



## Municipal Energy Financing: Lessons Learned

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### Executive Summary

Twenty states now allow cities and counties to finance energy efficiency retrofits and on-site renewable energy generation and let the recipient repay improvements via a property tax assessment. Five municipalities launched **Property Assessed Clean Energy (PACE)** programs in the past two years and these programs have spent \$37.5 million to help enable close to 2,000 voluntary residential retrofits.

Although still young and evolving, the existing PACE programs identify stumbling blocks and offer valuable lessons about program design and implementation. This ILSR Policy Brief, based on an analysis of existing programs, identifies important issues that have surfaced and comments on possible strategies for addressing them.

#### Among the issues identified are:

1. How to offer greater access to homeowners with lower incomes or lower credit ratings while maintaining the financial integrity of the program and gaining a bond rating that allows for low cost municipal financing.
2. How to lower the administrative costs and interests rates through aggregation.
3. How to resolve lien issues with lenders.
4. How to maximize energy efficiency investments.

The strategies these pioneering PACE programs have begun to elaborate to address these issues include:

- Lending guidelines require participants to have a good property tax payment history and a mortgage less than the assessed property value. Energy savings frequently outweigh assessment costs.
- Aggregating programs at the county or state level to reduce administrative costs.
- Ensuring that the PACE program complies with all laws regarding special assessments and liens, that PACE special assessments are treated like other special assessments, as well as following the White House program framework.
- Setting minimum requirements for energy efficiency before proceeding with on-site renewable energy. requirements for participation.

Ultimately, using municipal financing can make the city or county a hub in a comprehensive community-wide energy self-reliance program.

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## Introduction

Most states allow cities and counties to create special assessment districts for which bonds can be issued and repaid through property tax assessments. These districts usually assess homeowners or businesses in a specific area for physical improvements (e.g. streetlights). A growing number of states are amending the special assessment district statutes to allow for financing of energy improvements and to allow for non-contiguous (or city- or county-wide) districts so that individual homeowners or businesses in all sections of the community can benefit.

These clean energy assessment districts can be used to overcome the biggest barriers to growing renewable energy and reducing energy consumption: high upfront costs and unattractive financing terms. A local government's ability to borrow at low rates for long terms and lend the money at a small markup to residents and businesses can represent an important new tool for communities seeking to minimize energy expenditures and maximize the use of renewable energy. Local governments are already very familiar with bonding for capital improvements. Many thousands of localities raised over \$550 billion in 2008 by issuing bonds.<sup>1</sup>

Energy programs using local government financing go by many names, but the most common and generic is Property Assessed Clean Energy (PACE).

PACE programs come in many shapes and forms but a sample program may have the following components:

**Interest rate:** 7%

**Maximum financed:** 10% of home value or \$25,000

**Eligible improvements:** insulation, windows, Heating, Ventilating, and Air Conditioning (HVAC), duct work, solar photovoltaics (PV), solar thermal hot water, geothermal.

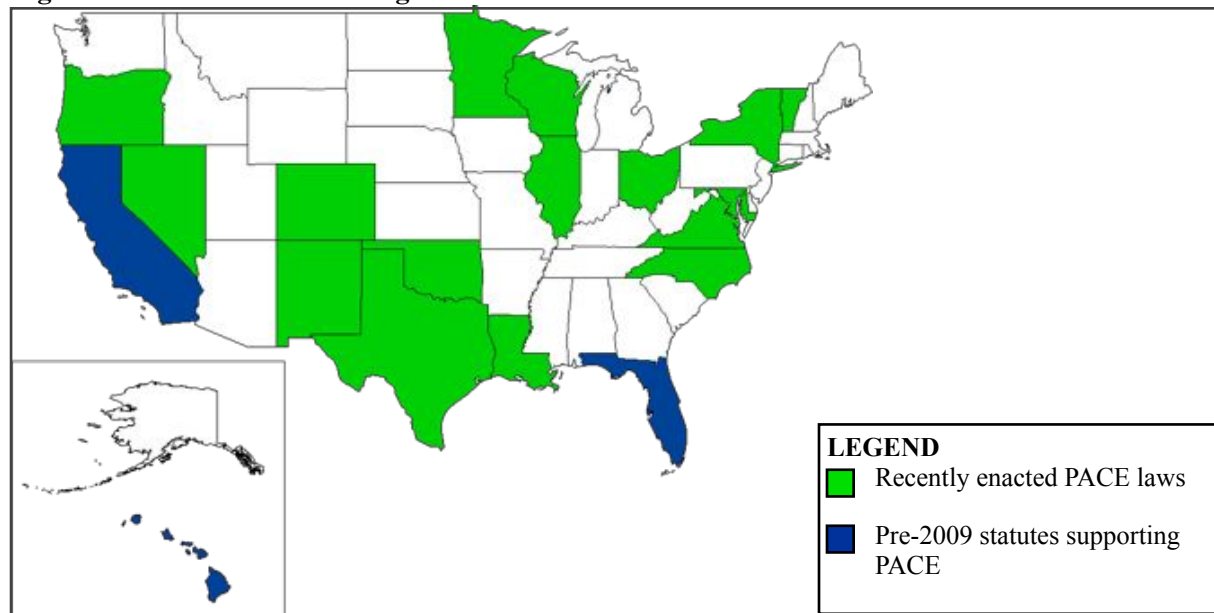
**Financing term:** 15-20 years (or less than the weighted average life of improvements)<sup>2</sup>

**Upfront cost:** \$250 audit fee, applied to cost of improvements

The advantages of utilizing local government financing include a combination of benefits:

- Allowing those without access to conventional financing sources to invest in clean energy improvements.
- Reducing or eliminating upfront costs for renewable energy and energy efficiency improvements.
- Below-market interest rates (see [Lessons Learned](#)).
- Linking on-site energy improvements with the property through the property assessment payback mechanism.
- The potential to increase property values because of lower operating costs.

