Picking up the PACE

Team: Green Dinosaurs

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18 February 2014

PICKING UP THE PACE - EXECUTIVE SUMMARY

The 51st State aims to scale up the Property Assessed Clean Energy (PACE) program oriented for commercial, industrial, and residential facilities with 5+ dwelling units on the state level, providing low-interest and long term loan for property owners to retrofit or install renewable technologies. In order to achieve the scale uptake, the program needs to improve operation structure, relationships to stakeholders, and strategies to be sustainable.

This proposal models strategic approaches based on assumptions of the state's current attributes. Features such as effective marketing tool are a crucial component to our program's success during the early development phase to encourage participation from key stakeholders. Adding on to the effort of motivating stakeholders, we plan to improve clarity and easiness of application process by utilizing innovative tools such as automated online application form and database management system, allowing replicability at larger scale. Incorporation of intensive and simplified technical support system will be included to cater to customers' needs. Additionally, our model highlights two secure financing methods, attracting both the open market and governmental bond market, tailoring to different building assets. Moreover, the proposal also examines the investment sizing in building retrofits, providing context to strategic direction of the program's development.

Ultimately, the proposal lays out the strategy for program growth in three phases while targeting specific building types. First, aiming at small scale commercial buildings and local government buildings, the program hopes to illustrate leading examples that can achieve the largest energy savings. Moreover, these project's achievements can build confidence in the program's fluidity and marketability as the program continues to improve its tools and relationships, particularly with private investors. Second, the program will target larger commercial buildings and industrial corporations. As the volume of applicants increase, the state program will be able to expand its loan volume by connecting to private investors to support larger scale projects. Third, our program will accelerate the program's success through political approvals and interest groups' support, leading more local governments to authorize PACE in their region to participate. At this point, the state commercial PACE program expects to reach the critical loan volume to ensure the program's sustainability and growth.

1. INTRODUCTION

Modern commercial and industrial buildings consume 49.5% of energy in the US (United States Department of Energy, 2012). In an effort to reduce energy consumption in the built environment, the Property Assessed Clean Energy (PACE) program was initiated to accelerate energy efficiency implementations across the country. PACE offers 100% upfront capital with long-term, low interest loans for property owners who want to make clean energy improvements to their property. The current commercial PACE programs continue to grow in more than 30 states, facilitate over $30 million in project revenues, and pipeline an additional $71 million as of 2013 (PACENow, 2013a, p. 3).

Some of the obstacles that state commercial PACE programs face include complications within the commercial mortgage lenders, issues with lien consent, finding strategic marketing and outreach under a strict budget, and many more (National Renewable Energy Laboratory, 2010). These concerns often deal with financial capacity, political feasibility, and effective process flow, preventing the achievement of market uptake needed to attract major capital, build confidence, and reduction of transaction costs.

This proposal aims to develop a replicable, standardized model of state PACE program for commercial buildings by targeting five aspects: 1) strategic marketing techniques 2) streamlined application process 3) resourceful technical support, 4) innovative financial structure, and 5) targeting building asset. The proposal first addressed the roles of each key stakeholder. The subsequent sections highlight strategies and features that characterize the program. Ultimately, the paper also examines the building assets to estimate the total investment capacity, leading to the various phases of the program's growth and development.

2. KEY STAKEHOLDERS INVOLVEMENT

As the facilitator of the PACE program, the state administration's crucial responsibility is to effectively communicate and engage with key stakeholders, including the local government, property owners, mortgage lenders, contractors, and investors.

Local government: PACE is voluntary, hence local governments must establish public policies to operate the program. There are two options in adopting a local commercial PACE programs: 1) sign an agreement to participate in a state PACE program, or 2) create its own commercial PACE program. Local governments who volunteer to participate have to conform to the state administration and have no liability to the bond pool or any kind of claims under or related to the state program. Appealing to different stakeholders at the grassroots level in local communities is crucial to encouraging local participation in the state program. Local governments with their own administration are encouraged to partner up with the state program to maintain consistency across the state.

Property Owners: The purpose of PACE program is to provide a mean for property owners to afford clean energy improvements. Hence, their interests in PACE financing directly impact the program's growth. Larger volume of applicants will build confidence for prospective investors.

Mortgage Lenders: The addition of a PACE loan as a senior lien on the property generates concern for mortgage lenders, who can significantly affect the political support for the program.

