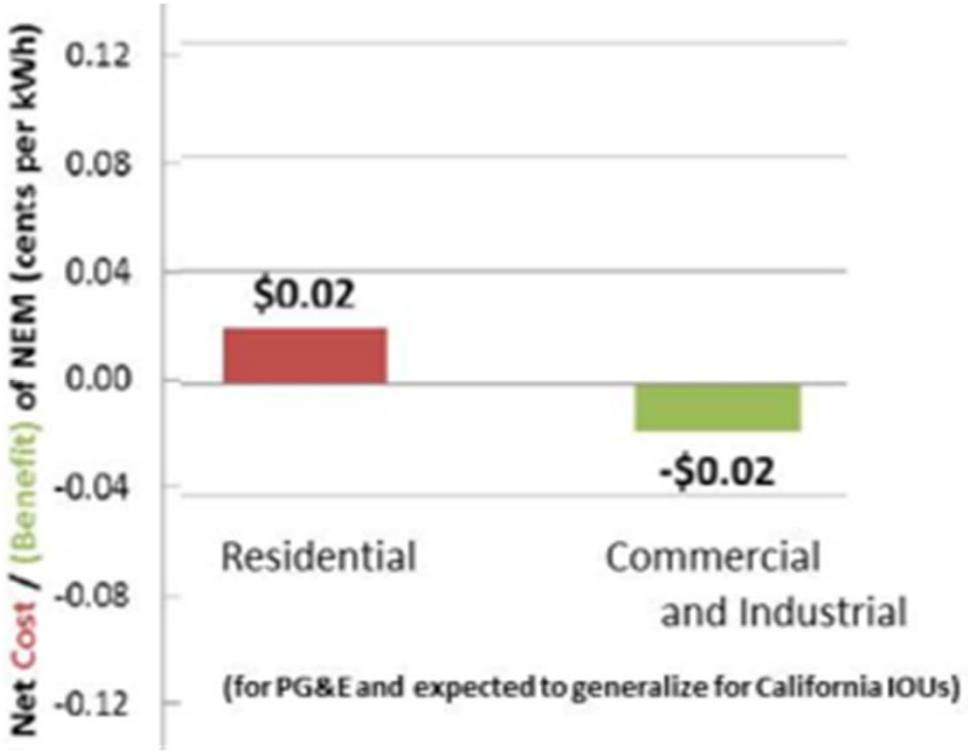
- 12,000 MW of new local renewable power by 2020, out of 20,000 MW target.
- 8,000 MW of new local solar is already set into state policy: GoSolar rooftop (3,000 MW), recent CPUC expansion of GoSolar rooftop (~2,000 MW), Renewable Auction Mechanism (1,000 MW), investor-owned utility PV (1,050 MW), Feed-In Tariff (750 MW).
- SDG&E "pro-rated" allotment of 12,000 MW of new local renewable power would be ~1,000 MW.
- There was about 120 MW of rooftop solar installed in SDG&E territory at the end of 2011.
- SDG&E territory needs to add ~900 MW of local renewable resources to stay on track with the Governor's 12,000 MW target, and at least that much rooftop solar to meet the 2020 goals of the *Energy Efficiency Strategic Plan*.

Rooftop solar growth in SDG&E territory would achieve ~1,000 MW by 2020 if not impeded by punitive tariffs & caps



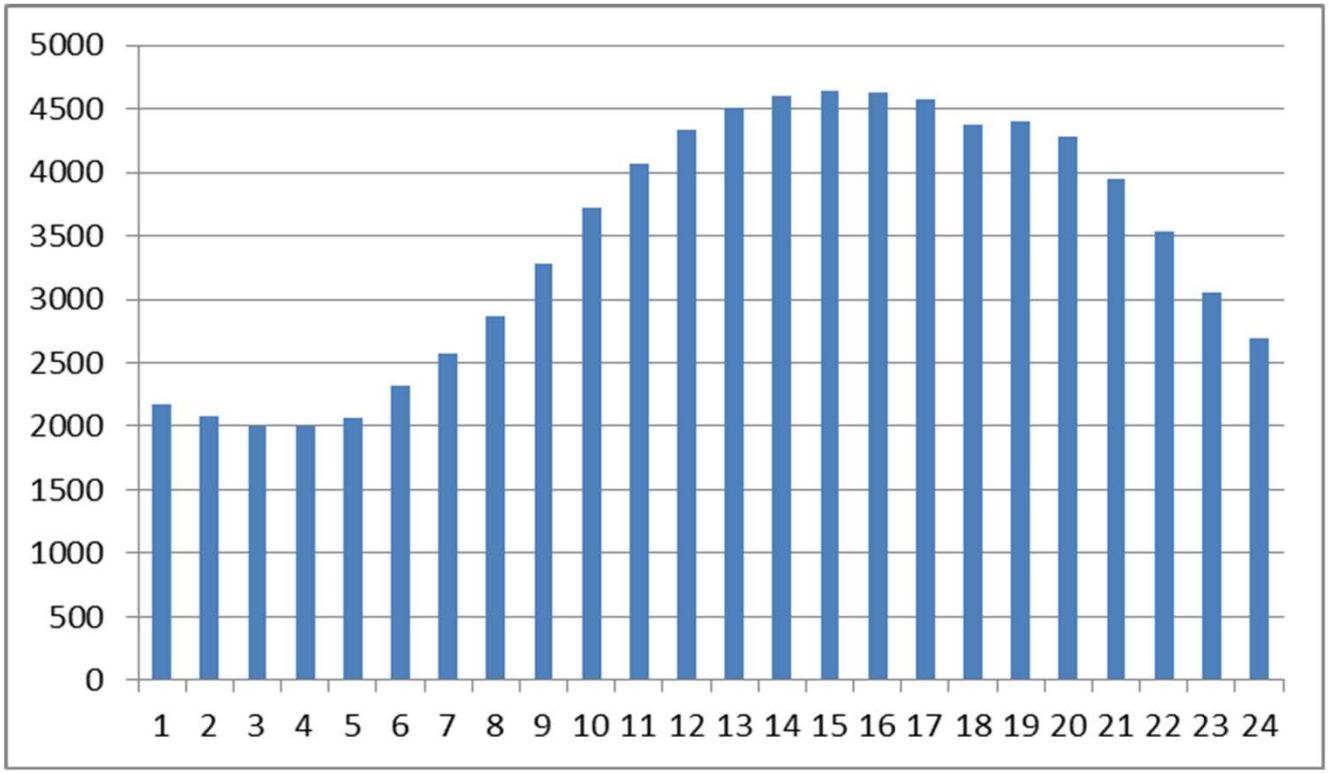
Net-metered rooftop solar imposed no net cost on ratepayers – in contrast Quail Brush capacity charges would be $30 million/yr, 20-year life-of-project would be $600 million

