

Case Study

# CT Solar Lease 2

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# Executive Summary

In 2014, the Connecticut Green Bank (CGB) released the second edition of its CT Solar Lease program in an attempt to create an accessible financing solution for independent local contractors to support the rising demand for residential and commercial solar systems.

This case study focuses on the residential side of the solar-lease program. The program combined public funds and private capital to finance residential solar projects and solar water heaters.

CT Solar Lease 2 stemmed from a response to a gap in the market that was clearly felt by both contractors and homeowners—especially since the successful execution of CT Solar Lease 1. Over the span of two years, the new program financed 1,192 residential solar PV projects—amounting to over \$43 million in investment and 9.5 MW of solar installations.

The program provided 27 contractors with training to take advantage of the growing local market as well as the various state and federal incentives. It also provided them with important sales and marketing tools. This product experienced extremely high demand. It was well-received by both homeowners and contractors.

This case delves into the financing structure of the program and presents the lessons learned from implementation challenges. One central challenge was that contractors initially had a difficult time adapting to the requirements of the program. Also, the solar-hot-water-financing aspect of the program failed due to contractors being discouraged by its one-size-fits-all design. There was also resistance to financing replacing the prior subsidy model—which was funded by ARRA funds that had been depleted.<sup>1</sup>

In the case of the one-size-fits-all approach, increased conversations with contractors might help prevent roadblocks like these from impeding solar financing. And in the case of the financing model, channeling product offerings through a somewhat limited but highly incentivized group of contractors might help to prevent these issues.

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<sup>1</sup> American Recovery and Reinvestment Act funding from the United States Department of Energy to State Energy Programs

# Problem

New England is notorious for its high electricity costs—the highest among all the regions in the nation. Connecticut residents spend more on electricity than those in any other state in the continental United States. According to U.S. Energy Information Administration data from October 2016, they paid up to 19.95 cents per kWh of electricity used. This is much higher than the national average of 12.46 cents per kWh.

Connecticut’s energy policy goals are to provide cheap, clean, and reliable energy. They also include using private capital motivated by the new green bank to finance these improvements for homeowners, businesses, nonprofits, schools, and municipalities.

In addition to the federal 30% Investment Tax Credit (ITC) available for solar panels, there are several state policies that make solar extremely attractive for residential customers in Connecticut. To start with, Connecticut’s Renewable Portfolio Standard (RPS) sets a goal of expanding renewable energy to 23% of the state’s electricity by 2020. By 2014, only 3.5% of the state’s net electricity generation came from renewable energy sources. Connecticut still had a long way to go to meet its 2020 RPS goal.

To facilitate this goal, the state has a number of incentives and policies that support the proliferation of renewables. They are shown in Table 1 below.

INCENTIVE	DESCRIPTION
Net Metering Policy	Connecticut has a positive net metering policy.
Performance Based Incentive (PBI) for Third-Party-Owned Systems or Expected Performance-Based Buydown incentive (EPBB)	Through the PBI, a rebate is paid to the third-party system owner on the basis of actual performance over the course of six years. The EPBB is an incentive for homeowners who elect to purchase and own their solar PV systems. Regardless of whether customers use cash or financing, the incentive is paid in two installments. The final installment is paid after completion and a successful inspection.
Property Tax Incentive	This incentive exempts property tax for renewable energy systems that serve up to four-unit residential dwellings.
Sales and Use Tax Incentive	This is an exemption on the sales tax that would ordinarily apply to equipment and installation costs for solar PV systems.

**Table 1.** Connecticut’s State Solar Incentives

Despite the incentives, only 870 homes in Connecticut had solar installed on their rooftops as of 2008. Market penetration for solar, even using the most conservative market definitions, was still only 0.68% of potential customers. According to GeoStellar, given the federal and state policies for solar, over 500,000 Connecticut rooftops could carry solar panels and produce net present value gains.

CGB provided financial support by combining ratepayer capital with private capital. It also ran several educational programs to increase awareness about the benefits of solar PV for residents and provide training for independent contractors.

The first CT Solar Lease product was introduced in 2008. It was the first program of its kind to offer a \$0 down payment for a solar PV system. It was well-received by both homeowners and contractors. The funds were deployed until 2011, when funding ran out.

## COMPLICATIONS

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### Barriers to Adoption

Despite the untapped potential in Connecticut and the successful first iteration of a lease product, very few households with positive solar economics had installed systems as of 2011. As of the end of that year, approximately 1,700 customers had installed solar through the solar lease program. Additional systems were sold outside of the program.