Contractors: As property owners evaluate the project, contractors play an important role in aiding property owners to make qualified technical decisions. They also serve as a secondary market pioneers for the PACE program at the local level because they directly interact with potential applicants. In addition, investors of the PACE program, who provide capital and the livelihood of PACE program at a large scale, would be more engaged if highly qualified

contractors are involved to lower construction risk (PACENow, 2013c, p. 10).

Investors: The success of PACE depends on the commitment of investors who provide the upfront capital to fund projects. To involve more investors, we must be able to increase their confidence and brand the program's security by meeting a critical transaction volume of roughly $50 million.

3. STRATEGIC APPROACHES TO PROGRAM DEVELOPMENT

3.1. Marketing and Outreach

We aim to publicize state PACE and to encourage involvement of key stakeholders in achieving energy efficiency in commercial buildings. Marketing techniques involve positive partnerships with industrial experts, non-profit interest groups, local government, and different organizations to promote PACE. State PACE will delegate most of the marketing implementations to the participating local governments as they are more accessible to and knowledgeable of the local communities. The marketing manager from our program will be responsible for overseeing local government marketing activities among other responsibilities addressed in Appendix F. The following sections list parties and outreach partners that the state and local PACE programs will market towards.

3.1.1. Marketed stakeholders

Our primary goal is to educate property owners about the importance of implementing energy efficiency measures because we want to motivate applicants to make upgrades for their buildings. We will provide resources for property owners to inform them about methods used to assess their buildings' performance and how they can utilize PACE program effectively. We will target local organizations, such as Building Owners and Managers Association (BOMA), to encourage participation for workshops and webinars. We will recommend local governments to adopt PACE programs, so they can be a role model in their communities.

Marketing towards contractors is essential because they interact with property owners on a regular basis. Since PACE is new and complex, most contractors are unfamiliar with PACE. We will delegate this responsibility to local government to lead efforts in communicating with local contractor associations by presenting the benefits of PACE. Our goal is to achieve mutual marketing benefits for both PACE program and contractors by advertising approved contractors on the PACE website. Contractors will gain access to a pool of customers through PACE projects, and in turn, contractors will benefit the PACE program through marketing PACE program to their customers.

Another group that the State PACE program markets to is the potential municipal bond holders and investors cooperation. Our goal is to deliver accurate information of PACE financing model to them in showing that they will ultimately be benefited from the investment. Lastly, we aim to target towards mortgage lenders to avoid miscommunication and misunderstanding of impacts of PACE program towards the mortgages they hold.

3.1.2. Potential Outreach Opportunity

Utility companies: We aim to partner with utility companies so that they act as a media channel in spreading the information about PACE program to their customers, similar to marketing of On-Bill Financing done by San Diego Gas & Electric (SDG&E) (San Diego Gas & Electric, 2013b). SDG&E is working towards an automated benchmarking system through Energy Star Portfolio Manager for their customers (San Diego Gas & Electric, 2013a). We will connect PACE buildings to Energy Star database to obtain rating scores of building performance, so the

scores will be included on PACE website. This method provides an effective way to track the successes of the program and showcase successful PACE projects.

Interest Groups: We plan to establish a partnership with non-profit interest groups, such as the Regional Energy Efficiency Organizations, for hosting workshops and conducting specific energy efficient studies for technical services. By doing so, we carry a lighter burden in sustaining the program while providing technical services to the public and marketing to a broader range of audience.

3.1.3. Marketing techniques

We will display a list of available public workshops, public hearings, webinars, online courses on an interactive map and calendar on our website to promote PACE program for property owners, contractors, investors, and lenders. We will require local government and partnered non-profit interest groups to host workshops to the public on a fixed schedule. Topics include benchmarking and evaluating building performances using different energy modeling software, energy efficient methods for different types of buildings, and lessons learned from previous experiences. Emphasis will be placed on tutorials that illustrate the PACE application process and financial model. Building owners and contractors will be able to exchange experiences through online forums. In addition, we will include a building profile database to demonstrate the credibility of the program, to be described in Section 3.3.1.

