Picking up the PACE:
A New Tool for Financing Energy Efficiency and Distributed Renewable Energy

By

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Submitted to the Department of Urban Studies and Planning
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Abstract:

This thesis describes the potential of new legislation in Louisiana to provide
municipal financing for energy efficient building retrofits and distributed renewable
energy. First, the thesis identifies how energy efficiency loan funds should be
structured so as to access public debt markets. Second, it reviews current best
practices in the field of Property Assessed Clean Energy (PACE) bonds. Then it
discusses the current energy efficiency and renewable energy market in New
Orleans, LA. Finally, the thesis discusses the policy and market changes necessary to
implement LA Senate Bill 224 authorizing PACE districts in Louisiana.

Thesis Supervisor: Karl Seidman
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Chapter 1: Financing Energy Efficiency

Benefits of Energy Efficiency

"Energy efficiency offers a vast, low-cost resource for the U.S. Economy… If executed at scale, a holistic approach would yield gross energy savings worth $1.2 trillion, well above the $520 billion needed through 2020 for upfront investment.”¹

McKinsey&Company, 2009

At the beginning of the new millennium an era of historically low energy prices came to an end not because of a large disruption in supply but for the first time because rapidly increasing global demand pushed production facilities beyond capacity. While academic models of the unsustainable growth in consumption compared to investment in production had foreshadowed this spike in prices, consumers were caught by surprise. The public learned a quick lesson about the implications of the exponential growth in energy demand in the 20th century. While utility and energy companies hustled to increase production, a second option gained significant influence: instead of increasing production, what would it take to curb demand?

Any homeowner that stuffs a towel under the door jam in January to keep heat from escaping understands the concept of energy efficiency and long before energy efficiency was an industry, real estate developers understood this relationship when analyzing property pro forma’s and choosing building materials that reduced long term operating costs. In the past decade, this common sense has become common knowledge as televisions shows, magazines, appliance companies

¹ Granade, 2009 pg 19
and building contractors all advertised the concept that going green saves money. A study by McKinsey & Company in 2009 found that the cost of producing 1 MMBTU through energy efficiency is $4.40 per MMBTU as compared to natural gas, which costs $5.76 per MMBTU. The McKinsey Report argued that the investment in energy efficiency did not just offer a return on investment that covers the initial cost of the retrofit, but offers a super-return that actually makes the energy efficiency investment cash flow positive for the property owner. The analysis identified over 600 different types of retrofits with positive net present value (NPV) that, if executed at scale in buildings across the US, would reduce US energy consumption by 23%. In this study, NPV is defined based on the retrofits “direct energy, operating and cost savings over the equipment’s useful life, net of equipment and installation costs.”

Not included in the report was a calculation of the additional return on investment at the macro level. By managing the demand side of energy use, a significant investment in new power generation facilities could be avoided, creating additional NPV at the municipal level. Communities that invested in energy efficiency before new power generation receive the public benefits of avoiding the large investment in additional electric generation facilities, abated carbon emissions and reduced use and dependence on fossil fuel sources.

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2 Granade, 2009 pg v
3 The McKinsey Report used a discount rate of 7%, though a sensitivity analysis found positive NPV for half of the energy savings measures even at a discount rate of 40%.
4 Granade, 2009 pg v
<table>
<thead>
<tr>
<th>Private Property Owner Benefits</th>
<th>Public Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower utility bills increase disposable income</td>
<td>Reduced Carbon Emissions</td>
</tr>
<tr>
<td>Improved household systems: newer and better functioning HVAC, Washer/Dryer, dishwasher, etc</td>
<td>Reduce demand for new generation facilities, a large investment often subsidized by public funds and passed on to utility customers in rates</td>
</tr>
<tr>
<td>Upgrade to quality and comfort of the home increases property value</td>
<td>Longer reserves of fossil fuels</td>
</tr>
<tr>
<td></td>
<td>More energy efficient properties may be desirable and have higher property values adding to a locality's tax base and desirability as a place to live and locate a business.</td>
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</table>

**Barriers to Energy Efficiency**

While public knowledge of the benefits of energy efficiency and renewable energy investment has increased rapidly in the last decade, adoption of these measures is extremely low even when there are large subsidies and long-term tax benefits for the property owner. Annual utility energy efficiency program participation often does not exceed 1% of the utility customer base. With such a substantial NPV available, the question remains as to why this investment is not being made in the private sector and why participation in coordinated programs is so low. Unfortunately, there are a number of substantial barriers preventing the U.S. from bringing energy efficiency to scale as a power resource. These barriers include:

- Regulatory barriers
Utility structure
Lack of information about energy efficiency and distributed energy science.
Up front capital
The disparate nature of the investment.

The regulatory structure of the utility industry creates a scenario where an investment in energy efficiency, even with a present value return twice the expected cost of the investment is nearly impossible to pursue from the utility’s perspective. Energy efficiency is not treated as a source of energy in most generation markets in the US. If regulators allowed energy efficiency professionals to compete on the same level as natural gas, nuclear and other traditional power generation producers, the generation market could be used as a source of the up front capital for efficiency improvements. In this way, if the region could save 3MW through efficiency, the transmission utility could purchase this efficiency to meet its future goals for grid production just as it would purchase the future production of 3MW from a nuclear power plant. By not allowing Demand Side Management (DSM) options to compete against fossil fuel generation, there is a regulatory preference for more generation over conservation and efficiency.

In addition to utility regulation, the structure of transmission utility companies discourages utility investment in efficiency because transmission utility revenue is derived from total usage in its system. Reducing usage reduces utility profits. As private corporations with shareholders, it does not make sense for the company to encourage its customers to use less electricity or gas. Attempts to change this relationship by decoupling utility profits from total generation are encouraged as part of scaling up energy efficiency. Decoupling is a complicated
process that takes place when the utility files a rate case with the regulatory body. A utility rate case typically occurs every five to ten years depending on local regulation and is where the utility negotiates the price of a kilowatt-hour (kWh) for the various classes of customers it serves. This final price is based on anticipated costs to improvement to the grid, need to build new generation facilities, and disaster mitigation planning in addition to the price at which the transmission utility purchases electricity from generation sources.⁵ A decoupled utility sets a base year on which all future profit is based. Typically the utility is guaranteed to see profit within +/- 10% of the base year profit. Thus, if the utility invests in efficiency and sees total usage drop, the price of kWh can be adjusted upward so that total utility profit does not change more than 10% compared to the base year.

It is unclear how decoupling actually removes the disincentive from utilities to invest in efficiency and this raises the question of whether the transmission utility is the correct manager of efficiency programs. The benefits of energy efficiency accrue to the end user in the form of lower electric bills and to the region as a whole in the avoided cost of building new generation. Even with decoupling, the utility does not benefit from efficiency program, but the benefit to the end user is transferred to the utility, as the rising energy prices to cover the utility's lost profit will negate the end user's expected savings from lower usage. For this reason, utilities and critics of decoupling both consider utilities a poor source of energy efficiency programs.

⁵ These are just a few examples of additional charges that are part of the final kWh price that utility customers are quoted. Sometimes they appear as separate fees of the bill, sometimes they are part of the quote. Suffice it to say it takes more than an advanced degree from MIT to fully parse utility rate formulas.
While there are obvious barriers to utility companies financing wide scale energy efficiency, it is less clear why a private banking solution has not yet been created to capture the wide spread NPV available from energy efficiency improvements. One reason is that energy efficiency science is expressed in terms of building science and has yet to be successfully translated into terms comfortable to finance community. Though the NPV of energy efficiency appears evident to the field of energy efficiency professional, financial firms, particularly retail lenders, remain skeptical. Banks are particularly resistant to financing projects that do not have a guarantee of the energy savings associated with them. On a small scale, green mortgages by retail lenders, but these are treated like traditional home equity lines in which the security is provided by the home value and not the expected energy savings. Though theoretically the savings on utility bills should be viewed as increase in borrower income, this is not an accepted practice nor is it accepted as an argument for lower interest rates associated with low risk loans.

A second problem that has hobbled the development of a private markets lending mechanism is the disparate nature of the total NPV calculated in the McKinsey study. This NPV is actually spread across many small properties. Financing this investment involves thousands of individual contracts just at the municipal scale, let alone regionally or nationally. It also requires coordination of resources like government rebates and tax credits in addition to the investment in the education of the local building trades that is well beyond the scope of a typical retail lending program. Thus, the private banking industry remains on the periphery of energy efficiency interested in the concept but not yet providing a
solution for wide scale adoption. Due to all of these barriers, there is not a wide spread source of the up front capital necessary to make energy efficient investments.

The lack of a source of up front capital for the investment remains the largest barrier for individual property owners to unlock the energy efficiency potential in the buildings. The NPV of the energy efficiency investment is returned over the lifecycle of the retrofit. The property owner must finance the initial investment upfront, which costs thousands of dollars out of pocket. Individual property owners must choose to make an investment in their property in the belief that long term they will see the pay back in the operations and maintenance costs. The McKinsey report describes this as the highly fragmented nature of the efficiency potential,

[S]pread across more than 100 million locations and billions of devices used in residential, commercial and industrial settings . . . this dispersion ensures that efficiency is the highest priority to virtually no one.6

There may be enormous NPV available, but it is dispersed across so many owners that the transaction costs of individual projects dissuade participation both by the property owners who must seek private financing and the commercial banking sector.

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6 Granade, 2009 pg 19
### Table 1.2: Barriers to Individual Property Owners Adopting Energy Efficiency

<table>
<thead>
<tr>
<th><strong>Initial Capital Investment</strong></th>
<th>Significant NPV is captured over the lifetime of an EE retrofit, but it takes years to achieve the payback. The market has yet to provide a stable source of capital for the initial investment.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uncertainty of energy savings</strong></td>
<td>Building scientists have developed many models of expected energy savings from retrofits, but the disparity of condition and use from one building to the next raise doubts about the certainty of these predicted savings. Significant investment in Measurement and Verification as EE programs are ramped up will allow the creation of more certain financial models.</td>
</tr>
<tr>
<td><strong>Split Incentive/Agent problem</strong></td>
<td>Because EE has a medium term payback period, there is resistance to the investment from property owners that might sell their property before the payback period is over. In addition, rental properties where the tenant pays the utility bill further complicate the picture as the property owner does not experience the energy savings.</td>
</tr>
<tr>
<td><strong>Transaction Costs</strong></td>
<td>Without a coordinated program, it takes significant effort on the part of the property owner to research and contract for an energy efficient retrofit. This effort reduces the completion of retrofits, even if the retrofit is revenue positive for the owner</td>
</tr>
<tr>
<td><strong>Lack of Information</strong></td>
<td>This final barrier has been reduced significantly in recent years by the growth of the Green movement. Energy Efficiency is not longer a well-kept secret. What is difficult to navigate is how to qualify the multitude of programs that now exist to subsidize the investment.</td>
</tr>
</tbody>
</table>
While a tool for small property owners to finance energy efficiency projects is evasive, the private market very effectively and with great profit finances energy efficiency projects for large property owners like industrial complexes, educational institutions and municipalities. Energy Service Companies (ESCO) create a profile of large property owners’ energy usage and then guarantee a level of operational savings based on a retrofit of the building systems to get financing. This has saved individual property owners millions of dollars a year. It also raised the question in many local leaders minds: why can’t smaller properties access this type of financing. In Babylon, NY, it was the Mayor that could not understand why he could get a great interest rate to retrofit the city’s buildings but not for his own home. He approached the ESCO contracted with the town, but they were uninterested in trying to coordinate many small property owners. Their business model worked because they only contracted with one owner to retrofit the many municipal buildings. ESCOs would not offer the solution for widespread residential and small commercial energy efficiency adoption. Still, the mayor wondered, there must be a way to finance energy efficiency retrofits en mass.

Developing a municipal tool

With a lack of private options for financing energy efficiency, municipalities are looking for creative solutions to provide the upfront capital investment. Possible tools include revolving loan funds, on-bill financing from utility companies, and loan guarantees. With the exception of loan guarantees, previous mechanisms have all encountered the same problem: where to get a large enough pool of capital

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7 Interview, Dorian Dale
for wide spread investment. In 2007 Francisco Devries, the Chief of Staff to Mayor Tom Bates in Berkeley, CA, tried for the first time using special tax assessment districts to fund energy projects on individual privately owned properties. Berkeley set a target of reducing its CO\textsuperscript{2} emissions by 80\% by 2030 and identified solar generation of electricity as the primary method for reducing emissions. A $30,000 photovoltaic (PV) system could effectively take most of Berkeley's residential buildings off the grid. Yet, even with a 30\% federal tax credit, this investment was still beyond what most property owners could invest up front.

At the time Devries was working on a municipal bond float for burying the power lines in a section of Berkeley. The property owners in this neighborhood agreed to pay a 20-year property tax special assessment to fund the municipal bonds to cover the project. He theorized that a similar program could be established for PV systems. Devries describes the process as "micro-financing these things within the municipal bond world."\textsuperscript{8}

Simultaneously to developing a program to finance PV installations on homeowner occupied homes through a property tax special assessment, Berkeley, CA, released a while paper on the concept. The idea caught like wild fire. By the summer of 2009, 14 states including California passed legislation allowing Property Assessed Clean Energy, PACE, districts.

In November of 2009, the Obama administration's middle class task force identified PACE as a key component of the administration's on going commitment not just to energy efficiency but also to job creation. The second round of the

\textsuperscript{8} Jenkins, 2009
American Recovery and Reinvestment Act's Energy Efficiency Community Block Grant funding specifically encouraged submissions to create PACE programs. Over 200 municipalities currently have PACE programs in the design stage. Devries explains the rapid adoption of property tax assessment financing that:

> at its root, there is a financing market failure for renewable and energy efficiency in people's homes. Everyone's talking about all the technology, but we have to solve the financing problem. ⁹

PACE Bonds offer a solution to two of the biggest barriers facing energy efficiency and distributed renewable energy. First, it provides a well-established mechanism for aggregating individual property owner investments into a large pool. The municipal bond market has a long history of financing special assessment districts and is comfortable with the mechanisms for compiling many cash flow sources into one bond. In addition, the super lien status of special assessment districts is viewed as extremely secure and thus PACE bonds expect to receive low interest rates in the capital markets. Second, the sale of PACE bonds allows for a constant source of capital for coordinated energy efficiency programs. A municipal program can combine the property owner outreach and building professional training in a way that a retail lending institution would never consider taking responsibility for. The securitization of the assessment revenue stream into the municipal bond market allows programs to operate in a constant way that evades revolving loan funds that must wait for the loans to be paid back before making new loans. ¹⁰

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⁹ Jenkins, 2009 pg 2  
¹⁰ Seidman, 217-239
PACE bonds, though, are not without risks. As a combination of traditional special assessment districts and home equity loans, PACE bonds are a new asset class that must be handled with caution and strong underwriting standards. The rapid adoption of PACE enabling legislation is symbolic of the strengths that this program offers to overcome the formidable barriers that have blocked wide adoption of energy efficiency up to this point, but the concept is also in its infancy. Berkeley, CA, though credited with the creation of the PACE concept, is also a warning. The BerkeleyFIRST program ended after its pilot financing only completed loans for 13 homeowners. The city was unable to get capital market financing competitive enough to attract significant participation by homeowners. Berkeley now plans to join a California statewide program, but its struggles to enter the municipal bond market show that PACE is not a silver bullet for defeating the barriers to the capital markets, but part of a number of programs and tools a municipality needs to bring DSM programs to scale.