The upfront investment to purchase solar panels was a major barrier to adoption. Before CGB's solar financing programs, there were no solar lease or solar loan programs available in Connecticut.<sup>2</sup> As a result, low- and moderate-income households typically lacked the access to funding to make the investment. Higher-income households formed the bulk of "early adopters." But even among this cohort, an investment in solar PV was often perceived as risky.

Few households understood the economic benefits. This was due to the large upfront cost, long payback period, potential repair/maintenance requirements, and high tax and policy complexity. The process of purchasing clean energy was not straightforward for consumers.

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### SolarCity in Connecticut

National installers—most prominently, SolarCity—began entering the Connecticut market with a third-party ownership model in 2012.

With this model, customers typically paid zero dollars upfront to have solar panels installed on their roofs. Customers then made monthly payments to SolarCity, which owned the system. These payments were lower than their previous utility bills. SolarCity went from a 0% market share in 2011 to a 25% market share in 2013.

Research by Jeffrey Schub of Coalition for Green Capital suggests that growth in the third-party ownership model was a key driver for rapidly increasing residential installation rates in Connecticut. After years of negative growth in the market, the residential solar market grew by 262% year-on-year in 2012. (This figure is based on the number of customers.)

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<sup>2</sup> A few solar panel manufacturers offered solar loans, but only for their specific equipment. Other solar financing options required a mortgage on the properties, were cumbersome to obtain, and required a lengthy application and underwriting process.

With the entry of national installers, local contractors lost market share. The smaller, local installers had difficulty offering a third-party-ownership model because they could not take advantage of the federal investment tax credit (ITC) and lacked access to tax equity financing. Lack of competition in the market as the local contractors lost market share was a barrier to driving costs down and ramping adoption up.

Tax equity financing takes place when equity investors partner with commercial debt providers and tax equity investors to finance solar projects where tax credits are available.

In addition, national installers were only offering leases to high-FICO-score customers—above 700 at the time of program design—and were only operating in select areas of the state. New solutions were needed to expand solar leases to lower-FICO-score customers across all areas of the state. Local, independent installers began asking CGB for an extension to the original CT Solar Lease program so that they could offer financing competitively to customers.

## Solution

Responding to the demand for solar lease options, CGB developed a new lease product: CT Solar Lease 2. The product was designed to fund all upfront costs of solar installation and give Connecticut customers a power price lower than the grid with steady savings over a 20-year lease.<sup>3</sup> CGB pooled many residential leases and established a partnership with a tax equity investor to take advantage of the ITC.

## DEVELOPING A COMPLEX NETWORK: PROGRAM STRUCTURE AND FINANCING

CGB established partnerships with private lenders (First Niagara, Webster Bank, Liberty, and People's United Bank); a tax equity investor (US Bank); a credit and payment servicer (AFC First); and an insurance provider (Assurant). Several of these partners were selected through a competitive solicitation process for the first CT Solar Lease in 2008. CGB also worked with a financial structuring advisor (Reznick Group) and legal counsel to set up the complex structure.

CGB provided sponsor equity of \$7.2 million and subordinated debt of \$2.3 million for a \$9.5 million investment. US Bank invested \$23.6 million. The lenders' syndicate provided \$26.7 million in debt for the purchase of solar PV and solar-hot-water equipment.

This resulted in a leverage ratio of 5:1 with significantly more private investment and less state investment compared to the first CT Solar Lease, which was funded on a 1:1 basis.

