

Picking Up the PACEs: Approaches for Evaluation of the Mortgage Market Impacts of Property Assessed Clean Energy Programs

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ABSTRACT

A few years ago, property assessed clean energy (PACE) programs were widely viewed as promising novel financing mechanisms for energy efficiency and renewable energy improvements in residential buildings. Concerns raised in 2009 and 2010 about potential impacts on the household mortgage markets stalled their development almost completely. Little to no careful discussion or empirical evidence has been presented regarding actual mortgage-related impacts of the handful of PACE programs operating in the past and present. This paper discusses potential impacts of residential PACE programs on homeowner budgets, mortgage defaults, and mortgage-holder recovery in the event of default. I suggest approaches for answering the empirical questions that arise from this framing, and evaluate the prospects for robust and reliable results from each of them.

PACE In Brief

Property assessed clean energy (PACE) programs allow local governments to provide loans to property owners for energy efficiency or renewable energy measures.¹ Owners accept a lien on their property in the amount of the loan and pay off that lien over time through the property tax system. This arrangement is known as a “land-secured financing district” and has been used by local governments for many years, generally to collect money for public purpose infrastructure projects such as roads, sewers, schools, and parks. States must pass legislation enabling the use of land-secured financing districts for this purpose, and as of March 2012 27 states have done so (PACENow 2012). Funds for the loan can come from general government revenues; if sufficient revenues are not available, local governments issue bonds to raise capital, securing these bonds with the lien payments. The first PACE pilot program began in 2008; the largest residential programs, some of which continue today, began in 2008 and 2009. Table 1 provides basic information about the three programs referenced throughout this document.

Table 1. Basic Facts and Figures on Three Largest Residential PACE Programs

Program Name	Start Date	Homes Served	\$ Loaned
City of Palm Desert Energy Independence Program	8/2008	240	\$5.5 million
Long Island Green Homes Program	10/2008	600	\$3.6 million
Sonoma County Energy Independence Program	3/2009	1648	\$56.4 million

Sources: PACENow 2011; updated with more recent information from program websites where available 5/2012.

Two critical features of PACE make it unlike most other vehicles for financing these measures, and each of these features addresses a widely postulated barrier to adoption of cost-effective energy measures. First, the lien is taken out on the property itself, and the obligation to

¹ Some PACE programs also support water conservation measures, but uptake of PACE financing to fund such measures has been minor relative to energy efficiency and renewable energy improvements.

repay it rests with whoever owns the property, not with the party who originally took on the lien. Thus, repayment transfers with the sale of a property unless the lien is paid off at that time. Tying repayment to the property helps address a split incentive problem between current and future building owners. Absent such a mechanism, current owners must pay for energy improvements, while their benefits accrue in part to future owners if the useful life of the improvement extends beyond sale of the property. The current owner will not receive the full benefit of measures that require several years or more to pay back if s/he is considering selling the property sooner, and therefore will tend not to adopt them.²

Second, in most cases,³ the PACE lien is senior in debt obligation to mortgages on the property. Past due PACE obligations are therefore collected before mortgage debt in the event of foreclosure, and the foreclosing bank becomes responsible for payment of the lien while it holds the property. This feature makes the obligation quite secure, and consequentially makes bonds supported by these obligations much more attractive to private capital providers. This reduces the cost of that capital and allows the PACE administrator to offer lower interest rates to property owners without using public dollars to buy down these rates. These low-interest loans expand the universe of affordable energy measures. Lower interest rates ease the first cost barrier for energy projects. Left to its own devices, the market for financing such improvements has largely failed to form, despite the fact that cash flows for many of these projects appear to be attractive at reasonable interest rates. Lenders appear to largely neglect energy bill savings from these projects, treating loans for them as unsecured even when the project's monthly energy savings are expected to be larger than the loan payment. Interest rates offered tend to be much higher than estimates of social and private discount rates, suggestive of financial market failures. The interest rates offered by existing residential PACE programs⁴ are much more in line with commonly advanced discount rates.