Thesis Purpose and Methodology
The purpose of this thesis is to analyze the three most advanced PACE programs currently operating in the US to identify best practices in financing energy efficiency through municipal special assessment and also to identify risks associated with using the capital markets. In addition, recommendations are made to improve PACE programs to mitigate risks and advise the creation of new PACE programs. In particular, I came to this topic based on my work in housing reconstruction in Post-Katrina New Orleans. New Orleans is both an exceptional and all too common

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11Home Performance Resource Center, March 2010
example of the complexity in creating an effective citywide energy efficiency program. Hurricane Katrina damaged nearly 80% of the building stock of the City of New Orleans, eliminating some neighborhoods completely. With the subsequent rebuilding the city is, at the macro-level, 9% more efficient compared with a pre-storm baseline. Few cities can conceive of implementing efficiency retrofits on 80% of buildings in 5 years and replacing 75% of all refrigerators.

This savings, though, was achieved without a coordinated energy efficiency program and in many ways represents a capture of the low-hanging fruit. The rebuilding was a missed opportunity for achieving deeper retrofits to the building envelop that could have garnered the 25% to 40% most experts deem necessary to make a serious impact on carbon output and fossil fuel dependence. Residents of New Orleans have personal experience with catastrophic consequences of ignoring climate change. The City now realizes a need to develop its local markets for energy efficiency including training its building trades, coordinating utility, state and federal incentive programs and identifying capital sources for upfront investment in energy efficiency and renewables.

The three programs profiled in the case studies, Babylon, NY, Boulder County, CO, and Palm Desert, CA, are suburbs with majority white populations and municipal governments that regularly run a surplus. The analysis, though, keeps in mind that most communities in the US have more in common with New Orleans than the case study communities. They do not have regular budget surpluses, already trained building trades, or even significant experience in using assessment districts. New Orleans is a city with a majority minority population, 18% of the
population living below the poverty level, a city government that consistently runs a budget deficit and property owners and tenants with considerable construction fatigue. If PACE is truly going to revolutionize energy efficiency financing, it must work both in our suburbs and our cities. The second half of this thesis, thus, analyzes the potential of Louisiana Senate Bill 224, authorizing PACE districts in Louisiana, to impact the New Orleans energy efficiency and renewable energy market.

New Orleans may appear an outlier for any number of reasons, but in reality each community will have inherent characteristics that make it different from the case study scenarios. The things about New Orleans that make a PACE program difficult to envision are exactly the barriers PACE needs to overcome to truly establish itself as a solution to energy efficiency financing. Finally, while New Orleans’ commitment to energy efficiency comes from local activism, residents of the Big Easy are aware that because of the focus their rebuilding receives internationally, they are in the unique position to educate other communities on how to build back better. As the City transitions out of recovery, it needs to develop local tools to build upon the progress made in the initial phase of rebuilding. As Mayor Mitch Landrieu declared in his inauguration, “we are no longer recovering no longer rebuilding. Now we are creating. Let’s stop thinking about rebuilding the city we were and start dreaming about the city we want to become.”

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12 Times-Picayune, 5/3/2010
Chapter 2: Property Assessed Clean Energy

As of May 1, 2010, 17 states enacted laws enabling municipalities to float bonds for energy efficiency tax districts that pool property assessments to create loan pools securitized through the public bond market. The property owners commit to repaying the loan for energy efficiency retrofits through a property tax special assessment. The property tax assessment spreads the cost of the retrofit over the lifetime of the loan. Two very important features of a PACE program are that the assessment stays with the property even when the owner sells and the loan has a senior lien status ahead of the mortgage. As a tax lien, the debt cannot be wiped away even in foreclosure. The next owner must bring the assessment up to date and assume the future payments. Though not all states have extensive history with special assessment districts, the use of a well-known municipal tool creates a low risk instrument for the financial markets and provides a breakthrough in aggregating many small properties to capture energy efficiency.

Special Assessment Theory

PACE is a new take on an old planning and municipal finance tool, the special assessment district. A special assessment is distinct from annual property taxes and tax incremental financing districts. Property taxes are levied against property owners in a geographic district in an equal and universal manner. The tax is levied

\[\text{\footnotesize 13 Baker, 2008}\]
based on set rules and applied based on the assessed value of the individual properties. Property taxes are used to fund local programs on an annual basis that benefit the community in general. The municipality sets its annual budget based on the projected revenue of various taxes, including property tax.

Tax incremental financing is used to finance general improvements that are expected to raise property values and thus tax revenue in a specific area. The improvement should lead to the improved property value of all the properties in the TIF district. Tax increment financing uses the increase, or increment, in existing property taxes in the defined TIF district to finance these improvements. Typically the municipality commits the expected increase in tax revenue as the future cash stream to pay back municipal bonds. The bonds are sold to finance the upfront cost of the investment.\textsuperscript{14}

A special assessment targets a specific property where a public investment is made and a private property accrues private gain. The public investment has value to the general public, but the specific private property experiences gain greater than the community as a whole. In the past special assessments were typically used to fund sewer extensions and utility improvements that benefit the properties that received the service. In a 1980 decision, the California Court of Appeals found, “strictly speaking, a special assessment is not a tax at all, but a benefit to specific real property financed through the use of public credit.”\textsuperscript{15} This case challenged the use of special assessment districts in California following the passage of Proposition 13, limiting property taxes in the state. The plaintiff claimed that municipalities could

\textsuperscript{14} Seidman, 348  
\textsuperscript{15} Solvang, 1980
not levy special assessments in excess of the Proposition 13 limit. The court found that a special assessment was exempt from the Proposition 13 limit as,

The rationale of special assessment is that the assessed property has received a special benefit over and above that received by the general public. The general public should not be required to pay for special benefits for the few, and the few specially benefited should not be subsidized by the general public.\(^{16}\)

Another difference between property taxes and special assessments is the treatment by the IRS for federal and state income tax deduction. Special assessments, unlike property taxes are not deductible from personal income for federal taxes. In some states it is treated instead similar to mortgages, allowing the interest to be deductible but not the principal. The IRS does not allow an income deduction of special assessments from federal income tax. Similarly, because the special assessment benefits a private property owner and not the public in general, they are not eligible for tax-exempt municipal bond status and the interest income for bonds backed by special assessments are not necessarily exempt from federal income taxes.

A special assessment district, though, does share two key characteristics with property taxes. First, it assumes a senior status over other debt secured by the property, including the primary mortgage and any home equity loans. This makes special assessment bonds a very secure investment for the bondholder.\(^{17}\) Should

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\(^{16}\) Solvang, 1980

\(^{17}\) In 2008, the Municipal Bond Fairness Act established an online searchable database for municipal bonds and listed the historical default rate of all Municipal bonds. Aaa bonds had a historical default rate of 0.00, Aa bonds had an historical default rate of .06, and A bonds had a historical default rate of .03. Comparatively, an Aaa Corporate Bond has a historic default rate of 0.52.
the property go into foreclosure, while the primary mortgage may be wiped away, the new owner assumes responsibility for the remainder of the assessment term. If the current owner is delinquent on the special assessment, the municipality has the primary position to take the house as collateral, even if the property is up to date on its mortgage.

For this reason, it is vital that any assessment program inform the mortgage holder of the assessment. The mortgage holder then adjusts the escrow account to ensure the assessment does not fall behind and threaten the primary mortgage. The mortgage escrow account collects from the borrower the cost of annual payments of obligations that stand in front of the primary mortgage or otherwise safeguard the value of the property, like property taxes, insurance premiums, or special assessments. Thus, a property should never fall into tax default ahead of mortgage foreclosure as the mortgage holder specifically maintains a trust account to keep the senior lien and insurance obligations current for the owner.

The second characteristic the special assessment shares with property taxes is that it stays with the property at the sale and does not have to be paid down by the owner that initiated the project. This extends the amortization term of the assessment and lowers the annual payment. The concept of the special assessment district is that the public has provided financing for a private gain and thus assesses the property for that gain. The owner does not have to pay down the assessment at sale because it is tied to the property and not the owner.
**Property Assessed Clean Energy Districts**

Property Assessed Clean Energy districts take special assessment districts a step further. PACE districts provide financing for the actual interior renovation of properties in the district. This use is justified by the lack of financing available to tackle an investment that is important both to our environmental sustainability and our national security. Municipalities initiating PACE districts gain a number of community wide benefits by providing long-term financing for individual property owners to reduce their total energy usage including:

- Increased building efficiency reduces demand for electricity and reduces need to invest in new generation sources.\(^{18}\)
- Reducing energy use reduces fossil fuel demand.
- Reduced dependence on fossil fuels thus reduces carbon output for the municipality.
- Increased energy efficiency reduces peak energy demand, reducing brownouts and grid failure.
- Utility costs can take up a significant portion of low-income family income, thus increasing home efficiency is an anti-poverty tool.
- Providing a tool for all property owners to capture the NPV of efficiency in their buildings is a political win.
- Potential benefit to property values and tax base
- Encouraging energy efficiency retrofits is job stimulus for the building trades.

It is undeniable that the structures of PACE programs use public funding to finance a private benefit. Property owners participating in a well structured PACE program should immediately see positive cash flow from the savings on their energy bill compared to assessment cost. In addition to the energy savings, the property

\(^{18}\) The State of Florida currently cannot site a new power plant due to the depletion of aquifers in the state. In addition to being carbon intensive, power plants are water intensive and this is leading more areas to think twice about investment in large generation facilities. Energy efficiency is an alternative way to meet future demand. More information on water shortage effects on energy production can be found [http://www.evs.anl.gov/project/dsp_fsdetail.cfm?id=119](http://www.evs.anl.gov/project/dsp_fsdetail.cfm?id=119)
owners receive an upgrade to the property that will be reflected in the value of the home. PACE districts provide owners a double benefit, both increasing the value of the property and reducing the operating costs.

Moreover, the use of the special assessment district in such a widespread manner and with participants whose spatial locations are non-contiguous raises the programmatic costs and requirements compared to traditional special assessment districts. In fact, it would be ineffective to exclude a property from the assessment district when installing sewer and utility lines, even if traditional lending requirements like a credit score did not meet a retail loan standard. PACE, on the other hand, does not require the properties to be abutting each other to be effective. It is also adding a substantial amount of debt to the property and giving it first priority. For these reasons, it is important for programs to take traditional retail lending qualifications under consideration when approving participants. Instead of ignoring credit risks, programs should provide credit enhancement so as not to exclude low and moderate income homeowners and small business owners. This enhancement can come in the form of a loan-loss reserve for the PACE program to provide an additional layer of security of mortgage holders. It can also bundle other incentives to reduce the total PACE loan and adjust loan terms to make sure the annual payment is below the estimated utility savings. This positive cash flow should improve income and thus improve credit worthiness.

This last point highlights a key way a PACE assessment differs from a home equity loan. A properly designed home retrofit should create positive cash flow for the property owner or tenant in the form of lower utility bills. So, unlike a
traditional retail home equity loan in which the property's value is theoretically increased but the property owner does not see immediate cash flow, a PACE retrofit does create the potential for a new cash flow stream.

These various characteristics are what led a number of investment banks, including Barclays\(^\text{19}\), Deutche Bank, US Bank Trust Corp, and Wells Fargo Securities to consider PACE bonds as a new asset class. A hybrid of municipal assessment bonds and mortgage backed securities, PACE could at long last be the financing breakthrough energy efficiency needs to bring it to scale. As a new asset class, it cannot just be assumed that PACE loans will perform identically to special assessment and TIF districts. As PACE becomes more prevalent and there is more data on the performance of both PACE loans and the energy savings on the retrofit, PACE programs will be able to adjust underwriting standards. Until this history is established, though, it is important to err on the side caution.

**PACE Enabling Legislation**

To allow for this expansion in special assessment district use, PACE programs have sought authorization through statewide legislation enabling the creation of special assessment districts specifically for energy efficient retrofits and renewable power installation. In some cases, individual municipalities created programs ahead of the statewide legislation, but currently all active programs are empowered by statewide legislation. Each state regulates property taxes, special assessments and municipal bonds differently. For this reason, PACE programs vary

\(^{19}\) Moriarty, 2009.
programmatically from place to place, but in general terms, the authorizing
legislation does the following:

1.) Grant jurisdiction to establish geographic districts where property
owners can opt in to the special assessment.
2.) Designate specific types of energy efficient, water conservation and
renewable energy generation technology to be financed.
3.) Grant bonding authority to the municipal power overseeing the special
assessment district.
4.) Set limit on total amount to be financed through municipal bonds.

Additionally, the state legislation may address local issues around PACE
programs such as: requiring public meetings, referendum approval, mortgage
lender notification, and state income tax exemption. If the state offers rebates or tax
credits for efficiency or renewable installation, the enabling legislation may clarify
how property owners can layer or transfer these incentives to receive the best final
rate on PACE loans.

Once the enabling legislation is signed into law, the PACE jurisdiction must be
established. PACE programs have thus far only been established at the city and
county level though both California and Louisiana are currently considering
statewide programs. The controlling jurisdiction is responsible for prioritizing the
types of properties eligible for PACE, establishing the retrofit and renewable energy
guidelines, determining whether efficiency or renewable energy investments
receive priority in the program, and coordinating, if available, with other local
rebate or tax credit programs.

Observations about components of a successful PACE program
For this thesis, based upon the case studies in Chapter 3 and conversations
with professionals in the energy efficiency and banking industries, key policies and
components of a PACE program were identified. This list is specifically to inform municipalities looking to use financing programs that access the municipal bond market. It does not universally apply to all energy efficiency programs and loan funds, though a few of the observations are fairly universal, like the need for a well trained and certified building trades to complete the retrofits. These observations, in the end, would provide the basis for structuring a program that can use municipal bonds to securitize energy efficiency loans:

- **PACE** loans must be originated with a market interest rate and in sufficient size to access the public debt market.
- Utility and State incentives should be designed to cover a portion of the total retrofit and **PACE** to finance the rest.
- There must be well-trained local efficiency professional in the building trades and energy audit industry.
- Programs must invest in actual measurement and verification of energy saved.
- A successful **PACE** program requires political will to take on the risk associated with making the assessments and standing behind the bonds.
- As **PACE** is still a new tool, there is a need for credit enhancement at least until **PACE** bonds develop a track record and market acceptance.

There is a distinction between originating loans to property owners and using the capital markets to finance municipal bonds. Originating the loan to the property owner allows her to initiate the retrofit of the property. This is providing the up front capital that has eluded efficiency programs up to this point. Floating **PACE** bonds involves bundling lots of these initial loans into a bond offering and selling it to investors. This distinction is important, as the **PACE** bond comes after the initial loan. It is possible to create the **PACE** bond immediately after making the loan. Boulder County, CO, only offers residential **PACE** loans in May and October, immediately bundling all of the loans into a bond offering. This avoids the need for an origination capital pool but limits the flexibility of the program to respond to
emergency situations, like a boiler going out in December. Palm Desert, CA, instead cobbled together local resources to originate loans in order to build a larger pool to securitize and thus reduce the transaction costs of entering the capital market. Palm Desert is locally financing until it has a pool equal to $15 million in loans. They are on a pace that suggests it will be two years from originating the first loan to selling the bonds publicly.