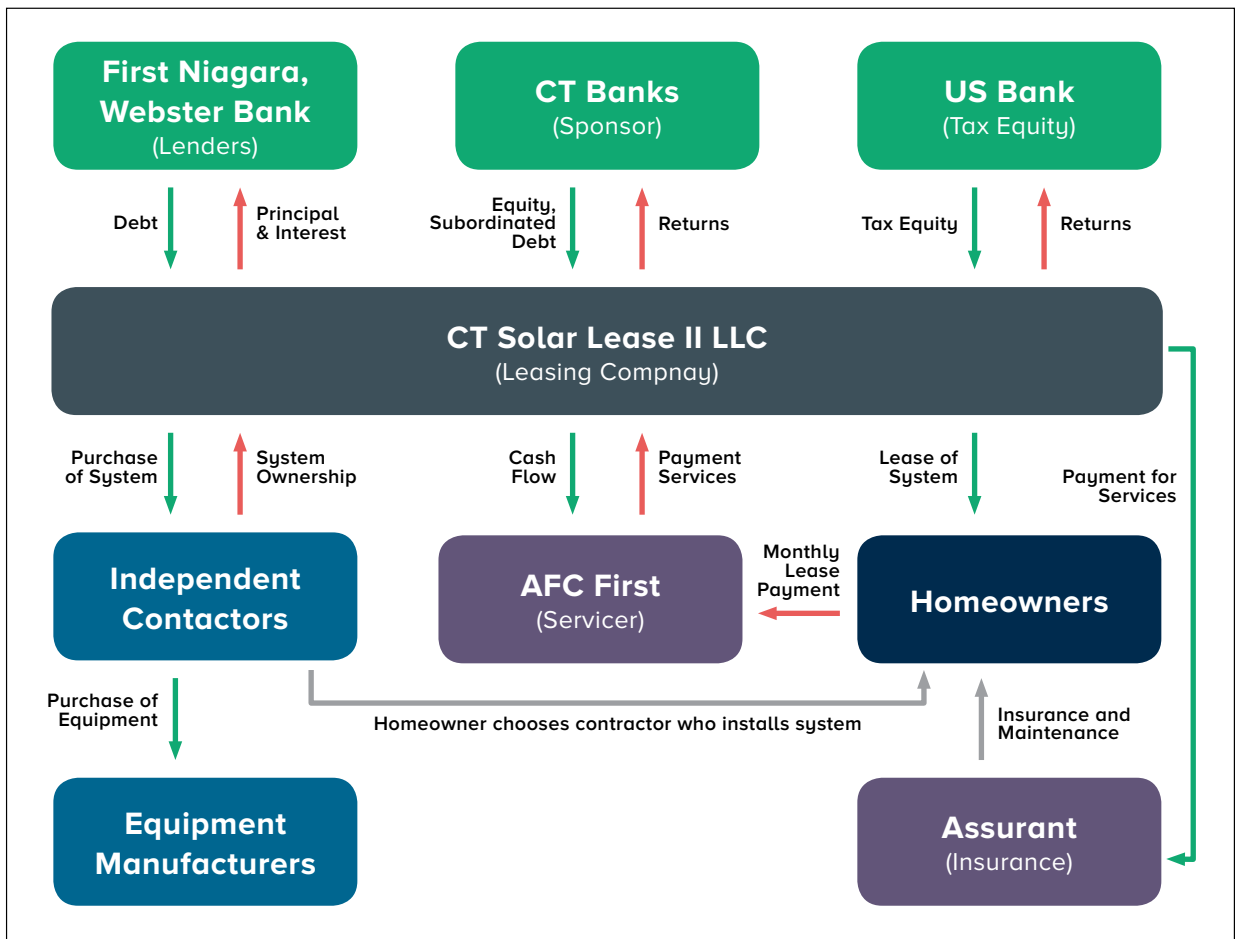
In addition to sponsor equity, CGB provided three other forms of support to make all partners comfortable with the financing structure.

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<sup>3</sup> While Solar Lease 2 provided solar lease funding for both residential as well as larger, commercial-sized systems, the focus of this case study is on the residential aspects of the program.

1. **Loan Loss Reserve:** \$3.5 million of repurposed ARRA funds are the first to cover any losses from delinquencies or defaults. The loan loss reserve improved the debt service coverage ratio (DSCR), which in turn lowered the cost of capital raised from commercial banks and improved the probability of return for equity investors. The reserve also provided comfort from a credit perspective, which enabled expansion to lower-FICO-score customers. This was an important goal of the product.
2. **Performance Based Incentives (PBI):** An estimated \$15–16 million in state incentives, which apply in per-kWh state incentives for residential solar systems, increased returns for equity investors and diversified cash flows for debt investors. All or nearly all of the ratepayer funds paid out through the PBI were expected to be repaid to CGB through the structure. This repayment would come through CGB’s equity position.
3. **Subordinated Debt:** CGB provided subordinated debt at a reduced rate of 2.5% to increase the likelihood of senior debt repayment.

As the sponsor, CGB planned to oversee a complex network of legal and payment relationships among these entities, contractors, and customers. CGB established a new special purpose vehicle (SPV) as the leasing company. The diagram below illustrates the players in CT Solar Lease 2 along with their financial flows, ownership transfers, and respective services.



**Note** The SPV structure is simplified in this diagram. The actual structure includes two entities—CT Solar Lease II, LLC and CEFIA Holdings, LLC—that serve different functions.