Our program will feature unique marketing strategies toward contractors as they have a large impact on PACE operation and local presence. We will develop a directory of the PACE approved contractors on our website where requirements include holding a business license in the local region, having a minimum of five years of work experience, and submitting a technical expertise summary of previous experiences. Benefits of being a approved contractor include participation in the bidding process of projects[1] and engagement in marketing opportunities on PACE website and workshops.

3.2. Streamlined Application Model

A simple and clear application process is imperative to improve satisfaction for related parties in a cost effective manner. We will develop a web-based application process that is simple, automated, and informative to reduce the need for technical support, and produce a visually stimulating, approachable, and user-friendly experience. The model proposed combines best management practices as seen in current PACE programs (C-PACE, 2014), utilizing existing resources to improve process clarity, visualization, and efficiency. Figure 1 from Appendix B highlights the main steps of the program's application process.

3.2.1. Step 1: Utilization of Web-based Software to Streamline Initial Applications

We will develop an automated web-based application, like CaliforniaFirst (CaliforniaFirst, 2014), which allows property owners to quickly check whether they meet basic eligibility requirements. Unlike the downloadable applications (DC PACE Commercial, 2014) or single lengthy applications that are commonly used, this method will easily weed out unsatisfactory projects early on, reducing human capital and time. The eligibility criteria will be standardized across the state and may include: financial stability, building size, years of ownership, and current occupancy details (United States Department of Energy, 2012).

[1] 1.5% of the project's cost will be collected by PACE from the respective contractors towards the conditional bank, which is described in financial model section.

3.2.2. Step 2: Technical Requirements

Using conditions such as location, building size, and desired improvements, PACE will give eligible applicants a recommended list of state and local PACE-approved auditor contractors through an automated system. A full list of all approved contractors within the state will also be available on the website through an interactive map. We will brief approved energy auditors on PACE guidelines, standards, available resources, and responsibilities in a mandatory training session (Eventbrite, 2013). PACE projects will require audits to be ASHRAE II equivalent minimum for detailed assessment of potential improvements and financial analysis.

3.2.3. Step 3: Technical and Final Review

The final application includes an audit summary, desired loan information, and Lien Holder consent. Our admin (see Figure F.1.) will conduct a detailed financial review and will subsequently post project summaries onto the Bidding Portal with a Request for Qualification for contractors and lenders. We will use a software to accelerate the underwriting process, as used by C-PACE (Sustainable Real Estate Solutions, 2014).

PACE has senior lien in foreclosures which is a concern when obtaining Lien Holder Consent. This concern is heightened by commercial mortgage-backed security (CMBS), a mortgaging method for multiple commercial properties that are under a single fund and multiple property owners. We propose two methods to increase Lien Holder security:

Non Accelerated Repayment Requirement: All Loans will be placed on the same level lien payment as the PACE Loans. In case of foreclosure, the Pace Conditional Bank (PCB), further explained in section 3.4.2.2, will allow PACE to pay back interest rates until foreclosed properties are sold. CMBS Lien Holders will not experience any additional risks with PACE Loans. New owners must pay the missing loan payments in total or pay an increased property tax payment until the loan is paid off in order to gain the full deed.

Strengthening Credit Underwriting Criteria: To mitigate lender concerns regarding payback risks, state PACE programs will standardize the underwriting criteria of applicants (United States Department of Energy, 2010). PACE will underwrite CMBS properties with more stringent set of terms, including a loan cap at 10 percent of the property's market price. Additionally, we require that 30% or more of the senior lien be paid. State PACE will perform a background and credit check of the property owners to estimate the potential risks of the loans.

3.2.4. Step 4: The Bidding Portal

In many PACE projects today, applicants are either matched to a single contractor (Energy Upgrade California, 2011) or required to choose one before application (Burlington Electric Department, 2014). Our Bidding Portal will encourage competitiveness and provide the best offer to the property owner. It will be located on the website where interested contractors will submit a Request for Proposal. Applicants will then be able to review all bids and respective contractors' expertise summaries before choosing a contractor that best meets their needs. Lender bidding will follow a similar process depending on project finances explained in Section 3.4.3.

3.2.5. Step 5: Final Documentations & Implementation.

Following contractor and lender selection, all parties will sign all necessary documents, bids, or permits (Los Angeles County PACE, 2013), demonstrating awareness and approval of the project. From here, the applicant will have one year to implement the project similar to GreenFinanceSF (GreenFinanceSF, 2014).

