

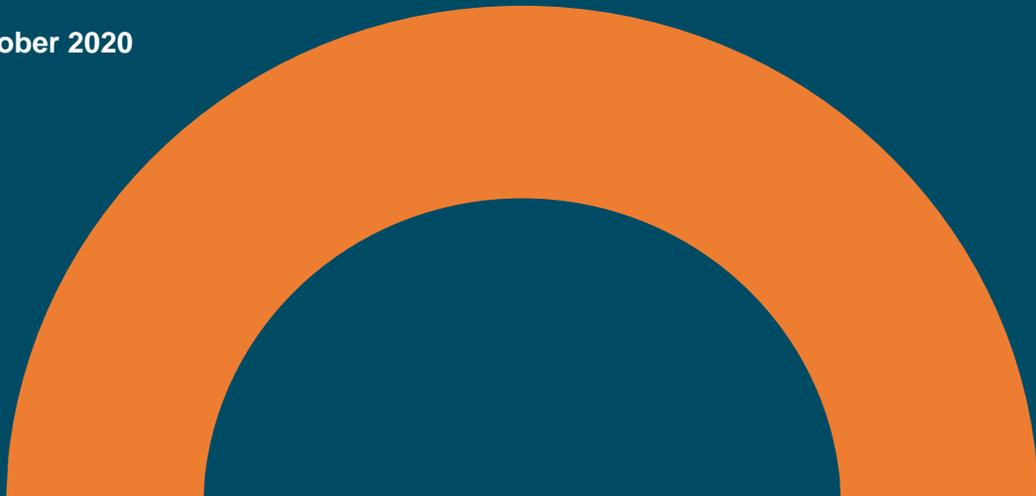


# Connecticut Green Bank Low and Moderate Income Solar Program Savings Analysis

*Research for and support from:*



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# Acknowledgements

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## Executive Summary

This report quantifies realized and estimated solar and energy efficiency savings in 2019 for 252 customers that participated in the Connecticut Green Bank's low and moderate income (LMI) solar programs. These programs include an incentive available to solar projects installed for low- or moderate-income households, as well as a public-private partnership that supports a solar lease paired with energy efficiency services targeted at low and moderate income households (the Solar for All program). While all customers that participate in these programs receive basic weatherization and efficiency improvements through the utility-run Home Energy Solutions ("HES")<sup>1</sup> program, customers that participate in the Solar for All program also receive deeper energy efficiency services. Based on this analysis, customers that participated in the Green Bank's LMI incentive program but not the Solar for All program achieved average measured savings of \$349 in 2019 from their solar PV installation. These customers are also estimated to have saved an additional \$200-\$250 from their participation in the HES program, bringing their total estimated 2019 savings to \$549-\$599. Customers that participated in the Solar for All program achieved average measured savings of \$687 from solar in 2019, and an estimated average savings of \$403 from deeper energy efficiency improvements recommended through the HES program. The combined solar lease, HES program measures and recommended energy efficiency improvement offered in the Solar for All program are estimated to have delivered average annual savings of \$1290-\$1340 per customer in 2019.

## Introduction

In 2015 the Connecticut Green Bank (CGB) developed a new initiative focused on delivering behind the meter solar savings for low- and moderate-income households in Connecticut. The program, which provides an elevated incentive to income-qualifying households through the Green Bank's Residential Solar Investment Program, and features a public private partnership that created a solar and energy efficiency lease targeted at LMI households, has increased annual solar deployment in LMI communities from 44% to 54% since 2015.

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<sup>1</sup> <https://www.energizect.com/your-home/solutions-list/home-energy-solutions-core-services>

The first component in the Green Bank's LMI solar program is an elevated incentive offered through the organization's long-running Residential Solar Investment Program (RSIP). The RSIP was established in 2012, but the Green Bank's LMI incentive did not launch until August 2015. The incentive was created to correct market inequities in the distribution of behind the meter solar projects in the RSIP. The LMI incentive is a performance-based incentive ("LMI PBI") that is approximately three times higher than the non-LMI incentive. The incentive is only available to qualifying third-party owned solar providers that have responded to an open RFP and had their product approved by the Green Bank, to ensure the value of the elevated incentive is passed through to customers. To receive the LMI incentive for a given project the solar provider must confirm the household meets the program's income requirements.<sup>2</sup> As of July 1, 2020, two (2) third-party owned solar providers and their solar products have been approved to access the LMI incentive.<sup>3</sup>

