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PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

ENERGY DIVISION

ID # 11258
RESOLUTION E-4476
May 24, 2012

R E S O L U T I O N

Resolution E-4476

PROPOSED OUTCOME: This Resolution modifies the existing dollar per watt cost caps for the California Solar Initiative (CSI) program. It is pursuant to Senate Bill 585 (Kehoe, 2011).

ESTIMATED COST: No cost to ratepayers.

Of the Energy Division's own initiative.

SUMMARY

This Resolution modifies the existing California Solar Initiative (CSI) program cost caps on installed system costs, setting separate caps for CSI solar systems up to 10 kilowatts (kW) and 10 kW and above. The caps are based on CSI program data and updated weekly. They apply to the CSI General Market program[1] and are set at the rolling twelve month average installed cost of CSI systems, plus a $1.00 per watt adder.

BACKGROUND

On September 22, 2011, Governor Brown signed into law Senate Bill (SB) 585 (Kehoe), which required that:

[1] The CSI Program has five program components, including a General Market Program. The CSI General Market program is administered by Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and the California Center for Sustainable Energy (CCSE) in San Diego Gas and Electric territory-collectively known as the Program Administrators.

> Within 90 days of the enactment of this act, the Public Utilities Commission shall establish and impose project cost caps for residential and nonresidential projects under the California Solar Initiative, based on national and state installed cost data.

In December 2011, Decision (D.) 11-12-019, which modified the CSI budget per SB 585, directs Energy Division to "continue to monitor national and state installed cost data and adjust CSI project cost caps as needed through the CSI Handbook revision process." (D.11-12-019, Ordering Paragraph 9).

The CSI Program has had a cost cap in place since mid-2010, but in keeping with the Commission's intent to exert downward pressure on installed prices, the Energy Division provides the following analysis and recommendation.

EXISTING CSI COST CAPS

Prior to 2010, the CSI Program did not have in place any mechanisms prohibiting participation by high cost projects. The first cost caps were put into place mid-2010 and were set at two standard deviations above the program's average cost.[2] In fall 2011, the CSI Program Administrators filed an advice letter to modify the cost cap methodology to one standard deviation above the mean of the CSI project cost. The current cost cap is modified weekly, based on current CSI system costs. As of April 4, 2012, the cost cap was at $9.83 per watt (W)-AC.[3]

The current cost cap is called a "soft cap" because it does not absolutely prohibit funding for projects above the limit. Rather, for projects whose installed cost exceeds the limit, it requires submission of a "High Cost Justification and Acknowledgment Form"[4] in which the installer first explains the reasons for the

[2] The original CSI cost cap was $14.70 per W.

[3] Further explanation of the cost cap as well as the current value can be found here -- http://californiasolarstatistics.com/faq/#costcap.

[4] This "High Cost" form can be found on this list -- http://www.gosolarcalifornia.org/documents/csi_application_help.php.

unusually high cost and the host customer[5] then certifies that he/she is aware of the high cost and understands the explanation provided. Finally, the procedure requires that the Program Administrator (PA) find the cost justification legitimate.

Since the cost cap has been in place, the CSI Program has seen a downward shift in total project costs for solar photovoltaic (PV) systems. Table 1 shows the difference in project costs before and after the imposition of the cost cap.

Table 1. CSI applications filed before and after imposition of the cost cap[6]

Installed cost ($/watt)	**% above installed cost before 6/30/2010 (n = 40,811)**	**% above installed cost after 6/30/2010 (n = 32,804)**
$15.00	4.04 %	0.65 %
$14.00	5.66 %	2.14 %
$13.00	8.64%	3.52 %
$12.00	12.43%	5.80 %
$11.00	19.07%	9.89 %
$10.00	33.87%	19.40 %
Below $10.00	16.29%	58.60%

Nevertheless, the Energy Division further refines the cost cap methodology to more accurately reflect the costs of PV in residential and non-residential markets according to state and national data per SB 585.