3.2.6. Step 6: Tracking Program's Success with Efficient Tools

After project completion, PACE will add a tax line to the property tax until loan period is over. Additionally, PACE requires buildings to track savings through the Energy Star Portfolio Manager for the first 2 years, or more if required by local government. A local third-party firm hired by the property owner is required to verify actual savings with audit-projected savings. The local government may choose to issue fines if property owners do not meet these requirements. Property owners are eligible for tax abatement as mentioned in section 3.4.2.3 up to two years after project completion if they meet 50% reduction in energy consumption compared to baseline.

3.3. Technical Services

The state PACE program will increase participation and customer satisfaction by incorporating an intensive, simplified, and up-to-date technical support system. Several PACE programs demonstrate good practices including various forms of communication and a updated page of PACE related news on their webpage (Figtree Financing, 2014). However, to provide a more cost-effective yet informative services, we will take advantage of existing resources. Technical services will keep costs low while maintaining a high performance of the support system in order to increase approachability and encourage statewide participation. General services offered will include a Frequently Asked Questions page, scroll-over definitions for legal terms, and informative videos. In addition to these general services, we propose the creation of the following services to increase education, automation, and local PACE uptake.

3.3.1. Building Profile Database:

Upon project implementation, our software will transfer building profiles to a public database accessible through state and local websites. This database will allow potential applicants to estimate savings by exploring similar projects based on location, upgrade type, loan rate, and more. PACE will be establishing partnerships with utility companies to obtain energy usage data and buildings' scores from Energy Star to be included on the website.

3.3.2. Troubleshooting: Self-help Tools

An automated troubleshooting service, like the Microsoft troubleshooting tool (Microsoft, 2014), provides self-help for applicants and potential applicants. We will adapt this service for energy efficiency information to guide the property owners through technical questions and navigate their concerns to provide specific answers. The answers may include links to existing hand-picked forums or websites such as Sustainable Facilities Tool (United States General Services Administration, 2014). Although there will be an initial cost to create this service, it will reduce human capital in the long run. Moreover, the development cost would be less burdensome since we will take advantage existing resources.

3.3.3. Personal Technical Support:

In addition to the self-help services, PACE will offer 25 hours and 50 hours of personal technical support for small projects (<$50,000) and big projects (>$50,000) respectively within a year of project completion. Further personal technical support, such as live help as seen in HERO (HERO Program, 2014), can be delegated to the local level.

Overall, we envision a standardized, statewide PACE website that will maximize cost-effectiveness and expedite the application process by utilizing automation methods and existing resources. A parallel effort in creating visual and simple web interfaces should be made across different states. Automation and an interactive website will be crucial to the growth of PACE by reducing human capital. In the presence of strong technical services provided by the PACE program, the next section leads into discussion of funding foundation of the program.

3.4. Financial Model

3.4.1. Models Options

There are two major categories of financing models found in PACE programs today: 1) municipal funded bonds, and 2) privately funded model (Managan & Klimovich, 2013, p. 11). Municipal bond uses a reserve pool to finance projects, which is advantageous for smaller projects due to lower interest rates. However, there are uncertainties in the pool reserve to attain high volume of transactions because of the unpredicted project demands. Many current PACE programs adopted the open market approach where projects are funded by a capital provider of choice, selected through a competitive bidding process. Interest rates, terms, and costs vary on a case-by-case basis. This model is advantageous to retrofits of larger buildings (Managan & Klimovich, 2013, p. 11)**.**

3.4.2. Definitions

PACE Bank is the official bank created by the State PACE Program, aiming to fund small projects. PACE Bank gathers funds by issuing Municipal Bonds to the public at different interest rates and duration as shown in Table 1. Municipal Bonds are issued based on projects' demand to eliminate the burden of unnecessary payback interest rates.

Municipal Bond (All Semi-annual)	Type A	Type B	Type C
PACE (Mature Years, Interest Rate)	5years , 1.5%	10years , 2.5%	15years , 3.3%
Department of Treasury	5years , 1.44%	10years , 2.61%	20years , 3.29%

Table 1. Different types of common Municipal Bonds

PACE Conditional Bank (PCB) is the bank where our program stores funding for emergency, operation, and expansion of the PACE program. Unlike the PACE Bank, the PCB does not fund projects. In case of property foreclosures or failure of repayment, our program can withdraw money from the PCB to repay investors. Once the repayments from the new property owners are received, the payment will later automatically be added back to the PCB. Additionally, PCB obtains its money from contractor commissions as mentioned in section 3.1.3 and the conditional funding portion of owners interest rates as mentioned in section 3.4.4. In case of insufficient funds, PCB will generate money from selling municipal bonds.