As PACE is still a very new tool, it is possible this problem will go away. Particularly if states take over the bonding of PACE loans, it is possible that loans will be originated statewide rapidly enough that the state PACE facility could enter the capital markets every month. Also, as PACE develops a longer record of verification of energy savings and low default rates, private banks may become more comfortable in financing the origination capital. As long as this distinction between originating capital and PACE bonds remains, though, PACE programs must be sure to structure the up front financing with an interest rate that will be competitive in the public debt market. Though the instinct of many efficiency professionals is to offer very low interest loans, the public debt market is fickle about financing a project just because it is good for society. The bond investors expect a competitive return. PACE bonds cannot ignore this basic tenant of finance just because it is a good cause.

The second observation is that PACE significantly shifts the responsibility for energy efficiency programs away from utilities and on to the municipality. For the utility industry, this is a welcome change. Up until now, efficiency programs have focused on offering incentives from property owners to do efficiency retrofits. The
incentives are most often targeted to the retrofits that have the quickest payback periods. Efficiency professionals refer to these types of retrofits as low-hanging fruit. The structure of utility incentive programs is a topic that deserves a thesis unto itself, though a brief discussion can be found in Chapter 4 relating to the Entergy New Orleans Energy Smart program. Suffice it to say that widespread adoption of PACE and availability of long-term, low-interest financing for efficiency retrofits should be accompanied with significant change to the way incentive programs are structured and organized. Instead of targeting a small list of quick payback measures, incentive should be layered in front of PACE financing to reduce the total cost of the retrofit, particularly targeting measures with longer payback periods. Utility programs can work with PACE programs by providing up front incentives applied to total retrofit cost, by using utility funding to buy down the market interest rate for specific income groups, and by funding specific programmatic needs like energy audits or training for building trades. It does not need to incentivize the replacement of refrigerators, a retrofit that can pay for itself in the first few years of the assessment.

The local market must have building trades and energy audit professionals that are well trained in performing retrofits and understand the science of energy efficiency. This is important because programs must invest in measurement and verification of the projects completed under the PACE program. Until efficiency science moves away from deemed values from engineers of expected energy savings and produces a verified database of efficiency retrofits, the financial markets will not let efficiency loans stand on their own based on the expected cash flow from
energy savings. This requires serious coordination on the part of the municipality and utility to collect and publish this data and it requires the retrofits to be completed properly. Until this system is established, the municipal bond market is going to require some form of credit enhancement from the municipality to give PACE bonds a competitive rate.

The final observation is that a PACE program is not for the meek hearted. The communities that successfully created efficiency financing programs have serious commitments to reducing energy usage in the area. Whether this commitment comes from concern about climate change, serious local barriers to increasing local power generation sources, or a local desire to extend the benefit of energy efficiency to the local constituency, establishing a real PACE program takes political will. Whether financing directly through the capital markets or using government revenue to originate the loans, the municipality is exposing itself to risk and taking on a significant coordination role. It is also a role, though, that the municipality is particularly well suited to play: coordinating public and private sources to capture the NPV available from efficiency retrofits, intervening to correct a market failure by providing long term capital financing, and using its regulatory power to direct the development of a strong, well-educated energy efficiency work force. PACE is an exciting new tool for local governments. The next chapter profiles three such municipalities that each arrived at this very calculation, but for very different reasons.
Chapter 3: Case Studies

This chapter provides an analysis of three existing PACE programs, their structure and financing. While each program uses a type of municipal assessment to repay an investment on private property that reduces energy usage, the most striking thing about the three programs is how different their initial conception, operations and financing are. For comparisons sake, I have included background on each programs and then divided each case study into four parts: Origination Capital, Program Design, Program Participation, and Capital Market Take Out. Origination Capital identifies how the municipality amassed the capital to make loans to the property owners. Program Design analyzes how much the municipality controls the retrofit process and integrates with other programs like utility incentives and state tax credits. Program Participation provides data on the number of completed retrofits. Finally, Capital Market Take Out analyzes the success thus far at securitizing the PACE loans and predicts program’s the ability to use public debt markets. Finally, at the end of each case study are my observations about each program.

Babylon, NY

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<tr>
<th>Babylon, NY Characteristics²⁰</th>
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<tr>
<td>Population</td>
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<td>Total Housing Units</td>
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<tr>
<td>Owner Occupied Housing Units</td>
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<td>Median Household Income</td>
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²⁰ 2008 American Community Survey Fact Sheet
Babylon, NY, was a pioneer in using municipal financing to overcome the initial capital hurdle to energy efficient retrofits. The LI Green Homes program actively completed retrofits before Berkeley, CA, created the Berkeley FIRST program. The program is an outgrowth of previous entrepreneurial local government investments. When the city wrested control of garbage collection away from a consortium of private collectors that were gouging local residents, local leaders noticed that the city was paying high fees for disposal of garbage outside municipal boundaries. The city entered into a public-private partnership with Covanta Electric to build a Waste-to-Energy facility that not only produces revenue from power sales, but also collects fees from surrounding towns that use the facility to dispose of trash.

In 2006 the Town decided to retrofit municipal buildings to lower the city government's utility bills. They contracted with an Energy Service Contracting Organization (ESCO) to complete the retrofit. The Town approached the ESCO to run a residential program targeted to Babylon property owners. The ESCO, though, was only interested in single customer projects and did not think a residential model would meet the companies return expectations.

Convinced of the financial sense of encouraging energy efficiency, town leaders brainstormed alternatives to a private ESCO model. From this brainstorming, Babylon changed the definition of solid waste to include carbon

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21 In addition to articles in the works cited, this section heavily draws on an Interview with Dorian Dale, Energy Director and Sustainability Officer for the Town of Babylon, NY.
output, thus giving the Town the ability to charge customers to mitigate their carbon output by retrofitting homes. Just like the Town can bill a property owner for hauling away their trash, Babylon, NY, offers services to its constituents that abates the carbon output of the building by retrofitting building for energy efficiency.

**Origination Capital**

The success of the LI Green Homes program is reflective of the fact that this is a well-run municipality. The State of New York required that a reserve fund be maintained to deal with the irregular disposal of fly ash associated with the Covanta Energy-to-Waste facility. As the reserve fund is contributed to regularly from revenue from the facility and the fly ash is disposed of infrequently, the reserve fund grew to be $28 million. This sat in a money market account generating very low returns. The Town decided that changing the definition of solid waste to include carbon provided legal ground to use the solid waste reserve fund to capture buildings’ carbon output the same way it financed the irregular removal of excess fly ash from the Waste-to-Energy plant. The Town Council approved a $2 million program allocated from the reserve fund to invest in loans for home retrofits. Viewing the reduction of energy use and carbon output as a serious public issue, the Town set the financing at a 3% interest rate. This was extra incentive, beyond the reduction of utility bills and improvement to the building, to entice property owners to participate.
Program Design

Babylon very strictly follows loading order standards\textsuperscript{22}, requiring properties to reach an Energy Star rating\textsuperscript{23} for efficiency before financing renewable energy projects through the LI Green Homes program. The program only finances retrofit items with 2.0 lifetime savings to investment ratio (SIR)\textsuperscript{24}. With its strict focus on energy efficiency first, LI Green Homes financed smaller projects than the PACE programs geared towards solar installation. In the LI Green Homes program, the loan is paid annually on a separate bill from trash collection. If the borrower becomes delinquent, the Town has the right to turn the loan into a property assessment. The bill is passed on to the new owner if the property is sold. Property owners participating in the program are charged an annual payment equal to 80\% of the expected energy savings, thus the program expects to provide immediate positive cash flow for the participants. The payback period for the loan thus is flexible to allow each owner to meet the 80\% of energy savings target for the annual payment and 3\% interest rate. The average payback period for the first round of

\textsuperscript{22} The California Energy Commission defines loading order as, "decreasing electricity demand by increasing energy efficiency and demand response, and meeting new generation needs first with renewable and distributed generation resources, and second with clean fossil-fueled generation." (CEC, 2005)

\textsuperscript{23} The DOE is in the process of rolling out Home Performance with Energy Star across the country, creating a standard rating system for homes that invest in whole structure efficiency retrofits. More information can be found at http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_hp

\textsuperscript{24} Savings to Investment Ratio (SIR) is used by the DOE to rank the performance of different retrofits. The DOE defines SIR as, "a ratio of economic performance computed from a numerator of discounted energy and/or water savings, plus (less) savings (increases) in other operation-related costs, and a denominator of increased initial investment costs plus (less) increased (decreased) replacement costs, net of residual value (all in present-value terms), as compared with a base case." (Buildings Energy Data Book, 2009)
loans is 8.6 years. Due to the focus on energy efficiency the Town capped loans at $12,000. The 3% interest rate is the lowest of any of the municipal assessment programs actively underwriting loans thus far. The Town remains comfortable with this return on the $2 million allocated from the solid waste reserve fund but has yet to identify a source for additional capital at this interest rate.

The local utility, Long Island Light and Power (LILP) does not participate in the program. LILP ran a local incentive program that provided an upfront subsidy for a set list of home improvement projects. Though the program was ended after 3 years and did not achieve a notable number of retrofits, it did fund local contractors to be certified in energy efficient retrofits by the Building Performance Institute (BPI), the gold standard in the energy efficiency building techniques. These contractors provided the work force that the Town of Babylon needed to quickly implement the LI Green Homes Program.

The Town contracted directly with BPI certified contractors, aggregating the participating property owners into larger contracts. Property owners contact the Town to schedule an in-home audit. The contractors provide an energy audit using Conservation Services Group’s (CSG) HomeCheck software. Property owners pay for the audit, though the cost is used as a down payment for any retrofit undertaken through the program. Town officials see a connection between making the property owners pay for the audit and with the program’s 80% audit to retrofit completion rate.
**Program Participation**

To date, Babylon has closed the financing of 400 houses, approximately .7% of owner-occupied units. The Town sees the next round of participants as being key to building a social network of happy clients that will push participation beyond people who use LI Green Homes to make repairs that were already planned or individuals sensitive to climate change issues. As the program grows, they see the participants as their sales force and thus are very careful to inspect their contractors’ work and monitor the actual energy savings. Program participants are required to provide energy bills from two years before and two years after the retrofit. This data is being used to adjust the energy audit process and improve the savings-to-investment ratio used in approving retrofits and setting the annual payment. Babylon is committed to making sure the program is financing retrofits with significant positive net present value.

**Capital Market Take-Out**

Babylon completed the first $2 million in financing in early 2010 and is now considering options for the next round of loan capital. The Town is very proud that it is has thus far avoided the public debt market. The program managers were advised that it is inefficient to use the public debt market with less than $30 million in loans. In addition, they view the public debt market as too volatile to finance a program with benefits beyond its financial return. The Town’s commitment to reducing carbon output justifies, in the program administrators’ opinion, the fixed 3% interest rate. The low fixed rate, though, limits Babylon’s ability to securitize the loans to replenish the efficiency loan fund. The Town must use more of the reserve fund, identify a new source of origination capital, find an investor willing to take on
the low interest loans because of perceived triple bottom line benefits of investing in a sustainable program, or wait for the first round of loans to be repaid which is expected to take on average 8.6 years.

Officials in Babylon believe they will to continue to find creative sources for the loan fund. Current possibilities include exploring power purchase agreements that would allow the Town to sell expected energy abatement into the power generation market. In a trial program expected to launch soon, the Town is exploring how the property owner can transfer the energy savings, rebates, and tax credits to a third party investor that completes the retrofit and assumes the risk of variation in the energy savings. The Town’s commitment to a low interest rate, though, suggests the Town itself will have to continue to replenish the loan fund or the program will operate like a revolving loan fund, waiting until the first round is paid back before financing new loans.

Observations

Babylon was a pioneer in providing municipal financing for private property retrofits. They focused exclusively on program development and made low-cost financing a priority for their program. In the process, they developed a number of policies that new programs should seriously consider, including a strong commitment to efficiency before renewables and a serious investment in the measurement and verification needed to guarantee positive cash flow for the property owner. Their commitment to the front end of the program and providing a low interest rate to further incentivize property owner participation limits their
ability to securitize the first round of loans and has stalled the program until a new capital source is identified.

Only recently did the Babylon program gain the same attention as Berkeley in the national press. The lack of national spot light, though, allowed Babylon time to develop its program without outside scrutiny or influence. This is obvious in the very different approach to both originating the loans and structuring the billing. The entire program was conceived and executed in a manner that created a coalition early on of bankers, trade unions, the utility company and local politicians. This allowed the program to develop with significant local buy-in and limited political opposition. The program manager likens the service to other programs the government provides for the private sector, suggesting it is in a way an extension of blight removal – the removal of carbon output. This framing fits with concept of PACE as a special assessment district and provides a key perspective to consider in the current disagreement over PACE’s first lien status.

Boulder County, CO

<table>
<thead>
<tr>
<th>Boulder County, CO Characteristics25</th>
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<tbody>
<tr>
<td>Population</td>
<td>279,360</td>
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<tr>
<td>Total Housing Units</td>
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<tr>
<td>Owner Occupied Housing Units</td>
<td>75,669</td>
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<tr>
<td>Median Household Income</td>
<td>$65,960</td>
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In 2005, Boulder County, Co, signed on to the Kyoto protocols and committed to reducing the CO₂ output of the local area in 2012 by 7% compared to 1990 levels. Their primary method of reducing carbon output is making the building stock more

25 2008 American Community Survey Fact Sheet
energy efficient and installing solar. The county created ClimateSmart to develop a one-stop shop for educating and encouraging citizens to participate in energy reduction measures. ClimateSmart offered information about in-home audits, utility programs and rebates for energy efficient upgrades. In addition, the county recognized there was a need for a financing mechanism for homeowners to complete deep retrofits.

In late 2007, employees of Boulder County heard about Berkeley’s plans to offer financing for photovoltaic systems using a special assessment. An analysis by a county attorney determined that the Berkeley model was not permitted under current Colorado state law. The local representative introduced Colorado House Bill 08-1350 in May of 2008 authorizing Colorado municipalities to create special assessment districts and float municipal bonds for the financing of energy efficiency and renewable energy measures. While the house delegation pushed the authorizing legislation through, the local officials identified the steps it would take to create the local tax district. Ballot Measure 1A appeared on the November 2008 election ballot to permit the sale of up to $40 million in municipal bonds to finance the county’s ClimateSmart loan program. The ballot measure passed and all except one town in Boulder County opted into the voluntary tax assessment district.

Once the local authorities met the legal requirements to proceed, the focus shifted to program design. Simultaneously, the downturn in the national economy became a serious issue for Boulder County. In January 2008 the county had four construction tradesmen for every one job. One year later, there were 17
construction tradesmen for every available job. The county decided to expedite the program roll out as a jobs stimulus initiative, opening the application period to homeowners in February 2009 and selling the first round of public debt in May of 2009.

*Origination Capital*

Boulder County finances the ClimateSmart loans directly through the public debt market, waiting until the bond sale to commence the construction. The property owners have 180 days from the time of the bond sale to complete the retrofit. The county sets a “not-to-exceed” interest rate when soliciting applications for the program, giving the property owner an out should the bond sale not go well. The first four rounds of bond sales came back significantly below the “not-to-exceed” rate quoted to the property owners when they committed to the program. The county plans to do two residential and one commercial PACE bond sale each year. They acknowledge that this makes the program less flexible for responding to emergency situations like a broken furnace in January. The benefit of the structure is that it reduces the city’s risk exposure and by having firm deadlines for program participation, local property owners develop a greater sense of urgency to complete their applications.