The financing structure can be summarized as follows:

1. The homeowner chooses a qualified contractor, applies for lease financing, and signs a lease.
2. The contractor purchases solar equipment from a manufacturer and installs it on the home.
3. Debt and equity financing flow into the SPV for the purchase of solar equipment.
4. The SPV purchases the solar system from the contractor and becomes the owner.
5. The homeowner makes monthly lease payments to the SPV through the servicer, AFC First.
6. Lenders and equity providers are repaid with cash flows from the monthly lease payments.
7. Assurant provides insurance on the projects and delegated maintenance services over the lease term.

## EXPANDING OPTIONS FOR HOMEOWNERS: ELIGIBILITY AND LEASE TERMS

With CT Solar Lease 2, homeowners chose their own solar installers. The ability to choose from qualified contractors across the state ensured that all Connecticut homeowners, not just populations targeted by national installers, could participate in a solar lease.

Homeowners with FICO scores of 640 or higher were eligible for the product. Reaching lower-FICO-score customers expanded the potential universe of solar customers and made the product more accessible to low- and moderate-income customers. Residential properties could receive financing for systems up to 10 kW or \$45,000.

A standard lease was offered with a 20-year term and the option to extend the lease for another five years at a significantly reduced price. Lessees had the opportunity to purchase the systems after five years of successful repayment. Customers made monthly payments to AFC First. Assurant provided a “one-call” issue resolution product over the entire lease term along with insurance for the solar projects themselves for the SPV.

## WORKING CLOSELY WITH THE INDEPENDENT CONTRACTORS: EDUCATION FOR IMPROVED RESULTS

A major goal of CT Solar Lease 2 was to help local contractors gain sophistication in their product offerings and expand their access to this kind of third-party financing. CGB provided contractors with a great deal of training. The team created marketing materials to clearly explain the lease product’s value proposition to customers. Contractors could then use these materials to drive customer acquisition. CGB simultaneously marketed the product through its own channels.

CGB also provided onboarding for contractors regarding the process they must follow when installing leased systems. When a homeowner was interested in moving forward with a lease, the contractor would upload a work order and documentation to the CGB portal. The customer would simultaneously submit an application for financing through AFC First.

Then the contractors followed a series of steps and deadlines regarding process documentation, product installation, and ownership transfer. The ownership transfer was from the contractor to CT Solar Lease 2 LLC. This allowed projects to be included in CGB's monthly tranche of projects communicated to its investors and lenders.

CGB submitted groups of projects in monthly tranches to the tax equity investor, which gave approval before the solar systems could be energized. The contractors were paid by CT Solar Lease 2, LLC at completion based on system costs.

A 1.75% retainage fee was held in escrow for six years after installation to provide additional security and ensure that installers would stand by their workmanship for the duration of the warranty period.

## Results

Demand for the product was high and funds ran out in less than 2 years. 2,833 residential applications were received and 1,192 projects were approved. (1,026 applications were withdrawn and 615 were declined.)

The program resulted in over 9.5 MW of installed solar PV capacity. It involved 20 different residential solar PV contractors. As of June 2016, there have been no defaults and only one delinquency. Table 2 below summarizes the investment and capacity of these projects by year of installation.

YEAR	# OF PROJECTS	INVESTMENT	INSTALLED CAPACITY (KW)
2014	60	\$2,306,025	461.2
2015	486	\$18,370,999	3,966.6
2016	646	\$23,187,919	5,145.0
<b>Total</b>	<b>1,192</b>	<b>\$43,864,942</b>	<b>9,572.7</b>

**Table 2** Summary Data from CGB for CT Solar Lease 2 Residential Projects

CGB provided an important sales tool to contractors, lowered customer energy costs, and brought in significant private capital. After the CT Solar Lease 2 funds were committed, the CGB transitioned to a privately funded residential lease product. Numerous residential lease and PPA providers that work with independent contractors have entered the market as well, so CGB support for this product is no longer needed.

# Recommendations

Despite the success of the product, there were several pain points for CGB. Given that CGB is a quasi-public organization, CT Solar Lease 2 was an extremely ambitious program to take on comprehensively. This was due to its complex and layered structure. Key aspects such as program marketing, contractor training, and customer service proved to be far more time-consuming than CGB had anticipated.