These are not the only advantageous features of PACE. PACE also eases several transaction burdens for the homeowner. Collection by property tax is seen as reliable as property tax payment rates are very high and as the property owner (and the lender) need not track and maintain a new account. Local government as loan administrator sets up one-stop programs that publicize financing and incentives, advise on measures, and dispense financing; owners need not seek a loan elsewhere. Moreover, to the extent that PACE successfully catalyzes large volumes of loans, the risk of governments' loan portfolios will lessen due to risk pooling. However, the two PACE features discussed above are particularly germane to the objections raised to PACE by federal housing agencies, which this paper investigates.

² On-bill financing programs, which are currently receiving a lot of attention from policymakers, are another tool for overcoming this barrier by tying loan repayment to utility meters rather than individuals.

³ A handful of states have adopted "subordinated PACE" programs where PACE obligations are subordinate to mortgages. Such a debt structure removes most of PACE's power to attract inexpensive private capital, muting its distinctive appeal. I do not consider subordinated PACE programs further in this paper.

⁴ Sonoma County's Energy Independence Program and Palm Desert's Energy Independence Program both offer 7% interest, a rate commonly suggested for the private discount rate and which has been used for cost-benefit analysis in the United States for years. The Town of Babylon's Long Island Green Homes program offer a 3% discount rate (termed an "administrative fee"), which more closely resembles a social discount rate or the rates used for cost-benefit analysis in Western European countries. We must note that all three of these programs initially self-funded their programs rather than issuing bonds, so these rates may not be informative of the attractiveness of PACE bonds to private capital. Moreover, if these rates are not set to be revenue-neutral to local government, it is possible that they provide an implicit subsidy. Sonoma County declares its program to be revenue-neutral to government; Palm Desert and Babylon, as far as I can tell, make no such claim. Discount rate information is from program websites as of 3/21/12.

Residential PACE and the Mortgage Market Controversy

In 2009, with several residential PACE programs newly operating and many more under design, the Federal Housing Finance Administration (FHFA) issued a letter raising concerns about PACE's impacts on lenders and homeowners. This prompted a year of correspondence between FHFA, state and local governments interested in PACE, and the White House. FHFA ultimately issued a June 2010 statement that senior-lien PACE programs "present significant risk to lenders and secondary market entities [and] may alter valuations for mortgage-backed securities." (FHFA 2010) The statement directed Fannie Mae and Freddie Mac, who underwrite the majority of American residential mortgages, to use more restrictive criteria when evaluating mortgages in jurisdictions with PACE. This action brought residential PACE to a halt around the country and led many programs to be abandoned. A few programs have since resumed operation, however, and a handful more have been introduced despite the FHFA's action. Commercial PACE programs, which are not affected by the FHFA ruling, now outnumber residential programs.

Several parties have challenged FHFA's declaration as potentially overreaching its authority and one district court required FHFA to open public comment through the Federal Register. The Federal Register notice, the longest and most thorough exposition of FHFA's perspective, suggests the following concerns:

- PACE programs may lead to higher rates of delinquency, default, and/or foreclosure if expected energy savings do not materialize and homeowners cannot handle the extra debt
- Prospective purchasers of properties with existing PACE obligations may be willing to pay less for these properties than they would otherwise, harming mortgage holders in the event of foreclosure
- The need to pay off past due PACE assessments and cover current payments while a property is in foreclosure may harm mortgage holders regardless of the lien's impact on property value

These questions are empirical, and can be answered for the PACE programs implemented to date if data are adequate. The Federal Register notice solicited information and research that address these issues, suggesting some prospect for reconsideration of FHFA's position.

The first concern above relates to PACE's impact on the rate of default and/or foreclosure. The second and third concerns relate to PACE's impact on recovery in the event of foreclosure. To understand the total impact on the mortgage holders FHFA regulates, we would like to understand all of these impacts.

The remainder of this section explores the impacts we might expect, while section 3 considers the most promising avenues for empirical analysis.