sources: CEC, *Comparative Costs of California Central Station Electricity Generation – Final Staff Report*, January 2010, Table B-4, p. B-5; Crossborder Energy, *Re-evaluating the Cost-Effectiveness of Net Energy Metering in California*, December 20, 2011.

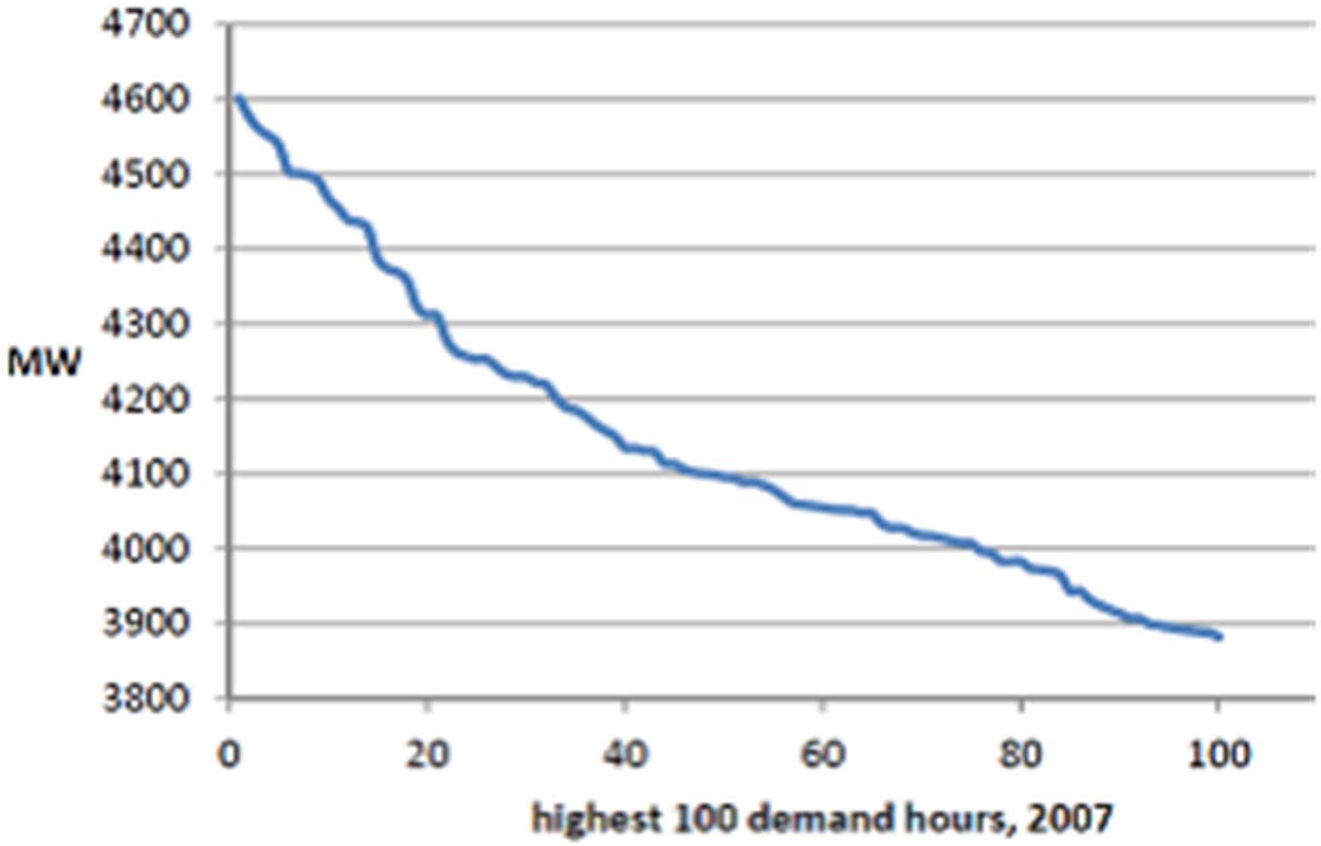


SDG&E already ramps at as much as 500 MW per hour – all local gas-fired generation can ramp quickly if necessary

source: CAISO OASIS, SDG&E actual September 27, 2010 (peak hour - HE 16 – in 2010)