DISCUSSION:

CSI INSTALLED PV COSTS IN NATIONWIDE CONTEXT

Costs for installed PV systems are coming down steadily, both in the CSI Program and throughout the U.S. From Q1 2009 to Q1 2012, prices for systems

[5] The "host customer" is defined as an individual or entity that meets all of the following criteria: 1) has legal rights to occupy the site where the solar system is installed, 2) is a customer of PG&E, SCE, or SDG&E, 3) is the utility customer of record at the site or owns the site, 4) is connected to the electric grid, and 5) is the recipient of the net electricity generated from the solar equipment.

[6] Source: www.californiasolarstatistics.ca.gov. Data as of January 6, 2012.

installed in the CSI Program have dropped from $10.24/W-AC to $7.84/W-AC, a decline of 23%.[7]

According to the report, "Tracking the Sun, An Historical Summary of the Installed Cost of Photovoltaics in the United States from 1998 to 2010" from Lawrence Berkeley National Laboratory (LBNL),[8] average capacity costs across the U.S. have also decreased in recent years, from $7.90 per W-DC in 2007 to $6.20 per W-DC in 2010.[9]

National averages for systems less than 10 kW:

In response to a data request from the Energy Division, researchers at LBNL produced data for all U.S. projects. The mean value for these non-CSI projects is $7.12 per W-DC for systems less than 10 kW. By comparison, CSI systems less than 10 kW installed in 2010 were 3% higher than the national average, with a mean installed cost of $7.33 per W-DC.

In 2010, California's installed PV costs were in the midpoint range of average costs ranked by state. California's average costs for systems less than 10 kW installed in 2010 was $7.30 per W-DC, within a range of $6.30 (New Hampshire) to $8.30 (Utah). California ranks as the ninth most expensive out of the 22 states which have a significant number of PV installations.

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[7] Source:http://californiasolarstatistics.com/reports/quarterly_cost_per_watt/. The 2011 Q4 price has shown a rise in costs, but the sample set is relatively small and may move around. Data as of April 4, 2012.

[8] LBNL's "Tracking the Sun" report is available here: http://eetd.lbl.gov/ea/ems/reports/lbnl-5047e.pdf.

[9] It is important to note the difference between dollars per W-DC and dollars per watt-AC numbers. Solar collectors make electricity in direct current (DC), and when this power is converted to alternating current (AC) the conversion losses from the inverters ensure that there will be fewer delivered AC watts. Consequently, installation costs always appear cheaper (by 10 to 15%) when reported in terms of watt-DC. In the CSI program, on average 86% of DC watts (also called nameplate) get converted into AC watts. The AC watts used in this Appendix are "CEC PTC" watts as reported in the CSI's Working Data Set, found at http://californiasolarstatistics.com/current_data_files/.

National averages for 10 kW and over:

By contrast, at $6.39 per W-DC, CSI systems 10kW and above were 2% lower than the national average of PV systems in the same size range. For systems 10 kW and greater, system costs range from $4.80 per W-DC (New Jersey for systems over 500 kW) to $8.60 (for systems between 10 kW to 100 kW). California ranks as the 11th most expensive state for systems from 10kW to 100 kW (out of 20 states), the 5th most expensive state for systems from 100 to 500 kW (out of 10 states), and the 2nd most expensive state for systems above 500 kW.[10]

The effect of state sales tax:

The impact of sales tax on installed prices – which the authors of the LBNL report estimate at $0.40 per W-DC – has caused California's installed system prices to be higher than they would be if there were no state sales tax. It is important to note that many states have no sales tax, and California's sales tax is among the highest of those states with a sales tax.

The authors of the report have estimated the impact of state sales tax on the installed average prices for each state. After eliminating the effect of sales taxes for systems less than 10 kW, California's average costs were still higher than the national average at $7.10 per W-DC. In this comparison, California ranks as the twelfth most expensive of the 22 states for smaller systems.

National data as compared to the current CSI Cost Cap:

Energy Division staff examined the current cost cap within the context of average national costs. We used the current cost cap methodology (average cost per watt plus one standard deviation) to calculate a cost cap using national data to compare with the current CSI cost cap. Table 2 below shows the current CSI cost cap is 8 percent higher than national average for systems less than 10 kW plus one standard deviation and 20 percent higher than the national average for systems 10 kW and above plus one standard deviation.

