



California Energy Commission

DOCKETED
07-SB-1

TN 71240

JUN 12 2013

June 12, 2013

Via Electronic Mail

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 07-SB-1
1516 Ninth Street
Sacramento, CA 95814-5512
docket@energy.ca.gov

RE: Cost-Effectiveness of Rooftop Photovoltaic Systems for Consideration in California's Building Energy Efficiency Standards

Thank you for the opportunity to comment on the May 2013 draft consultant report, *Cost-Effectiveness of Rooftop Photovoltaic Systems for Consideration in California's Building Energy Efficiency Standards* ("Draft Report"). These comments are submitted on behalf of Sierra Club California. Sierra Club California is the state regulatory and legislative advocacy arm of Sierra Club, a non-profit public benefit corporation with over 600,000 members nationwide, and more than 140,000 members living in California. Our mission includes promotion of the responsible use of the earth's ecosystems and resources, and education of the public about the need to protect and restore the quality of the natural and human environment. Sierra Club advocates on behalf of its members for clean, renewable energy to reduce air pollution, water pollution, and the effects of climate disruption resulting from fossil fuel extraction and combustion. Sierra Club works to pass laws and develop regulations needed to decarbonize California's economy and achieve and strengthen the State's environmental and energy objectives.

Sierra Club agrees with the Draft Report's finding that rooftop solar will be cost-effective for both residential and nonresidential new construction across California's climate zones by 2020. The Draft Report uses a robust methodology for evaluating the cost-effectiveness of rooftop solar photovoltaic (PV) based on reasonable, and often conservative, assumptions of future economic and regulatory conditions.

The Draft Report is an important first step toward the development of standards for the inclusion of rooftop solar PV for new construction as part of California's Building Energy

Efficiency Standards (Title 24, Part 6). Ensuring rooftop solar is incorporated into new construction is critical to the success of programs and goals under the Commission's purview related to distributed and onsite renewable generation, including Governor Brown's goal of installing 12,000 MW of local renewable energy capacity by 2020 and the Zero Net Energy (ZNE) goals for new construction adopted as part of the Commission's long-term planning through the Integrated Energy Policy Report (IEPR). Implementation of ZNE goals for new construction is also necessary for California to reduce greenhouse gas pollution to 80% below 1990 levels by 2050 as set forth under Executive Order S-3-05. Achievement of this ambitious emissions reduction trajectory will be frustrated if new development contributes additional greenhouse gas pollution to the atmosphere.

The importance of the Commission's leadership in working toward including rooftop solar in new construction cannot be overstated. This is exactly the type of action that sets an example and inspires other states, the nation, and the world to take action to combat the climate crisis. The Draft Report is well-supported and, given the severity of present and future climate impacts facing California, the need to achieve ZNE in new construction could not be more urgent. The Energy Commission should promptly adopt the Draft Report's determination that rooftop solar is cost-effective for new construction and proceed toward incorporating rooftop solar into Title 24 requirements.

I. The Draft Report's Conclusion that Rooftop Solar is Cost-Effective For New Construction is the Result of a Series of Conservative Assumptions

The Draft Report concludes that under the vast majority of reasonably likely scenarios related to cost and production capabilities, rooftop solar PV is cost-effective for nearly every climate zone and for nearly every class of customer. In reaching this determination, the Draft Report makes several conservative assumptions that err on the side of understating the cost-effectiveness of rooftop solar. In other words, the cost-effectiveness of rooftop solar on new construction will likely be greater than estimated in the Draft Report. With the exception of more clearly differentiating between the likelihood of Scenarios 1 and 2 and identifying areas where assumptions likely undervalue cost-effectiveness, the Sierra Club does not believe the Draft Report requires further revision. We identify the following conservative assumptions only to note that the Draft Report's ultimate determination that rooftop solar is cost-effective is well-grounded and should be finalized and adopted by the Commission.

A. Retail Rate Escalation Assumes the State Will Not Take Further Action to Decarbonize the Energy Sector

The Draft Report assumes that from 2012 to 2020, retail rates will escalate at 2.11 percent per year as California moves to meet its greenhouse gas targets under the cap-and-trade program and achieves a 33 percent RPS. After 2020, the Draft Report assumes a much lower growth rate – 1.42 percent per year – based on the assumption that “California meets remaining load growth with natural gas generation after 2020.” (Draft Report at 19.) The Draft Report's assumption that California will take no further action to decarbonize its energy supply is extremely conservative, highly unlikely, and inconsistent with the State's target of reducing greenhouse gas pollution to 80% below 1990 levels by 2050.