Prior to 2009, three states had existing statutes supporting PACE (California, Hawaii and Florida). In California the authority was restricted to home rule cities. Legislation enacted in 2008 expanded the authority to all cities. By early 2010, 17 states had joined them, passing PACE legislation to enable local governments to finance renewable energy, energy efficiency, or both. **Figure 1** maps the states with PACE enabling authority.

**Figure 1: States with PACE Legislation**

Unlike many other policies supporting renewable energy and energy efficiency, from mandates to tax breaks, PACE legislation has been largely non-controversial and has bipartisan support. In eight states, enabling legislation passed with a unanimous vote in one or both chambers. The following table shows the vote totals for PACE enabling legislation in each state; in most states with standalone bills, there was very little opposition. Arizona is a special case, where the legislation passed in 2009 but was held out of a special session and had to be re-considered in 2010.

**Table 1: PACE Legislation and Votes by State**

State	Bill Number	House Vote	Senate Vote
Arizona	H. 2335 (2009)	41-11	28-12
Arizona	H. 2574 (2010)	47-13	pending
Colorado	HB 1350 (2008)	63-1	n/a
Illinois	SB 583 (2009)	unanimous	unanimous
Louisiana	SB 224 (2009)	unanimous	unanimous
Maryland	HB 1567 (2009)	unanimous	45-2
Minnesota	HF 2695	112-20	58-3
Nevada	SB 358 (2009)	40-1	20-1
New Mexico	HB 572 & SB 647 ('09)	unanimous	unanimous
New York	AB 40004A (2009)	unanimous	unanimous
North Carolina	SB 97	85-25	42-3
Ohio (omnibus)	HB 1 (2009)	54-44	17-15
Oklahoma	SB 668 (2009)	88-11	43-1
Oregon	HB 2626 (2009)	unanimous	27-3
Texas	HB 1937 (2009)	87-51	unanimous
Vermont (omnibus energy)	S. 54 (2009)	88-44	16-10
Virginia	SB 1212 (2009)	unanimous	unanimous
Wisconsin	AB 255 (2009)	87-11	25-8

## Implementation and Administrative Process

Municipal energy financing programs like PACE leverage the local government's familiarity with bonding and apply it to renewable energy and energy efficiency improvements on residential and commercial properties. The basic principle of a PACE program is to aggregate many small projects on a home-by-home basis into a larger pool, collectively pay for them with low-cost city or county financing (at favorable interest rates), and have individual property owners repay the financing for their improvements via a long-term property tax assessment (transferable to any new property owner).

Most programs are implemented as follows:

1. City advertises program and recruits property owners.
2. Property owners are educated about eligible investments and counseled about their best options. For programs with energy audit requirements, they are performed at this point.
3. The city reviews the applicant's credit-worthiness, typically based on property tax payment history and a comparison of the property's mortgage to assessed value.
4. Property owners sign up for financing and agree to pay for improvements via a special, long-term property tax assessment.
5. Local government issues aggregated bond, secured by the special assessments on participating properties.
6. Contractors make the efficiency improvements and/or install the renewable energy system. Contractors are typically paid directly from the bond proceeds.
7. Project energy savings may be verified by independent auditors.
8. Residents begin repaying the financing through their property tax assessment.
9. If the resident moves, the assessment (like the energy improvements) remains with the property or is negotiated between the buyer and seller.

In some cases, municipalities administer their own programs. In others, a third party can provide turnkey service for PACE programs, handling marketing, recruiting, enlistment, contracting, and financing.<sup>3</sup> Cities often pay for this service with an increment on the bond they are already issuing for the program.

## Programs

Although there are dozens of PACE programs in development (one launched in San Francisco just as we were completing this brief), the following five programs have the longest history and thus offer the most data on PACE programs.

### Babylon, NY

Total financing: \$2.5 million

Financing source: City Solid Waste Fund

Interest rate: 3%

Eligible technology: Energy efficiency, solar thermal, solar PV

Eligible sector: residential

Completed as of April 2010: 145 retrofits

Average Cost: \$7,500

Administration: City



Babylon took a unique route to financing their 2008-launched Long Island Green Homes program. By reclassifying carbon as a solid waste they were able to tap the city's solid waste fund rather than use bonding to provide project financing. Participating residents pay back financing separate assessment which, like the property tax strategy in other communities, is considered a senior lien.<sup>4</sup>

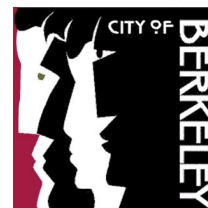
Babylon's program focuses on energy efficiency, but properties that achieve the Energy Star standard for new home construction may also apply for funds for solar PV. This standard requires a home to reduce its

energy consumption to a certain amount per square foot (compared to other similarly sized buildings in the region). Because the city does not have to sell bonds for the program fund, the interest rate for the financing is a low 3%.<sup>5</sup> However, there is no way to expand the program without increasing solid waste fees, so Babylon is exploring private financing options.<sup>6</sup>

To date properties have reduced average infiltration by 23% at an average cost of \$7,500, which should translate into significant thermal and cooling energy savings (data on actual energy reduction will be available soon).<sup>7</sup>

## Berkeley, CA

Total financing: \$1.5 million  
Financing type: “micro” bonds  
Interest rate: 7.75%  
Eligible technology: Solar PV  
Eligible sector: residential  
Completed as of April 2010: 13 solar PV installations  
Administration: Contractor



In 2008, Berkeley launched one of the earliest municipal financing programs under a longstanding California state law. The program, called Berkeley FIRST (Financing Initiative for Renewable and Solar Technology), was a pilot focused on residential solar PV only. The project provided enough money – \$1.5 million – to support about 40 solar PV projects through “micro” bonds – one bond per home – that were sold to Renewable Funding. The program was administered by Renewable Funding LLC (a turnkey provider of PACE programs) and was fully subscribed nine minutes after opening in the fall of 2008.