Cash Flow Impacts on Default

In terms of the risk of default and foreclosure (which I treat collectively, using the term default from here), taking on a PACE obligation has two direct financial impacts on the property

owner: it requires a new payment and (potentially) lowers energy costs.⁵ A first-order consideration, then, is the net effect of these two impacts on the owner's cash flow.

Existing PACE programs vary as to the extent of control they attempt to exert on this net effect. The Department of Energy (DOE) released a set of recommended best practices “to help ensure prudent financing practices during the current pilot PACE programs” and the first recommended practice is to restrict financing to measures with a savings-to-investment ratio (SIR) greater than one—in other words, those for which the monthly payment is more than offset by the energy savings.⁶ Uptake of this recommendation has been mixed. The Long Island Green Homes program requires a SIR of 1.3 or greater. In contrast, the California programs do not test this ratio, nor do they require audits to establish expected savings (though they do recommend them).

We should assume that the owners themselves will be mindful of this concern regardless of a SIR restriction. A share of the demand for financing these measures may evaporate as this ratio drops below one, at which point households are losing rather than gaining income. Some owners may be willing to undertake measures anyway; however, we can presume that they would be disinclined to do so if they perceived that they would be at significantly higher risk of mortgage default as a result. This expected self-regulating owner behavior should mitigate default risks, but we should not assume it would eliminate them; after all, fully understanding one's financial risks is a challenge for any homeowner. Any case in which the owner's cash position is worsened as a result of a PACE assessment is something of a concern, as that owner is then at least at marginally greater risk in the event of sudden income loss or some similar, potentially default-inducing event.

We should note two potential limitations of a SIR-type threshold. First, the threshold is based on an *ex ante* estimate of energy savings. If that estimate turns out to be wrong on average, the threshold will also be wrong on average. This could be a problem for default if the estimates tend to systematically overstate the savings, though one could compensate by using a more conservative threshold than one. Second, irrespective of whether it is correct on average, the energy savings estimate is uncertain. If savings are very uncertain, PACE could result in greater default even if the average impact on the owner's cash flow is positive. (In practice, it is difficult to imagine that these cost savings, which represent a small portion of an owner's income, could be sufficiently unpredictable to throw financial expectations off that badly.)

The discussion in this section suggests seeking empirical evidence on two things. First is the *change in energy costs for PACE-financed properties*, especially as compared to PACE payment amounts, measured *ex post* through billing data. Second is a *comparison of forecast and realized energy savings*. Given the discussion in the previous paragraph, we would be interested in the full distributions of these outcomes, not simply the averages. Section 3 discusses prospects for measuring these effects. Neither of these would directly tell us the impact of the studied PACE programs on default. However, if a very large fraction of PACE-

⁵ In certain cases, renewable energy systems could provide another cash flow if they are used to sell electricity back to the grid.

⁶ This ratio is calculated by taking an expected stream of annual energy savings from a building model over the lifetime of the PACE assessment, discounting that stream to obtain a present value of those savings, and dividing by the cost of the measure. The guidance allows for counting “quantifiable” environmental or comfort benefits in this calculation as well as the use of an energy price escalator to reflect future expected energy price increases. Both these provisions—particularly the former—might be seen as moving the test away from a pure cash flow evaluation, which is the relevant test for a lender, though it's unclear how much these provisions would be used. The discount rate is not specified.

financed properties consistently do save more in energy costs than their PACE payments, this would in my mind create a presumption that PACE programs as implemented are not raising default rates—and may well be lowering them.

Non-Cash Flow Impacts on Default

While the impact of PACE financing on owners' financial resources is an obvious concern when thinking about mortgage impacts, there are other channels through which PACE might have an impact. Default often contains some element of choice; it is not simply the condition of being unable to pay. If the measures installed through a PACE program make the home more desirable to the owner, the owner will exert at least marginally greater effort to avoid default, or at least be marginally less inclined to default “strategically” (where the owner has the means to pay but chooses not to because the house is worth less than the mortgage; see, e.g., Guiso, Sapienza & Zingales 2011). If the PACE measures make the house less desirable we would expect the reverse, but this seems less likely since the owner is voluntarily adopting the measures.

