



# Memo

**To:** Connecticut General Assembly – Energy & Technology Committee  
**From:** Bryan Garcia (President & CEO) and Sergio Carrillo (Managing Director of Incentive Programs)  
**Cc:** Board of Directors of the Connecticut Green Bank, Brian Farnen (General Counsel and CLO), James Desantos (Associate Director and Legislative Liaison), Eric Shrago (Vice President of Operations)  
**Date:** January 1, 2023  
**Re:** Progress Report on the Residential Solar Investment Program (RSIP)

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## Progress Toward RSIP Policy Goals

This memorandum provides an update on progress toward the public policy goals of the Residential Solar Investment Program (RSIP) and how the Connecticut Green Bank (“Green Bank”) supported the sustained orderly development of CT’s residential solar PV industry and related policy goals.

RSIP was legislatively enabled through Section 106 of Public Act (PA) 11-80<sup>1</sup>, updated by PA 15-194<sup>2</sup>, PA 16-212<sup>3</sup> and most recently by PA 19-35<sup>4</sup>, amending Connecticut General Statute (CGS) at Section 16-245ff<sup>5</sup>. The Green Bank is providing progress updates on the following provisions of Section 16-245ff:

(4)(b) The Connecticut Green Bank, established pursuant to section 16-245n, shall structure and implement a residential solar investment program established pursuant to this section that shall support the deployment of not more than three hundred fifty megawatts<sup>6</sup> of new residential solar photovoltaic installations located in this state on or before (1) December 31, 2022, or (2) the deployment of three hundred fifty megawatts of residential solar photovoltaic installation, in the aggregate, whichever occurs sooner. The procurement and cost of such program shall be determined by the bank in accordance with this section.

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<sup>1</sup> PA 11-80: <https://www.cga.ct.gov/2011/ACT/Pa/pdf/2011PA-00080-R00SB-01243-PA.pdf>, “An Act Concerning the Establishment of the Department of Energy and Environmental Protection and Planning for Connecticut’s Energy Future.”

<sup>2</sup> PA 15-194: <https://www.cga.ct.gov/2015/act/pa/pdf/2015PA-00194-R00HB-06838-PA.pdf>, “An Act Concerning the Encouragement of Local Economic Development and Access to Residential Renewable Energy.”

<sup>3</sup> PA 16-212: <https://www.cga.ct.gov/2016/act/pa/pdf/2016PA-00212-R00SB-00366-PA.pdf>, “An Act Concerning Administration of the Connecticut Green Bank, the Priority of the Benefit Assessments Lien under the Green Bank’s Commercial Sustainable Energy Program and the Green Bank’s Solar Home Renewable Energy Credit Program.”

<sup>4</sup> PA 19-35: <https://www.cga.ct.gov/2019/ACT/pa/pdf/2019PA-00035-R00HB-05002-PA.pdf>, “An Act Concerning a Green Economy and Environmental Protection.”

<sup>5</sup> [https://www.cga.ct.gov/current/pub/chap\\_283.htm#sec\\_16-245ff](https://www.cga.ct.gov/current/pub/chap_283.htm#sec_16-245ff) (Residential Solar Investment Program)

<sup>6</sup> All solar PV capacity units in this progress report are provided in direct current (DC). The performance of PV modules and arrays are generally rated according to their maximum DC power output (watts).

(4)(d)(3) provide incentives that decline over time and will foster the sustained, orderly development of a state-based solar industry;<sup>7</sup>

(4)(j) On or before January 1, 2017, and every two years thereafter [(e.g., January 1, 2023)] for the duration of the program, the Connecticut Green Bank shall report to the joint standing committee of the General Assembly having cognizance of matters relating to energy on progress toward the goals identified in subsection (b) of this section.

In addition to reporting on CGS Section 16-245ff, the Green Bank is providing updates on:

- Benefits and trends in deploying residential solar PV, including societal impact, as well as deployment in vulnerable communities.
- Regulatory implementation of the policy transition from net metering to a tariff compensation structure, as put forth in PA 18-50 and updated by PA 19-35.

### **RSIP Progress toward 350 MW**

Over the past 10 years, and through June 30, 2022, 46,657 projects totaling 380 MW (DC) of residential solar PV were approved through the RSIP, achieving over 100% of the 350 MW (DC) public policy goal under Section 16-245ff.

Starting in January 2022, the Green Bank turned its focus to achieving the public policy objective of fostering the sustained, orderly development of a state-based solar industry in light of COVID-19 impacts and in the transition from net metering plus RSIP to a tariff compensation.