However, only 13 of 40 participants went ahead with city-financed solar and the short pilot program’s duration precluded replacing the dropouts. The primary reason for the dropouts was that the city-provided financing at very high interest rates (7.75%) nearly double home equity loan rates for qualified applicants. In fact, 85% of the dropouts still had plans to install solar PV using other financing mechanisms.<sup>8</sup>

Because of the low participation rate and high cost of financing, the Berkeley program closed down in 2010 and has joined the new “statewide” PACE program, called CaliforniaFIRST.

## Boulder County, CO

Total financing: \$40 million  
Financing type: revenue bond  
Interest rate: 5.2% (income qualified) or 6.68%  
Eligible technology: Energy efficiency, solar hot water, solar PV, small wind, wood/pellet stoves  
Eligible sector: residential, commercial  
Completed as of March 2010: 612 retrofits  
Average cost: \$16,000  
Administration: County



Boulder County’s ClimateSmart Loan Program opened its doors in 2009 and is one of the larger municipal financing programs, receiving authorization for \$40 million in projects. As of March 2010, \$10 million had been loaned out in two phases to 282 local contractors for improvements in 612 households at an average project cost of \$16,000.<sup>9</sup> A review of the second phase of funding found that 40% of financing paid for solar panels and 22% for upgrading windows and glass doors.<sup>10</sup> Although open to both commercial and residential borrowers, the Boulder County program has attracted mostly homeowners. The Boulder County program was launched with help from Renewable Funding, LLC, but is administered by the county.

The Boulder County program is authorized under state law, but each bond offering must be approved in a county-wide referendum, like school levies. The first referendum passed in 2008, but a subsequent referendum in 2009 – to double authorized funding to \$80 million – failed by a very narrow margin. It seems that the referendum was victim of organized opposition to another environmental ballot initiative (the extension of an open space tax that also narrowly failed) as well as complacency on the part of supporters – the coalition that had driven the first referendum largely did not campaign for the second round. The PACE program expansion is on the ballot again in 2010.<sup>11</sup>

### Palm Desert, CA

Total financing: \$5 million (2008) + \$6 million (2010)  
Financing type: General fund and Redevelopment Agency bond  
Interest rate: 7%  
Eligible technology: Energy efficiency, solar PV, solar thermal  
Eligible sectors: residential, commercial  
Completed as of April 2010: 208 retrofits  
Average cost: \$36,000  
Administration: City



Palm Desert's PACE program started in 2008 and has since spent \$5 million, half from the city's general fund and half from the Redevelopment Agency.<sup>12</sup> The first round of funding enabled 208 households to invest in energy efficiency or solar improvements (an average of \$36,000 per project).<sup>13</sup>

In 2010, the city made available an additional \$6 million, half for energy efficiency and half for solar projects.<sup>14</sup> The second phase of funding has come from a sale of lease revenue bonds to Wells Fargo Bank.<sup>15</sup>

### Sonoma County, CA

Total financing: \$45 million  
Financing type: General fund, county treasury notes (revenue bond)  
Interest rate: 7%  
Eligible technology: Energy efficiency, water conservation, solar thermal, solar PV, geothermal and electric vehicle charging stations  
Eligible sectors: residential, commercial  
Completed as of March 2010: 670 retrofits  
Average cost: \$30,000  
Administration: County



Launched in 2009, the Sonoma County PACE program has paid out \$21 million to complete 670 energy improvements projects (an average cost just over \$30,000), with an additional 500 applicants as of March 2010.<sup>16</sup> The program is financed from the general fund and with the use of revenue bonds. The program will be expanded soon thanks to a grant from the California Energy Commission to help with marketing to commercial and multifamily residential properties.

## Lessons Learned

By early 2010, four full-scale PACE programs were in operation in Babylon, Boulder County, Palm Desert, and Sonoma County. These programs had completed nearly 2,000 retrofits and several were in their second or third round of financing with nearly \$40 million paid out to date. It is likely that many of the retrofits completed under these programs would not have occurred in the absence of the PACE financing.

However, communities attempting to follow in their footsteps would do well to consider how these programs have overcome several hurdles and identified important issues and challenges. In every case, the existing PACE programs have faced these challenges and found them surmountable. The following section shares the lessons learned from these PACE program pioneers and in some cases identifies lingering questions.

### PACE's Impact is Both Quantitative and Qualitative

On a quantitative level, the four major PACE programs offer evidence that the strategy could have a significant impact nationally. After about 12 months of program activity the four major PACE programs – serving a combined population of around 1 million – have retrofitted approximately 1,700 homes. For comparison, Center for Energy and Environment (CEE), the state's largest provider of energy efficiency services in Minnesota (population 5 million) helps provide Minnesota Housing Finance Agency financing for retrofits of around 1,000 residential homes/year.<sup>17</sup> If Minnesota had a statewide PACE program, it would likely be able to finance energy improvements on more properties than CEE can in a given year.

The four PACE programs have invested \$40 million in retrofits. This compares to about \$3.6 billion invested in energy efficiency by the nation's utilities in 2008. But on a per capita basis the still-infant PACE program investments (\$4 per capita) compare respectable to the mature utilities programs (\$11).

Prospects for PACE to make a serious dent in overall residential energy efficiency depend on the "pace" of expansion. More than ten new programs could come online in the next 12 months. On the other hand, the existing programs do not plan major expansions.

If one looks at the dent PACE programs are making in improving the overall existing building stock, the figures are modest. Sonoma County, the largest program to date has enabled the retrofit of 670 properties in a county with 180,000 households. And when it comes to solar, the number of PACE-financed projects is dwarfed by other options like solar leasing via power purchase agreements. These third party options for solar accounted for between 70 and 80 percent of the commercial solar PV market in 2008 and are growing in the residential and commercial markets.