These impacts seem likely to be small relative to the cash flow impacts, and measuring them on their own might not be worth it. However, if we can directly measure the *impact of PACE programs on residential default rates*, we can see the net effect of both cash flow and non-cash flow impacts. Unfortunately, as discussed in section 3, the prospects for this empirical effort are weaker.

Impacts on Mortgage Holder Recovery in the Event of Foreclosure

If PACE programs do not impact default rates,⁷ they might still be harmful to mortgage holders if they lower the amount recovered in the event of foreclosure. We would expect this to occur if (a) the *impact of participation in PACE on a home's market value* is negative, or (b) if that impact is zero or slightly positive but does not compensate the *forecloser's costs of making past and current lien payments during the foreclosure process*.⁸ Therefore, we would like to measure both impacts on home values and typical expenses due to PACE liens in the event of foreclosure.

A PACE lien—a compulsory payment obligation attached to a property—might have a negative effect on property values. On the other hand, if the PACE program induced home improvements that would not have been made otherwise—improvements that themselves raise the property's market value—then that value should count in PACE's favor. The forecloser's

⁷ If PACE proves to *lower* default—not hard to imagine if net dollar savings are consistently positive—one would have to balance any negative impact on recovery with this positive impact to determine whether mortgage holders are made better or worse off by PACE. A significant reduction in default due to PACE would likely counter and overwhelm any negative impacts on recovery.

⁸ In the event of *foreclosure*, past due PACE payments would need to be made by the foreclosing bank. The bank would also be responsible for making PACE payments while it held title to the property. State default laws vary; the entire obligation accelerates upon *default* in some states, requiring the owner to immediately pay off the entire balance. This rule changes the risks to both owners and mortgage holders: acceleration could be expected to drive more default situations into foreclosure, and the mortgage holders would then be left responsible for the balance themselves, reducing their recovery. In this paper I assume non-acceleration. For more on this issue, see Zimring & Fuller 2010.

incremental cost of paying PACE obligations in foreclosure is relatively easy to estimate *ex ante* if we assume that PACE foreclosures proceed much like any other foreclosure.

I discuss prospects for measuring these impacts in the next section.

Possible Strategies for Estimating PACE Impacts

Here I briefly consider potential methods of estimating PACE program impacts on energy cost savings, default rates, home values, and foreclosure costs using data and evidence from current PACE programs. I also give a preliminary evaluation of the feasibility of each and the likelihood of achieving reliable results.

Change In Energy Usage and Costs for PACE-financed Properties

To estimate the impact of taking up PACE on a property's energy costs, we first need data on that property's energy use before and after PACE-financed measures are installed. These data alone, when combined with easily available energy price and weather data to correct for confounding effects on energy use, would allow a decent estimate. We could do better by including data on energy usage in non-PACE households as a sort of control group against which to measure PACE impacts.

The utilities that serve jurisdictions offering PACE financing have energy use data by household; however, the utilities presumably don't know which households have received PACE measures and when they received them. PACE program administrators would need to supply this information. In at least two PACE jurisdictions—Sonoma County and Babylon, Long Island—PACE administrators routinely collect before-and-after utility bill data from properties that receive PACE financing, and thus could potentially supply these data themselves, though they would not be able to supply utility bill data from non-PACE households.

If these data can be made available, I see no particular barriers to answering this question well, at least in jurisdictions with a fairly large number of PACE-financed households. More than 1600 homes have been approved for PACE financing in Sonoma County, making this an appealing first jurisdiction to analyze. Multiple jurisdictions would strengthen the evidence base.

We should note that the relationship between savings and payments is affected by design choices. Use of a more stringent SIR, either directly or implicitly through a more restricted list of allowable measures, might have a large impact. Usefully, data would allow us to test the size of this impact. These choices have nothing to do with the PACE financing mechanism *per se*, and in fact there may be other non-PACE financing programs with measure screening processes similar enough to be usefully included in the analysis.