Tax Abatement Agreements is a strategy to attract the first wave of applicants by negotiating with the local government to reduce a percentage in the original property tax amount if the implemented projects meet high saving goals as shown in section 3.2.6. Participating local

governments can choose to adopt, administer the abatement, design their own criteria, and limit a threshold amount upon their participation. Similar concept of tax abatement incentives have already demonstrated successful results, such as On-Bill Financing and the Mill Act Property Abatement Program (California State Parks, 2013 and San Diego Gas & Electric, 2013b). The purpose of this strategy not only encourages monitoring and operation maintenance after project completion, but it also increases market exposure of the program's initial development and meets the critical application volume to build investors' interests. Additionally, this method involves the local government's effort to reward green buildings, which ultimately benefit local environment, real estate values, and economic activities.

3.4.3. Models Based on Current Needs

To overcome financial barriers of gaining investment, we examine the current market activity of all existing commercial PACE programs and projects through the market dashboard as shown in Figure 2 of Appendix B. According to the PACENow Dashboard, 50.3% percent of the projects costs under $50,000 across 26 PACE programs. As a result, we will classify projects that cost under $50,000 and above $50,000 as small and big projects respectively, each with different financial strategies.

PACE Bank from Municipal Bonds for Small Scaled Project (<$50,000): For PACE projects that cost <$50,000, the property owners will obtain the project funds from the PACE Bank. PACE Bank will issue Municipal bonds to maintain roughly $4 million in the vault during the first year, judging from previous financings trends in other PACE programs as shown in Figure 3 in Appendix B. Depending on the demand, additional bonds will be issued. Meanwhile, property owners will interact directly with our state administration. The interest rate of the loan varies by the loan amount and payback time. For small scale projects, the interest rate is capped at 7% and with a maximum payback time of 20 years.

Open Market to Private Investors for Large Projects (>$50,000): For large PACE projects, the funds will come directly from private investors who seek to earn higher interest rates. Our program will provide property owners with investors and act as the middle-man to negotiate terms and interest rates that satisfy both parties. Property owners will receive the loan at higher interest rates on a case-by-case basis, due to the higher risks that are associated to larger loans.

3.4.4. Loan Interests

The loan interests collected from the property owners are used for the following:

- Administrative fee - salaries for employees and technical experts
- Variable interest rate - payback interest rate for municipal bonds
- Conditional funding - allow emergency fund for PCB

3.4.5. Funds for Program Sustainability & Growth

Currently, PACE programs around the country have the loan interest rate of 3-8% (National Renewable Energy Laboratory, 2010, p.3). However, in order to create a self-sustaining program while maintaining a positive cash flow, the loan interests should not be less than 5.5%, as shown in the Appendix G. As addressed earlier, the money obtained from the conditional funding interest will feed the PCB, where at least half of the balance is set aside for emergency usage while the rest is used for the program's growth.

3.5. Targeting Building Assets

3.5.1. State's Building Portfolio

Based on the assumptions made for our state listed in Appendix C, the commercial state PACE program aims to include commercial, industrial, and residential facilities with 5 or more dwelling units as shown in Figure 3 in Appendix B. The decision to include multifamily housing largely depends on the state's interest. Based on the CBRE study on U.S. Multi-Housing Marketview (2013), multifamily housing shows an increasing demand in energy hubs cities, potentially expanding our program's total investment capacity. Moreover, although multifamily housing is traditionally considered as housing residential, i.e. non-commercial, the financing structure for multiple family housing is similar to those of commercial buildings (Mortgage Bankers Association, 2013). With lender consent, qualified multifamily housing should be eligible to participate in commercial PACE program because the mortgage structure separates itself from the political opposition of the residential sector.