Colorado allows municipal bonds for private property improvements to be offered as tax-free investments if the loans are made to Income Qualified borrowers who earn less than 120% of area median income. Boulder County took advantage of

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26 Ann Livingston, 2010
this option to offer up to $15,000 in PACE financing at a lower interest rate to qualified borrowers.

Program Design

Key characteristics of the program include a focus on efficiency before renewables, reinvestment in the local economy, and a holistic approach that incorporates PACE into the existing local programs. The initial outreach is conducted through homeowner workshops that educate the public about the concepts behind energy efficiency, explain the benefits of an in-home energy audit and highlight the different programs available through the county and local utilities.

Boulder County is served by six different electric utilities, though over 50% of residents are customers of Xcel. Xcel now offers audits for its customers, which the ClimateSmart program highly encourages participants to take advantage of before designing their retrofit. For residents not served by Xcel, the county offers subsidized audits. The PACE program gives priority to customers who complete an audit and who choose to complete efficiency retrofits before installing renewables. Local officials credit the workshop with convincing participants initially interested in renewables to complete efficiency retrofits first.

Once a property owner completes the homeowner workshop, the homeowner selects a contractor to submit a not-to-exceed bid for the PACE application. Boulder County’s program is designed very specifically with local job stimulus in mind in addition to addressing the County’s carbon commitments. The county pays the contractors directly reducing delays in payment but does not chose the contractor for the property owner. As long as the contractor is licensed for the
specific type of work, the county will accept them on the project. The Boulder Green
Building Guild was actively training and educating the local trades in energy
efficient building techniques prior to the creation of the ClimateSmart program.
This created the local workforce needed for Boulder County's quick role out and
allowed the county to focus on training the property owners.

ClimateSmart loans fund forty types of energy efficiency retrofits and eight
types of renewable retrofits. A property owner can borrow up to 20% of statutory
actual value of the property or $50,000, whichever is greatest. The loans all have
15-year payback periods. When designing the specific retrofit, the property owners
have access to another ClimateSmart program, Residential Energy Action Program
(REAP). REAP provides counseling to help identify the best retrofit for the specific
property and guides the owner through the application process, identifying
additional rebates and tax credits to further improve the property owners' return on
investment.

Applications for residential properties are due in April and September.
Accepted properties are entered into the next round of debt financing. The program
does not require the homeowner to notify their mortgage holder of the special
assessment, though most participants have refinanced their mortgages since
participating in the program. There is a bill before the Colorado legislature to
require residential PACE participants to get mortgage holder approval. This is
already required of commercial participants.
Program Participation

To date, the program financed 612 homeowners, or .8% of all owner-occupied homes, in two separate bond sales, first in May of 2009 and again in October of 2009. The average loan size is $15,970. Income qualified loans were quoted a not-to-exceed interest rate of 6.75%, but actually received 5.2% in the first round and 5.8% in the second round. Open loans were quoted a not-to-exceed rate of 8.75% but actually received 6.7% in the first round and 6.8% in the second round. The projects were split 50-50 between efficiency and renewables. One-third of the financing specifically financed PV systems. Loans for efficiency have a lower average size than loans for PV. One participating house was sold to a new owner. The buyer negotiated to make the seller pay off the special assessment.

Capital Market Take Out

Boulder County took advantage of a number of rules that are specific to Colorado that allowed their PACE program to function directly through the capital markets. In addition to using Income Qualified loans to qualify for a tax-free interest rate, the program includes a Moral Obligation Clause in the bond prospectus to achieve a higher rating. Colorado allows municipalities to assume a “moral obligation” when offering revenue bonds without providing the full faith and service of the municipality’s general fund. The Moral Obligation Clause states that should the bonds default, the county commissioners will consider assuming the deficiency and making the bondholders whole. The county commissioners are not obligated to assume responsibility, though it would kill the PACE program if they refused.

The county is confident this will not be necessary. In addition to a historical 99.9% payment record on property taxes, the county created a reserve fund to cover
six months of total default by the PACE program participants. In addition, in Colorado, they are able to sell the tax debt without actually seizing the property. The tax debt can be sold for three years before the property faces foreclosure.

**Observations**

Boulder County, CO, is the only program to enter the public debt market thus far. The two bond issues last year were a success and the program expects to finance two more issues this year for owner occupied homes and one for commercial properties. Boulder County's use of the special status for Income Qualified loans provides guidance on how municipalities can reach further down the income ladder and target moderate income homeowners with lower interest rates while still using the capital markets. The direct use of the capital markets does limit the flexibility of this program but if the program dramatically takes off bond issues could occur more frequently.

Boulder County's failure to include mortgage holders upfront in the process generated considerable push back in the state from the Mortgage Brokers Association. Though the use of a special assessment district is appropriate as a first lien on a property, it is very important that mortgage holders know about the assessment. If the mortgage holders adjust the mortgage escrow account to include the PACE assessment, the security of the PACE loan is even greater. This could eventually be used as an argument to remove the Moral Obligation Clause from the PACE bond assessments. At the moment, though, the capital markets will not accept PACE Bonds on the assessment revenue alone.
Finally, Boulder County's coordination of the various local efficiency programs and the homeowner training allowed PACE participants to use incentives and tax credits to significantly lower the final PACE assessments. The strong push to use PACE as a job stimulus expanded the political support for the programs and is acting as a stimulus for green businesses in the county.27

Palm Desert, CA

<table>
<thead>
<tr>
<th>Palm Desert, CA Characteristics28</th>
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<tr>
<td>Population</td>
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<tr>
<td>Total Housing Units</td>
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<td>Occupied Housing Units</td>
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<td>Owner Occupied Housing Units</td>
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<td>Median Household Income</td>
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California was an early victim of the recent energy crisis and experienced rolling blackouts during summer months in the later half of the 1990s. This created the political will to explore ways to reduce demand load within the state. The state led the way with Renewable Portfolio Standards, requiring utilities to reach 25% of electricity generation with renewable energy sources by 2030 and municipalities to develop an action plan on energy. In 2006, Palm Desert, CA,29 in conjunction with the local utility, Southern California Edison, and the CA Public Utility Commission set a goal of reducing total electricity usage in the city by 30% by 2011. This deal was brokered on the boat of City Councilman Jim Ferguson. He wanted to put Palm

27 NREL is expected to release an economic impact analysis of Boulder County ClimateSmart in May of 2010.
28 2008 American Community Survey Fact Sheet
29 In addition to articles in the works cited, this section heavily draws on an Interview with Benjamin Druyon, Energy Project Technician for the City of Palm Desert, Carter Williams, Principle at EnerPath and Michael Karlosky and Wayne Seaton in the Sustainable Public Finance Group at Wells Fargo Securities.
Desert on the map as the city with the most aggressive energy targets in the U.S. and to prove that forward-looking energy policy does not only happen in liberal strongholds like Berkeley, but also could succeed in conservative districts like Palm Desert. The goal is all about local pride. It did not come with any penalties for failing to meet the target, but enough people in the City of Palm Desert bought into the program that it now is becoming a reality.

To respond to this aggressive target, the City of Palm Desert created an Energy Department to administer programs encouraging energy conservation and efficiency. In addition, the department was to encourage the adoption of local renewable energy. Six months after its creation, the department employees learned about the Berkeley FIRST program. It was decided that a PACE financing program would be a central part of the municipality's attempt to reduce energy use. The city council supported the program and created the tax assessment district under the power granted by PACE enabling legislation, CA Assembly Bill 11 in 2008 and authorized the City to float up to $25 million in bonds to finance the program.

In concert with the local utility, the energy department rolled out the Energy Independence Program to provide long-term financing for efficiency and renewable projects for property owners in Palm Desert. While political support was strong, the funding for the program was not as forthcoming.

*Origination Capital*

Palm Desert is a well-run city of just over 50,000 residents. The City was one of the fastest growing in the US at the end of the last millennium, doubling in

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30 American Community Survey, 2008
size between 1990 and 2000. The local government regularly runs a surplus, but unlike Babylon, NY, it did not have access to a reserve fund to originate the PACE loans before bundling the program into the public debt market. Unlike Boulder County, CO, Palm Desert decided to use local funding to originate the loans expecting to reduce transaction costs and receive a better interest rate by accumulating loans into a larger bond issuance. To do this, the city used local resources creatively.

The city council financed the first round of funding through the General Fund. $2.5 million was approved out of the General Fund in 2008 to launch the program. A second $2.5 million was financed by a bond sale to the local redevelopment authority but this took nearly a year to secure delaying loan origination despite demand for the program. At the end of the first two financing rounds, the city knew the program was a hit, but was in a bind as to how to continue originating the loans without draining the General Fund. Wells Fargo's Securities division stepped in. Wells Fargo provided private financing, using bonds backed by lease revenue from city-owned property to repay the General Fund the initial $2.5 million and provided an additional $2.5 million for the third round of financing. The city plans to originate $15 million in loans between Wells Fargo, the General Fund and the Redevelopment Authority before packaging the program for the public debt market.

The city uses local money to originate the loans and then is paid back by selling the lease revenue bonds through Wells Fargo to private investors. The lease revenue from public buildings is collateral if the project should fall apart. Under the
current method, the City experiences a positive spread between the fixed 7% interest rate on the PACE loans and the rate on the lease revenue bonds. As the PACE revenue is in fact currently paying the lease revenue bonds (the lease revenue will only be used in the case of the PACE programs failure to meet this obligation), this is a money-making investment for the city. Still, the city does plan to sell PACE bonds and pay back the lease revenue bonds using the municipal debt market.

The Energy Independence Program is now running smoothly and anticipates making $6 million in loans this year, but due to the difficulty in securing the origination capital, the City lost a year on its five-year implementation time line and now does not expect to reach its 30% goal until 2012.

**Program Design**

The Palm Desert program is actually the combination of a number of programs with different actors. The local utility, using a system benefits charge on consumer utility bills, created a program to provide a free energy audit and up to $1500 in easy efficiency retrofits for free for property owners. The program is part of Southern California Edison’s goals to meet the Renewable Portfolio Standards set forth by the CA Public Utility Commission.

Southern California Edison contracted with EnerPath, a private company, to conduct audits and coordinate the utility funded retrofits. EnerPath acts as the face of the program, using its auditors like a sales force. The auditor uses EnerPath’s software to model expected energy savings for the property owners. During the audit, EnerPath completes simple retrofits and schedules the follow up for the utility program retrofits. This was the total requirement of EnerPath in its contract with
the utility, but EnerPath recognized the potential of the Palm Desert PACE program and incorporated the program into its sale pitch.

In addition to the retrofits subsidized by the utility, EnerPath provided the homeowner with a list of additional fixes that could be completed and the total energy savings expected for the additional retrofits. If the total job came to less than $2500, EnerPath would take a credit card for the additional retrofit and complete the job. If the total was greater than $2500, EnerPath informed the homeowner about the PACE program and provided them with application materials. Though EnerPath offered the PACE program to encourage customers with jobs in excess of $2500 to complete larger retrofits. Thus most participants in the PACE program first received an energy audit and had $1500 of the retrofit funded by the utility. To the end customer this all appeared to be one program and there was only one end bill. It cut down on transaction costs and only required one final bid from the contractor.

Though it was typical for a PACE participant to come through EnerPath, it is not required that participants have an energy audit. A homeowner can submit a contractor bid separate from the utility program, but this misses the $1,500 subsidy from the utility. A property owner participating in PACE must be current on her taxes and have no other outstanding tax liens on the property. The PACE program has a set amortization period of 20 years and is paid through a special assessment. There are no restrictions on types of properties participating. To date, there was one commercial application. With the PACE financing, customers can combine energy efficiency upgrades with solar installations and the City sets no preference
on one type of PACE application versus the other. The City capped individual property loans at $30,000 in response to complaints from mortgage holders about the primary position of the PACE program. This typically limits the customer to one large upgrade – like the installation of energy efficiency windows. If a customer chooses to install a photovoltaic system, that typically takes the total $30,000.

**Program Participation**

EnerPath visited 6000 homes in Palm Desert since the start of the utility program, and achieved a 10% participation rate in the final retrofits. Palm Desert launched the Energy Independence Loan program in late 2008. The first $2.5 million in financing did not have a loan size limit. In total 66 loans were made. For the second round the city implemented a $30,000 cap on loans, unless approval is granted by City Council and the property mortgage holder. Since implementing this rule, mortgage holders have blocked all requests for loans over $30,000. Thus, the second round of $5 million financed 190 loans. In the first round, the average loan size was $38,000 and in the second round, with the new rules in place, the average loan size was $26,000. At this pace, to reach the City’s goal of originating $15 million in loans before entering the capital market, the Energy Independence Program will originate loans to 541 property owners, or 2.5% of occupied housing units.

**Capital Market Take Out**

Palm Desert plans to amass $15 million in loans before selling into the public debt markets. This strategy has a number of benefits. The city wants the PACE program to stand on its own as revenue bonds and not require the full faith and
credit of the City. As PACE gains momentum nationally, this is thought to be more likely. In addition, the City believes it will get better terms with a larger pool than submitting the program in smaller increments. Palm Desert is fortunate to have a flush general fund that has been used to capitalize the loan pool. Still financing is the limiting factor. There is a waiting list to participate in the program but the city must wait for each round of new funding to move forward. As PACE becomes more common, there is hope that the private sector will provide more assistance in originating the loans and reduce the exposure of the City’s general fund.

**Observations**

By structuring its program with a market interest rate, Palm Desert created a local program that can eventually be finance through the capital markets. Due to the fixed 20 year loan term for the PACE loans, it is going to be necessary for Palm Desert to securitize the loans to keep the money flowing into the loan pool. They have thus far found creative local financing, though eventually the capital markets will be necessary to really take the program to scale.

Palm Desert is also an example of how a PACE program can be a boon to private business. EnerPaths’ successful use of PACE financing to get its customers to go beyond the utility funded $1500 free retrofit is a model the company hopes to sell to other regions as it expands its services. The layering of the utility program with PACE financing in a seamless manner for the borrower both improves the terms of the final loan and reduces perceived transaction costs for the property owner.
The significant use of PACE to finance solar in Palm Desert led to a very high average loan principle balance. Understandably, mortgage holders were displeased that there was no limit on the first round of assessment and that they were not informed at the time of the assessment. The larger PACE loans get the more difficult it is to justify the use of special assessment district for the financing. Municipalities are conducting an investment that has positive implications for society, but the addition of considerable debt in front of the primary mortgage is cause for concern. The programs have to seriously consider the state of the primary mortgage in the current real estate environment and make absolutely certain that the retrofit or renewable installation cost is being offset long term by the reduction in energy costs.

**Conclusion**

PACE financing promises significant benefits over the current options available for long term financing of energy efficiency and renewables. Financing through a special assessment district gives PACE a senior position and ties the assessment to the property and not the owner at sale. This suggests, like other special assessment bonds, that PACE will be a very safe investment for financial markets. That said, the three programs above highlight important considerations to ensure the viability of using capital markets for financing.

First, the interest rate must be competitive in the municipal bond market. Different tools are available, like the Income Qualified loans used by Boulder County, CO, to provide below market interest rates. Setting a below market fixed interest rate like Babylon, NY, though, is not an effective way to set up the origination loan
fund if the intention is to access capital markets and securitize the loans. If the concern is about the annual payment for the borrower, a more effective method is to extend the payback period of the loan further. This does, though, in the end cost the borrower more in financing.