[10] "Tracking the Sun, An Historical Summary of the Installed Cost of Photovoltaics in the United States from 1998 to 2010", Figure 15, p. 21.

Table 2. National Average Cost per Watt vs. CSI Average Cost per Watt

	National Costs for Systems <10kW	National Costs for Systems ≥10kW	CSI PV Costs
Average Cost per Watt (a)	$7.13	$6.49	$7.85
Standard Deviation (b)	$1.94	$1.72	$1.98
Total (a+b)	**$9.07**	**$8.21**	**$9.83 (current CSI cost cap)**

Based on this analysis, the current CSI cost cap is substantially higher than it would be if national data was taken into account. Therefore, we will revise the cost cap methodology to keep CSI system costs in line with the national PV costs.

RESIDENTIAL VS. NON RESIDENTIAL SYSTEMS

In the CSI Program, the residential sub-program includes small (<10 kW) commercial systems. CSI systems 10 kW and over are roughly 12-15% less expensive than systems under 10 kW.[11] Further, over 96% of systems up to 10 kW within the CSI Program are residential PV systems, and over 98% of systems 10kW and over are non-residential systems.[12]

This classification by PV system size serves as a reasonable proxy for residential and non-residential cost caps. Therefore, there will be separate cost caps for systems up to 10kW and systems 10 kW and over.

DATA REPORTING FOR THIRD PARTY OWNERS

Reporting of total system costs is generally straightforward for owner-occupied buildings. Third party owners, because they do not sell the systems they build, face a much greater challenge in reporting for this number, and often resort to estimates or proxies. The Energy Division is aware of these challenges and is

[11] Source: http://californiasolarstatistics.ca.gov. Data as of February 8, 2012.

[12] Ibid.

working with parties over the next several months to develop clearer guidelines for reporting installed system costs.

In the meantime, we will exclude third party data from the calculation of the CSI cost cap until such time a more accurate reflection of installed costs for third-party owned systems is included in the CSI database. However, as is current practice, we will require that *all* CSI systems are subject to the cost cap - whether they are owned by the host customer or a third party. We also require that third party system owners, in reporting installed system costs, account, to the best of their abilities, for materials, labor, financing, and profit, i.e. any and all of the components that a contractor which sells a rooftop system to an owner-occupant would include.

COST CAP CALCULATION

The current cost cap is calculated based on the simple average of all cost per watt for all CSI systems,[13] as well as the standard deviation for the data in that time period. The standard deviation is included to account for any variances in project costs above the average cost per watt. For the purposes of simplicity in calculating the cost cap, a $1.00 adder will replace the standard deviation to account for variances in system prices.

While it is important to review national data to see where CSI systems costs fall as compared to other states and the nation as a whole, it is impractical to do national data comparisons with any frequency. The CSI database holds a wealth of data on system costs that is current and readily available. Further, Table 3 below shows that the new cost cap methodology keeps costs more closely in line with national costs per watt plus one standard deviation than the current cost cap methodology, as shown in Table 2.

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[13] The "simple average" is the cost per watt for projects installed within the last 12 months, where cost per watt is defined as the (total cost) divided by the (CEC-AC system size) for each project.

Table 3. Current cost cap methodology vs. new cost cap methodology[14]

Current Cost Cap Methodology	**New Cost Cap Methodology**	
For all CSI Systems	For CSI Systems <10kW	For CSI Systems ≥ 10kW
12-month average of CSI system costs (a) = $7.85	12-month average of costs of CSI systems <10kW (a) = $8.01	12-month average of costs of CSI systems ≥ 10kW (a) = $6.59
1 Standard Deviation (b) =$1.98	$1.00 adder (b)	$1.00 adder (b)
Cost Cap (a+b) = $9.83	**Cost Cap (a+b) = $9.01**	**Cost Cap (a+b) = $7.59**

Therefore, any ongoing adjustments to the cost cap using the cost cap methodology described above should be based on CSI data only. National data shall be reviewed by Energy Division, in collaboration with the CSI PAs, no less than once per year and the cost cap methodology may be adjusted to reflect national data trends as needed.