The learning curve for contractors, in particular, was also much steeper than was initially expected. They encountered several hurdles—partly due to contractor paperwork and ambitious timelines. For example, there were instances where installers energized homeowners' systems before AFC First had approved the customer credit. In those cases, the project was not eligible to enter the CT Solar Lease 2 portfolio. In such situations, each entire system had to be removed and reinstalled with new equipment to qualify for the lease.

Independent contractors had parallel projects outside of CT Solar Lease 2 that ran on completely different timelines. This often made it confusing for them to follow the distinct timelines required under the lease program.

CT Solar Lease 2 was a unique product because it sought to bridge various gaps. But because it was such a novelty, it took the contractors a long time to get up to speed with the processes involved. This was a setback that CGB did not fully anticipate in the program design phase. In retrospect, a user-friendly technological platform for contractors would have helped to handle the process. Once contractors caught on, the product was fully sold fairly quickly.

In addition, as the project sponsor and developer, CGB still has to manage the 1,192 PV systems that were installed using the CT Solar Lease 2 model. Owning and managing the systems is challenging for a public organization to take on, considering technological and human constraints.

Assurant provides one-call issue resolution. But in practice, homeowners and contractors have often contacted CGB directly. This was partially because CGB had carried out the marketing campaigns associated with the product and homeowners automatically assumed that CGB was responsible for maintenance. Providing capital to a private sponsor would be a simpler choice for agencies that undertake programs like this in the future. This would allow them to delegate day-to-day operational questions.

While the solar PV aspect of the program was very successful, another residential technology that could have been financed under CT Solar Lease 2 was solar water heaters. The lease product for solar water heaters was not popular with contractors and was ultimately never used at all. Contractors that focused on PV were not interested in solar hot water. Others did not like the inflexible program design, as they were mandated to use a specific water heater from Alternate Energy Technology. Importantly, the contractors had been used to very generous incentives for solar hot water systems that existed through 2011. The pre-existence of the generous rebate program reduced the motivation of the solar hot water installers.

A takeaway from this unsuccessful aspect of the program is that it is important to include key stakeholders in the design process for new products to ensure there will be market demand. At the same time, other markets where solar hot water has been successfully marketed at scale have often been using one or a few installers that were competitively awarded franchises for the products.<sup>4</sup>

## SHIFTING TO ADDRESS NEW MARKET GAPS

CT Solar Lease 2 was also offered to commercial customers as a smaller component of the program. CGB saw much higher demand for the commercial product than it had expected. There was a total of 36 projects and 7.5 MW of capacity installed.

While larger players such as SolarCity have now entered the residential solar market, there is still a market gap for a lease model for commercial projects. The CGB has therefore expanded the commercial aspect of the program, incorporating lessons learned during CT Solar Lease 2, and is transitioning to focus on the more underserved commercial sector.

This was a successful example of the CGB shifting its focus to address market needs.

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<sup>4</sup> CGB and AET Technologies considered a limited number of installers through a competitive process but decided against this program design because it would have taken too much time to reposition the program.

# Appendix

CONTRACTOR	# OF LEASES	\$ OF LEASES	% OF LEASES
Aegis Electrical Systems, LLC	60	\$2,158,610	4.92%
AllGreenIT, Inc.	9	\$387,576	0.88%
Astrum Solar	54	\$2,137,763	4.87%
BeFree Green Energy, LLC	84	\$3,535,688	8.06%
Boston Solar	6	\$230,580	0.53%
Connecticut Solar Power, LLC	2	\$76,523	0.17%
C-TEC Solar LLC	85	\$3,061,148	6.98%
Direct Energy	114	\$4,373,528	9.97%
Earthlight Technologies	19	\$721,551	1.64%
EcoSmart Home Services	3	\$118,035	0.27%
Encon, Inc.	139	\$4,641,335	10.58%
Litchfield Hills Solar, LLC	17	\$682,940	1.56%
PurePoint Energy, LLC	7	\$270,117	0.62%
Real Goods Solar, Inc	7	\$229,775	0.52%
Renewable Resources, Inc.	4	\$136,773	0.31%
RGS Energy	100	\$3,547,073	8.09%
Ross Solar Group	88	\$3,516,632	8.02%
Sunlight Solar Energy, Inc.	35	\$1,251,128	2.85%
Trinity Solar	356	\$12,672,388	28.89%
Tuscany Solar	3	\$115,785	0.26%
<b>Total</b>	<b>1,192</b>	<b>\$43,864,942</b>	<b>100.00%</b>

**Table 3** Residential Solar PV Contractors for the CGB CT Solar Lease

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