Although 2020 is still seven years away, the Legislature and Air Resources Board have already begun to consider additional actions necessary to meet a 2050 greenhouse gas reduction trajectory. For example, Assembly Bill 177 was recently amended to increase California's RPS to 51% by 2030 and Governor Brown has repeatedly stated that the 33% RPS is a floor, not a ceiling. The Air Resources Board is also working on an update to its AB 32 Scoping Plan to include a post-2020 element to provide a high level strategy for meeting California's 2050 emission reduction goals. It is highly likely that these efforts will solidify into actionable requirements as 2020 approaches. Because the specifics of future action are unknown at this juncture, it may be overly speculative for the Draft Report to alter its retail rate escalation assumptions based on a higher future RPS scenario. However, the Draft Report should, at a minimum, note that the post-2020 "natural gas only" assumption is unlikely to occur and serves to significantly undervalue the cost-effectiveness of rooftop solar.

B. PV System Lifetime Is Only Assumed to Be 25 Years

The Draft Report assumes that the average productive life of a rooftop solar installation will be 25 years. This timespan conforms with the terms of many industry warranties. However, while solar panels are typically warranted to operate at 80% of new performance after 25 years,¹ solar panels remain productive well after the warranty expires and continue to provide benefits to homeowners. By truncating panel lifetime to 25 years, the benefit of continued panel productivity is entirely discounted.

Because the cost of rooftop PV is primarily a result of initial capital costs, and ongoing maintenance is very low, even if the system degrades over time, extending the expected useful life of the facility increases the overall value and cost-effectiveness of the installation. Indeed, other studies valuing solar have relied on a 30-year expected life-cycle for solar PV installations.² The Draft Report's use of a 25-year lifespan is therefore conservative and serves to understate solar cost-effectiveness.

C. The Draft Report Evaluates Two Alternative Cost Scenarios on Equal Footing When the Low Cost Scenario is Much More Realistic

The Draft Report includes two cost scenarios for the installation of rooftop solar. Scenario 1, termed "more expensive solar," bases the capital costs of rooftop solar installation on data found in the 2012 CSI reported costs. The CSI program only applies to retrofits, which means that all of the data used in Scenario 1 are based on the cost for retrofitting an existing roof with solar. Scenario 2, the "less expensive solar" scenario, reduces the capital costs assumed in Scenario 1 due to the decreased costs associated with incorporating solar into new home construction. Incorporating solar at the time of construction avoids additional permit fees, costs of rewiring for the many existing homes that are not "solar ready" and, in the case of installation in new subdivisions, provides significant savings through economies of scale.

¹ Andy Black, *Economics of Solar Electric Systems for Consumers: Payback and other Financial Tests*, July 2009, 42, 16.

² See, e.g., Fthenakis, Vasilis M. Hyung Chul Kim, and Erik Alsema, *Emissions from Photovoltaic Life Cycles*, *Environ. Sci. Technol.* 2008, 42, 2168–2174.

According to the Draft Report, the two scenarios “create reasonable uncertainty bounds on a range of potential PV costs.” (Draft Report at 14.) In reality, the costs of solar will depend on the relative likelihood of each scenario. The Draft Report errs by assigning equal weight to both Scenario 1 and Scenario 2. Because the cost-effectiveness analysis applies to solar in new homes only, the assumptions identified in Scenario 2 (less expensive solar) are much more realistic than the assumptions identified in Scenario 1. Therefore, the results of Scenario 2 should be weighted more heavily than the results of Scenario 1.

Scenario 1 is also overly conservative in its estimate of solar production. The Draft Report relies on actual, observed capacity factor data in Scenario 2, whereas Scenario 1 relies on a simulated model from NREL’s PV simulation tool PVWatts. Figure 3 of the Draft Report shows that observed performance of solar generation exceeded the modeled simulation in all but two climate zones, and in some cases actual performance exceeded modeled expectations by as much as 5 percent. This data shows that relying on the PVWatts modeling is an overly conservative assumption. Existing data on actual experiences – when available – provides a better estimate of system performance.