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<sup>7</sup> Section 16-245ff (4)(d): The Connecticut Green Bank shall develop and publish on its Internet web site a proposed schedule for the offering of performance-based incentives or expected performance-based buydowns over the duration of any such solar incentive program. Any such direct financial incentives shall only apply to the first twenty kilowatts of direct current of the qualifying residential solar photovoltaic system. Such schedule shall: (1) Provide for a series of solar capacity blocks the combined total of which shall be a maximum of three hundred-fifty megawatts and projected incentive levels for each such block; (2) provide incentives that are sufficient to meet reasonable payback expectations of the residential consumer and provide such consumer with a competitive electricity price, taking into consideration the estimated cost of residential solar installations, the value of the energy offset by the system, the cost of financing the system, and the availability and estimated value of other incentives, including, but not limited to, federal and state tax incentives and revenues from the sale of solar home renewable energy credits; **(3) provide incentives that decline over time and will foster the sustained, orderly development of a state-based solar industry;** (4) automatically adjust to the next block once the board has issued reservations for financial incentives provided pursuant to this section from the board fully committing the target solar capacity and available incentives in that block; and (5) provide comparable economic incentives for the purchase or lease of qualifying residential solar photovoltaic systems or power purchase agreements from such systems. The Connecticut Green Bank may retain the services of a third-party entity with expertise in the area of solar energy program design to assist in the development of the incentive schedule or schedules. The Department of Energy and Environmental Protection shall review and approve such schedule. Nothing in this subsection shall restrict the Connecticut Green Bank from modifying the approved incentive schedule to account for changes in federal or state law or regulation or developments in the solar market when such changes would affect the expected return on investment for a typical residential solar photovoltaic system by ten per cent or more. Any such modification shall be subject to review and approval by the department.

## Sustained, Orderly Development of CT Solar PV Industry

To foster the sustained, orderly development of a solar industry in the state, the Green Bank approved up to 32 MW of additional capacity beyond the 350 MW statutory target, including up to 10 MW to ensure RSIP reached its statutory target. The Green Bank also authorized an additional 22 MW to support the residential solar PV industry toward achieving sustained orderly development in the context of COVID-19 impacts. The Green Bank assumed cost-recovery risk for this additional 32 MW of approved capacity outside of the legislatively mandated RSIP program. The non-legislated extension of RSIP was called the Residential Solar Investment Program Extension (RSIP-E).

Figure 1 provides a perspective on projects incentivized through RSIP and RSIP-E from FY 2012 through FY 2022. The average RSIP incentive was reduced steeply as shown by the lower/green portion of the bars in the chart, roughly 90% from \$1.75/W in FY 2012 to \$0.17/W in FY 2022, while the average net cost to the customer shown in the upper/black portion of the bars has stayed roughly stable, from \$3.37/W to \$3.46/W (with some fluctuations) over the same time period. Average installed costs have decreased 29% from \$5.13/W in FY 2012 to \$3.63 in FY 2022 while deployment has increased 2400% from nearly 2 MW in FY 2012 to between 50-60 MW in recent years.

In recent years, however, installed costs in Connecticut have not decreased as anticipated due to various factors including federal import tariffs, pandemic impacts, supply chain constraints and increasing equipment and raw material costs, rising customer acquisition costs, and increasing costs of doing business, despite ongoing solar PV soft cost reduction efforts at the federal and state levels.