Perhaps a better measure on the impact of PACE, however, would be how many investments were made that would not otherwise have been made under existing programs or with conventional financing mechanisms. Here the hard data is unavailable. As Berkeley's solar-focused program discovered, the vast majority of those enrolled could access conventional financing sources. Other programs may serve constituencies that are less qualified for private financing, but no data supports this theory thus far.



Despite the relatively small scale of efforts so far and only being around for about 12-18 months, there have been some promising outcomes from PACE programs. In addition to reducing energy consumption in nearly 2,000 properties, the PACE programs have expanded employment in their regions as local businesses hire up to meet the demand for home retrofits. Hard data is scarce, but the Home Performance Resource Center notes there was a “8.4% job growth in trade labor industries in Sonoma County as of Nov. 12, 2009, while other counties in the area had lost construction jobs. Employment spikes tracked the number of projects under way at the time.”<sup>18</sup> Babylon, NY, has also seen an increase in employment. It estimates, the \$1.5 million spent in Babylon has generated 15 jobs.<sup>19</sup>

Arizona’s County Supervisors Association (CSA) spoke in favor of PACE legislation in 2009, “not only as a way to increase access to solar technology but also as an avenue to support the economic development potential of the industry in Arizona.”

Minutes of the Committee on Government, Arizona Legislature. (3/3/09). Accessed 3/18/10 at <http://tinyurl.com/yibdlbt>.

One important point is that the impact per dollar invested in job creation by PACE programs is much greater than that in conventional job creation programs because the latter depend on grants or tax credits, that is, government pays for these jobs with money that becomes unavailable for other services. PACE isn’t spending government money. It is using government credit to borrow money from the private sector. Moreover, the money is largely or entirely repaid through energy savings.

The greatest potential for PACE programs, however, may not be in the number of units that it retrofits but in the way it becomes a vehicle for cities and counties to undertake more comprehensive energy-related planning and action. Utility programs are fragmented. Electric utilities invest in electricity efficiency while gas utilities invest in thermal efficiency. Moreover, the essential problem, that utilities are being asked to underwrite programs that reduce their sales, has never been successfully overcome despite many innovative strategies adopted by state public utility commissions.

Today some government grant programs focus on reducing energy consumption in low income households (e.g. weatherization) while others focus on reducing energy consumption in municipal buildings. There are mostly privately initiated and financed investments in renewable technologies (e.g. geothermal heating and PV). Meanwhile there are agencies of city governments that are responsible for achieving carbon reduction goals that were formally embraced by city councils.

A PACE program, especially if administered locally, can become a hub in a comprehensive city-wide energy self-reliance program. Administering a PACE program puts the city at the center of energy policy, financing, contracting, and coordination. Banks, contractors, unions, code and permitting agencies and equipment suppliers are integral participants in a PACE program. A PACE program can invest in energy efficiency in both thermal and electrical energy. It can invest in renewable energies that cut across household uses (e.g. solar hot water heaters, solar PV, geothermal, biomass heaters). A PACE program, in other words, can bring the pieces together, a first step in comprehensive planning. Indeed, Sonoma County (and Minnesota in its enabling ordinance) allows for the financing of level 2 energy chargers for electric vehicles, bringing EVs, with their potentially revolutionary potential to build a distributed generation and storage capacity to urban areas, into the equation.

A PACE program can also have a longer view than most energy programs. Long term borrowing can lead to long term lending and as a result, the maximization of energy reductions or the use of renewable energy. Long term and low interest borrowing can also be a vital tool in achieving another municipal goal, reducing energy use in rental commercial and residential buildings. A number of jurisdictions mandate energy efficiency investments in such buildings when ownership changes hands. New York seriously considered requiring large building owners to reduce energy, (albeit by a paltry 5 percent) even before they sold the building.

A missing piece in these mandates is financing. PACE type financing can make it relatively painless for owners of residential properties to comply with municipal mandates and reduce opposition to those mandates.

### Maximizing Efficiency Needs to Be a Priority

The biggest lesson learned from PACE is that when citizens have a facilitated route to energy efficiency improvements, they are willing to pay above-market interest rates and wait for payback over time. Of operational PACE programs, only Babylon’s Long Island Green Homes program makes it a priority to have energy savings outweigh the cost of financing (meaning that in year one, savings are greater than the annual assessment repayment). In every other PACE program, especially ones that allow for solar PV with minimal requirements, residents may or may not see a positive cash flow within the first few years. And yet, nearly 2,000 households have participated in PACE financing since programs opened last year.

There are several possible explanations for this phenomenon. It could mean that PACE finance participants are irrational or that they are primarily motivated by the desire to reduce their environmental footprint rather than reduce costs. But given the scale of the programs (and the speed with which additional rounds of financing are filled up), it’s at least as likely that participants have other motivations such as wanting a longer period to pay back the investment, or hearing that their neighbors were going to participate or the ease of the one stop shopping. Finally, participants may also be confident in their ability to recapture some of their costs in a higher price for their home.

Participation	PACE: v.	Savings
An analogy: we'd like to encourage drivers to buy hybrids, and to carpool. We don't do this, however, by requiring Prius owners to only carpool, or carpoolers to only drive hybrids. Doing so would significantly undercut participation. Same with PACE.		The Prius-carpool metaphor is not equatable to sequencing EE in advance of RE. Plug up the leaks, then a system can be appropriately sized and thus smaller and less costly.
(quotes from a PACE listserv conversation, April 2010)		In Babylon, we offer financing for solar, but only after the thermal envelope is sealed. That's...the sensible loading order, as DOE would, no doubt, have it.