The second observation is that as pioneering programs, these municipalities took risks that the next generation of PACE programs can avoid. Most importantly, establishing a mechanism to ensure the PACE loan is added to the mortgage escrow account is extremely important. Also important is establishing firm guidelines around efficiency before renewables and measurement and verification of expected energy savings. In order for PACE to truly stand on its own without additional guarantees, there needs to be firmly established evidence that these retrofits do translate into saved money on utility bills and that renewable energy installation is not being used on homes that are inefficiently using this energy.

Finally, financing alone (or in this case, the ability to securitize the financing) is not enough to make an efficiency program successful. The common thread through the three case studies is integration with other programs providing incentives and an existing, well-trained workforce. Boulder County’s and Palm Deserts’ programs both provided significant opportunity for benefit to private companies participating in the retrofit process. Municipalities must do a balancing act between assuring quality and allowing significant participation of local contractors.

The three communities show significant initiative in rolling out programs to seriously take on commitments to combating climate change and creating energy
independence. The question now, is can PACE programs seriously be taken to scale. To accomplish this, PACE needs to work not just in suburban areas with median household incomes well above the national average and a building stock of single-family homes. The next section analyzes the potential for this type of program in New Orleans, LA, but the intention is to push the PACE concept in to an urban area that does not have the luxury of local government revenue surplus or a well-trained workforce. New Orleans, thought, undeniably understands the consequences of not taking a serious stand on climate change and energy alternatives.
Chapter 4: New Orleans

In Orleans Parish, the damage from Hurricane Katrina was catastrophic. The failure of the levy system flooded 80% of the city and some areas remained underwater for nearly a month. In one crushing blow 79,000 housing units were "severely damaged", estimated by FEMA to have damage was in excess of $30,000. Another 26,000 housing units had "major damage" with estimated repairs costing between $5,000 and $30,000.\(^{31}\) In total, 71% of the 188,000 units occupied before the storm fall into the two categories. Today, 79% of addresses are reactivated\(^ {32}\) and the population of the city is at nearly 80% of its pre-Katrina level. This was accompanied by a rebuilding of epic proportions.

To analyze the potential for a PACE program in New Orleans, I identified four areas that would impact the success of a PACE program and gathered information specific to New Orleans. Specifically, this chapter outlines the current market for energy efficiency in New Orleans, provides a history of utility structure and regulation, highlights local efforts at efficiency planning and incentives, and then outlines Louisiana's historic bias against property taxes. This is all to provide a background to influence the recommendations in Chapter 5 for a New Orleans PACE program.

The next four sections detail the current programs and plans that are influencing the environment for a potential PACE program. While New Orleans

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\(^{32}\) Greater New Orleans Community Data Center, March 2010
could sit back and rest on the laurels of the efficiency captured naturally during the
reconstruction process, there is significant local interest in pushing the boundaries
and creating a model program for the adoption of deep energy efficient retrofits and
widespread distributed renewable energy.\textsuperscript{33} A number of recent changes in New
Orleans that are encouraging this including the in-migration of professionals after
the storm specializing in advanced building technologies, a desire to diversify the
Louisiana economy and build a significant renewable energy presence, and an
enthusiasm for building New Orleans back better. Overarching all of this is the fact
that the residents of New Orleans are very well aware that a failure to stem global
climate change will be a disaster of epic proportions and New Orleans is the on the
front line.

\textbf{Energy Consumption in New Orleans post-Katrina}

First, it is necessary to do an analysis of market demand for energy efficiency
retrofits and to get an accurate picture of current energy usage in the city. New
Orleans, LA, is in the unique position that 80\% of its building stock is either recently
renovated or off the grid compared to five year ago. In 2008 the New Orleans utility,
EntergyNO, commissioned a study from GCR & Associates, Inc, to analyze trends in
energy consumption in post-Katrina New Orleans.\textsuperscript{34} The analysis found that
compared to a pre-storm baseline, residential properties in the city are, per meter,

\textsuperscript{33} Most recently, Mayor Mitch Landrieu assembled a task force for his transition to
indentify goals for sustainable energy and environment programs. Recommendations include the creation of a citywide PACE program. The full report is available at http://www.transitionneworleans.com/taskforce/SustainableEnergy

\textsuperscript{34} The data in this section is found in Appendix 1 of EntergyNO's 2009 filing
available at http://entergy-neworleans.com/IRP/
9% more efficient. This data paints a picture of what efficiency was accomplished as a part of the rebuilding process and areas in which efficiency can still be captured in the city.

To analyze the change in energy usage in New Orleans after the storm, EntergyNO, the local utility, commissioned a baseline study from GCR, Inc. in the summer of 2008. To create a comparison between pre-Katrina and post-Katrina energy usage GCR used the 12 months proceeding Hurricane Katrina (September 2004 – August 2005) as the baseline for their analysis and compared usage to May 2007 – April 2008. To make their analysis, GCR used two data sources: a database of customer energy usage maintained by EntergyNO and divided into customer class – residential, commercial, and industrial and tied to specific user accounts. The second data source was the responses to EntergyNO Customer Residential Appliance Saturation Surveys (RASS) from 2005 and 2007. The surveys allowed GCR to create a profile of changes to building structures and then compare this to energy consumption over time. Because EntergyNO does not deliver electric or gas service to the West Bank, this part of the city is excluded from analysis. In addition, GCR only analyzed residential customers.

<table>
<thead>
<tr>
<th>Neighborhood flood level</th>
<th>2005 Total Participants</th>
<th>2005 % of Total Participants</th>
<th>2007 Total Participants</th>
<th>2007 % of Total Participants</th>
<th>% decrease in energy usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Flooding</td>
<td>10,948</td>
<td>13.66%</td>
<td>11,024</td>
<td>27.95%</td>
<td>8.6%</td>
</tr>
<tr>
<td>0 – 2 Feet</td>
<td>9,691</td>
<td>12.09%</td>
<td>7,679</td>
<td>19.47%</td>
<td>6.1%</td>
</tr>
<tr>
<td>2 – 4 feet</td>
<td>12,748</td>
<td>15.90%</td>
<td>6,706</td>
<td>17.00%</td>
<td>8.8%</td>
</tr>
<tr>
<td>4+ feet</td>
<td>46,786</td>
<td>58.36%</td>
<td>14,036</td>
<td>35.58%</td>
<td>12%</td>
</tr>
<tr>
<td>Total</td>
<td>80,713</td>
<td>100%</td>
<td>39,445</td>
<td>100%</td>
<td>9.6%</td>
</tr>
</tbody>
</table>
A comparison of the 2005 RASS participation to 2007 highlights the drastic population change and shift in the City caused by Hurricane Katrina. The 2007 survey has only half as many total participants as the 2005 survey, symbolic of the population loss after the storm and the struggle of many residents to return to New Orleans. In addition, breaking participants down by geographic location based on level of flooding, it is clear that areas with severe flooding have suffered the most population loss. The area with severe flooding, 4+ feet, accounted for 58% of survey responses in 2004, but only 36% of total responses in 2006.

In order to differentiate actual increased efficiency from under-utilization that may be attributable to residences that were unoccupied or under renovation in 2007, GCR filtered out all properties that utilized less than 250kWh/month. This filter was applied to both the 2004-2005 data and the 2007-2008 data. In addition to this filter, GCR excluded all utility accounts that were more than one standard deviation away from the mean usage in the city. Thus, only the accounts with average usage in the central 68.3% utility usage rate were included in the analysis.35 Finally, only accounts that were active for all 12 months both in the 2004-2005 analysis and 2007-2008 analysis were included. Thus, when the sample of survey responses actually used in the energy baseline analysis is broken down by level of flooding, the percentages are different than the total survey participation rates for 2007. In the sample, the percentage of properties that sustained severe flooding of more that four feet is even smaller.

35 EntergyNO Appendix 1 pg 4
Table 4.2: Final RASS analysis Sample Characteristics

<table>
<thead>
<tr>
<th>Level of Katrina flooding in neighborhood</th>
<th>% of Sample</th>
<th>% Decrease in Utility Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Flooding</td>
<td>30.26%</td>
<td>9%</td>
</tr>
<tr>
<td>Light (0-2 feet)</td>
<td>18.44%</td>
<td>7%</td>
</tr>
<tr>
<td>Moderate (2 to 4 feet)</td>
<td>20.09%</td>
<td>5%</td>
</tr>
<tr>
<td>Severe (4 or more feet)</td>
<td>31.21%</td>
<td>12%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Council District</th>
<th>% of Sample</th>
<th>% Decrease in Utility Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>32.62%</td>
<td>7.79%</td>
</tr>
<tr>
<td>B</td>
<td>29.75%</td>
<td>5.77%</td>
</tr>
<tr>
<td>C</td>
<td>11.43%</td>
<td>8.25%</td>
</tr>
<tr>
<td>D</td>
<td>14.05%</td>
<td>15.79%</td>
</tr>
<tr>
<td>E</td>
<td>12.14%</td>
<td>10.06%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household Income</th>
<th>% of Sample</th>
<th>% Decrease in Utility Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; $25,000</td>
<td>29.55%</td>
<td>7.57%</td>
</tr>
<tr>
<td>25,000 - 49,999</td>
<td>22.46%</td>
<td>10.22%</td>
</tr>
<tr>
<td>50,000 - 74,999</td>
<td>14.66%</td>
<td>12.66%</td>
</tr>
<tr>
<td>75,000 - 99,999</td>
<td>9.46%</td>
<td>8.78%</td>
</tr>
<tr>
<td>100,000 - 149,000</td>
<td>6.86%</td>
<td>2.83%</td>
</tr>
<tr>
<td>150,000 - 199,999</td>
<td>3.31%</td>
<td>6.20%</td>
</tr>
<tr>
<td>200,000 +</td>
<td>3.07%</td>
<td>1.93%</td>
</tr>
<tr>
<td>Blank</td>
<td>10.64%</td>
<td>11.56%</td>
</tr>
</tbody>
</table>
Graph 4.1: RASS Survey Participation

Number of RASS Participants by level of flooding

- Severe (4 or more feet)
- Moderate (2 to 4 feet)
- Light (0-2 feet)
- No Flooding

2005 RASS participants:
- Severe: 46,786
- Moderate: 12,748
- Light: 9,691
- No Flooding: 10,948

2007 RASS participants:
- Severe: 14,046
- Moderate: 6,706
- Light: 7,679
- No Flooding: 11,024
Chart 4.2: Aggregate average decrease in electricity usage by level of flooding

% Decrease in Utility Usage

- No Flooding: 9%
- Light: 7%
- Moderate: 5%
- Severe: 12%

Chart showing the percentage decrease in utility usage for different levels of flooding.
Graph 4.3 – 4.5: RASS Sample by Flood Level

2005 RASS participants

- No Flooding: 13.7%
- Light (0-2 feet): 15.9%
- Moderate (2 to 4 feet): 58.4%
- Severe (4 or more feet): 10.0%

2008 RASS participants

- No Flooding: 36%
- Light (0-2 feet): 17%
- Moderate (2 to 4 feet): 29%
- Severe (4 or more feet): 19%

Final Sample Participants by level of flooding

- No Flooding: 31.21%
- Light: 18.44%
- Moderate: 20.09%
- Severe: 30.26%
Graph 4.6 Percentage of Orleans Parish households with new system between 2005 and 2007

**Post Storm Appliance Replacement**

- **AC**
- **Water Heater**
- **Dryer**
- **Washer**
- **Refrigerator**

- % of RASS respondents that identified new appliance as ENERGY STAR
- % of RASS respondents that replaced appliance

Scale: 0.0% 10.0% 20.0% 30.0% 40.0% 50.0% 60.0% 70.0% 80.0%
Graph 4.8: RASS Survey Responses

**Energy Efficiency Practices**

- Attic Insulation: 70%
- Wall Insulation: 60%
- Floor Insulation: 50%
- EE HVAC: 40%
- EE Appliances: 30%
- Solar Energy: 20%
- Post Storm have: 10%
- Post Storm plan: 0%
The usage trends were similar for each month when comparing the same utility accounts from 2005 to 2007, but there was a 9% average reduction in consumption per meter after the storm. GCR attributes this to home renovation and the replacement of appliances related to Hurricane Katrina recovery. GCR further broke the data down by determining the increased efficiency in homes by foot of water flooded during the storm. This analysis uncovered that although the city is more efficient over all, not all areas have rebuilt with same increase in efficiency. In fact, while buildings that did not flood are in aggregate 9% more efficient, buildings in areas that flooded with 2ft of water are on average only 7% more efficient and buildings in areas that flooded with between 2 – 4ft of water are only 5% more efficient on average. Buildings in areas that flooded with greater that 4ft of water (often the level at which the entire building envelop and electrical system needed to be replaced) are in aggregate 13% more efficient compared to pre-Katrina energy usage. (See maps)

In addition, using the RASS data, GCR found 78% of EntergyNO customers reported damage to their homes from Katrina. 73% replaced their refrigerator after the storm, 50% replaced their hot water heater, 43% replaced their heating system, and 43% replaced their air conditioning unit. Lower numbers reported improvements to the building envelope and the addition of insulation, though these were high on respondents’ wish list. Overall, GCR found survey respondents were conscience of energy efficiency when making renovation decisions and noticed the savings on their electricity bills.
Map 4.1: Post Katrina Decrease in Energy Usage by Flood Level

2007 New Orleans Energy Usage
Baseline Analysis Decreased
Energy Usage

12%
9%
7%
5%
Map 4.2: Post-Katrina Decrease in Energy Usage by Flood Level Masked for Severely Damaged Properties

2007 New Orleans EnergyNO Baseline Analysis Decreased Energy Usage By severity of flood

- 12%
- 9%
- 7%
- 5%
This was achieved without a coordinated effort on the part of the city to encourage energy efficiency, but instead as a consequence of stricter building codes and, according to an EntergyNO customer survey, an acknowledgement by the general population that energy efficiency is a good investment.

The findings of the GCR report, while not surprising for a region recovering from a catastrophic disaster, pose interesting questions for the direction of an energy efficiency program in the City. Much of the low-hanging fruit of efficiency was accomplished in the last five years, not because of a coordinated effort, but out of necessity and repair. Due to the low possible market penetration, a refrigerator swap out program, normally the backbone of a utility efficiency program, does not meet a feasibility test. Instead, the City must pursue deeper retrofits to achieve greater energy efficiency at a citywide scale.

GCR, Inc, at EntergyNO's request, provided its analysis as part of a public filing to the Utility Committee in July of 2009. The data on efficiency was only provided in the categories listed above. Unfortunately, this level is too general to make a real analysis about potential efficiency remaining to be captured. When analyzed spatially using the flood map from Hurricane Katrina to identify the severe, moderate, light, and no flood areas, it appears that vast swaths of the city are in the 13% category. These neighborhoods lost the most buildings in the disaster and have struggled the most to rebuild. In reality, the 13% efficiency area is significantly undeveloped at this point.

In addition, it is difficult to make assumptions about the current characteristics of the New Orleans building stock because entire neighborhoods
with specific housing typology, like brick homes built on concrete slap on grade in the Lower Ninth Ward, were severely damaged in the storm. The baseline data could be broken down to a more local level, like neighborhood, or block group, and provide the opportunity for a richer analysis of what areas rebuilt in the most efficient manner.

Utility Regulation and Planning in New Orleans, LA

A history of utility regulations and the recent energy planning process outlines the unique situation that allows New Orleans to regulate its electric and gas utility separately from the rest of the state. Recent steps by the New Orleans City Council and the Louisiana legislature to encourage energy efficiency and foster a distributed photovoltaic sector in the state include the most competitive state solar tax credit in the US.