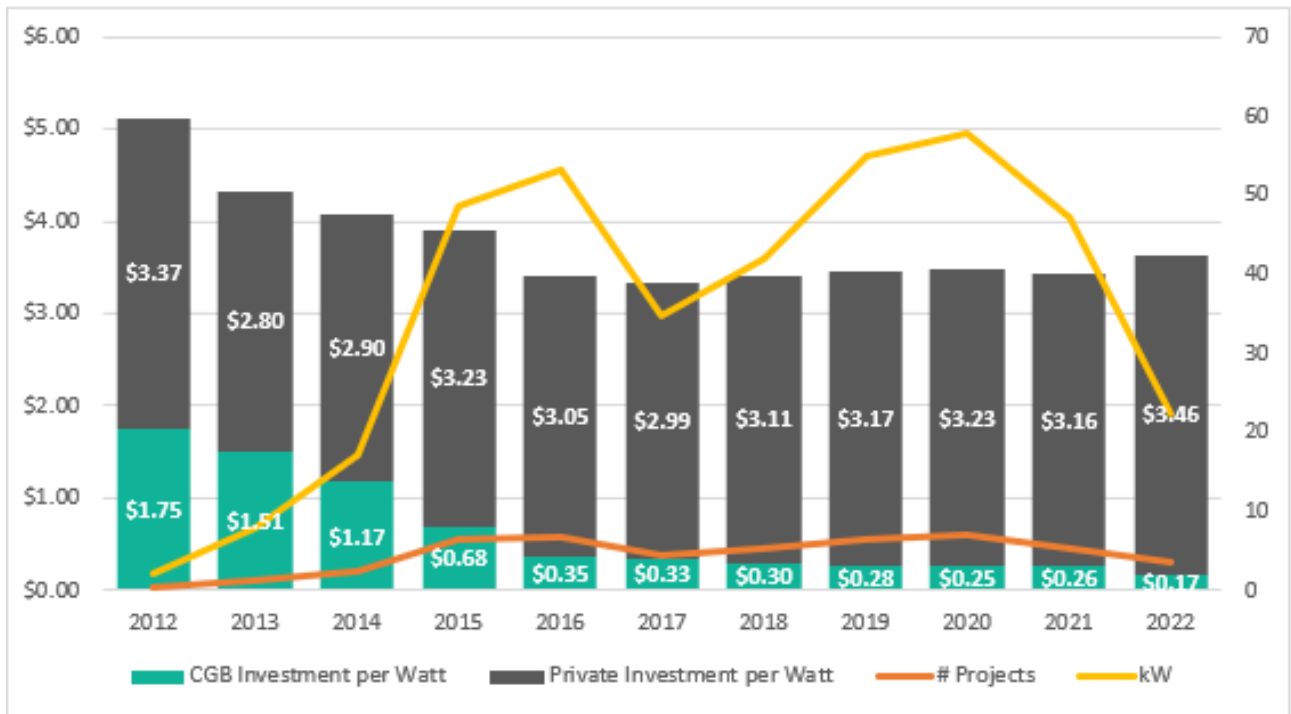


Figure 1. RSIP and RSIP-E Historical Installed Costs, Incentives, Net Customer Cost, Installed Capacity, FY 2012-2022

Overall RSIP and RSIP-E milestones as of the end of FY22 are:

- 380 MW or 46,657 projects have been approved through RSIP and RSIP-E since FY12, with over 376 MW or 46,148 projects completed.
- Total investment in RSIP has reached \$1.4 billion, with Green Bank leveraging nearly \$1.3 billion in private capital by investing \$157.1 million in RSIP REC-based incentives, a leverage ratio of 9.1 for the program through FY22.

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## Transition to New Solar Tariff

Over the past 2 years, the Green Bank team supported the transition from RSIP plus net metering to the new tariff structure, which concluded with the official end of RSIP on 12/31/2021, and the launching of the Residential Renewable Energy Solutions (RRES) Program by Eversource and United Illuminating. After this date RSIP did not accept additional incentive applications.

The Green Bank's contributions to the new tariff included the just, reasonable, and adequate rate of return of 10% to system owners used to calculate the tariff rates, inclusion of multifamily affordable housing in the definition of residential customers, additional adders for low-income families and projects located in distressed communities, direct payments, and requirement for energy audit (e.g., Home Energy Solutions).

As of November 30, 2022 the utilities reported applications under RRES of over 100 MW, far exceeding the best year of RSIP around 60 MW, which is an indication of the strength of the local solar industry at the sunset of RSIP.

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## Societal Impacts

As of June 30, 2022, the Green Bank estimates that the RSIP and RSIP-E systems have combatted climate change by avoiding the emission of 6,031,211 tons of CO<sub>2</sub> over their lifetime. This Greenhouse Gas reduction is the equivalent to 6.6 million acres of forest or 13.6 billion miles driven in a car. The RSIP and RSIP-E systems further improve the air quality in the state by avoiding the emissions 6,225,526 pounds of NO<sub>x</sub>, 5,484,954 of SO<sub>2</sub>, and 519,718 pounds of particulate matter<sup>8</sup>. These improvements in air quality are estimated to add between \$189 million and \$427 million in savings to the Connecticut economy by avoiding illnesses such as asthma and heart attacks<sup>9</sup>.

In addition to these benefits, the installation of the RSIP and RSIP-E systems has created more than 6,700 direct jobs and 9,700 indirect and induced jobs. These jobs and the associated corporate activity have generated \$33 million in personal income taxes and \$11 million in corporate income taxes<sup>10</sup>.