PACE programs offer an opportunity for deep retrofits that maximize a building’s energy efficiency. With long finance terms, efficiency investments with payback of 10 or 15 years can be economically completed. However, current PACE programs do not demand or necessarily achieve deep retrofits.

Some programs set minimum project costs to be eligible but the levels are fairly low (**Figure 2**). None have minimum payback periods. In any event, minimum costs aren’t a particularly good measure to use if your goal is to maximize the potential energy savings.

**Figure 2 – Minimum Project Costs for Municipal Financing**

Program	Minimum Project Size
Boulder County, CO	\$3,000
Palm Desert, CA	\$5,000
Sonoma County, CA	\$2,500
Babylon, NY	none

California PACE programs that apply for state-allocated stimulus funds must achieve a minimum energy reduction, but it sets a very low bar: 10 percent. The U.S. Department of Energy (DOE) selected a higher standard for certain programs that receive stimulus funding: 20 percent.<sup>20</sup> See **Figure 3** for a list of communities receiving the Retrofit Ramp-Up funds.<sup>21</sup>

Virtually all PACE programs require an energy audit before financing is provided. Programs should require investments in improvements with a minimum payback of at least 10 years or improvements with a payback that is half the expected life of the efficiency investment.

All PACE programs invest in both efficiency and solar. Solar electric, as well as geothermal, have much, much longer payback periods than efficiency. In many PACE programs, solar is what brings people in the door but it is far less economical than most, if not all, energy efficiency improvements. Homeowners that first maximize efficiency can find themselves needing a smaller PV project than they expected (e.g. saving money) or having the same PV project covering a larger portion of their electricity needs than they otherwise would have (e.g. being more self-reliant and “greener”).

Babylon, NY’s PACE program – Long Island Green Homes – has put a strong priority on efficiency. In Babylon’s program, there is a “loading order” for improvements, where financing for solar PV is available only after the property’s thermal envelope is sealed.<sup>22</sup> The theory is that the cost of greenhouse gas emissions reductions are lower and energy savings much higher for efficiency improvements than for solar. In addition, solar PV may reduce electricity consumption from the grid but does not help improve the performance of any heating system on the property. As mentioned above, a properly sealed house also requires less energy to operate, so a subsequent solar PV system can be more appropriately sized to the house’s remaining load.

Long Island Green Homes supports their “loading order” by requiring an audit by a contractor certified by the Building Performance Institute, qualifying the contractor to assess the whole house as a system (e.g. maximizing efficiency and then sizing heating, cooling, and electrical to the improved home performance). Babylon’s envelope sealing program has resulted in a reduction of about 25 percent in air infiltration although it is unclear how that has translated into heat savings.<sup>23</sup>

Montgomery County, MD, will soon launch a PACE program with an even stronger efficiency mandate before installing solar. Property owners will have to achieve energy reductions of 25% or achieve a 7.5 on the EPA’s Home Energy Yardstick.<sup>24</sup>

Since PACE programs will, even in the best of circumstances, have only a limited amount of money to lend, the tradeoff between solar and efficiency is important. In Sonoma County, CA, most of the program money had been going to solar PV, cool roofs and window retrofits, because the program was relying on direct marketing by contractors who only had specific technological interests. Only 9% of funds were going to other types of energy efficiency projects. To address this, the program will be amended to require audits for residential properties as well as requiring projects to have a regrettably low 10% energy savings to access PACE financing.<sup>25</sup> The latter standard, as noted above, is a requirement by the California Energy Commission for communities seeking grant funding for starting up or expanding their PACE program.<sup>26</sup>

**Figure 3 – Recipients of DOE Retrofit Ramp-Up Funds**

- Austin, Texas - \$10 million
- Boulder County, Colorado - \$25 million
- Camden, New Jersey - \$5 million
- Chicago Metropolitan Agency for Planning - \$25 million
- Greater Cincinnati Energy Alliance, Ohio - \$17 million
- Greensboro, North Carolina - \$5 million
- Indianapolis, Indiana - \$10 million
- Kansas City, Missouri - \$20 million
- Los Angeles County, California - \$30 million
- Lowell, Massachusetts - \$5 million
- State of Maine - \$30 million
- State of Maryland - \$20 million
- State of Michigan - \$30 million
- State of Missouri - \$5 million
- Omaha, Nebraska - \$10 million
- State of New Hampshire - \$10 million
- New York State Research & Development Authority - \$40 million
- Philadelphia, Pennsylvania - \$25 million
- Phoenix, Arizona - \$25 million
- Portland, Oregon - \$20 million
- San Antonio, Texas - \$10 million
- Seattle, Washington - \$20 million
- Southeast Energy Efficiency Alliance - \$20 million
- Toledo-Lucas County Port Authority, Ohio - \$15 million
- Wisconsin Energy Conservation Corporation - \$20 million

In Palm Desert, CA, 70% of program funds were going to solar PV, so they've revised the second phase funds so that a maximum of 50% can go to solar PV.<sup>27</sup>

The metrics of solar and efficiency were well illustrated by the project done at the Moscone Center in San Francisco. Revenue bonds were issued and a solar PV system was expected to be installed. To allow for the project to be repaid from energy savings major investments were done in improving electricity efficiency. The result was that although solar comprised 80% of the project's costs, efficiency provided 80% of the project's financial savings.

### Program Costs Can be Lowered Through Aggregation

PACE programs have two types of costs, startup and operations. Since operations costs are typically covered through margins on interest rates and application fees, the startup costs are the more challenging. In general, communities have found internal staff time to get the program rolling. A more detailed sample program budget can be found in City of Berkeley's *Guide to Energy Efficiency & Renewable Energy Financing Districts for Local Governments*.<sup>28</sup>

For operations costs, cities have generally committed enough funds to support 1-3 staff for program management (whether internally or externally administered). **Figure 4** details the program overhead costs borne by the municipality as well as the fees that the participant contributes up front to enroll in the program. Most programs have relatively low upfront fees for participants and instead recover program operations costs using a small margin on the interest rate.

