August 29, 2007

California Energy Commission
Dockets Office
RE: Docket No. 07-SB-1
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Comments of the California Center for Sustainable Energy on Senate Bill 1 Eligibility Requirements Staff Report

On August 22, 2007, the California Energy Commission's (CEC's) Renewables Committee conducted a workshop to receive comments on the Energy Commission Staff Report *Eligibility Criteria and Conditions for Incentives for Solar Energy Systems Senate Bill 1* (Staff Report). The California Center for Sustainable Energy (CCSE), formerly known as the San Diego Regional Energy Office (SDREO), appreciates the diligent work of CEC Staff and the creative ideas presented in the Staff Report. CCSE is pleased to provide post-workshop *Comments on Senate Bill 1 Eligibility Requirements Staff Report* pertaining to the following issues:

- Energy Efficiency Requirements
- Expected Performance-Based Incentives (EPBI) and Time Dependent Valuation (TDV)
- Shading

Energy Efficiency Requirements

CCSE fully embraces the energy efficiency goals of SB 1 and the state's approved preferred loading order for the procurement of energy infrastructure in the state. Both are excellent principles to promote long-term sustainable energy. We also believe that the CEC's stated intent to pursue the zero energy home concept is extremely exciting.

At the same time, the state has set ambitious goals for reductions in greenhouse gas emissions that require aggressive planning and execution on multiple fronts; CCSE believes that all options that can help achieve these goals must be on the table at once, and implemented in parallel. As a CSI PA, CCSE is concerned that imposing relatively stringent energy efficiency requirements as a prerequisite to participation in solar incentive programs may hamper the rapid deployment of solar. At the same time, as an implementer of utility energy efficiency programs and promoter of clean energy solutions more generally, we understand that a wide variety of programs, approaches and incentives are available to promote energy efficiency among the utilities' various customer segments.

Program Audiences and Behavior

In principle, we agree that most rational, engineering-economic approaches would indicate that energy efficiency be exploited as a matter of course, prior to installing solar. We would make three points here. First, energy efficiency and renewables, including solar, are different product areas with distinct attributes that motivate the adoption decision in unique and independent ways, and will thus appeal to different audiences. These audiences may show significant overlap, but it is by no means a given that anyone interested in acquiring solar will be an easy sell for energy efficiency within the same timeframe or project context. Even quite rational business decision makers may choose with good reason to sequence projects in some way other than that proposed for participation in the CSI. Second, some market sectors—particularly significant portions of the residential—do not necessarily operate under a rational approach. A suite of tactics is necessary to enable the adoption decision, and while one of these tactics may well be to package efficiency upgrades with solar installation, there are many others. Third, the public goods attributes of energy efficiency exist independent of whether measures are installed in a residence that is also a candidate for solar power.

In sum, we believe that embracing the market in order to influence it requires finding some middle ground in this "linkage" debate. Staff recommends that in order to understand this issue properly, the California Public Utilities Commission (CPUC) sponsor a study of the impact of the current online audit requirement for CSI participation. This study would determine what energy efficiency measures have been installed by CSI applicants.[1] We support this initiative and, pending its precise outcome, would be enthusiastic to develop activities complementary to the CSI that explicitly highlight and leverage the CSI audit activity to increase deployment of energy efficiency measures.

Market transformation goals

The CSI was designed to be a solar market transformation program. In order to meet the goals of the CSI and create a mainstream market for solar, we estimate that installed costs will have to come down a minimum of 50%, and likely more, by 2017. Adding new program requirements creates barriers that decrease participation in the program and can reasonably be expected to impede the volume-based cost reductions on which the CSI goals are predicated. CCSE recommends that meeting energy efficiency standards and installation of solar be concurrent activities, rather than requiring energy efficiency measures to be installed as a condition of eligibility for solar incentives.