Recognizing the unique challenges of serving the LMI market, and that a concerted effort and specialized product would be needed to properly serve this market, Green Bank opened a Request for Proposals from financing providers to establish a public-private partnership to better serve the LMI market segment. PosiGen Solar Solutions, a Louisiana based solar provider, was selected under the open RFP and together with the Green Bank established Connecticut's "Solar for All" program. PosiGen offers a solar lease paired with energy efficiency improvements that leverage and build on efficiency services provided by through the state's Home Energy Solutions program.<sup>4</sup> Any homeowner can qualify for PosiGen's product, but the company specifically targets LMI households and simplifies the approval process by using an alternative underwriting process rather a traditional credit check. Green Bank supported PosiGen's foray into the Connecticut market by investing an initial \$5 million in PosiGen's Connecticut solar lease fund and has since provided additional subordinated investments to enable the company to continue to offer an affordable LMI solar product in the Connecticut market. Since the program launched, nearly 3,300 households have participated and almost 22MW of solar has been installed as of August 2020. For more information on Connecticut's Solar for All program visit: <https://www.cesa.org/resource-library/resource/building-a-state-solar-program-for-low-and-moderate-income-homeowners-replicating-connecticuts-success/>

In July 2020, five years since the LMI program launched, the Green Bank and the Vermont Energy Investment Corporation (VEIC) conducted an analysis of realized solar savings for customers who participated in the Solar for All program, or whose project received the LMI PBI. The analysis

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<sup>2</sup> To receive the LMI incentive the solar provider must confirm that the household earns below 100% of Area Median Income (AMI), based on the applicable Metropolitan Statistical Area

<sup>3</sup> In order to access the LMI incentive the solar provider's product pricing must be approved by Green Bank. Green Bank does not allow lease escalators to be applied to LMI products.

<sup>4</sup> <https://www.energizect.com/your-home/solutions-list/home-energy-solutions-core-services>

considers both measured solar savings as well as estimated energy efficiency savings for participants.

## Methodology

### Solar Savings

To measure customer solar savings, a sample set of 252 residential solar projects was established. The dataset included 242 randomly selected PosiGen customers whose solar PV systems were energized prior to December 31, 2018, and for whom a full year’s worth of production data was available for 2019. This sample size represents approximately 15% of PosiGen’s installed portfolio as of 12/31/2018.<sup>5</sup> 61% of these projects were verified as income-eligible households and received the LMI PBI, which is representative of PosiGen’s larger portfolio ratio of LMI PBI to PBI projects.<sup>6</sup> The analysis also included 10 out of 15 customers whose solar PV project qualified for the LMI PBI, but whose systems were not installed by PosiGen. Only 10 out of these 15 total projects were included because a full year’s worth of data for 2019 was not available for the remaining 5 projects.

Table 1. Solar Savings Analysis Data set

<b>Program</b>	<b>Number of Projects</b>	<b>Capacity (kW)</b>	<b>Average System Size (kW)</b>	<b>Average Lease or PPA Price</b>
Solar for All				
<i>LMI PBI</i>	148	917	6.2	\$78/month
<i>PBI</i>	94	629	6.7	\$84/month
<i>LMI PBI Only</i>	10	68	7.6	\$0.17/kWh

For LMI PBI Only projects, system sizes ranged from 3.3kW to 12.87kW and customer power purchase agreement (PPA) pricing ranged from \$0.163/kWh in Eversource territory to \$0.192/kWh in United Illuminating territory. Customers that participated in the Solar for All program installed systems ranging from 4.5kW to 8.7kW and their lease prices ranged from \$54.99 to \$119.99 based on the solar PV system size.

<sup>5</sup> As of 12/31/2018 PosiGen had 1,513 customers whose systems were installed and energized. As of April 30, 2020, PosiGen had 2,513 customers whose systems are installed and energized.