3.5.2. Total Investment Capacity & Priority

Studies from McGraw-Hill Construction (2010) reveals that a mounting demand for green buildings has risen from 10 to 12 percent in 2008 (24-29 billions) to 28-35% in 2010 (67 - 84 billion) in the US. From Appendix E, equation (1) was used from a study to estimate the maximum total investment capacity particular to a state. The assumed costs are divided into two hypothetical categories: quick hit ($1.72/SF) and deep ($9/SF) retrofits (Lori Bamberger Consulting, 2009, p. 9). Deep Retrofits aim to save more than half of the current energy use by applying big scale changes such as HVAC system; whereas quick hit retrofits aim to decrease energy use by applying small scale change such as lighting fixtures (Rocky Mountain Institute, 2014). The state's total investment capacity is calculated to be $3.8 billion and $731 million for deep retrofits and quick retrofits respectively. Compared to the studies conducted by McGraw-Hill mentioned earlier, these calculations illustrate a reasonable estimation relative to the national market. Ultimately, we aim for implementing both quick and deep retrofits into PACE projects, but with a stronger emphasis on deep retrofit as our program strengthens.

The initial priority in targeting building assets is to focus on the scope of buildings that will yield the greatest impact on improving energy efficiency and provide a marketing advantage to the state PACE program. These buildings can be identified by using resources such as State Energy Data System program provided by the U.S. Energy Information Administration, building performance database, and more. The goal is to identify building types that will influence key stakeholders in the green building market by looking at historical trends of market investments and production, leading to decisions that shape the program's growth.

4. PROJECTED PROGRAM'S GROWTH

As capital is limited at the beginning of PACE program, shown in Figure 4 in Appendix B, we plan to develop our program into three different phases, leading to incremental growth. First, our program will depend on municipal bonds to develop its tools, image, and foundation. Second, our program will strengthen our relationship with private investors or corporations by establishing our presence in the private market and target big buildings that require large capital. The third phase will put emphasis on branding our success, inducing more partnerships with local governments that are starting to legalize PACE in their region.

4.1. Phase I: Initial Development

During the first phase of the program, our state administration will focus on developing and implementing the framework of the commercial PACE program such as the website, marketing materials, and drafting guidelines or agreements. Upon the establishment of our foundation, staff will begin marketing toward local governments to pass commercial PACE legislation and join our state program, as well as to promote PACE to local stakeholders using strategies mentioned in Section 3.2. Particularly, we will target regions with successful residential PACE programs where positive political and economic interests are present. Utilization of existing local PACE program's established relationships and partnerships to local stakeholders will greatly expand our network to larger corporations, potentially affecting marketability in other regions.

Based on trends from existing PACE programs, we assume that the first wave of applications will most likely include a lot of small projects and a few large projects (PACENow, 2013b). The state program will strongly encourage local governments to be the first groups of applicants, so they will be a role model for their communities and help PACE increase publicity. Phase I of program development will largely depend on municipal bonds to fund projects. State PACE program will expand and gain more momentum after establishing a functional program and a moderate loan volume.

4.3.2. Phase II. Targeting Big Money

The next step is to target big building property owners who require a large upfront capital for energy efficiency implementation, e.g. class A type buildings or larger industrial buildings. Class A office buildings are on the high end of the real-estate market where buyers and tenants have high demand for sustainability built-out spaces (PACENow, 2013c, p. 5). In our state, class A encompasses 22% of the total office buildings and holds the majority of the total investment capacity for office building as shown in Table E.4 of the Appendix. Class B office buildings, which are lower quality than class A, also have an equal share of the total investment capacity as class A. Therefore, we will prioritize marketing efforts toward class A and B, expecting class C properties to follow the market trend as our program expands.

Since larger commercial buildings require longer assessment time, we will use this period to market to investors who desire larger profits that these projects can offer. Due to the expected increase in large projects, staff will steer marketing strategies towards corporate investors. The program is expected to attain this growth within two years following phase I by expanding applicant interests and revenue pool in the private market.

4.3.3. Phase III: Branding PACE

Lastly, we will track energy usage of completed projects from Phase I and II to demonstrate energy saving achievements. Consequently, we can further brand the state commercial PACE model to obtain recognition from political figures or interest groups in local regions from phase I and II. With this support, our program will attract neighboring regions or other regions to uptake PACE. Ultimately, phase III of the program is expected to attain $50 million of loan volume. At this point, our PACE program will be self-sustaining and have excess funds from the Conditional Bank to expand offices and operations.