As is the current practice, the cost caps shall be made publicly available on www.californiasolarstatistics.ca.gov. The cost caps shall be adjusted based on the current working data set on a weekly basis.

The new cost caps will remain "soft" caps. That is, if a CSI system's installed cost exceeds the cost cap, then a "High Cost Justification and Acknowledgment Form" must be submitted to the CSI PAs.

Within 30 days of the effective date of this resolution, the CSI PAs shall file a Tier 1 advice letter revising the CSI Handbook to include the new cost cap methodology. The new cost caps shall become effective upon approval of the revisions to the CSI Handbook.

[14] Source: http://californiasolarstatistics.ca.gov/. Data through April 4, 2012.

NEW CSI COST CAP METHODOLOGY

Based on these various considerations, Energy Division establishes the following new methodology to determine the soft cap for installed system costs:

1. The cost cap should be calculated using a rolling twelve-month mean, updated weekly, based on CSI data. National data will be considered on an annual basis, and the cost cap will be revised as needed.
2. Given that there is a significant difference in costs for systems up to 10 kW and systems 10 kW and above, there should be separate caps for systems up to 10 kW and systems over 10 kW.
3. Third party-owned systems will be excluded from the data sets used to calculate the caps; but all CSI systems will be subject to the cost caps.
4. The cost caps should be calculated of each category (<10kW and ≥10kW) to be equal to the simple average installed cost per watt (CEC-AC), plus $1.00.

PROTESTS

Since this resolution was instigated at the Energy Division's own initiative, there was no advice letter to protest.

COMMENTS

The Comment Period will NOT be waived or reduced:

The 30-day comment period for the draft of this resolution was neither waived nor reduced. Accordingly, this draft resolution was mailed to parties for comments, and will be placed on the Commission's agenda no earlier than 30 days from today.

FINDINGS AND CONCLUSIONS:

1. The CSI Program has established a "soft" cost cap based on CSI data since 2010.
2. SB 585 (Kehoe, 2011) requires the Commission to establish and impose project cost caps for residential and nonresidential projects.
3. D.11-12-019 directs the CPUC's Energy Division to "continue to monitor national and state installed cost data and adjust CSI project cost caps as needed through the CSI Handbook revision process."

4. CSI system costs are in the middle to high-range of the national average cost per watt for PV systems.
5. It is reasonable to lower the CSI cost cap to keep CSI system costs in line with national average system costs.
6. We lower the cost cap by revising the cost methodology to be calculated using a rolling twelve-month mean plus $1.00.
7. Systems under 10 kW and systems 10kW and above serve as a reasonable proxy for residential and non-residential systems, thus separate cost caps shall be established for systems under 10 kW and systems 10 kW and above.

THEREFORE IT IS ORDERED THAT:

1. We adopt the new cost cap methodology as specified herein.
2. CSI projects that exceed the new cost caps must submit a "High Cost Justification and Acknowledgment Form" to the CSI PAs.
3. All CSI systems are subject to the cost cap - whether they are owned by the host customer or a third party.
4. Third party system owners shall, in reporting installed system costs, account, to the best of their abilities, for materials, labor, financing, and profit, i.e. any and all of the components that a contractor which sells a rooftop system to an owner-occupant would include.
5. The current cost caps shall be made publicly available on www.californiasolarstatistics.ca.gov.
6. National data on PV system costs shall be reviewed by Energy Division, in collaboration with the CSI PAs, no less than once per year and the cost cap methodology shall be adjusted as needed.
7. Within 30 days of the effective date of this resolution, the CSI PAs shall file a Tier 1 advice letter to include the new cost cap methodology in the CSI Handbook. The new cost caps will become effective upon approval of the revisions to the CSI Handbook.

This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California held on May 24, 2012; the following Commissioners voting favorably thereon:

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Paul Clanon
Executive Director