Benchmarking

The Staff proposal posits that benchmarking and targeting might be utilized to make decisions about the energy efficiency requirements to be applied to a given home or business. Use of a new tool will require additional steps, stakeholders and expense to what is already by many accounts a complex application process. In response to vociferous requests by various stakeholder groups, the CSI has been moving in the direction of *reducing* program requirements. The CPUC is currently considering changes

[1] California Energy Commission, Staff Report, *Eligibility Criteria and Conditions for Incentives for Solar Energy Systems Senate Bill 1*, August 2007, page 40.

to the CSI Handbook that eliminate some requirements in an effort to streamline the application process. One of these proposed changes is to eliminate the requirement that applicants justify actual site load for any system under 5kW; the effort to obtain and process consumption information, and then match it to the proposed system, was greater than the program savings from eliminating system oversizing. Implementing a protocol for home rating or benchmarking would move the program relatively far in the other direction.

Benchmarking has indeed been a useful tool for comparison of industrial and commercial facilities as well homes to detect outliers that are ripe for improvement. It is worth pointing out that benchmarking generally groups similar facilities for comparison—e.g. dairy processing facilities, or homes built between 1920 and 1945 with a square footage of between 2000 and 3000—rather than, for example, all industrial plants or all homes. Such an approach allows more useful comparison that might result in actionable recommendations appropriate for that particular group. If a benchmarking approach were to be adopted, use of simple quartiles may produce perverse or unfair outcomes.

Funding issues

Finally, we note that implementing efficiency requirements will necessitate additional due diligence and cost on the part of the CSI program administrators (PAs) and other participants in the process. For example, the benchmarking assessment, including gathering of data particular to the site, information on the number and situation of people living in the home, etc., entails a contract with a HERS rater or the like and incurs significant monetary cost. Further, compliance with any mandated requirements must be verified and documented. The CSI PA would track all developments in order to verify site eligibility for the CSI, and may logically deliver cost-effective energy efficiency services to the customer. Some of these costs may be covered by Public Goods Charge (PGC) funds collected by the utilities for energy efficiency programs, but it is unlikely that all would be covered.

As a CSI PA responsible for facilitating and enforcing compliance with the program's requirements, and for ensuring that CSI installation goals are reached, CCSE expects to integrally involved in the development of the processes and requirements for the program's energy efficiency component. CCSE and the other PAs will likely have to provide substantial proactive technical support on the energy efficiency side in order to maintain a robust project pipeline. If these activities are to be funded with Public Goods monies, and thus fit within the energy efficiency portfolio, they must achieve verifiable savings and meet certain cost-effectiveness criteria. Additionally, in the evolving context of efficiency program planning, a funding allocation to CSI energy efficiency activities would need to be coordinated within any risk/reward mechanism that may be applied for future energy efficiency program cycles. We look forward to continued discussions with both the Energy Commission and the CPUC on this topic.

As the California Solar Initiative (CSI) Program Administrator (PA) for the San Diego region, CCSE recognizes that our program region is unique. The San Diego region boasts abundant sunshine, making our region ideal for installation of high-performing solar energy systems that will help meet the State's renewable energy installation goals. At the same time, it is important to note that attitudes and lifestyles differ across the state in substantive ways. Flexibility and adaptation to the particulars of each region will permit appropriate implementation of both solar and energy efficiency.

Expected Performance Based Incentives (EPBI) and Time Dependent Valuation (TDV)

CCSE supports the Staff recommendation to include hourly production values to determine expected system performance for calculation of Expected Performance Based Incentives (EPBI) in accordance with SB 1.[2] Further, we support the Staff

[2] id. at page v.

recommendation to use Time Dependent Valuation (TDV) multipliers to weight the hourly kWh system performance to account for time-of use (TOU) production.[3]

Starting in 2009, prospective CSI participants will again need to grapple with the application of TOU rates. Any calculator used to estimate system performance at that point must be able to provide accurate results within a TOU environment. The current Expected Performance-Based Buydown (EPBB) calculator exists to provide system performance information. However, in a TOU environment the EPBB incentive may not accurately reflect the actual situation. Currently, for example, it is possible for an east-facing system to receive an incentive similar to a south- or west-facing system. Application of a typical TOU rate, however, would significantly favor the south- or west-facing system. The performance calculator must be capable of ensuring that qualification for the maximum incentive reflects a corresponding optimal system design.

The impact of shading is also important to understand within a TOU framework. Currently, the calculator does not distinguish a loss, for example, of 10% of on-peak production versus 10% of off-peak production. In a non-TOU setup, this is sufficient as both the customer economic impact is blind to the time of production. With TOU, however, on-peak shade impacts are magnified and must be accurately accounted by the calculator.