<sup>6</sup> While only approximately 60% of PosiGen’s projects are verified as income-eligible (earning <100% AMI), 73% of projects are in census tracts with a median income <100% of AMI. This is due, in part, to the fact that not all customers are able to provide the information required to verify their income.

The Green Bank monitors system production for each solar installation that receives an incentive through the RSIP (regardless of whether the project receives an LMI or non-LMI incentive). The Green Bank also collects information on each customer's annual electric load through the incentive application process. To calculate customer savings, each customer's pre-solar annual electric load was compared to their system's solar production from January 1, 2019 – December 31, 2019 to determine how much of their electric load was offset by their solar production, and the total value of net metering credits the customer received in 2019.<sup>7</sup> The cost of the customer's solar PPA or lease was then subtracted from these savings to determine each customer's net savings for the year.

#### Solar Savings Calculations

**Net Solar PPA Savings** = *(Pre-Solar annual electric load \* applicable utility rate) – (((Pre-Solar annual electric load – measured solar PV production) \* applicable utility rate) + (Measured solar PV production \* PPA rate))*

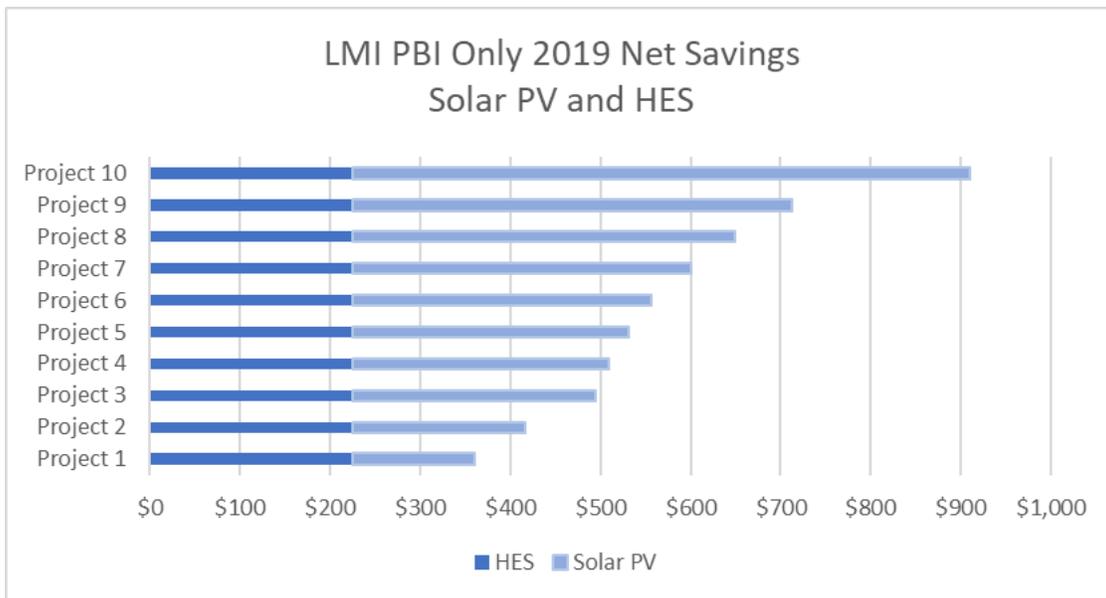
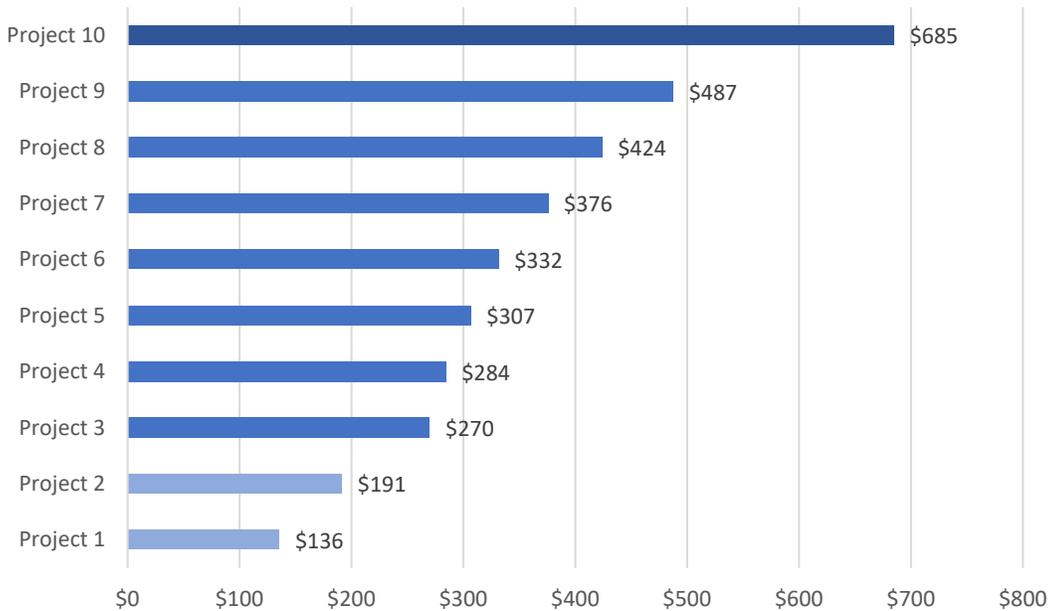
**Net Solar Lease Savings** = *(Pre-Solar annual electric load \* applicable utility rate) – (((Pre-Solar annual electric load - measured solar PV production) \* applicable utility rate) + (Monthly Lease Price \* 12))*

