



Incentive Step-Down Analysis: 2021-2022

Summary

- [Decision \(D.\)17-12-022](#) (Section 4, pages 39-43) discusses SOMAH's incentive structure and decides that, "incentive levels will decrease by the annual percent decline in residential solar costs as reflected by National Renewable Energy Lab (NREL) reports, or 5% annually, whichever is less."
- Due to a delay in receiving NREL's updated report, the SOMAH Program Administrator (SOMAH PA) requested and was granted an administrative extension by the California Public Utilities Commission (CPUC) through October 29, 2021, to complete its analysis for SOMAH's incentive step-down for the 2021-2022 program year. Upon receiving the updated report in late August, the SOMAH PA promptly began conducting its analysis and composing this report.
- Following the direction in D.17-12-022 and the methodology from SOMAH's incentive step-down for the 2020-2021 program year, the SOMAH PA examined changes in the cost of residential solar energy systems from 2019 to 2020 in the most recent publication of NREL's technical report series entitled "U.S. Solar Photovoltaic System Cost Benchmark."
- NREL reported the following national residential benchmark costs:
 - 2019 benchmark in 2019 USD: \$2.77 per Watt, DC
 - 2020 benchmark in 2019 USD: \$2.71 per Watt, DC
- The incentive step-down, or percentage decrease, is calculated by $[(\$2.77-\$2.71)/\$2.77]*100 = 2.17\%$. SOMAH incentives levels for the period spanning October 30, 2021, to June 30, 2022, are as follows:

Tax Credits		\$ per AC Watt Incentive			
ITC	LIHTC	Tenant		Common	
		2020-2021	2021-2022	2020-2021	2021-2022
No	No	\$3.04	\$2.97	\$1.04	\$1.02
Yes	No	\$2.14	\$2.09	\$0.76	\$0.74
No	Yes	\$2.14	\$2.09	\$0.76	\$0.74
Yes	Yes	\$1.52	\$1.49	\$0.57	\$0.56



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Analysis

This section provides a detailed summary of how the SOMAH PA calculated the incentive step-down of 2.17% for the period spanning October 30, 2021, to June 30, 2022.

Incentive Period

- The SOMAH Program launched on July 1, 2019.
- Given D.17-12-022's direction that incentives decrease annually, SOMAH's first-year incentive levels expired on June 30, 2020, and new incentive levels for the program's second year went into effect on July 1, 2020, the anniversary date of the program launch. This timeline for the step-down is described in the SOMAH Program Handbook, [Section 3, Incentive Structure](#), which states, "The annual reduction will occur at the 12-month point from the program launch date."
- The National Renewable Energy Lab (NREL) Q1 2020 report was published in January 2021; however, the report had expanded its scope to include energy storage cost benchmarks, had updated its title to "U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark" and was not published in the Solar Technology Cost Analysis System Benchmarks and Roadmaps webpage where previous versions of the NREL report had been posted. The SOMAH PA continued to check the Solar Technology Cost Analysis System Benchmarks and Roadmaps webpage for the Q1 2020 NREL report and made multiple requests for updates to NREL regarding the status of the updated report to no avail. By the July 1, 2021, deadline for incentive step-down, the SOMAH PA had still not received a response from NREL or located the report on NREL's website.
- Due to the delay in receiving NREL's updated report, the SOMAH PA requested and was granted an administrative extension by the California Public Utilities Commission (CPUC) through October 29, 2021, to complete its analysis for SOMAH's incentive step-down for the 2021-2022 program year. Upon receiving the updated report in late August, the SOMAH PA promptly began conducting its analysis and composing this report.
- Based on this delay, incentive levels determined by this analysis are effective the day after the expiration of approved administrative extension, i.e., October 30, 2021, through the end date of the SOMAH Program's third program year, June 30, 2022.



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Report Series

- [D.17-12-022](#) (section 4.1, pages 39-43) discusses SOMAH's incentive structure and decides that, "incentive levels will decrease by the annual percent decline in residential solar costs as reflected by NREL reports, or 5% annually, whichever is less."