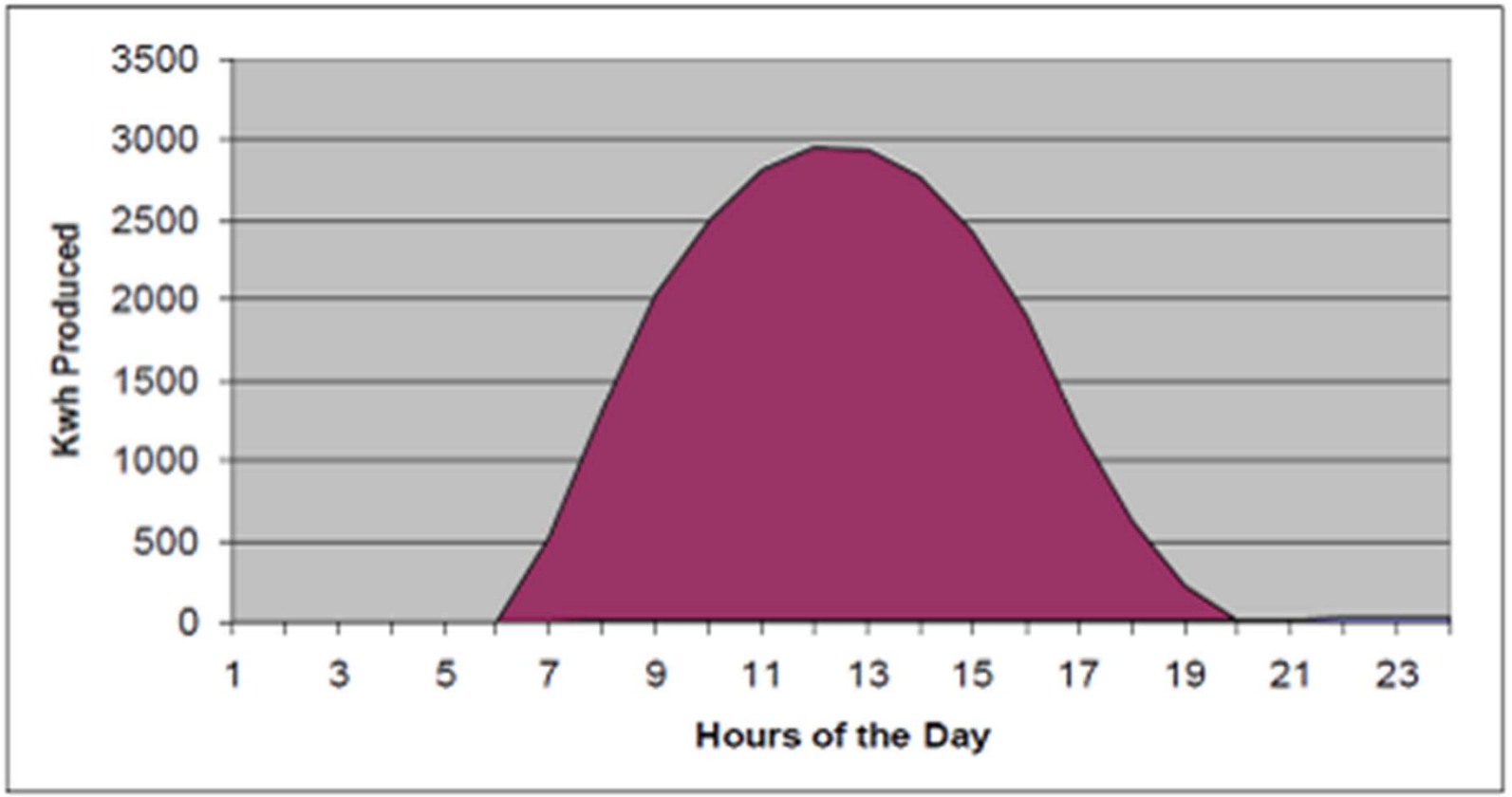
Demand declines rapidly in SDG&E territory across top 100 hours (source: CAISO OASIS System Load database)