Comparison of Forecast and Realized Energy Savings

To make this comparison, we need two types of data for households that install energy measures: *ex ante* forecasts of savings, and data on actual energy use before and after installation of energy measures, again accompanied by weather, price, and other relevant controls. Utilities are again the crucial keepers of the latter data, and again program administrators for programs that collect billing data may also be able to supply it. Some PACE programs require an *ex ante* savings estimate and therefore should have it; for those that do not require the estimate, contractors who conduct household energy assessments may have it.

Again, this question is not only relevant to PACE, and many non-PACE homes receive energy assessments. A single contractor with good records on energy assessments that could be paired with utility energy data could provide good evidence. However, we should be mindful that many different building simulation models exist, and the relationship of predicted to actual savings may vary by model, by modeler, and by the modeling assumptions used. Results from several different models and jurisdictions would therefore be helpful.

Impact of PACE Programs on Residential Default Rates

This is a question of very direct relevance; it is also challenging to answer well given the limits of PACE experience thus far. Few PACE homes have defaulted to date. In Sonoma County, where over 1600 homes have received PACE financing, only one default had been declared on a PACE-financed home (PACENow 2011) despite a county-wide default rate of 7% (in the third quarter of 2010, Federal Reserve Bank of New York 2012). However, homes receive fairly rigorous screening before PACE approval. Most importantly, to qualify for PACE financing a property's value must be higher than the total debt owed on it, including the PACE assessment.⁹ Properties that are "under water" and therefore at high risk of default would not qualify for PACE. In that sense, comparing the average PACE-financed home to the average home in its jurisdiction will make PACE's impact on default look better than it really is: just because a home *qualifies* for PACE, we already expect it to be less likely than average to go into default, regardless of the impact of PACE itself.

To discern the impact of PACE, we instead might want to compare PACE-financed homes to homes that have similar risks of default prior to PACE adoption, but do not adopt PACE. This comparison group is difficult to find, since debt-value comparisons are only typically made during a transaction of some kind. We could perhaps look to homes that qualify for mortgages or refinancing. However, the testing that these homes undergo is different from typical PACE testing in important ways that could invalidate the comparison.¹⁰ Nonetheless, comparisons like these may be worth exploring.

Another way to create a valid comparison would be to compare default rates in jurisdictions with PACE programs to those in similar jurisdictions without PACE. By looking at the jurisdiction-wide rates, we get around the problem of PACE programs "selecting" more financially stable homes. However, such a strategy would need higher penetrations of PACE-financed homes in their jurisdictions than we have so far seen. In Sonoma County, for example, just over 1% of households have received PACE financing. While this is impressive for a three-year-old program, even large impacts in the default rate for this 1% of properties would not make much difference at all in the countywide rate—certainly not a large enough difference to be detectable in a statistical analysis.

⁹ This is the case in Sonoma County, Palm Desert, and Babylon, and is recommended in DOE's guidance. I cannot state with certainty whether this is the case in the handful of small, recently introduced PACE programs.

¹⁰ Since PACE liens are placed on the property rather than the owner, PACE testing focuses on characteristics of the property, such as property tax and mortgage repayment history and debt vs. value. Mortgages, which are a contract between a lender and the property owner, test characteristics of the owner's financial situation, including credit score and debt-to-income ratio.

Impact of Participation In PACE on a Home's Market Value

Empirical investigation of this question is reliant on sales of PACE-financed properties. PACE programs have only existed for about three years. As such, while I have not gathered data, I expect the number of sales to be small. Still, we could perhaps learn something from comparing sale prices of homes with PACE liens to those of similar homes without PACE liens. The number of potential confounds to this comparison are many, as homes have many attributes that affect their sale prices. Therefore, we would need data covering as many attributes of the households as possible. I have not closely investigated sources for these data to date. We could also perhaps resort to expert estimates of likely home value impacts. There is literature on the impact of efficiency and renewable energy measures on home values which could also prove helpful; perhaps there is also literature on the impact of liens on home prices.