NREL produces a number of interrelated work products pursuant to solar technology cost analysis. Those work products are hosted on its website on a webpage titled "Solar Technology Cost Analysis"¹ as well as part of NREL's publications database.²

NREL organizes this work into four areas of specialization:

- Solar Manufacturing Cost Analysis
- **Solar Installed System Cost Analysis**
- Solar Levelized Cost of Energy Analysis
- Solar Supply Chain and Industry Analysis

Reporting under the "Solar Installed System Cost Analysis" area is the most relevant of the areas of specialization. In this area, NREL produces two types of work products: a technical report series titled "U.S. Solar Photovoltaic System Cost Benchmark" that reviews costs in the prior calendar year³ and a quarterly presentation series titled "Quarterly Solar Industry Updates" that reviews costs across an approximate three-month period, often spanning two calendar quarters. Following the letter of D.17-12-022 as closely as possible, the SOMAH PA is required to examine the technical "report" work product rather than the less formal standalone presentation series.

D.17-12-022 references NREL's technical report entitled "U.S. Photovoltaic Prices and Cost Breakdowns: Q1 2015 Benchmarks for Residential, Commercial, and Utility-Scale Systems" and summarizes stakeholder comments supporting the idea that technical reports, specifically those produced by national labs, may be used to step-down annual incentive amounts. Following its recap of stakeholder comments, D.17-12-022 then directs the SOMAH PA to use "NREL reports" to calculate SOMAH's incentive step-down.

¹ Solar Technology Cost Analysis, NREL, <https://www.nrel.gov/analysis/solar-cost-analysis.html>.

² Publications, NREL, <https://www.nrel.gov/research/publications.html>.

³ Note: NREL published a "U.S. Solar Photovoltaic System Cost Benchmark" report in all years since 2015 except for 2019, potentially due to COVID-19 impacts on the lab's operations.



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Beginning in 2016, this specific technical report series was slightly renamed but written by the same authors and with a similar structure to the 2015 version mentioned by parties in D.17-12-022. The report was again slightly renamed in its Q1 2020 iteration to include energy storage and is now titled "U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark." The SOMAH PA believes this is the most appropriate NREL report to use for the incentive step-down analysis because it is the only NREL report series referenced specifically in D.17-12-022 and is focused on cost rather than price, which are distinct values.

D.17-12-022 also mentions by name a related report series entitled "Tracking the Sun" produced by Lawrence Berkeley National Laboratory (LBNL), a related, though distinct from NREL, federally funded research and development center. The NREL report analyzes solar costs, whereas the LBNL report analyzes solar prices, which have distinct definitions,⁴ further supporting the use of NREL's report rather than LBNL's as the primary source in calculating incentive step-down values. Based on D.17-12-022's explicit reference to "NREL reports" and LBNL's focus on price rather than cost, the "Tracking the Sun" report series is ruled out as the proper source of the incentive step-down analysis.

In summary, the SOMAH PA understands D.17-12-022's requirement that we examine NREL's "U.S. Solar Photovoltaic System Cost Benchmark" technical report series to calculate SOMAH's annual incentive step-down value. The citation for the most recent version is provided below.

- Citation: Feldman, David, Vignesh Ramasamy, Ran Fu, Ashwin Ramdas, Jal Desai, and Robert Margolis. 2021. U.S. Solar Photovoltaic System and Energy

⁴ NREL notes in its cost benchmark-focused report in 2018 that, "Costs are represented from the perspective of the developer/installer; thus, all hardware costs represent the price at which components are purchased by the developer/installer, not accounting for preexisting supply agreements or other contracts. Importantly, the benchmark also represents the sales price paid to the installer; therefore, it includes profit in the cost of the hardware, along with the profit the installer/developer receives, as a separate cost category. However, **it does not include any additional net profit**, such as a developer fee or price gross-up, which is common in the marketplace." LBNL notes in its price-focused report that, in contrast to cost benchmarks, "the market price data assembled for this report are based on whatever profit margin developers are able to capture or willing to accept, which may exceed a theoretically competitive level in markets with high search costs and/or barriers to entry." NREL summarizes this distinction more succinctly in noting, "Profit is one of the differentiators between 'cost' (aggregated expenses incurred by a developer/installer to build a system) and 'price' (what the end user pays for a system)."