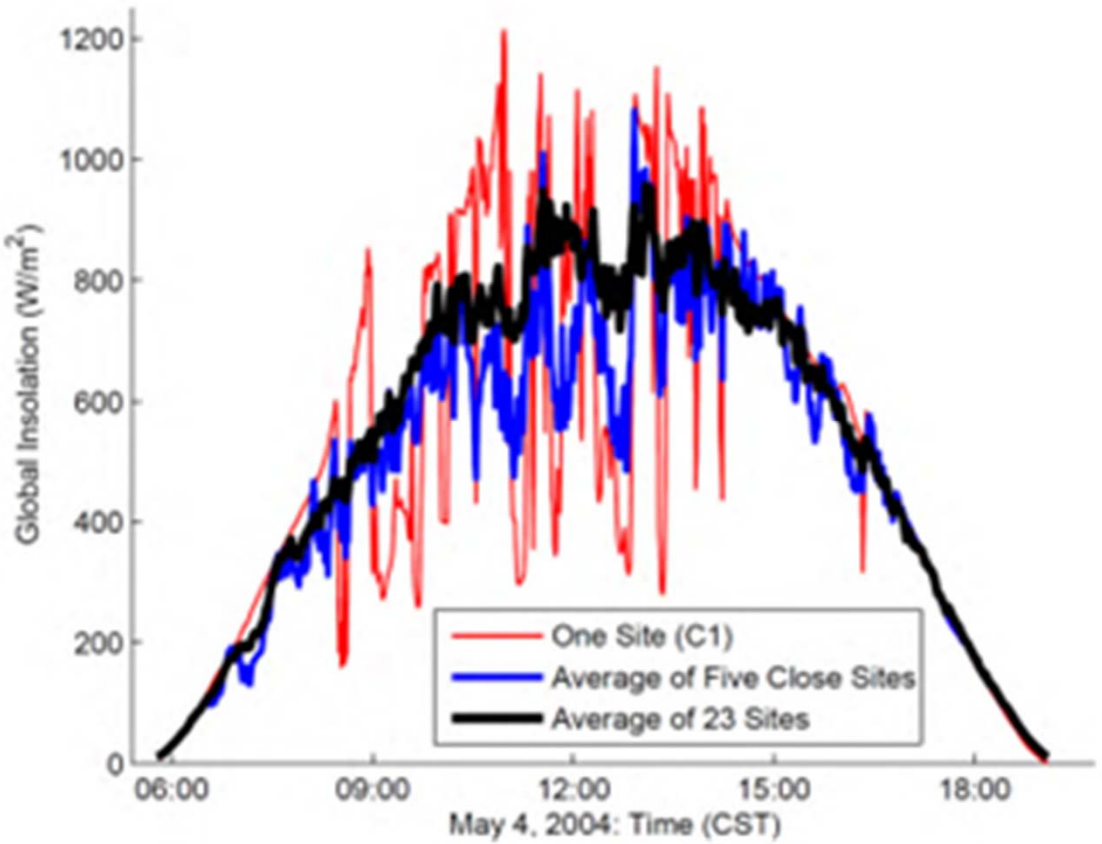
Solar resource availability in San Diego area is as good or better than unsubstantiated Pio Pico availability of 98%+

Demand hour range	Load Range (MW)	Average Solar Resource Availability (%)
Top 10 demand hours	4,468 – 4,601	98
Top 20 demand hours	4,312 – 4,601	99
Top 100 demand hours	3,883 – 4,601	99
Top 239 demand hours	3,500 – 4,601	99+

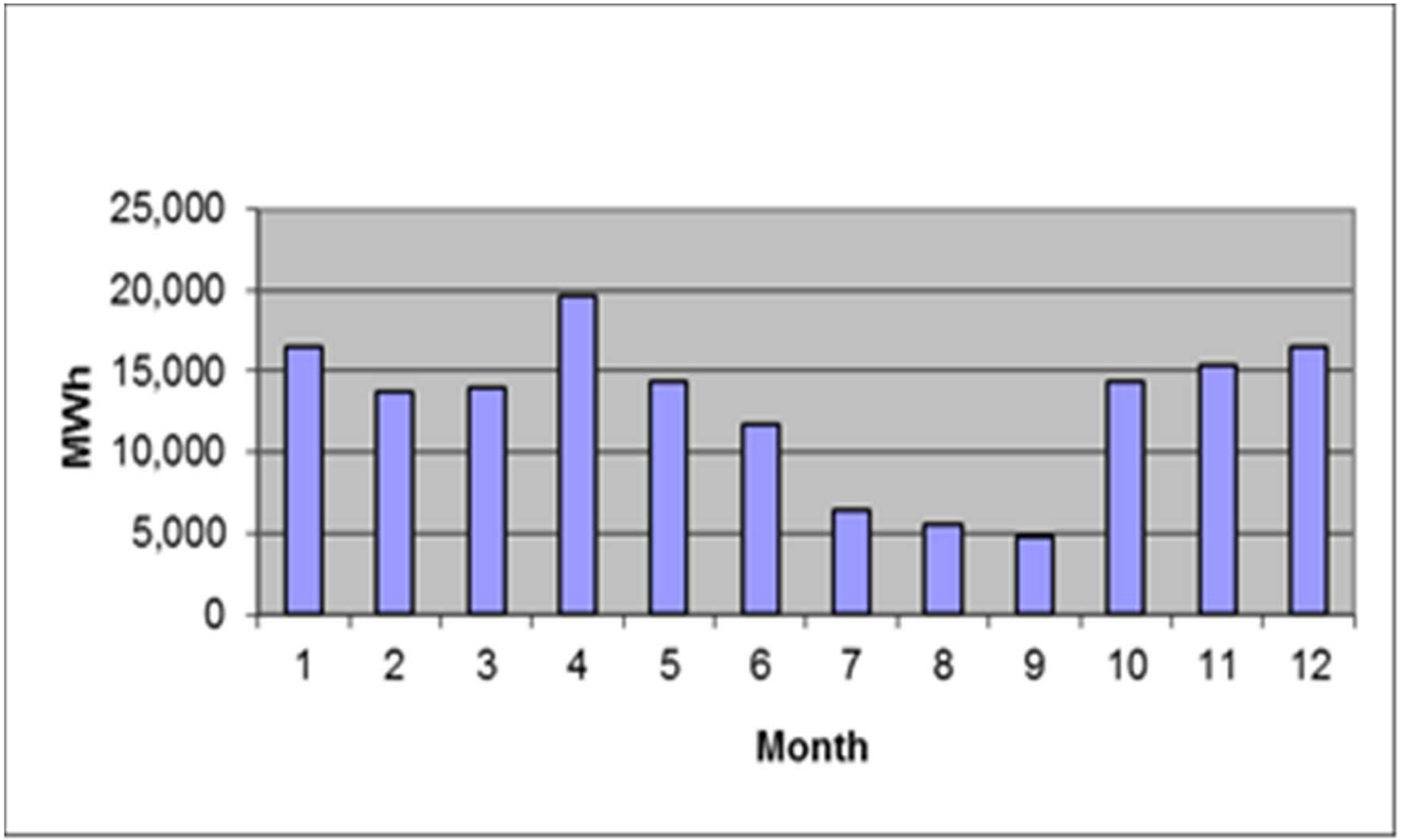
Rooftop solar output is very predictable on clear days – no fast-response ramping resources necessary