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<sup>8</sup>All figures come from the Green Bank's Annual Consolidated Financial Report: <https://www.ctgreenbank.com/wp-content/uploads/2022/10/Connecticut-Green-Bank-FY22-ACFR-FINAL-2022.10.21.pdf>. More information on the Green Bank's environmental impact methodology can be found here: <https://www.ctgreenbank.com/wp-content/uploads/2018/01/CGB-Eval-IMPACT-091917-Bv2.pdf>. The Green Bank uses the EPA's GHG equivalency calculator here: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results>

<sup>9</sup> All figures come from the Green Bank's Annual Consolidated Financial Report: <https://www.ctgreenbank.com/wp-content/uploads/2022/10/Connecticut-Green-Bank-FY22-ACFR-FINAL-2022.10.21.pdf>. More information on the Green Bank's Public Health impact methodology can be found here: <https://www.ctgreenbank.com/wp-content/uploads/2018/03/CGB-Eval-PUBLICHEALTH-1-25-18-new.pdf>

<sup>10</sup> All figures come from the Green Bank's Annual Consolidated Financial Report: <https://www.ctgreenbank.com/wp-content/uploads/2022/10/Connecticut-Green-Bank-FY22-ACFR-FINAL-2022.10.21.pdf>. More information on the Green Bank's Tax Revenue impact methodology can be found here: <https://www.ctgreenbank.com/wp-content/uploads/2018/09/CGB-Eval-Tax->

The Green Bank has sought to make sure that the benefits of the Green Economy are available to all residents in the state of Connecticut. After noticing a disparity in terms of where RSIP systems were being installed, the Green Bank created a Low-to-Moderate-Income Incentive Adder and worked to bring PosiGen, a solar installer with deep experience in working with LMI communities, to Connecticut. As a result, Connecticut has gone beyond parity meaning that uptake of solar is at or beyond parity in vulnerable communities and communities of color.

During the fall 2020 Special Session, the Connecticut General Assembly passed Public Act 20-5 to address emergency response by the state's electric utilities during recent storms. Within the resiliency aspects of the bill, a definition for "vulnerable communities" was included: "Vulnerable communities" means populations that may be disproportionately impacted by the effects of climate change, including, but not limited to, low and moderate income communities, environmental justice communities pursuant to section 22a-20a, communities eligible for community reinvestment pursuant to section 36a-30 and the Community Reinvestment Act of 1977, 12 USC 2901 et seq., as amended from time to time, populations with increased risk and limited means to adapt to the effects of climate change, or as further defined by the Department of Energy and Environmental Protection in consultation with community representatives". As of the 30<sup>th</sup> of June 2022, 50% of all RSIP and RSIP-E systems were installed in Vulnerable Communities<sup>11</sup>.