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Storage Cost Benchmark: Q1 2020. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-77324. <https://www.nrel.gov/docs/fy21osti/77324.pdf>

- Publication date: January 2021

Data Sets and Points

Analysis of National Data

Last year, the SOMAH PA compared residential solar cost benchmarks from the Q1 2017 and Q1 2018 reports to determine the incentive step-down. This year, the Q1 2020 report alone was used as **there was no distinct Q1 2019 report published by NREL**. Within the Q1 2020 report, however, benchmark costs for residential solar installations are given for both 2019 and 2020. In previous iterations of the report, a year-over-year comparison of benchmarks was calculated using the more recent inflation-adjusted USD (i.e., comparisons between 2017 and 2018 had both benchmarks listed in 2018 USD). **In the Q1 2020 report, both 2019 and 2020 values are given in 2019 inflation-adjusted USD.**

Last year, the SOMAH PA also analyzed NREL's California-specific data, which yielded the same incentive step-down as the national benchmark. **In the Q1 2020 NREL report, there was no such breakdown by state, and as such, the national benchmark was used to determine the incentive step-down and will be used going forward for future program years.** Topline metrics in NREL's technical report rely on a cleaned, national data set with values weighted by a state's total installed capacity.

Whereas historic efforts like the Low-Income Weatherization Program (LIWP), the Multifamily Affordable Solar Housing (MASH) program and SOMAH exist in part to create and develop a "multifamily" segment in the solar energy market, no such market segment currently exists in NREL's cost analysis, and D.17-12-022 explicitly requires that the SOMAH PA examine changes in the "residential" solar market segment to calculate SOMAH's annual incentive step-down values. The most recent report at the publishing of this analysis, from January 2021, provides the relevant data points on page vii-viii of the report and in Figure ES-1 and Table ES-2, excerpted below.

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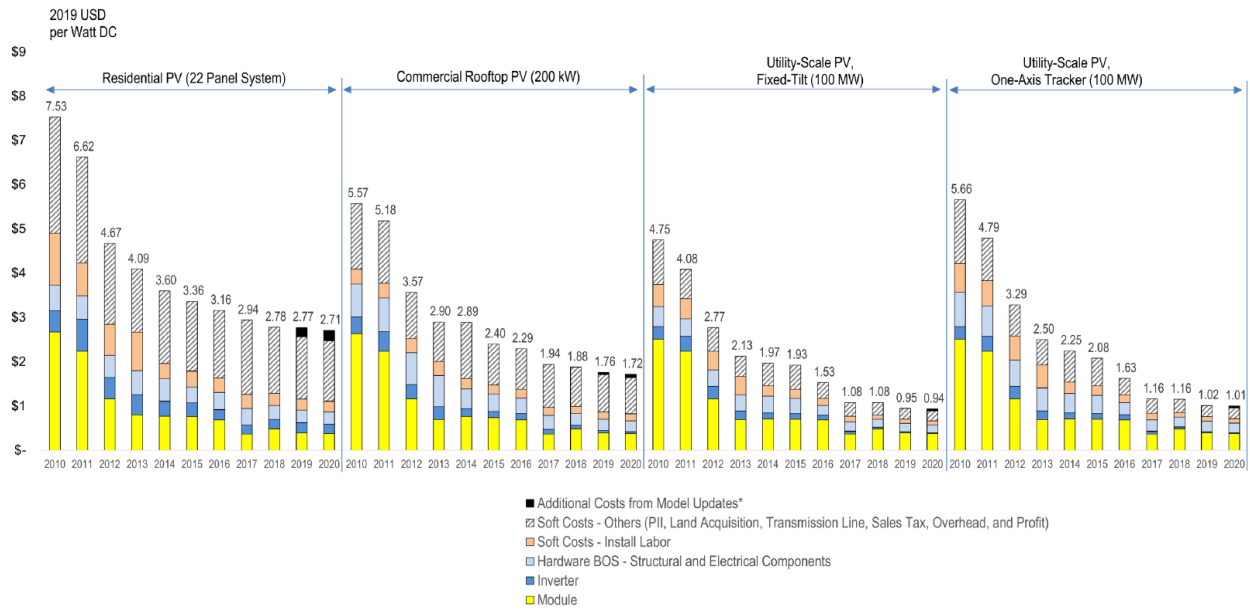


Figure ES-1. NREL PV system cost benchmark summary (inflation-adjusted), 2010–2020