Distributed PV has predictable pattern on partly cloudy days. No fast-response ramping resources necessary. There are 15,000 PV sites in San Diego spread over 100s of square miles (graphic: LBNL)

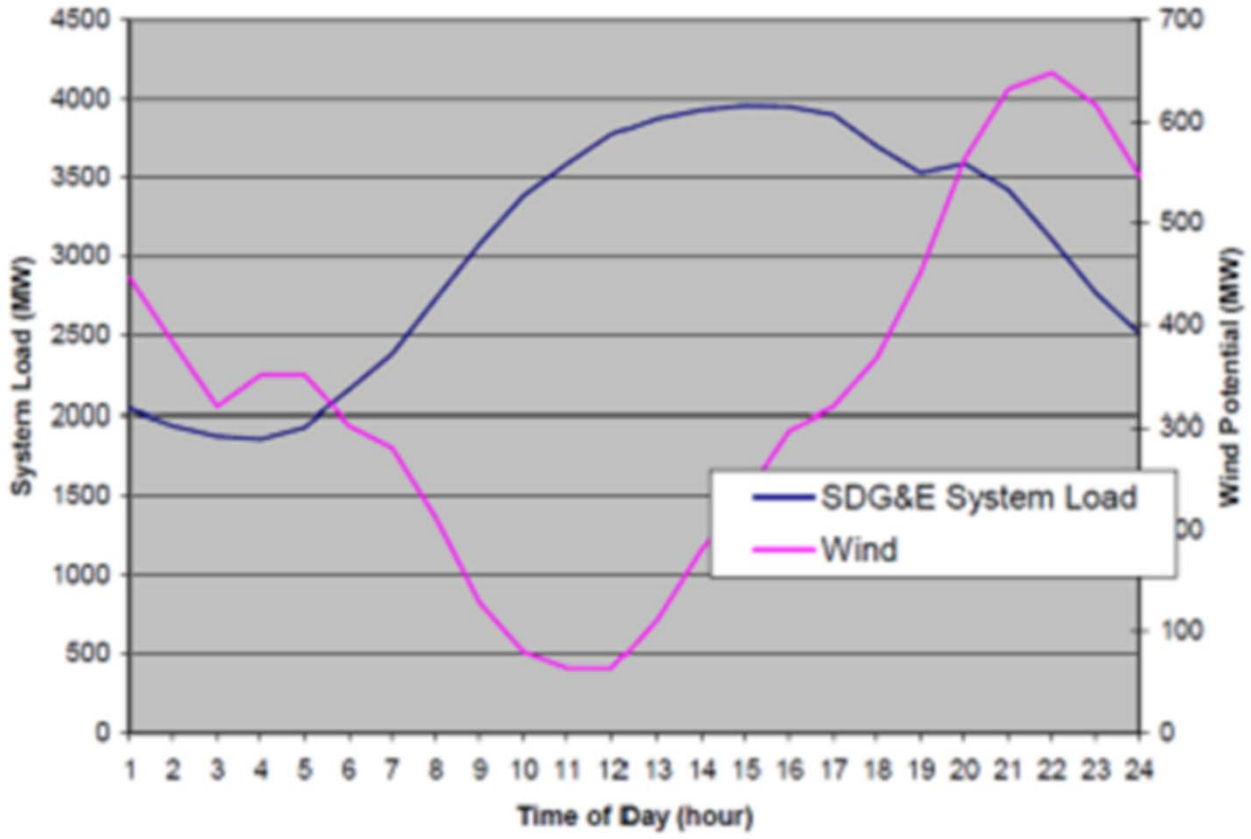


Wind resource is weak in San Diego County in the summer months – 50 MW Kumeyaay wind project output, 2008