II. The Draft Report’s Assumption that Net Energy Metering (NEM) Will Continue in California is Reasonable Given the Strong State Interest in the NEM Program

While acknowledging the existing statutory cap on NEM participation, the Draft Report assumes that the existing NEM program will remain in place for the lifetime of systems installed through 2020. This assumption is reasonable given the strong state interest in the NEM program. The State of California has determined that NEM is a means to “encourage substantial private investment in renewable energy resources, stimulate in-state economic growth, reduce demand for electricity during peak consumption periods, help stabilize California's energy supply infrastructure, enhance the continued diversification of California's energy resource mix, and reduce interconnection and administrative costs for electricity suppliers.” (Pub. Util. Code § 2827(a).) Throughout the history of the NEM program, NEM limits have repeatedly been raised as participation levels approached existing limits. California has demonstrated a firm commitment to NEM, as well as the distributed generation and ZNE goals enabled by NEM. Accordingly, the Draft Report’s assumption that the NEM program will remain in place is reasonable.

III. The Draft’s Report’s Assumption that Residential Rates Will Remain Unchanged is Reasonable Given the High Degree of Uncertainty in the Extent and Direction of Any Future Changes to Rate Design

The Draft Report acknowledges that changes in retail electric rates could have a significant impact on the overall cost-effectiveness of rooftop solar. Given the high degree of uncertainty in the outcome of any rate design changes, the Draft Study appropriately used existing rates as a measure of cost-effectiveness.

The California Public Utilities Commission is currently considering potential changes to residential rate design structures that could change electric utility rates. However, the ultimate

outcome of this proceeding is highly uncertain. Investor owned utilities (IOUs) have proposed a rate structure that includes fixed charges and flattened tiers and would render rooftop solar less cost effective than under the existing rate structure. In contrast, Sierra Club and other parties have proposed a combination of tiers and time-of-use rates that would have the opposite impact. In addition, state law strictly limits the ability of IOUs to impose fixed charges on its customers.³ Therefore, the types of changes that would negatively impact the cost-effectiveness of solar would also require significant changes to existing law. Use of existing rates in the Draft Report is appropriate and reasonable given the range and uncertainty of potential outcomes of any future changes to rate design.

The Energy Commission should not permit uncertainty to derail the advancement of building standards that include rooftop solar. Like any other endeavor, it is impossible to predict with certainty changes to the regulatory and economic landscape over a 25 year period. Were the Commission to await regulatory certainty, it would be forever paralyzed to act. The Draft Report uses reasonable assumptions based on current understanding to conclude that rooftop solar is cost-effective.

IV. The Commission Should Grant the Petition to Evaluate the Societal Benefits of NEM

The debate over rooftop solar is too often plagued by a myopic focus that fails to account for the significant and quantifiable contribution of rooftop solar to improving the local economy, the environment, and human health and safety. To better understand these benefits, a broad coalition of environmental, public health, and solar groups, including the Sierra Club, submitted a Petition to the Commission on June 5th requesting a Societal Cost-Benefit Evaluation of California's Net Energy Metering Program. The Sierra Club urges the Commission to grant and act on the petition to enable a more fully informed discussion of the future of rooftop solar policy.

Conclusion

Sierra Club appreciates the thoughtful and systematic analysis provided in the Draft Report. The results of the Draft Report show that even under a relatively conservative analysis, rooftop solar installations are cost-effective for new construction in California. The Energy Commission should approve the Draft Report and continue with the development of updated California's Building Energy Efficiency Standards to include rooftop solar PV on new construction.

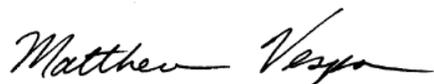
If you have any questions please contact Kathryn Phillips at kathryn.phillips@sierraclub.org / (916) 557-1100 x102 or Matt Vespa at matt.vespa@sierraclub.org / (415) 977-5753. We look forward to continue working with the California Energy Commission in this important endeavor.

³ Public Utilities Code Section 739.9 limits annual rate increases to 3 – 5% for usage up to 130% of baseline. The PUC has interpreted this provision as “including fixed charges within the limitations on allowable percentage increases.” D.11-05-047, Decision Regarding Residential Rate Design (June 2, 2011) at 24.

Respectfully Submitted,

A handwritten signature in cursive script that reads "Kathryn Phillips".

Kathryn Phillips
Director
Sierra Club California

A handwritten signature in cursive script that reads "Matthew Vespa".

Matthew Vespa
Senior Attorney
Sierra Club

A handwritten signature in cursive script that reads "Travis Ritchie".

Travis Ritchie
Staff Attorney
Sierra Club