Forecloser's Costs of Making Lien Payments During the Foreclosure Process

Our ability to evaluate this issue in an *ex post* fashion is extremely limited, as we could at best do a couple of case studies on the handful of PACE foreclosures that have occurred, if any have actually concluded. This question is likely better addressed by creating predictions based on typical lengths of foreclosure periods and based on the empirical distribution of PACE assessment costs. The former should be available from housing agencies, the latter from PACE program administrators.

Prospects for Moving Forward

I know of no serious effort to evaluate and quantify existing PACE programs' impacts on the mortgage market concerns raised by FHFA. It is difficult to anticipate the influence such an analysis might have on FHFA's position, and of course the nature of that influence would depend on the findings. However, FHFA did explicitly solicit research addressing these issues in the Federal Register. Careful analysis with reasonable data can do nothing but help, even if we can't easily answer all the questions we would like to.

The most promising way to make good evidentiary use of our PACE experience to date is by exploring the impacts of PACE on household energy use and energy savings. Given access to household billing data in the jurisdictions that have substantial numbers of PACE-financed projects, we should be able to answer these questions well. We could also perhaps explore the impacts of differences in program design. For example, the Long Island Green Homes program only approves measures with a certain SIR; do projects there save money more reliably than projects in other jurisdictions than have no such provision, or is this restriction not necessary to ensure savings? Repayment of measure costs through energy savings is core to what makes PACE liens different from other debt, so a firm grasp of this issue should go a long way toward understanding housing market impacts. I hope to explore these questions in future work.

There is some promise in two of the more tenuous suggested investigations: comparing rates of default between PACE homes and "similar" non-PACE homes, and comparing property sale values between PACE homes and "similar" non-PACE homes. The difficulty in identifying "similar" homes from a default risk perspective is the key challenge in both cases: the screening process for PACE approval is different than screening for other loans, such as mortgages and

home equity loans. The questions are sufficiently important, however, to merit further thought and investigation of available data on home lending.

In investigating PACE outcomes to date, we should bear in mind that there are many choices to be made in program design. The details of the screening and approval process for obtaining PACE financing vary somewhat from jurisdiction to jurisdiction (the presence or absence of a SIR being one important example). More stringent testing of loanworthiness, or stricter limits on allowable measures (for example, use of a SIR threshold), would presumably lower default risk, albeit at the cost of excluding more potential program participants—a difficult balancing act. Regardless of the outcomes we find, we should not presume that these outcomes will automatically occur in the future, particularly if future programs make different design choices. Careful consideration of design elements that seem likely to affect default rates offers the prospect for mitigating any negative impacts, or enhancing any positive impacts, that we might find.

References

- City of Palm Desert. 2012. Energy Independence Program website, <http://www.cityofpalmdesert.org/Index.aspx?page=484>. Accessed 3/21/12.
- [FHFA] Federal Housing Authority. 2010. Statement on Certain Energy Retrofit Loan Programs, July 6.
- Federal Reserve Bank of New York. 2012. <http://data.newyorkfed.org/creditconditions/>. Accessed 5/3/12.
- Guiso, L., P. Sapienza, & L. Zingales. 2011. “The Determinants of Attitudes towards Strategic Default on Mortgages.” Fama-Miller Working Paper Forthcoming; Chicago Booth Research Paper No. 11-14.
- Long Island Green Homes program. 2012. <http://ligreenhomes.com/>. Accessed 3/21/12.
- “Mortgage Assets Affected by PACE Programs,” 77 Federal Register 17 (26 January 2012), pp. 3958-3964.
- PACENow. 2011. “Making the Case for PACE Legislation.” <http://pacenow.org/blog/wp-content/uploads/Making-the-Case-for-PACE-Legislation.pdf>. Accessed 3/21/12.
- _____. 2012. <http://pacenow.org/blog/>. Accessed 3/21/12.
- [SCEIP] Sonoma County Energy Independence Program. 2012. <http://www.sonomacountyenergy.org/>, accessed 3/21/12
- Zimring, M. & M. Fuller. 2010. “Accelerating the Payment of PACE Assessments.” Lawrence Berkeley National Laboratory Clean Energy Financing Policy Brief, May 4.