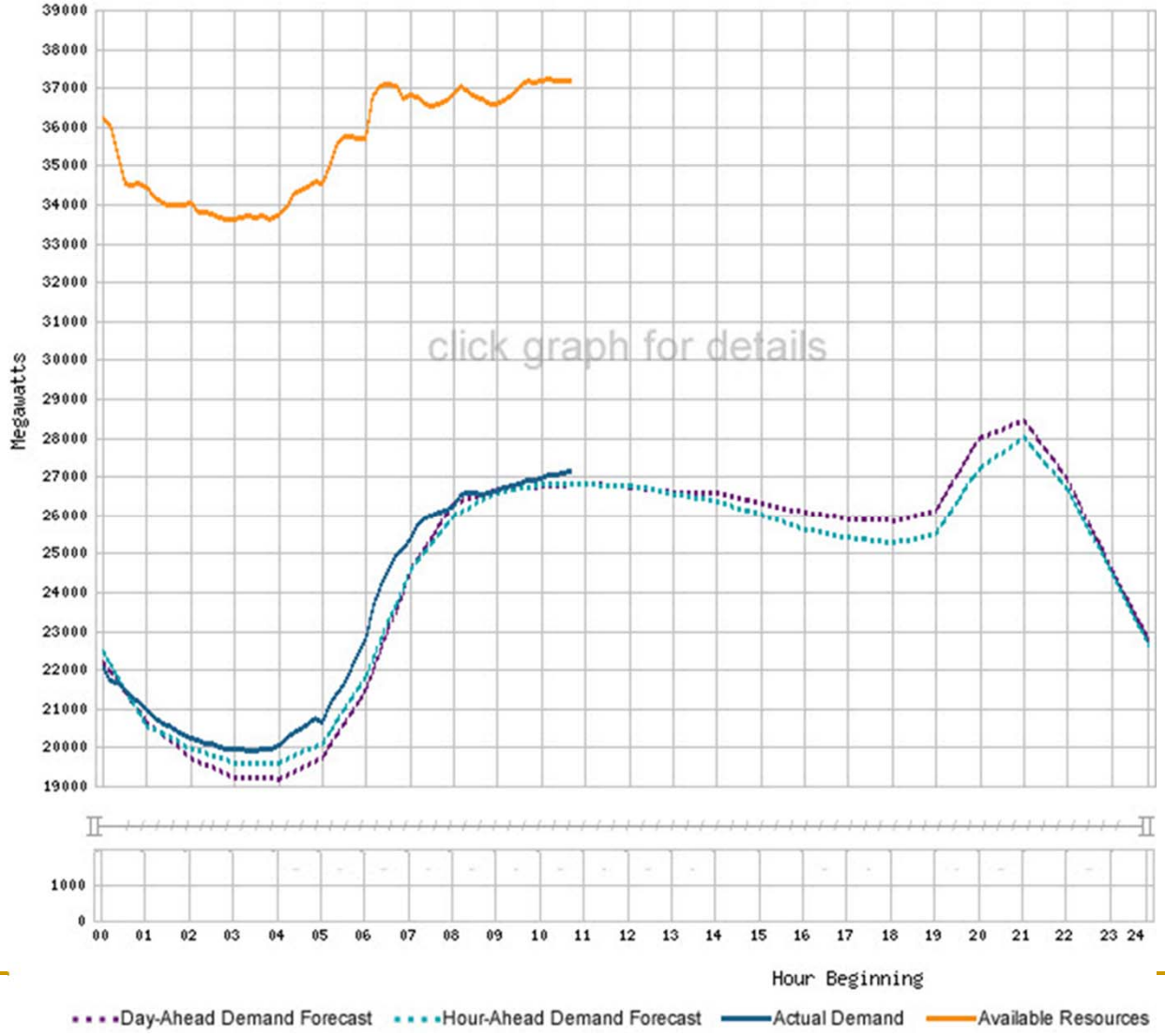
About 500 MW of regional wind in SDG&E PPA pipeline – even if entire 1,400 MW County technical potential developed, only 300 MW available at peak – yet 700 MW of existing peakers available to respond

source of 1,400 MW technical potential estimate: http://www.renewablesg.org/docs/Web/Wind.pdf.



CAISO prepares day-ahead and hour-ahead forecasts to ensure that sufficient generation is scheduled for the expected demand in SDG&E territory

source, CAISO Today's Outlook, July 22, 2012: http://www.caiso.com/Pages/AboutTodaysOutlook.aspx.



California already has ~6,500 MW of wind and solar installed – no brownouts/blackouts reported due to lack of fast start ramping resources

sources: *AWEA U.S. Wind Industry Q1 2012 Market Report*; KCET, *California keeps breaking solar records*, July 11, 2012: http://www.kcet.org/news/rewire/solar/california-keeps-breaking-solar-records.html.

Resource type	MW installed, April 2012 (wind) and July 2012 (solar)
Wind	4,287
Utility-scale solar	971
Net-metered solar	1,255

NREL: 35 percent RPS feasible in West with little new gas-fired generation (source: National Renewable Energy Laboratory , *Western Wind and Solar Integration Study* , May 2010)

- Study examines challenges of integrating sufficient wind and solar into the grid to produce 35 percent renewable energy by 2017.
- NREL determined that utilities will have to substantially increase their coordination of operations over wider geographic areas and schedule their generation on a more frequent basis to accomplish 35 percent.
- Currently generators provide a schedule for a specific amount of power they will provide in the next hour.
- More frequent scheduling would allow generators to adjust that amount of power based on changes in system conditions such as increases or decreases in wind or solar generation.
- Coordinating the operations of utilities can provide substantial savings by reducing need for new back-up generation, such as gas-fired plants.
- Use of wind and solar forecasts in utility operations to predict when and where it will be windy and sunny is essential for cost-effectively integrating these renewable energy sources.

CEC [May 9, 2011 hearing] has already identified relatively poor wind and solar forecasting in California as problem – Germany has put in 10× the renewable energy capacity and avoided building new generation of peaker plants by improving wind and solar resource forecasting

RMSE Renewables Forecast Error	Germany, Spain[2]	California[1]
Day-Ahead	< 5%	< 15%
1 Hour-Ahead	1.5%	<10%

Property Assessed Clean Energy (PACE) assessments – mechanism to create sustainable energy efficiency and PV markets – these markets drive local green jobs

- PACE assessments for energy efficiency and PV repaid along with property tax payments – low interest funds supplies by city revolving fund or private capital.
- Reduced electric bill with no out-of-pocket expense
- Assessment funds can be used for:
  - rooftop solar PV
  - energy efficient windows, doors and skylights
  - tankless water heating equipment
  - white-roofs and coatings
  - air conditioning and ventilation systems

Commercial PACE booming in some cities, residential PACE focused on homes with no mortgage

- Pioneered in Berkeley using city revolving fund.
- Federal Housing Finance Administration stalled PACE with misinterpretation of “assessment.” Federal legislation introduced to address concerns with residential PACE – “PACE Assessment Protection Act of 2011, HR 2599”.
- Sonoma County has maintained strong uninterrupted residential and commercial PACE programs despite federal misinterpretation.
- $100 million commercial building PACE program underway in Sacramento based on Sonoma County model, similar program could be launched in San Diego or other California cities in as little as 12 months.