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A. List of Tables

Municipal Bond (All Semi-annual)	Type A	Type B	Type C
PACE (Mature Years, Interest Rate)	5years, 1.5%	10years, 2.5%	15years, 3.3%
Department of Treasury	5years, 1.44%	5years, 2.61%	5years, 3.29%

Table 1. *Different types of common Municipal Bonds*

B. List of Figures

Figure 1. *Application Process*

Figure 2. *Existing Trends from PACE Projects by Project Sizes (PACENow, 2013b)*

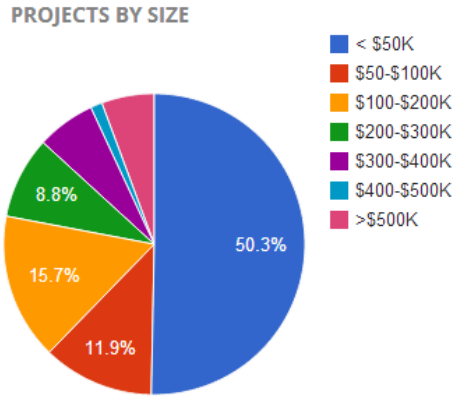


Figure 3. *Percentage of Commercial Buildings by Types in Our State*

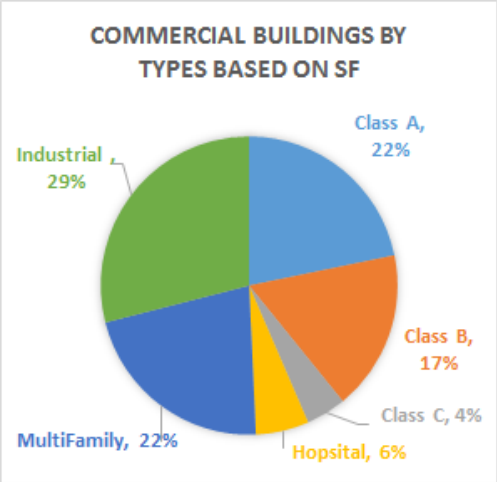
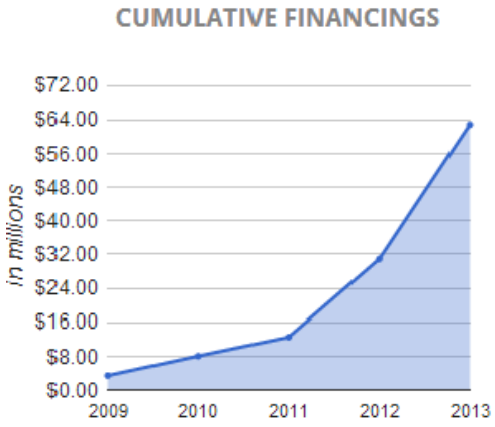


***Figure 4**. Trends for Cumulative Financing for PACE in the Last Five Years (PACENow, 2013b)*



C. Assumptions of State Model

The assumptions made for the 51st State includes that the state contains 7 large cities that encompassed 75% of the population, each with population ranging from 200,000 to 700,000 people.

Below are the assumed building portfolios for potentially qualifying buildings within the state. Figure 2 from Appendix B is a representation of the buildings portfolio that the program would target.

Table C.1. Buildings Portfolio of Our State

	Square Feet (SF)	**Percentage of Total Office Based on SF**	**Percentage of All Buildings based on SF**	**Number of Buildings**	**Percentage of Office Buildings based on # of Buildings**	**Percentage of All Buildings based on # of Buildings**
Class A	150,000,000	50%	22%	770	35%	14%

Class B	120,000,000	40%	17%	990	45%	18%
Class C	30,000,000	10%	4%	440	20%	8%
Total Office	300,000,000	100%	43%	2,200	100%	41%
Hospital	40,000,000		6%	200		4%
MultiFamily	150,000,000		22%	2,000		37%
Industrial	200,000,000		29%	1,000		19%
Total	690,000,000		100%	5,400		100%

D. List of General Equations

(1) Total Investment capacity = # of pre 1980 building * Average Square Feet * Cost of Retrofit per SF

E. Total Investment Capacity Model

The equation (1) used for the total investment capacity model is obtained from a study done by the Rockefeller Foundation (Rockefeller Foundation, 2012):