**Figure 4 – Overhead Costs and Participant Contribution, Existing PACE Programs**

Program	Municipal Costs	Participant Costs
Berkeley, CA	\$227,000 (2 years)	\$25, 7.75% interest rate
Palm Desert, CA	\$90,000 (~1.5 FTE)	\$360, 7% interest, 10% contingency
Boulder County, CO	not available	\$75, ~9% of loan for closing costs and debt reserve; 6.68% interest
Sonoma County, CA	not available	\$116-191 + audits, permits, 10% contingency; 7% interest
Babylon, NY	\$10,000 for equipment, 3 FTE	\$250 refundable audit; 3% interest

*FTE = full-time staff equivalents*

Since the administrative elements are common across PACE programs, aggregation of PACE programs has become a common pursuit of enabling legislation and policy makers. State enabling legislation should be clear that cities and counties are able to administer PACE programs. Many existing state PACE laws have used this approach. This has allowed Boulder and Sonoma Counties, for example, to serve a larger population than city-only programs and create a more efficient administrative process.

In the case of Berkeley, the high cost of borrowing for the city's program led the city to close its program and instead merge with CaliforniaFIRST. This program will allow over 100 participating local governments (as of April 2010) to customize their individual PACE programs but will aggregate financing. This will be accomplished by adding renewable energy and energy efficiency to the list of eligible projects for the California Statewide Communities Development Authority. The aggregated financing will achieve lower borrowing costs and provide lower interest rates for the individual PACE programs than could have been achieved on an individual community basis. Colorado is poised to establish the first statewide PACE program with legislation (HB 1328) nearing passage in the 2010 legislative session.<sup>29</sup>

## Minimizing Program Risk Can Also Minimize Interest Rates

One of the larger challenges for PACE programs is that its political strength – no taxpayer liability and a voluntary program – becomes its greatest weakness in the finance world. Bond ratings and interest rates are tightly tied, and the highest rated municipal bonds are those backstopped by general property taxes – called general obligation bonds – and from cities with good credit histories. At this early stage of the game, PACE bonds are several rungs down the credit ladder.

Generally, local governments prefer to use revenue bonds – secured by the anticipated revenue from special assessments – for PACE, rather than general obligation bonds. Because revenue bonds are backed by an anticipated revenue stream (e.g. water bills for water pipe improvements), but not by the general taxpayer, they are considered higher risk and carry higher interest rates. Furthermore, while revenue bonds issued by a public utility may rank highly because they deliver essential services, a PACE bond is backed by the special assessment tax revenue from a self-selected subset of a municipality, so it is viewed as a less diverse, and riskier, investment.<sup>30</sup>

The early PACE bonds issued by Boulder County and Palm Desert have received credit ratings of A+ and AA, respectively (see **Figure 5** for more information on credit ratings).<sup>31</sup> The interest rates on the taxable bonds have been in the low 6% range, although Palm Desert’s offer has a variable rate. Bond underwriters have suggested that minimum standards, such as including no fewer than 500 properties per bond offering, diversity in properties and project size, stable property values, as well as many of the guidelines provided by the White House framework (see box) can reduce interest rates and risk.<sup>32</sup>

To address the credit rating issues, four of the pioneer PACE programs qualify participants by requiring a clear title and good payment history on property taxes.<sup>33</sup> Many of the programs also follow the White House framework or worked with the banking community to set underwriting guidelines. In addition, PACE programs have looked to aggregating projects and financing in larger groups, as discussed under [Program Costs Can be Lowered Through Aggregation](#).

## Expanding the Energy Financing Market

PACE is not the only energy financing program available. Private financing tools like home equity loans could also be used. In Berkeley, many participants left the program after initially expressing interest because financing rates were lower in the private market. Since Berkeley targeted solar PV retrofits it may be that the original pool of participants was particularly well suited to take advantage and/or qualify for private financing (see **Figure 6**).

Existing financing programs, like PACE, have benefits and restrictions.

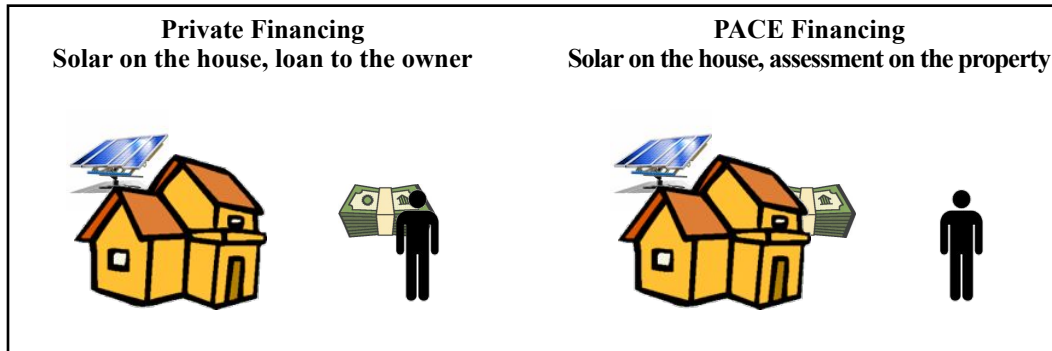
**Figure 5 – Bonds and Credit Ratings**

Bond Type (security)	Bond Rating
<b>Municipal general obligation bond</b> (full faith and credit of municipality)	<b>High</b> (AA, AAA)
<b>Municipal revenue bond</b> (revenue from an essential service, e.g. water)	<b>Upper Medium</b> (A, A+, A1)
<b>Municipal revenue bond</b> (revenue from a non-essential service)	<b>Lower Medium</b> (BBB)

### White House PACE Framework Recommendations

- Energy savings to assessment ratio of 1 or greater
- Financing should be for high value investments
- Projects should be verified
- Assessment reserve fund
- Assessment terms should not exceed improvement life expectancy
- Financing should be limited to 10% of property value
- No financing where there’s a current default
- No negative equity financing

**Figure 6 – PACE Financing Ties Improvements *and* Financing to the Property**



PACE programs can “lend” to any property owner. This creates an opportunity and a risk. With special assessments, tied to the property, the property owner’s credit is not at stake. Therefore, the PACE program can provide financing to a much wider range of participants, regardless of their credit history. The opportunity created is that energy efficiency and renewable energy investments can be completed on a much wider swath of a city’s property than would be possible with private financing alone.