Green jobs are driven by markets for green services/products – PACE assessments can create large, sustainable markets

- PACE approach eliminates major hurdle – upfront costs.
- Recent studies (UCLA, LBNL) indicate assessed home value increases by more than the value of the solar PV system the moment the system is installed.
- PACE assessments provide near-term avenue for high urban market growth in energy efficiency and PV
- Fair tariffs for PV is another proven avenue for establishing a dynamic urban PV market, though California officials reluctant to establish adequate pricing.

Communities select their own electric generation supply – Community Choice Aggregation

- Community Choice Aggregation (CCA) law passed in 2002 as alternative to investor-owned utility electric supply.
- Cities and counties can select/develop electric generation sources.
- Provides more local control, choice to pursue more ambitious renewable energy targets, access to low cost public finance funds.
- Marin Clean Energy (2010) first operational CCA in state (http://marincleanenergy.info/)
- San Francisco launching pilot CCA, CleanPowerSF (http://cleanpowersf.org/)

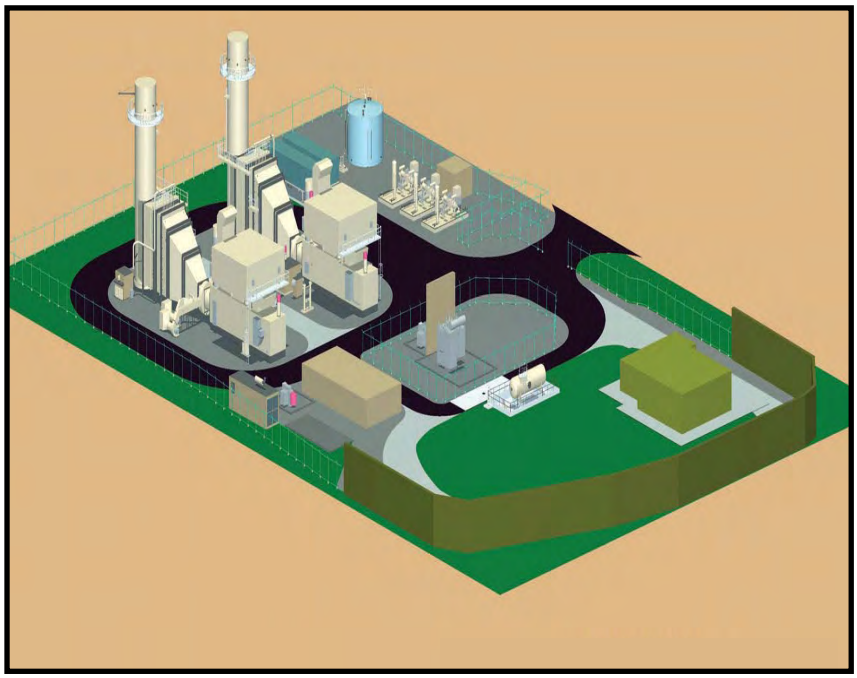
Conclusion

- Local solar can meet the same need at less cost with no emissions and no land use compromises. Quail Brush is an obsolete solution in the 21st century.

CALIFORNIA
ENERGY
COMMISSION

CHULA VISTA ENERGY UPGRADE PROJECT

Application For Certification (07-AFC-4)
San Diego County



FINAL COMMISSION DECISION

JUNE 2009
(07-AFC-4)
CEC-800-2009-001-CMF

expected growth in electricity needs, a significant amount of aging existing capacity will need to be replaced in the next ten to fifteen years. Both new generation and new transmission facilities will be needed in the immediate future and beyond in order to maintain adequate supplies.

2. Renewable Resources

Applicant and Staff compared various alternative technologies such as solar, wind, and biomass with the proposed project. There are no geothermal resources in the project vicinity and the region lacks water sources for hydroelectric power.

Both solar and wind generation have little or no air pollutant emissions and visible plumes. In the case of biomass, however, emissions can be substantially greater. Central station solar and wind resources require large land areas in order to generate 100 MW of electricity. Specifically, central receiver solar thermal projects require approximately five acres per MW; 100 MW would require approximately 500 acres, or 50 to 100 times the amount of land area taken by the proposed CVEUP facility. Parabolic trough solar thermal technology requires similar acreage per MW. Wind generation generally requires about 4.5 acres per MW; about 450 acres would be needed to generate 100 MW although in some cases this land can also be used for agricultural purposes in addition to wind generation. It is unlikely that this amount of acreage, and specifically acreage that offers the specific needs of these renewable resources would be available in the project area. The need for extensive acreage would also add to the complexities of local discretionary actions for land use modifications.