LMI-PBI Only customers saw average savings of \$349, which equates to an average of 18% of their annual utility bill. 2019 annual customer savings ranged from \$136 to \$685, with larger savings realized by customers who had a larger percent of electric load offset by solar PV, and customers with larger loads and related offset seeing greater savings. LMI-PBI Only customers were able to offset their electric load with solar by 79% on average.

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<sup>7</sup> **Net metering** is a billing mechanism that credits solar energy system owners for the electricity they export to the grid at the retail purchase rate.

Figure 1: 2019 LMI-PBI Only Net Customer Solar Savings



Customers that participated in the Solar for All program saw average savings of \$687, which equates to an average of 34% of their pre-solar utility bill by offsetting their electric load with solar by 83% on average. 2019 annual customer savings ranged from \$46 to \$1,585, with customers who had a larger percent of electric load offset by solar PV seeing greater savings. 98% of customers saw annual solar savings greater than \$100, with the highest percentage of customers (27%) realizing savings of \$500-\$750 annually.

Figure 2. 2019 Solar for All Customer Net Savings by Dollar Amount (\$)

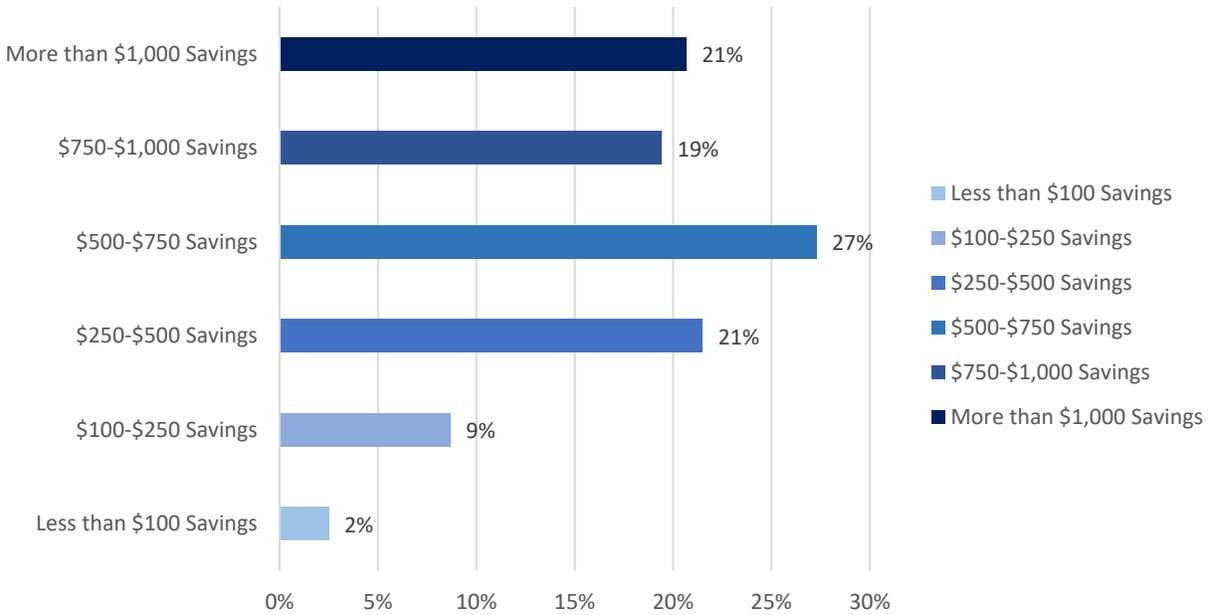
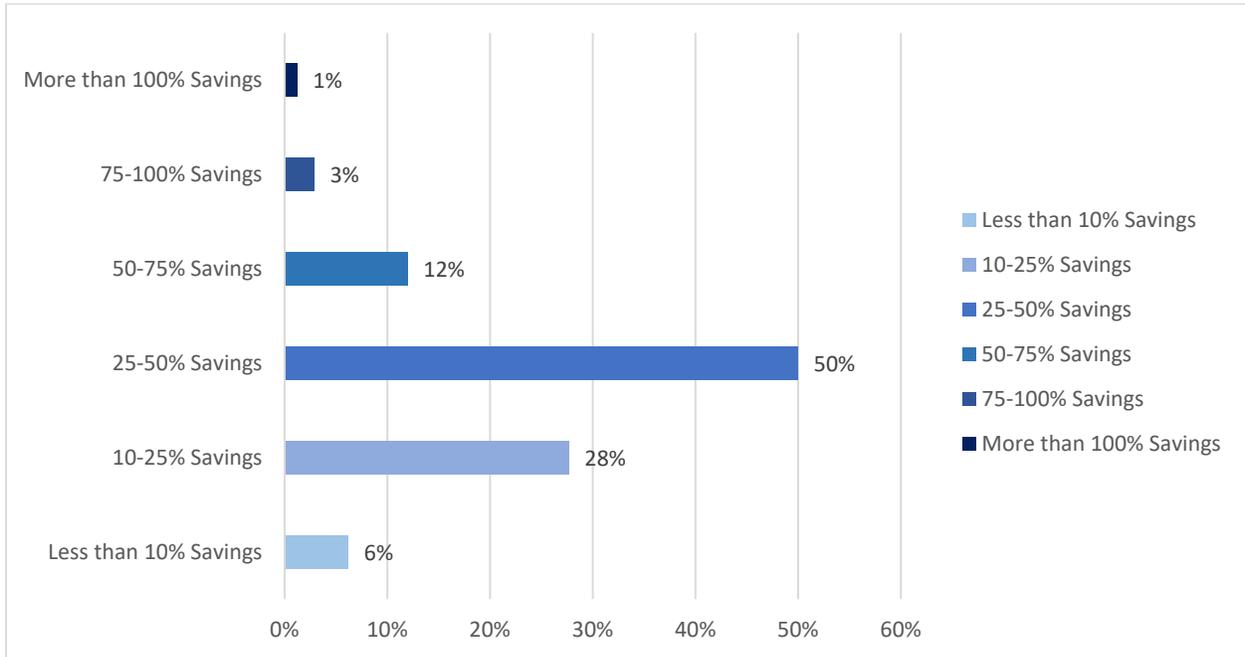


Figure 3. 2019 Solar for All Customer Net Savings by Percent (%) of Pre-Solar Electric Bill



Within the Solar for All sample, 61% of customers income-qualified for the LMI PBI, which is consistent with the broader portfolio’s ratio of LMI-PBI to PBI customers. When comparing LMI PBI to PBI customers, the sample revealed that the distribution of savings was roughly the same between the two groups, with most customers saving between \$500 and \$750 (27% and 28% respectively).