Total Investment capacity = # of pre 1980 building * Average Square Feet * Cost of Retrofit per SF

Assumptions:

- # of pre 1980 buildings is expressed in percentage (%), which is a variable depending on each state building portfolio. In our study, we used the assumptions made from the same study that provided the equation. (Table E.1)
- Average Square Feet is expressed in square feet (SF). Per building categories, we obtained the numbers from the assumption of the state model in Appendix Section C.
- Cost of Retrofits per SF is expressed in dollar per square feet ($/SF). This variable is also varied according to the state. We used the assumptions for the cost of retrofits per units were divided into two hypothetical categories: quick hit ($1.72/SF) and deep ($9/SF) retrofits (Lori Bamberger Consulting, 2009).

Table E.1 listed the assumptions used to calculate the total investment capacity. Table E.2 and E.3. showed the estimation in the total investment capacity for all building types. Table E.4 further examined the investment capacity between the different classes of office buildings, showing the highest potential for class A.

Table E.1. Assumptions Used for Each Building Type for Calculating the Total Investment Capacity

Potential Buildings	**Total Office**	**Hospital**	**Multi-Family**	**Industrial**	**Total**

# of Building	2,200	200	2,000	1,000	5,400
x share of pre 1980	60.00%	48.00%	56.00%	70.80%	
Total Square Feet	300,000,000	40,000,000	150,000,000	200,000,000	690,000,000
Potential Building	1,320	96	1,120	708	3,244
Potential Square Feet	180,000,000	19,200,000	84,000,000	141,600,000	424,800,000

Table E.2. Total Investment Capacity of Deep Retrofits

Deep Retrofit Potential	**Total Office**	**Hospital**	**Multi-Family**	**Industrial**	**Total**
Square Feet	180,000,000	19,200,000	84,000,000	141,600,000	424,800,000
Cost/ SF	$9	$9	$9	$9	$9
Total Cost	$1.6 billion	$172 million	$756 million	$1.3 billion	$3.8 billion
Cost/ unit	$1.2 million	$1.8 million	$675,000	$1.8 million	

Table E.3. Total Investment Investment of Quick Retrofits

Quick Retrofit Potential	**Total Office**	**Hospital**	**Multi-Family**	**Industrial**	**Total**
Square Feet	180,000,000	19,200,000	84,000,000	141,600,000	424,800,000
Cost/ SF	$1.72	$1.72	$1.72	$1.72	$1.72
Total Cost	$310 million	$33 million	$144 million	$243 million	$731 million
Cost/ unit	$234,545.45	$344,000.00	$129,000.00	$344,000.00	

Table E.4. Summary of the Total Investment Capacity for Different Types within Office Categories

Office type	**Type A**	**Type B**	**Type C**	**Total**
Square Feet	150,000,000	120,000,000	30,000,000	300,000,000
Pre-1980	55.00%	65.00%	65.00%	
Total Pre-1980 Office SF	82500000	78000000	19500000	180000000
Quick Retrofit	$1.72/SF	$1.72/SF	$1.72/SF	$1.72/SF
Deep Retrofit	$9/SF	$9/SF	$9/SF	$9/SF
Total potential Quick Retrofit	$141,900,000	$134,160,000	$33,540,000	$310 million
Total potential Deep Retrofit	$742,500,000	$702,000,000	$175,500,000	$1.6 billion

F. Staff Roles & Responsibilities

The state will provide budget for the salaries of the six staffs. In addition to the staff of six, the state program will work with the staff(s) from the local government to work on marketing strategies and application assistance. The staffs are tasked with leading components of the program while the program director will oversees the direction of the program's development and operations.

Figure F.1. List of Responsibilities for the Prospective Staffs of 6

G. Assumptions of Interest Rate

In order for the program to be sustainable, the money collected from the loan Interest rate has to at least break even with the money from paying for the Bond Interest Rate by the end of the payback period. The following table assumes a 15 years loan of $10,000 and a Municipal Bond of $10,000 that matures in 15 years.

Table G.1. The Breakeven Point between the Loan and Bond Interest Rate

Assumption based on $10,000, 15 years			
Loan Interest rate	5.51%	Bond Interest Rate	3.30%
Amount pay in 15 years	$14,953.77	Amount pay in 15 years	$14950