The Applicant effectively eliminated photovoltaic (PV) generation from its alternatives analysis when it stated that it did "not meet the project objective of utilizing natural gas available from the existing transmission system." (Ex. 1, p. 6-13.) This is another example of a too-narrow project objective artificially limiting the range of potential alternatives. Requiring the use of natural gas as a project objective eliminates consideration of alternative fuel sources. Bill Powers, P.E., an engineer with over 25 years of experience in the energy field, testified that it may be feasible to install PV on rooftops and over parking lots in a quantity sufficient to meet or exceed the project's incremental increase in output. (Ex. 616, pp. 11- 14.) According to the FSA, rooftop PV would consume 4 acres per MW and for that reason is infeasible. (Ex. 200, p. 6-13.) We are unpersuaded by this evidence. Photovoltaic arrays mounted on existing flat warehouse roofs or on top of vehicle shelters in parking lots do not consume any acreage. The warehouses and parking lots continue to perform those functions with the PV in

place. (Ex. 616, p. 11.) Mr. Powers provided detailed analysis of the costs of such PV, concluding that there was little or no difference between the cost of energy provided by a project such as the CVEUP compared with the cost of energy provided by PV. (Ex. 616, pp. 13 – 14.) In addition, while PV is not a quick-start technology which can be dispatched on ten minutes' notice any time of the day or night, PV does provide power at a time when demand is likely to be high—on hot, sunny days. Mr. Powers acknowledged on cross-examination that the solar peak does not match the demand peak, but testified that storage technologies exist which could be used to manage this. The essential points in Mr. Powers' testimony about the costs and practicality of PV were uncontroverted.

If new biomass technology is developed in the near future, increased energy production could come from the Otay Landfill and other landfills in the area, limiting the necessity for power from base-load power plants. Nonetheless, such technology is not currently available and thus cannot be considered a potentially viable alternative generation technology in this case. Thus, based upon the evidence of record, we find that, at this time, geothermal, hydroelectric, wind or biomass technologies do not present feasible alternatives to the proposed project.

We find the analysis of the PV alternative is insufficient to comply with the requirements of the California Environmental Quality Act, the Warren-Alquist Act, and their respective regulations. In the event the Applicant chooses to pursue this matter further, we will require a more in-depth analysis of the PV alternative by both Staff and Applicant.

b. The "No Project" Alternative

The "no project" alternative under CEQA assumes that the project is not constructed. In the CEQA analysis, the "no project" alternative is compared to the proposed project and determined to be superior, equivalent, or inferior to it. The CEQA Guidelines state that "the purpose of describing and analyzing a No Project Alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project" [CEQA Guidelines, § 15126.6(i).] Toward that end, the "no project" analysis considers "existing conditions" and "what would be reasonably expected to occur in the foreseeable future if the project were not approved…" [§ 15126.6(e)(2).] CEQA Guidelines and Energy Commission regulations require consideration of the "no project" alternative. The "no project" alternative also

Fact Sheet: Why Quail Brush Is Not Needed

SDG&E is proposing to contract for 450 MW of new peaking power plants, including the 100 MW Quail Brush plant. SDG&E states this capacity is needed to address a projected gap in local capacity on hot days and to ramp quickly to "fill in the gaps" for intermittent solar and wind output. Here are the facts about SDG&E's claims:

- SDG&E's peak load growth has been static for seven years, from 4,601 in 2006 to 4,643 MW in 2010 to 4,619 MW in 2012. In other years the peak load has been well below 4,600 MW. Claims by SDG&E/Cogentrix that peak load is rising are wrong.
- SDG&E has ample power generation reserves without San Onofre. SDG&E is required to maintain some reserve generation to assure grid reliability at peak demand. The requirement is 15 to 17 percent. SDG&E had reserves of about 24 percent during the hottest hour of the year on Sept.14, 2012.
- San Diego County has a rooftop and parking lot solar potential of approximately 7,000 MW, far more than the peak load in SDG&E territory. To date only about 2 percent, 140 MW, of this capacity is being utilized. Local rooftop and parking lot solar is obvious alternative to new peaking power generation.
- The local solar resource is 98 percent available during the top 100 hours of demand. The CEC projects a reciprocating engine plant like Quail Brush will achieve 94 to 98 percent availability.
- The California Energy Commission (CEC) has already approved 850 MW of new gas-fired power plants for San Diego County in 2012, 550 MW Carlsbad Energy Center (June 2012) and 300 MW Pio Pico (September 2012). The CEC approves projects without any consideration of whether they are needed or not.
- The CEC rejected a gas-fired peaker plant planned for Chula Vista in 2009, the 100 MW Chula Vista Energy Upgrade Project, justified as necessary for peaking and fast ramp duty (just as Quail Brush is), for violating local ordinances. The CEC also stated that rooftop solar is a potentially viable alternative available at comparable cost to the peaker plant (pp. 29-30): http://www.energy.ca.gov/2009publications/CEC-800-2009-001/CEC-800-2009-001-CMF.PDF
- The CEC rejected in 2008 the Eastshore reciprocating engine peaker plant in the Bay Area, that was to use the same engines proposed for Quail Brush, for non-compliance w/local ordinances: http://www.energy.ca.gov/2008publications/CEC-800-2008-004/CEC-800-2008-004-CMF.PDF
- SDG&E is attempting to force the retirement of fully functional local power plants owned to create a need for the new peaking units. These plants include NRG's 964 MW Encina Power Plant (Carlsbad), and nearly 200 MW of existing NRG peaker gas turbines. Encina can be retrofit to cooling towers to meet OTC requirements at 1/10th the cost of a new peaker plant.
- Peaking power plants do not create anywhere near the permanent job growth of rooftop and parking lot solar. Cogentrix says Quail Brush will create 11 permanent jobs. The state of California estimates about 150 permanent jobs are created for each 100 MW of local solar added (Air Resources Board, June 2010).
- Peaking power plants are not a deal for SDG&E ratepayers. The initial capital cost of Quail Brush will be $150 million. The amortized cost over 20 years, in current dollars, will be ~$600 million according to the California Energy Commission. This cost, which will be shifted to ratepayers, will translate into higher electricity bills.