This commitment by regulatory bodies to energy efficiency and renewable energy is reflected in the growing number of for-profit, non-profit and public-private partnerships sprouting around efficiency and renewables. This year, the City of New Orleans and EntergyNO are launching Energy Smart, the first citywide effort to encourage energy efficiency and renewable energy adoption. In addition, groups like Rebuilding Together New Orleans and Total Community Action are targeting weatherization programs to low-income families rebuilding after the storm while EriRENEW, Global Green USA and the Make it Right Foundation are pushing the boundaries of new construction in the city to encourage green building practices. Though there are many groups actively seeking to encourage efficiency
and renewables, there are few active programs educating local building trades in efficiency practices, creating a significant gap in marketing and implementation.

As with many things about New Orleans, the history of its energy utilities is long, colorful and involves a series of rebirths. New Orleans had one of the first public gas systems in the US, the New Orleans Gas Light Company, founded by James Caldwell in the 1820s to provide gas for outdoor lights and street lamps. Caldwell was granted an exclusive contract for the production and distribution of gas in New Orleans by the Louisiana legislature in 1834. Though gas burning outdoor lamps remain a distinguishing feature of New Orleans today, Caldwell's monopoly failed in 1848 – the first of over 200 privately operated utility companies that went bankrupt in New Orleans. Finally, in 1919, the principle utilities in New Orleans including all electric, gas and streetcar companies were put under federal receivership. A “Citizen’s Committee of Forty” was established to recommend the future form of utilities in the city and in 1926 New Orleans Public Services Inc. (NOPSI) emerged from receivership to handle all of the utility needs of the city north of the Mississippi River (the East Bank). Algiers, the portion of New Orleans south of the river known as the West Bank, was incorporated into the utility serving the rest of Southern Louisiana. This remains true to this day.

Between 1921 and 1985, electricity consumption in New Orleans increased by 3000%. The growth in demand was met by the construction of the A.B. Paterson Station on the Industrial Canal, completed in 1947, and the Michoud 3 Plant in New Orleans.

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36 The Louisiana Department of Natural Resources Louisiana Electric Utilities: Volume I is the source of the history in this section.
37 Louisiana Department of Natural Resources, 1994
Orleans East, completed in 1967, both natural gas powered generation facilities. In addition, under its parent company Middle South Electric, NOPSI committed to purchasing 17% of the power produced at the planned Grand Gulf Nuclear Power Plant in Mississippi. At the time of this commitment New Orleans was at its peak population of nearly 650,000 residents. Due to regulatory and market delays, the construction of the Grand Gulf Plant was blocked for over 15 years, by which time the economic fortunes of New Orleans had changed and the population of the city was declining. Today, the city’s generation and transmission facilities are significantly oversized for the current demand.

In 1983, a New Orleans Municipal Task Force considered a public take over of the utility. In the end only the streetcar system was taken public under the Regional Transportation Authority, while electric and gas distribution remained under NOPSI. Instead, in 1985, Orleans Parish voters gave the New Orleans City Council oversight of NOPSI, taking it away from the Louisiana Public Service Commission (LPSC). Regulation of the West Bank remained under the LPSC.

In the late 1980s, Middle South Utility Inc., the parent company of NOPSI, rebranded to Entergy and NOPSI was renamed Entergy New Orleans (EntergyNO).38 Today Entergy is the only Fortune 500 company headquartered in New Orleans, LA. The parent company serves customers in Arkansas, Louisiana, Mississippi, and Texas. In addition, Entergy is the second largest nuclear generator in the US and operates ten nuclear plants in the US, including the Grand Gulf Plant. Entergy is recognized as a leader in environmental sustainability, appearing on the Dow Jones

38 Entergy, 2010
Sustainability Index for 8 years in a row – one of only two US utility companies on the Index.39

Entergy’s global expansion and dominance was not mirrored by its home city. By 2005 New Orleans population shrunk from its peak of 650,000 to 450,000. During this time its building stock aged and little reinvestment was made in either public or private infrastructure. Hurricane Katrina’s devastating hit to the Gulf Coast on August 29th, 2005, and the subsequent failure of the New Orleans levee system scattered New Orleans residents around the U.S. and flooded 80% of the structures in the city. EntergyNO was forced into bankruptcy protection40 and the Federal Government stepped in to assist hundreds of thousands of underinsured homeowners. In the wake of the destruction, New Orleans and, once again, its utilities entered a new phase of reorganization and rebirth.

Post-Katrina Energy Planning in New Orleans, LA

Energy Policy Task Force

In 2007, as part of the larger refocus on planning in the City of New Orleans, the New Orleans City Council Utility Committee endorsed the creation of the Energy Policy Task Force, a group of citizens charged with rethinking energy policy in New Orleans and identifying steps for modernizing the New Orleans grid. The task force, chaired by local real estate developer Pres Kabacoff, includes local business, civic and university leaders. It draws on the knowledge of outside experts in the field of energy policy and energy efficiency, including representatives of the US Department

39 Dow Jones Sustainability Indexes, 2010
40 Daily, 2007
of Energy (DOE), the City of Austin, TX, municipal energy program and Conservation Services Group, a leading national ESCO. The mission of the task force is to:

[C]reate a new vision for energy and the economy in a way that enables the regeneration of the health and quality of life in New Orleans, its communities and ecosystem so that the city we love survives, thrives and evolves in a changing world.41

In October of 2007, the task force produced a report, *Energy Hawk*, outlining goals for encouraging energy efficiency and renewable energy in the next 6-12 months. Table 4.1 details the recommendations of the report. The Task Force identified a much stronger role for the New Orleans City Government in encouraging utility participation in demand side management programs and fostering both the supply of trained energy efficiency and renewable contractors and a demand for their services. In particular, the report called for the creation of an executive branch office in city government to support sustainable energy programs. The New Orleans Executive Branch controls most of the resources in the city. The creation of an energy office would increase the profile of energy policy and provided the Mayor with a stronger outlet for leadership on issues like promoting renewable energy, energy efficiency, and a proactive stance on climate change.

In addition, the report called for stronger regulation of EntergyNO through the City Council's Utility Committee. The Task Force sought a thorough Integrated Resource Plan from the utility that identified ways EntergyNO would encourage demand side management practices like energy efficiency and support the adoption of renewable supply side resources like distributed photovoltaic generation. The

41 Energy Hawk, 2007
Task Force also recommended the adoption of a Renewable Portfolio Standard that required EntergyNO to source a portion of its total generation from either DSM practices or renewable sources. This would encourage further market adoption of both energy efficiency and renewable energy. Finally the report called for increased transparency from the utility on total energy usage, energy efficiency programs, and use of city funds like CDBG grants. The Task Force encouraged rapid adoption of its recommendations so that efficiency and renewable requirements and subsidies could be incorporated to the rebuilding happening post-Katrina and the City's overall master plan process.
Table 4.3: Energy Hawk Report Recommendations

<table>
<thead>
<tr>
<th>Goal:</th>
<th>Action Items:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a Comprehensive Energy Policy for the City</td>
<td>Establish an Executive Branch Office to provide leadership on energy policy and climate change</td>
</tr>
<tr>
<td>Elevate the importance of energy policy in city government</td>
<td>Make the Energy Policy Task Force a permanent commission to advise future policy</td>
</tr>
<tr>
<td>Create a Public/Private Partnership to encourage the development of</td>
<td>Support creation of a Center for Excellence in coordination with the Regional Planning Commission, Home Builders</td>
</tr>
<tr>
<td>best practices in the New Orleans built environment</td>
<td>Association, local building trades, non-profits and educational facilities</td>
</tr>
<tr>
<td>Encourage Integrated Resource Planning by the local utilities that</td>
<td>Support the research of best practices for the building trades in the New Orleans climate</td>
</tr>
<tr>
<td>encourages prioritization of Demand Side Management programs like</td>
<td>Train local builders and energy raters to meet nationally recognized standards</td>
</tr>
<tr>
<td>energy efficiency</td>
<td>Establish certification of buildings above code to create a market premium for energy efficient building practices</td>
</tr>
<tr>
<td>Increase Transparency for Utility Customers</td>
<td>Expand definition of energy service provider to include conservation, renewable energy and energy efficiency along with traditional fossil fuel sources</td>
</tr>
<tr>
<td>Require Standards of efficiency on government projects</td>
<td>Consider decoupling utility profits</td>
</tr>
<tr>
<td></td>
<td>Provide incentives for utility investment in energy efficiency and demand side management programs</td>
</tr>
<tr>
<td></td>
<td>Establish utility rates that encourage customer participation in energy efficiency programs</td>
</tr>
<tr>
<td></td>
<td>Establish a binding Renewable Portfolio Standard</td>
</tr>
<tr>
<td></td>
<td>Require Entergy to report on use of City money provided through CDBG funding</td>
</tr>
<tr>
<td></td>
<td>Create a user friendly web page for City energy programs</td>
</tr>
<tr>
<td></td>
<td>Increase detail on changes to rate payer formula</td>
</tr>
<tr>
<td></td>
<td>Mandate city building retrofit for efficiency and identify renewable opportunities</td>
</tr>
<tr>
<td></td>
<td>Promote local green building contractors</td>
</tr>
<tr>
<td></td>
<td>Mandate energy efficiency performance on NORA owned properties</td>
</tr>
</tbody>
</table>
Also during the summer of 2007 the Office of Recover Management (ORM), housed in the City’s Executive Branch, created a road map for the City government to green itself. The report, GreeNOLA, outlined key areas where the city could foster the greening of the City of New Orleans (table 4.2) and became the basis of the city's Energy Strategy submitted to the DOE as part of the Energy Efficiency Community Block Grant (EECBG) application in the summer of 2009.

<table>
<thead>
<tr>
<th>Table 4.4: GreeNOLA Energy Policy Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>City Government</strong></td>
</tr>
<tr>
<td>City of New Orleans should formalize its commitment to the Kyoto Protocol by setting a firm target for the reduction of greenhouse gas emissions.</td>
</tr>
<tr>
<td>Create the Office of Energy Management in the Executive Branch.</td>
</tr>
<tr>
<td>Commit to greening city owner buildings.</td>
</tr>
<tr>
<td><strong>Green Buildings &amp; Energy Efficiency</strong></td>
</tr>
<tr>
<td>Implement Green standards on projects in City defined Target Redevelopment area and NORA projects.</td>
</tr>
<tr>
<td>Expand local incentives for home weatherization.</td>
</tr>
<tr>
<td>Create a New Orleans Green Standard for building similar to Chicago.</td>
</tr>
<tr>
<td>Encourage programs that provide competitive financing for green construction projects and retrofits.</td>
</tr>
<tr>
<td>Stimulate Green Jobs training by hiring certified tradesmen for City projects.</td>
</tr>
<tr>
<td>Support the creation of a regional center dedicated to best practices and training in Green building trades.</td>
</tr>
<tr>
<td><strong>Alternative Energy</strong></td>
</tr>
<tr>
<td>Change building codes to allow solar installation and encourage energy efficiency retrofits.</td>
</tr>
<tr>
<td>Expand local incentives for renewables.</td>
</tr>
<tr>
<td>Enact Renewable Portfolio Standard requiring Entergy to procure 20% of energy from renewable sources by 2015.</td>
</tr>
<tr>
<td><strong>Waste Reduction, Reuse &amp; Recycling</strong></td>
</tr>
<tr>
<td>Support deconstruction programs that salvage reusable building materials and historic architectural details.</td>
</tr>
<tr>
<td>Restart city wide recycling program.</td>
</tr>
<tr>
<td>Create a Waste-to-Energy program.</td>
</tr>
</tbody>
</table>
ORM, at the time under the one-year stewardship of Dr. Ed Blakely, was a short-term office under the Mayor designated with managing the rebuilding process in the city, advising the master plan process, and stewarding the sizable amount of federal funding anticipated to arrive in the City coffers. Over the summer of 2007, Dr. Euthea Nance guided the creation of the GreeNOLA\textsuperscript{42} plan by two MIT interns to provide the City guidance to leap to the front of the pack of cities striving to green themselves in the new millennium. The report is a compellation of best practices from cities around the world that could be incorporated into current city programs or used as models for the rebuilding process.

Though created separately from City Council Energy Task Force's \textit{Energy Hawk} report, similar ideas emerge in both proposals. Most notably, the importance of creating a Renewable Portfolio Standard and using City Council's regulatory power over EntergyNO to push the utility to create energy efficiency and renewable energy programs. In addition, GreeNOLA called for a formal commitment on the part of the City to reduce total CO\textsubscript{2} output.

Building upon the work of the citizen task force and the Office of Recovery Management, in December of 2007 the City Council passed R-07-600, a non-binding resolution that outlined the Council's intent to foster an energy efficiency and renewable energy industry in New Orleans as part of the city's long-term energy strategy.

\textsuperscript{42} Quinn, 2007
Active Programs

Though there was no coordinated government effort to require that energy efficiency be incorporated in the post-Katrina building, there were a number of local groups promoting the cause. Rebuilding Together provided significant rebuilding assistance to low income homeowners throughout the city, promoting energy efficiency in every project they took on. The Alliance for Affordable Energy, a local non-profit that advocated for over 20 years for reducing utility costs for low-income people in Louisiana, created a training and education facility for LA Green Corp, an Americorps program that works with at-risk youth in a four-month training program that teaches the basics of energy efficient construction. This program could be an excellent stepping-stone to an apprenticeship program with local building trades or an energy efficiency curriculum at local community colleges.

In the private sector, a number of new businesses were launched after the storm specifically to promote green building including Green Coast Enterprises, a real estate development firm that amongst other projects built four zero net energy condos, South Coast Solar, a regional firm providing residential solar installation, and Ontility, formerly Louisiana Clean Tech, a training firm that has partnered with city and the DOE to provide solar installation training.

While all of the programs deserve significant credit for advancing the issue of energy independence and efficiency in the city, they will acknowledge that the issue will only get so far without a serious source of financing for the upfront costs. As the relief funding from the Katrina disaster dwindles, both the non-profit and the for-profit firms see the lack of access to financing for energy efficient retrofits and solar
installation as the biggest barrier to the demand side management industry taking off in Southern Louisiana. That said, there are a number of local incentive program currently active in the region that encourage energy efficiency, provide access to training, and could be layered with a PACE program

**HERO**

The Louisiana Department of Natural Resources has offered the Home Energy Rebate Option (HERO) as part of the State Energy Program for six years. The program uses funding from the Department of Energy for energy efficiency rebates and home ratings and audits. The program offers rebates on investment to improve the efficiency of the home equal to the lesser of 20% of the total cost of the retrofit or 20% of present value of expected energy savings as determined by an energy audits. A HERO certified rater must perform the energy audit. HERO raters must complete training for the HERO program in the State of Louisiana in addition to being certified by the national group, RESNET. This process is onerous, and as such there have never been more than 20 raters actively certified in the whole state.

*Solar American Cities*

Solar American Cities is a project of the Department of Energy designed to stimulate local solar industries and encourage the use of solar by municipal governments. The program is three years old and completed two rounds of financing. Each round identified 25 cities with projects to encourage solar adoption. New Orleans was chosen as a Solar American City in both rounds. The goal is to create 2MW of solar generation in each city through the program. In the first round, New Orleans received funding to install solar panels on five schools and create a
training program for local building trades (run by Ontility). In the second round, New Orleans submitted four additional proposals for revving up the local solar industry. The only concept funded was the creation of a PACE program. This project includes the local group the Alliance for Affordable Energy as a partner to create the storefront for a PACE program and Renewable Funding, Francisco Devries firm, to consult on PACE creation. Ontility was not included in the second round of Solar American Cities funding, but received separate grant for training from DOE.