Table 2. 2019 Solar for All Customer Net Savings by Incentive Type

Net Savings	LMI PBI Customers	PBI Customers	Grand Total
Less than \$100 Savings	3%	2%	2%
\$100-\$250 Savings	9%	7%	9%
\$250-\$500 Savings	22%	21%	21%
\$500-\$750 Savings	27%	28%	27%
\$750-\$1,000 Savings	20%	19%	19%
More than \$1,000 Savings	20%	22%	21%
<b>Grand Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

On average LMI PBI customers in the Solar For All Program, saved \$679 through their solar lease and PBI customers saved an average of \$699, with both groups saving nearly 34% of their pre-solar electric bill, on average.

Table 3. 2019 Solar for All Average Customer Savings by Incentive Type

Incentive Type	Average Net Dollar (\$) Savings	Average Net Savings Percent (%)
LMI PBI	\$679	34%
PBI	\$699	33%
<b>Grand Total</b>	<b>\$687</b>	<b>34%</b>

Table 4: 2019 Net Savings for LMI PBI Only and Solar for All Customers

Program	Average Net Dollar (\$) Savings	Average Net Savings Percent (%)
LMI PBI Only	\$349	18%
Solar for All	\$687	34%

When comparing solar savings attained by the LMI PBI Only program and the Solar for All program, it is important to note that the LMI PBI Only dataset is very small, including only 10 projects, and the majority (90%) of those were completed in Eversource service territory which has a lower \$/kWh electric rate. By contrast, the majority (67%) of Solar for All projects were completed in UI service territory which has a higher \$/kWh electric rate. Additionally, the annualized average lease rate through the Solar for All program is approximately \$260 less than the annualized average PPA rate for the LMI PBI program.

## Energy Efficiency Savings

All customers that participate in the RSIP are required to complete a home energy audit through the utility-run Home Energy Solutions (“HES”) program. A HES visit consists of an assessment of

the home’s energy performance as well as the installation of basic weatherization and energy saving measures. It is estimated that a HES audit saves customers \$200-\$250 annually.<sup>8</sup> Customers that went solar through the RSIP and were eligible for the LMI PBI all completed a HES audit and are estimated to be saving an additional \$200-\$250 per year in addition to their solar savings. As a result, customers whose project received the LMI PBI but did not install solar with PosiGen are estimated to have saved an average of \$549-\$599 in 2019 as a result of their participation in the RSIP and HES programs.

Customers that participate in the Solar for All program, receive a package of “deeper” energy efficiency measures on top of their HES services. The services each customer receives are in addition to the services they receive as part of the HES program and provide increased energy savings. The deeper measures include recommended measures resulting from the HES program. Through this portion of Solar for All product, each customer receives \$2,400 worth of efficiency measures and the cost of the service is rolled into their monthly price for the 20-year term of the lease. Estimates of savings achieved through these efficiency measures are calculated based on the deemed savings for each individual measure, as stated in the Connecticut Program Savings Document<sup>9</sup>.

Estimated savings from the additional energy efficiency improvements made in the home are calculated for each customer. Based on these calculations, PosiGen customers in the sample saved an average of \$403 from energy efficiency in addition to their solar savings and savings from the HES program. The range of savings from additional recommended EE measures estimated for customers in the dataset was \$19 -\$1343. Based on these estimates of energy efficiency savings, customers that participated in the Solar of All program are estimated to have saved an average of \$1,315 in 2019.

Table 5. 2019 Estimated Average Total Customer Savings

Program	Average Net Solar Savings	Average Estimated Energy Efficiency Savings	Average Estimated Total Customer Savings
LMI PBI Only	\$349	\$200-\$250	\$549-\$599
Solar for All	\$687	\$603-\$653	\$1290-\$1340

<sup>8</sup> <https://www.energizect.com/your-home/solutions-list/home-energy-solutions-core-services>

<sup>9</sup> [https://www.puc.nh.gov/EESE%20Board/EERS\\_WG/ct\\_trm.pdf](https://www.puc.nh.gov/EESE%20Board/EERS_WG/ct_trm.pdf)

Figure 4. Average Annual Customer Savings: Energy Efficiency and Solar PV.