Table ES-2. Comparison of Q1 2019 and Q1 2020 PV System Cost Benchmarks

Sector	Residential PV	Commercial Rooftop PV	Utility-Scale PV, One-Axis Tracking
Q1 2019 benchmarks in 2019 USD/W _{DC}	\$2.77	\$1.76	\$1.02
Q1 2020 Benchmarks in 2019 USD/W _{DC}	\$2.71	\$1.72	\$1.01
Drivers of cost decrease	<ul style="list-style-type: none"> Higher module efficiency (from 19.2% to 19.5%) Decrease in BOS hardware and supply chain costs 	<ul style="list-style-type: none"> Higher module efficiency Lower material & equipment costs in some categories 	<ul style="list-style-type: none"> Higher module efficiency Lower material & equipment costs in some categories Movement of land acquisition cost from upfront capital expenditures into operation & maintenance
Drivers of cost increase	<ul style="list-style-type: none"> Higher labor wages Higher module costs 	<ul style="list-style-type: none"> Higher labor wages Higher module costs 	<ul style="list-style-type: none"> Higher labor wages Higher steel prices Higher module and inverter costs



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Real vs. nominal dollar values for historical prices

In the Q1 2020 benchmark report, when comparing 2019 to 2020 residential benchmarks, cost values are provided in “real” inflation-adjusted dollars using the 2019 Consumer Price Index (CPI). This is addressed by the authors who note, “Because the benchmark reports are produced before the end of the calendar year, indexing them to the full-year average CPI in that year is not possible. To better correct for inflation, in this year’s report, we quote values in previous year’s dollars (2019 USD).” Adjusting for inflation, residential PV costs decreased nationally by 2.17% year-over-year.

Benchmark Description	Cost	Change	Step-Down
Q1 2020 Benchmarks in 2019 USD/W _{DC}	\$2.71		
Q1 2019 Benchmarks in 2019 USD/W _{DC}	\$2.77	-2.17%	2.17%

Conclusion

The SOMAH PA has concluded in its understanding of [D.17-12-022](#) and NREL's most recent “U.S. Solar Photovoltaic System Cost Benchmark” report that the program’s incentive levels must be reduced by 2.17% in the third program year, spanning October 30, 2021, to June 30, 2022, due to the delay in the receipt of the NREL report.

Tax Credits		\$ per AC Watt Incentive			
ITC	LIHTC	Tenant		Common	
		2020-2021	2021-2022	2020-2021	2021-2022
No	No	\$3.04	\$2.97	\$1.04	\$1.02
Yes	No	\$2.14	\$2.09	\$0.76	\$0.74
No	Yes	\$2.14	\$2.09	\$0.76	\$0.74
Yes	Yes	\$1.52	\$1.49	\$0.57	\$0.56

All else being equal, and pending the timely receipt of NREL’s 2021 report, the SOMAH PA will be required to step-down incentive levels again on July 1, 2022. Nevertheless, [D.17-12-022](#) (section 4.1, pages 39-43) importantly prescribes that “This incentive



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step-down methodology will be reviewed and may be changed in the 2020 program evaluation, if appropriate based on further cost or market information."

With the recent public release of the third-party evaluator's draft Phase II Evaluation Report⁵ on September 2, 2021, the SOMAH PA acknowledges that Verdant Associates and Illume Advising have found that "program interest started strong but has declined after satisfying pent-up demand" and further that,

"The SOMAH Program is not a market transformation program. D.17-12-022 directs the SOMAH PA to annually evaluate the incentive levels and decrease them to ensure they stay in line with the actual market cost of solar PV. It is important to recognize that the SOMAH Program is not a market transformation program. Incentive step-downs are typically used for market transformation programs that strive to increase demand for a technology and consequently drive down costs for that technology and therefore the incentives required. The affordable housing properties that the SOMAH Program was developed to serve are reliant on program incentives to install solar PV, and there is no reason to believe that the need for incentives is going to change over the life of the program or after the program has ended. It is important that future incentive levels are appropriately set to encourage participation amongst a diverse set of contractors and property owners."

The SOMAH PA is committed to continuing to engage with the CPUC and interested parties to ensure that the approach to modifying incentive levels is consistent with achieving program goals.

Contact Us

Do you have questions or comments on this analysis?

Get in touch with the PA:

- [CalSOMAH.org](https://www.calSOMAH.org)
- 858-244-1177, ext. 5
- Contact@CalSOMAH.org

⁵ "Solar on Multifamily Affordable Housing Phase II Report," pp. 127. Verdant Associates, LLC and Illume Advising, September 2, 2021. Accessed via the CPUC's SOMAH Program website: <https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/implementation-of-ab-693>.