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## Next Steps

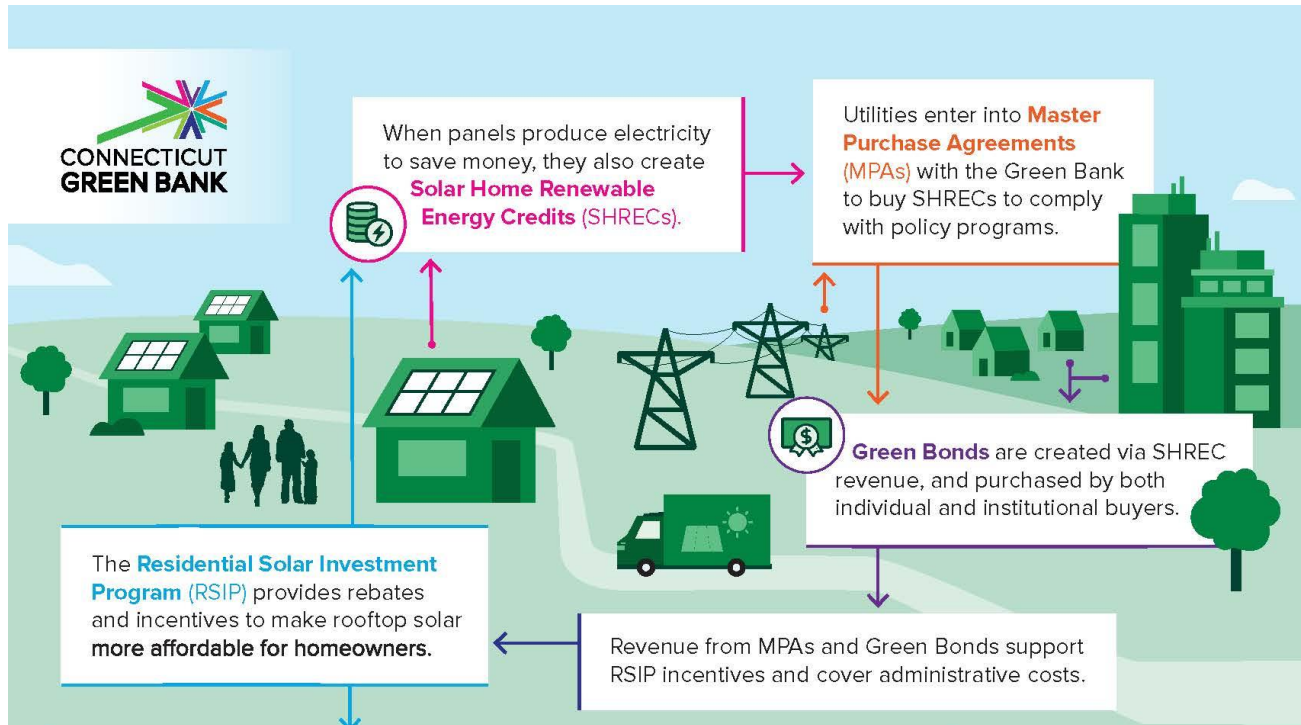
The Green Bank has engaged with Slipstream, Inc to conduct a program evaluation of the RSIP including a comparison to programs in other states. This report will be completed in 2023 and will be provided to this committee when ready.

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[Methodology-7-24-18.pdf](https://www.ctgreenbank.com/wp-content/uploads/2018/03/CGB_DECD_Jobs-Study_Fact-Sheet.pdf). More information on the Green Bank's job creation methodology can be found here: [https://www.ctgreenbank.com/wp-content/uploads/2018/03/CGB\\_DECD\\_Jobs-Study\\_Fact-Sheet.pdf](https://www.ctgreenbank.com/wp-content/uploads/2018/03/CGB_DECD_Jobs-Study_Fact-Sheet.pdf)

<sup>11</sup> All figures come from the Green Bank's Annual Consolidated Financial Report: <https://www.ctgreenbank.com/wp-content/uploads/2022/10/Connecticut-Green-Bank-FY22-ACFR-FINAL-2022.10.21.pdf>. More information on vulnerable communities definitions can be found here: [https://www.ctgreenbank.com/wp-content/uploads/2021/10/Equity\\_Investment\\_in\\_Vulnerable\\_Communities.pdf](https://www.ctgreenbank.com/wp-content/uploads/2021/10/Equity_Investment_in_Vulnerable_Communities.pdf)

# Residential Solar Investment Program Surpasses Its Goal a Year Early



## Residential Solar Investment Program (RSIP)

Through a network of contractors, the Green Bank helped **43,000+ households** access solar energy since 2012, surpassing the statutory target of 350 MW one year ahead of the December 2022 deadline.

**\$1.33 billion**  
Total investment

**\$149.7 million**  
Total incentive

**\$0.43/W\***  
Incentive (\$31 per Zero Emission Renewable Energy Credit Equivalent)

**\$3.80/W**  
Installed Cost



### Solar Power Generation

**350 MW** Capacity  
**9,966,706 MWh** Estimated lifetime generation



### Connecticut's Solar Industry

**15,437** Jobs created  
**\$41.9 million** Tax revenue generated

**6,291** Direct  
**9,146** Indirect and induced



### Solar and Energy Efficiency for All

- 50% of RSIP projects have been deployed in **vulnerable communities**
- 98% of RSIP projects had **energy audits** (i.e., Home Energy Solutions)



### Environmental Impact

Through the production of zero emission renewable energy, the lifetime reduction of greenhouse gases is equivalent to:

**5.5 million** Tons of CO<sub>2</sub>  
**606,686** Homes energy use

**6.1 million** Acres of forests  
**12.6 billion** Miles driven

**\$397.8 million** Public health cost reduction from cleaner air



### SHREC Backed Bonds

Consumer demand is greater than the supply of bonds, showing consumers' high interest in supporting investment to confront climate change in Connecticut.

Green bonds are certified and verified by a third-party for consumer protection.

\*Average incentive over life of the program