The risk of offering greater access to financing is that some participants will have a poor credit history and may have a higher risk of default than more affluent borrowers. To address this, there are two mitigation strategies for PACE programs. First, unlike other special assessments (e.g. sidewalks), the energy savings from efficiency improvements can provide part or all of the cash flow for assessment repayment. So even if property owners may not seem a good lending risk for private financing, they will have an income stream to make payments on their assessment (**Figure 7**).

**Figure 7 – PACE Assessments are not Traditional Assessments**



Additionally, PACE programs can (and have) establish(ed) restrictions on lending that reduce risk, such as maximum assessment to property value ratios (typically 1:10) and prohibitions on lending to properties with negative equity.

### PACE and Bank Financing

Bankers may see the PACE program as a competitor that diverts homeowners who might have otherwise used home equity financing from the bank. In the Berkeley program, many residents who could get more attractive financing from the private market did so.

However, home equity financing and PACE don't necessarily serve the same market. A borrower with a good credit history may prefer lower interest rates in a home equity loan, whereas a borrower with good payment history on their property taxes but poorer credit may be far better off with PACE financing.

PACE programs don't completely sever the role of banks. With PACE, banks are being engaged on the back end of financing, as bond buyers. In Sonoma County, banks have expressed interest in buying municipal bonds or securitized assessments for PACE.<sup>34</sup> In Palm Desert, CA, Wells Fargo purchased the city's lease revenue bonds for the second phase of funding. In the Long Island Green Homes program, efforts have been made to engage the banking community, but program administrators have been told, "aggregate \$30-\$50 [million] of work and we'll talk."<sup>35</sup> Community banks have also expressed an interest in PACE program developments.

### **PACE and Third-Party Financing**

The other competitor with PACE financing is on-site solar PV with third-party ownership. Many companies offer a solar product that allows the homeowner to have solar PV installed with minimal upfront cost, in exchange for a long-term lease or contract to buy power. While both PACE and third-party solar products address the upfront cost, third-party solar also removes the responsibility for maintenance and does not burden the homeowner with debt. Since the solar project is not truly part of the property, it's not clear if it has an impact on the re-sale value of the home. On the other hand, a PACE-financed solar project is tied directly to the property and can add to the re-sale value.

The two models, PACE and third-party ownership, are certainly different but it seems unlikely that they would prove to be significant competitors. In practice, a property owner could use PACE financing for energy efficiency improvements and then use third party financing for solar, for example. For the foreseeable future, each approach will have a substantial pool of consumers that will prefer one approach over the other.

Another tool financing energy efficiency is an Energy Service Companies (ESCOs). An ESCO "develops, installs, and arranges financing for projects designed to improve the energy efficiency and maintenance costs for facilities over a seven to twenty year time period."<sup>36</sup> The ESCO traditionally uses the energy savings to pay for a building's improvements. ESCOs are minimal competition for PACE, however, because they only serve commercial properties (not residential) and typically focus on energy efficiency rather than on-site renewable energy generation.

### **Resolving Lien Issues (for Lenders and Realtors)**

While PACE simplifies financing for citizens committed to renewable energy and energy efficiency improvements to their property, the holders of the property's mortgage are less excited. Some bankers, for example, resent that PACE assessments are often given senior lien status, making them ahead of the mortgage holder for collecting if the property owner defaults on payments. The government's mortgage-finance agencies Fannie Mae and Freddie Mac have also expressed concern about the impact of these liens on the order of repayment if the borrower defaults.<sup>37</sup> In Colorado, a bill for a statewide PACE program was stopped by bankers who felt that it would jeopardize their claims in the event of a mortgage default.<sup>38</sup>

One participating property in the Sonoma County, CA, PACE program was refused refinancing because of a PACE lien. However, the problem was the loan officer, who was acting out of line with bank policy. More than 20 other properties in the program have successfully refinanced the mortgage with a PACE lien with no issues.<sup>39</sup>

Lenders' issues can be resolved. In Colorado, the statewide PACE bill introduced in 2010 (HB 1328) seems destined for passage after the 2009 bill was held up by bankers' concerns.<sup>40</sup> In Sonoma County, CA, underwriting criteria were developed with a stakeholder group of large and small banks that serve the community, minimizing concerns.<sup>41</sup>

The most significant response to lenders' concerns is that PACE-funded improvements are energy savers, generating an income stream to match assessment payments (unlike other local government special assessments, such as street repairs). Some PACE programs, such as Long Island Green Homes, structure financing so that the energy savings from improvements exceed than assessment payments. Other programs have set limits on borrowing following the White House guidelines.<sup>42</sup>

There are other mitigating factors. One is that many communities only require the lender to cover the lien costs during the delinquency period (e.g. 18 months, while the property goes from delinquency to foreclosure to resale). Another is that the improvements to the property increase resale value, reducing the prospect of a loss for the lender. Finally, as has been done with lending tools like Energy Efficiency Mortgages, lenders can use the energy savings of PACE improvements in their debt-to-income calculations.<sup>43</sup>