EECBG
For the first round of Energy Efficiency Community Block Grant Funding through the American Recovery and Retrofit Act, the City of New Orleans submitted the GreeNOLA plan for its Energy Conservation Strategy and identified three projects for the $2.4 million allocated in the competitive process. This money is directed to the installation of LED streetlights, the installation of solar on local libraries, and seed funding for a local revolving loan fund.

In the second round of competitive financing for ECBG, New Orleans was part of a collaborative of 15 southern cities that were awarded funding as part of the Southeast Energy Alliance for the creation of a PACE program. The city currently awaits word on the total award and continues working with first round partners to develop the revolving loan fund as a PACE program.

EntergyNO Energy Smart Plan
Sensing a renewed vigor in the city for regulating the utility’s energy generation portfolio and in keeping with Entergy’s national commitment to being a “green” utility, EntergyNO committed in its 2008 rate case to creating an energy
efficiency program. This was the utility’s first-rate case since Hurricane Katrina and its 2005 bankruptcy filing. Part of the settlement required EntergyNO to refund $1.9 million to its customers that was over-collected in post-storm charges. The refund would be used to create programs that benefited its residential customers, particularly the elderly and low-income. EntergyNO identified this as the seed funding for Energy Smart, a citywide energy efficiency program that EntergyNO would develop in partnership with City government and civic groups. City Council approved this proposal in July of 2008.43 Furthermore, the conclusion of the 2008 rate case Agreement in Principle anticipated the collection of $3.1 million annually through a systems benefit charge on customers’ bills to provide a steady stream of funding for the Energy Smart program. To shelter the utility’s shareholders from the lost revenue associated with decreasing utility usage, the council decoupled the utility.44 To date, Council has not implemented the systems benefit charge.

To meet the criteria of the Council and create a program specific to the New Orleans climate, EntergyNO commissioned two reports. The first was the GCR, Inc. report analyzing post-Katrina utility data. The second by ICF, a national firm that specializes in energy efficiency planning, analyzed what specific retrofits should be targeted in a New Orleans energy efficiency program. The two reports informed EntergyNO’s final presentation identifying six specific energy efficiency programs and two pilot DSM and renewable energy programs to be offered as part of Energy Smart. EntergyNO submitted the plan to City Council for approval after a public comment period in September of 2009.

43 New Orleans City Council, R-08-601
44 New Orleans City Council, R-09-136
ICF Efficiency Potential Study

Having identified the state of New Orleans energy usage using the GCR report, EntergyNO turned to the national energy efficiency planning firm, ICF, to analyze specific energy efficiency measures for their cost effectiveness in the New Orleans market. Cost effectiveness is a common method for utilities to determine their energy efficiency portfolio. The enabling legislation passed by New Orleans City Council calls for only the inclusion of programs that pass the cost effectiveness test, according to the standard industry Total Resource Cost test (TRC) as defined in the California Standard Practice Manual. The concept is to identify all possible efficiency measures and then analyze the total cost – installation, program administration, marketing, etc – and compare this to the total energy saved. The utility then compares the cost of the efficiency measure to the costs of producing the same amount of electricity through generation. If the efficiency measure cost the same or less as generation, it is considered cost effective.

To create a list of cost effective energy efficiency measure, ICF identified over 700 total efficiency measures for various classes of utility customers, falling into three broad categories: residential, commercial and industrial. ICF then used data from Frontier Associates, a national utility consulting firm, and data from their own Measures Database to approximate the cost of each measure and its potential savings. This approach is the accepted practice in utility sponsored energy efficiency programs, but relying on national data in a market as unique as New Orleans where 80% of customers surveyed had performed significant construction

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45 New Orleans City Council, R-09-136
on their home in the last five years is questionable. ICF used data from the American Communities Survey based in the 2000 Census to build a profile of building type and age in the New Orleans market. New Orleans is a city of neighborhoods, and as such, the destruction of Hurricane Katrina did not treat all building typology or building ages the same. In fact, the areas that did not flood are some of the oldest buildings in the city while the areas that did flood are rebuilding with newer technology and stricter building codes.

A major criticism of the Total Resource Cost test is that reinforces itself, only allowing new utility programs to incorporate the same series of efficiency measures because it does now allow for innovation or experimentation to see if cost effectiveness can be achieved on measures that do not pass the TRC in the database. It was only after determining the TRC for efficiency measures and bundling them into the most cost effective program groups, that ICF used the data from GCR's analysis of the RASS to filter out programs that had already reached saturation based on post-Katrina rebuilding. The selection of rebates and program is what you would expect to find if the city were making a first attempt at energy efficiency except for the exclusion of a refrigerator rebate due to the massive post storm replacement. While Energy Smart is the first coordinated effort at energy efficiency, the residents themselves have captured a substantial proportion of the low hanging fruit in the last five years. If the Energy Smart program is to be successful it must target the next level of efficiency retrofit, often a level that does not have as

46 A critique of the methodology generally used in determining cost effectiveness can be found: “Assessment of All Cost-Effective Electric and Gas Savings: Energy Efficiency and CHP” Submitted to the MA EEAC, July 2009
dramatic a return on investment, though most retrofits still payback over the lifetime of the retrofit. A utility program that bought down a portion of the up front cost of these deeper retrofits, like radiant heat insulation, would be a stronger companion for a New Orleans PACE program. As it stands now, EntergyNO will launch their program based on the ICF study of cost effective retrofits in the summer of 2010. New Orleans residents will have access to nearly $2000 in incentives from the utility.

Recent legislative advances

The passage of SB 224, the Louisiana PACE enabling legislation, in the summer of 2009 came after four years of intensive planning and rebuilding efforts in the state that revolutionized its built environment, particularly in the southern part of the state most heavily affected by Hurricanes Katrina and Rita in late summer 2005. The process started in 2005 with the passage of the International Building Code requirements, finally bringing the state’s building practices up to national standards on electrical systems and general construction.47 This coincided with the rebuilding of over 200,000 buildings in the state damaged in the 2005 hurricane season.

The State Legislature followed up in the summer of 2007 with passage of Act 371 creating the largest state renewable energy tax credit in the country. Louisiana currently offers a 50% tax credit for residential installation of photovoltaic systems. This tax credit can be combined with the 30% federal tax credit to reduce the property owners’ costs to 20% of the systems cost. In the 2009 session, in addition

47 International Code Council, 2005
to approving PACE financing, the legislature created an employer tax credit encouraging the creation of “green” jobs in the state.\(^{48}\) The favorable environment for green business led to explosive growth in both for-profit entrepreneurship and non-profit expansion in energy efficiency and renewable energy.

**Property Taxes and New Orleans**

The final key input is an analysis of the property tax system in the State of Louisiana. Louisiana ranks 46\(^{th}\) out of 50 states in per capita revenue collection of property tax. A significant percentage of properties in the state are exempt from property taxes in the state constitution, including the first $75,000 of assessed value of owner-occupied homes. This is a considerable challenge compared to PACE programs in other jurisdictions as it removes past property tax payment as an underwriting tool and may create much strong property owner opposition to assessments.

According to 2000 census ranking, Louisiana ranks 46\(^{th}\) amongst states in property tax, 39\(^{th}\) for income tax and 8\(^{th}\) for sales tax in per capital revenue collection.\(^{49}\) In 2002, Louisiana voters approved a measure to improve the distribution of the tax burden. The Stelly Plan, as it was known, redistributed the burden of revenue collection from a regressive sales tax to a more progressive income tax.\(^{50}\) In 2008, though, the legislature lowered income taxes across the board after a huge budget surplus accrued from higher than expected mineral

\(^{48}\) Moore, 2010 pg 32  
\(^{49}\) Keller, 2003 pg 9  
\(^{50}\) Keller, pg 10
revenues from oil. This year, as oil prices have receded, the state faces a huge budget short fall.

Local governments are prohibited in the Louisiana constitution from levying an income tax and face limited powers in collecting property taxes based on statewide exemptions for specific properties. As such, municipalities rely heavily on the sales tax for revenue. Orleans Parish in particular has a complicated history with property taxes. Until the 2010 election cycle, the parish was divided into seven assessment districts and each district elected its own assessor. There was no uniformity in how property value was assessed across districts and across property types.

Starting this year, Orleans Parish elected one assessor citywide. The expectation is one standardized database for property assessment will be created. This process will see some properties’ assessed value increase as much as 100x its current value, as with the W Hotel that is assessed at a fair market value of $330,000 but sold in 2007 for $32 million.51

Determining appropriate fair value is important because the State of Louisiana exempts a number of types properties from tax rolls. In 1996, Bureau of Government Research found that 65% of all Orleans property was exempt from property taxes for reasons ranging from non-profit ownership, homestead or industrial exemption to property in use by a labor organization.52 Though there was limited reform to these exemptions since 1996, a 2009 report found that under the current Homestead Exemption 42% of eligible properties were completely exempt

51 Webster, 2009
52 Bureau of Government Research, 2006
from property taxes. Proposals before the State Legislature called to increase the Homestead Exemption to $160,000 from its current level of $75,000. Though this bill did not pass in the last fiscal legislative session, if it did, 67% of eligible properties in Orleans Parish would be exempt from property taxes. A second bill that also did not pass in the last legislative fiscal session sought to exempt owner occupied homes value of $75,000 above the first $10,000. The purpose of this legislation was to increase local funding for school districts. Currently, the only assessments that a property cannot be exempted from are Fire and Police fees.

Observations about the potential for a PACE program in New Orleans

The local interest in building New Orleans back better is undeniable. The City takes pride in the example it is setting for other communities in how to invest in local infrastructure and business to redevelop in a stronger and more sustainable manner. This investment, though, is heavily subsidized by federal government relief dollars, and as the city transitions out of post-disaster rebuilding, there is a recognized need to develop local tools to continue to support innovative and alternative methods for building the city back better.

The PACE concept bookends nicely with a number of efforts to encourage green building in the City of New Orleans. The multiple planning processes that occurred post-Katrina repeatedly called for municipal commitment to reducing carbon output and developing alternative forms of energy. This has led to the creation of private and non-profit efforts to encourage the energy efficiency and renewable sectors. The results of these efforts are state and utility rebates that

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53 Bureau of Government Research, 2009
cover over $4,000 of a typical home retrofit. With slight reconfiguring of the types of retrofits these programs target, this provides an excellent basis for creating a PACE program that can finance the rest of the $8,000 to $12,000 retrofits that would achieve deep energy savings.

As New Orleans already captured the easiest 9% of energy efficiency, the city can expect an efficiency PACE program to be making lower average loans than the examples in the case studies. Amortizing a $4,000 loan over 15 years with a 7% interest rate, the property owner will have an annual payment of $435. If PACE Bonds are granted tax-exempt status and get a 5% interest rate, the annual payment is $380. The HERO program estimates Louisiana homeowners can expect to save $300 to $600 annually from a retrofit in their program. By combining the current incentives with market rate PACE financing, the City should be able to make the program at least revenue neutral, if not revenue positive for property owners.

In addition, there are local resources available to quickly expand the knowledge base of local building trades around energy efficiency and renewable installation. As the trades see the market for these specific skills growing, the demand for this type of training program is happening naturally. The City can play a key roll here in quickly coordinating resources between local trade schools, private training programs, and non-profit education facilities to assure that the trades are indeed properly trained to meet this challenge.

The greatest barrier to a PACE program in the State of Louisiana is the historic antipathy towards property taxes and tax financing districts. The Homestead Exemption in its current form creates a serious challenge to
underwriting a PACE program. The State must be careful about trying to import a program from another part of the country without doing the due diligence locally both to build political support for PACE and also to create a program that works within Louisiana's system of tax collection. Few people understand enough about the nuance between a special assessment district and property taxes. In a state as skittish about taxing property as Louisiana, this misunderstanding could easily torpedo the program.

Finally, as there are still a lot of questions about how PACE bonds will be received in the capital markets, it is important to include local bankers in the discussion of PACE financing terms and underwriting standards. PACE is a program that greatly benefits from the input of local knowledge. It should not be developed as turn-key program run by administrators from outside the state. Previous experience in local use of municipal financing will identify ways that Louisiana PACE bonds can overcome concerns about the security of the investment. With good reason, a PACE program for the City of New Orleans is going to face heightened scrutiny, not just about the validity of the energy savings, but also about the risk associated in investing in a city that faces a serious threat every hurricane season. Mitigating this perceived risk will be a big challenge for a New Orleans PACE program.
Chapter 5: Recommendations for PACE in New Orleans, LA

In the summer of 2009, LA Senate Bill 224 was passed into law by the Louisiana legislature and signed by Governor Bobby Jindal. The legislation, sponsored by State Senator Nick Gautreaux and supported by the fledgling solar industry in south Louisiana, allows the creation of special assessment districts for the financing of sustainable energy. The legislation authorized any government body in the state to create a sustainable energy financing district as long as they are already empowered to collect property taxes and issue bonds.

The legislation outlines a standard PACE program allowing the creation of a geographic district in which property owners can opt in to be assessed for the cost of installing energy efficiency or renewable energy improvements on their property. The legislation enables the participation of commercial and residential properties. Terms of assessment are not to exceed 20 years and though the legislation outlines eight broad categories of energy efficiency improvements and four types of renewable energy improvements, it includes the caveat, "Any other modification or remodeling authorized as a utility cost saving measure."
Table 5.1: Energy Efficiency Improvements Specifically mentioned in SB 224

<table>
<thead>
<tr>
<th>Category</th>
<th>Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation</td>
<td>Wall, Roof, Foundation, Heating and cooling distribution</td>
</tr>
<tr>
<td>Storm Windows and Doors</td>
<td>Multi-glazed windows and doors</td>
</tr>
<tr>
<td>Windows and Doors</td>
<td>Heat-absorbing or heat-reflective glazed windows and doors</td>
</tr>
<tr>
<td></td>
<td>Additional glazing</td>
</tr>
<tr>
<td></td>
<td>Reductions in glass area</td>
</tr>
<tr>
<td>Automatic Energy Control System</td>
<td>HVAC distribution systems</td>
</tr>
<tr>
<td>Caulking</td>
<td></td>
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<tr>
<td>Lighting</td>
<td></td>
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<tr>
<td>Energy Recover System</td>
<td></td>
</tr>
<tr>
<td>Daylighting System</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.2: Renewable Energy Improvements specifically mentioned in SB 224

<table>
<thead>
<tr>
<th>Category</th>
<th>Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photovoltaic Systems</td>
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<tr>
<td>Solar Thermal Systems</td>
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<tr>
<td>Small Wind Systems</td>
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<tr>
<td>Biomass Systems</td>
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</table>

Based on the analysis in Chapter 4 of the current conditions for energy efficiency and renewable installation programs in New Orleans, a series of recommendations are offered to inform the creation of a PACE programs in New Orleans. Before a PACE program can be implemented, the City and EntergyNO must
reevaluate the utility list of cost effective retrofits to take into account the nature of the building stock after Katrina rebuilding. As the PACE enabling legislation ties PACE funding to improvements that are deemed cost effective by the local utility, it is very important that the EntergyNO Energy Smart program reflect the actual need for energy efficiency investment in the city. To this extent, the City should take advantage of its position as the regulator of EntergyNO to make the data parsed in the GCR report publically available at the block group level. This data would allow better profiling of the building stock and successful neighborhood reconstruction techniques to form a cost effective profile specific to the city and its current condition. EntergyNO rebates should be used to target retrofits that have a negative or only a slightly positive NPV to subsidize the investment by the property owner and allow the PACE retrofit to achieve positive cash flow.