Finally, solving the technical problem of properly modeling systems and assigning incentive amounts will be a moot point if the marketplace itself is confused. Education of the customer and other participants is key for making any "EPBx" tool understandable and operational within the context of the program. None of the proposed tools provide the benefit of an intuitive result for the majority of users. CCSE believes it is the role of the CSI PAs to help customers make informed decisions

[3] Id. Note: We support the shift towards TDV for compliance with SB 1 in principle only because the current tool is unable to do this.

regarding the CSI program. Training funds must be devoted to ensuring the tools adopted for the CSI program do not become barriers to participation.

Shading

CCSE agrees with the Staff recommendation to "encourage a purposeful avoidance of shading...."[4] However, CCSE has concerns about the shade methodology proposed within the Staff Report as it is not appropriate for broad application in the CSI, specifically due to the larger systems (up to 100kW for EPBB and up to 1MW for PBI) covered under the CSI program. This conclusion is based upon what we believe are two fundamental assumptions of the CEC methodology: 1) that any amount of shade present on the array shuts down the entire array; and 2) that measurements are taken from the closest point of the array to the shade object.

1) Any amount of shade present on the array shuts down the entire array.

When working with smaller system sizes[5] , an individual system is more likely to be closer to using the minimum number of panels per string required by the inverter to operate. Depending on the layout of the system and the panels being shaded, losing just a few panels due to shade could bring the entire array's output to zero. This is because the inverter will be receiving input from fewer than the minimum number of panels necessary for the inverter to produce any output. Thus, when viewed with the smaller system in mind, the loss of even one panel might genuinely halt the production of an entire array.

When applying this same logic to larger systems, the approach results in greatly exaggerated impacts. Larger systems can continue to produce when losing fully half their strings to shading. Systems of greater than 100kW can cover areas of over 13,000 square feet, and are not likely to be impacted severely by even relatively large shading obstructions.

[4] id.
[5] New construction residential projects are typically smaller than retrofit residential projects and certainly smaller than the largest CSI commercial projects.

2) Measurements are taken from the closest point of the array to the shade object.

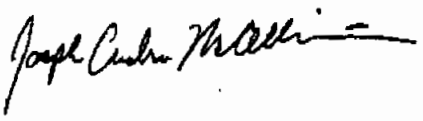
The proposed methodology also seems to break down when measuring shade impacts for larger systems. A 2kW sample system covers approximately 200 square feet. Measurements are taken are from the nearest point on the array to the shade object, and then recorded from that point using 22.5 degree increments. This works reasonably well with small array sizes because the presence of multiple shade objects with the same azimuth relative to the array is not likely. However, using this same methodology on larger arrays presents several inconsistencies. For example, a 30kW, 200 panel system covers an area of 3,000 square feet. Given the much larger footprint, the presence of several shade objects with the same azimuth between each shade object and its respective closest point on the array is likely. Because neither calculator relies upon 3-D CAD quality drawings indicating true spatial relationships between the shade objects and the array, this recommendation presents either an input problem, i.e., how to input three like objects with the same azimuth relative to the array, or an output problem, i.e., the calculator providing a level of performance and incentive as if only one object is present when clearly there are three. This challenge of taking azimuth readings relative to a point on the array becomes even more unwieldy and problematic when looking at the very large arrays of 100+kW systems.

A possible solution for larger systems would be to take the shade impacts for each string. However, an estimate taken for each string is cumbersome and the results of the estimate may not be any better than current CSI methodology for purposes of estimating productivity and thus assigning an incentive amount. Another possible solution is to modify the existing methodology to require additional shade impact measurements to be taken, rather than just those taken at the major corners. The additional readings could then be averaged with the corner measurements, providing an additional level of accuracy that would be more scalable to large systems.

Conclusion

CCSE appreciates the opportunity to contribute these post-workshop *Comments on Senate Bill 1 Eligibility Requirements Staff Report.* CCSE looks forward to working within the energy efficiency portfolio for our region and with other regional stakeholders, particularly municipalities, to vigorously promote both the solar energy system deployment and energy efficiency goals of SB 1.

Sincerely,



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