Another concern of mortgage companies and bankers is allowing homeowners to pile debt on a property whose value is already less than the mortgage amount (negative equity). The White House guidelines specify that PACE programs should not provide financing to properties with negative equity. Both California PACE programs have successfully addressed the debt concern with limits on financing of \$30,000 (without approval by the mortgage lender) or by limiting total homeowner property-based debt to 110 percent of the "assessed or market value."<sup>44</sup> Babylon, NY, restricts projects to \$12,000<sup>45</sup> and Boulder County limits them to the lesser of \$50,000 or 20% of the property value.<sup>46</sup>

Realtors have expressed concern that properties with a PACE lien could be harder to sell because the lien is supposed to – and in some states, must – remain with the property. However, this concern largely ignores that the lien, like any special assessment, is a negotiable part of the property sale. Even if the buyer can't force the seller to pay off the PACE special assessment prior to sale, the buyer can lower their offer price for the property. The seller can counter such an offer with a discussion of the property's improved energy profile.

For a more complete discussion of the legal issues surrounding PACE liens, see *Property Assessed Clean Energy (PACE) Programs: White Paper* released by the Natural Resources Defense Council (NRDC), PACENOW, the Vote Solar Initiative, & Renewable Funding.

## Summary

The early adopters of PACE financing have cleared many of the biggest hurdles and their lessons learned should smooth the road for programs that follow. In addition, the White House, federal agencies, and academic institutions have provided a number of toolkits to help communities establish programs that will be effective. However, more work is needed to maximize the energy savings potential of PACE.

### Pursuing a More Perfect PACE

- Prudently expand access to financing
- Aggregate to lower finance costs
- Resolve lien issues with lenders
- Do more to maximize efficiency first and then move to on-site renewables

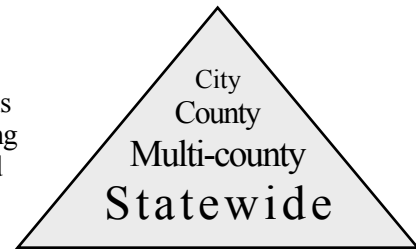
## Expand Access to Financing

On the issue of access, local governments should continue a policy of trying to increase participation in the PACE program and its financing for energy efficiency. In particular, retrofit packages with energy savings exceeding costs should be available to as many property owners as possible (perhaps even those with negative equity). After all, these improvements pay for themselves and a more efficient house may have greater value. This is not to say that governments should ignore prudent practices for lending, since these will also help lower interest rates for municipal bonds. But a balance must be struck.



## Aggregate, Aggregate, Aggregate

Local governments will also need to collaborate to find more affordable financing, by aggregating bonds across several communities (as California is doing) or across an entire state (as Colorado is considering). PACE financing could also be backstopped by federal loan guarantees or by the full faith and credit of municipalities to buy down interest rates. While municipal financing offers benefits even at a premium to private equity (greater availability and transferability), cheaper financing was one of the initial goals of the PACE concept and should be pursued.



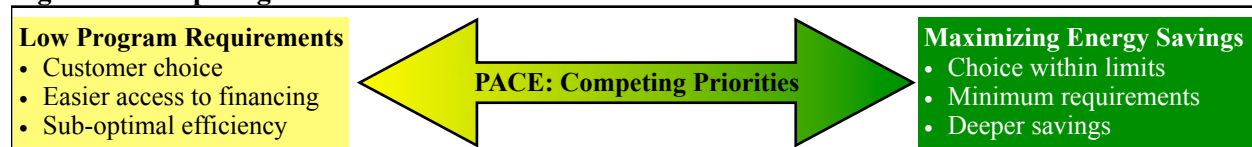
## Clarify Lien Authority

The concerns raised by Fannie Mae and Freddie Mac regarding the senior lien status of PACE assessments were addressed in the recent white paper published by NRDC and this brief discusses several strategies for easing concerns of lenders, but a recent Fannie Mae lender letter suggests that the agencies are not satisfied. Although prior case law supports the use of senior liens for improvements tied to property and the authority of legislatures to establish the public benefit of energy efficiency and clean energy, the issue is unresolved.

## Maximize Efficiency

PACE programs must balance accessibility with the priority of maximizing energy savings. Few property owners will be repeat participants. Thus, it is crucial that PACE participants target the deepest energy savings that the program can support, including projects that pay back in 10 or 15 years. The Department of Energy's minimum savings requirement of 20% for certain programs receiving (Retrofit Ramp-Up) stimulus funding is a good start.

**Figure 8: Competing Priorities**



Currently, programs allow for significant customer choice in selecting the improvements financed by the PACE program, but cities can encourage people to maximize energy savings. Babylon, NY, requires the home heating envelope sealed before solar investments can be financed. The forthcoming program in Montgomery County, MD, will require properties to achieve a 25% reduction in energy use or a 7.5 on the EPA Home Energy Yardstick before adding on-site renewable generation. Other options include minimum project standards (10-20% improvement in efficiency), minimum project portfolio (all improvements with less than a 10 year payback must be completed), discounted financing for deeper investments, or discounts on renewable energy equipment for homes with higher efficiency goals.

## Conclusion

PACE has emerged as a popular tool to address the enormous market for building efficiency in the United States and it shows promise. Early programs have overcome many obstacles to expand access to affordable financing for energy efficiency retrofits and on-site renewable energy. However, PACE programs can do more. Existing programs must expand and new programs must be developed, and both should be aggregated to lower overhead and borrowing costs. Lien issues should be addressed to remove any lingering doubts about legality. And PACE programs should set policies to maximize efficiency, to make the most of this unique opportunity to improve the energy profile of American buildings.

Ultimately, the greatest benefit of PACE may not be the energy savings from retrofits, but the increased authority and experience gained by cities and counties operating the programs. PACE makes cities into energy financiers and "general contractors" and may provide them with valuable expertise to expand into many other areas of public interest, in energy and beyond.

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