The city’s private energy efficiency and renewable groups must coordinate better to stop their overlapping programming and funding requests. These groups should focus on specializing and no try to do the entire process alone. Finally, to have a truly successful PACE program, Louisiana needs to devise underwriting standards specific to its program that takes into account the unique property tax situation in the state. These standards should resemble a retail loan and it is imperative that the mortgage lenders are informed of the assessment. For this Chapter, I return to the format from the case studies in Chapter 3 and highlight the key points about Origination Capital, Program Design, and Capital Market Take Out that the City of New Orleans must address to create a successful PACE program.
**Origination Capital**

New Orleans does not have the benefit of the municipalities profiled in the case studies of running budget surpluses. There is already an estimated $25 million budget deficit for the City in 2010, and it is only 1/3 of the way through the year.\(^{54}\) In this way New Orleans is much more representative of the over 200 municipalities currently trying to create a PACE program. Even without running a budget surplus, cities have a couple of options in designing the origination of the loans.

The first option is to follow Boulder County's model and go directly into the bond market. This avoids the issue of origination capital, but also limits the timing of when the program can make loans. Boulder's program plans to sell bonds every May and November. If a property owner has the need to make the retrofit outside of those two months they must wait or find another source of capital. In addition, Colorado law allowed Boulder to get around providing full faith and credit of the County for the bonds. This is very unlikely to be the case for a program in New Orleans. The bond market is most certainly going to require both credit enhancement and some form of security in its investment beyond the PACE cash flow due to continued concern around the safety of the city in the face of another Hurricane, as well as the history of properties exempt from paying real estate taxes.\(^{55}\) For this reason, New Orleans would be best served by aggregating a large pool of loans before entering the municipal bond market to cut down on transaction costs associated with getting a competitive rating by using credit enhancement and

\(^{54}\) Krupa, 2010

\(^{55}\) Fowles, 2007
collateral. Thus, the Boulder method of floating PACE bonds every six months is an unlikely solution.

The second option is to use recent federal government relief and stimulus funds to create a revolving loan fund that can aggregate a pool of loans. New Orleans received $300,000 specifically for the creation of an energy efficiency revolving loan fund as part of EECBG Round 1. In late April they were part of a consortium of cities to win funding as part of the Southeast Energy Alliance for the Round II EECBG competitive funding. This additional funding will be used to plan the PACE program in New Orleans. Combining these two federal options with possible additional funding from a systems benefit charge through the utility and federal disaster relief funding could create a revolving loan fund of close to $3 million. While this is a significant size loan fund, interviews for the case studies in Chapter 3 suggest that, in order to reach an aggregate pool of loans to enter the capital markets, New Orleans will need to identify closer to $15 million in origination capital. The revolving loan fund is only 20% of the needed capital.

The third option, which appears to be most likely, is the State of Louisiana establishing a statewide program. The State has more options available to create the origination capital pool and aggregating PACE loans statewide will both reduce the risk associated with properties in the hurricane danger zone and likely allow the total pool to reach a size in which it can be converted into a bond more quickly. The State of Louisiana’s credit rating is AA, while the City of New Orleans’ rating is A, so the state can expect better terms in public debt market.\textsuperscript{56}

\textsuperscript{56} Moody’s, 2010
The origination capital pool is not an expenditure; instead it is like the government putting its money into a short term CD. The origination loan pool is eventually securitized through the municipal bond market and the origination capital can be returned to its initial purpose, often with higher return on investment than the typical money market returns. However, there is risk that the securitization will be delayed or never happen, in which case the origination funds are returned very slowly. The State of Louisiana should consider the Palm Desert program, in which the City is earning nearly 300 basis points on the PACE loans.

While the State budget is limited in making direct expenditures, there are a number of reserve and rainy day funds that could view investing in PACE the way private colleges view endowment investment. This would not require a budget appropriate and expenditure of tax revenue, but rather be an investment vehicle for reserve funds.

Program Design
While PACE is an innovative tool for financing energy efficiency and renewable energy, it is not a program that can stand on its own. A successful PACE program requires a well-trained efficiency workforce, an outreach mechanism for encouraging the adoption of efficiency and renewables, and a simple way for property owners to take advantage all other efficiency and renewable tax credits, rebates and incentives. The New Orleans program will ideally seamlessly interface with the EntergyNO Energy Smart Program, the Total Community Action Weatherization Assistance Program, the statewide HERO program and federal
rebates and tax credits. The three programs profiled in the case studies all carved out a strong role for the municipal government in coordinating the programs.

Since PACE requires the municipality to provide the financing, or at least serve as a conduit for the financing, it does behoove the City government to ensure that the program is running efficiently and also that PACE participants are taking advantage of every possible subsidy before applying for financing. Although there are a number of non-profit organizations that have been involved in crafting the PACE program in New Orleans, the City should be cautious about turning over coordination to a third party. The City has the power to compel other actors to participate in a way that a third party would not. This is why Boulder County, Palm Desert, CA, and Babylon, NY, all have staff in City government devoted full time to the program in addition to partner organizations.

The key piece of a well functioning energy efficiency program that New Orleans is currently missing is building trades certified in property energy audit and efficiency installation techniques. The entire State of Louisiana only has six active energy auditors that have passed the national standard ResNet test. An immediate investment needs to be made in training more auditors and in training the local building trades in how to properly complete an energy efficient retrofits. Without a well-trained work force, the PACE financing will be a poor investment for the City.

Finally, due to the unique property tax situation in Louisiana, that allows nearly 50% of properties in Orleans Parish to be exempt, the New Orleans PACE program must design strong underwriting standards that go well beyond past

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property tax payment history. Underwriting can include past payment on utility bills, a limit on the size of PACE loan as a percentage of total assessed value and household income, and other income and asset verification. The PACE program must also inform the mortgage holder about the PACE assessment so that escrow accounts can be adjusted appropriately to avoid a situation in which the city or state must foreclose on a property for unpaid PACE assessments.

Louisiana, though, should not give up the first lien status of these investments. First, an energy efficient or renewable energy improvement to a home, increases the value of the property for the private homeowner and has significant benefits for society as whole by reducing CO₂ output and the need to build future utility generation facilities. This public good justifies the PACE status as a special assessment. Second, the municipality is creating a tool to overcome the disaggregated nature of energy efficiency in our building stock. The private banking sector has thus far not developed a tool to do this and is not the sector taking the risk on making the PACE loans. Municipal assessments have a first lien status ahead of private bank loans. If the private banks are capable of producing a financing tool that can compete with the interest rates of the PACE program and achieve significant participation so as to impact CO₂ output and reduce total system energy use, then that product can take the place of the PACE program. Without such a solution, mortgage lenders and private bankers must accept their second position.

The special assessment district is a tool that, though used infrequently in Louisiana, still has a history of taking first lien status in front of mortgages. New Orleans used an assessment district in the Canal Street Area to finance bonds in
2001 to fund improvements to the Central Business District. Mortgage holders have accepted their secondary position to assessment districts in the past and continued to financed mortgages in assessment districts. PACE assessments should have the same status.

Due to the smaller total cost of retrofits in New Orleans, particularly when using state and utility rebates, New Orleans is particularly well positioned to use PACE with low and moderate-income property owners. If the program makes it a priority that the energy savings from the retrofit is greater than the assessment and allows for flexible payback periods on the assessment, the PACE program should create positive cash flow for participants. In addition, other local programs like WAP, can even further reduce the principle for the retrofit. Though the temptation may be to try to reduce the interest rate, this is not the most effective method for encouraging low-income participation in the program. Reducing initial loan balance of the $4,000 loan profiled in Chapter 4 by $900 has the same effect on the annual payment as reducing the 7% annual interest rate by 400 basis points to 3%. By focusing on efficiency retrofits and well-designed incentives and rebates, New Orleans could develop a program accessible to most of its property owners and achieve wide scale energy savings.

Capital Market Take Out

While this final category is last in the list of recommendations, it is in fact the most important. No PACE program should be created with out clearly mapping the eventual capital market take out. To forge ahead and make loans, or worst commit to repaying property owners with PACE funds before the bond market solution has
been identified is a recipe for disaster. While PACE is gaining national prominence and enjoys significant support from both the White House and a number of investment banks, no PACE program has successfully entered the capital markets without a guarantee beyond the PACE cash flow stream. Either the municipality, the State, or a third party credit enhancer must provide some additional form of security. This is not to suggest that getting the final PACE capital market financing needs be difficult, but it is to highlight the importance of identifying how this will happen before the program is launched. Failure to do this ultimately doomed the Berkeley PACE program.

To this extent, it is important to use local knowledge about traditional forms of municipal financing when crafting the program. Experts that have done municipal bond financing for the city (or state if New Orleans operates within a state program) must be at the table from the very beginning of crafting the program and in fact should lead key elements of program design like loan underwriting standards, amortization period and acceptable retrofit profiles. It is in fact more important to have local stakeholders with experience in municipal bond financing and retrofit lending involved in PACE creation than it is to have national experts. Similar to the problems identified when a national firm determines the cost effective retrofits for an efficiency program, municipal financing is also not one size fits all. A PACE expert is not as important as someone who has 20 years experience packaging municipal bonds in New Orleans or Louisiana. While PACE may be a new asset class, it is an old tool with a new use. The capital market portion will not be grossly different than previous bond financed municipal assessment districts.
Finally, if the PACE program has access to a large enough reserve fund for origination capital and the reserve fund does not need to be significantly liquid, the PACE program may consider staying out of the capital markets and accruing the interest rate spread to the reserve fund. This concept has thus far frightened many municipalities, but makes good investment sense. The use of public reserve funds or private placement with pension funds or insurance companies that also traditionally invest in low risk long term assets is an alternative that would reduce the volatility of using the capital markets.

**Conclusion**

Property Assessed Clean Energy Bonds are an important step forward in financing energy efficiency in the US. Despite the widespread acceptance of energy efficiency as a good investment with positive Net Present Value, the private banking sector has struggled to produce a tool that has attracted large participation from property owners. Moreover, the disparate nature of the energy efficiency investment discourages investment by private companies, like ESCOs that have found profitable methods for capturing the efficiency in large industrial and commercial project. PACE provide four key features that overcome previous barriers to capital market participation in energy efficiency:

**PACE aggregates many small property owners together**

Trying to coordinate small property owners into an aggregate that overcomes transaction costs and makes a meaningful impact on total energy usage in a municipality escaped the private sector. PACE is a new take on an old tool, special assessment districts, used for decades by municipalities to make
investments provide a public good over many owners but that would not happen if left to the private owners to coordinate. By aggregating owners in a district into the PACE Bond, the municipality is providing a key step to providing a tool that is easy for the property owner to participate in and considered a good investment by the financial markets.

**PACE provides a first lien status**

There is still hesitation in the financial sector about financing energy efficiency or renewable energy improvements solely on the cash flow stream associated with energy savings. Until there is better access to the actual post installation measurement and verification of utility bills of properties that participate in these programs and low risk in repayment of PACE bonds, the financial markets need a form of security for the investment. The first lien status awarded investments made through municipal special assessment districts promises to make PACE bonds a safe investment.

**PACE assessments stay with the property, not the owner**

In addition to providing a low cost source of capital for an investment that leads to lower utility bills, a PACE loan is appealing to property owners because when they sell the property the assessment balance does not have to be paid off. Instead the assessment stays with the property and the remaining loan balance becomes the responsibility of the new owner. Thus, if the property owner does not expect to stay in the property for the lifetime of the investment, this is not a disincentive from participating in the PACE programs. Similarly, if a property goes through foreclosure, the PACE assessment cannot be wiped away, but must be
brought up to date by the new owner. This also contributes to making the PACE mechanism a safe investment.

**PACE provides a well-understood mechanism for accessing the capital markets**

By using a municipality’s special assessment power and providing the first lien status to PACE loans, PACE bonds are using a well established tool to aggregate property owners into a pool to enter the capital markets. Though PACE is a new asset class, it still follows a model with a long history and a low default rate.\(^5\) If the PACE programs maintain strong underwriting standards, the long history of low special assessment district default will serve the programs well and produce low interest rates compared to commercial loans.

PACE, though, still faces barriers to implementation. The three biggest barriers remain:

**PACE programs need origination capital to make the loans before entering the capital markets.**

PACE is an excellent advancement in the securitization of the energy efficiency and renewable improvement loans but it is not an immediate source of upfront capital. The one program that does source its PACE program directly from the capital market, Boulder County, CO, is limited to issuing PACE loans to property owners in May and November. If a property owner wants to complete the work on their property at another time of the year, they will not be able to participate in the PACE program.

\(^5\) In 2008, the Municipal Bond Fairness Act established an online searchable database for municipal bonds and listed the historical default rate of all Municipal bonds. Aaa bonds had a historical default rate of 0.00, Aa bonds had an historical default rate of .06, and A bonds had a historical default rate of .03. Comparatively, a Aaa Corporate Bond has a historic default rate of 0.52.
Identifying a source of origination capital is extremely important for the viability of a PACE program. Municipal bond offerings require significant transaction costs and thus to get the best return on investment the municipality wants to accrue a sizable pool of loans before entering the capital market. Identifying where the funding to make the upfront loan comes from is still a barrier to implementation.

*PACE bonds need credit enhancement to get a competitive interest rate.*

Though special assessment districts have a long history of low default rates, PACE is a significant expansion of this tool. Due to the lack of experience with and data on PACE default rates and general conservative nature currently in capital markets, programs will likely be required, for some time, to offer security from the municipality in excess of dedicating the stream of cash flow from the PACE loans. In essence, this barrier, which exists at the property owner’s level, PACE can aggregate and transfer this security requirement to the municipality. Any investment that requires security from the municipality is inviting controversy. Recently, Boulder County voters voted down a referendum to increase the ceiling for PACE bonds, indicating local concern over taking responsibility for this debt.⁵⁹

Creating proper underwriting standards will limit the risk to the primary mortgage holder and identify properties that already too burdened with debt. In June of 2009, the Federal Housing Finance Agency first raised alarms that PACE loans would put negative equity mortgages further underwater. In March of 2010, Fannie Mae and Freddie Mac issued a statement against PACE because it provides a

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⁵⁹ Ann Livingston, 2010
first lien status over the mortgage holder. The concerns about negative equity homeowners are legitimate and require municipalities to create much stronger standards in screening participants than the first few programs have implemented. It is imperative that the primary mortgage holders be informed about the PACE assessment so that the mortgage escrow account can be adjusted accordingly. In addition, programs must consider both assessed value and market value in making PACE loans. Still, due to both the social benefits from promoting efficiency and deferring the need to build new generation in addition to the positive cash flow that a property owner should see from participating in a PACE program, it is not entirely clear that homeowners with negative equity should be excluded from the program, particularly in markets that are currently experiencing an over correction. Since the PACE assessment stays with the property and not the owner, as long as the municipality has faith in its property market that this property would not sit vacant through foreclosure and as long as the PACE assessment is part of the mortgage holders escrow account, the PACE investment should be secure.
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